Robert Hooke's *Praxes:* Reading, Drawing, Building

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— VOLUME 1 —

Abstract

Robert Hooke (1635–1703), now mostly known for his scientific work as the first Curator of Experiments of the Royal Society, was also the architect of some of the most visible buildings in Restoration London. He was operating at a time when significant transformations were occurring in how natural philosophy, natural history, and architecture were being practiced.

Centred on Hooke's archives, this dissertation studies the affinities and cross-pollinations between his experimental and architectural works. Rather than focussing on their interactions as two distinct disciplines, it studies their shared *praxes* of reading, drawing, and building. In addition to bringing to the fore previously unnoticed archival evidence, it provides the first systematic study of the prints and manuscript drawings among Hooke's papers, as well as a documentary analysis of the projects he has been associated with.

Chapter I, on Hooke's biography, concentrates on his formative years and provides an alternative interpretation for his self-image as a 'mechanick'. Chapter II, on reading, studies Hooke's idea that the first step in obtaining knowledge is the perusal of books. It looks not only at the titles he had access to, but also his philosophical outlook on the utility of the written word, as well as his involvement in the failed project of translating Vitruvius. In Chapter III, Hooke's drawing practices are evaluated and contextualised; his early difficulties with figural and perspectival drawing, and concerns with accuracy are highlighted. This is followed by an extensive study of the prints and manuscript drawings (architectural, mathematical, natural philosophical, and figural) attributed to Hooke in twenty-one different repositories; a lengthy annotated list of these, supported by over 350 illustrations, is provided. The focus of Chapter IV is Hooke's building practices. After a discussion of the philosophical origins of utilising artifice in studying nature, it examines various exchanges between natural philosophy and architecture in Hooke's work, particularly his use of models and architectural analogies. Pointing to the difficulties with the secondary scholarship on Hooke's architectural work and the inherent problems with attribution during this period, it then provides an extensive documentary analysis of the architectural projects by or attributed to Hooke. Primary evidence from his diaries, drawings, archival and other sources are extracted, reproduced and utilised to assess the various degrees of his involvement, or lack thereof, in the 53 projects he has been associated with. Additionally, as an Appendix, some textual evidence of Hooke's architectural work, including correspondence, reports, and extracts from other manuscript sources, is provided.

Résumé

Robert Hooke (1635–1703), maintenant surtout connu pour son travail scientifique en tant que premier conservateur des expériences de la Royal Society, a également été l'architecte de certains des bâtiments les plus visibles de Londres. Il opérait durant une époque où d'importantes transformations se produisaient dans la pratique de la philosophie naturelle, de l'histoire naturelle et de l'architecture.

Centrée sur les archives de Hooke, cette thèse étudie les affinités et les pollinisations croisées des idées appuyant ses œuvres expérimentales et architecturales. Plutôt que de se concentrer sur leurs interactions en tant que deux disciplines distinctes, elle étudie leurs praxes partagées de lecture, de dessin et de construction. En plus d'avancer des preuves fondées sur divers matériels d'archives qui ont passé inaperçus jusqu'à présent, elle présente la première étude systématique des gravures et des manuscrits parmi les papiers de Hooke, ainsi qu'une analyse documentaire des projets auxquels il a été associé.

Le chapitre I, sur la biographie de Hooke, se concentre sur ses années formatrices et fournit une interprétation alternative pour son image de soi en tant que *mechanick*. Le chapitre II étudie l'idée de Hooke que selon laquelle la première étape dans l'acquisition de la connaissance est la lecture des livres. Il examine les titres auxquels il a eu accès, ainsi que son point de vue philosophique sur l'utilité de l'écrit et son implication dans le projet raté de traduction de Vitruve. Au chapitre III, les pratiques de dessin de Hooke sont évaluées et contextualisées; ses premières difficultés avec le dessin figuratif et perspectif, et son soucis pour la précision sont mis en évidence. Ceci est suivi d'une étude approfondie des gravures et des dessins tracés ou à main levée (architecturaux, mathématiques, philosophiques naturels et figuratifs) attribués à Hooke dans vingt et un recueils différents; une longue liste annotée de ceux-ci, soutenue par plus de 350 illustrations, est fournie. Le chapitre IV porte sur les pratiques de construction de Hooke. Après une discussion sur les origines philosophiques de l'utilisation de l'artifice dans l'étude de la nature, il examine divers échanges entre la philosophie naturelle et l'architecture dans le travail de Hooke, en particulier son utilisation de modèles et d'analogies architecturales. Soulignant les difficultés avec les discours contemporains sur le travail architectural de Hooke et les problèmes inhérents avec l'attribution des œuvres au cours de cette période, ce chapitre fournit ensuite une analyse documentaire approfondie des projets architecturaux par ou attribués à Hooke. Les preuves primaires de ses journaux, dessins, archives et autres sources sont extraites, reproduites et utilisées pour évaluer les divers degrés de son implication, ou sa non-implication, dans les 53 projets auxquels il a été associé. De plus, en annexe, des preuves textuelles du travail architectural de Hooke, y compris de la correspondance, des rapports et des extraits d'autres sources manuscrites, sont fournies.

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ii. 3. British Museum, London

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ii. 8. Cumbria Archive Centre, Carlisle

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ii. 11. [Oxford] All Souls College, Codrington Library, University of Oxford

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3. Hooke, rates allowed for masons' work for churches, 14 Oct. 1674.
4. Hooke, autograph survey of the Monument, 10 July 1679.
5. Hooke, 'Report of a survey of a wall . . . adjoining . . . Christ's Hospital', 16 Dec. 1680.
6. 'Mr Hooke's Certificate', 16 May 1682.

iii. Other

1. Selected extracts from his diaries on construction materials and techniques.
2. Royal Society meeting minutes, 1666-1669; selected extracts on brick-making.
3. Royal Society meeting minutes, 1686–1696; selected extracts.
4. John Aubrey, *Naturall historie of Wiltshire*, 1656–1691; extracts.
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Britain; Merima Hadzic at the Warwickshire County Record Office; Matthew Payne at Westminster Abbey Muniments; and Elizabeth Wells at Westminster School.

I would like to acknowledge that my research would not have been possible without the doctoral scholarship I received from Fonds de recherche du Québec – Société et culture, and further support from the Early Modern Conversions project and McGill School of Architecture.

Finally, I thank my parents who never pretended to understand their middle child but unconditionally supported her nonetheless, and my younger sister who patiently endured my many lengthy monologues on Robert Hooke.

in memory of my friend Helene Stub,

now navigating the powdery slopes of another realm

Abbreviations and Conventions Used

Abbreviations

attrib.	attributed to
b.	born
bap.	baptised
cent.	century
c.	*circa*
cf.	compare
d.	death
esp.	especially
fig.	figure
fl.	*floruit* or flourished
fol. / fols.	folio / folios
MS / MSS	manuscript / manuscripts
n.d.	no date
no. / nos.	number / numbers
n.p.	no place or no publisher
p. / pp.	page / pages
pl. / pls.	plate / plates
pub.	published
r	*recto* (e.g. fol. 17r)
sig.	signature mark
v	*verso* (e.g. fol. 17v)

Abbreviations of repository names

ASC	Codrington Library, All Souls College, University of Oxford
BL	British Library
BM	British Museum
Bodl.	Bodleian Library, University of Oxford
CCA	Canadian Centre for Architecture
C.R.O.	County Record Office (preceded by the name of the county)
CUL	Cambridge University Library
EEBO	*Early English Books Online*, eebo.chadwyck.com
EMLO	*Early Modern Letters Online*, emlo.bodleian.ox.ac.uk
ESTC	*English Short Title Catalogue*, estc.bl.uk
LMA	London Metropolitan Archives
RCP	Royal College of Physicians, London
RS	Royal Society of London; additional RS abbreviations are:
	Cl.P Classified papers
	EL Early letters
	JBO Journal book original
	LBO Letter book original
	MM Miscellaneous manuscripts
	RBO Record book original

Abbreviations of print and digital sources

Aubrey, *Brief Lives*	John Aubrey, *Brief Lives with An Apparatus for the Lives of our English Mathematical Writers*, ed. Kate Bennett, 2 vols. (New York: Oxford University Press, 2015).
Batten	M. I. Batten, 'The Architecture of Dr. Robert Hooke, F.R.S.', *The Walpole Society* 25 (1936-1937), pp. 83-113.

BH	*Bibliotheca Hookiana* (London, 1703).
Birch	Thomas Birch, *The history of the Royal Society of London for improving natural knowledge, from its first rise*, 4 vols. (London: Printed for A. Millar, 1756–1757).
Colvin, *BDBA* (1954)	Howard Colvin, *A Biographical Dictionary of British Architects, 1600-1840*, 1st ed. (London: John Murray (Publishers), 1954).
Colvin, *BDBA* (1978)	Howard Colvin, *A Biographical Dictionary of British Architects, 1600-1840*, 2nd ed. (New York: Facts on File, Inc., 1978).
Colvin, *BDBA* (1995)	Howard Colvin, *A Biographical Dictionary of British Architects, 1600-1840*, 3rd ed. (New Haven, CT: Yale University Press, 1995).
Colvin, *BDBA* (2008)	Howard Colvin, *A Biographical Dictionary of British Architects, 1600-1840*, 4th ed. (New Haven, CT: Yale University Press, 2008).
Diary i	Henry W. Robinson and Walter Adams, eds., *The Diary of Robert Hooke, M.A., M.D., F.R.S., 1672-1680, Transcribed from the Original in the Possession of the Corporation of the City of London (Guildhall Library)* (London: Taylor & Francis, 1935).
Diary ii	Robert Hooke, 'Diary, 1688-1693', in *Early Science in Oxford: The Life and Work of Robert Hooke (Part iv),* ed. Robert T. Gunther (Oxford: [Printed for the editor], 1935), pp. 69-265.
'Espinasse	Margaret 'Espinasse, *Robert Hooke* (Berkeley, CA: University of California Press, 1956).
Memoranda	Felicity Henderson, 'Unpublished Material from the Memorandum Book of Robert Hooke, Guildhall Library MS 1758', *Notes and Records of the Royal Society* 61 (May 2007), pp. 129-275.
NHLE	*National Heritage List for England*, historicengland.org.uk/listing/the-list.
ODNB	*Oxford Dictionary of National Biography*, www.oxforddnb.com.
OED	*Oxford English Dictionary Online*, www.oed.com.
RHBdb	*Robert Hooke's Books Database*, www.hookesbooks.com.

Robinson	H. W. Robinson, 'Robert Hooke as a Surveyor and Architect', *Notes and Records of the Royal Society of London* 6 (1948), pp. 48-55.
Waller	Richard Waller, 'The Life of Dr. Robert Hooke', in *The Posthumous Works of Dr. Robert Hooke*, ed. by Richard Waller (London, 1705), pp. i-xxviii.
Worsley	Giles Worsley, 'Taking Hooke Seriously', *Georgian Group Journal* 14 (2004), pp. 1-25.
Wren Society	Wren Society, 20 vols. (Oxford: Printed for the Wren Society at the University Press, 1923–1945).

Dates (calendar)

Until the Calendar Act of 1750, England followed the Julian calendar which was ten days behind the Gregorian one used on the continent, and considered 25 March (Lady Day) as the first day of the year. Contemporary accounts used formats such as 1673/4 or $167\frac{3}{4}$ for the period between 1 January and 24 March. All dates used in the dissertation take 1 January as the first day of the year, but are transcribed exactly when from a manuscript.

Dates (birth/death and publication)

Most of the birth and death dates for the individuals mentioned are sourced from Howard Colvin's *A Biographical Dictionary of British Architects* (various editions), *Complete Dictionary of Scientific Biography*, the *Oxford Dictionary of National Biography*, and *Early Modern Letters Online*.[1] When a primary published source is cited for the first time, publication place and date of the first edition are provided in-text, with the full bibliographical information in the footnote. As noted below, capitalisation in titles, unless for proper names, is avoided.

Images

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[1] Colvin, *BDBA* (2008); *Complete Dictionary of Scientific Biography*, 27 vols. (Detroit, MI: Charles Scribner's Sons, 2008); EMLO; *ODNB*.

institution. Images from seventeenth-century publications are sourced from digitised versions made available via archive.org unless otherwise specified.

Monetary units

Monetary units during the period were pound (Latin *librae*), shilling (Latin *solidi*), and penny (singular) or pence (plural) (Latin *denarius* or *denarii*), denoted with the symbols £ or *li*, *s*, and *d*. Prices were written in the format of £-s-d, thus 1-5-3 meant one pound, five shillings, and three pence. The relation between the units are such that there are twelve pennies in a shilling, and twenty shillings or two hundred and forty pennies in a pound. In terms of coinage, other units included guineas (about twenty-one shillings depending on the quality of the coin), marks (thirteen shillings and four pence), crowns (five shillings), halfpence, and farthings (quarter of a penny).[2]

Orthography and the use of [sic]

The reader should be cautioned that punctuation and spelling during the period were not yet standardized, making it possible to find multiple spellings of the same word on a single page. As it would have been unduly distracting, the use of '[sic]' was avoided throughout. The few exceptions to this are printing errors, such as when a word is repeated.

When quoting from contemporary publications, some modernisations were implemented to make the text more readable. Some early modern publications, continuing the Latin tradition, used the letters 'u' and 'v', and 'i' and 'j' interchangeably (e.g. 'vsed' instead of 'used', 'Iohn' instead of 'John', etc.). While for the book titles the original spellings were retained, when quoting from the texts, these were modernized to reflect current usage. Italics, unless specifically used for emphasis or book titles, were ignored.

Palaeographical conventions

All transcriptions from manuscript sources are by the author unless otherwise indicated. A semi-diplomatic transcription method, where contractions and abbreviations are silently expanded with the supplied letters italicized, was adopted to make the text more readable; e.g. using 'w*hi*ch' for w^{ch}, '*et*c.' for &c., and 'occasio*n*' for occasiõ. The use of 'y' in place of the Old English letter thorn (þ) has been

[2] A useful source on coinage and the cost of living during this period and beyond is Clive Emsley, Tim Hitchcock, and Robert Shoemaker, 'London History - Currency, Coinage and the Cost of Living', *Old Bailey Proceedings Online*, https://goo.gl/L5BpXt.

avoided and contractions such as y^e and y^t have been similarly expanded to *th*e and *tha*t. Use of majuscules in titles, unless for proper names, are ignored. In order to save space, the symbol '/' has been used to denote lineation. In cases where there are numerous deletions, e.g. in rough drafts, these are not indicated in the transcription to avoid undue distraction but an explanation is provided in the footnote. Also used were the following conventions:

[xxx]	for text provided by the transcriber,
[[xxx]]	for brackets used in the manuscript itself,
<xxx>	for text deleted in the manuscript,
{.....}	for letters lost (tear, blot, fade) or illegible,
⌜xxx⌝	for words inserted into the text.

When quoting transcriptions from secondary sources, their conventions are retained.

Translations

All translations are by the author unless otherwise stated.

URL's

In order to avoid lengthy URLs running several lines, 'Google URL Shortener' (goo.gl) has been utilised to generate truncated addresses. The reader can type in the short URL directly into their browser or use a URL expander to generate the original address.

All of the cited webpages were re-accessed on 10 February 2018 to ensure their functionality, obviating the need to add the date of access to each reference.

INTRODUCTION

SCENE opens, and discovers Sir Nicholas learning to swim upon a Table, Sir Formal and the Swimming-Master standing by.

Sir Formal — In earnest this is very fine: I doubt not, Sir, but in a short space of time, you will arrive at that curiosity in this watery Science, that not a Frog breathing will exceed you . . .

. . .

Sir Formal — Truly I opine it to be a most compendious method, that in a fortnights prosecution has advanced him to be the best Swim*m*er of Europe . . .

Longvil — Have you ever tri'd in the Water, Sir?

Sir Nicholas — No, Sir; but I swim most exquisitely on Land.

Bruce — Do you intend to practise in the Water, Sir?

Sir Nicholas — Never, Sir; I hate the Water, I never come upon the Water, Sir.

Longvil — Then there will be no use of Swim*m*ing.

Sir Nicholas — I content my self with the Speculative part of Swim*m*ing, I care not for the Practick. I seldom bring any thing to use, 'tis not my way. Knowledge is my ultimate end.[3]

On 2 June 1676, returning home after an excursion to the theatre, Robert Hooke (1635–1703) bitterly noted in his diary "Damned Doggs. *Vindica me Deus*. People almost pointed."[4] He had just seen a production of Thomas Shadwell's *The virtuoso* (pub. 1676), a satire on experimental philosophy, that parodied material published in the Royal Society's journal *Philosophical transactions*. And it was obvious to all that its protagonist, Sir Nicholas Grimcrack, was based on Hooke, the Society's first Curator of Experiments.

Gimcrack, lying on a table, following the instructions of an experienced swimming master, and imitating the motions of a frog, was attempting to gain an understanding of 'the speculative part

[3] Thomas Shadwell, *The virtuoso. A comedy, acted at the Duke's Theatre . . . Licensed, May 31. 1676. Roger L'Estrange* (London: Printed by T. N. for Henry Herringman . . . , 1676), pp. 25, 27.

[4] Robert Hooke, *The Diary of Robert Hooke, M.A., M.D., F.R.S., 1672–1680, Transcribed from the Original in the Possession of the Corporation of the City of London (Guildhall Library)* (London: Taylor & Francis, 1935) (hereafter *Diary i*, as noted in the list of abbreviations), p. 235.

of swimming' while dismissing any interest in its actual practice. Hooke must have been particularly frustrated with this depiction as he was indeed interested in the practical but, like many of his colleagues, did not quite have a satisfactory answer as to how speculative knowledge could be put to use. The new science had extended natural philosophy beyond the confines of the scholarly world of the university, so that knowledge could be searched "first in bookes, 2*n*dly in men, [and] 3*rd*ly in the things themselves."[5] But this expansion brought with it the risk of criticism especially from the public it sought to integrate itself into. Indeed, the virtuosi could read books, observe and learn from craftsmen, and experiment on materials all day, but to what end? They could never reach a craftsman's level of manual skill, or in Shadwellian terms, they could only "swim most exquisitely on Land." Even King Charles II would "mightily" laugh at his own Royal Society "for spending time only in weighing of ayre."[6] Practical uses of such knowledge were not readily obvious.

Hooke rose to international fame as a natural philosopher, 'a scientist' in today's terminology, with the publication of *Micrographia* (London, 1665), a folio-sized tome dedicated to microscopical observations.[7] Extensively illustrated, it offered glimpses into an otherwise invisible alien world. It was designed to amaze and its detailed illustrations, for instance of an armoured flea or the head of a drone fly (**Figures I-1 and 2**), appear spectacular even to our jaded modern eyes. Hooke, who had been the 'Curator of Experiments' to the Royal Society since 1662, was also appointed one of the Surveyors for the Rebuilding of the City shortly after the Great Fire of London in 1666, effectively launching what may be called—albeit anachronistically—his architectural career.

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[5] Robert Hooke, 'Proposals for the good of the Royal Society', n.d.; Royal Society (hereafter RS), Cl.P/20/50, fol. 92r.

[6] This was likely banter rather than any serious criticism, as shortly before his quip, the King had been giving William Petty (1623–1687) a hard time about the latter's boat design, leading Samuel Pepys to praise Petty for bearing "the unreasonable follies of the King's objections;" *Memoirs of Samuel Pepys, Esq. F.R.S. Secretary to the Admiralty in the Reigns of Charles II and James II. Comprising His Diary from 1659 to 1669, Deciphered by the Rev. John Smith, A.B. from the Original Short-hand MS. in the Pepysian Library, and a Selection from his Private Correspondence*, ed. Richard Lord Braybrooke, Second ed., 5 vols. (London: Henry Colburn, 1828), p. 146; E. S. de Beer, 'King Charles II, Fundator et Patronus (1630–1685)', *Notes and Records of the Royal Society of London* 15 (1960), pp. 39-45, at pp. 42-43.

[7] Robert Hooke, *Micrographia, or, some physiological descriptions of minute bodies made by magnifying glasses with observations and inquiries thereupon* (London: Printed by Jo. Martyn and Ja. Allestry . . . , 1665).

Introduction

i. Thesis questions

The Renaissance concept of the 'architect' had made a late entry to the British Isles and was still in its infancy when experimental philosophy began to develop. In unexpected ways, Vitruvian ideas about the education of the architect shared many similarities with the formation of this new type of natural philosopher who was to possess a mixture of theoretical knowledge and artisanal or practical skills.[8] Conversely, there was much room to bring theoretical knowledge into architecture, which was still being dominated by a medieval guild system with craftsmen learning their trade hands-on via apprenticeships. Indeed, the seventeenth century saw the rise of, what Hentie Louw has termed the 'scientist-architects', who were deftly able to traverse between these nascent fields.[9]

From an architectural point of view, the relationship between theory and practice during this period is often studied in terms of how theoretical knowledge was brought to craft. After all, John Dee (1527–1608), who wrote the first English text on architectural theory with his 'Mathematicall praeface' to Henry Billingley's translation of Euclid's *Elements*, distinguished between a craftsman and an architect, defining the latter as someone who possessed "the Demonstrative reason and cause, of the Mechaniciens worke."[10] An architect could have manual skill, but his job was to direct the works,

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[8] On continental exchanges between scholars and artisans, see Pamela O. Long, 'Artisans, Humanists, and the De architectura of Vitruvius', in *Artisan/Practitioners and the Rise of the New Sciences, 1400–1600* (Corvallis, OR: Oregon State University Press, 2011), pp. 62-93.

[9] Hentie Louw, 'The "Mechanick Artist" in Late Seventeenth-Century English and French Architecture: The Work of Robert Hooke, Christopher Wren and Claude Perrault Compared as Products of an Interactive Science/Architecture Relationship', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Cyril William Hunter (Aldershot: Ashgate, 2006), pp. 181-199. Other British examples of 'scientist-architects' include Wren, who was a founding member of the Royal Society, Professor of Astronomy at Gresham College and the University of Oxford, and an accomplished mathematician; and in a less professional capacity, Roger North (1651–1734); see Jim Bennett, *The Mathematical Science of Christopher Wren* (Cambridge Cambridgeshire ; New York: Cambridge University Press, 1982); Howard Colvin and John Newman, eds., *Of Building: Roger North's Writings on Architecture* (New York: Oxford University Press, 1981).

Among continental examples from this period, we may consider Guarino Guarini (1624–1683), Juan Caramuel y Lobkowitz (1606–1682), and Claude Perrault (1613–1688). The latter was greatly admired by Hooke for his edition of Vitruvius. Another name that can be added to the list in terms of landscape architecture is Gottfried Wilhelm Leibniz (1646–1716); see Horst Bredekamp, *Leibniz und die Revolution der Gartenkunst: Herrenhausen, Versailles und die Philosophie der Blätter* (Berlin: Verlag Klaus Wagenbach, 2006).

[10] John Dee, 'Mathematicall praeface', in *The elements of geometrie of the most auncient philosopher Evclide of Megara. Faithfully (now first) translated into the Englishe toung, by H. Billingsley, citizen of London* . . . (London: Imprinted . . . by Iohn Daye, 1570), sig. d.iij.

"For the hand of the Carpenter, is the Architectes Instrument."[11] Yet Dee still assumed that an architect would have had hands-on experience on construction sites, regardless of how architecture was categorised under 'mathematical practice'. This was the reason he would begin the section on architecture with a counterargument against those who would have objected to its inclusion among the mathematical arts. Their argument would have been that architecture involved the building of "a house, Pallace, Church, Forte, or such like, grosse workes;" a kind of materiality not encountered in other branches of 'Artes Mathematicall' which by definition "dealed with no Materiall or corruptible thing." Dee's justification was that architecture, like other mathematical arts, still derived from principles and demonstrative reason, but he did not take the opportunity to downplay its materiality. For him, while the architect was defined by his ability to ascribe meaning to a work's delineation, he would have gained this through a long process of training. "I thinke, that none can iustly account them selues Architectes, of the suddeyne," he noted; only those "who from their childes yeares, ascendyng by these degrees of knowledges, beyng fostered vp with the atteynyng of many Languages and Artes, haue wonne to the high Tabernacle of Architecture."[12]

It was this seemingly 'of the suddeyne' aspect of Hooke's appointment as a City Surveyor that inspired this dissertation research. In Britain at the time, 'surveyor' was a term used interchangeably with 'architect'. Having been educated and worked as an architect myself and encountering Hooke for the first time in the context of my studies in the history and philosophy of science, I found this appointment puzzling. How could someone lacking the specialist knowledge and training necessary could make this leap into architecture, however plausible it may seem on paper on account of architecture theoretically being a branch of mathematical practice.[13] The most basic yet obvious questions came to mind. How would Hooke learn to read architectural drawings? To design a building

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Resources on architectural writing in Britain during this period include Eileen Harris and Nicholas Savage, *British Architectural Books and Writers, 1556–1785* (New York, NY: Cambridge University Press, 1990); Caroline van Eck, *British Architectural Theory, 1540–1750: An Anthology of Texts* (Burlington, VT: Ashgate, 2003).

[11] Dee, 'Mathematicall praeface', sig. d.iiij. On Hooke's use of Dee's preface, see also Matthew C. Hunter, *Wicked Intelligence: Visual Art and the Science of Experiment in Restoration London* (Chicago: The University of Chicago Press, 2013), pp. 183-186.

[12] Dee, 'Mathematicall praeface', sig. d.iij. 'Artes' in this context connotes practical skills.

[13] On the relationship between mathematical practice and architecture, in addition to Dee's preface, see Jim Bennett, 'Architecture and Mathematical Practice in England, 1550–1650', in *English Architecture Public and Private: Essays for Kerry Downes*, ed. John Bold and Edward Chaney (Rio Grande, OH: Hambledon Press, 1993), pp. 23-29, Anthony Gerbino and Stephen Johnston, *Compass and Rule: Architecture as Mathematical Practice in England, 1500–1750* (New Haven, CT: Yale University Press, 2009).

from scratch? To devise a foundation system capable of supporting a structure on uneven soil? To calculate material quantities to verify a contractor's bill? To know enough about plumbing to estimate the linear length of lead needed? And why would he be interested in architecture in the first place? Could he have seen it as a repository of possible practical uses for the speculative knowledge he was exploring through his experiments? Or was there a more deep-seated relationship between natural philosophy and architecture that transcended the simple 'application of knowledge' model?

ii. Previous scholarship

Hooke's work as a surveyor, while enjoying increased attention in the past couple of decades, has been overshadowed by his experimental work. This is despite his involvement in the construction of some of the most visible structures of the time, including Montagu House (which later became the first building of the British Museum), Bethlem Hospital 'for the Lunatikes', the Royal College of Physicians, and the Monument to the Great Fire, the latter being the only one of these structures to still stand. This is partly due to the fact that most of Hooke's architectural works have since been demolished. That some of his works have been erroneously attributed to Christopher Wren (1632–1723) is another contributing factor. It also does not help that the architectural drawings extant among Hooke's papers appear underwhelming, especially when compared with the striking illustrations in *Micrographia*, making him not the most attractive candidate for study in the context of architectural history—which says more about how we have come to assess architecture than about Hooke himself. Complicating matters further, there are numerous problems with the secondary scholarship, which is full speculative attributions without any documentary basis. This has rendered an overall assessment of, or even a consideration of, Hooke's architectural work a precarious task for a scholar.

Hooke's architectural activities were evidently well-known to his contemporaries; all of the biographical notes dating to that period mention at least some of his projects.[14] However, it was the publication of his diaries for the 300th anniversary of his birth that brought the topic back into scholarship.[15] The following year, M. I. Batten published a lengthy article, listing all of the projects she had found mentioned in the diaries, supplementing these with correspondence and images. By this time, Wren Society publications had also begun to appear, making primary sources, such as correspondence, reports, and drawings, related to Wren's work widely available. Some of these also

[14] Aubrey, *Brief Lives*, p. 98; Waller, xxv.

[15] *Diary i*; Robert Hooke, 'Diary, 1688–1693', in *Early Science in Oxford: The Life and Work of Robert Hooke (Part iv)*, ed. Robert T. Gunther (Oxford: [Printed for the editor], 1935), pp. 69-265 (hereafter *Diary ii*).

recorded Hooke's architectural activities, albeit attributing most of the drawings extant among his papers to Wren. In the following couple of decades, H. W. Robinson (one of the editors of Hooke's earlier diaries) and Margaret 'Espinasse made further contributions on Hooke's work as a surveyor and architect, the latter adding several other attributions that had been missed by Batten. Thereafter, the only other major contribution to Hooke's list of architectural works, at least based on primary source material, came from Howard Colvin's *Biographical Dictionary of British Architects, 1600-1840*, which was published in four editions in 1954, 1978, 1995, and 2008.[16]

Most of the highly-speculative attributions can be traced to Giles Worsley's 2004 article 'Taking Hooke Seriously'. Worsley, while acknowledging the caveats to such attributions, noted that his intention was to use "the intensive study of primary documentation" from the previous half-century as a "solid body of information on which to ground careful speculation." He noted that his sources would include not only "stylistic analysis but . . . patterns of patronage, kinship and craftsmanship."[17] Worsley's article is problematic at numerous levels. To begin with, forming a "solid body of information" is difficult to achieve for this period; indeed, some of the drawings he based his speculations on have since been de-attributed. Establishing patterns of patronage and kinship is an equally perilous task that requires utmost attention to dates and biographical details. There are also inherent issues with the nature of attribution, such as what exactly is meant when a building is deemed to be have been authored by a specific architect, but these are equally valid for many of the non-speculative attributions.

Worsley's point that Hooke must have continued his architectural activities during the lacunae in the dairies is valid, but in the absence of additional evidence, speculating on what these may have been is futile. Perhaps this is the reason why, during the past few decades, scholarship on Hooke's architectural work has shifted towards analyses of specific projects and practices. Michael Cooper, for instance, has conducted a thorough study of Hooke's surveyorship for the City of London, producing

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[16] In the order they are mentioned: M. I. Batten, 'The Architecture of Dr. Robert Hooke, F.R.S.', *The Walpole Society* 25 (1936–1937), pp. 83-113; Wren Society, 20 vols. (Oxford: Printed for the Wren Society at the University Press, 1923–1945); H. W. Robinson, 'Robert Hooke as a Surveyor and Architect', *Notes and Records of the Royal Society of London* 6 (1948), pp. 48-55; Margaret 'Espinasse, *Robert Hooke* (Berkeley, CA: University of California Press, 1956), pp. 83-105; Howard Colvin, *A Biographical Dictionary of British Architects, 1600–1840*, 1st ed. (London: John Murray (Publishers), 1954); 2nd ed. (New York: Facts on File, Inc., 1978); 3rd ed. (New Haven, CT: Yale University Press, 1995); 4th ed. (New Haven, CT: Yale University Press, 2008). Hereafter, most of these sources will be cited in their abbreviated form as noted in the 'Abbreviations of print and digital sources' above.

[17] Giles Worsley, 'Taking Hooke Seriously', *Georgian Group Journal* 14 (2004), pp. 1-25, p. 3.

several lengthy articles and a monograph on the subject.[18] Christine Stevenson has produced several articles and chapters on Hooke's Bethlem Hospital, as well as on his work on the Monument to the Great Fire. The latter has also been a subject of study for Lisa Jardine and John E. Moore. Alison Stoesser has written on Montagu House and the stylistic influence of Dutch architecture on Hooke's work in general, and Hentie Louw has discussed Hooke's use of the newly-invented sash window as well as his work on Ramsbury Manor.[19] Due to Hooke and Wren's collaborations, scholarship on Wren by Jim Bennett, Kerry Downes, Anthony Geraghty, Lydia Soo, and others has also included

[18] See his 'Robert Hooke's Work as Surveyor for the City of London in the Aftermath of the Great Fire. Part One: Robert Hooke's First Surveys for the City of London', *Notes and Records of the Royal Society of London* 51 (1997), pp. 161-174; 'Robert Hooke's Work as Surveyor for the City of London in the Aftermath of the Great Fire. Part Two: Certification of Areas of Ground Taken Away for Streets and Other New Works', *Notes and Records of the Royal Society of London* 52 (1998), pp. 25-38; 'Robert Hooke's Work as Surveyor for the City-of-London in the Aftermath of the Great Fire. Part Three: Settlement of Disputes and Complaints Arising from Rebuilding', *Notes and Records of the Royal Society of London* 52 (1998), pp. 205-220; *Robert Hooke and the Rebuilding of London* (Phoenix Mill, UK: Sutton Publishing, 2005).

Although somewhat outdated, other sources on Hooke's work for the City include Sydney Perks, 'The Scheme for a Thames Embankment after the Great Fire of London', *Journal of the Royal Institute of British Architects* 31 (1924), pp. 445-461; T. F. Reddaway, *The Rebuilding of London After the Great Fire* (London: Jonathan Cape, 1940). Further resources are noted in Chapter IV.

[19] In the order they are cited: Christine Stevenson, 'The Architecture of Bethlem at Moorfields', in *The History of Bethlem*, ed. Jonathan Andrews, et al. (New York: Routledge, 1997), pp. 230-259, 'Robert Hooke's Bethlem', *Journal of the Society of Architectural Historians* 55 (1996), pp. 254-275, 'Robert Hooke, Monuments and Memory', *Art History* 28 (2005), pp. 43-73; Lisa Jardine, 'Monuments and Microscopes: Scientific Thinking on a Grand Scale in the Early RoyalSociety', *Notes and Records of the Royal Society of London* 55 (2001), pp. 289-308; John E. Moore, 'The Monument, or, Christopher Wren's Roman Accent', *The Art Bulletin* 80 (1998), pp. 498-533; Alison Stoesser, 'Robert Hooke's Montagu House: London Architecture with Continental Flair', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 165-179, Alison Stoesser-Johnston, 'Robert Hooke and Holland: Dutch Influence on His Architecture', *Bulletin Koninklijke Nederlandse Oudheidkundige Bond* 99 (2000), pp. 121-137; Hentie Louw, 'The Origin of the Sash-Window', *Architectural History* 26 (1983), pp. 49-72, 144-150, 'New Light on Ramsbury Manor', *Architectural History* 30 (1987), pp. 45-49. Further secondary studies and sources are cited in the relevant sections in Chapter IV.

some limited research on Hooke.[20] Somewhat controversially, Paul Jeffery, in his monograph on Wren's City Churches, even attributed some of the church designs to Hooke.[21]

The most recent concentrated study of Hooke's architectural work has been the 2009 dissertation '*Architectus Ingenio*: Robert Hooke, the Early Royal Society, and the Practice of Architecture' by art historian Matthew Walker. Employing a social constructivist approach, and with the aim of providing "a new reading of the interrelationship between architecture and institutionalised science," Walker has contextualised Hooke's work by studying theoretical texts on architecture from this period and found him to be 'a paradigmatic architectural agent' as defined in the writings of the Royal Society fellow John Evelyn (1620–1706). Focussing on several projects that can be verifiably attributed to Hooke, Walker then provided case studies of some of his domestic projects, his design for the College of Physicians, and his collaboration (or limitations thereto) with Wren on the Monument to the Great Fire.[22] While the subject matter may appear close to this dissertation's, the methodological approaches employed here are markedly different and actually cover different areas of this rich subject.

While there is much to criticise in some aspects of social constructivist approaches to the history of science, one of its more important contributions to historiography has been the interest it has inspired in the rhetorical value of graphical representation in early science. As a result, Hooke's *Micrographia*, which was a pioneering work in the Royal Society's visual program, and Hooke's techniques of illustration in general, have garnered much attention during the past few decades.[23] Most recently, art historian Matthew C. Hunter has written a creative monograph on the subject, *Wicked Intelligence: Visual Art and the Science of Experiment in Restoration London*. Mostly centred on Hooke's visual

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[20] Bennett, *The Mathematical Science of Christopher Wren*; Kerry Downes, *Christopher Wren* (London: Allen Lane The Penguin Press, 1971); Anthony Geraghty, *The Architectural Drawings of Sir Christopher Wren at All Souls College, Oxford: A Complete Catalogue* (Burlington, VT: Lund Humphries, 2007); Lydia M. Soo, *Wren's "Tracts" on Architecture and Other Writings* (New York: Cambridge University Press, 1998); Paul Jeffery, *The City Churches of Sir Christopher Wren* (London: Continuum International Publishing Group, 1996).

[21] Jeffery, *City Churches of Wren*; Anthony Geraghty, 'Review of The City Churches of Christopher Wren. By Paul Jeffery', *The Burlington Magazine* 139 (1997), pp. 336-337.

[22] Matthew Walker, 'Architectus Ingenio: Robert Hooke, the Early Royal Society, and the Practices of Architecture' (unpub. diss., University of York, 2009). See also Matthew Walker, 'Architecture, Anatomy and the New Science in Early Modern London: Robert Hooke's College of Physicians', *Journal of the Society of Architectural Historians* 72 (2013), pp. 475-502, 'The Limits of Collaboration: Robert Hooke, Christopher Wren and the Designing of the Monument to the Great Fire of London', *Notes and Records of the Royal Society* 65 (2011), pp. 121-143.

[23] See the annotations for Figures III-140 to 150. cf. for references to the relevant scholarship.

work, but in relation to that of other Royal Society fellows and the general context of Restoration London, the task Hunter set up for himself was one of "Diving deep into the visual archive of experimental-philosophical practice . . . [to offer] an unprecedented exploration of the stunning cognitive techniques and stylized strategies through which London's experimentalists pursued knowledge."[24] Although his highly ornate style of writing sometimes renders his arguments opaque, Hunter's book is full of insights into previously-unstudied material, and this dissertation builds on some of these. However, it also diverges greatly in certain respects. Hunter is not concerned with Hooke's actual architectural work—he even largely skips over it in his last chapter which is dedicated to architecture—and does not seem to consider his architectural or mathematical drawings as part of his visual work. Furthermore, previous assumptions such as Hooke's apprenticeship with the painter Peter Lely (1618–1680) or his authorship of some early insect sketches (**Figures III-141 and 142**), both of which are used by Hunter in his discussions, are contested here. Thus, while some of the same manuscript material is studied in this dissertation, the aims and some of the reached conclusions are different.

iii. Methodology

Scholarship of the recent decades has rendered commonplace any argument for an interdisciplinary approach for studying the seventeenth century. After all, divisions between the disciplines did not yet exist, or indeed as some have argued, they were being delineated during this very period, with human knowledge and artifice, and divine influence being eventually assigned separate domains. During the Early Modern period, a debate about mathematics or experimental philosophy could be silently referencing theological positions, or a discussion about human artifice could be as much about epistemology as economics. This makes it challenging to only utilise simple models of historical contextualisation which assume the existence of already separate and independent domains of influence (politics, society, religion, etc.) acting upon the phenomenon under study.[25] Yet if any justification is needed for adopting an interdisciplinary approach in relation to Hooke's work, it will perhaps suffice to simply consider the multiple official and institutional positions he held, often simultaneously, throughout his life: the first Curator of Experiments of the Royal Society, Cutlerian

[24] Hunter, *Wicked Intelligence*, p. 7.

[25] Steven Shapin and Simon Schaffer, *Leviathan and the Air-pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press, 1985); Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), pp. 13-35.

Lecturer on the History of Nature and Art, Gresham Professor of Geometry, and Surveyor for the City of London.

Another challenge, particularly relevant in studying someone like Hooke, is the fact that how natural philosophy, natural history, and architecture were being practiced underwent significant transformations during this period. Any working definitions of 'scientist' or 'scholar' or 'architect' or 'artist' are bound to be anachronistic and can only reflect our current conceptions. Even a term such as 'gentleman-architect', which attempts to adapt to the period, assumes 'gentleman' to be a fixed social category during what was a particularly turbulent time that experienced civil war, regicide, restoration of the monarchy, and a 'Glorious Revolution', all within a fifty-year period, resulting in dizzying rates of social mobility—up or down.

It is for these reasons that this dissertation is organised around *praxes*, an in-between word originating from both Greek and Latin etyma denoting 'direct practical experience', 'habitual or customary mode of action, method, or technique', and 'exercise of a profession or occupation'.[26] Rather than concentrating on published texts with their well-rehearsed claims, such as on the identity of the architect, or a litany of particular instances in which natural philosophers engaged with architecture, or even a monolithic study of 'Architecture' as a field in the period, this dissertation takes as its focus primary evidence of various *practices*. Admittedly, part of this is by necessity since, Hooke did not leave any published tracts on architecture or even well-organised archive. But his diaries, correspondence, drawings, and other manuscripts provide an exceptionally unique perspective into architectural practice at the time, allowing us to ask how one could attain architectural knowledge and skills. Beyond a narrow view into the work of a single 'minor' architect, these archival sources also highlight the necessarily-collaborative nature of architecture, while exposing the inherent problems with the concepts of authorship and attribution. They also reveal a complex of cross-pollinations between natural philosophy and architecture during this period, not obvious from published texts alone.

This holistic view of mostly manuscript material allows for an alternative way of studying this period. Drawing on my background as an architect and further specialisations in architectural history, history of science, and history of the book, I examine material from thirty different repositories and

[26] In addition to these etymological meanings, according to *OED*, the primary definition of 'praxis, n.' is "Action or practice; spec. the practice or exercise of a technical subject or art, as distinct from the theory of it; (also) accepted or habitual practice or custom."

libraries to see how practices of reading, drawing, and building equally benefited multiple disciplines and facilitated exchanges between them. Thus the focus is less on the interactions between 'science' and 'architecture' as distinct fields, and more on how a practice of extracting natural philosophical knowledge from the 'perusal of books' set forth a similar practice of mining architectural knowledge from all kinds of texts, how an ability to draw created a bridge between different modes of mathematical practice, and how 'building' was not a domain exclusive to architecture.

iv. Contributions to scholarship

Due to the fragmentary nature of the documentary evidence, secondary scholarship on Hooke's architectural work has been piecemeal or, as noted, full of spurious attributions. Overall approaches to this work mostly date to the first half of the last century and are by now outdated. And despite recent studies of some of his visual work and the architectural projects he undertook, no new attempt has been made at a thorough and systematic approach to Hooke's output. In that regard, this dissertation makes two major contributions to scholarship: an annotated list of Hooke's drawings, and a catalogue of building projects attributed to him, both provided in Volume 2.

In the second section of Chapter III on Hooke's drawing practices, an annotated list is provided of prints and drawings among his archives. 120 pages long and supported by over 350 images reproduced separately in Volume 3, it examines architectural, mathematical, natural philosophical, and figural drawings among the papers attributed to Hooke in 21 separate repositories. Included in the list are several discoveries, such as a sketch on the verso of a certificate he had prepared for the City of London, a small architectural elevation among his notes on velocity and motion, a drawing of magnetic fields related to an experiment he conducted with a terrella, and the sketches he sent to Robert Southwell (1635–1702) of a water engine.[27] All of the prints,[28] as well as the sources of most of the manuscript copies of prints[29] are identified, while attributions to Hooke of some early insect sketches, and the plan fragments of Ragley Hall extant at the RIBA are rejected.[30] While this list does not claim to be exhaustive, it is nonetheless a useful tool. The overall view it allows already helps us identify

[27] E.g. Figures III-157, 172, 181, 315 and 316. Figure III-193 is an anonymous copy of a sketch, the original of which may have been in Hooke's hand.

[28] E.g. Figures III-13, 65, 81, 82, 88, 99, 113, 117, 131, and 347 to 349.

[29] E.g. Figures III-10, 83, 86, 107, 109, 115, 122, 284, 304, and 306.

[30] Figures III-141, 142, 234, and 235.

Introduction

Hooke's previously-unnoticed difficulties with perspectival and figural drawings,[31] illustrate how he honed his skills,[32] and even how he copied parts of a master's drawing among his papers at the British Library to generate sections of a figural drawing now extant at Tate Britain.[33]

The second major contribution is the catalogue of building projects attributed to Hooke. Expanding on previous work by Batten, 'Espinasse, and Colvin, taking into consideration additional sources and scholarship, and making a few new attributions, the second section of Chapter IV includes a 'documentary analysis of architectural projects by or attributed to Hooke'. Primary evidence from Hooke's diaries, drawings, archival and other sources are extracted, reproduced and utilised to assess the various degrees of his involvement in 53 projects. Noting the absence of any corroborating evidence, some of the attributions are marked 'speculative'. Although it is lengthy at over 250 pages and is supported by further material (approximately 300 images and almost 50 pages of transcriptions of primary evidence), the documentary analysis is limited in its scope, and is meant to facilitate further research and discoveries into Hooke's architectural work.

Through a careful examination of archival sources, this dissertation makes further contributions to scholarship. By identifying Hooke's coat of arms and highlighting the influence of his formation at Westminster School, it brings nuance to the relatively-recent views of Hooke as a socially inferior 'philosophical servant', offering an alternative interpretation to his image as a 'mechanick'. Considering his earlier difficulties with figural and perspectival drawings, and by bringing to the fore his autodidactic skills with his use of his library, Hooke's alleged apprenticeship as a painter is called into question. The discovery of two previously-unnoticed letters from his publishers regarding the hiring of engravers for *Micrographia*, and of new epistolary evidence of his involvement in the translation project of Vitruvius's book on architecture, are some of the additional contributions.

v. User's guide

This dissertation is distributed over three volumes to facilitate easier, side-by-side reading: the text is divided into Volumes 1 and 2, and the illustrations are provided in Volume 3.

Volume 1 contains the main body of the dissertation, composed of the introduction, four chapters, and the conclusion, as well as the list of figures and the bibliography. The three core chapters

[31] E.g. Figures III-23, 56, 73, and 291.
[32] E.g. Figures III-35, 41, and 73.
[33] Figures III-65 and 333. a.

on Hooke's *praxes*—II on reading, III on drawing, and IV on building—are each divided into two sections, 'i' and 'ii'. The first sections place these practices in Hooke's philosophical outlook; they are where the central argument of the dissertation is expounded. The second sections, provided in Volume 2, contain the annotated catalogues of pertinent material on which the individual chapters and the dissertation are built on: the lists of books compiled from several primary sources, the annotated list of the drawings and prints in Hooke's archives, and an extensive catalogue of the construction projects attributed to him with detailed evaluations of the evidence. Considering the methodological approach taken, the two sections are integral, therefore the catalogues of pertinent material in the second volume should not be seen as merely supplementary. What *is* supplementary, however, is the appendix, also included in Volume 2: it is composed of transcriptions of some of the available textual evidence of Hooke's architectural work, such as correspondence, reports, extracts from his diaries, Royal Society meeting minutes, and other works.

All of the illustrations, of which there are close to six hundred and fifty, are provided in Volume 3. For easier identification, they are numbered to reflect the chapters they belong to (e.g. Figure I-1, Figure II-5, Figure III-10, Figure IV-100, etc.).

vi. Summary of the chapters

Six years before his death, Hooke began to write his life story. Left unfinished, his recollections did not go beyond his childhood years but are nonetheless illuminating as a record of how fundamental his self-image as a 'mechanick' was. Chapter I contextualises Hooke's life within this mechanical narrative. In the first part, a brief biography is provided with an emphasis on Hooke's formative years. While his alleged apprenticeship with painter Peter Lely, is rejected, his time under the tutelage of Richard Busby at Westminster School is highlighted. A synopsis of his published works, which did not include any architectural texts, as well as a discussion of the locations and content of his extant papers are also provided. The second part of the chapter, 'Life mechanick', returns to Hooke's self-identification as a mechanical genius. It interprets the reasons why he would invest in such an image, and how, due to various reasons well beyond his control, it would not pay off and instead give rise to the current misinterpretations of his social status.

In his 'Proposals for the good of the Royal Society', Hooke suggested that natural knowledge could be "soonest, easiest and most certainly attained" by "the perusall of Bookes, the consulting of men & the Examination and tryall of things." Chapter II focuses on Hooke's first step, the "persuall

of Bookes," for obtaining knowledge, practical or theoretical. It looks not only at the books he owned, but also his philosophical outlook on the utility of the written word. When Hooke died intestate, his library of about 2,700 titles was sold at auction. The catalogue, *Bibliotheca Hookiana* (London, 1703), has been an invaluable source on his book-collecting practices, especially in the context of the Royal Society whose motto was 'Nullius in verba'. The first part of this chapter, 'i. Hooke's books', focusing especially on the architectural titles, contextualises Hooke's library in its milieu. But going beyond *Bibliotheca Hookiana*, it also utilises other manuscript and print sources to study Hooke's access to books at Westminster School, and later to the collections of the Royal Society and the Arundels. The sections titled 'Practice' and 'Theory' explore how Hooke used his books both for practical purposes and to extract architectural theory from non-architectural titles. It ends with a section on Hooke's involvement in a failed project to publish an English edition of Vitruvius's treatise on architecture. The second part of the chapter, titled 'ii. Book lists' (in Volume 2), is composed of three lists extracted from various primary sources, with a concentration on the architectural titles he had access to.

In Chapter III, Hooke's drawing practices are evaluated and contextualised before a lengthy annotated list of his drawings is provided. The first section, 'i. Hooke's drawings', gives an archival overview followed by an evaluation of what can be learnt from these drawings in terms of how Hooke gained and honed his skills, and how he came to view drawing as a tool in his natural philosophical work while also realising its profound limitations. The last part of this first section notes how drawing skills gained importance in the mechanical arts, creating a common ground that allowed switching between disparate specialties, and likely facilitated Hooke's appointment as a Surveyor for the Rebuilding of London. It ends with a short synopsis of Hooke's architectural drawings. In the second section, 'ii. Annotated list of prints and manuscript drawings among Hooke's papers or that have been attributed to him' (in Volume 2), as the title suggests, a list of prints and drawings among Hooke's papers (or attributed to him) in twenty-one different repositories is provided.[34] Most of the prints, presumably collected by Hooke himself, as well as the possible sources of some of the drawings, are identified—additional images suffixed with 'cf' (e.g. Figure III-2. cf) are provided to illustrate the

[34] The qualification 'or attributed to him' is added as there have been drawings formerly thought to have been in Hooke's hand that were subsequently de-attributed, but not before they were cited in secondary sources as his.

connections. To this list, notes are added, sometimes spanning several pages, connecting and contextualising the drawings.

The focus of Chapter IV is Hooke's building practices. While these are widely construed to include his experimental philosophy, the main concentration is Hooke's relatively less studied architectural work. The first section, 'i. Hooke's buildings', begins with a point of contact between experimental philosophy and architecture: the use of models. After a discussion of the philosophical origins of utilising artifice in studying nature, and the traditional use of models for representational purposes in architecture, it examines the various cross-fertilisations between natural philosophy and architecture in Hooke's work. It also highlights the difficulties with the secondary scholarship and the inherent problems with attribution, particularly during this period. The second section 'ii. Documentary analysis of architectural projects by or attributed to Hooke" (in Volume 2) assesses 53 projects of various sizes and scopes that Hooke has been associated with. Rather than a regular catalogue of works with detailed descriptions of the projects, its objective is limited to assessing the primary evidence as well as the secondary scholarship for the attributions.

CHAPTER I – LIFE MECHANICK

i. Robert Hooke (1635–1703), a brief biography

On 10 April 1697, in a small pocket-diary now lost, Hooke wrote

> *I began this Day to write the History of my own Life, wherein I will comprize as many remarkable Passages, as I can now remember or collect out of such Memorials as I have kept in Writing, or are in the Registers of the Royal Society; together with all my Inventions, Experiments, Discoveries, Discourses, &c. which I have made, the time when, the manner how, and means by which, with the success and effect of them, together with the state of my Health, my Employments and Studies, my good or bad Fortune, my Friends and Enemies, &c. all which shall be the truth of Matter of Fact, so far as I can be inform'd by my own Memorials or my own Memory, which Rule I resolve not to transgress.*[35]

Unfortunately, like numerous other projects of his, Hooke did not complete this 'History', prompting his friend and editor of his *Posthumous works*, Richard Waller (*c.* 1660–1715), to lament "it affords but little satisfaction, being only concerning his Childhood."[36] Nonetheless Waller was able to combine these memorials with other material from Hooke's papers and the Journals of the Royal Society to compile 'The life of Dr. Robert Hooke', which has recently been described as "the first biography to embrace the subject's natural-philosophical work as the centre of his life."[37] Another contemporary source we have on Hooke's life is his close friend John Aubrey (1626–1697) who wrote a collection of brief biographical entries on his contemporaries. These were put to good use by the Oxford antiquary Anthony Wood (1632–1695). While Aubrey's *Brief lives* remained in manuscript until the nineteenth century, his notes on Hooke's life made their way into the expanded second edition of

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[35] Quoted in Richard Waller, 'The Life of Dr. Robert Hooke', in *The posthumous works of Robert Hooke, M.D. S.R.S., geom. prof. Gresh. &c., containing his Cutlerian lectures, and other discourses*, ed. Richard Waller (London: Printed by Sam. Smith and Benj. Walford . . . , 1705), pp. i-xxviii (hereafter, and as noted in the 'List of abbreviations', Waller), at p. i.

[36] Waller, p. ii.

[37] Noah Moxham, 'An Experimental 'Life' for an Experimental Life: Richard Waller's Biography of Robert Hooke (1705)', *British Journal for the History of Science* 49 (2016), pp. 27-51. Waller had inherited Hooke's papers; see the section below on the descent of Hooke's papers.

Wood's *Athenae Oxonienses* (London, 1721; first published in two volumes in 1691 and 1692).[38] While fragmentary and incomplete, Hooke's own memorials and his friends' biographical notes are extremely useful in interpreting how he presented himself and how this was received by his contemporaries.

Most recent biographies of Hooke were published to coincide with the three-hundredth anniversary of his death.[39] Prior to these, important book-length studies of his life and works were published by R. T. Gunther and Margaret 'Espinasse, with other articles appearing on various aspects of his works after the publication of his diaries in 1935.[40] The following notes on Hooke's life, concentrating on his formative years, are based on the two recent biographies as well as contemporary accounts and primary sources.

i. 1. Early years

Robert Hooke was born in 1635 in Freshwater at the western end of the Isle of Wight, just off the southern coast of England. He spent the first thirteen years of his life in this coastal village renowned

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[38] Aubrey's manuscript was first published as Andrew Clark, ed., *'Brief Lives', Chiefly of Contemporaries, Set Down by John Aubrey, Between the Years 1669 & 1696, Edited from the Author's MSS*, 2 vols. (Oxford: Clarendon Press, 1898). The most recent scholarly edition is Kate Bennett, ed., *John Aubrey, Brief Lives with An Apparatus for the Lives of our English Mathematical Writers*, 2 vols. (New York: Oxford University Press, 2015) (hereafter Aubrey, *Brief Lives*).

The biographical note on Hooke was published in Anthony Wood, *Athenae Oxonienses. An exact history of all the writers and bishops who have had their education in the most antient and famous University of Oxford, from the fifteenth year of King Henry the seventh, A. D. 1500, to the author's death in November 1695* (London: Printed for R. Knaplock, D. Midwinter, and J. Tonson, 1721), pp. 1039-1041. Wood's (and by extension Aubrey's) and Waller's texts provided the basis for the entry on Hooke in John Ward, *The lives of the professors of Gresham College* (London: Printed . . . for the author, 1740), pp. 169-193.

[39] Stephen Inwood, *The Man Who Knew Too Much: The Strange and Inventive Life of Robert Hooke, 1635–1703* (London: Pan Macmillan, 2003); Lisa Jardine, *The Curious Life of Robert Hooke: The Man Who Measured London* (London: Harper Collins Publishers, 2003).

[40] 'Espinasse; R. T. Gunther's two volumes on Hooke's life and work, arranged chronologically covering the 1655–1702 period and compiled from printed and manuscript sources are *Early Science in Oxford, Vol. VI: The Life and Work of Robert Hooke (Part I)* (Oxford: [Printed for the editor], 1930); *Early Science in Oxford, Vol. VII: The Life and Work of Robert Hooke (Part II)* (Oxford: [Printed for the editor], 1930).

As already noted, Hooke's two extant diaries were published in 1935 and are cited here as *Diary i* and *Diary ii*. Omissions from the first diary have been more recently published in Felicity Henderson, 'Unpublished Material from the Memorandum Book of Robert Hooke, Guildhall Library MS 1758', *Notes and Records of the Royal Society* 61 (2007), pp. 129-175 (hereafter *Memoranda*).

for its geological formations and rich fossils, which Hooke would later refer to in his writings.[41] He was the youngest of four children born to John Hooke (*d.* 1648) and Cecily Gyles. His mother was a local from the Isle of Wight but his father was from the family "of Hooke in Hampshire," as Aubrey noted, "a very ancient Family, and ⌜in⌝ that place, for many ⌜3 or more⌝ hundred yeares."[42] According to the Church of England records, John was educated at the University of Oxford receiving his BA from Hart Hall sometime before 1610 when he was ordained and appointed to the church of St. Helen on the Isle of Wight.[43] He later joined the household of Sir John Oglander (1585–1655) as a tutor to the latter's son, and later, though before Hooke's birth, was appointed curate of All Saints' parish church.[44]

Hooke was a sickly child, "very infirm and weakly," so his parents had little expectation of his survival.[45] He was homeschooled by his father, whose hopes of his youngest joining the Ministry dimmed as Hooke's chronic headaches hindered his learning. Himself suffering from the infirmities of illness and old age, Rev. John "laid aside all Thoughts of breeding him a Scholar" and began

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[41] On the influence of these early observations on Hooke's work, see Helen Tan Drake, *Restless Genius: Robert Hooke and His Earthly Thoughts* (New York: Oxford University Press, 1996), pp. 60-68; Jardine, *Curious Life of Hooke*, pp. 26-42.

[42] As transcribed by Bennett in Aubrey, *Brief Lives*, vol. 1, p. 96.

[43] John Hooke's BA from Hart Hall at the University of Oxford is noted in his 1610 ordination record; see *John Hooke (CCEd Person ID 13381)*, https://goo.gl/ZegeRt.

Rev. John is not listed in Andrew Clark, ed., *Register of the University of Oxford*, vol. II (1571-1622), part II, Matriculations and Subscriptions (Oxford: Printed for the Oxford Historical Society at the Clarendon Press, 1887), nor in Joseph Foster, ed., *Alumni Oxonienses: The Members of the University of Oxford, 1500–1714*, vol. II (Oxford: James Parker & Co., 1891). Kirsty Taylor, Hertford College librarian, has indicated that matriculation records from Hart Hall (now Hertford College) are not extant from this period, and that even if they had survived, John Hooke may still not have been listed since not everyone who entered a hall matriculated; Kirsty Taylor, email to the author, 9 July 2012. This is unfortunate since matriculation records included the name of the student's father and the county they were from—essential information that would have made it possible to locate Hooke's exact lineage.

Paul Breeze, who has located the same ordination record in 'the Index to Clergy held in the Oxfordshire record office', connects it instead to a John Hooke from Warwickshire with a 1606 BA from New College; 'The Ancestry of Robert Hooke: John Hooke of Wroxhall', *Notes and Records of the Royal Society* 57 (2003), pp. 269-271.

[44] 'Oglander, Sir John (1585–1655)', *ODNB*. On Rev. John joining Sir Oglander's household, see Jardine, *Curious Life of Hooke*, p. 23.

[45] Without denying the grim reality of high rates of child mortality at the time, it is interesting to note that Aubrey and Wren were also described as 'sickly' in their childhood. As Kerry Downes has remarked, Wren was "the kind of sickly child who survives into robust old age"—he died at the age of ninety; 'Wren, Sir Christopher (1632–1723)', *ODNB*.

neglecting his education. Hooke, now left to his own devices, discovered his own talents in handling tools and making small mechanical toys "so that there was nothing he saw done by any Mechanick . . . [that he did not endeavour] to imitate, and in some particulars could exceed (which are his own words)" Waller judiciously noted, mindful of his friend's occasionally boastful style. Hooke recalled showing special aptitude in horology (making a functional wood copy of a brass clock), model-making (building a yard-long ship fitted with ropes, pulleys, and masts, with a contrivance to fire off small guns), and drawing. His abilities in copying prints with a pen without any prior instruction reportedly impressed John Hoskins (b. *c.* 1617) who was in Freshwater at the time.[46] Waller connected these early aptitudes to Hooke's later work:

> These Indications of a Mechanick Genius appeared in him when very young . . . This early Propensity of his to Mechanicks was a sign of his future Excellency in such Contrivances, and admirable Facility he afterwards manifested in applying Mechanical Principles to the explication of the most difficult *Phænomena* of Nature.[47]

Recognizing his talent in mechanics and drawing, Hooke's father, who "was not Mathematicall at all" according to Aubrey, intended him to apprentice to an 'easy trade' like watch-making or limning, i.e. painting. It is not clear whether he had already arranged for an apprenticeship for his son when he died in October 1648, which is also the point at which Hooke's autobiographical notes terminate. Exact details of how Hooke spent the next six or seven years are unknown. As Jardine has suggested, he may have intentionally "kept the manner of his arriving in London a mystery."[48]

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[46] Kate Bennett identifies Hoskins as the son of the miniature painter John Hoskins the elder (*c.* 1590–1665); Aubrey, *Brief Lives*, vol. 2, p. 873. For biographical details, see 'Hoskins, John [known as John Hoskins the elder, Old Hoskins] (*c.* 1590–1665)', *ODNB*. According to Aubrey, Hooke observed Hoskins create a mixture of chalk, ruddle (a pigment made of red ochre), and coal to use with a 'pencill' (i.e. a fine brush): a new type of crayon or 'pastel' which was becoming increasingly popular at the time. It is possible that a figural sketch (Figure III-28) among Hooke's papers at the British Library may have been created with a similar type of mixture. On pastels and crayons during this period, see Martin Hardie, ed., *Miniatura or the Art of Limning [c. 1627] by Edward Norgate, Edited from the Manuscript in the Bodleian Library and Collated with Other Manuscripts* (Oxford: Clarendon Press, 1919).

[47] Waller, p. ii.

[48] Jardine, *Curious Life of Hooke*, p. 53.

Chapter I – Life Mechanick

London

With his inheritance of £50, Hooke left for London where he was expected to apprentice with Peter Lely, though details about this supposed apprenticeship remain unknown.[49] Waller wrote "I understand he was for some time with Sir Peter Lely, how long I am not certain: I suppose but a short time; for I have heard that the smell of the Oil Colours did not agree with his Constitution; increasing his Head-ach, to which he was ever too much subject." Aubrey gave a slightly different account: Hooke's inheritance

> was sent up to London with him, with an intention to have bound him Apprentice to Mr Lilly the Paynter, with whom he was a little while upon tryall, who liked him very well; but Mr Hooke quickly perceived what was to be donne; so thought he, why cannot I doe this by my selfe and keep my hundred pounds? He also had ⌜some⌝ instruction in draweing from Mr Samuel Cowper (Prince of Limners of this Age) but whether from him before or after Mr Lilly quaere.[50]

Details of Hooke's apprenticeship with Lely are indeed scarce. Peter van der Faes (1618–1680), better known by his pseudonym Peter Lely, was born in Germany to Dutch parents. The family must have returned to the Netherlands sometime before 1637 when he was listed as a pupil in the Guild of St. Luke in Haarlem. Exact date of Lely's arrival in England is unknown though he was in London by 1643. He was patronized by aristocratic families during the Civil War and Commonwealth years, and in 1647 was made a freeman of the Painter Stainers' Company. While in touch with the royalists, he also seems to have tried to keep a good relationship with the parliamentary figures, applying to secure a commission to decorate Whitehall Palace in 1653 and painting a portrait of Oliver Cromwell the

[49] Aubrey reported the amount of Hooke's inheritance as £100 but Rev. John's will shows that he only bequeathed £40, a chest, and his books to Hooke. The latter had also inherited £10 from his maternal grandmother; see the transcription of the wills in Hideto Nakajima, 'Robert Hooke's Family and his Youth: Some New Evidence from the Will of Rev. John Hooke', *Notes and Records of the Royal Society* 48 (1994), pp. 11-16, at pp. 14-15. Inwood has suggested Hooke may have made up the difference by selling the books, while Kate Bennett has proposed that he may have received additional financial help from family or friends; see *Man Who Knew Too Much*, p. 8; Aubrey, *Brief Lives*, vol. 2, p. 873. £50 would have been an enormous sum at that time, and may have been difficult to raise from book sales alone, so it was perhaps a mixture of both.

[50] Waller, p. iii; Aubrey, *Brief Lives*, vol. 1, p. 97. On the discrepancy in the amount of Hooke's inheritance, see footnote 49.

next year. By the Restoration, he had enough of a reputation to be appointed principal painter in 1660, a position that was made official in 1662.[51]

Thus, in 1648, when Hooke arrived in London, Lely had just been made a freeman, and thirteen-year old Hooke was at just the right age for apprenticeship. The apprenticeship system was a well-established educational scheme for many of the trades, functioning to control quality and protect the rights of the citizens. Apprenticeships were legal contracts; once 'bound', Hooke would have had to pay a fee to Lely and work for him for seven years.[52] Curiously only in 1652 did Lely apply to the Company for permission to take on an apprentice, and thereafter increased the number of his assistants as his commissions multiplied. And as Jardine pointed out "1648–9 was a bad time to be thinking of joining the studio of any painter who made their living from portraits of royalty, or even of the nobility."[53] Whatever the arrangement was between Lely and Hooke, that Lely did not have the legal permission (nor probably a need) to have an apprentice may have been the reason Hooke was able to take his money back without having to go to court. Hooke's diary suggests they remained on friendly terms: on 27 December 1675, Hooke visited Lely to discuss ways of helping the sight and his 'picture box' while enjoying 'rare but heady wine'.[54]

Westminster School

Hooke may have been accompanied to London by one of the executors of his father's estate: Cardell Goodman (1608–1654).[55] Goodman had been a fellow of St. John's College, Cambridge, prior to his arrival in 1641 at Freshwater on the Isle of Wight, where he served as the rector until he was removed in 1651 by order of the Council of State due to his royalist tendencies.[56] He was most likely friends

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[51] 'Lely, Sir Peter (1618–1680)', *ODNB*.

[52] On apprenticeship practices in the Painter-Stainers' Company, see Richard Johns, 'Framing Robert Aggas: The Painter–Stainers' Company and the "English School of Painters"', *Art History* 31 (2008), pp. 322-341.

[53] Jardine, *Curious Life of Hooke*, p. 54.

[54] *Diary i*, p. 204; it is nonetheless odd that during the nearly eleven years covered by the first diary, they only met once. Hooke's 'picture box' will be discussed in Chapter III.

[55] Jardine, *Curious Life of Hooke*, p. 55. See also Rev. John's will, where Cardell is named as an executor, in Nakajima, 'Robert Hooke's Family and his Youth: Some New Evidence from the Will of Rev. John Hooke', pp. 14-15.

[56] For the few biographical details available on Goodman, see the notes on his son, the actor 'Goodman, Cardell (*b.* 1653)', in *ODNB*. His removal by the Council of State is mentioned in the archived version; Wentworth Francis Wentworth-Sheilds, 'Goodman, Cardell or Cardonnell (1649?–1699)', in *Dictionary of National Biography, 1885-1900*, ed. Leslie Stephen and Sidney Lee (New York: Macmillan and Co., 1890), p. 128.

with another staunch royalist, Richard Busby, the famous headmaster of Westminster School. They had both attended Westminster at the same time, and subsequently, in 1626, matriculated at Christ Church, Oxford. London being hardly a safe place for a thirteen-year-old child on his own, Goodman may have deposited him in his friend Busby's care.

Although the matriculation records from this period have not survived and Hooke's exact date of arrival remains unknown, he may have already been at Westminster by the end of 1648, a few months after his father's death, not leaving much time for an apprenticeship with Lely.[57] Indeed, it is possible Hooke was always meant to be a scholar, exhibiting enough talents for his father to leave him all of his books. The issue may have been financial; tuition at Westminster cost £1 per quarter, not including room and board, so without an arrangement with Busby, which may have been reached with help from Goodman, Hooke's inheritance would have been depleted within a few years.[58] Hooke was being helped by a network of family and friends connecting Freshwater to London and Oxford. As suggested by Jardine, Samuel Fell (*bap.* 1584, *d.* 1649) may have been another connection; he had been a rector of Freshwater, a pupil at Westminster, and dean of Christ Church, where Hooke would be later sent as a 'servitor' to Goodman.[59]

Details on Busby's curriculum at Westminster during this period are sparse, and most are related to the general classes held in the school hall rather than private tuition in specific subjects.[60] Through Waller and Aubrey, we know that under Busby's instruction, Hooke learnt Latin and Greek,

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The family friendship continued in later years when Goodman's son would visit Hooke in London, and living the life of a poor actor, even borrow money from him; *Diary i*, p. 131. See also note 72.

[57] Jardine gives 1648 as the date of arrival while Edward Smith dates it to 'around 1650'; Jardine, *Curious Life of Hooke*, p. 53; Edward Smith, 'Hooke and Westminster', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Cyril William Hunter (Burlington, VT: Ashgate, 2006), pp. 219-232, 317-320, at p. 219. Neither specify the source of their choice of date.

[58] John Locke (1632–1704), who was at Westminster at the same time as Hooke, reportedly paid a quarterly fee of £1 for tuition; James L. Axtell, *The Educational Writings of John Locke* (New York: Cambridge University Press, 1968), p. 25. To increase his chances of being selected for a scholarship at Christ Church, he paid Busby an additional £1 per quarter for extra lessons; ibid., p. 27.

[59] Jardine, *Curious Life of Hooke*, p. 53; 'Fell, Samuel (*bap.* 1584, *d.* 1649)', *ODNB*. It was during Fell's deanship that the famous fan-vaulting over the Christ Church hall staircase was built. Fell died before Hooke's arrival at Oxford, but this does not necessarily preclude his help prior to then.

[60] 'Three Documents on the Westminster School Curriculum', namely 'the Laud', 'the Shaftesbury', and 'the Frowick' documents, have been translated and reproduced in James Anderson Winn, *John Dryden and His World* (New Haven, CT: Yale University Press, 1987), pp. 521-524. For discussions regarding the curriculum, see also Axtell, *The Educational Writings of John Locke*, pp. 21-26; Smith, 'Hooke and Westminster', p. 221-223; Winn, *John Dryden and His World*, pp. 36-57.

as well as some Hebrew and Arabic, learnt to play twenty lessons on the organ, and studied mathematics, mastering the first six books of Euclid's *Elements* within one week.[61] Despite his reputation of severe discipline, Busby appears to have given Hooke some latitude to explore his interests. In addition to his scholarly learning, Aubrey wrote that during this time Hooke was also "very mechanicall, and (amongst other things), he invented thirty severall wayes of Flying."[62] Presumably he was making wooden models using joinery tools, which, according to Waller, may have been responsible for Hooke's spinal deformities. Both Waller and Aubrey described Hooke as being "crooked" but Waller had also heard from Hooke and others that "he was strait till about 16 Years of Age [i.e. 1651, when he was still at Westminster] when he first grew awry by frequent practicing, turning with a Turn-Lath, and the like incurvating Exercises." The deformities worsened as he grew older and shortened his stature.[63]

Hooke built a considerable network while at Westminster School, which had become a kind of melting pot under Busby's care. It has been remarked that the latter's reputation "induced many of the leading families in England to entrust their sons to the Public School rather than to the private tutor or the private academy." Thus at Westminster, sons of aristocratic families such as the Cavendishes and the Montagus "mixed with the sons of the country gentlemen, clergy, lawyers, merchants and lesser folk."[64] By the time Hooke arrived there, Wren had already left, mostly due to the political circumstances of the time, but many others who were his contemporaries would become renowned men of influence in the political and scholarly circles.[65] In addition to his lifelong friendship with Busby, who commissioned him several architectural projects and likely introduced him to an even wider circle of former and later pupils, Hooke's schoolmates included John Dryden (1631–1700), poet and playwright, who was at Westminster until 1650; Thomas Gale (1635/6–1702), dean of York and antiquary; John Hoskins (1634–1705), natural philosopher; John Locke (1632–1704), philosopher; Richard Lower (1631–1691), physician and physiologist; Ralph Montagu (*bap.* 1638, *d.* 1709), diplomat,

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[61] This is in stark contrast to Newton who had not studied mathematics until he arrived at Cambridge; 'Newton, Sir Isaac (1642–1727)', *ODNB*. See also Chapter II on Busby's book collection.

[62] Aubrey, *Brief Lives*, vol. 1, p. 97.

[63] Waller, p. xxvi. Inwood offers a more medical explanation; *Man Who Knew Too Much*, p. 10. See also section ii in this chapter.

[64] Lawrence E. Tanner, *Westminster School: A History* (London: Country Life Ltd., 1934), pp. 14-15.

[65] Christopher Wren had been enrolled at Westminster in 1641 but had to leave in 1646 as his father Dean Wren worried for his safety; see Lisa Jardine, *On a Grander Scale: The Outstanding Life of Sir Christopher Wren* (New York: HarperCollins, 2002), pp. 50, 53 On Wren's early education, see Adrian Tinniswood, *His Invention so Fertile: a Life of Christopher Wren* (London: Pimlico, 2002), pp. 14-33.

who gave Hooke his first major residential commission; Walter Needham (*bap.* 1632, *d.* 1691), physician and anatomist; Robert South (1634–1716), theologian; Henry Stubbe (1632–1676), author and physician; Francis Vernon (*bap.* 1637, *d.* 1677), diplomat; Joseph Williamson (1633–1701), secretary of state and second president of the Royal Society; and Benjamin Woodroffe (1638-1711), principal of Gloucester Hall, Oxford.[66] Like Hooke, some of these men would continue their education at Christ Church, Oxford, and some would become fellows of the Royal Society.

Oxford

Westminster School had special relationships with Christ Church, Oxford, and Trinity College, Cambridge. Through a foundation set up by Queen Elizabeth I in 1561, three or four students would be elected to each of the Colleges as 'Queen's Scholars'; the playwright Ben Jonson (1572–1637), and closer to Hooke's time, Dryden and Locke were among these scholars.[67] Hooke was not, but according Woodroffe, one of his contemporaries at Westminster and a Queen's Scholar at Christ Church, Busby sent Hooke to Christ Church in 1654.[68] It is unclear whether Hooke had spent any of his inheritance by this time, but he was hardly wealthy, and once again needed support through his network. According to Aubrey, he was admitted as a chorister, which provided him with "a pretty good maintenance" and most likely did not require any work on his part since church music was suspended

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[66] See, in *ODNB*, 'Dryden, John (1631–1700)', 'Gale, Thomas (1635/6–1702)', 'Hoskins, Sir John, second baronet (1634–1705)', 'Locke, John (1632–1704)', 'Lower, Richard (1631–1691)', 'Montagu, Ralph, first duke of Montagu (*bap.* 1638, *d.* 1709)', 'Needham, Walter (*bap.* 1632, d. 1691)', 'South, Robert (1634–1716)', 'Stubbe, Henry (1632–1676)', 'Vernon, Francis (*bap.* 1637, *d.* 1677)', 'Williamson, Sir Joseph (1633–1701)', 'Woodroffe, Benjamin (1638–1711)'. On Hooke's architectural work for Busby, see Chapter IV, ii. 24, 35, and 50.

[67] Joseph Welch, ed., *The List of the Queen's Scholars of St. Peter's College, Westminster, Admitted on That Foundation Since 1663; and of Such as Have Been Thence Elected to Christ Church, Oxford, and Trinity College, Cambridge, from the Foundation by Queen Elizabeth, 1561, to the Present Time* (London: G. W. Ginger, 1852). The examinations (in grammar and classical literature) for the scholarship were arduous and required intensive preparations. As noted in footnote 58, Locke paid extra tuition to Busby to be especially tutored for the challenge; Axtell, *The Educational Writings of John Locke*, p. 25.

[68] Woodroffe also noted that "[Dr. Busby] always valued [Hooke] much, for his great Genius for the Mathematicks, and all sort of Curiosities in Philosophy;" letter from Benjamin Woodroffe to Mr. Houghton, 28 January 1705; Trinity College, Cambridge, 0.11a.1.29. Waller indicated Hooke's arrival date as 1653 but Woodroffe was Hooke's contemporary both at Westminster and at Christ Church. He may also have been related to Edward Woodroffe (*c.* 1622–1675) who would be appointed Surveyor to the Dean and Chapter of Westminster in 1662 and receive frequent mentions in Hooke's diaries regarding their work on the City Churches after the Great Fire, on which see Chapter IV, ii. 5.

during the Interregnum.[69] Waller noted that Hooke was "a Servitor to one Mr. *Goodman*" which has been interpreted, as might be expected, as Hooke being a servant to a richer student.[70] Certainly, according to the *OED*, in certain colleges at Oxford a 'servitor' was "one of a class of undergraduate members . . . who received their lodging and most of their board free, and were excused lecture fees."[71] However this was most likely Cardell Goodman, who was, as mentioned above, one of the executors of Hooke's father's will, and an alumnus of both Westminster and Christ Church. Goodman died in 1654, soon after Hooke's arrival at Oxford, and it is unlikely the latter had to spend any of his time as a 'servitor'.[72]

In any case, Hooke found himself in Oxford through the help and patronage of Busby and Goodman, who must both have seen a scholarly spark in him. This is not to suggest Hooke was studious in the traditional sense, or perhaps, it can be argued, he was a new type of scholar. At Oxford, formally and informally, he received an education that was a mixture of university scholarship and laboratory experience or apprenticeship. In 1655, he entered a circle of like-minded individuals, attending their meetings where "divers Experiments were suggested, discours'd and try'd with various successes."[73] Members of the 'Oxford Philosophical Club', some of whom would later found the Royal Society, included John Wilkins (1614–1672), the warden of Wadham College, who would become one of Hooke's mentors, and Seth Ward (1617–1689), Savilian Professor of Astronomy, who would introduce him to astronomy.[74] Applying his mechanical skills to his new interests, around 1656 or 1657, Hooke began working on improving the pendulum mechanism of timepieces used for astronomical measurements, and in the following years, he would contrive several astronomical

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[69] Aubrey, *Brief Lives*, p. 98.

[70] Inwood, *Man Who Knew Too Much*, p. 17.

[71] 'Servitor, n.', *OED Online*, Oxford University Press, June 2017; https://goo.gl/vuT1ma.

[72] Goodman's son, also named Cardell Goodman (*b.* 1653), was too young at the time to be Waller's 'Mr. Goodman'. Goodman junior does not appear to have inherited an interest in scholarship; after taking his degree from Cambridge, he became an actor with some notoriety and financial difficulties and was a 'steward' of Charles II's former mistress Barbara Palmer, duchess of Cleveland (*bap.* 1640, *d.* 1709). A note, albeit a confusing one, in another hand on the verso of Woodroffe's letter reads "Dr [John] Beaumont sayes that Dr. Hook/ was serviteur in Oxford to Dr Goodman *th*e Dutches of Clevelands Steward and this he had from Goodmans mouth;" Woodroffe to Houghton, 28 January 1705, Trinity College, Cambridge, 0.11a.1.29. See also note 56 above.

[73] Waller, p. iii.

[74] On the Oxford Philosophical Club, see Robert G. Frank, *Harvey and the Oxford Physiologists: A Study of Scientific Ideas* (Los Angeles: University of California Press, 1980), pp. 51-57, and the list of 'Oxford scientists and virtuosi, 1640–1675' in ibid., pp. 63-89.

instruments for observations at sea and on land.[75] At Oxford, Hooke also began assisting Thomas Willis (1621–1675) 'in his Chymistry'. Once a royal physician to Charles I—today mostly remembered for his influential work on the anatomy of the brain, *Cerebri anatome* (London, 1664) which featured drawings by Wren—at the time, Willis was making a living through his medical practice.[76] Hooke may have been recommended to him by Willis's brother-in-law John Fell (1625–1686), son of Samuel Fell, who knew Hooke's father from Freshwater.[77] Through this informal apprenticeship, Hooke would have gained invaluable laboratory skills and perhaps learnt dissection.

Sometime in late 1655 or early 1656, through Wilkins's encouragement, Robert Boyle (1627–1691) moved to Oxford to set up his laboratory. A serious scholar and experimental philosopher, Boyle was also splendidly rich as the youngest son of the first earl of Cork. He was soon in need of an assistant for his 'Chymicall operations', and upon Willis's recommendation, hired Hooke; this was the beginning of a lifelong friendship and Boyle would remain a steady patron of Hooke's.[78] For his experiments on air, Boyle had commissioned the instrument maker Ralph Greatorex (*c.* 1625–1675) to build an air pump, but the contrivance had proven to be "too gross to perform any great matter."[79] Hooke perfected the design and built a new device, and helped perform the experiments, descriptions of which, along with Hooke's drawing of the instrument, were published in 1660.[80]

Continuing the aerial theme, around the same period, Hooke also worked on several designs on "the Art of flying in the Air, and moving very swift on the Land and Water." He made a 'module', i.e. a model, "which, by the help of Springs and Wings, rais'd and sustain'd it self in the Air." Applying this to the human was problematic he found, "but finding by my own trials, and afterwards by

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[75] Waller, pp. iv, viii.

[76] 'Willis, Thomas (1621–1675)', *ODNB*. After the Restoration, from 1660 until his death, he was the Sedleian Professor of Natural Philosophy at Oxford.

[77] See note 59 above.

[78] Aubrey, *Brief Lives*, vol. 1, p. 98. It should be noted that during this period, 'chemistry' and 'chymistry' were used interchangeably. Moreover, while both 'alchemy' and 'chemistry' were in use, it is now generally accepted that there was no difference between the terms. On this terminological issue, see William R. Newman and Lawrence M. Principe, 'Alchemy vs. Chemistry: The Etymological Origins of a Historiographic Mistake', *Early Science and Medicine* 3 (1998), pp. 32-65.

[79] Waller, p. iii.

[80] Robert Boyle, *New experiments physico-mechanicall, touching the spring of the air, and its effects* (Oxford: Printed by H: Hall, printer to the University, for Tho: Robinson, 1660). This work was heavily criticised by the philosopher Thomas Hobbes (1588–1679), who also challenged Boyle's experimental method. For a thorough analysis of the controversy and its wider philosophical implications, see Shapin and Schaffer, *Leviathan and the Air-pump*.

Calculation, that the Muscles of a Mans Body were not sufficient to do any thing considerable of that kind, I apply'd my Mind to contrive a way to make artificial Muscles."[81] Waller described the sketches Hooke had prepared to illustrate the possibilities; one showing a man with bat-wings attached to his arms and legs, and another of a contrivance with horizontal vanes angled to catch the wind to flap the wings. These drawings are now lost, although a sketch of a version of the horizontal sails can be found in Hooke's diary (**Figure III-197**).

i. 2. Curator of the Royal Society, Cutlerian Lecturer, Gresham Professor of Geometry, Surveyor for the City of London

On 28 November 1660, a group of natural philosophers met at Gresham College and announced the formation of a 'College for the Promoting of Physico-Mathematical Experimental Learning', which would meet weekly to discuss science and run experiments.[82] Two years later, Hooke was hired as its first 'Curator of Experiments', which also made him the first 'professional' experimental philosopher.[83] This position required that Hooke prepare "three or four considerable Experiments" for each meeting, which was no easy feat and kept him extremely busy.[84] The range of experiments Hooke performed for the Society is remarkable; the Society's journal *Philosophical transactions* (from 1665), Thomas Sprat's *The history of the Royal-Society of London, for the improving of natural knowledge* (London, 1667), and Thomas Birch's four-volume *The history of the Royal Society of London for improving natural knowledge, from its first rise* (London, 1756–1757) are full of accounts of Hooke's experiments with air and its effects, gunpowder, heat, refraction, gravity, anatomical dissections, microscopical, astronomical and meteorological observations, etc. Hooke also designed and improved instruments for horology, astronomy,

[81] Waller, p. iv. See Chapter III, i. 3 on Hooke's ideas regarding the use of instruments and machines to improve bodily weaknesses.

[82] Secondary literature on the history of the Royal Society is extensive. Some useful starting points are Michael Hunter, *Royal Society and its Fellows 1660–1700: The Morphology of an Early Scientific Institution* (Chalfont St Giles, Bucks.: British Society for the History of Science, 1982), *Establishing the New Science: The Experience of the Early Royal Society* (New Hampshire, CT: The Boydell Press, 1989), and *The Image of Restoration Science: The Frontispiece to Thomas Sprat's History of the Royal Society (1667)* (New York: Routledge, 2016); Charles Webster, *The Great Instauration: Science, Medicine and Reform, 1626–1660*, 2nd ed. (New York: Peter Lang, 2002).

[83] Robert D. Purrington, *The First Professional Scientist: Robert Hooke and the Royal Society of London* (Basel: Birkhauser Verlag AG, 2009). 'First professional scientist' is no doubt an anachronism at multiple levels, but the emphasis is that he was remunerated for conducting experiments.

[84] Waller, p. ix.

microscopy, metrology (thermometers and barometers), and even contrived a way of supplying air under a diving bell.[85]

Hooke quickly rose to international fame with his first major publication, *Micrographia*. It included lengthy descriptions of his experiments and observations, but is mostly known for the large and astonishingly-detailed views of insects and objects drawn with the aid of a microscope (**Figures I-1 to I-5**).[86] Between 1677 and 1682, he also served as Secretary to the Royal Society, a position that placed him right in the center of the republic of letters, putting him in touch with natural philosophers, mathematicians, and mathematical practitioners from all over Europe.

Though technically employed by the Society, receiving actual compensation for his work remained problematic for Hooke. To supplement his income, in 1664, he secured the 'Cutlerian lectureship on the history of nature and art', although extracting his £50-per-year salary from Sir John Cutler (1607/8–1693) proved to be an even bigger challenge.[87] A year later he was elected Gresham Professor of Geometry with the expectation that he would teach arithmetic in Trinity term, theoretical geometry in Michaelmas and Hilary terms, and practical geometry in the Easter term.[88] Between these two positions, Hooke was regularly lecturing on mathematics and its applications, which included civil and military architecture, astronomy, geography, instrument-making, mechanics, navigation, optics, and surveying.[89]

After the Great Fire of London in 1666, alongside Wren, Evelyn, and others, Hooke proposed his own plan for rebuilding the city. Ultimately, none of these proposals were implemented for

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[85] Some of these experiments are summarized in Waller. Since Hooke included sketches for many of his experiments, observations, and inventions, further examples of his work can be found in Chapter III, ii which includes an annotated list of his drawings.

[86] See Chapter III on Hooke and drawing.

[87] Cutler was a wealthy merchant and an influential member of the Grocers' Company; 'Cutler, Sir John (1607/8–1693)', *ODNB*. His philanthropic endeavours included paying for the anatomy theatre of the new building of the Royal College of Physicians which Hooke built; see Chapter IV, ii. 10.

Hooke's dispute with Cutler over his salary ended in litigation; see 'Science, Technology and Patronage: Robert Hooke and the Cutlerian Lectureship' in Hunter, *Establishing the New Science*, pp. 279-338. See also the illustrations for two of his Cutlerian lectures, reproduced as Figures III-273 and III-291.

[88] His Gresham professorship would also induce his involvement in the Royal Mathematical School at Christ's Hospital; see Chapter IV, ii. 21.

[89] Jim Bennett has convincingly argued that lecturing on mathematical practice and applications of knowledge profoundly influenced Hooke's natural philosophy; see his 'Robert Hooke as Mechanic and Natural Philosopher', *Notes and Records of the Royal Society of London* 35 (1980), pp. 33-48; 'The Mechanics' Philosophy and the Mechanical Philosophy', *History of Science* 24 (1986), pp. 1-28. See also section ii in this chapter.

numerous reasons, but Hooke's orthogonal grid plan, which is unfortunately not extant, was appreciated enough that he was soon appointed one of the London Surveyors for the Rebuilding of the City. Hooke's subsequent architectural career, which is treated in Chapter IV, included of some of the most visible projects at the time, such as Montagu House, later to become the first building of the British Museum, Bethlem Hospital 'for the Lunatikes', ironically one of the most ornate buildings in London at the time, the Royal College of Physicians, which featured the first anatomy theatre built in England after Inigo Jones's for the Barber-Surgeons, and the Monument to the Great Fire of London, one of the few of his works to still exist.

As the Curator of Experiments for the Royal Society, Cutlerian Lecturer on the History of Nature and Art, Gresham Professor of Geometry, and Surveyor for the City of London, Hooke was not always able to successfully balance all of his responsibilities and was occasionally admonished for neglecting his duties. Such treatment, especially by the Royal Society, has been used as evidence to support the contention that Hooke was of lower social status.[90]

Of his personality, contemporary accounts are at best mixed. Waller described Hooke's temper as "Melancholy, Mistrustful and Jealous," noting that it only worsened as he got older, as did his propensity to live "too penuriously."[91] However, he recalled that in his earlier years, Hooke had been much more open to sharing his discoveries and inventions. Indeed, his diaries suggest he was a very energetic and sociable man, frequenting popular coffee houses, dining with friends and patrons, shopping for books, exchanging techniques with artists and craftsmen, training apprentices, although he did make some questionable choices.[92] As "an active, restless, indefatigable Genius," Waller explained, Hooke could quickly generate ideas (cf. **Figure III-9**) but would rarely find the time to properly develop them—this is reflected in many of his works which contain unfulfilled promises that he would elaborate on a specific subject at a later date. But when others "took occasion from his Hints to perfect what he had not," Waller reported, Hooke reacted bitterly and increasingly became more secretive.[93] For instance, when he published his discovery of the mechanical principle of the catenary

[90] See section ii below for a treatment of this subject.

[91] Waller, p. xxvii. Confirming this, in a letter dated 2 March 1703 to Thomas Kirke, Godfrey Copley reported that "Dr Hooke is very crazy much concern'd for fear he should outlive his Estate. He hath starved one old woman allready, & I believe he will endanger himself to save six pence for any thing he wants;" Folger Library, v.b.267, after p. 484. Hooke would die the next day.

[92] One of the unsavory details of his life was his inappropriate relationship with Grace Hooke, his niece.

[93] Waller, p. xxvii.

arch, he did so as an anagram to protect his priority claim while buying himself time to work on a mathematical proof.[94] Hooke became involved in several priority disputes. Perhaps the most well-known of these was with Isaac Newton (1643–1727), who had not given Hooke enough credit, the latter thought, for the inverse square law of gravity in *Philosophiae naturalis principia mathematica* (London, 1687). The protracted episode left Newton resentful enough to wait for Hooke's death before publishing his *Opticks* (London, 1704).[95] The quarrel was more than a clash of two highly irascible figures, however, and pointed to a change in the nature of mathematics that will be alluded to throughout this dissertation.

Towards the end of his life, Hooke's experimentation with highly toxic substances as potential remedies for his chronic health issues caught up with him. His health deteriorated, causing him to spend the last year of his life bedridden. Although he had promised to will the considerable fortune he had accumulated to the Royal Society, he never signed the draft he had prepared and died intestate.[96] He was a life-long bachelor, and his brother John and niece Grace pre-deceasing him, his estate was inherited by distant members of his family.[97]

Hooke's reputation is often said to have been eclipsed by Wren and Newton's, but the reasons for this are complex and certainly not an accident of history or due to interventions from his nemesis, Newton. Wren and Newton outlived Hooke by at least two decades during which ideas about self-fashioning changed. Newton was particularly canny in crafting his image—as Patricia Fara has noted, "At the end of the seventeenth century, Newton was known only to a small group of natural philosophers, mainly at Cambridge. A hundred years later, he was universally celebrated."[98] Books and lectures were no doubt instrumental in spreading his fame, but so were the vast sums he spent

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[94] Hooke announced his discovery as "The true Mathematical and Mechanichal form of all manner of Arches for Building, with the true butment necessary to each of them. A Problem which no Architectonick Writer hath ever yet attempted, much less performed. abcccddeeeee f gg iiiiiiii llmmmmnnnnnooprr sssttttttuuuuuuuux;" *A description of helioscopes and some other instruments* (London: Printed by T.R. for John Martyn . . . , 1676), p. 31. Waller solved the anagram as "Ut pendet continuum flexile, sic stabit contiguum rigidum inversum," i.e. "As hangs the flexible line, so but inverted will stand the rigid arch;" Waller, p. xxi. See also the annotations for Figure III-165. cf. in Chapter IV, ii.

[95] See also the annotations for Figure III-353 in Chapter III, ii.

[96] Hooke unsigned draft will is now National Archives, Kew, PROB 20/1315. In it, he divided his assets between "my good friends A, B, C, & D," without ever naming them. On the project for building a College for the Royal Society, see Chapter IV, ii. 2.

[97] On the claimants to Hooke's fortune, see Jardine, *Curious Life of Hooke*, pp. 306-310.

[98] Patricia Fara, *Newton: The Making of Genius* (New York: Columbia University Press, 2002), p. 34.

commissioning portraits of himself, which he displayed at his home or otherwise disseminated.[99] In contrast, Hooke is one of the few natural philosophers from this period for whom we do not have a portrait at all.[100] And Christopher Wren junior's *Parentalia* (London, 1750) did much to build and continue his father's legacy, to the point of even attributing some of Hooke's buildings to Wren.[101] Hooke's lack of descendants and erratic dispersal of his papers further contributed to his relative obscurity, though the past few decades have seen a concerted effort to reappraise his work and restore his reputation.[102]

i. 3. Published works

Hooke's overall oeuvre encompasses a wide variety of subjects including natural and experimental philosophy, astronomical and anatomical observations, natural history, and architecture. While he never identified himself as an 'architect', he did consider himself an experimental philosopher dedicated to the improvement of natural philosophy, and during his lifetime published works that reflect this.

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[99] Ibid., pp. 34-35.

[100] There are popular myths about Newton destroying Hooke's portrait at the Royal Society, but there is no evidence that this dramatic episode ever occurred; see Felicity Henderson, 'Hooke, Newton and the "Missing" Portrait', *Robert Hooke's London: Life and Science in Restoration London [blog]*, 15 May 2013, https://goo.gl/CDJWvR. Past 'discoveries' of Hooke's portrait have been subsequently disproven; see M. F. Ashley Montagu, 'A Spurious Portrait of Robert Hooke (1635–1703)', *Isis* 33 (1941), pp. 15-17; Jardine, *Curious Life of Hooke*, pp. 15-19. The latter portrait was later attributed instead to the Flemish chemist van Helmont in William B. Jensen, 'A Previously Unrecognised Portrait of Joan Baptista Van Helmont (1579–1644)', *Ambix* LI (2004), pp. 263-268.

During my research, I encountered nineteenth-century references to two portrait paintings of Hooke and am currently working on a paper on the subject. While not a painting, a possible self-portrait is Figure III-28, which fits some of Hooke's reported physical characteristics such as bulging eyes, sharp chin, and emaciated appearance.

[101] Christopher Wren, ed., *Parentalia: or, memoirs of the family of the Wrens* (London: Printed for T. Osborn, 1750).

[102] In addition to the works cited in footnotes 39, 41, 83, most recent book-length publications include Jim Bennett et al., *London's Leonardo: The Life and Work of Robert Hooke* (New York: Oxford University Press, 2003); Allan Chapman, *England's Leonardo: Robert Hooke and the Seventeenth-Century Scientific Revolution* (Philadelphia: IOP Publishing Ltd, 2005); Cooper, *Robert Hooke and the Rebuilding of London*; Michael Cooper and Michael Cyril William Hunter, eds., *Robert Hooke: Tercentennial Studies* (Burlington, VT: Ashgate, 2006); Hunter, *Wicked Intelligence*; Michael Hunter and Simon Schaffer, eds., *Robert Hooke: New Studies* (Wolfeboro, NH: The Boydell Press, 1989); Paul Kent and Allan Chapman, eds., *Robert Hooke and the English Renaissance* (Leominster, Herefordshire: Gracewing, 2005).

Detailed lists of Hooke's publications are provided in two dedicated bibliographies: the 1951 dissertation by F. H. Ayres and the 1960 publication by Geoffrey Keynes, the latter presenting a more extensive picture including Hooke's unpublished papers.[103] Due to some de-attributions, fresh discoveries of papers, and the extensive secondary literature published during the past half century, these are expectedly outdated. The most current bibliography, although not always exclusively related to Hooke, is appended to the 2006 collection of essays *Robert Hooke: Tercentennial Studies* edited by Michael Cooper and Michael Hunter.[104] Felicity Henderson's valuable article on Hooke's archive elucidates its general content (including manuscripts he owned of others' works) and descent after his death, but an updated study or inventory of Hooke's unpublished manuscripts is yet to be conducted.[105]

Unavoidably, a chronological discussion of Hooke's publications has to start with two books that possibly have little to do with him. The main reason for their attribution to Hooke is that the author of both books, published five years apart, is identified only as 'R. H.'. Since at least Ayres's 1951 bibliography, the 1655 duodecimo *The fatall doom; or, the charms of divine love. By R. H.* (London, 1655) has been accepted not to have been written by Hooke at all, although it is still attributed to him in the British Library's online catalogue.[106] It is arguably less easy to outright dismiss his authorship of the octavo *New Atlantis. Begun by the Lord Verulam, Viscount St. Albans: and continued by R. H. esquire* (London, 1660). It purports to be a continuation of Francis Bacon's unfinished work, and Hooke's self-identification as a Baconian is certainly in favour of an attribution to him. While Ayres does not mention the book at all, Keynes lists it as Hooke's first book; scepticism remains to this day for either view.[107]

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[103] F. H. Ayres, 'Robert Hooke (1635–1703): A Bibliography' (unpub. Diploma of Librarianship diss., University of London, May 1951); Geoffrey Keynes, *A Bibliography of Dr. Robert Hooke* (Oxford: Clarendon Press, 1960).

[104] Cooper and Hunter, *Robert Hooke: Tercentennial Studies*, pp. 259-298.

[105] Felicity Henderson, 'Robert Hooke's Archive', *Script and Print* 33 (2009), pp. 92-108.

[106] *The fatall doom; or, the charms of divine love. By R. H.* (London: Printed for John Williams . . . , 1655); Ayres, 'Robert Hooke (1635–1703): A Bibliography', p. 1.

[107] *New Atlantis. Begun by the Lord Verulam, Viscount St. Albans: and continued by R. H. esquire* (London: Printed for John Crooke . . . , 1660); Keynes, *A Bibliography of Dr. Robert Hooke*, p. 4; Adrian Johns, *The Nature of the Book: Print and Knowledge in the Making* (Chicago: The University of Chicago Press, 1998), pp. 478-480; Donald R. Dickson, *The Tessera of Antilla: Utopian Brotherhoods & Secret Societies in the Early Seventeenth Century* (Boston, MA: Brill, 1998), p. 181n1. Stephen Pumfrey appears to have revealed an alternative author in his talk

The first publication that can be attributed to Hooke with absolute certainty is *An attempt for the explication of the phaenomena observable in an experiment published by the Honourable Robert Boyle* (London, 1661). Dedicated to Boyle, it is an explanation of capillary attraction or action, experimenting with the movement of various liquids in glass tubes of assorted widths and shapes. Within a year, the book was translated into Latin and published as *Conatus ad explicanda phaenomena notabilia in experimento publicato a Roberto Boyle* (Amsterdam, 1662).[108] No copy of Hooke's next work, a quarto pamphlet *A discourse of a new instrument to make more accurate observations in astronomy, than ever were yet made* (London, 1661) appears to have survived; we only know of its existence via Aubrey.[109] Exchanges between Hooke, Henry Oldenburg, and Adrien Auzout, some of which had been published in the *Philosophical transactions* in English, were translated into French and printed in a quarto in Paris in 1665 as *Reponse de Monsieur Hook aux considerations de M. Auzout* (Paris, 1665).[110] As already alluded to, the book that launched Hooke's career internationally was the thick folio *Micrographia* (**Figures I-1 to 5**), published with the *imprimatur* of the Royal Society. Lavishly illustrated with fold-out plates, it was the first major book on microscopy. The book was reissued in 1667 using the same engraved plates, save for one which was printed in reverse perhaps because that particular plate was lost.[111]

Although he was publishing articles in the Royal Society's journal *Philosophical transactions*, it would take almost another decade for Hooke to publish his next book, *An attempt to prove the motion of the earth from observations made by Robert Hooke* (London, 1674); it was later translated into Latin as

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'Solomon's House Restored: Innovation, Utility and R.H.'s Alternative Royal Society' at King's College London on 24 February 2015; https://goo.gl/UoDMGX.

[108] Robert Hooke, *An attempt for the explication of the phaenomena observable in an experiment published by the Honourable Robert Boyle, esq., in the XXXV experiment of his epistolical discourse touching the aire in confirmation of a former conjecture made by R.H* (London: Printed by J.H. for Sam. Thomson . . . , 1661); Robert Hooke, *Conatus ad explicanda phaenomena notabilia in experimento publicato ab honorabili viro Roberto Boyle* (Amsterdam: Apud Petrum vanden Berge . . . , 1662).

[109] Keynes, *A Bibliography of Dr. Robert Hooke*, p. 12.

[110] Robert Hooke, *Reponse de Monsievr Hook avx considerations de M. Avzovt. Contenve dans vne lettre ecrite a l'avtevr des Philosophical Transactions, et qvelqves lettres ecrites de part & d'autre sur le sujet des grandes lunetes* (Paris: Chez lean Cvsson . . . , 1665). On Hooke's exchanges with Auzout, see also the annotations for Figure III-1 in Chapter III, ii.

[111] Hooke, *Micrographia*; Keynes, *A Bibliography of Dr. Robert Hooke*, p. 24-28.

Henry Power had published a book that included microscopic observations with a few small woodcut illustrations, but these were not nearly as detailed as the engravings in Hooke's book; Henry Power, *Experimental philosophy, in three books containing new experiments microscopical, mercurial, magnetical: with some deductions, and probable hypotheses, raised from them, in avouchment and illustration of the now famous atomical hypothesis* (London: Printed by T. Roycroft, for John Martin, and James Allestry, 1664). See also the annotations for Figure III-150. cf.

Conamen ad motum telluris probandum ex observationibus astronomi celeberrimi Roberti Hooke ([Oxford], 1679). It included an engraving which featured a cross section through Gresham College, illustrating the large zenith telescope Hooke had installed (**Figures III-54, 55. cf**).[112] Also in 1674, he published his criticism of Hevelius's *Machine coelestis* (Gdańsk, 1673), the first part of which had appeared the year before. In his animadversions, Hooke specifically attacked the astronomer's reliance on naked-eye observations without telescopic sights facilitating more accurate measurements.[113] During the rest of the decade, Hooke would publish several pamphlets and books with descriptions and illustrations of his improvements to instruments and numerous discoveries. In 1676, alongside helioscopes and other instruments, he announced various inventions including the pocket watch, and in anagram form, the principle of extension and compression of springs (now called Hooke's Law), and the aforementioned mechanical principle of the catenary arch.[114] After a publication on lamps, he further elaborated on his work on springs.[115] A compilation of his lectures on comets and microscopes was published in 1678, followed by *Lectiones Cutlerianae* (London, 1679) that brought together all of these publications into one volume (**Figures III-152. cf, 161. cf to 163. cf, 267, 268. cf**).

When Oldenburg, the secretary of the Royal Society, died in 1677, there was a pause in the publication of the Society's *Philosophical transactions*, which he had been editing. As the new secretary,

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[112] Hooke, *An attempt for the explication of the phaenomena observable in an experiment published by the Honourable Robert Boyle, esq., in the XXXV experiment of his epistolical discourse touching the aire in confirmation of a former conjecture made by R.H*; *Conamen ad motum telluris probandum ex observationibus astronomi celeberrimi Roberti Hooke Regiae Societatis, apud Londinenses, Socii Quod è sermone Anglicano in Latinum transtulit Guilhelmus Nicolson, Collegi Reginalis, apud Oxonienses, Art. Bacc.* ([Oxford]: n.p., 1679).

[113] Johannes Hevelius, *Machinae coelestis pars prior; organographiam, sive instrumentorum astronomicorum omnium, quibus auctor hactenus sidera rimatus, ac dimensus est, accuratam delineationem, et descriptionem, plurimus iconibus, aeri incisis, illustratam & exornatam, exhibens . . .* (Gdańsk: Auctoris typis, & sumptibus, imprimebat Simon Reiniger, 1673); Robert Hooke, *Animadversions on the first part of the Machina coelestis of the honourable, learned, and deservedly famous astronomer Johannes Hevelius, consul of Dantzick together with an explication of some instruments* (London: Printed by T. R. for John Martyn Printer to the Royal Society . . . , 1674).

See Chapter III, i. 3 on Hooke's criticism of the 'unmachined hand', and the annotations for Figure III-1 in Chapter III, ii on the various contemporary debates on telescopes.

[114] Hooke, *A description of helioscopes and some other instruments*. On the catenary arch, see footnote 94.

[115] Robert Hooke, *Lampas, or, descriptions of some mechanical improvements of lamps & waterpoises together with some other physical and mechanical discoveries* (London: Printed for John Martyn . . . , 1677); *Lectures de potentia restitutiva, or, of spring explaining the power of springing bodies: to which are added some collections* (London: Printed for John Martyn . . . , 1678); *Lectures and collections* (London: Printed by J. Martyn . . . , 1678); *Lectiones Cutlerianae, or, a collection of lectures, physical, mechanical, geographical, & astronomical made before the Royal Society on several occasions at Gresham Colledge: to which are added divers miscellaneous discourses* (London: Printed for John Martyn . . . , 1679).

Hooke began his own publication titled *Philosophical collections* (1679–1682), of which seven issues were released featuring mostly the work of others, until 1683 when the *Philosophical transactions* was resumed. Hooke continued to publish shorter pieces there, and made contributions to works by others, such as the preface to Robert Knox's 1681 book on Ceylon, but did not publish any further books himself.[116]

While these works reflect the heterogeneity of Hooke's natural philosophical work, they are not entirely representative of it. He left behind a large body of unpublished work, some of which found their way into the hands of his friend Richard Waller (*c.* 1660–1715) who edited and published them as Hooke's *Posthumous works* (London, 1705). Waller, who was the Secretary of the Royal Society 1687–1714, added prefatory notes to the papers, as well as illustrations, some of them in his hand (cf. **Figures III-134 to 139. cf**). The subject matters include methods for improving natural philosophy, nature of light, mechanical explanation of memory, causes of gravitation, magnetism, earthquakes, with further lectures on how to improve navigation and astronomy. The papers that were not published by Waller were later received by William Derham (1657–1735), who included them in the compilation *Philosophical experiments* (London, 1726), alongside works by others. Dated between 1662 and 1697, they include experimental findings, inventions, and instruments, including the portable *camera obscura* (**Figure IV-180**).[117]

Thomas Birch's four-volume *The history of the Royal Society of London for improving natural knowledge, from its first rise* (London, 1756–1757) include the meeting minutes of the Royal Society from its inception though to 14 December 1687. They are full of valuable information on Hooke's presentations to the Society, with summaries of his lectures and accounts of his experiments.[118]

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116 Robert Knox, *An historical relation of the island Ceylon, in the East-Indies together, with an account of the detaining in captivity the author and divers other Englishmen now living there, and of the authors miraculous escape* (London: Printed by Richard Chiswell . . . , 1681).

117 Robert Hooke, *The posthumous works* (London: Printed by Sam. Smith and Benj. Walford . . . , 1705). As noted throughout, Waller also included a biography of Hooke in ibid., pp. i-xxvii.

W[illiam] Derham, ed., *Philosophical experiments and observations of the late eminent Dr. Robert Hooke . . . and other eminent virtuoso's in his time* (London: Printed by W. and J. Innys . . . , 1726); a list of Hooke's papers is provided in Keynes, *A Bibliography of Dr. Robert Hooke*, pp. 64-65. On the descent of Hooke's papers to Waller and Derham, see Henderson, 'Robert Hooke's Archive', pp. 94-99. Some of Hooke's papers published by Derham are extant in the Macclesfield Collection at the University of Cambridge; see Figures III-167 to 172.

See also Chapter III, i. 3 on Hooke's *camera obscura*.

118 Thomas Birch, *The history of the Royal Society of London for improving natural knowledge, from its first rise*, 4 vols. (London: Printed for A. Millar, 1756–1757). As noted in the list of abbreviations at the beginning of the dissertation, this work is cited simply as Birch, with the volume and page numbers indicated.

i. 4. Extant Papers

Locations of the manuscripts

Considering the prodigious use made of Hooke's archives in this dissertation, it will be helpful to have an overview of his extant papers.

Without direct descendants, and despite Waller and Derham's compilations, Hooke's archives became scattered among multiple repositories, though most of them are at the British Library and the Archives of the Royal Society. The latter holds his natural philosophical papers, including accounts of experiments, lecture notes, drawings of instruments, and correspondence, especially from the period in which Hooke served as the Society's Secretary (**Figures III-238. cf to 329. cf**). The more recently-discovered 'Hooke Folio', is also deposited there. Most of Hooke's papers at the British Library descended there via his later contemporary and voracious collector Hans Sloane; they include his small pocket diary (Sloane MS 4024; **Figures III-158 to 160**), a thick volume of papers and correspondence (Sloane MS 1039; **Figures III-151 to 156**), autograph catalogue of his library (Sloane MS 949; **Figures II-4, II-5**), and a large folio containing drawings and prints (Add. MS 5238; **Figures III-10 to 133**).[119] Other smaller bundles containing his drawings of fossils and insects, correspondence, etc. are distributed among various volumes (**Figures III-134 to 138, 157, 161. cf to 163. cf**).

London Metropolitan Archives, where most of the manuscripts at Guildhall Library have been transferred to, holds some of Hooke's notes on travel, music, navigation, anatomy, and mathematics (CLC/495/MS01757; **Figures III-194, 195**), as well as his folio diary (CLC/495/MS01758; **Figures III-197 to 214**); the latter was recently digitised and is now available online.[120] Reports, payment records, and other papers related to Hooke's work as Surveyor for the City may also be found there (**Figure III-197**). Trinity College, Cambridge, has a bundle of Hooke's papers on music, motion,

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[119] As discussed in Chapter III, Sloane's collection of artifacts, manuscripts, and books became the foundation of the British Museum, the library of which later became the British Library. Most recent scholarship on his collecting practices include James Delbourgo, *Collecting the World: Hans Sloane and the Origins of the British Museum* (Harvard University Press, 2017); Giles Mandelbrote, 'Sloane's Purchases at the Sale of Robert Hooke's Library', in *Libraries Within the Library*, ed. Giles Mandelbrote and Barry Taylor (London: British Library, 2009), pp. 98-145; Kim Sloan, 'Sir Hans Sloane's Pictures: The Science of Connoisseurship or the Art of Collecting?', *Huntington Library Quarterly* 78 (2015), pp. 381-415; Alison Walker, Arthur Macgregor, and Michael Hunter, eds., *From Books to Bezoars: Sir Hans Sloane and his Collections* (London: British Library, 2012).

[120] Robert Hooke, *Diary Kept from 10 March 1671/2 to 16 May 1683*, London Metropolitan Archives, Collections Catalogue, Digital Documents, https://goo.gl/9WQMFU.

gravitation, light, and some travel accounts (MS O.11a.1[6-29]; **Figures III-173 to 180**); interestingly, on the verso of a folio with his notes on velocity and motion, we also find a small sketch of an unidentified building (**Figure III-181**). The Cambridge University Library holds the Macclesfield Collection in which there are numerous letters, drawings, and notes in Hooke's hand (**Figures III-167 to 172**). The Bodleian Library, Oxford, has some of his correspondence, and at least one architectural drawing (**Figure III-225**). Also in Oxford: at Worcester College, there is a recently-acquired drawing of an unidentified building (**Figure III-228**), and at All Souls College, among Wren's papers, a number of drawings related to the City Churches (**Figures III-215 to 224**). Other repositories with drawings attributed to him include the Royal College of Physicians (**Figures III-229, 231**), Royal Institute of British Architects (**Figures III-233 to 235**), Sir John Soane's Museum (**Figure III-330**), Society of Antiquaries (**Figure III-329**), and Warwickshire C.R.O. (**Figures III-334 to 352**); an annotated list of drawings from these and other archives, along with their reproductions, are provided in Chapter III, ii. References to further manuscript material are cited in Chapter IV, in the individual sections on the buildings and projects related to Hooke.

The diaries

As already alluded to, some of Hooke's diaries, also called 'memoranda books', have survived, and provide unparalleled insight into the daily life of a seventeenth-century English virtuoso.[121]

With several extended gaps, the diaries cover a twenty-one-year period between 1672 and 1693. Previously identified as 'Guildhall Library, MS 1758', the bound folio volume now at the LMA covers the earlier dates spanning between 10 March 1672 and 15 May 1683 (**Figures III-197 to 214)**. After a five-and-a-half-year gap, the diary continues in a significantly smaller, pocket-sized manuscript, now BL, Sloane MS 4024 (**Figures III-158 to 160**), covering the periods 1 November 1688 to 9 March 1690, and after another gap of approximately two-and-a-half years, 6 December 1692 to 3 August 1693.[122] The manuscripts were published in two separate editions in 1935 for the three-hundredth

[121] They are simply referred to as 'diaries' in the body of this dissertation. Abbreviated forms of the citations reflect their published titles (i.e. *Diary i*, *Diary ii*, and *Memoranda*); see footnote 123 below.

[122] See Figures III-158 to 160, and 197 to 214 for reproductions of some of the pages from the diaries.

anniversary of Hooke's birth. Omissions made by the editors of the LMA manuscript have been transcribed and annotated in a 2007 article by Felicity Henderson.[123]

Waller, in his biography of Hooke, quoted an entry dated 10 April 1697 from another 'Pocket-Diary' of Hooke's, but the latter is yet to be rediscovered.[124] Some fragments in BL, Sloane MS 1039 (e.g. **Figures III-153, 154**), may be loose sheets from his lost diaries; fols. 152r and 154r, for instance, contain notes between 9 September to 1 November 1682 (e.g. "NB to get a parapet wall between the Stables & the galery against fier").[125] However, since some of these dates are covered in the LMA manuscript, it is possible these were loose sheets on which Hooke took notes in addition to his diary.[126]

The following table gives a useful overview of the dates covered by the extant diaries. For ease of reading, the gaps are also indicated.

Table I: Periods covered by Hooke's diaries

Dates covered	Manuscript	Printed edition
10 March 1672 to 31 July 1672	LMA, CLC/495/MS01758	*Memoranda*
1 August 1672 to 31 December 1680	LMA, CLC/495/MS01758	*Diary i*
1 January 1681 to 15 May 1683	LMA, CLC/495/MS01758	*Memoranda*
MISSING: 16 May 1683 to 31 October 1688		
1 November 1688 to 9 March 1690	BL, Sloane MS 4024	*Diary ii*

[123] Hooke, *Diary i*; hereafter *Diary i*. Omitted parts are published in Henderson, 'Unpublished Material from the Memorandum Book'; hereafter *Memoranda*. BL, Sloane MS 4024 has been transcribed in Hooke, 'Diary ii', hereafter *Diary ii*. Henderson is currently working on a new edition of both manuscripts.

[124] Waller, p. i.

[125] These fragments are published in Gunther, *Early Science in Oxford, Vol. VI: The Life and Work of Robert Hooke (Part I)* and *Vol. VII: The Life and Work of Robert Hooke (Part II)*.

[126] Waller, p. i. One surviving fragment from a period in which no diaries are extant is Hooke's notes for 1 June 1695 on fol. 160r.

MISSING: 10 March 1690 to 5 December 1692		
6 December 1692 to 3 August 1693	BL, Sloane MS 4024	*Diary ii*

The diaries are the most valuable source available on Hooke's architectural activities, which had largely been ignored prior to their publication in 1935. As already noted, shortly afterwards, M. I. Batten was able to use them to write the first comprehensive article on Hooke's architectural works, noting how some of them had erroneously been attributed to Wren. Indeed, the diaries show that Hooke was the sole architect of the Royal College of Physicians and the Church in Willen, two of the works previously attributed to Wren, and that he closely collaborated with the latter on other works.[127] Had the diaries not survived, we would have had a handful of contemporary references that he was, according to Aubrey, "much made use of in Designing Building," and his architectural work would have been a footnote to the life of a prolific natural and experimental philosopher.[128]

While the paucity of detail in Hooke's diary entries can, at times, be frustrating, they aptly illustrate a restless man multi-tasking at a dizzying pace between architectural projects, inventions, socialising (sometimes at coffee houses) with Royal Society fellows, artists, or people of note. For instance, on 10 July 1674 he

> Sent by Harry the arabick manuscript for Mr. Barnard and Receivd Mr. Scots Bond. Mr. Hoskins here. Told him my way of Pictures by pin wire. At Davys about Bedlam module [model for the Bethlem Hospital]. At Mrs. Tillotsons, Dind with her at Sir G. Ents. At Mr. Hoskins. To Oldenburg and Sir W. Pettys. To the Wits coffee house.

And on 28 September of the same year, he

> Set out Morefield for Bethlehem with Sir W. Turner, Sir. Th: Player, &c. – 30 and 350 west and 390 East. With Oldenburg at Broken wharf. Saw Horizontale Sayles. Very good. With Burrough at Garaways and

[127] Batten. See Chapters III and IV on the projects Hooke and Wren collaborated on, and for hints of occasional antagonism between them.

[128] Aubrey, *Brief Lives*, p. 98.

> with Faithorn. D*ined* H*ome*. View for Fishmonger at Sulmon. Mended Skeleton of crocodile. At Garways. Broke Lamp and spilld oyle.[129]

The Hooke folio

For periods in which no diaries have survived, there is other material that provides information relevant to Hooke's activities. One of these is the so-called 'Hooke Folio', bound in the eighteenth-century, and famously discovered in a country house in Hampshire in January 2006.[130] With public help, it was purchased and deposited in the archives of the Royal Society, and has been carefully transcribed and made available online.[131]

It is a large folio of manuscript material in Hooke's hand, containing extracts from the Royal Society Journal Books between 1661 and 1677, meeting minutes between 1677 and 1691, and supplementary pages such as the indices created by Derham (e.g., 'Index to Dr Hookes Extracts from the Journals of R.S.'). Hooke had received the Society journals after Oldenburg's death. He had suspected that the latter had been relaying his ideas to his rivals, and to support his case, he took careful notes, cataloguing the injustices he had suffered from Oldenburg's (what he assumed to be) willful avoidance of noting things down, to ultimately prove his priority claims for his innovations for the pocket-watch and in microscopy.[132] Until the discovery of the Hooke Folio, Hooke's claims about Oldenburg were considered as further evidence of his difficult and jealous nature, but it has been shown that the Folio does contain some material supporting Hooke's claims, which illustrates the role archival materials can play in fine-tuning our presumed understanding of the consequences of these historical figures' personalities.[133]

The second section of the Folio contains Hooke's draft minutes of Society meetings between January 1678 and November 1683, when he served as Secretary. As there are some details in these

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[129] *Diary i*, pp. 112, 113.

[130] Robyn Adams and Lisa Jardine, 'The Return of the Hooke Folio', *Notes and Records of the Royal Society* 60 (2006), pp. 235-239, at p. 235.

[131] Centre for Editing Lives and Letters, *Hooke Folio Online*, https://goo.gl/k5QSHd.

[132] Adams and Jardine, 'The Return of the Hooke Folio', p. 235.

[133] Ibid. See also Lisa Jardine, 'Robert Hooke: A Reputation Restored', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 247-258.

It is worth noting that more details, some of them unsavory, are known of Hooke's life due to the survival of his diaries, which seems to have worked against his posthumous reputation. That we do not know as many details about the personal lives of his friends or rivals, can sometimes have a distorting effect.

drafts that did not make it into the fair-copy official records transcribed by scribes, they are important for researchers. Unfortunately, however, the Folio does not contain material directly related to architecture.

ii. Life mechanick

There has been much debate, some of it contentious, on Hooke's social status.[134] The interest in the subject appears to stem from the relatively recent social constructivist approaches to the history of science, which argue that knowledge is socially constructed and is therefore impacted by the dynamics of the society in which it is generated.[135] It is perhaps partly even political: a desire, in our post-French Revolution, post-Marx world, to see a 'lower class labourer' become a hero of science.[136] As tired a subject Hooke's social status is, its reconsideration is necessary for the purposes of this dissertation especially to determine whether he should be seen within the 'gentleman-architect' category of the era, or as a 'learned craftsman'.

Class mobility is a complex subject, but it should be emphasised that its fluidity worked in both directions, particularly during this time. Civil Wars saw possessions and fortunes confiscated, forcing many royalists to live on meager funds—even Charles II himself had to live modestly in exile during the Interregnum. Practical education, especially in the mathematical arts, became increasingly relevant. In his manuscript on education, Aubrey, admiring how William Petty (1623–1687) was earning "honestly & ingeniously" several thousand pounds per year from surveying, concluded that "Knowledge is a sort of Riches . . . [that] cannot be pillaged."[137] He was unhappily familiar with

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[134] Mordechai Feingold, 'Robert Hooke: Gentleman of Science', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 203-217; Stephen Pumfrey, 'Ideas above his Station: A Social Study of Hooke's Curatorship of Experiments', *History of Science* 29 (1991), pp. 1-44; Steven Shapin, 'Who was Robert Hooke?', in *Robert Hooke: New Studies*, ed. Michael Hunter and Simon Schaffer (Wolfeboro, NH: The Boydell Press, 1989).

[135] Sources that adopt this approach include Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: The University of Chicago Press, 1993); Shapin and Schaffer, *Leviathan and the Air-pump*; Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: The University of Chicago Press, 1994).

[136] For a brief but very useful introduction to early twentieth-century theorisation of 'artisanal influence', especially contextualising the work of Edgar Zilsel, see Pamela O. Long, 'Artisan/Practitioners as an Issue in the History of Science', in *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600* (Corvallis, OR: Oregon State University Press, 2011), pp. 10-29.

[137] Bodl., MS Aubrey 10, fol. 143r. Petty was one of the founder members of the Royal Society; 'Petty, Sir William (1623–1687)', *ODNB*. Sources on his work include Rhodri Lewis, *William Petty on the Order of Nature:*

financial struggles, having inherited a debt of £1800 from his father, Richard Aubrey (1603–1652), forcing him to sell his assets, including books.[138] He likely saw a reflection of himself when he remembered how when he was a schoolboy at Blandford, he had met a German gentleman who had been driven out of his estate and country by the wars, and was then maintaining himself by surveying. Aubrey recalled, "before the Warres (Sayd he) I had as good an Estate as any of You," and warned the children "that 'twas good to have a little Learning: [for] no man knew to what Streights, or Shifts he might be brought." Aubrey realised "had this Gentleman been breed only to understand Genus, & Species, he might have wanted Bread."[139] Even in relatively peaceful times, laws of primogeniture favoured the first-born son, forcing the younger sons of gentlemen and even aristocrats to earn a living. Some, who were not able to make a career in politics or become a doctor or a lawyer, even apprenticed in guilds.[140] Charles II's death in 1685, his Catholic brother James II's deposition in the Glorious Revolution in 1688, and the subsequent coronation of Protestant William of Orange in 1689 saw fortunes change overnight, with promises made by one monarch ignored by another.[141] At the same time, figures of more modest backgrounds were being recognised for their services to the Crown. Alongside Sir Isaac Newton, Sir Christopher Wren, Sir Jonas Moore, et. al. was Sir Thomas Fitch (1637–1688), a master carpenter who was awarded with a knighthood for his work on the Fleet Canal.[142] Some took pride in their rise from such humble circumstances. For instance, Petty, son of a clothier, was reportedly "keen to stress the obscurity of his origins in order to exaggerate his spectacular success."[143]

An Unpublished Manuscript Treatise (Tempe, AZ: Arizona Center for Medieval and Renaissance Studies, 2012); Ted McCormick, *William Petty and the Ambitions of Political Arithmetic* (New York: Oxford University Press, 2009).

138 'Aubrey, John (1626–1697)', *ODNB*.

139 Bodl., MS Aubrey 10, fol. 41a.

140 For instance, in his will, Sir William Turner (1615–1693), one of Hooke's architectural patrons, left his younger nephew money he could only access upon successful completion of an apprenticeship. See Chapter IV, ii. 15 regarding Hooke's work on Turner's almshouses in Kirkleatham.

141 See, for example, Chapter IV, ii. 27 on Hooke's work on Aubrey de Vere's house in Whitehall.

142 On Thomas Fitch and his brother John, both of whom worked with Hooke on numerous projects, see Colvin, *BDBA* (2008), pp. 377-379. On Thomas's knighthood, see T. F. Reddaway, 'Fleet Canal and Thames Quay', in *The Rebuilding of London after the Great Fire* (London: Jonathan Cape, 1940), pp. 200-243, p. 216; and Colvin, *BDBA* (2008), p. 378. See Chapter IV, ii. 7 on the Fleet Canal project.

143 'Petty, Sir William (1623–1687)', *ODNB*. Incidentally, fortunes were being made in the speculative real estate market in London by noblemen and craftsmen alike; see Chapter IV, ii. 28 on Hooke's work for 6 and 7 St. James Square.

As noted earlier, places like Westminster School under Busby's care had brought together under one roof children of noblemen and gentlemen, as well as of clergymen, merchants, and 'lesser folk'. Busby's renown had encouraged aristocratic families such as the Montagus and Cavendishes to put their sons in his care rather than educating them in isolation with private tutors.[144] Hooke, who had found his way to the School through his Oxford-educated father's connections, built his considerable network there, later receiving his first major residential commission from his former schoolmate (and later duke) Ralph Montagu.[145] If aristocrats feigned to mix with 'lesser folk' which included gentlemen in a sliding scale of class, then gentlemen such as the fellows of the Royal Society mixing with 'mechanicks', i.e. those who worked with their hands, must not have been too radical or negatively reflected back on their status. Drawing attention to Hooke's living arrangements at Gresham College, Shapin has pointed that he received few visits from other gentlemen philosophers.

> If, however, attention is shifted from philosophers to instrument-makers, mathematical practitioners, builders, and the like, a different picture emerges. Hooke spent an enormous amount of time with them, often in his rooms working on mechanical and optical projects, often dining with them.[146]

Connecting this to Hooke's supposed lower class status is not satisfactory. It ought to be noted that such details are known only because some of his diaries have survived, otherwise there are not enough examples to compare with. William Brouncker (1620–1684), second Viscount Brouncker of Lyons, mathematician and first president of the Royal Society, was appointed commissioner of the Admiralty in November 1664, and thereafter lived at the Navy Office at Seething Lane. In fact, it was at his lodgings that the fire that consumed the Office, along with thirty houses including the lodgings of Samuel Pepys (1633–1703), started; or rather, it was in the closet of his mistress Abigail Williams, an actress Pepys took a dim view of. It is known that Brouncker held 'musical meetings' at his lodgings, but there is not sufficient information on who else he may have received there.[147]

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[144] Tanner, *Westminster School: A History*, pp. 14-15.

[145] See Chapter IV, ii. 19 on Hooke's work for Montagu House.

[146] Shapin, 'Who was Robert Hooke?', p. 259.

[147] 'Brouncker, William, second Viscount Brouncker of Lyons (1620–1684)', *ODNB*. On Hooke's work on the subsequent rebuilding of the Navy Office, see Chapter IV, ii. 20.

Whatever the rules for social mixing may have been, personal agency should not be overlooked. That the marquess of Dorchester, Henry Pierrepont (1607–1680), would study medicine and law, and later even be admitted to Gray's Inn as a lawyer, attracted slights from his peers, which he seems to have simply ignored.[148] Roger North (1651–1734), as the youngest son of the fourth Baron North, complained of having been "forct to live in the quality of a nobleman" during his one year at Cambridge, recalling how he would "most extreamly envy the comon scollers for the joy they had at foot ball, and lament my owne condition."[149] North, who later became a lawyer and wrote on a variety of topics including architecture, mathematics, perspective, music, and biography, was particularly interested in mathematical practice and enjoyed making 'gimcracks', to use his term. A case of his mathematical instruments is still extant at Jesus College, Cambridge.[150]

Hooke's early circumstances were hardly different from those of someone like Samuel Morland (1625–1695). The latter was the son of a rector from Westmorland and was educated at the prestigious Winchester College before proceeding to Magdalene College, Cambridge. He too was an inventor, particularly known for his calculating machines and numerous water engines, but their stories significantly diverged, and Morland was not only knighted, but made a baronet.[151] What Hooke lacked most of all was money, but pecuniary shortcomings did not denote a lower class. He also did not have a living father to facilitate his entry into more comfortable positions; even Goodman, the executor of his father's will and his guide into Westminster School, died shortly after Hooke arrived in Oxford. He likely took on the assistantships with Boyle and others due to his monetary circumstances, but it would not be too unreasonable to think of these as apprenticeships where the master would take credit for any work done in his workshop, or in this case, laboratory. For a while, until he also started to earn money from his architectural work, Hooke would have to solely rely on the Royal Society and Cutler's patronage for his income, earning the 'philosophical servant' moniker from Shapin. While the latter's study was more nuanced, and its goal was to understand "the seventeenth-century connections

148 'Pierrepont, Henry, marquess of Dorchester (1607–1680)', *ODNB*.

149 Peter Millard, ed., *Notes of Me: The Autobiography of Roger North* (Toronto: University of Toronto Press, 2000), pp. 91-92.

150 Ibid., pp. 129-142; Gerbino and Johnston, *Compass and Rule*, pp. 114-118; 'North, Roger (1651–1734)', *ODNB*.

151 'Morland, Sir Samuel (1625–1695)', *ODNB*.

between the emerging role of the experimental philosopher and the existing codes of English gentility and Christian morality," there are alternative explanations to the evidence he presented.[152]

In his autobiographical notes, relayed by Waller, Hooke presented himself as "a Mechanick Genius" whose aptitudes appeared at an early age. 'Mechanick' denotes manual skill, and although it could carry negative connotations in reference to labourers (also called 'mechanicks'), early modern philosophy had reoriented it into a metaphor for the workings of nature.[153] For Hooke, it was literal. As Jim Bennett has observed, in his attack on the idea of a 'Hylarchick Spirit' being responsible for gravity and other phenomena—an idea put forth by the Cambridge Platonist, Henry More (1614–1687)—Hooke argued that this unintelligible notion was expected "to perform all those things which are plainly and clearly performed by the common and known Rules of Mechanicks, which are easily to be understood and imagined, and are most obvious and clear to sense."[154] Indeed Hooke often resorted to material explanations, at one point even locating the non-material soul in the brain, integrating it into the mechanical workings of memory.[155] According to Bennett,

> Hooke's 'Rules of Mechanics' were often different from those of Descartes and were related more closely to what he could perform or demonstrate mechanically. This led to a principle of intelligibility, or of explanation, that to demonstrate, to control, to manipulate and to measure were a large part of what it meant to understand, and we find that Hooke's solutions to questions in natural philosophy were often

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[152] Shapin, 'Who was Robert Hooke?', p. 285.

[153] As was the case with many other terms during this period, there were no clear distinctions between the words mechanic, mechanick, mechanical (as a noun), etc. While I use the word 'mechanick' for Hooke's learned version, it is to distinguish it from current usage rather than to remove the inherent ambiguity.

[154] Hooke, *Lampas*, p. 33; Bennett, 'Robert Hooke as Mechanic and Natural Philosopher', p. 43. See also Henry More, *Remarks upon two late ingenious discourses: the one, an essay touching the gravitation and non-gravitation of fluid bodies; the other, touching the Torricellian experiment by Sir Matthew Hale, so far as they may concern any passages in his Enchiridion metaphysicum* (London: Printed for Walter Kettilby, 1676), chapters 11-13.

[155] See 'An hypothetical explication of memory; how the organs made use of by the mind in its operation may be mechanically understood' in Robert Hooke, 'Lectures of light, explicating its nature, properties, and effects, &c.', in *The posthumous works of Robert Hooke, M.D. S.R.S., geom. prof. Gresh. &c., containing his Cutlerian lectures, and other discourses*, ed. Richard Waller (London: Printed by Sam. Smith and Benj. Walford . . . , 1705), pp. 71-148, at pp. 138-148. See also B. R. Singer, 'Robert Hooke on Memory, Association and Time Perception', *Notes and Records of the Royal Society* 31 (1976), pp. 115-132; David R. Oldroyd, 'Some "Philosophical Scribbles" Attributed to Robert Hooke', *Notes and Records of the Royal Society* 35 (1980), pp. 17-32.

> conceptualized around some demonstration, or application, or instrument.[156]

The concept of 'demonstration' was open to debate during this period. For Thomas Hobbes (1588–1679), 'demonstrable' meant "based on knowledge of causes rather than effects."[157] A fierce critic of Boyle and other experimental philosophers of the Royal Society, Hobbes argued that only geometry and civil philosophy were demonstrable in that sense: geometry because "the lines and figures from which we reason are drawn and described by ourselves" and civil philosophy because "we make the commonwealth ourselves." Nature, however, was different; because we did not have knowledge of the construction of natural bodies, we could only seek it from the effects; "there lies no demonstration of what the causes be we seek for, but only of what they may be."[158] If we can only truly know that which we create, in Hooke's conception of demonstration, philosophy involved remaking the world, reconstructing it in a laboratory or in a physical model or in a machine. Unlike in Hobbes's conception, there was no perceptible difference between nature and artifice; by studying the latter, Hooke thought it was possible to gain knowledge of the former analogically. If, as Shapin has observed, Hooke did not call himself a philosopher but a mechanick, it was because for him, the mechanick *was* the philosopher.[159]

Indeed, 'mechanick' was such a self-defining feature for Hooke that he even ascribed it to his bodily deformities. As noted earlier in this chapter, Hooke was, to quote Aubrey, "something

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156 Bennett, 'Robert Hooke as Mechanic and Natural Philosopher', p. 43; see also his 'The Mechanics' Philosophy and the Mechanical Philosophy'.

157 Helena M. Pycior, 'Mathematics and Philosophy: Wallis, Hobbes, Barrow, and Berkeley', *Journal of the History of Ideas* 48 (1987), pp. 265-286, p. 271.

158 The epistle dedicatory to Henry Pierrepont in Thomas Hobbes, *Six lessons to the professors of the mathematiques one of geometry the other of astronomy, in the chaires set up by the noble and learned Sir Henry Savile in the University of Oxford* (London: Printed by J.M. for Andrew Crook . . . , 1656), sig. A2r-v; Pycior, 'Mathematics and Philosophy: Wallis, Hobbes, Barrow, and Berkeley', p. 271.

On Hobbes's acrimonious debates with Royal Society figures, sources include Douglas Michael Jesseph, *Squaring the Circle: The War between Hobbes and Wallis* (Chicago: University of Chicago Press, 1999); Shapin and Schaffer, *Leviathan and the Air-pump*.

159 This was hardly a revolutionary idea, as both on the continent and in the British Isles, mechanical philosophy had gained a strong foothold by Hooke's time. However, there were many differences in the approaches, and despite their popularity among university students, Descartes's ideas were met with a lot of resistance by English philosophers; see John Henry, 'The Reception of Cartesianism', in *The Oxford Handbook of British Philosophy in the Seventeenth Century*, ed. Peter R. Anstey (New York: Oxford University Press, 2013), pp. 116-138.

crooked."[160] But although a weakly child, he had been straight until age sixteen at which point he began to grow awry. Hooke blamed this on his "frequent practicing, turning with a Turn-Lath, and the like incurvating Exercises."[161] The deformities, rather than signalling feebleness, were proof that his was the true body of a mechanical philosopher. Unlike the manual labour that strengthened the constitution of 'manly mechanicals' working on construction sites or at other trades, the physical work undertaken by the philosophical mechanick, inscribed itself on his body.[162] The body, aided and extended with instruments, was in fact part of the experiment; Hooke would not shy away from taking near-lethal 'remedies' to test their effects or inserting himself into a low-pressure chamber.[163]

Hooke's recollections of his childhood date to 1697, when he was sixty-two years old. Life-writing (to borrow Adam Smyth's term, in lieu of the nineteenth-century word 'autobiography') could serve various purposes during this period. In piecing together his narrative, unlike those whose "sense of identity . . . [was] constructed through objects and possessions," Hooke built his on his self-reported innate ingenuity and manual skills.[164] Without denying that, as a precocious child, he indeed may have built a yard-long model ship capable of firing off small guns or impressed established artists with his abilities in copying prints without any prior instruction, his recollections mostly served to give an

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160 Aubrey, *Brief Lives*, vol. 1, p. 98.

161 Waller, p. xxvi.

162 On early modern attitudes towards the body of the labourer, see Ronda Arab, *Manly Mechanicals on the Early Modern English Stage* (Selinsgrove, PA: Susquehanna University Press, 2011). See also Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: The University of Chicago Press, 2004).

163 At the 23 February, 2 and 23 March 1671 meetings, Hooke reported spending fifteen minutes in the chamber, first "with a little air drawn out of it," a week later with tenth of the air evacuated, and another three weeks later a quarter, suffering just some uncomfortable pain in his ears; Birch, vol. 2, pp. 469, 470, 472.

One may also recall Newton's "experiment to put pressure on the eye" to change its curvature—it involved inserting a thick needle between his eye and the bon. His illustrations of the experiments are reproduced, with extracts and explanatory text, in Scott Mandelbrote, *Footprints of the Lion: Isaac Newton at Work. Exhibition at Cambridge University Library 9 October 2001 – 23 March 2002* (Cambridge: Cambridge University Library, 2001), pp. 32-36.

164 On the various forms self-writing took in the context of sixteenth- and seventeenth-century Britain, see Adam Smyth, *Autobiography in Early Modern England* (New York: Cambridge University Press, 2010); the quote is from p. 11. See also James S. Amelang, 'Popular Autobiographical Writing: a Checklist', in *The Flight of Icarus: Artisan Autobiography in Early Modern Europe* (Stanford, CA: Stanford University Press, 1998), pp. 253-350 for a lengthy list of autobiographical texts up to around 1800.

origin to his lifelong application of "Mechanical Principals to the explication of the most difficult Phaenomena of Nature."[165]

'Mechanick' being such an ambiguous term, it is understandable that Hooke, even as "the greatest Mechanick . . . in the World" per Aubrey's description, could be identified as a "philosophical servant" in current scholarship.[166] It also does not help that Hooke eschewed gentlemanly conventions. Apart from a rough sketch (**Figure I-7)** in a folio of notes bound in his copy of Pietro Accolti's *Lo inganno de gl' occhi* (Firenze, 1625), there is no trace of his using his coat of arms.[167] During his time, the use of heraldic symbols in bookplates and other personalised items was not yet popular, but these were commonly used in seals, for which Hooke mostly adopted what appears to be a profile of Socrates (**Figure I-6**).[168] This stands in contrast to Newton, who, upon being knighted in 1705, went through the trouble of drawing up his family tree to prove his pedigree and right to use the coat of arms he subsequently adopted.[169] Hooke's coat of arms was not a secret among his contemporaries; Aubrey was certainly aware of it and included a sketch in his *Brief Lives* (**Figure I-8**). Arms-painter Sylvanus Morgan (1620–1693) reproduced it in his *Armilogia, sive ars chromocritica, the language of arms by the colours and metals* (London, 1666) along with an epistolary address "To Robert Hook Gentleman, Fellow of the Royal Society, and Geometry Reader in Gresham College" (**Figure I-9**).[170] Morgan, who was clearly trying to promote the use of arms, wondered why "Gentlemen (or as the French call them les Gentlehommes) whose proper Ensigns are Coat Armours, by which they are distinguished from the Vulgar" did not seek to know more about these "visible marks of Honour." After elaborating on

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165 Waller, p. ii.

166 Aubrey, *Brief Lives*, vol. 1, p. 99; Shapin, 'Who was Robert Hooke?', pp. 262-269.

167 Hooke's folio of notes is also reproduced as Figure III-9, and further elaborated on in the annotations in Chapter III, ii.

For his help in identifying the relevant manuscript records related to Hooke's coat of arms, and for allowing me to consult and transcribe them, I am grateful to Hon. C. J. Fletcher-Vane, Portcullis Pursuivant of the College of Arms, London.

168 One of the most intact wax impressions in the correspondence I have consulted is in Hooke's August 1678 letter to Evelyn; BL, Add. MS 17521, fol. 34. The choice of Socrates is puzzling, especially if he had the seal custom-made; *Diary i*, p. 27.

169 Newton's manuscript note on his family tree is reproduced in Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton* (New York: Cambridge University Press, 1983), p. 43. On Newton's heraldry, see Alejandro Jenkins, 'Isaac Newton's Sinister Heraldry', *arXiv* (2014), https://goo.gl/MX3e23.

170 Indeed, it was even known by those who commissioned the commemorative stained-glass window installed in 1878 at St. Helen's Church in Bishopsgate, where Hooke was buried. The window was destroyed in a 1992 IRA bombing nearby. I am grateful to Mike Burden of St. Helen's Church and Wilfried Jaekel of Mayer of Munich for their help with my queries.

the meaning of Hooke's arms, he claimed that "Heraldry is a study for the Virtuosi," connecting it to the study of nature, liberal arts, mathematics, and mechanics.[171]

For Hooke's contemporaries, 'gentleman' and 'mechanick' do not appear to have been binary positions, explaining why he would invest in such a self-image. What he did not realise, however, was that this image of the mechanick would soon change. More than any personal animosity between Hooke and Newton, Hooke's reputation would be eclipsed by the fundamental changes to how natural philosophy would soon be practiced.[172]

[171] Sylvanus Morgan, *Armilogia, sive ars chromocritica, the language of arms by the colours and metals* (London: Printed by T. Hewer for Nathaniel Brook . . . , 1666), pp. 173-[176]. For biographical notes, see 'Morgan, Sylvanus (1620–1693)', *ODNB*. His contemporaries appear to have criticised his work as 'pedantic' and it is hard to disagree with them. The subtitle of his book claimed that his study was "analogically handled according to the nature of things" and his short epistolary address to Hooke is peppered with Latin quotes, references to Descartes, and prodigious use of the language of the virtuosi. Cf. Vaughan Hart, 'Heraldry and the Architectural Orders as Joint Emblems of the "House of British Chivalry", in *Art and Magic in the Court of the Stuarts* (New York: Routledge), pp. 60-83.

[172] This will be further elaborated below.

CHAPTER II – READING

i. Hooke's books[173]

i. 1. Context

Nullius in verba

The Royal Society's motto, 'Nullius in verba' emblazoned on its coat of arms, is often invoked to contrast with the significant book collections of its fellows. A paraphrasing of "nullius addictus iurare in verba magistri" from Horace's *Epistles* 1.1.14, it is a declaration of freedom from any master's word, or as Adrian Johns has framed it, "a turning away from the world of 'words' towards that of 'things'."[174] Yet, recent scholarship has amply illustrated how essential words and books were for the 'Physico-Mathematical Experimental Learning' the Society was founded to promote.[175]

Hooke himself considered books to be the starting point of any investigation. In his 'Proposals for the good of the Royall Society', he wrote:

> The Designe of the Royall Society being *th*e Improvement of Naturall knowledge . . . [and] Naturall Knowledge then being the thing sought for, we are to consider by what means it may be soonest, easiest and most certainly attain*e*d.

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[173] The booklists pertinent to this chapter are provided in Volume 2 as Chapter II,
ii. 1. List of selected architectural and mathematical titles from the catalogue of Richard Busby's library,
ii. 2. List of architectural and related titles from the *c.* 1675 manuscript catalogue of Hooke's library,
ii. 3. List of architectural and related titles owned or borrowed by Hooke.

[174] Horatius Flaccus, *Horace, Satires, Epistles and Ars Poetica* ed. H. Rushton Fairclough (Cambridge, MA: Harvard University Press, 1929), p. 252. On the Society's motto, see Hunter, *Establishing the New Science*, p. 17.
The quote is from Adrian Johns, 'Reading and Experiment in the Early Royal Society', in *Reading, Society and Politics in Early Modern England*, ed. Kevin Sharpe and Steven N. Zwicker (New York: Cambridge University Press, 2003), pp. 244-272, at p. 244.

[175] Sources on the subject include Johns, *Nature of the Book*; Giles Mandelbrote, 'Scientific Books and their Owners: A Survey to c. 1720', in *Thornton and Tully's Scientific Books, Libraries, and Collectors: a Study of Bibliography and the Book Trade in Relation to the History of Science*, ed. Andrew Hunter (New York: Ashgate, 2000), pp. 333-366; Scott Mandelbrote, 'Professional Collections: Libraries for Scientists and Doctors', in *The Cambridge History of Libraries in Britain and Ireland*, ed. Giles Mandelbrote and K. A. Manley (New York: Cambridge University Press), pp. 158-172. See also Peter Dear, 'Totius in Verba: Rhetoric and Authority in the Early Royal Society', *Isis* 76 (1985), pp. 145-161.

> These meanes we shall the sooner find . . . in three places: first in bookes, 2*n*dly in men, 3*rd*ly in the things themselves . . . [i.e. through] the perusall of Bookes, the consulting of men & the Examination and tryall of things.[176]

Books occupied an unclear locus between knowledge and tacit knowledge. Practices could be set down in writing for posterity, but there was always a surplus of practical knowledge necessitating a perspective beyond words. Recognising this, in its early years, the Royal Society attempted to systematise this 'perusall of Bookes'; at the 17 October 1664 meeting of the 'Mechanicall Committee', it was declared that its working method was

> to collect what is delivered in Books, and practiced; to take notice of what is practised and not found in Books; and then to consider what may be further done for the improuvement of mechanicks.[177]

Reading and collecting books in seventeenth-century Britain

Thus, it appears, reading the book of nature started with the reading of actual books, and by the time of his death, Hooke had amassed a sizable collection of them. Dying intestate, i.e. without an official will, his library of nearly 2,700 titles was catalogued in *Bibliotheca Hookiana* (London, 1703; hereafter *BH*) and subsequently auctioned off.[178] Hooke was hardly unique in accumulating such a large collection, however. Library catalogues, in print or in manuscript, and sometimes both, of many

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176 RS, Cl.P/20/50, fols. 84r, 92r; partly also quoted in Johns, 'Reading and Experiment', p. 244.

177 RS, MS 5.67, fol. 1, transcribed in Hunter, *Establishing the New Science*, pp. 115-116.

178 Edward Millington, *Bibliotheca Hookiana. Sive catalogus diversorum librorum: viz. mathematic. philologicor. philosophic. hist. natural. medicorum, navigat. &c. Plurimis facultatibus linguisque insignium quos Doct. R. Hooke . . . sibi congessit* . . . (London: n.p., 1703). An annotated copy of the catalogue, with prices, is reproduced in H. A. Feisenberger, ed., *Sale Catalogues of Libraries of Eminent Persons. Volume 11: Scientists. Elias Ashmole, Edmund Halley, Robert Hooke, John Ray* (London: Mansell, with Sotheby Parke-Bernet, 1975), pp. 57-116; and a plain copy in Leona Rostenberg, *The Library of Robert Hooke: The Scientific Book Trade of Restoration England* (Santa Monica, CA: Modoc Press Inc., 1989), pp. 37-56. In addition to these facsimile editions, is also available online as a searchable database in the web source William Poole, Felicity Henderson, and Yelda Nasifoglu, *Robert Hooke's Books Database*, http://www.hookesbooks.com, where the locations of the six known extant copies of the catalogue are also provided.

Note that the relatively substantial 'Appendix, to Dr. Hooke's Catalogue', listing more than 700 lots which were long thought to be additional items from Hooke's library, in fact had nothing to do with him. In a 2009 study, Giles Mandelbrote showed that those books instead belonged to 'Stuart Bickerstaff, Esq.'; 'Sloane's Purchases', at p. 99. Any secondary literature on Hooke's library prior to Mandelbrote's study should be accordingly re-evaluated.

Society fellows and virtuosi from the era are extant. Some of these have reached posterity via auction catalogues after their deaths; in addition to Hooke's, *bibliotheca* of Arthur Annesley (1614–1686), Elias Ashmole (1617–1692), Edward Bernard (1638–1697), Edward Bysshe (*c.* 1610–1679), John Collins (1626–1683), Ralph Cudworth (1617–1688), Kenelm Digby (1603–1665), William Dugdale (1605–1686), Jonas Moore (1617–1679), Charles Scarburgh (1615–1694), Henry Stubbe (1632–1676), John Tillotson (1630–1694), et al. are now available via EEBO. Others are extant in manuscript lists that have since been published either in transcription or in facsimile; such as those of John Flamsteed (1646–1719), John Locke, John Milton (1608–1674), Isaac Newton, Samuel Pepys, and if we are to look a bit farther back, John Dee. There are further lists, surviving in various archives, of the personal libraries of the likes of Richard Busby (1606–1695), Edward Conway (*bap.* 1594, *d.* 1655), John Covel (1638–1722), John Evelyn, Martin Lister (*bap.* 1639, *d.* 1712), Francis Lodwick (*bap.* 1619, *d.* 1694), Henry Oldenburg (*c.* 1619–1677), John Pell (1611–1685), Henry Power (*c.* 1626–1668), Prince Rupert (1619–1682), and Joseph Williamson. While this is still not an exhaustive list, it is meant to illustrate how ubiquitous large individual libraries had become by the end of the seventeenth century.[179]

Not all collections were strictly working libraries, however. Books were not only for perusal in search of knowledge—in an age when possessions and their display were increasingly becoming tied to their owners' self-image, books were also turning into symbols of status. For instance, the libraries of William Cavendish, second earl of Devonshire (1590–1628), and Thomas Howard (1585–1646), fourteenth earl of Arundel, gained fame of their own.[180] There were guidebooks on how to assemble gentlemanly libraries, such as Gabriel Naudé's *Advis pour dresser une bibliothèque* (Paris, 1627) which was translated into English by no less a figure than Evelyn as *Instructions concerning erecting of a*

[179] Some of these catalogues are listed in David Pearson, *English Book Owners in the Seventeenth Century: A Work in Progress Listing* (London: The Bibliographical Society, 2016). For auction catalogues, a useful source is Harold Mattingly, I. A. K. Burnett, and Alfred W. Pollard, *List of Catalogues of English Book Sales, 1676–1900, Now in the British Museum* (London: Printed by Order of the Trustees [of the British Museum], 1915); for manuscript lists at the British Library, see R. C. Alston, *Handlist of Library Catalogues and Lists of Books and Manuscripts in the British Library Department of Manuscripts* (London: the Bibliographical Society, 1991). There are also numerous lists, among the 'State Papers' at the National Archives, of libraries confiscated from royalists and Catholics during the Commonwealth period; see Ian Roy, 'The Libraries of Edward, 2nd Viscount Conway, and Others: An Inventory and Valuation of 1643', *Historical Research* 41 (1968), pp. 35-46.

[180] For brief accounts of these libraries, see Linda Levy Peck, *Consuming Splendor: Society and Culture in Seventeenth-Century England* (New York: Cambridge University Press, 2005), pp. 125-142; for a fuller description of the Arundel library, see Linda Levy Peck, 'Uncovering the Arundel Library at the Royal Society: Changing Meanings of Science and the Fate of the Norfolk Donation', *Notes and Records of the Royal Society of London* 52 (1998), pp. 3-24.

library (London, 1661).[181] Not content with reading a manual on the subject, some aristocrats and gentlemen recruited scholarly help. The Cavendish library was assembled with the help of Thomas Hobbes, and the Arundels were accompanied by Inigo Jones during their tour of Italy when they collected not only books, but also artworks and antiquities. Henry Pierrepont, who was also a fellow of the Royal Society with genuine interests in mathematics, hired mathematical writer Thomas Salusbury to assemble his library which was later bequeathed to the Royal College of Physicians in London.[182] And Walter Yonge (*bap.* 1653, *d.* 1731), one of Hooke's architectural clients, corresponded with John Locke for advice on which books to furnish his library with.[183]

Architects and artists had also begun accumulating collections of various sizes. The libraries of Inigo Jones (1573–1652), whose collection has survived almost intact at Worcester College, Oxford, and of Roger Pratt (*bap.* 1620, *d.* 1685), a 'gentleman-architect' who collected close to two hundred titles in books and prints, show that their interests were not limited to architectural texts alone.[184] Even the humbler library of John Dunstall (*d.* 1693), an engraver and drawing-master working at Blackfriars

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[181] Mandelbrote, 'Scientific Books and their Owners', pp. 334, 338-339. On Evelyn's own library, which contained nearly five thousand titles, see Guy de la Bedoyere, 'John Evelyn's Library Catalogue', *The Book Collector* 43 (1994), pp. 529-548.

[182] Rather unconventionally, despite his aristocratic title, Pierrepont became a physician. This put him in touch with other physician-mathematicians such as Charles Scarburgh and William Petty, perhaps explaining his continued interest in mathematics and even Thomas Hobbes's dedication in *Six lessons*; see Jeffrey R. Collins, *The Allegiance of Thomas Hobbes* (New York: Oxford University Press, 2005), p. 217. On Pierrepont's mathematics tutor, see William Poole, 'A Royalist Mathematical Practitioner in Interregnum Oxford: The Exploits of Richard Rawlinson (1616–1668)', *The Seventeenth Century* (2018), pp. 1-30; volume no. to be assigned; published online 10.1080/0268117X.2017.1410216. On Pierrepont and Salusbury, see Nick Wilding, 'The Return of Thomas Salusbury's "Life of Galileo" (1664)', *The British Journal for the History of Science* 41 (2008), pp. 241-265, at p. 260.

[183] For Yonge's correspondence with Locke, see for example E. S. de Beer, ed., *The Correspondence of John Locke*, 8 vols. (New York: Clarendon Press, 1980), vol. 3, pp. 149-150; and for Hooke's work on Yonge's house, see Chapter IV, ii. 32.

[184] On Jones's library, see Christy Anderson, 'Inigo Jones's Library and the Language of Architectural Classicism in England, 1580–1640' (unpub. PhD diss., MIT, 1993); on Pratt's, Kimberley Skelton, 'Reading as a Gentleman and an Architect: Sir Roger Pratt's Library', *Transactions of the Ancient Monuments Society* 53 (2009), pp. 15-50. For an overview of the libraries of British gentleman-architects, including Pratt, Hooke, and later figures, see Charles Hind, 'The Amateur Architect and His Library', in *The Role of the Amateur Architect: Papers Given at the Georgian Group Symposium*, ed. Giles Worsley (London: The Georgian Group, 1993), pp. 33-39.

Sources on continental examples include Cécile Beuzelin, 'Jacopo Pontormo: A Scholarly Craftsman', in *The Artist as Reader: On Education and Non-Education of Early Modern Artists* (Boston, MA: Brill, 2013), pp. 71-104; Anthony Gerbino, 'The Library of François Blondel 1618–1686', *Architectural History* 45 (2002), pp. 289-324; Olga Medvedkova, ed., *Bibliothèques d'Architecture, Architectural Libraries* (Paris: INHA / Alain Baudry et Cie, 2009).

in London, included useful volumes on medicine and basic arithmetic, grammars and dictionaries, and travel books alongside the usual manuals on drawing. Suitably, as 'working' libraries, artists' and architects' collections additionally included prints, drawings, and most interestingly, instruments—Dunstall's sectors, compasses, quadrants, and tools for engraving and etching were sold alongside his books.[185] As were the instruments of Nicholas Hawksmoor (1662?–1736): his auction included "a dial, two quadrants, a compass, a box of numbers, and three mathematical rules" as well "a microscope and stand," a silver watch by Tompion, a telescope, and a reading glass.[186]

It is unfortunate that an unadulterated list of Wren's library has not survived as it would have been useful to compare it to Hooke's. Wren's collection was auctioned off alongside his son's in 1748 and 1749, but it is plausible that Wren junior had gotten rid of some of the titles, perhaps those related to natural philosophy and mathematics, after Wren's death in 1723.[187] Furthermore, the catalogue is

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[185] John. Bullord, *The library of Mr. John Dunstan, late of London: consisting of divinity, history, architecture, perspective; also his curious collection of prints, by the best antient and modern masters, with his mathematical instruments in brass and wood, his graving and etching tools* ([London]: n.p., 1693); note that 'Dunstan' in the auction catalogue appears to be a misspelling. On Dunstall, see Kim Sloan, *'A Noble Art': Amateur Artists and Drawing Masters c. 1600–1800* (London: British Museum Press, 2000), pp. 23-24; his drawing of the main gate and facade of Hooke's Bethlem Hospital is reproduced as Figure IV-111 in Volume 2 of this dissertation.

[186] Aaron Lambe, *A catalogue of the household furniture, and effects of the Hon. Col. John Mercer . . . And Nicholas Hawksmoor, Esq; Both deceased . . . To be sold by auction at Mr. Lambe's . . . on Thursday the 15th instant, and the six following days* ([London]: n.p., [1740]), pp. 13, 15. The prints and books were listed in a separate catalogue, Aaron Lambe, *A catalogue of a curious collection of original pictures, prints, drawings, and brass figures, books, and books of prints, and of architect, of that well known architect Nicholas Hawksmoor, Esq; deceas'd . . . As also the pictures, prints, drawings, and books of the Hon. Col. John Mercer . . . To be sold by auction, at Mr. Lambe's . . .* ([London]: n.p., [1740]).

The auction taking place four years after Hawksmoor's death, and in conjunction with the collections of a 'Col. John Mercer', it is not possible to be absolutely certain which of the books and instruments belonged to Hawksmoor. Nonetheless, it is interesting to note that the books included mathematical titles on algebra, geometry, and practical mathematics, in addition to architectural tracts, e.g. by Vitruvius, Palladio, Evelyn, and others. On Hawksmoor's collection, see also Vaughan Hart, *Nicholas Hawksmoor: Rebuilding Ancient Wonders* (New Haven, CT: Yale University Press, 2002), pp. 16-18; Kerry Downes, 'Hawksmoor's Sale Catalogue', *The Burlington Magazine* 95 (1953), pp. 332-335.

[187] *A catalogue of the curious and entire libraries of that ingenious architect Sir Christopher Wren, Knt. and Christopher Wren, Esq; his son, late of Hampton Court, both deceas'd; consisting of great variety of books of architecture, antiquities, history, &c. in Greek, Latin, French, and English; together with some few lots of prints. Which will be sold by auction, by Mess. Cock and Langford, on Monday the 24th of this instant, October, 1748, and the three following evenings, at Mr. Cock's in the Great Piazza, Covent Garden* ([London]: n.p., 1748); *A catalogue of the genuine and entire collection of curious Greek and Roman medals and medallions in silver and brass; antique marble statues, busts, urns and inscriptions, bronzes, gems and other curiosities of Christopher Wren, Esq; late of Hampton-Court, deceas'd; together with the collection of drawings of architecture of the late Sir Christopher Wren, his father. Which will be sold by auction, by Mr. Langford . . . on Tuesday, Wednesday, and Thursday the 4th, 5th and 6th of April 1749* ([London]: n.p., 1749). D. J. Watkin has noted the "extreme paucity of scientific

much less detailed, with lot descriptions such as "Euclidis Elementa, J. Barrow, and 17 Lat." with no further information on which Latin editions the other seventeen books corresponded to. Nonetheless, in addition to the many architectural titles, Wren's auction catalogue listed books on a variety of topics including medicine, history, classics, geography, travel, antiquities, languages, mathematics, philosophy, etc. Unsurprisingly it also listed prints and drawings. Writing from Paris during his visit in 1665, Wren had promised an unidentified friend that he would bring "almost all France on paper," referring mostly to the survey drawings he had made of some of the buildings there, but also to the prints he had purchased.[188]

i. 2. Hooke's books: sources

Bibliotheca Hookiana

Even against a backdrop of large personal libraries, Hooke's own was impressive.[189] The initial inventory of his estate listed a higher number of volumes than what made it to the printed auction catalogue. The discrepancy was partly due to some of the books actually belonging to the Royal Society's library, for there were reports of people returning books there after his death. But this in turn highlights the fact *BH* is not a definitive catalogue of all of Hooke's books, for there may have been volumes borrowed by friends and never returned. Indeed, thirty-five of the hundred books extant

books" and the absence of some of the more popular architectural publications from Wren's catalogue; see , *Sale Catalogues of Libraries of Eminent Persons. Volume 4: Architects* (London: Mansell, with Sotheby Parke-Bernet, 1972), p. 1.

[188] Wren, 'Letter to a Friend from Paris (late September / October 1665)' in Soo, *Wren's "Tracts" on Architecture and Other Writings*, pp. 103-106; quoted from p. 105.

[189] Hooke's books have been the subject of studies of various lengths which include H. A. Feisenberger, 'The Libraries of Newton, Hooke and Boyle', *Notes and Records of the Royal Society of London* 21 (1966), pp. 42-55; Anthony Geraghty, 'Robert Hooke's Collection of Architectural Books and Prints', *Architectural History* 47 (2004), pp. 113-125; Leona Rostenberg, 'Robert Hooke, Restoration Bibliophile', *American Book Collector* 8 (1987), pp. 9-15, and *Library of Robert Hooke*. Note, however, the caveat in footnote 178 regarding these studies. A more recent study is William Poole, Felicity Henderson, and Yelda Nasifoglu, 'Editors' Introduction to Robert Hooke's Books Database' (2015), http://www.hookesbooks.com/editors-introduction/.

In terms of the afterlife of Hooke's library, Giles Mandelbrote has studied the purchases made by Hans Sloane, whose collections would later become part of the British Museum and Library; Mandelbrote, 'Sloane's Purchases'.

from Hooke's library are not listed in *BH*, and there are further volumes in Hooke's *c.* 1675 autograph catalogue of his library that are neither extant nor listed in *BH*.[190]

While it may be insufficient to study Hooke's collection of books only by examining *BH*, the latter is nonetheless an invaluable source in giving an overview of the kinds of books he collected. Such auction catalogues were most often organised by language and size; e.g. Latin folios, followed by Latin quartos, down to the duodecimos, would be listed, and then the cycle repeated for books in English and other languages.[191] Predictably most of Hooke's books were in Latin, the language used for any natural philosophical work of international relevance; the majority of the books were quartos and octavos, totalling 830 and 761 respectively, and the rest were folios (479) and small volumes (466).[192] While some books resisted being neatly catalogued under a single subject alone, the lists were broadly organised in the following order "biblical criticism and theology; atlases and geography; navigation and travel; ancient and modern history and literature; philology, linguistics and exotic languages; natural philosophy and physics; medicine and anatomy; botany, zoology and agriculture; alchemy and chemistry; geometry and mathematics; mechanics and engineering; architecture and art; astronomy and optics; bibliography."[193] Hooke's collection was comprehensive and included titles from each of these categories, but it was very much a working library with a focus on natural philosophical and mathematical works.

Hooke's exposure to book collecting began early in his life when at the age of thirteen his father Rev. John Hooke bequeathed him "the great and best joined chest, and all my books."[194] Presumably Hooke kept at least some of these books which may very well be listed in *BH*, but it is impossible to speculate which titles they correspond to. As already alluded to, the books catalogued

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190 The extant books from Hooke's library, along with their current locations, are listed in *RHBdb*. For the inventory of Hooke's possessions prepared after his death, see Michael Hunter, 'Hooke's Possessions at his Death: A Hitherto Unknown Inventory', in *Robert Hooke: New Studies*, ed. Michael Hunter and Simon Schaffer (Wolfeboro, NH: The Boydell Press, 1989), pp. 287-294. The *c.* 1675 catalogue is discussed below.

191 Book sizes during this period reflect their modes of construction; while sheet sizes were not standardized, folios (depicted as 2°) were produced by folding a sheet once to produce two leaves, quartos (4^{o}) by folding it twice to produce four leaves, octavos (8°) by folding it three times to produce eight leaves, duodecimos (12°) by folding it four times to produce twelve leaves, etc.

192 'Part I. 4. The printed books' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

193 Mandelbrote, 'Sloane's Purchases', p. 98.

194 For a transcription of the will, see Nakajima, 'Robert Hooke's Family and his Youth: Some New Evidence from the Will of Rev. John Hooke', at pp. 14-15. See also 'The Inventory of John Hooke, Clerk, of Freshwater, Isle of Wight [Hampshire Record Office, 1648 B/09/2]', https://goo.gl/r2Hdno [archived].

in *BH* were not the only titles Hooke owned or had access to. During his years at Westminster School, he most likely had exposure to his headmaster Richard Busby's famed library.[195] Later, via the Royal Society, he also had access to the Arundel Library, of which a print catalogue with manuscript emendations in Hooke's hand is extant (**Figures II-2 and 3**). Shopping for books being one of Hooke's preferred activities, the diaries are full of references to titles he perused or purchased from various booksellers around London. After 1676, when the practice began, he also started attending book auctions; he would study the catalogue beforehand to prepare a list of *desiderata* (e.g. **Figure II-5**) and later record his successful purchases and the amounts he paid in his diaries (**Figure II-6**).[196] Also recorded in the diaries are the books he borrowed from colleagues or from the library of the Royal Society. The aforementioned *c.* 1675 catalogue Hooke prepared of his own library (**Figure II-4**) is another important source on his collection, particularly in terms of the books he already owned during one of his most architecturally-active periods. Although an incomplete list, it is still valuable as it contains titles that did not survive into *BH*. Considering the vital role books played in the formation of the self-taught 'gentleman-architect', it would be important to have a general view of these sources prior to assessing the architectural content of Hooke's books.

Westminster School

While at Westminster School, Hooke famously mastered the first six books of Euclid's *Elements* within one week.[197] In general histories of the School, this is often cited as evidence of extra-curricular mathematical instruction during this period, and Waller notes how Hooke was encouraged and allowed "particular times" to study the subject. But it remains unclear whether Hooke was directly tutored or simply left to his own devices among Busby's books.[198]

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[195] Quoting Aubrey on how Hooke's schoolmate Richard Knight seldom saw him "in the schoole," i.e. the School Hall where all the formal education took place, Smith draws attention to the possibility that "Hooke studied either in Dr Busby's house, where he boarded, or possibly in the Museum (Library), under the direction, but not necessarily close supervision, of a tutor;" Smith, 'Hooke and Westminster', at p. 221.

[196] I have been able to match the lists of *desiderata* extant among his papers at the Royal Society and the British Library to the auction catalogues Hooke prepared them from; see 'Appendix C' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'. These lists of *desiderata* and their matching catalogues are particularly useful in seeing which books Hooke had access to but was not interested in purchasing, e.g. whether the lack of certain architectural titles from his library was due to a general lack of their availability in the book market.

[197] Waller, p. iii.

[198] Hooke's Euclidean success is cited in 'The Curriculum under Busby' in John Sargeaunt, *Annals of Westminster School* (London: Methuen & Co., 1898), p. 121. See also footnote 195.

Busby's undated 'Catalogue of all my ⌜best⌝ Bookes', currently extant at Westminster School Archives, shows a working library rich in languages, classics, and the liberal arts.[199] It also includes an extensive collection of mathematical and natural philosophical texts. The availability of mathematical teaching in England during the first half of the seventeenth century is still a topic of debate, and while there is some scholarship on university education, there are fewer sources on how and to what purpose the subject was taught outside of the university before the Restoration.[200] But it is known that in the late 1660s, Busby was actively teaching his pupils mathematics, specifically the English translation of Rahn's introduction to algebra, and a lengthy section on arithmetic was added to the 1688 edition of the Latin grammar taught in the school.[201] Busby's collection of mathematics books, a selected list of which is included below (ii. 1 in this chapter), illustrates a particular interest in the field, and indeed in

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Sources on Westminster School include G. F. Russell Barker, *Memoir of Richard Busby D.D. (1606–1695) with Some Account of Westminster School in the Seventeenth Century* (London: Lawrence and Bullen, 1895); G. F. Russell Barker and Alan H. Stenning, *The Record of Old Westminsters: A Biographical List of All Those Who Are Known to Have Been Educated at Westminster School from its Earliest Times to 1927. In Two Volumes, with a Supplement and Appendices* (London: The Chiswick Press, 1928); Frederic H. Forshall, *Westminster School. Past and Present* (London: Wyman & Sons, 1884); Tanner, *Westminster School: A History*. On its curriculum during this period, see Sargeaunt, *Annals of Westminster School*, pp. 113-134; Winn, *John Dryden and His World*, pp. 36-57, 521-524.

[199] Richard Busby, 'A Catalogue of all my ⌜best⌝ Bookes both in the Upper & Lower Study in Order as they stand in the Severall Presses, every Booke being mark't wi[th] black lead where it stands. Note except bookes which are not yet marked', n.d., Westminster School Archives; see also ii. 1 in this chapter. Regarding the content of Busby's collection, see also Smith, 'Hooke and Westminster', at pp. 221-224. Hooke later built Busby a library to house the collection; see Chapter IV, part ii. 24.

[200] Sources on mathematical teaching, especially at Oxford and Cambridge during this period, include Mordechai Feingold, *The Mathematicians' Apprenticeship: Science, Universities and Society in England, 1560-1640* (New York: Cambridge University Press, 1984); James Hannam, 'Teaching Natural Philosophy and Mathematics at Oxford and Cambridge 1500–1570' (unpub. Doctor of Philosophy diss., University of Cambridge, 2008). See also Harris Francis Fletcher, 'The Beginnings of Milton's Mathematical Studies', in *The Intellectual Development of John Milton* (Urbana, IL: University of Illinois Press, 1956), pp. 355-384; I am thankful to Marilyn Lewis for drawing my attention to this source.

[201] Johann Heinrich Rahn, *An introduction to algebra translated out of the High-Dutch into English by Thomas Brancker* (London: Printed by W. G. for Moses Pitt . . . 1668). In a 3 June 1668 letter, writing to Thomas Brancker (1633–1676), the publisher Moses Pitt noted the popularity of the translation at Westminster School: "One of Dr Busby's scholars had one of me on Friday last and He told me the Doctor did highly extoll it and read it to them usually every night, and all that have it doe like it well;" Noel Malcolm and Jacqueline Stedall, *John Pell (1611–1685) and his Correspondence with Sir Charles Cavendish: The Mental World of an Early Modern Mathematician* (New York: Oxford University Press, 2005), pp. 205-206.

Richard Busby, *Rudimentum Anglo-Latinum grammaticae literalis & numeralis in usum scholae regiae Westmonasteriensis* (London: Ex officina Eliz. Redmayne, 1688); 'Grammatica numeralis, sive arithmetice literalis and figuralis', which also includes sections on harmonic ratios and music, is on pp. 197-288. See also Smith, 'Hooke and Westminster', p. 222.

1667, Busby proposed a mathematics lectureship at his alma mater Christ Church, Oxford, although eventually it fell through.[202] The 1695 inventory of Busby's possessions, taken after his death, included instruments such as a 'bamboo stick with a perspective in it', a 7'-long 'perspective glass', two quadrants, an astrolabe, a horizontal dial, and two burning glasses.[203] As it has been noted, even if none of these were present during Hooke's time at Westminster, Busby's obvious interest in mathematics no doubt made a lasting impression on his mechanically-inclined pupil. It is unlikely to be a coincidence that almost half of the titles in the extract included below are also present in *BH*.[204] It is also likely that Hooke's heavily annotated copy of William Oughtred's *Clavis mathematicae* (Oxford, 1652) (**Figure II-1**) dates to his Westminster days.[205]

Some of the mathematics books in Busby's library were predictably related to the *quadrivium*, i.e. arithmetic, geometry, music, and astronomy, but he also collected titles in the relatively new fields of algebra and logarithms, as well as in practical mathematics. Indeed, Waller relates how, once mastering Euclid, Hooke "thence proceeded orderly from that sure Basis to the other parts of the Mathematicks, and after to the application thereof to Mechanicks, his first and last mistress."[206] Mechanics, optics, horology, shipbuilding, navigation, fortification, and of course architecture were branches of practical mathematics, and Hooke would have had as much occasion to study Vitruvius for the sundials and water engines, as architectural theory and practice.[207] Busby owned a copy of

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[202] 'Busby, Richard (1606–1695)', *ODNB*.

[203] Smith, 'Hooke and Westminster', p. 224. Smith notes that Busby might not have owned these when Hooke was at his school but that they nonetheless showed an interest in scientific instruments.

[204] With the truncated forms used in both lists, it is possible further titles have been missed.

[205] William Oughtred, *Clavis mathematicae denuo limata, sive potius fabricata* (Oxford: Excudebat Leon. Lichfield . . . , 1652). Hooke's copy is now BL, shelfmark 529.b.19.(4, 5.).

[206] Waller, p. iii.

[207] Dee provided a much more expansive, not to mention, imaginative, list for the branches of mathematical practice; see his 'Mathematicall Praeface' in Euclid, *The elements of geometrie of the most auncient philosopher Evclide of Megara. Faithfully (now first) translated into the Englishe toung, by H. Billingsley, citizen of London* . . . (London: Imprinted . . . by Iohn Daye, 1570).

Sources on mathematical practice in Britain include Gerbino and Johnston, *Compass and Rule*; Stephen Johnston, 'Making Mathematical Practice: Gentlemen, Practitioners and Artisans in Elizabethan England' (unpub. PhD diss., University of Cambridge, 1994); Stephen Johnston, 'The Identity of the Mathematical Practitioner in 16th-Century England', in *Der "mathematicus": Zur Entwicklung und Bedeutung einer neuen Berufsgruppe in der Zeit Gerhard Mercators*, ed. Irmgard Hantsche (Bochum: Brockmeyer, 1996); Paolo Mancosu, *Philosophy of Mathematics and Mathematical Practice in the Seventeenth Century* (New York: Oxford University Press, 1996); E. G. R. Taylor, *The Mathematical Practitioners of Tudor and Stuart England* (New York: Cambridge University Press, 1954).

Giovanni Giocondo's illustrated 1522 edition of Vitruvius, which is still available in the School library.[208]

Royal Society Library and the Arundel Collection

During his professional life, Hooke also had access to the Royal Society's library which later included *Bibliotheca Norfolciana*, i.e. the Arundel Library. The latter had been assembled by Thomas Howard (1585–1646), fourteenth earl of Arundel and first earl of Norfolk, who was a well-known patron of the arts, and an enthusiastic collector of books, manuscripts, and antiquities which included the 'Arundel Marbles'. He vastly expanded his collections when he travelled to Italy with Inigo Jones in 1613, and it was likely there that he acquired the numerous architectural titles in his library. His grandson, Henry Howard (1628–1684), the future duke of Norfolk, was not as much a bibliophile, and was convinced by Evelyn to donate the collection, which ended up being divided between the Royal Society and the College of Arms, the latter receiving the books on genealogy and heraldry.[209]

At the time of the bequest, in 1667, the Society had temporarily moved their meetings to the Arundel House, as spaces at Gresham College had to be allocated to more immediate needs in the post-fire chaos of London.[210] In 1673, the Royal Society moved back to Gresham, but it would take another five years for the Arundel collection to follow, presumably due to a lack of space. The Society's library was eventually set up on the south-west side of the College quadrangle, and according to a 1708 description, it was approximately 144' long and 15' wide, with forty-four 'presses of books', i.e. bookshelf units, of which thirty-five were occupied by the Arundel collection.[211] A catalogue of the books was prepared by William Perry (*d.* 1696), the first 'Library Keeper' of the Society, and published

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[208] Vitruvius, *De architectvra libri decem: nuper maxima diligentia castigati atq; excusi, additis, Iulij Frontini De aqueductibus libris propter materiæ affinitatem* (Florence: Haeredes Philippi Junta, 1522).

[209] Sources on the Arundel Library include Marie Boas Hall, *The Library and Archives of the Royal Society, 1660–1990* (London: The Royal Society, 1992), pp. 2-6; Peck, 'Uncovering the Arundel Library at the Royal Society: Changing Meanings of Science and the Fate of the Norfolk Donation'; Peck, *Consuming Splendor: Society and Culture in Seventeenth-Century England*, p. 197. For bibliographical details on the Howards, see 'Howard, Thomas, fourteenth earl of Arundel, fourth earl of Surrey, and first earl of Norfolk (1585–1646)', 'Howard, Henry, sixth duke of Norfolk (1628–1684)', *ODNB*.

The 'Arundel Marbles', which were catalogued by John Selden (1584–1654), were later donated to the Ashmolean Museum, Oxford, where they remain on display. See John Selden, *Marmora Arundelliana* (London: Apud Ioannem Billium . . . , 1629).

[210] See also Chapter IV, ii. 2.

[211] Edward Hatton, *A new view of London: or, an ample account of that city, in eight sections* (London: Printed for John Nicholson . . . , and Robert Knaplock . . . , 1708), vol. 2, p. 686.

as *Bibliotheca Norfolciensis* (London, 1681), which also included sections on other donations to the Society, and the general collection of its library.[212] That Hooke was intimately familiar with the collection is without doubt. On 26 January 1677, while it was still at Arundel House, he noted "I returnd to Arundell Library, Palace de Genoa 2 vol., Fabius Columna 2 vol. 4d., Bortus Farnesianus 1, Acosta, Linscoten, Palladia, Vasari 4 volumes, Le matre, Cesari Ripa Iconologia, Vita di Titiano Aretinus, Morus, Ureses perspective, and some mapps." Later he was put in charge of the library's removal to Gresham College, recording on 16 September 1678, for instance, that he had "Removd 3 Cartload of bookes from Arundell to Gresham Colledge."[213] Hooke also made substantial manuscript emendations to his copy of the 1681 catalogue, recording what appear to be Arundel shelfmarks, and adding hundreds of titles to the section on the Society's collection (**Figures II-2 and 3**).[214]

The Arundel collection covered a wide range of subjects, including the classics, the liberal arts, medicine, literature, history, art, and architecture. In the latter category, there were several copies of Vitruvius, such as the anonymous folio edition printed by Simone Bevilacqua (Venice, 1497), Fra Giovanni Giocondo's first illustrated edition in folio (Venice, 1511) and its quarto reprinting in 1513, Guillaume Philander's octavo edition (Paris, 1545), and Barbaro's 1567 edition.[215] Of the classic treatises, Leon Battista Alberti's *L'architettura* is listed in three different sizes; a folio (Florence, 1550), a quarto (Paris, 1512), and an octavo (Venice, 1566); there were two folio editions of Andrea Palladio's *I quattro libri dell'architettura* (Venice, 1570 and 1596), Vicenzo Scamozzi's *Discorsi sopra l'antichita di Roma* (Venice, 1583), and Jacopo Barozzi da Vignola's *Le due regole della prospettiva pratica* (Rome, 1611).[216] Further titles included Martino di Bassi's *Dispareri in materia d'architettura, et perspettiva* (Brescia, 1572), Hans Blum's *Architectura antiqua* (1596?), Giovanni Branca's *Manuale d'architettura* (Ascoli, 1629), Onofrio Castelli's *Distributione universale dell' architettura de' fiumi, et delle atre acque* (Milano, 1631), Antonio

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[212] William Perry, *Bibliotheca Norfolciana: sive catalogus libb. manuscriptorum & impressorum in omni arte & lingua quos illustriss princeps Henricus Dux Norfolciae, &c. Regiae societati Londinenst pro scientia naturali promovenda donavit* (London: Execudebat Ric. Chiswel . . . , 1681). On the position of the library-keeper and Perry's appointment, see Birch, vol. 3, p. 466 (27 Feb. 1679); Peck, 'Uncovering the Arundel Library at the Royal Society: Changing Meanings of Science and the Fate of the Norfolk Donation', p. 6.

[213] *Diary i*, p. 377. On the distribution of the collection between the Royal Society and the College of Arms, see also the letter from William Dugdale to Hooke, 25 June 1678; Warwickshire C.R.O., CR721/3.

[214] Hooke's copy is now BL, shelfmark 824.f.52. See also Keynes, *A Bibliography of Dr. Robert Hooke*, p. xv; Mandelbrote, 'Sloane's Purchases', pp. 109n39, 120.

[215] *Bibliotheca Norfolciana*, pp. 94, 121. The catalogue listed a folio printed in Venice in 1501, but as there was no such edition, I took the liberty to note the 1511 edition instead.

[216] Ibid., pp. 4, 90, 107, 120.

Labacco's *Appartenente a l'architettura nel qual si figurarano alcune notabili antiquita di Roma* (Rome, 1552?), Buonaiuto Lorini's *Del' fortificationi* (Venice, 1597), and Antonio Lupicini's *Trattati di architettura militare* (Firenze, 1582).[217]

Of the manuscripts, of which there were more than five hundred volumes, two of them are especially notable. First is a fifteenth-century copy of 'Vitruvii de Architectura Lib. xii' which Thomas Howard had purchased in 1614 in Sienna; it is now BL, Arundel MS 122.[218] The second is simply listed as 'Mathematicarum Rerum Collectio, cum var. Diagrammatibus' in *Bibliotheca Norfolciana*; it is now BL, Arundel MS 263, i.e. the celebrated 'Codex Arundel' of Leonardo da Vinci.[219] It is possible that Hooke and his contemporaries were not aware of its author, however. Hooke, who owned a copy of da Vinci's *Trattato della pittura* (Paris, 1651; *RHBdb*, auct_BH_318), did not note the author of the manuscript in his annotated copy of the catalogue.[220]

Architectural books from the Society's own collection included numerous English titles, some of them translations of continental works, as well as volumes oriented towards mathematical practice. Taking into account Hooke's manuscript additions to the catalogue, these included Evelyn's third edition of *Sylva, or a discourse of forest-trees, and the propagation of timber* (London, 1678), as well as his translation of Roland Fréart's text, *A parallel of the antient architecture with the modern* (London, 1664), Inigo Jones's *The most notable antiquity of Great Britain, vulgarly called Stone-Heng, on Salisbury Plain* (London, 1655), Joseph Moxon's translation *Vignola, or, the compleat architect shewing in a plain and easie way the rules of the five orders of architecture* (London, 1673), Richard Norwood's *Fortification; or, architecture military* (London, 1639), Godfrey Richards's *The first book of architecture by Andrea Palladio translated out of Italian* (London, 1663), and Henry Wotton's *The elements of architecture* (London, 1624). Books oriented more towards 'practice' were Abraham Bosse's *La pratique du trait à preuves, de Mr Desargues Lyonnois, pour la coupe des pierres en l'architecture* (Paris, 1643), Guarino Guarini's *Modo di misurare le fabriche* (Turin, 1674),

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[217] Ibid., pp. 8, 9, 16, 22, 23, 27, 69, 74.

[218] See also Evelyn's 29 August 1678 diary entry regarding the Arundel Library, where he noted the presence of a "noble MSS: of Vitruvius;" E. S. de Beer, ed., *The Diary of John Evelyn*, 6 vols. (New York: Oxford University Press, 1955), vol. 4, p. 145.

[219] For the list of manuscripts, see Perry, *Bibliotheca Norfolciana*, pp. 126-153; especially pp. 132 (Vitruvius) and 140 (da Vinci). On the purchase of the Vitruvius manuscript, see Carol Herselle Krinsky, 'Seventy-Eight Vitruvius Manuscripts', *Journal of the Warburg and Courtauld Institutes* 30 (1967), pp. 36-70, p. 49. On Codex Arundel, which may have been purchased in Spain rather than Italy, see Simona Campbell, *Leonardo da Vinci: The Complete Works* (Cincinnati, OH: David and Charles, 2006), pp. 602-611.

[220] See Figures III-248. cf, 278. cf, and 325. cf, for some coincidental similarities between Hooke and da Vinci's diagrams or devices.

Moxon's *Mechanick exercises, or, the doctrine of handy-works* (London, 1677), Stephen Primatt's *The city and countrey purchaser and builder* (London, 1669), Nicholas Stone's *Enchiridion of fortification, or a handfull of knowledge in martiall affaires* (London, 1669), Thomas Wilsford's *Architectonics, the art of building* (London, 1660), with additional titles in practical mathematics, specifically quantity surveying.[221] While it is impossible to know whether Hooke read all of these titles, there are indications that he did indeed make use of the library and even lent books out to Royal Society fellows.[222]

'A Catalogue of the Books of R. H.'

As noted above, *c.* 1675 Hooke prepared a catalogue of his book collection; this manuscript is now BL, Sloane MS 949 (**Figure II-4**).[223] Titled 'A Catalogue of the Books of R. H.', it spans seventeen small pages and is organised by size, reflecting the cataloguing conventions of the period. Listing only folios and quartos, it begins in an evenly-spaced, neat handwriting (**Figure II-4. a**) which after a few pages is transformed into Hooke's characteristic hasty scribble (**Figure II-4. b**), perhaps in line with his decreasing patience with the task. There are approximately 480 titles listed, not counting individual volumes, although five of these are 'books to be procured' and some are manuscripts such as 'Rough bound Paperbook of Observations of the weather' (fol. 3v) or '3 Letters about R. S. 1670' (fol. 9v).

The *c.* 1675 date of the manuscript is based on both external and internal evidence. From his diary entries, we know that Hooke started cataloguing his books in August 1674.[224] Internal evidence suggests that he continued making additions to it at least through 1675; for instance, on fol. 4v, listed among the unbound folios, we find him noting "Cap. Sherburnes Manilius presented Jan. 22 1674/5,"

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[221] Most of these titles are listed in the manuscript additions in Hooke's copy of the catalogue; see BL, shelfmark 824.f.52., pp. 184, 187, [189], [190]. The rest can be found in *Bibliotheca Norfolciana*, pp. 155, 156, 158, 169. On the English titles, a useful reference book is Harris and Savage, *British Architectural Books and Writers, 1556–1785*.

[222] See the editors' notes for *RHBdb*, associated_BH_2; https://goo.gl/qovEzp.

[223] The manuscript is listed in Alston, *Handlist of Library Catalogues and Lists of Books and Manuscripts in the British Library Department of Manuscripts*, p. 56. Missing from previous Hooke bibliographies, it has most recently been discussed by Felicity Henderson, who has dated it to *c.* 1676 in 'Robert Hooke's Archive', p. 107, and in 'Part I. 2. Buying, borrowing, reading and reviewing' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'. I am grateful to Dr. Henderson for first alerting me to the existence of this manuscript, and for sharing her unpublished draught list of the titles. I subsequently studied the manuscript in person and compiled my own list of the architectural titles.

[224] Hooke noted cataloguing his books several times in his diary: in December 1672, August 1674 as already mentioned, and March 1677, when he catalogued the folios and small books; *Diary i*, pp. 16, 116, 278, 279.

and several other books such as Dürer's *Opera*, Kepler's *Harmonices mundi*, "The Large French Vitruvius," and "Dees Euclid," the acquisition of which we can trace to the diary. In the order they are listed: on 23 July 1675, Hooke recorded paying 4*s* for 'Alb. Durers works'; on 3 July 1675, he paid Mr. Littleberry 6*s* for Kepler's book and 1*s* for 'French arch'; and on 25 February 1675, he paid Mr. Win 25*s* for his copy of "Dee's Euclid." The price difference between 'The Large French Vitruvius', presumably Perrault's edition, and Dee's Euclid is notable.[225]

480 books constitute about 20% of the titles listed in *BH*. While it is not inconceivable that he would purchase another two thousand books during the next three decades, the manuscript catalogue should be treated as incomplete since it is unlikely that Hooke only owned folios and quartos when he prepared it. It has been suggested that either he did not get around to cataloguing the octavos and duodecimos, or an entire section of the manuscript is missing.[226] Nonetheless it presents a useful snapshot of his library during a period when he was most active in terms of architectural commissions, especially since some of the titles, most notably Henry Wotton's *The elements of architecture* (London, 1624), are missing from *BH*, rendering the latter an unreliable witness to the books he used during his lifetime.

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[225] *Diary i*, pp. 149, 167, 170. In the calculation of his 3 July 1675 purchases, there is a three-shilling difference between Hooke's total of £3-15-0 and the sum of the individual amounts he listed, i.e. £3-12-0. Compared with the original manuscript of the diary, the transcription is correct, so the discrepancy may have been a calculation error on Hooke's part. Assuming that the 'French arch' mentioned in the diary and 'The Large French Vitruvius' listed in the *c.* 1675 catalogue refer to the same book, even if we correct its price from 1*s* to 4*s*, it was still quite the bargain. Book auction prices may not be meaningful in themselves since competition between interested parties could drive up the price of a book, which might otherwise fetch a much lower amount at another auction. Nonetheless, it is noteworthy that Perrault's 1673 Paris edition of Vitruvius was bought at the comparably enormous sum of £2-10-6 at Jonas Moore's auction in 1684; see the hammer copy (BL, shelfmark C.194.b.37) of Edward Millington, *Bibliotheca mathematica optimis libris diversarum linguarum refertissima: unà cum variis philologicis, historicis & geographicis adornata: honoratissim. equitis Jonae Mori . . . nuper defuncti* (London: n.p., 1684), p. 10.

Incidentally, Kepler's book, for which he paid 6*s*, was most likely missing the illustrations for book 2, which would explain the manuscript copies among Hooke's papers; see Figures III-304 to III-307. cf. See also 'Part II. 2. i. Manuscript pages completing imperfect copies of books' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

[226] 'Part I. 2. Buying, borrowing, reading and reviewing' in ibid.

i. 3. Practice

A working library

The diaries make it clear that collecting books was one of Hooke's favourite activities. Whether by browsing the book stalls in Moorfields or Duck Lane, or stopping by Moses Pitt's or other bookseller's shops around London, or attending auctions, he was collecting books widely and on all topics, but especially natural philosophy, history, mathematics (theoretical and practical), art, and architecture.

Rather than a gentleman's prestige collection, however, Hooke's was very much a working library—not that this is reflected in its approximately hundred extant books. While most of these bear Hooke's ownership or acquisition inscriptions, they are otherwise typically unmarked.[227] Taken at face value, this could suggest they were not read very much. An alternative interpretation would be that they reflect the collecting practices of the following centuries when unmarked books were preferred by curators, making it possible that Hooke may have indeed heavily annotated some of his books but that these are now lost or discarded.[228] If the hundred books are a reliable sample, however, there may be other reasons for his not marking up his books. The one copy that is actually annotated, presumably in his hand, is Oughtred's *Clavis mathematicae* (**Figure II-1**), which as mentioned above might date to his earlier years. It is plausible that, later, when he began to exchange books with other Royal Society fellows, given his distrustful nature, he may not have wanted his valuable marginal notes and ideas to be open to anyone's survey.[229] In fact there is evidence that at some point Hooke began to write his notes on loose folios which he then inserted in his books. For instance, his calculations and sketches on Pierre de Fermat's *minima* and *maxima*, and theory of refraction have survived intact in his copy of the latter's *Varia opera mathematica* (Toulouse, 1679) (**Figures III-182 and 183**). Waller noted how Hooke's lecture 'Of Dr. Dee's book of spirits' had been discovered in his copy of Meric Casaubon's *A true & faithful relation of what passed for many years between Dr. John Dee . . . and some spirits* (London, 1659). His folio of notes and sketches, now bound in his copy of Pietro Accolti's *Lo Inganno de gl' occhi, prospettiva pratica* (Firenze, 1625) (**Figure III-9**) had also likely been a loose insert before the book was purchased by Sloane. Some of Hooke's notes on specific books, for instance on Guillaume de

[227] See 'Part II (Hooke's annotations)' in ibid.

[228] Many extant books from aristocratic collections, such as Arundel's at the Royal Society, or Dorchester's at the Royal College of Physicians, are equally pristine. Considering they were donated rather than acquired by curators, in their cases, it is more plausible to interpret them as likely never having been read.

[229] Regarding Hooke's exchange of books with his colleagues and friends, see 'Part I. 2. iii Borrowing and lending' in ibid.

l'Hôpital's *L'Analyse des infiniment petits, pour l'intelligence des lignes courbes* (Paris, 1696) (**Figure III-290**), have been separated from their source, and are now among Hooke's papers in various archives.[230]

In addition to these notes, further evidence of Hooke's use of his books can be found in the meeting minutes of the Royal Society. At the 2 April 1690 meeting, Evelyn gave "an account of a Sort of Mill now used at Deptford without either Cogg, or Wheel; made by the fall of water into a large tubb of about 6. or 7. foot Diameter," and thought that it had been contrived by a Welsh gentleman who had lived in Montpellier in southern France. Hooke, however, quickly interjected that such a mill "was not a new thing, but to be found in [blank] Book of Engines." The title of the book was left blank in the meeting minutes, perhaps simply because it was missed by the amanuensis, but a mill matching that description can be found in plate 50 of Georg Andreas Böckler's *Theatrum machinarum novum* (Cologne, 1662), a copy of which Hooke had owned at least since *c.* 1675. By 1690, he had worked on numerous projects that may have benefited from Böckler's 154 plates of mills and hydraulic machines, and it is easy to imagine him poring over each illustration with keen interest.[231]

We may expect Hooke to have paid equal attention to architectural illustrations, but there is at least one that stands out more than others. Moxon, in the section concerning foundations in his *Mechanick exercises: or, the doctrine of handy-works. Applied to the art of bricklayers-works* (London, 1700), noted how the

> ancient Architect Leon Baptista Albert advises, when the Earth on which we would make Pillars or Piers is of equal resistance, that is to say, not good, to turn Arches inversed, or upside down, and says, by this means one Pillar shall bear no more weight than another, when the Earth that is underneath is not so strong, or that it bears more than another part.[232]

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[230] See Waller's prefatory notes in Hooke, 'Of Dr. Dee's book of spirits [1690]'. Hooke's notes on de l'Hôpital are now Cl.P/20/87. The *RHBdb* numbers for the books mentioned in this paragraph are auct_BH_295 (Accolti), auct_BH_1914 (Casaubon), auct_BH_732 (de l'Hôpital), auct_BH_277 (Fermat).

[231] A week later Hooke's assistant Harry Hunt was ordered to go to Deptford, to take an account of the mill; RS, JBO/8, pp. 298-299. Böckler's book (*RHBdb*, auct_BH_320) is listed in Hooke's *c.* 1675 catalogue of his library; BL, Sloane MS 949, fol. 4v.

[232] Joseph Moxon, *Mechanick exercises: or, the doctrine of handy-works. Applied to the art of bricklayers-works* (London: Printed for, and sold by J. Moxon . . . , 1700), p. 20.

Moxon was describing, somewhat clumsily, the use of inverse arches in foundations to prevent differential settlement; a technique that had been used by the "Ingenious Surveyor Mr. Hooke . . . in building the Lord Montague's brave house in Bloomsberry," he further noted. He was referring to the house in Bloomsbury Hooke had built for Ralph Montagu in 1674–1677, a building that later became the first home of the British Museum. Hooke had made a good call—a 1754 surveyor's report described it as a "well-built brick building, the foundation sound, and free from any material cracks or settlement."[233] While we do not know when Hooke acquired his copy, the quarto edition of Alberti's *L'Architettura* (Venice, 1565; auct_BH_897) he owned at the time of his death indeed features an illustration of such inverse arches (**Figure II-7**).[234] It is possible that Hooke also made use of Alberti in conceiving of the foundations for the Monument to the Great Fire of London. The topic had come up at the 24 July 1689 Royal Society meeting where "M[r] Hook affirmed, that the Monument on Fishstreet-Hill is founded on a bed of Gravell not above 6 foot thick: under which there is a great bed of Clay not capable to bear the weight. So that that bed of gravell alone suffices to support so vast a Fabrick."[235]

Hooke's architectural books and prints

An inherent difficulty in listing 'architectural' books is determining how they are defined as such in the first place. So far, the adjective has been used conservatively here, to refer to continental treatises on the subject, and several other texts that are related to the practicalities of construction, whether these practicalities are 'theoretical' (e.g. Desargues's text on stonecutting) or not.

As noted earlier, architecture was considered a branch of mathematical practice; this was especially so in early modern Britain where the figure of the architect was imported from the continent only in the seventeenth century and was adopted very slowly.[236] Thus books on mathematical practice

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[233] Marjorie Caygill and Christopher Date, *Building the British Museum* (British Museum Press, 1999), p. 13. See Chapter IV, ii. 19 on Montagu House.

[234] The book is not listed in BL, Sloane MS 949, the incomplete catalogue Hooke prepared of his books *c.* 1675. On 5 July 1675, he noted seeing books by Alberti and Solomon de Caus at the engraver William Faithorne's place; *Diary i*, p. 168. He was borrowing books from the Arundel, which had several editions of the book; indeed, for example the 1550 edition features the same exact illustration on p. 70.

[235] RS, JBO/8, p. 271. See Chapter IV, ii. 6 on the Monument to the Great Fire.

[236] See Bennett, 'Architecture and Mathematical Practice in England, 1550–1650'; 'The Mathematical Practitioner and the Elizabethan Architect' and 'The Vitruvian Model: Inigo Jones and the Culture of the Book' in Gerbino and Johnston, *Compass and Rule*, pp. 45-82. Once the idea of the architect was adopted, it still went through significant changes throughout the century; on architectural practice in the first half of the seventeenth century, see Vaughan Hart, *Art and Magic in the Court of the Stuarts* (New York: Routledge). On mathematical

tended to contain sections on architecture. It would not have been unusual to see an entire segment on the design and construction of fortifications in a book on the military arts, or even in editions of Euclid's *Elements of Geometry*. Books on metrology sometimes included a segment on quantity surveying, with instructions on how to calculate timber or bricks, with no further architectural content. At a more theoretical level, some books on biblical exegesis featured discussions of Solomon's Temple or the Tower of Babel, speculating on ancient measurement systems and the practicalities of construction. Historical or antiquarian works could be sources of information on building materials and techniques of the ancients. Thus, in addition to the books discussed below, there were surely other texts with architectural content in Hooke's library.

In section ii. 3 of this chapter, a 'list of architectural and related titles owned or borrowed by Hooke' is provided. It is compiled from *BH*, with additional titles from the *c.* 1675 catalogue of his library, diary entries, and at least one extant book not noted anywhere else.[237] The selections include architectural treatises, and books on drawing, geometry, fortifications, mechanics, metrology, antiquities, and art.[238] Rather than discuss every title, which the reader can easily consult below, an overview will be given.

At the time of his death, Hooke owned six Vitruvian titles. In addition to an unidentified Latin octavo, he had a Latin translation of Barbaro's edition (Venice, 1567), given to him by Blackburne on 20 October 1673; a copy of Walther Ryff's German edition (Basel, 1575), which is now at the Smithsonian Library; Claude Perrault's French folio edition (Paris, 1673), which he may have purchased via Oldenburg on 25 March 1675; an abridged octavo version of Perrault's translation (Amsterdam, 1681); and Bernardino Baldo's lexicon, *De verborum Vitruvianorum significatione* (Augsburg, 1612). Of these, Barbaro's and Perrault's folio editions were listed in the *c.* 1675 catalogue.[239]

These were not the only copies Hooke had access to, however. On 17 May 1674, he noted borrowing Jonas Moore's Vitruvius. He gave no further details to be able to identify the edition, but

practice in Britain in general, see Johnston, 'The Identity of the Mathematical Practitioner in 16th-Century England'; Taylor, *The Mathematical Practitioners*.

[237] For a more limited 'List of architectural and related titles from the *c.* 1675 manuscript catalogue of Hooke's library', see ii. 2 in this chapter.

[238] Note that this list somewhat differs from the titles discussed in Geraghty, 'Robert Hooke's Collection'; in that it does not include the 'Appendix' in *BH* (see footnote 178), but does include lists and books discovered since the publication of that article. There are also differences in the topics included.

[239] *Diary i*, pp. 66, 129, 154. Hooke paid Oldenburg 40*s*, including binding and post, on 25 March 1675;

it may have been any one of the Vitruvian titles listed in the auction catalogue of Moore's library. He may have wanted to borrow Perrault's Paris edition or Baldo's lexicon before investing in copies for himself. Or perhaps he wanted to study Johannes de Laet's 1649 compilation, which included commentary from multiple authors as well as Baldo's lexicon, or the unidentified 'Dutch and French' edition published in Antwerp in 1581, perhaps by Vredeman de Vries.[240] Hooke also perused other copies in London bookshops before deciding not to purchase them, such as the unspecified edition for sale for 55*s* at Scots, the 'Italian Vitruvius' he saw at a bookseller's shop near Bethlem Hospital, or Guillaume Philander's edition he saw at Moses Pitt's shop.[241]

He collected further works by architectural authors from the continent, e.g. Alberti, Dietterlin, Félibien, le Muet, Palladio, Savot, Serlio, Vignola, Vingboons, as well as English translations by Evelyn and Godfrey Richards, of Fréart and Palladio. He also owned copies of *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot*, illustrations of French buildings by Jean Marot (1619–1679), printed in two sizes and dubbed 'Grand Marot' and 'Petit Marot' by scholars.[242] There were numerous English titles as well, most notably Henry Wotton's *Elements of architecture*, deemed to be "the first theoretical work on the subject published in English," his copy of which was lost by the time of his death.[243] In addition to antiquarian texts of architectural interest, such as Jones's book on Stonehenge and Greaves's *Pyramidographia*, there were also the more practical texts, such as Primatt's *City and countrey purchaser and builder* and Pricke's edition of Alexandre Francine's pattern book

[240] *Bibliotheca mathematica . . . Jonae Mori*, lot 39 on p. 1, lot 100 on p. 6, lot 178 on p. 7, lot 5 on p. 10, lot 6 on p. 20.

[241] *Diary i*, pp. 101, 231, 251.

[242] Hooke's copies are both listed in the *c.* 1675 manuscript catalogue of his library, but only the Petit Marot appears to have made it to *BH* (*RHBdb*, auct_BH_469).

On Marot, see A. Mauban, *Jean Marot: Architecte et Graveur Parisien* (Paris: Les Editions d'Art et d'Histoire, 1944); for a bibliography of his prints, see M. H. Destailleur, *Recueil d'estampes relatives a l'ornamentation des appartements aux XVI, XVII et XVIII siecles* (Paris: Rapilly, Libraire et Marchand D'Estampes, 1863), vol. 1, pp. 40-42. On the 'Grand Marot' and 'Petit Marot', including lists of their contents, see Mauban, *Jean Marot*, pp. 76-115. The second edition of 'Grand Marot', comprised of 227 plates, was published by Jean Mariette (1660-1742) in 1727, long after Hooke's death. Copies of 'Grand Marot' and 'Petit Marot' are available online via Gallica at https://goo.gl/xTgWCB and https://goo.gl/Bn7QkU respectively.

[243] Harris and Savage, *British Architectural Books and Writers, 1556–1785*, p. 499. Hooke copy is not listed in *BH*.

on gates, arches, and the five orders.[244] Interestingly, he had many of the same architectural books as the Royal Society, which suggests that having free access to a book did not prevent him from purchasing his own copy.[245]

Like many of his contemporaries, Hooke was a keen collector of prints. By the middle of 1677, he had accumulated enough of them to feel the need to prepare a catalogue, presumably to take stock of his collection before acquiring more prints from Roger Davys, the joiner, who had just returned from France with books and prints in tow.[246] Several prints from Hooke's collection have survived among his papers at the British Library, the British Museum, and Warwickshire C.R.O. These have all been identified and are listed, with annotations, in Chapter III, but it may be useful to highlight two of them to illustrate the utility of these prints for Hooke.

One of these, currently BL, Add. MS 5238, no. 2v (**Figure III-13**), can be attributed to the workshop of Jacques Androuet du Cerceau (1511–*c.* 1586). It is a folio size print of a longitudinal section through a domed Roman structure with an oculus in its apex. It is reminiscent of the woodcuts in *Quinto libro d'architettura* (first ed. Paris, 1547) by Sebastiano Serlio (1475/1490–1553/1557) and is indeed from a series of prints descriptively titled *Temples et habitations fortifiés* (*c.* 1545–1550) which was heavily influenced by Serlio's work. Hooke was particularly interested in arches and domes; he was, after all, the first to expose the mechanical workings of the catenary arch and might have had some

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[244] On the architectural book market, especially of pattern books, after the Great Fire, see also 'Conceiving the City II: Books and Alternative Design Methods' in Elizabeth McKellar, *The Birth of Modern London: The Development and Design of the City 1660–1720* (New York: Manchester University Press, 1999), pp. 138-154.

[245] As most of these titles are listed in subsequent catalogues of the Royal Society library, we can be fairly certain they were not accidentally listed in *BH* and auctioned off.

[246] The next day, Hooke noted "Separated prints 7sh., of St. Peters, 10sh., Tarripan Jesuits church, 1s. 8d., Piazza del populo, 1s. 3d., chiesu di St. Maria della pace, 1s. 3d., two prospa of the Louvre, 2s. 3d., Berninis St. Pieter 5sh., Merchants hall at Paris 5sh., St. Peters chair 6s. 3d., Fornesys Jesuits church at Rome 3s. 4d., Scavans large sheets of the Jesuits church at Paris 10sh., Fifteen of Perill's prospects 3s. 1½d., eighteen chimneys and altars 4s. 3d., 109 views of Israells 22s. 8½d." and eventually paid Davys £3-11-6 for the prints; *Diary i*, pp. 294-295, 319, 331-332. See Chapter IV regarding Davys's work, both in producing millwork and architectural models, for some of Hooke's architectural projects.

The year before, Hooke had also acquired some of Edward Woodroofe's prints after the latter's death in 1675. On Woodroofe, see Anthony Geraghty, 'Edward Woodroofe: Sir Christopher Wren's First Draughtsman', *The Burlington Magazine* 143 (2001), pp. 474-479; on Hooke's purchases, which included "90 pages of Bachinall grotescues, Ceelings, gates, Compartments and Sheilds, besides the Pallace of Richelau and the church of the Sorbon at Large," see ibid., pp. 477-478.

involvement in the design of the dome of St. Paul's Cathedral (**Figure III-165. cf**).[247] He may have taken a special interest in this Du Cerceau print as a model or inspiration. This would fit well within the Italian tradition of the 'model book' dating as far back as the third quarter of the fifteenth century: apprentices would study the principles of architecture by drawing Roman buildings, and sometimes these drawings would be bound into so-called 'model books' to be consulted as inspiration for the design of modern buildings. While initially these were hand-drawn, it has been argued that Du Cerceau's *Temples et habitations fortifiés*, along with his *Détails d'ordres d'architecture*, are examples of printed versions of such model books.[248] Having never gone on the Grand Tour or known to have taken any other kind of foreign trips, unlike many of his colleagues, Hooke would have particularly benefited from such books and prints to learn about design and architecture. As Alison Stoesser-Johnston has shown, he certainly made ample use of his copy of Vingboons.[249]

Another print in the same volume, BL, Add. MS 5238, no. 65 (**Figure III-88**), can be identified as an elevation/section of the Château of Coulommiers-en-Brie (or Colombières en Brie) built by the architect Salomon de Brosse (1571–1626) for Catherine de Gonzague, Duchess of Longueville. The inscriptions in the lower left corner, 'Iean Marot fecit' in print and 'P. Mariette 1677' in manuscript in Hooke's hand, identify the artist as the Parisian engraver and architect Jean Marot (1619–1679), and the printer as Pierre Mariette, the younger (1634–1716). As noted, Hooke owned copies of 'Petit Marot' and 'Grand Marot', although this particular engraving does not appear to have been printed with those collections.[250] Hooke would have been particularly interested in the Château's mansard-

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[247] See also notes on Figure III-165. cf. A crude sketch, presumably a copy of one made either by John Aubrey or by Hooke himself, that purports to be Hooke's plan for an economical way to build the dome as "a Rotundo, thus without any Pillar height 6 hundred foot" displays a faint configurational similarity to the plan of this *Serapaeum*; see Figure III-190.

[248] Myra Nan Rosenfeld, 'From Drawn to Printed Model Book: Jacques Androuet Du Cerceau and the Transmission of Ideas from Designer to Patron, Master Mason and Architect in the Renaissance', *RACAR: revue d'art canadienne / Canadian Art Review* 16 (1989), pp. 131-145, 219-250, p. 137.

[249] Philips Vingboons, *Gronden en afbeeldsels der voornaamste gebouwen van alle die Philips Vingboons geordineert heeft* (Amsterdam, 1665); *RHBdb*, auct_BH_2534. Hooke had purchased his copy on 7 November 1674; *Diary i*, p. 129. On Vingboons's influence on Hooke's architectural work, see Stoesser-Johnston, 'Robert Hooke and Holland'; H. J. Louw, 'Dutch Influence on British Architecture in the Late-Stuart Period, c. 1660–1714', *Dutch Crossing* 33 (2009), pp. 83-120.

[250] Interestingly, this print is not listed in the secondary scholarship on Marot's works nor among the extant documents and prints related to the building, although de Brosse scholar Coope did take note of an extremely rare untitled engraving of the building with the inscription 'J. Marot fecit'; Rosalys Coope, *Salomon de Brosse and the Development of the Classical Style in French Architecture from 1565 to 1630* (University Park, PA: The

style roof, the quadrilateral dome of the corps-de-logis, and the dome and lantern of the Capuchin church, features that he would use in some of his own designs. The arched pediments and the entrance flanked by two niches appear to have provided some inspiration for the following drawing in the volume, no. 66, of an unidentified building **(Figure III-90)**. Two reclining figures on a pediment was a feature used by Hooke at Bethlem Hospital and the preliminary design of the Royal College of Physicians **(Figure III-76)** but they predate this drawing.

In his article on Hooke's architectural books, Geraghty suggested that "the great theoretical works of contemporary France seem to have interested [Hooke] less," noting how titles such as Blondel's *Cours d'architecture* (Paris, 1675–1683) or Desgodets' *Edifices antiques* (Paris, 1682) were missing from Hooke's library, though he did not provide a detailed comparison with other libraries that actually had copies of these in their collections.[251] While they were rare titles in England, had Hooke really wanted them, he did have the means to directly procure them from the continent.[252] In his assessment of Hooke's collection of architectural books and prints, Geraghty's conclusion was that

> Hooke's library was very much a working one, combining an abundance of source material with technical books on building construction. As such, it is best understood as something mid-way between a 'Natural History' of contemporary architecture and, to judge from the availability of architectural publications in Restoration London, the sort of working collections amassed by the more sophisticated London craftsmen and surveyors. Certainly it contrasts with Wren's library, which reveals a broader range of architectural interests. Hooke emerges from his library as an architect who was more interested in the practicalities of building than in academic theory, and

Pennsylvania State University Press, 1972), p. 221. See also the annotations for Figure III-88 in Chapter III, section ii.

[251] Geraghty, 'Robert Hooke's Collection', pp. 115, 121. *Bibliotheca mathematica . . . Jonae Mori*, p. 10 in the hammer copy (BL, shelfmark C.194.b.37); I have been unable to find further information on 'Mr. Carfoot'.

[252] Geraghty noted how Hooke had made arrangements to import Felibien's *Principes*; Geraghty, 'Robert Hooke's Collection', p. 120. On exportation and importation of foreign books, see Rostenberg, *Library of Robert Hooke*, pp. 82-98. See also his personal copy of the 9 Aug. 1680 letter he sent to the bookseller Octavian Pullein in Rome, requesting books, including "Sig*n*or Fabretti treatise of the Roman aquaducts. as also Belloris & Cau: Pozzo Cutts & Illustrations;" BL, Sloane MS 1039, fol. 170r. These are Rafaele de Fabretti, de Aquis . . . (Rome, 1680); Giovanni Pietro Bellori, Le vitte di pittori, scultori & architetti moderni (Rome, 1672). It appears Hooke was also trying to procure prints and drawings from Cassiano dal Pozzo's 'Paper museum'.

> who was less interested in the architecture of classical antiquity than in the very latest European design.

Indeed, Hooke's library was a working one, but it also served as a substitute curriculum for his architectural training, a kind of 'education of an architect' redux or a Grand Tour on paper. Hooke needed the technical books not because he was "more interested in the practicalities of building" but because, as someone with no apprenticeship in the construction trades, he was learning some of these practicalities (techniques of construction, quantity surveying, etc.) from his books. We have already seen his use of Alberti's treatise to design an inverted arch system for the foundations of Montagu House. In his extant copy of Michael Dary's *Gauging epitomized* (London, 1669; *RHBdb*, extra_BH_6), for example, he left notes to make it easier to use the next time he needed to calculate a spheroid.[253] While he could have picked up some of this practical knowledge from the construction sites, or from the coffee houses where he socialised with some of the craftsmen, he could not have afforded to appear inexperienced to the workers whose bills he was to assess.[254] As for Hooke's apparent lack of interest in the architecture of classical antiquity or the latest academic discussions; he was already collecting prints of antiquities (e.g. **Figure III-13**), and in any case had likely already picked a side in the debate between Blondel and Perrault.[255] Hooke was aware of Blondel before the publication of the *Cours*. Writing to Oldenburg in 1673, Leibniz did ask "to learn from Mr. Hooke his opinion of Blondel's demonstration concerning the shape of uniformly resistant beams, when you say that he too has reflected on this question."[256] Hooke's answer does not seem to be extant, and although he did later borrow Blondel's *Cours* from Boyle, he must not have found it interesting enough to purchase his own copy.

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[253] Moxon, *Mechanick exercises . . . Applied to the art of bricklayers-works*, p. 20; Michael Dary, *Gauging epitomized: or, an Abbreviation of solid geometry, so much as concerns the business of caskguaging, etc* (London: Printed by W. Godbid, 1669).

[254] Regardless of how knowledgeable and trustworthy the craftsmen may be, one of the responsibilities of the architect was to ensure they were not overcharging the client by claiming they had used larger quantities of material than they actually had. For instance, Hooke thoroughly assessed and sometimes raised issues with some of the bills submitted by craftsmen regarding the work they had undertaken for Westminster Abbey and School; see Chapter IV, ii. 24.

[255] On the debate between Blondel and Perrault, see Anthony Gerbino, *François Blondel: Architecture, Erudition, and the Scientific Revolution* (New York: Routledge, 2010), pp. 148-165.

[256] Leibniz to Oldenburg, 26 Feb. 1673, reproduced as letter 2165 in vol. 9 of A. Rupert Hall and Marie Boas Hall, eds., *The Correspondence of Henry Oldenburg*, 13 vols. (Madison, WI: University of Wisconsin Press, 1965–1975); the quote is from p. 494. See also Gerbino, *François Blondel*, p. 140.

In terms of a balance of books on theory versus practice, a fair contrast between Hooke and Wren's libraries is difficult to achieve, both due to the nature of Wren's auction catalogue and the fact that Wren outlived Hooke by twenty years, allowing him two more decades of architectural practice and book collecting, and perhaps even discarding of outdated or no-longer-needed practical texts.[257] But it may be that Hooke's interest in 'practice' has once again painted a modern image of him as someone little more than a sophisticated craftsman or surveyor.

i. 4. Theory

Tower of Babel

Hooke was not entirely uninterested in architectural theory. While his own personal library may have been missing certain key titles in architectural theory of the time, he had ready access to other sources such as travel literature, books on biblical exegesis or antiquities, classical texts by Ovid and others, from which architectural knowledge could be distilled. But if he wrote any extensive theoretical tracts on architecture, these have not survived.

We know for instance of a shorter text, a lecture on the Tower of Babel which Hooke read to the Royal Society in May 1692. This text and its accompanying illustration have not survived, which is particularly unfortunate as they may have revealed connections between Hooke's interests in language, antiquity, and architecture, via his customary segues from topic to topic. We do, however, have some idea about the contents of the lecture from the meeting minutes of the Society:

> Dr. Hook read an account of the severall opinions concerning the Tower of Babel, from Herodotus, Strabo, and others, thereby showing, that the immense hight thereof is fabulous, and that the whole did not exceed the perpendicular hight of a Stadium, and that the Egyptian Pyramids were near as great buildings.[258]

A week later, he read

> a farther Discourse, concerning the Tower of Babell giving his own opinion of the magnitude, and structure thereof he also gave a

[257] See footnote 187 on Wren's library.

[258] 18 May 1692; RS, JBO/9, p. 85, with further extracts in Appendix iii. 3. See also Felicity Henderson, 'Faithful Interpreters? Translation Theory and Practice at the Early Royal Society', *Notes and Records of the Royal Society* 67 (2013), pp. 101-122.

> translation of a Letter of Pietro de la Valle, describing the Ruines of the said Tower, he produced likewise a figure thereof according as he conceived it to have been, shewing the proportion and Symmetrie thereof, which was contrived to deceive the Eye, and make it appear vastly higher, than really it was.[259]

The discussion appears to have continued a month later with Hooke reading another lecture "wherein he further discovered concerning the Forme, Magnitude, Materialls, Construction, and Use of the Tower of Babylon, or Bali [Baal?], Explaining Divers of them by Draughts, and Delineations there shewn."[260] What Hooke's 'figure', 'draughts', or 'delineations' may have looked like remains unknown; John Aubrey briefly reported how Hooke had "read an excellent Lecture concerning the Tower of Babel, and drawne a Scheme of it," but did not elaborate any further.[261]

Although it is not listed in *BH*, Hooke recorded purchasing a copy of Athanasius Kircher's *Turris Babel* (Amsterdam, 1679) on 26 April 1693, i.e. nearly a year after his lecture.[262] If he had access to it before then, it would have provided him with the most impressive illustrations of the mythical structure. But Hooke also had other textual sources in his library to draw on: the *Histories* of Herodotus, Strabo's *Rerum geographicarum*, and Pietro de la Valle's letters regarding his pilgrimage to the east.[263] He likely also consulted John Greaves's *A discourse of the Romane foot and denarius* or Richard Cumberland's *An essay towards the recovery of the Jewish measures and weights*.[264] With information from these ancient and modern sources, Hooke would have been able to 'reconstruct' the Tower, speculating on

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[259] 25 May 1692; RS, JBO/9, p. 86.

[260] 22 June 1692; ibid., p. 89.

[261] Aubrey, *Monumenta Britannica*, 1665–1693; Bodl., MS Top. Gen. c. 25, fol. 8r. See also Appendix iii. 5 for further extracts from Aubrey's manuscript.

[262] Recorded as 'Turris Beli'; *Diary ii*, p. 234.

[263] Hooke owned two copies of Herodotus's *Histories*: Joachim Camerarius's Greek edition (Basel, 1557; *RHBdb*, auct_BH_71) and an undated Latin translation by Lorenzo Valla (*RHBdb*, auct_BH_1039); Wilhelm Xylander's edition of Stabo's *Rerum geographicarum* (Basel, 1571; *RHBdb*, auct_BH_34), and two texts by Pietro della Valle, *The travels . . . into East-India and Arabia Deserta* (London, 1665; *RHBdb*, auct_BH_1823), and *Viaggi . . . il pellegrino* (Bologna, 1672; *RHBdb*, auct_BH_1517).

[264] John Greaves, *A discourse of the Romane foot and denarius from whence, as from two principles, the measures and weights used by the ancients may be deduced* ([London]: Printed by M. F. for William Lee . . . , 1647); RHBdb, auct_BH_2192, and auct_BH_2266; Richard Cumberland, *An essay towards the recovery of the Jewish measures and weights* (London: n.p., 1686); RHBdb, auct_BH_2125.

its form, dimensions, and materials of construction.[265] He reportedly used his illustration to show the tower's 'proportion and Symmetrie', but rather than this leading into a discussion about Vitruvian concepts of "Order (in Greek τάξις'), Arrangement (in Greek διάθεσις), Eurythmy, Symmetry, Propriety, and Economy," Hooke pointed to optical illusion, how the tower was "contrived to deceive the Eye, and make it appear vastly higher, than really it was."[266]

The subject of optical illusion had also come up a few years prior when a letter from Henri Justel (1620–1693) stimulated a discussion regarding columns at the Society's 24 October 1688 meeting.[267] The French scholar and librarian had relayed an account of the ruins of an ancient city, located somewhere between Tripoli and Alexandria, from where six 45'-high columns had been brought. A debate regarding columns ensued with John Hoskins "observing that that which is commonly called the Gothic, has been by some thought to have been Arabek." He further explained that there was great difference of opinion between architects on the diminution of columns "some holding that the biggest diameter of the Shaft out to be in the Middle of the length, others at one third from the bottom, others that there is no swelling at all." The discussion continued a week later when Hooke gave his opinion that "the reason of this custome of diminishing Pillars was to make them show the higher."[268] Four years later, he apparently thought that the Tower of Babel was repeating this custom.

It should be noted that Hooke's ideas regarding the diminution of columns significantly differed from traditional interpretations of Vitruvius. 'Diminution' referred to the practice of making columns more slender at the top, with the purpose of optically correcting any distortions that may appear from particular angles. It was to give an *appearance* of perfection, but Hooke was suggesting

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[265] The Tower of Babel was of interest beyond as an architectural model, and there were plenty of other books Hooke had access to in his library to expand his thinking into, such as Samuel Bochart, *Geographia sacra* (Frankfurt, 1681; *RHBdb*, auct_BH_607), or Richard Verstegan, *A restitution of decayed intelligence in antiquities* (London, 1673; *RHBdb*, auct_BH_2156). See William Poole, 'Babel and the Rise of Nations', in *The World Makers: Scientists of the Restoration and the Search for the Origins of the Earth* (Oxford: Peter Lang, 2010), pp. 75-83.

[266] Book I, chapter 2, section 1 in Vitruvius, *The Ten Books on Architecture*, trans. Morris Hicky Morgan (New York: Dover Publications Inc., 1960); 25 May 1692; RS, JBO/9/p. 86.

[267] See also Appendix ii. 6 on Hooke's 10 August 1680 letter to Justel, requesting information on "the new way invented for Removing earth made use of in the Kings building."

[268] 24 and 31 October 1688; RS, JBO/8, pp. 225, 227. See Appendix iii. 3 for further extracts from the Society's meeting minutes.

that rather than correcting a distortion, it caused it purposefully to fool the eye.[269] In this regard, he was closer to Claude Perrault, who had argued in his *Ordonnnance des cinq espèces de colonnes selon la méthode des Anciens* (Paris, 1683) that optical corrections would appear as distortions to the eye.[270]

Debates on architectural theory in the context of the Royal Society, as far as it can be discerned from Hooke's diary entries, the meeting minutes, and other sources, appear to have oscillated between the theoretical and the practical, or between "the perusall of Bookes, the consulting of men & the Examination and tryall of things."[271] Hooke and Wren's discussions on antiquities, such as Porsena's monument (**Figures III-226 and 227. cf**) were largely based on textual accounts, but actual findings of Roman and other artefacts during the rebuilding of London, would in turn help interpret an ancient world that had largely descended from books.[272] "In Bush-lane under the very street twenty foot deepe was found . . . *Opus tesselatum* of little pieces of brickes, marble, flints etc.," Aubrey had heard from Hooke. Further digging had revealed a foundation of Roman mortar and "many Roman bricks two foot square, as at Ariconium Kenchester." Another post-fire project, the Thames embankment, had led to findings that convinced Wren that "the gain'd ground from the River of Thames in the Countrey . . . was a greater worke by far then any drayning in Lincolnshire . . . and that it was certaynly so ⌜a Rom*an* worke⌝." But in this particular case, Aubrey could find no history books to back this claim and noted to query Wren further.[273]

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[269] I am grateful to Alberto Pérez-Gómez for drawing my attention to the parallels between Hooke and Perrault's ideas on the subject.

[270] Alberto Pérez-Gómez, 'Introduction', in *Ordonnance for the Five Kinds of Columns after the Method of the Ancients* (Santa Monica, CA: The Getty Center for the History of Art and the Humanities, 1993), pp. 1-44, pp. 24-26. See also Claude Perrault, *Ordonnance for the Five Kinds of Columns after the Method of the Ancients*, trans. Indra Kagis McEwen (Santa Monica, CA: The Getty Center for the History of Art and the Humanities, 1993), pp. 82-85. Perrault's book is not listed in *BH*.

[271] Hooke, 'Proposals for the good of the Royal Society'; RS, Cl.P/20/50, fols. 84r, 92r. See also the beginning of this chapter.

[272] On architectural discussions in the early years of the Royal Society, see James W. P. Campbell, 'Wren, Architectural Research and the History of Trades in the Early Royal Society', in *Architecture, Cultural History, Autobiography* (Oxford: Voltaire Foundation, University of Oxford, 2008), pp. 9-27. On Wren's views on antiquities, see Soo, *Wren's "Tracts" on Architecture and Other Writings*, pp. 18-33, 153-195. For a more theoretical, rather than historical, treatment of the subject, see Alexander Wragge-Morley, 'Restitution, Description and Knowledge in English Architecture and Natural Philosophy, 1650–1750', *ARQ* 14 (2010), pp. 247-254.

[273] Bodl., MS Top. Gen. c. 24, fol. 244r, with further extracts in Appendix iii. 5. Most recent work on Aubrey's antiquarian work includes Kelsey Jackson Williams, *The Antiquary: John Aubrey's Historical Scholarship* (New York: Oxford University Press, 2016). On the Thames embankment project, see Chapter IV, ii. 9.

Sometimes the found materials were even experimented on. At one of the meetings, in an attempt to find the "Ingredients of the Cement for the old Roman earthen Water-pipes found in Fleet ditch," it was "put into the fire [and] was found to smell strong of Pitch and Rosin, and it was supposed that a third Engredient was Brickdust." Finding the right mixture for cement capable of setting in wet environments was a concern at this time, especially for the Fleet Canal project which involved building brick walls on the sides of the river.[274] Indeed after the fire of London, the Society had been involved in attempts at developing building materials, such as bricks and tiles, but it would be wrong to interpret these as purely practical endeavours.[275] As noted at the beginning of this chapter, there was the desire to test knowledge that had descended from books against 'the things themselves'. In the words of the Society's 'Mechanicall Committee', once knowledge was collected from books, and notice was taken "of what is practised and not found in Books," the next step was indeed "to consider what may be further done for the improuvement of mechanicks."[276] And there was certainly considerable pressure on the Society to make knowledge useful and (as colourfully pointed out by Shadwell) suitable "for the Practick."[277] At a more fundamental level, however, theory and practice were inextricably linked in the 'new science'. Experimental philosophy necessitated that nature be recreated in an artificial setting; rather than passively observing nature, air pumps and engines and tools had to be invented and built to test the properties of air, measure gravity, etc. For a Society founded to promote 'Physico-Mathematical Experimental Learning', artifice could never exist at the extreme end of a 'artificial vs natural' spectrum, just as theory and practice could not exist in polar ends.[278] At the Society meetings, a discussion on the properties of sand could easily segue into Hooke's relation of the problems with the foundations of Berkeley House in Piccadilly, or one on air movement could lead to Halley giving a detailed account of Wren's "Chimney for the gunners room at Whitehall under the eddy of the

[274] 6 Mar. 1695; RS, JBO/9/p. 182. See also Appendix iii. 3, and Chapter IV, ii. 7 for Hooke and Wren's work on Fleet Canal.

[275] On the Society's attempts at improving brick production, see the extracts from the meeting minutes in Appendix iii. 2.

[276] RS, MS 5.67, fol. 1, transcribed in Hunter, *Establishing the New Science*, pp. 115-116.

[277] Shadwell, *The virtuoso*, p. 27.

[278] For the contemporary debates on the nature of experimental philosophy, see, for example, Shapin and Schaffer, *Leviathan and the Air-pump*.

Banqueting house, and long Gallery."[279] Indeed, a lecture on an "Indian Book of Arithmetick," could conclude with a demonstration of weaving cloth.[280]

Vitruvius

In such a context, it is not surprising that Hooke's interest in editions of Vitruvius would extend beyond architectural theory. In the 1670s, he was involved in a project to publish an English translation of *De architectura*, or in Evelyn's often-quoted words, to make "Vitruvius . . . speak English."[281]

In secondary literature, most references to this project can be traced to Eileen Harris's *British Architectural Books and Writers, 1556–1785*. Harris noted how in 1670, Christopher Wase (1625–1690) "a Latin scholar, a protégé and probably a relation of John Evelyn, started rendering the Latin text into English . . . [and] was able to complete a manuscript by 1671 and to print a specimen of the preface and first chapter along with 'Certain Humble Propositions' for its publication." It was to be illustrated with "proper Cutts and Diagrams, with some Comparison of Antient and Modern Architects," and include notes from other authors and 'able persons'. Considering Evelyn's role as one of the trustees of the subscription funds and his interest in architectural theory, Harris noted that he was likely one of those 'able person's and "may have been the initiator of the project." Wase's translation failed to attract enough subscribers willing or able to pay £1 sterling for the volume, and with the publication of Perrault's substantial 1673 edition, the project went dormant. And after receiving a few mentions in Hooke's diaries in 1675 and 1676, it appears to have died out completely.[282]

Perhaps because the translation was never published and therefore presumably had no influence on architectural discourse of the time, this episode occupies minimal space in secondary literature, and references to the project are summed up in a few sentences or are relegated to footnotes.

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[279] 17 July 1689 and 28 Oct. 1691; RS, RBO/8/pp. 59, 270. See also Appendix iii. 3.

There is no evidence of Hooke's involvement in the design or construction of Berkeley House, which was built by Hugh May, and was eventually destroyed in 1733. It is possible he heard of its construction troubles from the contractors he worked with. On Berkeley House, see Edward Walford, 'Mansions in Piccadilly', in *Old and New London: Volume 4* (London: Cassell, Petter & Galpin, 1878), pp. 273-290.

[280] Hooke, 'Of the arithmatick of the Brachmans', 4 Dec. 1689; RS, JBO/8/p. 283. See also Appendix iii. 3. Hooke's lecture has survived in manuscript as RS, Cl.P/20/79.

[281] Evelyn quoted in Harris and Savage, *British Architectural Books and Writers, 1556–1785*, p. 462; also referenced by Pierre de la Ruffinière du Prey, *Hawksmoor's London Churches: Architecture and Theology* (Chicago, IL: University of Chicago Press, 2000), p. 6.

[282] Harris and Savage, *British Architectural Books and Writers, 1556–1785*, p. 462.

Considering Hooke's involvement, however, it will be useful to shed some further light on this publication project.

In a 7 July 1671 letter to an unknown recipient, Wase wrote that during his past year of "vacancy from employment," he had translated some texts from Latin into English, the principal one being a "rendering [of] Vitruvius, a very difficult but erudite Authour in the usefull & concrete Mathematiques." In addition to a full translation, he explained, he was "preparing to publish an Abbridgem*en*t of Vitruvius found in a Manuscript in Westminster Colledge Library indifferent Ancient: w*hi*ch may be at 2s 6d price."[283]

It has been suggested that the letter was addressed to Evelyn's father-in-law, Richard Browne (1605–1683).[284] Had Evelyn been the instigator of the project, Wase would have likely mentioned something to that effect, so it is possible that the translation was Wase's own project, at least at the beginning. Indeed, Evelyn's expression of making "Vitruvius . . . speak English" actually dated to his 1706 edition of the 'Account of Architects', which included a 21 February 1697 dedication to Wren. It was appended to the 1707 edition of his translation of Fréart's *Parallel* (as well as the later 1723 edition), where Evelyn wrote

> one should proceed to the more particular Distributions of this Art, wither in Respect to Private or Publick Buildings, but I leave it for some perfect Edition of what remains of the incomparable Palladio; when either by the same it is begun, or by some other Charitable Hand,

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[283] Letter from Christopher Wase [to Richard Browne?], 7 July 1671; Corpus Christi College, Oxford, MS 332, fol. 16r. I am grateful to Corpus Christi College assistant archivist Harriet Patrick for providing me with a reproduction of this letter.

'Westminster Colledge' is almost certainly Westminster School rather than the Cambridge college which was founded in London in 1844 before moving to Cambridge in 1899; see Westminster College University of Cambridge, 'About the College', https://goo.gl/S9zzPc. This abridged manuscript does not appear to be extant.

[284] There is no clear indication of the addressee's identity, though Sir Richard Browne (1605–1683), baronet and father-in-law to John Evelyn and a distant relation to Wase, has been suggested as a likely candidate; Henricus O. Coxe, *Catalogus Codicum MSS, qui in Collegiis Aulisque Oxoniensibus Hodie Adservantur. Pars II* ([Oxford]: E Typographeo Academico, 1852), p. 174. That Wase may be related to Browne, we learn from Evelyn who wrote in his diary on 1 February 1652 "I brought with me from Paris Mr. Christopher Wase . . . From his excellent learning, and some relation he had to Sir R. Browne, I bore his charges into England," John Evelyn, *Diary and Correspondence of John Evelyn, F. R. S.*, ed. William Bray (London: Henry G. Bohn, 1862), p. 287. Wase is identified as a cousin of Lady Browne in Gillian Darley, *John Evelyn: Living for Ingenuity* (New Haven, CT: Yale University Press, 2006), p. 322n39.

> That, or our Master, Vitruvius himself, as Publish'd by the Learned Perault shall be taught to speak English.[285]

The same section of the 'Account of Architects' in the first edition of 1664, reprinted with the same wording in 1680, read differently:

> I should now proceed to the more particular distributions of this Art, wither in respect to private or publick Buildings, but I leave it for the next Edition of what remains of the incomparable Palladio, when either by the same it is begun, or by some other charitable hand, it shall be taught to speak English.[286]

It appears, for Evelyn at least, the impetus to make Vitruvius 'speak English' was the publication of Perrault's translation in 1673. This does not preclude his encouragement of Wase's translation but the latter may have already been interested in Vitruvius for other reasons.

Educated at Eton and then King's College, Cambridge, Wase was a classical scholar and a gifted translator. At age twenty, he published a Greek translation of Hugo Grotius's *Baptizatorum puerorum institutio* (London, 1647 and multiple subsequent editions), followed by further translations of Greek and Latin classical works. With Evelyn's help, around 1652, he was appointed tutor to William Herbert (1640–1674), eldest son of Philip Herbert (1584–1650), the fourth earl of Pembroke and a well-known patron of the arts. For his country seat at Wilton, the earl had commissioned no less figures than Isaac de Caus (1589/90–1648) to build the extensive gardens, and Inigo Jones and John Webb (1611–1672) to rebuild the house after its almost-complete destruction in a fire in 1647, and it is very possible that Wase saw at least some of the work under construction.[287] Between 1655 and

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[285] John Evelyn, *An account of architects and architecture, together, with an historical, etymological explanation of certain terms, particularly affected by architects. Much inlarg'd and improv'd, since the former impression . . . Together with Leon Baptist Alberti, Of statues* (London: [Dan. Brown?], 1706), p. 16.

[286] Roland Fréart, sieur de Chambray, A parallel of the antient architecture with the modern in a collection of ten principal authors who have written upon the five orders . . . : the three Greek orders, Dorique, Ionique, and Corinthian, comprise the first part of this treatise, and the two Latine, Tuscan and Composita, the latter written in French by Roland Freart, sieur de Chambray; made English for the benefit of builders; to which is added An account of architects and architecture, in an historical and etymological explanation of certain tearms particularly affected by architects; with Leon Baptista Alberti's treatise of statues, by John Evelyn, Esq (London: Printed by Tho. Roycroft for John Place . . . , 1664), p. 123.

[287] 'Herbert, Philip, first earl of Montgomery and fourth earl of Pembroke (1584–1650)', *ODNB*. He was the younger brother of the third earl, William Herbert (1580–1630), who founded Pembroke College in Oxford, served as the university chancellor, and made several bequests to the Bodleian Library; 'Herbert, William, third

1668, Wase made his living as a schoolmaster in Essex and Kent, before being appointed historiographer in the office of Joseph Williamson (1633–1701), secretary of state and later president of the Royal Society. During his post, Wase became involved in a debate regarding free schools where some were arguing that educating the poor had contributed to the dissent that had eventually led to the Civil War. Hoping to extol the benefits of general education, he began a systematic study which culminated in a later publication. In 1671, he was elected 'architypographus', a supervisor of the university press at Oxford, where he remained until his death.

His background as a tutor and schoolmaster, previous work as a classics scholar, and a desire to defend education in general, may have encouraged Wase to translate Vitruvius's treatise which was not only the sole surviving architectural text to descend from antiquity, but its section on the education of an architect was the only example of its kind.[288] The opening paragraph of his 'Certain Humble Propositions' announced the translation in a way that downplayed architecture in its narrow definition, emphasising instead its multidisciplinary nature, as "containing the whole Body of Architecture, under which are comprehended the Elements of the Old Musick, Picture in Fresco, Water Levelling or Hydrostaticks, Water-Organs, or Hydraulicks, Astronomy and Dialling, Mechanical Powers and Engines."[289]

Wase was ultimately unable to publish his translation, but years later, he found the chance to invoke Vitruvius in his *Considerations concerning free schools as settled in England* (Oxford, 1678), a defense of free schools which had been accused of "creating more scholars than there were preferments," and of "diverting those, whom Nature or Fortune had determin'd to the Plough, the Oar, or other Handicrafts, from their proper design, to the study of Liberal Arts, and even Divinity it self." Far from being potentially dangerous to the established social order, Wase argued, education was essential for the welfare of the state; after all, "the Nobility and Gentry require servants of different abilities," and

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earl of Pembroke (1580–1630)', *ODNB*. The brothers were the dedicatees of Shakespeare's first folio. *ODNB* states that the earl had commissioned 'Solomon de Caus' in the 1630s to design a new palace at Wilton, however if this was the architect 'Salomon' de Caus (*c.* 1576–1626), it should be noted that the latter had died in 1626.

The fact that Wase dedicated his translation of Faliscus Grattius's poem on hunting, *Cynegeticon* (London, 1654), to his pupil William strengthens the possibility that they were based in the country at Wilton House, rather than at the earl's estate in London.

[288] Wase was not entirely uneducated in practical mathematics. Among his archives are calculations, geometric illustrations, and notes in English, Latin, and Greek from various sources, including Vitruvius, David Rivaltus a Flurantia's Archimedes, Girolamo Cardano, and Guidi Ubaldi; Corpus Christi College, Oxford, MS 391/3, fols. 68, 69, 77, 92.

[289] Corpus Christi College, Oxford, MS 378, fol. 218r.

it was not "for the particular or publick more advantageous . . . to . . . be a meer Plough-man or Grazier."[290] Rather than concentrated training in one field, this basic education would cover the most basic topics, such as grammar, which was "of use in Navigation and in Travel, and in most of the politer Handcrafts," for

> [as Vitruvius says] an Architect neither is nor should be as good a Grammarian as Aristarchus, yet not illiterate: nor as good a Musician as Aristoxenus, yet not unmusical: nor as good a Limner as Apelles, yet not unskilful at designing: nor as good a Founder as Myron or Polycletus, yet not ignorant of the way of moulding: nor again, as good a Physician as Hippocrates, yet not unacquainted with the Grounds of Physick: nor in the other Faculties singularly eminent, but not ignorant of them: even in hedging and ditching men of improv'd sense and forecast, that comprehend Lines and Numbers, and Seasons, will be Master Work-men among the other Laborers.[291]

The translation project laid dormant until the publication of Claude Perrault's *Les dix livres d'architecture de Vitruve corrigés et traduits nouvellement en Français avec des notes & des figures* (Paris, 1673), which seems to have briefly reignited it. Even before its publication, Perrault's translation had generated some anticipation in England; in his February 1672 letter to fellow mathematician John Collins (1626–1683), John Wallis (1616–1703) wrote "Mr Wase I have not yet spoken with, but shall inform him as you direct about Peraults translation of Vitruvius."[292] There seems to have been a general feeling that Wase was either not up to the task or perhaps his translation was somehow not

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[290] Christopher Wase, *Considerations concerning free-schools as settled in England* (Oxford: Printed at the Theater, 1678), pp. 1, 48.

[291] Ibid., p. 49.

[292] Philip Beeley and Christoph J. Scriba, eds., *Correspondence of John Wallis (1616–1703): Volume IV (1672–April 1675)* (New York: Oxford University Press, 2014), p. 25.

Perrault's text would later be reviewed, with great praise, in the *Philosophical transactions* in 1675; 'An accompt of two books: I. Les dix livres d'architecture de Vitruve, corrigez, & traduits nouvellement en Francois, avec des notes & des figures; par Claude Perrault, de l'Academie Royale des Science, & medecin de la faculté de Paris. Imprimé à Paris, 1673. in fol', *Philosophical transactions* 10 (1675), pp. 279-282.

architectural enough. John Hoskins, writing to Aubrey about six months later expressed his impatience with Wase, and instead wished for some 'archarchitectonicall proposition from Dr C*hristopher* W*ren*'.[293]

A year later, there was still no word on Wase's translation. In a 9 December 1673 letter to Anthony Wood, Aubrey wrote "My hearty respects to my worthy friend M[r] Ch: Wase: you have not yet told me whether he will print a translation of any Com*m*entators on Vitruvius."[294] In an undated note, Aubrey wrote to Wood again, "Dr Wren & Mr Hooke desire to know if [Wase] has finished his Translation of Vitruvius and if he has translated any Com*m*entators upon him, and whom; & whether he is resolved to print it, or desist. pray aske him, you need not name them."[295] In a letter dated 27 April 1676, Wase finally wrote to Aubrey

> I understand by yo*u*rs of March 9th – 75 [1676] & a following April 17 – 76 [1676] *tha*t there is preparat*ion* to set forth Vitruvius in English by *th*e French cutts drawn over: & *th*e more conducing Annotations of S[r] Chr*istopher* Wren & M[r] Hooke.
>
> Be assur'd *tha*t yo*ur* own: & those very worthy names have great weight w*i*th me: & though my Papers are somew*ha*t embezell'd yet *th*e main of them is safe w*i*th me: & I shall be very ready (upon equall dialing) to rend*e*r those rough draughts to be fitted for *th*e publicq: but hast*e* in these things is pernicious.[296]

However, nothing much would result from these plans. A few months later, on 21 September 1676 Hooke would have a disappointing encounter with the translator, noting "met Wase [he was] Drunk. Discoursed about Vitruvius. Demanded £50 for translation, £5 each book."[297] After this, the subject

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[293] Bodl., MS Aubrey 12, fol. 212v. The part of the folio with the date is torn out, but there is a reference to 'Aug. 19 *167*2' at the beginning of the letter.

[294] Bodl., MS Wood F. 39, fol. 241v.

[295] Bodl., MS Wood F. 39, fol. 126r.

[296] Wase to Aubrey, 27 Apr. 1676; Bodl., MS Aubrey 13, fol. 250r. The previous letter and reply from Aubrey are lost.

[297] *Diary i*, p. 250. Other entries: 20 January 1675, p.143, "At Mr. Richards. Mr. Hill returnd. Saw map of France and spoke about Wase and Vitruvius;" 23 March 1675, p.154: "To Lord of Londons took Vitruvius and Marots subscriptions from Oldenburg;" 5 October 1676, p. 252, "Sir J. Hoskins read the proposition of Vitruvius."

was dropped, and the first English translation of Vitruvius would only appear in 1692, two years after Wase's death, as an anonymously-translated abridged edition of Perrault's text.[298]

It is difficult to speculate what Hooke and Wren's intentions may have been for their edition, or who their intended audience was.[299] Scholars would have already had the language skills to consult the numerous Latin editions of Vitruvius available, although not everyone would have found it easy to understand some of the more obscure uses of terminology.[300] Like Wase, Hooke was certainly interested in education, especially in practical mathematics due to his work with the Royal Mathematical School, and may have envisioned at least some parts of the translation as benefiting them.[301] Also, he did sometimes lend his books to craftsmen—could they have been whom he had in mind?[302] At the 14 November 1664 meeting of the Royal Society's 'Committee for mechanicks', each member submitted the list of 'mechanicall authors' they wished to peruse. Hooke's, which was the longest, contained "Vitruvius, Vegetius, Galilaei, Besson, Riccioli, Schouterus Conick Sections." As noted in their previous meeting, the task was "to collect what is delivered in Books, and practiced; to take notice of what is practised and not found in Books; and then to consider what may be further done for the improuvement of mechanicks."[303] Had this Baconian program been followed, the plan may have been to consult editions of Vitruvius, survey practices in the field, and produce a new edition with a view of 'improving' the art.

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298 Vitruvius, *An abridgment of the architecture of Vitruvius containing a system of the whole works of that author: illustrated with divers copper plates, curiously engraved : with a table of explanation: to which is added in this edition the etymology and derivation of the terms used in architecture / first done in French by Monsr Perrault, of the Academy of Paris, and now Englished, with additions* (London: Printed for Abel Swall and T. Child . . . , 1692). See also Harris and Savage, *British Architectural Books and Writers, 1556–1785*, pp. 462-463.

299 It is possible they had separate agendas. On Wren's study of Vitruvius and other architectural texts, see Soo, *Wren's "Tracts" on Architecture and Other Writings*.

300 It should, however, be noted that even established natural philosophers may not have had the best knowledge of Latin. Aubrey wrote of William Harvey: "He understood Greeke and Latin pretty well: but was no Critique, and he wrote very bad Latin," adding that his two famous works *De circuli sanguinis* and *De generatione animalium* were translated into Latin by George Ent; Aubrey, *Brief Lives*, p. 201.

301 See Chapter III on the portable *camera obscura* he invented for the pupils' use, and Chapter IV, ii. 21 on his work at Christ's Hospital where the School was founded.

302 On 21 May 1677, he noted lending his copy of 'Dee's Euclid' (i.e. the 1570 English translation of the *Elements*) to Bates, the carpenter. A few months later, he also "lent compasses and [an unidentified] book to the mason at Fish street hill," though he promptly collected them back the next day; *Diary i*, pp. 291, 323.

303 RS, MS 5.67, fol. 1, transcribed in Hunter, *Establishing the New Science*, pp. 115-116.

Hooke's views changed over the years on whether such improvements were possible and were particularly hardened by his protracted dispute with his patron John Cutler. The latter withheld Hooke's stipend payments arguing that his Cutlerian lectures were not sufficiently regarding 'the history of trades' as they had been intended.[304] Hooke defended himself arguing that it would be preferable to teach "perpetuall & universall knowledge" rather than "the mechanicke [which] is mostly pro hic & nunc & will not as the other, bee a part of naturall history." This did not mean being content with "the Speculative part" and not caring "for the Practick" Shadwell had unfairly ridiculed him for.[305] All tradesmen already knew the operative part of their work which could not be "taught by words," Hooke argued, but "the speculative & rationall part" could. A written text on a practice could but only impart the rationale behind it:

> There is nothing properly taught to bee knowne but where the reason and cause is explained which will also give light, rules, & hints for further inventions and it is better doe this at first altogether, that is, read lectures of principles than upon each severall subject begin & demonstrate from first principles, and trades or parts of them may bee instanced as experiments to prove theoryes.[306]

This was not a criticism of practical books. Considering the amount of knowledge he extracted from them, Hooke was well aware of their utility, and could 'peruse' copious numbers of such books to develop his skills.[307] Indeed they were the first step in his idea of facilitating the improvement of natural knowledge via 'the perusall of Bookes, the consulting of men & the Examination and tryall of things'. He also learnt techniques from craftsmen, consulting and collaborating with artificers, instrument makers, and builders.[308] The question was rather what he and other Royal Society fellows could contribute back to the arts. Hooke never fully developed his idea of a 'philosophical algebra', which he conceived of as a way to improve natural and experimental philosophy, but he seems to have

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[304] On the dispute, see Michael Hunter, 'Science, Technology and Patronage: Robert Hooke and the Cutlerian Lectureship', in *Establishing the New Science: The Experience of the Early Royal Society* (New Hampshire, CT: The Boydell Press, 1989), pp. 279-338.

[305] See footnote 277.

[306] Hunter, 'A "College" for the Royal Society', p. 313.

[307] See Chapter III on his bookish training in drawing and art.

[308] Rob Iliffe, 'Material Doubts: Hooke, Artisan Culture and the Exchange of Information in 1670s London', *British Journal for the History of Science* 28 (1995), pp. 285-318.

also seen its possible utility in the practical arts.[309] If these arts could be reduced to first principals, they could then generate the building blocks of further inventions: a kind of algebra for trades and craft. However, this theory of practice, and the Society's 'history of trades' project, seem to have eventually (and quietly) fizzled out.[310]

[309] On Hooke's idea of a 'philosophical algebra', first proposed in his 'General scheme' dating to around 1666, see Mary B. Hesse, 'Hooke's Philosophical Algebra', *ISIS: Journal of the History of Science in Society* 57 (1966), pp. 67-83; Hooke, 'General scheme, or idea of the present state of natural philosophy and how its defects may be remedied by a methodical proceeding in the making of experiments and collecting observations, whereby to compile a natural history as the solid basis for the superstructure of true philosophy', and 'Mathematicall language [*c.* 1686]', RS, Cl.P/20/72.

Hooke's idea of using language to produce new knowledge was not unique. In *De corpore*, book one, Thomas Hobbes had suggested that reasoning was computation and that logic worked with the arithmetic operations of addition and subtraction. This in turn may have influenced Leibniz's work on logic; George Macdonald Ross, 'Leibniz's Debt to Hobbes', in *Leibniz and the English-Speaking World*, ed. Pauline Phemister and Stuart Brown (Dordrecht: Springer, 2007), pp. 19-33, pp. 21-22.

[310] Campbell, 'Wren, Architectural Research and the History of Trades in the Early Royal Society'; Kathleen H. Ochs, 'The Royal Society of London's History of Trades Programme: An Early Episode in Applied Science', *Notes and Records of the Royal Society of London* 39 (1985), pp. 129-158.

CHAPTER III – DRAWING

i. Hooke's drawings[311]

i. 1. An archival overview

There is considerable amount of confusion regarding Hooke's drawings, no doubt caused by the erratic dispersal of his papers. The largest cache of his architectural drawings is at the British Library, bound in Add. MS 5238 (**Figures III-10 to 133**), which was compiled from two sets separately acquired by Hans Sloane (1660–1753) who catalogued it as 'Drawings and designs of the Monument & Designes relating to Architecture, draughts of the River Thames's wharf chiefly by Dr. Hook, Roe and others, with some other original drawings by several Masters – first by R*oger* Bradley 1722 part of a Roman Pavement found at Wood Chester in Glo*uce*ster*shire* – fo*lio*'.[312] As Sloane's description suggests, indeed the volume includes drawings dated after Hooke's death. Furthermore, the great variance in the drawing styles, especially of the figural ones, makes it highly likely that some of these are the 'other original drawings by several Masters' noted by Sloane. This does not preclude the possibility that Hooke may have purchased drawings for his own collection, whether for reference or pleasure. The inventory of his possessions at his death, after all, listed framed and unframed pictures, as well as "A Collection of prints, drawings &c. appraised and valued at Tenne pounds."[313]

The British Library is not the only repository with drawings attributed to Hooke. The Royal Society has most of Hooke's extant natural philosophical papers which contain sketches of observations and instruments, some with human figures (**Figures III-238 to 329**). The fact that

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311 An 'annotated list of prints and manuscript drawings among Hooke's papers or that have been attributed to him' is provided in Volume 2 as Chapter III, ii.

312 Sloane's note regarding the volume is from BL, Sloane MS 3972C IV, fol. 2497/243, as transcribed in Kim Sloan, 'Typescript of All 'Miniatura' Listed in Sloane's Own MS Catalogue of His Library (BL Sloane MS 3972C IV And Ms 3972 C VI)' (unpub. work, May 2010). I am grateful to Dr. Sloan for sharing her unpublished transcription of Sloane's catalogues.

Detailed information on these drawings is provided below in section ii, 'Annotated list of prints and manuscript drawings among Hooke's papers or that have been attributed to him'; see ii. 2. b for further information on BL, Add. MS 5238. As discussed below, Sloane's collection of objects, specimens, manuscripts, and printed books was purchased by the Parliament in 1753 and became the founding collection of the British Museum, the library of which later became one of the constituent parts of the British Library founded in 1972. Note that the first building of the British Museum was Montagu House, of which at least an earlier version was designed by Hooke; see Chapter IV, ii. 19.

313 Hunter, 'Hooke's Possessions at his Death: A Hitherto Unknown Inventory'.

Hooke never signed his drawings, with the single exception of a figural study now at Tate Britain (**Figure III-333. a**), has been a complicating factor, but since the accompanying notes among his Royal Society papers are dated, these sketches are useful in identifying Hooke's drawing skills at different times.

There are various other architectural drawings attributed to Hooke in different repositories. The attributions have been based on his handwriting (when enough of a sample is present), the subject of the drawing (e.g. a confirmed Hooke building like the Bethlem Hospital), and his presumed drawing style. The latter remains subjective and is the reason why some of these attributions have been retracted over the years.[314]

There is no known comprehensive list of Hooke's manuscript drawings—architectural or otherwise. Catalogues of the repositories where his drawings reside usually give the most general of information, rarely containing useful details. The Sloane catalogue at the British Library, for instance, describes Add. MS 5238, nos. 24-31 (**Figures III-45 to 49**) as 'trifling prints and sketches', when some of those 'trifling prints' may be related to the Royal Society's investigations into printing techniques, or nos. 50-56 (**Figures III-71 to 76**) as 'plans and elevations of Bedlam Hospital' when in fact only one, no. 55 (**Figure III-75**), is related to that building. This lack of proper identification of the drawings from his collections have further caused confusion, where by virtue of being among Hooke's papers, drawings by others have been automatically attributed to him.

It is with the intention of properly sorting out the primary sources to facilitate this dissertation, as well as to foster further research on the subject, that an 'annotated list of prints and manuscript drawings among Hooke's papers or that have been attributed to him' is provided in section ii of this chapter. The images are reproduced separately, in Volume 2, for easier consultation side-by-side. Given the interdisciplinary approach here, the list includes his architectural, figural, mathematical, and natural philosophical drawings, as well as prints and drawings by others found among his papers. However, it does not have any pretence of being a complete list of all of Hooke's drawings. It excludes some of Hooke's work as a City Surveyor, as well as the engravings printed in his works, unless they are related to his extant archives or serve an explanatory function (e.g. **Figures III-161 cf. to 163**

[314] Hooke's architectural work, such as the Bethlem Hospital or Montagu House are treated in Chapter IV.

cf).[315] The chance discovery of the Hooke Folio suggests that more documentation of Hooke's architectural work and other drawings in his hand may be discovered in future, some perhaps among the archives of his clients' and friends' descendants. They may also be lurking in unexpected places, such as the commonplace book among the Worsley papers at Lincolnshire Archives, where a rare criticism of Wren attributed to Hooke has hitherto remained obscure (**Figure III-193**).

The list has been compiled through research in twenty archives, twelve of which were consulted in person.[316] One repository, Cherokee Ranch and Castle Foundation in Colorado, proved to be difficult to reach, therefore images had to be sourced from a published article (**Figures III-184 to 188**). Some of the annotations are short, while others span several pages and discuss a group of thematically-linked images, for instance, of telescopes. Additional images been have provided for explanatory or contextual purposes; these are marked with 'cf' (e.g. Figure III-84. cf) to avoid giving any false impression that they were found among Hooke's papers. All of the architectural prints, as well as some of the figural engravings, have been identified; in turn, a few of the manuscript copies of engravings (e.g. **Figures III-284, 304, 306**) have been matched to the original prints. Sketches such as **Figures III-157, 193, 315, 316** are likely to be fresh discoveries.[317] Conversely, the attributions of some of the drawings to Hooke are called into question (**Figures III-234 and 235**), while others, such as the early insect drawings (**Figures III-141 and 142**), are outright rejected.

i. 2. Hooke's travails with perspective and figural drawings

A holistic view of Hooke's drawing practices reveals certain peculiarities that have otherwise gone unnoticed. First is Hooke's struggles with perspectival and figural drawings, which call into question his assumed apprenticeship with the painter Peter Lely. Indeed, it is possible to see that one of his more sophisticated figural drawings, now at Tate Britain (**Figure III-333. a**), is in fact composed with the aid of an Italian engraving among his papers at the British Library (**Figure III-65**). Hooke's

[315] Hooke's work for the City of London has been studied by Michael Cooper, who has reproduced two of his survey drawings as figures 47 and 66 on pp. 145 and 199 in *Robert Hooke and the Rebuilding of London*. As noted in Chapter IV, ii. 1, a detailed analysis of Hooke's work as a City Surveyor is outside of the scope of this dissertation. Nonetheless, a 1692 plan of Honey Lane Market, examined and approved by Hooke and fellow City Surveyor John Oliver, has been reproduced as Figure III-196, to illustrate the variety of drawing techniques in use at the time.

[316] Since only the repositories containing drawings and prints are listed here, for a full list of archives consulted for research on Hooke's work, see the primary sources section of the Bibliography.

[317] Or rather 'rediscoveries', considering they are found in archives.

graphical travails further contextualise and may have even encouraged his experimentation with mechanical devices for drawing.

Hooke was particularly comfortable drawing with the help of optical or so-called 'perspective' tools, such as magnifying glasses, microscopes, or telescopes. Working with craftsmen, he even developed his own instruments, and sketches of some of these devices can be found among his papers (e.g. **Figures III-1, 9, 167 a & b, 281**) as well as in his published works. Drawings he made with the help of telescopes (e.g. **Figures III-1, 9, 244, 281, 292 to 303, 326, 328**) or a terrella (**Figure III-172**) are extant but his microscopic observations are rarer to find.[318] The identity and contributions of 'Vander Diver', presumably a Dutch artist, assigned to produce the drawings of insects with Hooke, remain unknown. And while there is evidence that the Royal Society printers John Martyn (1617/18–1680) and James Allestry (*d.* 1670) were actively involved in soliciting help from the "best Gravers wee have in Towne" for *Micrographia*, frustratingly the identities of the engravers also remain unknown.[319] However there is one extant drawing reproduced in *Micrographia*; a sketch, not of an insect but of the 'six branched figures in frozen urine' Hooke observed in 1662 (**Figure III-252**), and it is possible to discern that it was done in a carefully-controlled hand. It is likely that his drawings of the 'figures observed in snow' from that same year (**Figures III-317 and 318**) were also used for the same plate (**Figure III-253. cf**).

Hooke's level of comfort did not extend into drawing *in* perspective, however. He did utilise orthogonal projections, sometimes aided by various techniques of shading, to illustrate devices for his natural philosophical or experimental work. These spanned between rough sketches of ideas (e.g. for his printing engine (**Figure III-9**) or for a rolling press (**Figure III-46**) or for what appears to be a

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318 The insect drawings formerly attributed to Hooke by Janice Neri (Figures III-141 to 145), can now be comfortably de-attributed; see the annotations for these figures in section ii of this chapter.

319 In 1663, Henry Power (*c.* 1626–1668), who was in the process of publishing his own microscopical observations, albeit with relatively crude woodcuts, was keeping tabs on the progress of Hooke's *Micrographia* by corresponding with Martyn and Allestry, who eventually printed both of their books. In a letter dated 7 August 1663, Martyn informed Power "Wee have as yett but 2 plates of Mr. Hooke's w*h*ich I have put out to 2 of *th*e best Gravers wee have in Towne, tomorrow I am to Call for more." Two weeks later Allestry updated him, noting "Mr. Hooke hath given mee three Cutts of his Booke w*h*ich are at the Gravers." For this correspondence, which seems to have eluded scholars, see BL, Sloane MS 1326, fols. 40r and 39r. For an expanded discussion on the subject, with further sources, see the annotations for Figures III-141 and III-142.

How many of the drawings from the dissection of the porpoise, later reproduced by Edward Tyson in *Phocaena, or the anatomy of a porpess* (London, 1680) (Figures III-229 to III-232. cf) were in Hooke's hand is unclear.

water pump (**Figure III-157**)) and more elaborate drawings in ink and ink wash (e.g. of an axe head (**Figure III-20**) or of various devices for measuring gravity (**Figure III-256**) or air movement (**Figure III-324**) or for sounding the depths of the sea (**Figure III-262**)).[320] But such projections did not involve the use of *perspectiva artificialis* with which Hooke appears to have had great difficulty for some time.

In 1664, Hooke produced a sketch of the new 36-foot telescope set up in the courtyard of Gresham College (**Figure III-281**). He had little trouble illustrating the elaborate hoisting structure in the middle of the yard; perhaps because he had already had some practice, having copied the drawing of a similar mechanism. The latter had been sent by Robert Southwell as an attachment to his *c.* 1661 letter to Boyle describing the telescope he had seen in Prince Leopoldo's court in Florence. Boyle must have shared it with Hooke, who produced a nearly-identical copy of the drawing (**Figures III-282 and 283**) and attached it to his description of the Gresham telescope.[321] Hooke borrowed the same type of orthogonal projection used in Southwell's drawing to illustrate the Gresham telescope, but he appears to have had difficulty sketching the courtyard itself, leaving traces of his efforts with the horizon line, not to mention the elevations of the colonnades surrounding the yard (**Figure III-281**). Hooke's undated one-point perspective drawing of a barrel (**Figure III-56**), with its three separate vanishing points, further illustrates his struggles with the technique. An unfinished figural sketch of a woman and child (**Figure III-23**), most likely copied from a print, displays similar problems; while the faces are drawn in a somewhat competent manner, the architectural elements seem rather problematic in terms of perspective and shading.[322] Indeed, for someone who supposedly apprenticed with Peter Lely, Hooke was oddly lacking the skills in the painterly art of perspective.

Ever the autodidact, via 'perusal of books', Hooke appears to have remedied his deficiencies. He was particularly interested in books on artistic techniques, and by 1675, had no less than five

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320 For various examples of illustrations of machines and instruments during this period, see Edoardo Rovida, *Machines and Signs: A History of the Drawing of Machines* (New York: Springer, 2013), pp. 31-69. For a short treatment of the use of orthogonal projections in architecture, see Yve-Alain Bois, 'Metamorphosis of Axonometry', *Daidalos* 1 (1981), pp. 41-58.

321 Southwell's letter is transcribed in *The Correspondence of Robert Boyle*, ed. Michael Hunter, Antonio Clericuzio, and Lawrence Principe, 7 vols. (London: Pickering & Chatto, 2001), vol. 1, pp. 457-460; Hooke's description of the Gresham telescope is now RS, Cl.P/20/61. These and other telescope sketches are discussed at length as annotations to the relevant figures in section ii of this chapter.

322 Among Hooke's papers, there is an unfinished copy of Kip & Knyff's illustration of Haigh Hall in Lancaster (Figure III-122). It also exhibits difficulties with one-point perspective, however the original illustration was not published until 1707, four years after Hooke's death.

instructional tracts on drawing, accumulating several others by the time of his death. One of these, Heinrich Lautensack's *Des circkels unnd richtscheyts* (Frankfurt, 1564), a manual on practical geometry and perspective, is extant at the British Library (**Figures III-6 to 8**). Geared towards artists and craftsmen, it was mostly based on Dürer's work although Hooke's particular copy was missing the last section on proportions. Some of the markings and clippings in the book may be attributed to previous owners, but the faint lines on some of the perspective exercises may indeed have been in Hooke's hand.[323] Whether they were drawn with the aid of Lautensack's book is unclear but three of Hooke's exercises in one-point perspective are extant (**Figure III-73**), along with other possible traces (**Figures III-57 and 59**).

Hooke was a quick study. The illustration of the working methods of felt makers he prepared for one of his Cutlerian lectures in February 1666 (**Figure III-291**), and judging from his notes ('This Draught must not be inverted' or 'This is not to be coppyed in the Plate'), for engraving, shows a more careful though still clumsy attempt at fixing a stable horizon line and vanishing point. But by July of that same year, he was able to produce an expertly-drawn illustration of the saltworks in Hampshire (**Figure III-273**) for another Cutlerian lecture.[324]

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[323] Heinrich Lautensack, *Des circkels unnd richtscheyts, auch der perspectiva, und proportion der menschen und rosse, kurtze, doch gründtliche underweisung, deß rechten gebrauchs* . . . (Frankfurt: [n.p.], 1564). For more extensive descriptions of Hooke's copy of this book, see the annotations in section ii of this chapter for Figure III-6, and 'Part II. 3. Notes on blank folios and book margins' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'. For the attribution of a figural sketch pasted in the book to Hooke, see Matthew C. Hunter, 'Hooke's Figurations: A Figural Drawing Attributed to Robert Hooke', *Notes and Records of the Royal Society* 64 (2010), pp. 251-260.

On Lautensack, see Sibylle Gluch, 'The Craft's Use of Geometry in 16th c. Germany: A Means of Social Advancement? Albrecht Dürer & After', *Anistoriton Journal, Essays* 10 (2007), pp. 1-16.

[324] Hooke also owned a copy of Moxon's book on perspective, but it was not published until 1670; Joseph Moxon, *Practical perspective; or perspective made easie . . . Usefull for all painters, engravers architects, &c. and all others that are any waies inclined to speculatory ingenuity* (London: Printed by Joseph Moxon . . . , 1670); *RHBdb*, auct_BH_1891.

The difficulty of producing perspectival drawings had not escaped other Royal Society fellows' notice. Prince Rupert and Wren had invented instruments that could cast planes or objects into perspective, and Hooke had even suggested and implemented improvements to Rupert's device. Hooke himself would later invent several *camera obscura* and optical devices, but these were for projections that could be traced, rather than geometric constructions of one-point perspective. On Hooke's experiments with such optical devices, see Michael Cooper, 'Robert Hooke (1635–1703): Proto-Photogrammetrist', *Photogrammetric Record* 15 (1996), pp. 403-417; Matthew C. Hunter, 'Mr. Hooke's Reflecting Box', *Huntington Library Quarterly* 78 (2015), pp. 301-328.

There is also evidence that Hooke learnt figural drawing from books or by copying other drawings or prints. Among his papers are three undated sketches of a young woman, quite likely his niece Grace (**Figures III-24, 26, 44**). By the time Hooke's extant diaries begin in March 1672, the twelve-year-old had already arrived in London to live with her uncle, and one of the first mentions of her name is on what has been interpreted to be a to-do list: "Gr[ace] picture."[325] The composition and styling of one of the drawings (**Figure III-26**) bear some resemblance to the portrait of Antoni van Dyck's wife Maria Ruten (**Figure III-27. cf**), etched by William Faithorne (*c.* 1620–1691) and reproduced in William Sanderson's instructional book on drawing and painting, *Graphice* (London, 1658).[326] Hooke owned a copy of the book and also personally knew Faithorne, whose shop he visited often to peruse books on art and architecture. Indeed, on 12 July 1675, he borrowed "a book of Limning" from Faithorne, perhaps a copy of Sanderson's book.[327]

Other practical books on drawing in Hooke's library included *Prima pars, 't eerste deel van de teeken-konst* (Amsterdam, 1611) by the Dutch artist and engraver Abraham Bloemaert (1566–1651), *Ars pictoria* (London, 1669) by the drawing master Alexander Browne (*d.* 1706), extracts from Albrecht Dürer's work published by Thomas Jenner (*fl.* 1618–*d.* 1673), and William Salmon's *Polygraphice* (London, 1672).[328] These would have provided Hooke with instructions on various techniques, as well

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[325] *Memoranda*, pp. 132, 136.

[326] William Sanderson, *Graphice. The use of the pen and pensil. Or, the most excellent art of painting: in two parts* (London: Printed for Robert Crofts . . . , 1658), facing p. 41; *RHBdb*, auct_BH_1889. This book is listed in the *c.* 1675 manuscript catalogue of Hooke's library; see Chapter II.

[327] *Diary i*, pp. 165, 168, 169, 263. Faithorne had also written about drawing but it was specifically about engraving; William Faithorne, *The art of graveing and etching wherein is exprest the true way of graueing in copper. Allso The manner & method of that famous Callot & Mr. Bosse in their seuerall ways of etching* ([London]: Willm. Faithorne, 1662); *RHBdb*, auct_BH_2418.

[328] Abraham Bloemaert, *Prima pars, 't eerste deel van de teeken-konst* (Amsterdam: Joachim Ottens, 1611); *RHBdb*, auct_BH_1922; Alexander Browne, *Ars pictoria: or an academy treating of drawing, painting, limning, and etching. To which are added thirty copper plates expressing the choicest, nearest and most exact grounds and rules of symmetry; collected out of the most eminent Italian, German, and Netherland authors* (London: Printed by J. Redmayne, for the Author . . . , 1669); *RHBdb*, auct_BH_1888; Thomas Jenner, *A book of drawing, limning, washing or colouring of maps and prints and the art of painting, with the names and mixtures of colours used by the picture-drawers. Or, the young-mans time well spent* (London: Printed by M. Simmons, for Thomas Jenner . . . , 1666); *RHBdb*, auct_BH_1890; William Salmon, *Polygraphice; or the art of drawing, engraving, etching, limning, painting, washing, varnishing, colouring and dying. In three books* (London: Printed by E. T. and R. H. for Richard Jones . . . , 1672); *RHBdb*, auct_BH_2416.

It bears mentioning here that most of the books related to engraving in Hooke's library were published after *Micrographia*, with the notable exception of John Evelyn, *Sculptura, or, the history, and art of chalcography and engraving in copper with an ample enumeration of the most renowned masters and their works : to which is annexed a new manner of engraving, or mezzo tinto, communicated by His Highness Prince Rupert to the authour of this treatise* (London: Printed by

as examples to copy and learn from, and there is at least one extant evidence (e.g. **Figure III-35**) that he put them to good use.

As noted earlier, at the time of his death, Hooke had a collection of prints and drawings.[329] Some of these may have been the masters' drawings noted by Sloane in his description of BL, Add. MS 5238 (e.g. **Figures III-12, 30, 62, 64, 65, 69)**. Hooke likely also used these to improve his drawing skills. In the figural composition marked 'Dr Hooks own drawing' now at Tate Britain (**Figure III-333. a**), when looked at carefully, it is possible to discern the profiles of two of the figures from an engraving by Oliviero Gatti among Hooke's papers in BL, Add. MS 5238 (**Figure III-65**).[330] It appears Hooke traced or otherwise loosely copied the profiles and then filled in the rest of the figure with different details, such as an awkwardly-protruding chin replacing the thick beard of the upper figure (**Figure III-333. b**).

The great variance in the technique and quality of the figural drawings among Hooke's papers makes it difficult to assess his overall skills. In addition to masters' drawings, there are also copies of prints (e.g. **Figures III-10, 83**), though their high quality suggests more expert hands, perhaps those of Bernard Lens II (1659/60–1725) or David Loggan (1634–1692). The figural drawings that can be confidently attributed to Hooke, such as his copy of a missing title-page in Joannes Ciermans, *Disciplinae mathematicae* (Louvain, 1640) (**Figure III-4**), or the illustration of the felt makers (**Figure III-291**), or his copy of Huygens's illustration of a tubeless telescope (**Figure III-284**), are not terribly impressive. But, as the numerous other sketches among his papers suggest, he seems to have spent considerable effort in learning and improving his skills in portraiture, especially the hatched shading used by engravers, perhaps a consequence of learning such techniques from books with engraved illustrations. He also seems to have picked up more manual skills, and it is possible that his overlaying of brown ink and ink wash may have been at least partially inspired by Faithorne (e.g. **Figure III-40. cf**).

J. C. for G. Beedle, and T. Collins . . . , and J. Crook, 1662); *RHBdb*, auct_BH_2417. See also the 'List of architectural and related titles owned or borrowed by Hooke' in Chapter II, ii. 3 for further titles on drawing and art.

[329] See footnote 313.

[330] The drawing at Tate Britain was rediscovered and attributed to Hooke by Matthew Hunter in Hunter, 'Hooke's Figurations: A Figural Drawing Attributed to Robert Hooke'. See also the annotations for the relevant figures in section ii of this chapter.

Without denying that Hooke may have had innate artistic talents, it is possible that he was thoroughly an autodidact, and rather than using skills he already had for the task at hand, he acquired them as he felt the need—instinctively or philosophically. This is, in effect, a testament to his creativity; innovating or anticipating new methods of representation, and then acquiring the skills, whether from books or artists or craftsmen, necessary to implement them.

Despite his contemporary biographers' caveats, Hooke's 'apprenticeship' with Lely has almost become accepted as fact by current scholars, who have tried to interpret Hooke's graphical work accordingly.[331] However, as noted in Chapter I, there is yet little corroborating evidence for it, and as Waller noted, Hooke thought he could keep his money and learn those skills on his own. This was very much in line with Hooke's personality and attitude: that he could learn, and very quickly at that, with little instruction and do much better on his own anyway. Aubrey reported that Hooke had also received some instruction in drawing from the miniature painter Samuel Cooper (1607/8–1672), however the extent of that training remains equally unclear.[332] But judging from the drawings among Hooke's papers, which show him practice and progressively improve his drawing skills, it is possible that whatever instructions he received from Lely or Cooper were short, and possibly for a specific skill he needed at that particular moment. Otherwise, it would be incredibly ironic that despite instruction from famed portrait painters, Hooke struggled with figural drawings and perspective. The latter was seen as essential to the art. According to the meeting minutes of the 20 February 1689 meeting of the Royal Society,

> Upon mention of the painting of the Ancients being without action or ordon*n*ance, Dr Aglionby observed that the whole Art of Painting had been much better understood, and practiced within the last i00 years, than at any time by the Ancients.

[331] A recent example is Hunter, *Wicked Intelligence*, pp. 101-111, although he treats Lely's work as more indicative of the visual culture of the time rather than try to prove a direct influence on Hooke.

[332] "He also had ⌜some⌝ instruction in draweing from Mr Samuel Cowper (Prince of Limners of this Age) but whether from him before or after Mr Lilly quaere;" Aubrey, *Brief Lives*, vol. 1, p. 97. Cooper was a nephew of the miniaturist John Hoskins the elder (*c.* 1590–1665). For Kate Bennett's interpretation of Hooke's training as reported by Aubrey, see *Brief Lives*, vol. 2, p. 873.

> The same [Aglionby] and Mr Hook did likewise agree, that the famous painter Raphael, did understand very little if anything of the art of Perspective, as doth appeare by all his peices.[333]

If they knew of Raphael's School of Athens, with its prominent use of one-point perspective, it is difficult to fathom why they were less than impressed with his skills, but Hooke must have found some solace in having the same struggles as such an illustrious figure.

i. 3. The machined hand

In his *Animadversions on the first part of the* Machina coelestis *of . . . Johannes Hevelius* (London, 1674), Hooke wondered "how many faults and inequalities the naked eye and unmachined hand do commit." Hooke was criticising astronomer Hevelius's reliance on naked-eye observations and his refusal to use telescopic sights fitted with magnifying glasses to take more accurate measurements.[334] The kind of precision required in astronomical work, where by scale the slightest error could translate into thousands of miles, had become a serious concern during this period and resulted in an international race to invent micrometers that could divide a foot into thousands of parts.[335] While that level of accuracy would have been less relevant in art or architecture, the Baconian idea of improving nature with art, or equipping hands or eyes with machines, would remain a compelling ideal for Hooke. Indeed, instruments, including simple drawing implements such as rules, elliptical, dividing, and proportional compasses, predictably received regular mentions in his diaries.[336]

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[333] RS, JBO 8, p. 245. Raphael and Baldassare Castiglione, in a *c.* 1519 letter to Pope Leo X, had advocated the use of perspective in architectural drawings, explaining "even though this type of drawing in perspective is the preserve of the painter, it is nevertheless also useful for the architect;" Vaughan Hart and Peter Hicks, 'Appendix: The Letter to Leo X by Raphael and Baldassare Castiglione (c. 1519)', in *Palladio's Rome: a Translation of Andrea Palladio's Two Guidebooks to Rome* (New Haven, CT: Yale University Press, 2006), pp. 177-192, at p. 191.

[334] Hooke, *Animadversions on the first part of the Machina coelestis of the honourable, learned, and deservedly famous astronomer Johannes Hevelius, consul of Dantzick together with an explication of some instruments*, p. 29. See also Bennett, 'Robert Hooke as Mechanic and Natural Philosopher', at p. 44.

[335] On micrometers, including Hooke's own invention of an instrument "consisting of two threads and a ruler, whereby an inch is diagonally divided into five thousand parts, and might be with the same ease divided into forty thousand or more at pleasure," see the annotations for Figures III-238. cf to III-243. cf in section ii of this chapter.

[336] For example, on 6 January 1675, he showed Kirk, who had just shared with him his method of copying prints with ease, "the way of Drawing in ovalls by beam compasse & square;" *Diary i*, p. 140. Kirk may have been related to the family of Aubrey de Vere's wife; see Chapter IV, ii. 27; it is unclear whether he was the same 'Mr Kirk' from Yorkshire who occasionally received mention in the Royal Society meeting minutes.

At the 19 December 1694 and 9 January 1695 meetings of the Royal Society, Hooke presented one such device. It was a portable *camera obscura* that attached to the body; 'An instrument of use to take the draught, or picture of any thing' (**Figure IV-180**).[337] This was not Hooke's first experimentation with such optical devices. In the early 1660s, he had implemented improvements to Prince Rupert's perspective instruments, before continuing onto inventing several optical devices, at least one of which helped project images on a wall, not only for 'delightful' effects but "so that Spectators, not well versed in Opticks . . . would readily believe them to be super-natural and miraculous."[338] Previous scholarship on Hooke's optical experiments has focussed on their more philosophical implications for art theory, or on Hooke's work as a 'proto-photogrammetrist'.[339] Yet Hooke's inventions and experimentation with drawing techniques may also be viewed in light of his struggles with perspectival and figural drawings, as well as his conviction in the possibility of remedying human deficiencies effected by the Fall with mechanics.

Hooke had originally invented the device for use at the Royal Mathematical School. The latter had been founded by Charles II in 1673 at Christ's Hospital, with the purpose of educating poor orphans in mathematics and navigation towards careers in the Royal Navy.[340] Hooke, who was one of the governors of the school, had proposed that the device be used by the pupils, but Jonas Moore having omitted it from the textbook he compiled, *A new systeme of the mathematicks* (London, 1681), it was never brought into use.[341]

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[337] The first mention of the 'Picture box' in the diaries is on 19 January 1675, when Hooke noted showing it to Kirk; *Diary i*, p. 142. About twenty years later, at the 19 December 1694 meeting of the Royal Society, he proposed it as "an Instrument for Seamen to take the line figure or Prospect of distant Lands, or the Picture of any Animall or other Object." Three weeks later, he further "shewed the use of his portable Picture=box, by placing it against the Flame, which it represented very lively painted on the focus of the Glass: but it required that the Object be luminous or strongly illuminated, to make a perfect distinct figure;" RS, JBO/9/pp. 176, 177; see also Appendix iii. 3. A description of the device was posthumously published in Robert Hooke, 'An instrument of use to take the draught, or picture of any thing. Communicated by Dr. Hook to the Royal Society, Dec. 19, 1694', in *Philosophical experiments and observations of the late eminent Dr. Robert Hooke . . . and other eminent virtuoso's in his time*, ed. W[illiam] Derham (London: Printed by W. and J. Innys, Printers to the Royal Society . . . , 1726), pp. 292-296.

[338] Robert Hooke, 'Contrivance to make the picture of any thing appear on a wall, cub-board, or within a Picture-Frame, &c.', *Philosophical transactions* 3 (1668), pp. 741-743, at p. 742. See also footnote 324.

[339] Cooper, 'Robert Hooke (1635–1703): Proto-Photogrammetrist'; Hunter, 'Mr. Hooke's Reflecting Box'.

[340] See Chapter IV, ii. 21 for Hooke's work on Christ's Hospital and the Royal Mathematical School.

[341] Hooke, 'An instrument of use to take the draught, or picture of any thing', p. 296.

Instruction in "drawing of Geometricall Schaemes & Draughtes" was part of the curriculum at the School from early on.[342] The pupils needed these skills for navigation, and indeed in the 'certificate of abilities in the Mathematicks' they received upon passing their examination, it was specified that they had been instructed "in describing of Lines, Angles, Parrallells, Chordes, Sines, Tangents, Secants, Triangles, and all sorts of plain Geometricall figures by a plaine ruler and compass."[343] As these pupils were expected to go on sea voyages during their apprenticeship in navigation, there were also calls for them to be taught to sketch coastlines, and soon knowledge of perspective would be added to their list of skills.[344]

Hooke noted that his *camera obscura* could be of use "to curious Navigators and Travellers . . . for procuring the Pictures, Draughts, or true Forms and Shapes of . . . Things." It could also be used inland, to draw "Prospects of Countries, Hills, Towns, Houses, Castles, and the like; as also of any Kind of Trees, Plants, Animals, whether Birds, Beasts, Fishes, Insects; nay, of Men, Habits, Fashions, Behaviours; as also, of all Variety of Artificial Things, as, Utensils, Instruments, Engines, Ships, Boats, Carriages, Weapons of War, and any other Thing of which an accurate Representation, and Explanation, is desirable." After all, images were significantly more effective than words in giving us a "full Representation of the true Form of the Thing describ'd."

But images could also deceive. Hooke noted how books published specifically for use by seamen, and often produced by mariners with little skill in the art of delineation, were full of inaccuracies. "I lately saw a Book containing the Prospects of all the Western Coasts of America" he

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342 Jonas Moore, 'Qualifications of a person fitt to be mathematicall master over his Majesties boyes of the new foundation of Christs Hospitall London', attached to his letter to Samuel Pepys, 18 Feb. 1678; Bodl., MS Rawl. A191, fol. 163r.

343 LMA, CLC/210/B/006/MS12873, p. 33. In the context of mathematics, 'describe' meant to represent by drawing.

344 Rob Iliffe, 'Mathematical Characters: Flamsteed and Christ's Hospital Royal Mathematical School', in *Flamsteed's Stars: New Perspectives on the Life and Work of the First Astronomer Royal (1646-1719)*, ed. Frances Willmoth (Rochester, NY: The Boydell Press, 1997), pp. 115-144, at pp. 127-128.

On instruction in drawing during this period, specifically in the British context, see Katherine Acheson, *Visual Rhetoric and Early Modern English Literature* (Burlington, VT: Ashgate, 2013), pp. 89-125; Ann Bermingham, "An Exquisite Practice': The Institution of Drawing as a Polite Art in Britain', in *Towards a Modern Art World*, ed. Brian Allen (New Haven, CT: Yale University Press, 1995), pp. 47-66, and *Learning to Draw: Studies in the Cultural History of a Polite and Useful Art* (New Haven, CT: Yale University Press, 2000), pp. 33-73; Richard Carline, *Draw They Must: A History of the Teaching and Examining of Art* ([London]: Edward Arnold (Publishers) Ltd, 1968), pp. 24-47; Sloan, *Noble Art*, *passim*. See also Claire Pace, 'Virtuoso to Connoisseur: Some Seventeenth-Century English Responses to the Visual Arts', *The Seventeenth Century* 2 (1987), pp. 167-188.

added, "but any one, that understands Prospect, will easily discern, how rude, imperfect, and false a Representation, all such Books contain."[345] He noted that some of the drawings were even made right at home by engravers who copied them from Dutch books. But equipped in his 'Picture-Box', "any Person that can but use his Pen, and trace the Profile of what he sees ready drawn for him" could produce a "true Draught." The device, by replacing the naked eye with a lens (effectively an eyepiece, to draw a parallel to his criticism of Hevelius), would facilitate accuracy not just in observation but also in depiction; indeed, observation and depiction would be identical.

Ultimately, rather than being a remedy, Hooke's device succeeded in highlighting a phenomenon emerging at the time: concerns with the general inaccuracy of drawing. There was, of course, a difference between pictorial depictions of coastlines and landscapes, and accurate geometrical constructions of navigational charts or maps, but that difference was not as vast as it might initially appear.

A halfway meeting point of the concerns with accuracy in astronomy and graphical representation is the cartographical project Hooke became involved in in 1678.[346] London bookseller Moses Pitt had proposed to publish an English Atlas repurposing the engraved plates that had descended from the Jansson family in Amsterdam. He sought help from the Royal Society, and Hooke became one of the four fellows appointed to the project. Although it eventually failed, especially in the way Hooke had conceived of the publication, his notes on the project have survived among his papers in BL, Sloane MS 1039. In what appears to be a prefatory note to a celestial map, Hooke noted "The present design is (as neer as may be) to make a true representation of the universe and the severall parts thereof 「in picture」 according to their proportionate figures magnitudes and positions."[347]

He would endeavour to avoid the 'inconveniences' that had plagued other projects, such as the 'disproportion of the parts one to an other' and 'distortion'. Hooke explained 'disproportion' as the use of multiple scales to represent the magnitude and motion of celestial bodies, so that their true

[345] Hooke, 'An instrument of use to take the draught, or picture of any thing', pp. 292-293.

[346] On the English Atlas project, see Daisy Hildyard, 'John Pell's Mathematical Papers and the Royal Society's English Atlas, 1678–82', *BSHM Bulletin: Journal of the British Society for the History of Mathematics* 29 (2014), pp. 18-31; E. G. R. Taylor, 'Robert Hooke and the Cartographical Projects of the Late Seventeenth Century (1666–1696)', *The Geographical Journal* 90 (1937), pp. 529-540, and '"The English Atlas" of Moses Pitt, 1680–83', *The Geographical Journal* 95 (1940), pp. 292-299.

[347] BL, Sloane MS 1039, fol. 1r.

figures were drawn out of proportion compared to their epicycles. The second inconvenience, 'distortion', was the use of different projection methods for flat representation of curved surfaces. The result was that "not only the severall mapps are made of differing projections and soe their figures and positions [are] Distorted, . . . but the comparative positions and Distances in the same map are infinitely various;" such projections caused magnitudes to be greater in the middle than in the periphery. A third inconvenience was distortion of the geometric figures; "making a circle into an ellipse, a square into a parallelogram, Rhombus or Rhomboid."[348] Even the simple insertion of place names caused confusion, as did the techniques of shadowing in the shorelines which sometimes even obscured small islands.

Hooke, who did not give any technical details for his proposal, described it as representing

> all things according to the true order, figure, and proportionate magnitude the thing themselves hold one to another, [so that they] exhibit a true representation of the universe and its parts to the fancey and minds of men. it ⌜may⌝ also more easily imprint that idea ⌜the deeper⌝ in the memory, which is the Principall use of such a work. There being nothing more conducive to the assistance of the understanding and memory then a plaine, simple, cleer, and uncompounded Representation of the Object to the sense.
>
> The first Part then of this is Designed to Represent the form and Fabrick of the Universe, to wit of the heavens and the celestiall bodys therein contained, to wit of the ⌜other⌝ sun, planets, and fixed Starrs, and of some other appearances w*hi*ch more seldome occurr, such as comets & meteors. In which, as neer as may be, shall be Represented their Reall and comparative Magnitudes, ⌜positions⌝ , Distances, motion, apparent figures, and other properties according to best observations and Hypotheses or opinion of the most Learned and Accurate Inquirers both amongst the Antient and Modern writers.

[348] Ibid., fols. 1r-2r.

> together with suitable Descriptions, tables, Directions, Instruments, &c.[349]

The lack of an explanation as to how these were to be achieved is perhaps understandable as finding a suitable method of projection was not a simple feat—mathematician John Pell would spend considerable effort and time in attempting at a solution.[350] But what is most striking here is the growing sense of an incongruity between the available methods of representation and accuracy—mathematical or otherwise. Drawing could not help but distort reality, and at the most, one could *attempt* to represent the magnitude and position of celestial bodies, 'as neer as may be'.

A concern with accuracy in drawing, especially of circles, remained a persistent preoccupation for Hooke. At the 8 May 1695 meeting of the Royal Society,

> Dr Hook said that he had found out a Method of describing [drawing] a very great Circle, by a small pair of Compasses, but capable of doing it, with great exactness even to a thousand foot Radius. This he promised to produce when he had drawn up a full account thereof.

At the next meeting, he demonstrated his "manner of describing a very great Circle . . . by help of a small circle or wheel made to turn at right angles to a line affixt to the center, and he alleaged that this would certainly keep the line under the same degree of tension." Tellingly, the description is cut short, and the meeting minutes for that particular section concludes with "This entry is imperfect."[351]

i. 4. Euclid under the microscope / drawing as experiment

"As in Geometry, the most natural way of beginning is from a Mathematical point," Hooke noted in the opening line of *Micrographia* (London, 1665). Following an initial plate showing his instruments, the first illustrations in the book were of a point, line, and plane, but rather than abstract Euclidean entities, they had physical presence in the world: the point was a printed period, the line was the edge

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[349] BL, Sloane MS 1039, fol. 2r. As this was a rough draft, bracketed insertions and punctuation are added to make Hooke's text flow slightly better.

[350] Hildyard, 'John Pell's Mathematical Papers and the Royal Society's English Atlas, 1678–82', pp. 24-29.

[351] RS, JBO 8, pp. 189, 190. As noted already, and further explained in section ii of this chapter, Hooke invented numerous instruments during his lifetime. For a material history of drawing instruments, see Maya Hambly, *Drawing Instruments, 1580-1980* (London: Sotheby's Publications, 1988). See also Gerbino and Johnston, *Compass and Rule*.

of a razor, and the surface was woven cloth (**Figures I-3, 4**). And they were all imperfect. Whether printed by type or copperplate or roll-pressed, all the periods Hooke had seen were "irregular and uneven," "disfigured," or "rugged and deformed." The line, the sharp edge of a razor, when seen under the microscope appeared rough, indeed he had not been able to "find that any part of it had any thing of sharpness in it." The tightly-woven linen cloth, with threads barely perceptible to the naked eye, was full of holes like a lattice window.[352] Hooke had wanted to know "how much . . . can be built upon demonstrations made onely by the productions of the Ruler and Compasses," and found that the physical constructions of abstract shapes in drawings, or really any form of artifice, simply lacked precision and perfection.[353] Nonetheless, both art and nature shared affinities with mathematics. Looking under his microscope, Hooke could see "small Machines of Nature" which could not be discerned otherwise.[354] In his descriptions of the natural world, he liberally used mathematical and artificial similes, so that "The Eyes of a Fly in one kind of light appear almost like a Lattice . . . In the Sunshine they look like a Surface cover'd with golden Nails; in another posture, like a Surface cover'd with Pyramids; in another with Cones" (**Figure I-2**).[355]

That nature was written in the language of mathematics, as posited by Galileo, was accepted by most natural philosophers by Hooke's time. Kepler had also elaborated on the idea, proposing a complex model of the cosmos based on Euclidean solids, and further geometrised vision itself, so that not only was the world created with geometry, but we saw with geometry.[356] Hooke doggedly pursued Keplerian books, and by the time of his death had collected no less than eighteen titles.[357] But for him

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352 Hooke, *Micrographia*, pp. 1-6, schemes 2 and 3.

353 Ibid., p. 2.

354 On the architecturally-relevant issue of scale, see Paul Emmons, 'Size Matters: Virtual Scale and Bodily Imagination in Architectural Drawing', *ARQ* 9 (2005), pp. 227-235, pp. 230-232.

355 Hooke, *Micrographia*, sigs. g1r, f2v.

356 Galileo Galilei, *Il saggiatore* (Rome: Appresso Giacomo Mascardi, 1623); Johannes Kepler, *Dioptrice* (Augsburg: Typis Davidis Franci, 1611), *Harmonices mvndi* (Linz: Sumptibus Godefredi Tampachii . . . Executebat Ioannes Plancus, 1619), and *Mysterivm cosmographicvm* (Frankfurt: Recusus typis Erasmi Kempferi, sumptibus Godefridi Tampachii, 1621). See also the recent treatments of the subject in Geoffrey Gorham et al., eds., *The Language of Nature: Reassessing the Mathematization of Natural Philosophy in the Seventeenth Century* (Minneapolis: University of Minnesota Press, 2016).

357 For Hooke's pursuit of books by Kepler, see *Diary i*, pp. 22, 72, 93, 102, 141, 167, 169, 208, 212, 219. Among his papers are meticulous copies (Figures III-304, 306) of the illustrations in book two of Kepler's *Harmonices mundi* (Linz, 1619). They were likely meant to replace pages missing from his copy of the book, but rather than simply tracing them, he appears to have taken the time and effort to re-construct them, leaving compass marks all over the folios. While his copy of *Harmonices mundi* is not extant, several other books from his library that are do have missing pages, such as his copy of Kepler's *De cometis libelli tres* (Augsburg, 1619)

this relationship between nature and mathematics was always mediated by a certain amount of imperfection. Looking at the 'pretty figur'd Stars of Snow' (**Figures III-253. cf, 317, 318**) under his microscope, he "found them not to appear so curious and exactly figur'd as one would have imagin'd, but like Artificial Figures, the bigger they were magnify'd, the more irregularities appear'd in them." However, he further noted, these irregularities were caused by their fall and thaw rather than a "defect of the plastick virtue of Nature." While it was impossible "to imitate exactly the curious and Geometrical Mechanisme of Nature" visible in these snowflakes, he tried nonetheless to make some mathematical sense of the 'starry flakes', laying out his sketches using a compass and scoring the 60-degree angles in the paper (**Figure III-317**).[358]

Despite their inherent imperfections and inaccuracies, Hooke did not shy away from using drawing and artifice as exploratory tools in his attempts at understanding nature. Of course, as noted previously, this was integral to experimental philosophy in general; it was through artifice, with models or the use of 'philosophical instruments', that nature could be understood.[359] Nevertheless Hooke's drawings stand out as distinct examples of this mode of exploration. In his investigations of the laws of circular motion (e.g. **Figures III-176 to 180, 257, 274 to 277**), compass points, scores, and lines, progressively map forces and movement on the paper, sometimes spilling onto the text (**Figures III-178, 277**). These are not static representations of an idea but reflections of experiments on paper. A most striking example of this is his drawing of the "isochronous motion of a conical pendulum" (**Figure III-277**) where the paper is abused with a compass and rule to the point of tearing (**Figure III-276**), leaving behind a palimpsest that captures the ghost of a pendulum (**Figure III-277 detail**). Equally intriguing is his experiment to determine shape of the magnetic fields around a terrella, a small spherical magnet (**Figure III-172**). Sprinkling iron filings on a piece of parchment stretched over the magnet, he first allowed nature to make its own drawing before attempting to trace over the lines with a compass attempting to read their true mathematical shapes.

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now at Harvard's Houghton Library. See Chapter II on Hooke's library, and 'Part II. 2. i. Manuscript pages completing imperfect copies of books' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

[358] Kepler had also written on the 'six-cornered snowflake' in his *Strena, seu de niue sexangula* (Frankfurt: Apud Godefridum Tampach, 1611); for a recent translation, see *The Six-Cornered Snow Flake* (Philadelphia: Paul Dry Books, 2010). It is difficult to speculate whether Hooke knew of Kepler's work on crystals; he did not have a copy of this particular text, and furthermore did not cite Kepler in his discussions; see e.g. *Micrographia*, pp. 14-15.

[359] Jim Bennett, 'Practical Geometry and Operative Knowledge', *Configurations* 6 (1998), pp. 195-222.

Elsewhere Hooke would attempt to construct a 'scheme' to show the proportional relationship between velocity, time, power, and space (**Figure III-194**); not simply to represent them but to chart the values in a mathematical or geometric relation to one another, to turn these forces into proportional lines. Unlike, for instance, Hooke's fossil drawings (**Figures III-134 to 138**) or most of the illustrations in *Micrographia* which may be described as 'portraits' of art and nature, these layered mathematical drawings are generative rather than representational.[360] They are equally different from his sketches exploring ideas and inventions (e.g. **Figures III-9, 33, 151, 157**) or records of these in his diaries (**Figures III-197 to 214**). These drawings of motion, of the 'Geometrical Mechanisme of Nature', don't attempt to illustrate, but instead construct, whether with a compass and rule or other instruments aiding the hand. If they lacked complete mathematical accuracy, they were 'as neer as may be'; they were the explorations of a mathematical *practitioner*, of a geometer.[361] After all, Aubrey did write of his friend "He is certainly ~~at this~~ the greatest Mechanick this day in the World. His head lies ⌜much⌝ more to Geometry, then to Arithmetique."[362]

i. 5. Designes of his owne drawing

In the early 1690s, the Schools Committee of Christ's Hospital began to consider teaching its pupils how to draw. The Hospital had been founded to maintain and educate poor orphans with the main goal of graduating them into apprenticeships in various trades. Their education began in the Writing School. Some of the more academically-gifted students would be transferred to the Grammar School to be prepared for university education in Oxford or Cambridge, and some would be selected into the

[360] On Hooke's use of the painterly conventions of his time, see, for example, Meghan C. Doherty, 'Discovering the "True Form:" Hooke's Micrographia and the Visual Vocabulary of Engraved Portraits', *Notes and Records of the Royal Society* 66 (2012), pp. 211-234, Sachiko Kusukawa, 'Drawings of Fossils by Robert Hooke and Richard Waller', *Notes and Records of the Royal Society* 67 (2013), pp. 123-138. See also the annotations for Figures III-134 to 150 in section ii of this chapter. Note that the early insect drawings attributed to Hooke should now be de-attributed and are thus not cited here; see the annotations for Figures III-141 to 150. cf in section ii of this chapter.

[361] Sources on 'mathematical practice' in Britain during this period, include Johnston, 'Making Mathematical Practice: Gentlemen, Practitioners and Artisans in Elizabethan England', and 'The Identity of the Mathematical Practitioner in 16th-Century England'; Gerbino and Johnston, *Compass and Rule*; Taylor, *The Mathematical Practitioners*.

[362] Aubrey, *Brief Lives*, p. 99, as transcribed by Kate Bennett.

Royal Mathematical School for future careers in the Navy.[363] But most of the students would be sent for apprenticeships around age fourteen or fifteen.

As noted earlier, the students of the Royal Mathematical School had already been receiving instruction in drawing, especially of the geometric kind, since its foundation in 1673. It was now being suggested that the general student population of Christ's Hospital be taught to draw in order to increase the pupils' future job prospects. After a successful trial with ten boys, who had been given drawings to copy, and before implementing a wider programme, the Committee sought opinions from Wren and Samuel Pepys.[364]

Wren wholeheartedly approved of the Committee's plan. In his letter addressed to the school's treasurer, Nathaniel Hawes (*d.* 1700), he wrote

> It was observed . . . that our English Artists are dull enough at Invention, but when once a forreigne patterne is sett, they imitate soe well that commonly they exceed the Originall. I confess the observation is generally true, but this shows that our Natives want not a Genius but education in that which is *th*e foundation of all Mechanick Arts, a practice in designing or drawing, to which every body in Italy, France and the Low countryes pretends to more or less.[365]

Having had to train his own draughtsmen, Wren would have been acutely aware of the advantages of such instruction from an early age.[366] Adding that drawing was not only for painters, sculptors, and

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[363] The nature of the curriculum at the Hospital around this time is elucidated by a petition to the Board by Samuel Pepys. The latter requested that a pupil by the name of Samuel Sheppard continue for another three or four months, presumably at the Writing School, "to fit him for a Surgeon or Apothecary or some other convenient trade" and that he spend one hour a day at the Grammar School to "better to retaine and improve his learning;" a request that was readily granted to him; LMA, CLC/210/B/005/MS12811/6, p. 330.

[364] The letters were read at the 30 November 1692 meeting of the Committee of the Schools in Christ's Hospital; LMA, CLC/210/B/005/MS12811/6, p. 362. See also Carline, *Draw They Must: A History of the Teaching and Examining of Art*, pp. 35-46; Sloan, *Noble Art*, pp. 103-107.

[365] LMA, CLC/210/B/005/MS12811/6, pp. 362-363. The letter is transcribed and reproduced in full in Wren Society, vol. 11, p. 74; note, however, that the 'November 24, 1694' date indicated there is an error, and the year should instead be 1672.

[366] On Wren's assistants and draughtsmen, see 'Wren and His Draughtsmen' in Gordon Higgott, 'Wren Office Drawings', https://goo.gl/tbPpZE.

engravers, but for many artificers as well, Wren further noted that students with drawing skills would be taken in as apprentices more easily.[367]

Pepys's response was no less enthusiastic. It is also illuminating in terms of the level of drawing skills, or lack thereof, available among craftsmen at the time. He explained that he has had the occasion to converse with and employ a great variety of craftsmen and had seen how one with drawing skills had twice the advantage

> by being able readily to present . . . [his clients] with designes of his owne drawing of the things they required, or him selfe proposed, which any other of the same Trade could doo, who for want of it was forced at his owne great charge, with loss of time, and for the most parte worse success, to help him selfe in it by anothers hand, who was ignorant in the matter. And this I have againe and againe proved in the case of
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Carvers	Stonecutters	Coach makers
Turners	Locksmiths	Sadlers
Joyners	Silver smiths	Cabinetmakers
Hous Carpenters	Founders	Clock makers
Masons	Silke Weavers	Glass painters
Bricklayers	Gun smiths	Shipwrights & Boate builders
>
> and Instrument makers of every kind.[368]

These letters by Wren and Pepys confirm that, even as late as the 1690s, drawing was not yet a widely-available skill in England. Pepys's letter is particularly useful since it confirms that even craftsmen in the building arts, stonecutters, masons, bricklayers, carpenters, joiners, etc. did not know how to draw. Model-making would have been much more common among artisans, perhaps because it was more

[367] The apprenticeship system was akin to today's vocational education, in that the students would pay the Master a fee and in return receive training, food and board. In his letter, Wren was suggesting that a Master would charge an apprentice who could draw a smaller fee presumably since he would be useful to him right away, without having to first train him.

[368] LMA, CLC/210/B/005/MS12811/6, p. 364.

instinctive, but drawing was a specialist skill that needed to be taught.[369] And taught it must be—Pepys continued

> I say again I doe not remember any one instance of a Manuall Trade that I have had to doe with, where I have not found a plaine difference in the Degree of satisfaction, given me by a workman, that could lay either his or my owne conceptions before me in Draught, & he that could doe it onely in Talke, which at best can never be but imperfect and uncertaine.
>
> And by the way it comes into my head to give you one further note, namely, That I doe not know any one thing that conduces more to the recommending forreigne Artizans & especially the French, to *th*e acceptance they commonly meete with, among people of Quality, before our owne Countrey men, then that you hardly find one of them of any Note, but ⌜what⌝ will give you a Designe of the thing you bespeake, to your intire satisfaction, before he goes to worke on it thereby preventing the disappointment, and often the finall losse of a Customer, and which is more, the haveing a chargeable peice of worke turned upon his hand.[370]

Indeed, many renowned artists in England at the time were foreigners. Some had been invited by aristocratic connoisseurs—for instance, Prague-born Wenceslaus Hollar (1607–1677), the famed etcher, had travelled with the earl of Arundel on the latter's diplomatic trip to the continent, before following him to England.[371] The renowned military engineer Bernard de Gomme (1620–1685), who designed fortifications for Liverpool and Oxford, and built the royal citadel at Plymouth with its Dutch-styled gates, was one of the numerous talents brought from Netherlands by Prince Rupert.[372]

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[369] A useful analogy may be to think of model-making as oral speech and drawing as writing.

[370] Ibid.

[371] 'Hollar, Wenceslaus (1607–1677)', *ODNB*.

[372] 'Gomme, Sir Bernard de (1620–1685)', *ODNB*. After the death of Jonas Moore's son, who had inherited the position from his father, he became the surveyor general of the ordnance. His designs, for instance for the Royal Citadel's main gate, illustrate an overtly-Dutch style; see, for instance, A. D. Saunders, *Fortress Builder: Bernard de Gomme, Charles II's Military Engineer* (University of Exeter Press, 2004), fig. 4.1. on p. 116, or fig. 6.5 on p. 181, or fig. 7.3. on p. 207.

England had also become a place of refuge for less illustrious artists escaping Louis XIV's revocation of Nantes, numerous religious wars, and other continental events. They brought along their skills and talents—one of them even set up a "School for Drawing, Limning, Painting" in St. Paul's Churchyard.[373]

This deficit of drawing skill and local talent must have been even more acute in 1666 when London was devastated by the Great Fire, which at the time was being blamed on foreigners—Dutch, French, Papist, or any combination thereof.[374] It may explain how Hooke, with no previous construction or surveying experience but with the ability to present 'designes of his owne drawing' could be appointed one of the City Surveyors after offering his proposal for the rebuilding of London.[375] Surveying and architecture were, of course, considered branches of mathematical practice, and Hooke as the Gresham Professor of Geometry at the time may have been a natural candidate for the job.[376] But lateral moves between disparate specialties within mathematical practice may not have been so obvious or easy to accomplish.[377] "Practice in designing or drawing," which Wren dubbed "*th*e foundation of all Mechanick Arts," would no doubt have created a common ground between the fields, allowing for transition between one or the other; i.e. facilitating Hooke's appointment as a surveyor.

This is not to suggest the ability to draw was sufficient on its own. Edmund Dummer (1651–1713), who had produced a set of highly elaborate prospects of cities and naval arsenals (now BL,

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373 Bernard Lens (1659–1725), who was of Dutch origin, advertised the school in a 1697 broadside; John Strype, *A survey of the cities of London and Westminster: containing the original, antiquity, increase, modern estate and government of those cities. Written at first in the year MDXCVIII by John Stow, citizen and native of London. Since reprinted and augmented by the author; and afterwards by A. M. H. D. and others* . . . (London: Printed for A. Churchill, J. Knapton, R. Knaplock . . . , 1720), Book 1, Chapter 25, pp. 173. His son, also named Bernard (1682–1740) would be employed as a drawing-master at Christ's Hospital; 'Lens [Laus] family (*per. c.* 1650–1779)', *ODNB*. See also Figure III-11. cf for a 1688 engraving by Lens.

374 Reddaway, *The Rebuilding of London After the Great Fire*, pp. 22-26.

375 Regarding Hooke's subsequent work as the City Surveyor, see Cooper, *Robert Hooke and the Rebuilding of London*. Further sources are listed in Chapter IV, ii. 1, on Hooke's 'Proposal for the Reconstruction of London after the Great Fire'.

376 Secondary literature on the relationship between mathematical practice and architecture in the British context include Bennett, 'Architecture and Mathematical Practice in England, 1550–1650' and 'Christopher Wren: Astronomy, Architecture, and the Mathematical Sciences', *Journal for the History of Astronomy* 6 (1975), pp. 149-184; Gerbino and Johnston, *Compass and Rule*.

377 It may have been reasonable to expect a mapmaker to be able to design fortifications, or an architect to design sundials, but it may have been more difficult for a telescope maker to suddenly switch to designing ships.

King's Library, MS 40) during a voyage to the Mediterranean in 1682–1684, secured an assistant surveyorship to the Navy and would later be put in charge of the design and construction of Plymouth Dockyards.[378] His considerable drafting skills (**Figures IV-171, 172, 264, 266, 268, 269**) enamoured him to Evelyn who supported his bids for further appointments, but Pepys was less than enthusiastic, criticising Dummer for being

> an ingenious young man, but said rarely to have handled a tool in his life, nor knows judiciously how to convert a piece of timber; has been much abroad indeed, but gained his present promotion . . . upon the credit only of his designing and making of draught.[379]

It has been suggested that Pepys may have had other reasons to attack Dummer.[380] However, when he was encouraging craftsmen to learn to draw in order to communicate their designs, he likely did not have in mind the kind of atmospheric, what we would call 'artistic', landscapes produced by Dummer (e.g. **Figure IV-269**). Pepys saw drawing as a tool, an aid to craft rather than a replacement of it.

Yet during this period, just as artisans were being encouraged to gain drawing skills, drawing was also being transformed into a 'polite art'.[381] In another fifty years, Alexander Cozens (1717–1786), who would briefly serve as drawing master at Christ's Hospital, would push aside all concerns with accuracy, and emphasise inventiveness and the imagination, i.e. the opposite of everything Hooke had been trying to accomplish with the *camera obscura* he had designed for his mathematical pupils.[382]

i. 6. A synopsis of Hooke's architectural drawings

The architectural drawings extant among Hooke's papers, or those that have been attributed to him in various archives, are frustratingly inconsistent in terms of the level of skill they represent. As it was

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[378] See Chapter IV, ii. 48 on the Royal Dockyard in Hamoaze, Plymouth.

[379] Pepys quoted in Celina Fox, 'The Ingenious Mr Dummer: Rationalizing the Royal Navy in Late Seventeenth-Century England', *eBLJ* Article 10 (2007), pp. 1-58, at pp. 22-23.

[380] Fox has pointed out that at this time Pepys was supporting Anthony Deane's bid for a rival position in the Navy "by rubbishing all of his potential rivals, variously accusing them of ignorance, infirmity, illiteracy and drunkenness;" ibid., p. 23.

[381] See Bermingham, "An Exquisite Practice': The Institution of Drawing as a Polite Art in Britain', and *Learning to Draw: Studies in the Cultural History of a Polite and Useful Art*; Pace, 'Virtuoso to Connoisseur: Some Seventeenth-Century English Responses to the Visual Arts'; Sloan, *Noble Art*, *passim*.

[382] 'Cozens, Alexander (1717–1786)', *ODNB*; Carline, *Draw They Must: A History of the Teaching and Examining of Art*, pp. 43-46.

evident with his figural and perspectival drawings, Hooke obviously continued to hone his skills, collecting prints (e.g. **Figures III-13, 88**) as inspiration both for design and for architectural representation. However, there are also indications that the drawings catered to specific purposes rather than just reflecting different skill levels. For example, the *c.* 1669 elevation and plan of the stables for Somerset House (**Figure III-128**) and the 1671 preliminary design for the Royal College of Physicians (**Figure III-77**) are more detailed and sophisticated than the much later drawings for the church in Willen (**Figures III-70, 336**) prepared sometime around 1678.[383] The differences in quality appear to be related to the audience for the drawings rather than being a matter of technique. A drawing presented to the courtiers of the Queen's household or to the officials of a prestigious institution would have necessitated more eye-catching renderings, whereas a design for a humble church to be built for charity only really needed to convince the patron.

In addition to rendered presentation drawings (e.g. **Figures III-75, 76, 80, 90, 104-106, etc.**), various design sketches ranging from small elevations (**Figures III-47, 181**) to explorations of a modular unit (**Figure III-18**) have survived. However, none of the drawings Hooke sent to clients to communicate his designs are extant. For instance, in his correspondence with Edward Conway (Appendix, i. 1-5, 7) concerning Ragley Hall in Warwickshire (Chapter IV, ii. 36), Hooke narrated at length the numerous drawings he had attached. Perhaps because they were not implemented, or precisely because they *were* and ended up on the construction site, these drawings do not appear to have survived. Had Hooke made the effort, however, they may have. Wren, for instance, was careful to preserve his own archive, especially from the mutilations of construction. In an undated letter regarding his designs for the Trinity College library at Cambridge, he noted

> I suppose you haue good masons, how ever I would willingly take a farther paines to giue all the mouldings in great, wee are scrupulous in small matters & you must pardon us, the Architects are as great pedants as Criticks or Heralds. And therfore if you approue the designes, let . . . the mason take his measures as much as is necessary for the present setting out of the worke & be pleased to transmit them to me again & I shall copy out partes of them at large, more proper for the use of the workemen & giue you a carefull estimate of the charge, & returne you again the originall designes, for in the handes of the

[383] Hooke did occasionally employ draughtsmen, but these particular drawings appear to be in his hand.

> workemen they will soon be soe defaced that they will not be able from them to pursue the worke to a conclusion.[384]

With this apt reminder that posterity needs careful archival planning, we are left to wonder how differently Hooke's architectural reputation may have descended had more of his drawings survived.

[384] Wren's draught letter is transcribed in David McKitterick, ed., *The Making of the Wren Library, Trinity College, Cambridge* (New York: Cambridge University Press, 1995), pp. 142-145; the quotation is from pp. 142-145. For a facsimile reproduction of the first page, see *Wren Society* 5, pl. xxii.

CHAPTER IV – BUILDING

i. Hooke's 'buildings'[385]

i. 1. Nature and artifice

Of models of nature

Long before he was appointed Surveyor for the rebuilding of London or his subsequent involvement in major construction projects, Hooke was undertaking other kinds of building practices as the curator of experiments of the Royal Society.

As noted earlier, experimental philosophy was built on the idea of remaking nature in an artificial setting. Indeed, some historians of science consider the real change in the seventeenth century to be the "breakdown of the distinction between nature and art" or "the erasure of an Aristotelian credo that art and nature were distinct and inviolable realms which could not interact."[386] This phenomenon found its theoretical expression in the work of Francis Bacon (1561–1626) who expounded new ways of interrogating nature through artifice in *Novum organum*, which was published as the second part of his *Instauratio magna* (London, 1620).[387] This 'new organon', its title referring to Aristotle's collected works on logic, was meant to replace a system of reasoning based on syllogisms with one based on the collection of data from observations and experiments.[388]

Some of Bacon's ideas were not entirely 'new', however. Two decades before the publication of *Novum organum*, William Gilbert (1544?–1603) had presented his 'foundations of magnetic science'

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385 A 'documentary analysis of architectural projects by or attributed to Hooke' is provided in Volume 2 as Chapter IV, ii.

386 Peter Dear, *Discipline and Experience: The Mathematical Way in the Scientific Revolution* (Chicago: The University of Chicago Press, 1995), p. 155; William R. Newman, 'Alchemical and Baconian Views on the Art-Nature Division', in *Reading the Book of Nature: the Other Side of the Scientific Revolution*, ed. Allen G. Debus and Michael T. Walton (St. Louis, MI: Sixteenth Century Journal Publishers, Inc., 1998), pp. 80-90, at p. 82.

387 Francis Bacon, *Instauratio magna* (London: Apud Ioannem Billium typographum Regium, 1620). For a modern English translation, see *The New Organon*, ed. Lisa Jardine and Michael Silverthorne (New York: Cambridge University Press, 2000).

388 Secondary literature on Baconian philosophy of science is vast; some starting points include Diana B. Altegoer, *Reckoning Words: Baconian Science and the Construction of Truth in English Renaissance Culture* (Mississauga, ON: Associated University Presses, 2000); Paula Findlen, 'Francis Bacon and the Reform of Natural History in the Seventeenth-Century', in *History and the Disciplines*, ed. Donald R. Kelley (Rochester, NY: University of Rochester Press, 1997), pp. 239-260; Stephen Gaukroger, *Francis Bacon and the Transformation of Early-Modern Philosophy* (New York: Cambridge University Press, 2001).

in similar terms. In *De magnete* (London, 1600), addressing "true philosophers" who looked for knowledge "not only in books but in things themselves," Gilbert proposed a new style of philosophising which derived authoritativeness from experiments and demonstrations.[389] Utilising Robert Norman's idea that the earth itself was a magnet, Gilbert also pioneered the use of a terrella, literally a "little earth", a spherical magnet fashioned out of a loadstone.[390] Applying techniques already in practice in navigation, Gilbert conducted experiments with the terrella, all the while assuming that the results would be the same for the earth. Indeed, Peter Dear has argued that the relationship between the earth and the terrella is not one of representation, i.e. the terrella does not represent the earth, nor does the earth represent a giant terrella. "Instead," Dear argued, "the earth is a magnet, and the terrella, possessing the proper shape for a magnet, is a little earth." For Dear this was a significant breach:

> once admitted as a legitimate part of natural inquiry, the use of contrivance might overwhelm the art/nature distinction that warranted the separation of natural philosophy from mathematics. If artificial contrivances could allow the investigator to discover what nature would allow him to do—and could even, as with the *terrella,* stand for other things not directly manipulable—the potential extent of new philosophical experience was unlimited.[391]

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[389] William Gilbert, *De magnete, magneticisque corporibus, et de magno magnete tellure physiologia noua, plurimis & argumentis, & experimentis demonstrata* (London: Excudebat Petrus Short, 1600); the quotations are from the English translation, *On the Loadstone and Magnetic Bodies, and on the Great Magnet the Earth. A New Physiology, Demonstrated with Many Arguments and Experiments*, trans. P. Fleury Mottelay (London: Bernard Quaritch, 1893), pp. l, xlix. The reader may recall that Hooke used a similar language in his 'Proposals for the good of the Royal Society'; see Chapter II.

Edgar Zilsel has described *De magnete* as "the first printed book, written by an academically trained scholar and dealing with a topic of natural science, which is based almost entirely on actual observation and experiment;" see his 'The Origins of William Gilbert's Scientific Method', *Journal of the History of Ideas* 2 (1941), pp. 1-32, at p. 1 and 6-7.

[390] Robert Norman, *The newe attractiue containyng a short discourse of the magnes or lodestone, and amongest other his vertues, of a newe discouered secret and subtill propertie, concerning the declinyng of the needle, touched therewith under the plaine of the horizon. Now first founde out by Robert Norman hydrographer. Heerevnto are annexed certaine necessarie rules for the art of nauigation by the same R.N* (London: Ihon Kyngston for Richard Ballard, 1581).

[391] Dear, *Discipline and Experience*, p. 161. On the influence of mathematical practice on Gilbert's cosmology, see also Jim Bennett, 'Presidential Address: Knowing and Doing in the Sixteenth Century: What Were Instruments for?', *British Journal for the History of Science* 36 (2003), pp. 129-150.

Thus, Gilbert's terrella had paved the way for conducting experiments on artificial models, with the expectation that the results would be universally valid in nature.

The use of three-dimensional models in scientific contexts has been receiving renewed attention in the history and philosophy of science.[392] Some care needs to be taken, however, in determining what is meant by a model in the sense of Gilbert's terrella. Representational models had already been in use by this time. We may even consider volvelles in medieval manuscripts or even 'mathematical instruments', such as astrolabes or armillary spheres, as models reproducing astronomical regularities that could then be utilised for calendrical or horological purposes.[393] But such models represented nature without interfering with it, unlike so-called 'philosophical instruments' which were designed to interrogate it.[394] Perhaps not a philosophical 'instrument' but an apparatus nonetheless, Gilbert's terrella helped generate new knowledge about nature, by investigating what both Gilbert and Hooke called the "things themselves."[395]

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[392] Most recent scholarship on the subject includes the collections of essays in Soraya de Chadarevian and Nick Hopwood, eds., *Models: The Third Dimension of Science* (Stanford, CA: Stanford University Press, 2004); Roman Frigg and Matthew C. Hunter, eds., *Beyond Mimesis and Convention: Representation in Art and Science* (New York: Springer, 2010); Lorenzo Magnani, ed., *Model-Based Reasoning in Science and Technology: Theoretical and Cognitive Issues* (New York: Springer, 2014); Mary S. Morgan and Margaret Morrison, eds., *Models as Mediators: Perspectives on Natural and Social Sciences* (New York: Cambridge University Press, 1999); Mauricio Suárez, ed., *Fictions in Science, Philosophical Essays on Modelling and Idealisation* (New York: Routledge, 2009). Previous scholarship includes Hans Freudenthal, ed., *The Concept and the Role of the Model in Mathematics and Natural and Social Sciences* (Dordrecht: Reidel, 1961); Mary Hesse, *Models and Analogies in Science* (London: Sheed and Ward, 1963).

[393] A nuance to note is that these were modelled on specific theories of astronomical regularity, e.g. those by Ptolemy; see Bennett, 'Presidential Address: Knowing and Doing in the Sixteenth Century: What Were Instruments for?', and *The Divided Circle: A History of Instruments for Astronomy, Navigation and Surveying* (Oxford: Phaidon - Christie's Llimited, 1987).

[394] The term 'philosophical instrument' (in reference to natural 'philosophy') has been in use in lieu of 'scientific instrument' to avoid anachronisms; Albert Van Helden, 'The Birth of the Modern Scientific Instrument, 1550–1700', in *The Uses of Science in the Age of Newton*, ed. John G. Burke (Berkeley, CA: University of California Press, 1983), pp. 49-84, Deborah Jean Warner, 'What is a Scientific Instrument, When Did It Become One, and Why?', *British Journal for the History of Science* 23 (1990), pp. 83-93. For a discussion of telescopes as mathematical *and* philosophical instruments, see Albert Van Helden, 'Telescopes and Authority from Galileo to Cassini', *Osiris, 2nd Series* 9 (1994), pp. 8-29.

[395] Gilbert, *On the Loadstone and Magnetic Bodies*, p. xlix; Hooke, 'Proposals for the good of the Royal Society', RS, Cl.P/20/50, fols. 84r, 92r.

Many of Hooke's experiments involved the use of such models; interestingly sometimes he even used architectural analogies to explain the results.[396] For instance, in his account of a 1662 experiment with glass balls (**Figure III-251**) which imploded when a vacuum was created inside, Hooke described the glass shell as an 'Arch', explaining

> If some parts of this arch (if I may soe call it) be weaker then the rest, or irregular, the ambient pressure breakes it in, Even as in architecture the same would happen in those larger vaults, if in either of these particulars they deviate from the rules of that art. But if they be sufficiently strong & equall, *th*e ambient pressure makes *th*e Crystalline vault the firmer, as in Arches of Stone is commonly observ'd.[397]

He used a similar analogy in his explanation of the workings of the so-called 'Prince Rupert's drops' (**Figure I-5**). These were created by dropping into water, or some other liquid, molten glass which would take on a tadpole-like shape; the bulbous end would be extremely strong, but when the tail was broken, the whole object would explode violently into dust.[398] Hooke gave his explanation of the phenomenon in Observation VII of *Micrographia*, effectively describing tempered glass. When dropped into liquid, the outer shell would immediately harden, while the inner core remained molten and hot. As it cooled, it contracted away from the shell, creating a great amount of tension ready to be released as soon as the tail was broken. Hooke explained that this outer shell, or "the Fabrick of the drop, that is able to hinder the parts from extricating themselves, is *analogus* to that of an Arch."[399] Indeed, his cross-section of the drop (labelled 'Fig: y' in **Figure I-5**) resembles the type of fan vaulting he would have seen in his youth at Christ Church above the staircase to the Great Hall.[400]

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396 On Hooke's use of models, see also Matthew C. Hunter, 'Experiment, Theory, Representation: Robert Hooke's Material Models', in *Beyond Mimesis and Convention*, ed. Roman Frigg and Matthew C. Hunter (New York: Springer, 2010), pp. 193-219.

397 RS, Cl.P/20/3, fol. 5r. Also transcribed, slightly differently, in Derham, *Philosophical experiments and observations*, pp. 12-13.

398 Whether Prince Rupert (1619–1682), Charles II's cousin, had any direct involvement in bringing these drops to England is subject to debate, but they had been known, and similarly experimented with, in continental Europe since the late 1650s; Laurel Brodsley, Charles Frank, and John W. Steeds, 'Prince Rupert's Drops', *Notes and Records of the Royal Society* 41 (1986), pp. 1-26, at p. 11. On these drops, see also Mihnea Dobre, 'On Glass-Drops: a Case Study of the Interplay Between Experimentation and Explanation in Seventeenth-Century Natural Philosophy', *JEMS* II (2013), pp. 105-124.

399 Hooke, *Micrographia*, p. 37.

400 The famed ceiling had been installed *c.* 1638; Mavis Batey and Catherine Cole, 'The Great Staircase Tower at Christ Church', *Oxoniensia* 53 (1988), pp. 211-220.

Hooke's interest in arches went beyond their use as analogical devices—as noted in previous chapters, he was in fact the first to give a mechanical explication of the catenary arch.[401] At the 8 December 1670 meeting of the Royal Society, he had drawn attention to the subject by bringing in a "problem of architecture," asking what the proper shape of an arch would be if its height and the distance between its two pillars were known. Naturally, he had a solution in mind, and was "desired to represent at the next meeting the mechanical way of making such an arch by pieces of angles standing in such angles, as to make the figure of an arch required."[402] A week later, he presented his "mechanical way" of making such an arch, but this in itself was deemed insufficient. By this time already, such physical representations, especially regarding mathematical curves, were deemed inaccurate: proper demonstration was mathematical proof, not a physical model. Hooke was asked to provide his 'demonstration' which he claimed, apparently unconvincingly, that he had shared with the Society's president, fellow mathematician Brouncker, who happened to be absent from the meeting. Repeated attempts thereafter at extracting the demonstration from him were unsuccessful, even after Wren had submitted his own alleged proof.[403]

Hooke's own terrella experiments in the 1660s and 1670s throw this issue of greater precision in defining mathematical curves into greater relief. When conducting the experiments in 1666, Hooke described the shape of the magnetic fields as ovals, which was not questioned at the time. Eight years later, he was less sure. In February 1674, he devised an experiment to allow nature to do the drawing: a terrella was fitted into hole cut into a round table over which a large skin of parchment was stretched like a drum head. When fine iron filings were sprinkled on the parchment, they arranged themselves into "magnetical orbs" which were judged to be of a single oval figure of different sizes. But Hooke quickly pointed out this was just a guess and further experiments would need to be conducted to verify their exact shape. It is unclear how he produced the drawing (**Figure III-172**) attached to the description of the experiment, but rather than tracing the iron filings, it appears he drew circles with

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[401] See especially the annotations in Chapter III, ii, for Figure III-165. cf.

[402] Birch, vol. 2, p. 461.

[403] Birch, vol. 2, pp. 461, 464, 465. As also noted above, sources on Hooke and Wren's work on the catenary arch include Philippe Block, Matt DeJong, and John Ochsendorf, 'As Hangs the Flexible Line: Equilibrium of Masonry Arches', *Nexus Network Journal* 8 (2006), pp. 13-24; James W. P. Campbell, 'Catenary Curves and Parabolic Conoids', in *Building St. Paul's* (London: Thames & Hudson, 2007), pp. 138-144; Higgott, 'Wren Office Drawings'. See also the notes on vaults and domes in Soo, *Wren's "Tracts" on Architecture and Other Writings*, pp. 149-152, and *passim*. For a succinct introduction to the European context, see John Bukowski, 'Christiaan Huygens and the Problem of the Hanging Chain', *The College Mathematics Journal* 39 (2008), pp. 2-11.

a compass, likely in an attempt to approximate their shape in relation to an idealised or demonstrable mathematical form.[404]

Ultimately neither Hooke nor Wren nor any other seventeenth-century mathematician would be able to prove the catenary curve. This did not prevent Hooke from experimenting further with physical models to work out the correct shape mechanically. A year later, at the 7 December 1671 meeting of the Society, he was able to produce "the representation of the figure of the arch . . . and found it to be a cubico parabolical conoid, adding, that by this figure might be determined all the difficulties in architecture about arches and butments."[405] The cubico parabolical conoid was formed by rotating the curve $y=x^3$ around the y axis, but it did not exactly yield a three-dimensional catenary arch. In practical terms, this mattered little—architecture could not yet accommodate such mathematical precision and Wren would still work with models for his designs for St. Paul's.[406]

The interest in bridging the gap between mathematical form and material reality persisted from that period on. On 8 January 1674, mathematician John Wallis, for instance, would tell Hooke about "his calculating the Distance of the arches analytically," i.e. algebraically. For some time by then, Wallis had also been interested in 'reciprocal grillage structures', e.g. the so-called 'Serlio floor', with which large spans could be covered with small lengths of timber. Wallis had even presented a model of it to the King in 1660, and ten years later published his pioneering structural analysis of it in his *Mechanica* (London, 1670).[407]

Still, it was Wallis's physical model of the "Geometrick flat Floor" that the Royal Society proudly displayed at its Repository.[408] Part of this can be explained by the immediacy and appeal of models in general; for instance, ship models were so popular at this time that there was even a practical book published on their construction.[409] But it was more likely because building physical models was

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[404] Birch, vol. 2, pp. 85, 88; vol. 3, pp. 128, 130, 133, 137. On Wren's experiments with a terrella, some of which date to the mid-1650s, see Sprat, pp. 315-316; Bennett, *The Mathematical Science of Christopher Wren*, pp. 46-47.

[405] Birch, vol. 2, p. 498 [misprinted as 984]; Campbell, 'Catenary Curves and Parabolic Conoids'.

[406] Ibid., p. 144. See also Gerbino and Johnston, *Compass and Rule*, pp. 100-104; Jacques Heyman, 'Hooke's Cubico-Parabolical Conoid', *Notes and Records of the Royal Society* 52 (1998), pp. 39-50.

[407] *Diary i*, p. 79; John Wallis, *Mechanica, sive, de motu, tractatus geometricus* (London: Gulielmi Godbid; impensis Mosis Pitt . . . , 1670); the analysis of the grid structure was later re-published, this time with an illustration, in his *Opera mathematica* (Oxford: Theatro Sheldoniano, 1695). On Wren's floor, See also Guy T. Houlsby, 'John Wallis and the Numerical Analysis of Structures', *Nexus Network Journal* 16 (2014), pp. 207-217.

[408] Hatton, *A new view of London*, vol. 2, p. 683.

[409] Thomas Miller, *The compleat modellist: Shewing the true and exact way of raising the model of any ship or vessel, small or great, either in proportion or out of proportion. Also the manner how to find the length of every rope exactly. And tables*

still an important and necessary first step in understanding what the forces were before they could be analysed algebraically.

Of models of architecture

In architecture, with which models are traditionally associated, their use dates at least back to ancient Greece, although the earliest extant examples, due to their fragility, only date back to around the fifteenth century.[410]

Architectural models (from the Italian 'modello') or 'modules' as they were often called in early modern Britain, had various purposes.[411] Presentation models, often made of wood, plaster, or pasteboard, were used to communicate the design to the patron. A good example is Wren's still-extant

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which give the true bigness of every rope in each vessel. Together with the weights of their cables and anchors (London: Printed for William Fisher . . . , 1676).

Note also Hooke's recollections, discussed in Chapter I, of the almost fully-functional model ship he had built as a child. Ship models, such as the one on display at the Royal Mathematical School, also had instructional uses; see ii. 21 in this chapter on Christ's Hospital and the Royal Mathematical School.

[410] Martin S. Briggs, 'Architectural Models–I', *The Burlington Magazine for Connoisseurs* 54 (1929), pp. 174-175, 178-181, 183, p. 174; a photograph of a fifteenth-century model of the Church of St. Maclou in Rouen is reproduced as Plate 1. On the history of architectural models, see also Martin S. Briggs, 'Architectural Models–II', *The Burlington Magazine for Connoisseurs* 54 (1929), pp. 245-247, 250-252; Bernd Evers, ed., *Architektvr Modelle der Renaissance: Die Harmonie des Bauens von Alberti bis Michelangelo* (New York: Prestel, 1995); Sabine Frommel and Raphäel Tassin, eds., *Les Maquettes D'architecture: Fonction et Évolution d'un Instrument de Conception et de Réalisation* (Paris: Picard, 2015); Henry A. Millon, 'Models in Renaissance Architecture', in *The Renaissance from Brvnelleschi to Michelangelo: The Representation of Architecture*, ed. Henry A. Millon and Vittorio Magnago Lampugnani (New York: Rizzoli, 1997), pp. 19-73; Monique Mosser, 'Models of French Architecture in the Age of Enlightenment', *Daidalos* 2 (1981), pp. 83-97; Hans Reuther, 'Origin and Development of the Architectural Model in Germany', *Daidalos* 2 (1981), pp. 98-110; Hans Reuther and Ekhart Berckenhagen, *Deutsche Architekturmodelle: Projekthilfe Zwischen 1500 und 1900*; Raphäel Tassin, 'Monumentalisation du Modèle ou Miniaturisation du Monument? Questions D'échelle entre Maquette et Architecture Réelle', *Histoire de L'art* 77 (2015), pp. 43-54.

In the British context, John Wilton-Ely has published several articles on architectural models; see his 'The Architectural Model – 1. English Baroque', *Apollo* 88 (1968), pp. 250-259; 'The Architectural Model', *Architectural Review* 142 (1967), pp. 26-32; 'The Architectural Models of Sir John Soane: A Catalogue', *Architectural History* 12 (1969), pp. 5-38, 81-101; and 'Wren, Hawksmoor and the Architectural Model', in *English Architecture Public and Private: Essays for Kerry Downes*, ed. John Bold and Edward Chaney (London: Hambledon Press, 1993), pp. 147-158. Further sources include Paul Jeffery, 'The Commissioners' Models for the Fifty New Churches: Problems of Identity and Attribution', *The Georgian Group Journal* 5 (1995), pp. 81-96; Margaret Richardson, 'Model Architecture', *Country Life* 183 (1989), pp. 224-227; Simona Valeriani, 'Three-dimensional Models as 'In-between-objects' – the Creation of In-between Knowledge in Early Modern Architectural Practice', in *History of Technology*, ed. Ian Inkster (New York: Bloomsbury Academic, 2012), pp. 26-46.

[411] It should be noted that the term 'model' could equally refer to a two-dimensional drawing or a three-dimensional object; Briggs, 'Architectural Models–I', p. 174.

'Great Model' of St. Paul's Cathedral, constructed at a scale of 1:25 in wood and plaster, and completed in 1674 at the considerable sum of £600.[412]

Models could also serve as negotiation tools or even contract documents with craftsmen who were expected to realise the design as closely as possible at the original estimated price. In projects involving the use of new techniques, they had limited use however. For instance, in 1671, for the Fleet Canal project, Wren and Hooke had recommended that a 2" : 1' scale model of the wharves be prepared to help negotiate with carpenters. Wren, as the surveyor-general of the King's Works, and Hooke, as the City Surveyor, had been put in charge of this post-Fire project of transforming Fleet Ditch—by then clogged up with mud and garbage, and prone to overflowing—into a navigable canal. Considering the complexity of the work, they additionally suggested 100'-long prototypes be built to help select the best craftsman for the job. These recommendations were adopted, but Wren and Hooke remained aware of the technical challenges and included many caveats in their estimates. Indeed, it turned out they had greatly misjudged the lateral pressures on the embankment walls, leading to an expensive trial-and-error process which no model or prototype had prepared them for. Eventually it was Thomas Fitch (1637–1688), the master carpenter acting as the main builder, who successfully undertook the project for which he was paid upwards of £50,000 and was eventually knighted.[413]

Hooke's diaries are full of references to models or modules being negotiated for various projects, albeit it is not always clear whether he was referring to a drawing or a three-dimensional model. For the latter, he often called upon the services of Roger Davys, the joiner, who constructed models for Bethlem Hospital, as well as for various private houses. One of these was Montagu House, for which several models were made, perhaps partly to appease an impatient client: writing to her sister, Lady Montagu noted "If our house went up as fast as we have models made, we should be in it before you get to yours, for we have no less than three that are big enough for Miss Ann [her toddler] to walk in."[414] Such presentation models were important enough that Hooke would take Davys with

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[412] James W. P. Campbell, *Building St. Paul's* (London: Thames & Hudson, 2007), pp. 26-34. For Hooke's implicit criticism of the cost of Wren's model, see the annotations for Figure III-193 in Chapter III, ii.

[413] See ii. 7 in this chapter regarding Hooke's work on Fleet Canal. On Thomas Fitch, see Colvin, *BDBA* (2008), pp. 378-379. He is sometimes referred to as a bricklayer in secondary literature, but it has been pointed out that he was instead a member of the Carpenters' Company; Reddaway, 'Fleet Canal and Thames Quay', p. 211n4.

[414] Letter from Elizabeth Montagu to Rachel Russell, 11 Feb. 1675/6, transcribed in *Letters of Rachel Lady Russell*, Third ed., 2 vols. (London: Longman, Brown, Green and Longmans, 1853), vol. 1, p. 23. See, in this chapter, ii. 19 on Montagu House.

him on a visit to Ragley Hall in Warwickshire, to make adjustments to the model on site to reflect the latest alterations to the design.[415]

Presentation models were different from Gilbert's terrella or even Hooke's own mechanical models of magnetic fields or arches or domes, in that they visualised and communicated ideas but did not necessarily generate new ones. This is not to question their expediency; Hooke did note how a "small Module would express all the Particulars, much plainer than any Draught."[416] But if we are to return to the differences between mathematical instruments versus philosophical ones, whereby one essentially reproduced nature while the other interrogated it, these models would align with the former.[417]

Points of exchange

There were numerous points of exchange between Hooke's natural philosophical and architectural works—both used in the widest sense to include experimental philosophy and engineering works. He seems to have been particularly adventurous with his first major residential commission: Montagu House. This was where, as mentioned earlier, he made use of Alberti's inverted arch system (**Figure II-7**) for the building's foundations, and where he is credited with one of the earliest uses of the sash window.[418] Celia Fiennes's contemporary account of her visit to the mansion

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The inventory of Hooke's possessions, taken shortly after his death, listed a model of an unidentified house in his workshop; Hunter, 'Appendix: Hooke's Possessions at his Death: a Hitherto Unknown Inventory', at p. 293. While it may have belonged to any number of residential projects Hooke worked on, it should be noted that Montagu had promised to send Hooke the model of his house; *Diary i*, p. 250. By the time of Hooke's death, the model would have been almost three decades old, but if it was constructed out of wood, it may have lasted.

415 See, in this chapter, ii. 36 on Hooke's work for Ragley Hall.

416 'A Contrivance which Sir Robert Southwell saw at Brandenberg, for speedy Conveyance of Earth, and to fill up, or raise Ground, &c. communicated to Dr. Hook, Sept. 9. 1692' in Derham, *Philosophical experiments and observations*, pp. 275-276, at p. 276.

417 See footnotes 393 and 394.

418 See ii. 19 later in this chapter on Montagu House. Regarding Hooke's use of this foundation system, see also Chapter II on Hooke's use of books for practical knowledge.

Sash windows, which incorporated a mechanical system that facilitated easy operation, were revolutionary in that they allowed half of the window to be open, increasing the air intake into the building. On the early uses of sash windows, see A. P. Baggs, 'The Earliest Sash-Window in Britain?', *The Georgian Group Journal* 7 (1997), pp. 168-171; Louw, 'The Origin of the Sash-Window', Hentie Louw and Robert Crayford, 'A Constructional History of the Sash-Window, c. 1670-c. 1725 (Part 1)', *Architectural History* 41 (1998), pp. 82-130.

also suggests that Hooke may have created a 'whispering gallery' in the great room .[419] In the early 1660s, there had been discussions at the Royal Society regarding the acoustic phenomenon—whereby a whisper at one end of the room could be clearly heard at the other end—with Henry Powle contributing his description of the whispering place at Gloucester Cathedral. It is possible Hooke made use of this in conceiving the room, although it may equally have been accidental and simply due to the shape of the ceiling.[420]

Hooke's 1663 Royal Society experiments on sounding the depths of the sea (**Figures III-262, 269**) were no doubt useful in the proposal he prepared in 1676 for repairing and completing the Tangier Mole, which involved creating foundations at the bottom of the sea. The original experiments had been undertaken to aid Jonas Moore's work at Tangier to begin with, so it would have been natural for him to propose to use this research to continue the construction.[421]

The exchanges extended to his interactions with craftsmen. Hooke would hire a joiner to help build his helioscope instrument; lend Roger Bates, the London carpenter he worked with on multiple projects, his copy of the 1570 English translation of Euclid, and "compasses and [an unidentified] book to [an equally unidentified] mason at Fish street hill."[422] Robert Bird, the brazier, would be hired for help both with the air pump and the brass urn ornament (**Figure III-314**) on top of the Monument to the Great Fire.[423]

Indeed, it is in the Monument project that we see the two types of building practices (in experimental philosophy and architecture) in close alignment. The project was a collaboration between Wren and Hooke in their different civic capacities, so it is impossible to assign the idea wholly to one or the other, but in his biographical note on Wren, Ward reported that the building had been conceived to double as a zenith telescope:

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[419] Celia Fiennes, *The Journeys of Celia Fiennes*, ed. Christopher Morris (London: The Cresset Press, 1949), pp. 235, 291-292; see ii. 19 below on Hooke's work on Montagu House for extracts. For biographical details, see 'Fiennes, Celia (1662–1741)', *ODNB*.

[420] See Celia Fiennes's accounts of her visit to the house in ibid. Extracts from these are included in ii. 19 on Montagu House in this chapter.

On discussions regarding the phenomenon at Gloucester Cathedral, see Birch, vol. 1, pp. 120-123; Henry Powle, 'Account of *th*e whispering place at Gloucester', 29 Oct. 1662; RS, Cl.P/2/33.

[421] See ii. 26 in this chapter on Hooke's ultimately-unsuccessful proposal for Tangier Mole for further details and extracts from primary sources.

[422] *Diary i*, pp. 291, 323.

[423] *Diary i*, pp. 238, 244. See ii. 6 in this chapter on Hooke's work for the Monument to the Great Fire. On Hooke's collaborations with craftsmen, including in the construction trades, see Iliffe, 'Material Doubts'.

> The ingenious and learned architect built it hollow, [so] that it might serve as a tube to discover the parallax of the earth, by the different distances of the star in the head of the Dragon from the zenith, at different seasons of the year. But finding it was liable to be shaken by the motion of coaches and carts almost constantly passing by, he laid aside that thought.[424]

The telescope would have required a stable alignment between the lenses—a difficult task to achieve in a 200'-tall structure, the summit of which would be subjected to not only the vibrations from coaches and carts, but also movement from the wind. Hooke also built a zenith telescope in his lodgings at Gresham College (**Figure III-55. cf**), but it too was unstable. Despite its telescopic failings, the Monument still provided a backdrop to other experiments, for instance, on air pressure. [425]

Architecture as metaphor

Beyond these, architecture also provided Hooke with a suitable metaphor for his philosophical work.[426] In his posthumously-published 'General Scheme, or Idea of the present state of Natural Philosophy', dating to around 1666, he expounded his 'Method of collecting Philosophical History'.[427] This involved the assembly of a "Repository of Materials, out of which a new and sound Body of Philosophy may be raised"—the materials, "Natural and Artificial Operations, Actions and Effects," were to be the "Foundation Stones" on which this whole structure would be built.

First, a sufficient store of materials would need to be accumulated, and "if the Architect were so skilful as to foresee to provide all kinds of Materials before he begins; . . . his Work would be carried on the more compleatly and uniformly, without Necessity of pulling down, or altering, or piecing, or

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[424] Ward, *The lives of the professors of Gresham College*, p. 104; Bennett, *The Mathematical Science of Christopher Wren*, pp. 42-43. As Bennett has pointed out, Ward's source was James Hodgson, a relation of Wren's; ibid., p. 42. On the Monument, see also Jardine, 'Monuments and Microscopes: Scientific Thinking on a Grand Scale in the Early RoyalSociety'; Lisa Jardine, 'For a Short Time an Endless Monument: The Shifting History of a Familiar London Landmark', *Historian* (2006), pp. 30-37; Stevenson, 'Robert Hooke, Monuments and Memory'; Walker, 'Limits of Collaboration'. Further sources are cited in the relevant section below on the Monument project.

[425] Jardine, 'Monuments and Microscopes: Scientific Thinking on a Grand Scale in the Early RoyalSociety', pp. 300-302. Wren's proposal to use St. Paul's as a zenith telescope dates to after Hooke's death; see ibid., p. 302.

[426] See also 'Architect as Model' in Hunter, *Wicked Intelligence*, pp. 183-187.

[427] For the dating of the text, see Hesse, 'Hooke's Philosophical Algebra', p. 68.

transforming any part, or staying or interrupting." Providing 'a proper History for the perfecting of a new Body of Philosophy' involved a similar process in which:

> the Intellect should first, like a skilful Architect, understand what it designs to do, and then consider as near as can be, what things are requisite to be provided . . . [for] this Design. then those Materials are to be carefully sought for and collected, and safely laid up in so convenient an Order that they may not be far to seek when they are wanting, nor hard to be come by when they are found: In the choice of which, Care ought to be taken that they are found and good, and cleans'd and freed from all those things which are superfluous and insignificant to the great Design . . . Brevity is [to be omitted] . . . for as in the laying up of Timber, the keeping on a branching part does make it serviceable for many Designs which it would be wholly unfit for, if it had been squared off, so it will be in the fitting and preparing the Particulars for a Philosophical History, there must be Judgment in the Historian to discern what will be material and useful in general, and what will be more especially adapted for the Inquiry whatever he designs.[428]

Thus, building from a repository of observations and results of experiments, Hooke's 'skilful Architect'/natural philosopher would have a 'design' in mind rather than blindly collect disparate data or information without end. Furthermore, he would take care that this information, while scrubbed of anything superfluous, would not be simplified, just as timber should not be 'squared off' without first knowing how it would be used. This passage, written just around the time his City surveyorship began, is particularly interesting since Hooke would often apologise for his conjectures and theories, but he may have seen them as 'design'. In some ways, Hooke's 'skilful Architect' is close to Dee's, who provided "Mathematicall Speculation" or "Demonstratiue reason and cause" to practice, to "the

[428] Hooke, 'General scheme, or idea of the present state of natural philosophy and how its defects may be remedied by a methodical proceeding in the making of experiments and collecting observations, whereby to compile a natural history as the solid basis for the superstructure of true philosophy', pp. 18-19. In order to make the text more readable, some punctuation has been silently added.

Mechaniciens worke."[429] The 'Mechanicien' in this particular context, is Hooke's 'mechanick': the experimental philosopher.

A decade-and-a-half later, in one of his lectures on light from 1682, Hooke would revive and apply this idea more directly to the workings of memory, arguing that memory is but

> a Repository of Ideas formed partly by the Senses, but chiefly by the Soul it self . . . For I conceive no Idea can be really formed or stored up in this Repository, without the Directive and Archietonical Power of the Soul; and the Actions or Impressions cease and fail without the concurrent Act of the Soul, which regulates and disposes of such Powers.[430]

Another decade later, in a lecture he "Read to *th*e Children [of the Royal Mathematical School] & a full auditory Apr.21.1692," now extant in manuscript among his papers at Trinity College, Cambridge, he connected this 'skilful Architect'/'Archietonical Power of the Soul' back to geometry:

> This Reduction of the Phenomena of the senses to number weight measure and proportion is not performed by the immediate action or operation of the appropriate organ of that Sense [which] only . . . communicates or conveys that Image . . . to the Internall and Distinguishing Sense which is the animate faculty. where it is Reposited or treasured up for Materialls for Ratiocination, which the minde makes use of for comparing one with another and thence deducing Conclusions and Demonstrations And tis in this operation of the mind wherein the use and benefit of the Geometricall knowled*ge* Doth <deleted> most eminently shew it Self.[431]

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[429] Dee, 'Mathematicall praeface', sig. diij.

[430] Robert Hooke, 'Lectures of Light, Explicating its Nature, Properties, and Effects, &c. [1680-1682]', in *The posthumous works of Robert Hooke, M.D. S.R.S., geom. prof. Gresh. &c., containing his Cutlerian lectures, and other discourses*, ed. Richard Waller (London: Publish'd by Richard Waller, R. S. Secr., Printed by Sam. Smith and Benj. Walford (Printers to the Royal Society) . . . , 1705), pp. 71-148, at p. 140. It was in this lecture that Hooke came dangerously close to the idea of a material interpretation of the soul, necessitating a preface from Waller.

On this lecture and Hooke's ideas regarding the Royal Society repository, see Hunter, *Wicked Intelligence*, pp. 182-183.

[431] Trinity College, Cambridge, O.11a.1.[14h]; quoted with corrections to Oldroyd's transcription in 'Some "Philosophical Scribbles" Attributed to Robert Hooke', pp. 29-30, note 29. Note that this is the beginning of the lecture, thus it is unclear what exactly "this reduction" refers to.

i. 2. Robert Hooke, architect

Beyond the metaphor of the 'skilful Architect', Hooke did not explicitly refer to himself as an architect—this, however, is only significant if we assume 'architect' to be a fixed professional identity in Britain at this time.

Indeed, 'architect' was yet a foreign concept, recently imported from Italy and France. Inigo Jones (1573–1652) is often credited with being the first British architect, having learnt the craft during his lengthy travels in Italy.[432] Through the seventeenth century, building work was done collaboratively by groups of craftsmen—masons, bricklayers, carpenters, glaziers, joiners, plumbers, etc.—with one acting as the master coordinating the work. Writing about this period often involves intermittent pauses to decide how to qualify the master; for instance, does one call Edward Jarman (*c.* 1605–1668), the designer of no less a building than the Royal Exchange, a master carpenter, a City Surveyor, 'an experienced man in buildings' as Roger Pratt (1620–1685) put it, or an 'architect' in modern terms?[433] Military engineers, such as Bernard de Gomme (1620–1685), surveyors to the Navy, such as Edmund Dummer (1651–1713), similarly undertook building designs, as did surveyors. There were also those who received the dubious honour of being called a 'local architect', a title usually used to belittle their work as being provincial or at best derivative. At the opposite end were the 'gentleman-architects', wealthy men who went on the Grand Tour, and returning home, continued their architectural training in their libraries. What stands out is that building practices were not limited to 'architecture' and were implemented under many different titles.

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[432] On Jones, see Christy Anderson, *Inigo Jones and the Classical Tradition*; Anderson, 'Inigo Jones's Library and the Language of Architectural Classicism in England, 1580–1640',.

[433] Sources on architectural practice during this period include James Ayres, *Building the Georgian city* (New Haven: Published for the Paul Mellon Centre for Studies in British Art by Yale University Press, 1998); Howard Colvin, 'The Practice of Architecture, 1600–1840', in *A Biographical Dictionary of British Architects, 1600-1840* (New Haven, CT: Yale University Press, 2008), pp. 15-37; John Harris and Robert Headsky, *A Passion for Building: The Amateur Architect in England 1650–1850* (London: Sir John Soane's Museum, 2007); Frank Jenkins, *Architect and Patron: A Survey of Professional Relations and Practice in England from the Sixteenth Century to the Present Day* (New York: Oxford University Press, 1961), pp. 40-66; Barrington Kaye, *The Development of the Architectural Profession in Britain: A Sociological Study* (London: George Allen & Unwin Ltd., 1960), pp. 22-53; Douglas Knoop and Gwilym Peredur Jones, *The London Mason in the Seventeenth Century* (London: The Manchester University Press, 1935); John Wilton-Ely, 'The Rise of the Professional Architect in England', in *The Architect: Chapters in the History of the Profession*, ed. Spiro Kostof (New York, NY: Oxford University Press, 1977), pp. 180-208; Giles Worsley, ed., *The Role of the Amateur Architect: Papers Given at the Georgian Group Symposium* (London: The Georgian Group, 1993); David Yeomans, *The Architect and the Carpenter* (London: RIBA Heinz Gallery, 1992).

Even if we were to simplify things and define Hooke as an 'architect', there are still some inherent problems with attribution that need to be addressed. First is how 'design' is defined. For some historians, an architect sending a set of drawings or even just one drawing which then has to be interpreted by local craftsmen into a building is enough to credit that design to him.[434] For others, authorship of an architect can be summarily dismissed if there is no record of him visiting the area; this is how, for instance, Pierre Puget (1620–1694) has been ruled out as the designer of the second Montagu House built after the first one was burnt down.[435] The issue appears to be even more complex when we take a close look at Ragley Hall, for instance. In that case, Hooke not only corresponded and sent drawings to the client, but visited the site with the joiner to fix the model. However, as the decision-maker, the client ultimately attributed the design to himself.[436]

There is also the fact that architecture, by necessity, is a collaborative practice, with craftsmen enjoying certain artistic licenses to employ their talents within the limits provided to them. Thus, an architect cannot be credited for every detail in a building, which should provide a caveat against stylistic attributions.[437] Related to this are stylistic *influences*. As Stoesser-Johnston has discussed, Hooke's design for Bethlem Hospital was heavily influenced by the work of the Dutch architect Philips Vingboons.[438] Yet, this does not mean any building with obvious Dutch influences should be attributed to Hooke, especially when there were so many Dutch artists and artisans working in England at that time.[439]

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[434] An interesting example is Ragley Hall, although Hooke did visit the site at least once; see ii. 36.

[435] See ii. 19 on Montagu House.

[436] See ii. 36 on Ragley Hall.

[437] The dichotomy between collaboration and authorship was not limited to architecture. It had obvious resonance in theatrical and printed works, but also increasingly in natural philosophy, where many experimental philosophers collaborated not only with other philosophers but also with mathematical practitioners and craftsmen in inventing new instruments. In an environment where the quality of the instrument had authority over the credibility of the experiment, the question remained: whose work was the instrument? The natural philosopher who conceived of it but lacked the tacit knowledge of materials and the skills needed to actually construct them? Or the instrument maker who invented a tool by interpreting a set of vague specifications?

The Royal Society minutes contain numerous references to teams of fellows being assigned experiments to conduct together; see Birch, vols. 1-4, *passim*. On issues of authorship in literature or natural philosophy, see, for instance, Janet Clare, 'Shakespeare and Paradigms of Early Modern Authorship', *Journal of Early Modern Studies* 1 (2012), pp. 137-153; Domenico Bertoloni Meli, 'Authorship and Teamwork Around the Cimento Academy: Mathematics, Anatomy, Experimental Philosophy', *Early Science and Medicine* 6 (2001), pp. 65-95.

[438] Stoesser-Johnston, 'Robert Hooke and Holland'. See also ii. 16 on Bethlem Hospital.

[439] Worsley, 'Taking Hooke Seriously'.

Problems of attribution in secondary literature

The National Heritage List for England (NHLE) attributes several extant buildings and structures to Hooke. One of these, located in Crooms Hill, Greenwich, is a 'Front Garden Wall to Number 52 and Gazebo' listed at the Grade II level.[440]

The gazebo (**Figures IV-100 to 103**) is an interesting little brick structure 'perched' on a wall facing Greenwich Park and bears the date 1672. It is seemingly insignificant but contains certain interesting details, such as the lack of any right angles in its footprint—a somewhat labour-intensive feat to accomplish in a brick building. Initial questions arise. Given Hooke's work in the post-fire reconstruction of the City Churches, might this be a much smaller, subtler version, of St. Dionis Backchurch (rebuilt *c.* 1670–1674, demolished in 1878) where "no two walls [were] at right angles to each other"?[441] While the structure looks obviously restored, could the original gauged brickwork have been an example of the kind described by Joseph Moxon in his *Mechanick exercises* (London, 1700)?[442] Was the coat of arms on the facade facing the Park a faithful restoration of an original or a later addition?

The NHLE entry offers no clues to help with these queries. The listing dates to 1951, and as it is sometimes the case with such early entries, there are no references even supporting the attribution, which is worded in less certain terms anyway as "probably by Robert Hooke." The sole reference is that it is based on 'RCHM', i.e. the Royal Commission on the Historical Monuments of England, which was established in 1908 to document and publish a series of inventories of heritage buildings. Greenwich was included in volume 5 of the London series published between 1924 and 1930, although no attribution to Hooke, or anyone else for that matter, was made for the structure.[443]

Instead, working backwards from Cherry and Pevsner's 2002 volume on South London in 'The Buildings of England' series, and following the chain of references, the attribution can be traced

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For example, the military engineer de Gomme, who was originally from the Netherlands, designed the gates to Plymouth Citadel in a thoroughly Dutch style.

[440] The National Heritage List for England (hereafter NHLE) is maintained by the Historic Buildings and Monuments Commission for England (Historic England) which was split from English Heritage in 2015. The latter is now a charity in charge of caring for four hundred historical places for the National Heritage Collection; see https://goo.gl/aqGnga. Regarding the gazebo, see ii. 12 in this chapter.

[441] Jeffery, *City Churches of Wren*, pp. 236-237.

[442] Moxon, *Mechanick exercises . . . Applied to the art of bricklayers-works*.

[443] 'Greenwich', in *An Inventory of the Historical Monuments in London, Volume 5, East London* (London: His Majesty's Stationery Office, 1930); available online at https://goo.gl/u3p1LL.

to a 1966 *Country Life* article by Beryl Platts who claimed that the structure "can almost certainly be attributed to Robert Hooke, who was designing Sir William's London house in that year." A photograph of the building reproduced as 'Figure 6' in the article was captioned in less ambiguous terms: "Sir William Hooker's Gazebo, designed by Robert Hooke in 1672."[444] Platts repeated the "almost certainly Robert Hooke" attribution in *A History of Greenwich* published in 1973, giving no sources to support the speculation in either publication. To speculate in return, Platts likely based the conjecture on Hooke's diary entries from 1672 and 1673 when he made several mentions to "Sir W. Hookers house [on] Fish Street Hill." At the time Hooke was indeed involved in renovations to Hooker's house at Crown Court on an extension of Fish Street Hill in London, and was negotiating with two contractors for carpentry and brickwork, but there is no evidence of his involvement in any work for Hooker's property in Greenwich.[445] Archival research into the history of the structure unearthed photographs prior to its restauration, showing that at least some of the gauged brickwork and the coat of arms are in fact recent additions.

While it is easy to dismiss this episode as a case of at-best-speculative-or-at-worst-erroneous attribution, it is in fact indicative of a general problem of similarly tenuous attributions plaguing the scholarship on Hooke's architectural work. Boone's Chapel in Lewisham (**Figure IV-240**), for instance, has been attributed to Hooke partly based on stylistic similarities to this gazebo.[446] The presence of several engraved prints of the Plymouth dockyards among Hooke's papers at the British Library (**Figures IV-263, 265, 267**) has resulted in speculation that he may have been involved in the design of at least one of the buildings there.[447] However, not only is there no other evidence corroborating Hooke's involvement, but a closer look at the history of the papers in question reveals that they were assembled at a later date from several different bundles and also include items dating to a period after Hooke's death.[448] Such problems with attribution and documentary evidence have

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[444] Bridget Cherry and Nikolaus Pevsner, *London 2: South* (New Haven, CT: Yale University Press, 2002), p. ; Beryl Platts, 'The Oldest Road in London? Crooms Hill, Greenwich-1', *Country Life* 140 (1966), pp. 1262-1264, pp. 1263, 1264; repeated in Beryl Platts, *A History of Greenwich* (Newton Abbot, Devon: David & Charles, 1973), p. 181.

[445] However, with the extant diaries beginning in March 1672, this cannot be conclusively ruled out. On Hooker's London house, see ii. 14 in this chapter.

[446] On Boone's Chapel, see ii. 38 in this chapter.

[447] On Plymouth Dockyards, see ii. 48 in this chapter. For the engravings in question, see Figures III-113, 117, and 131, and the related annotations for these figures in Chapter III.

[448] See the notes on BL, Add. MS 5238 in Chapter III, ii.

hindered an assessment of Hooke's architectural work, to the point where it is treated as an extracurricular activity in relation to his natural philosophical oeuvre.

With the goal of facilitating further research and discoveries into Hooke's architectural work, a documentary analysis of the projects he has been associated with is provided in Volume 2. Rather than a regular catalogue of works with detailed descriptions of the projects, its objective is limited to assessing the primary evidence as well as the secondary scholarship for the attributions.

Conclusion

Architecture as a distinct field, both in theory and practice, was not yet defined in seventeenth-century England. The concept of the architect had not been fully imported from Europe, publications on the subject were sparse and mostly appeared in the last quarter of the century, and construction work was still being undertaken by craftsmen who received their formation in an apprenticeship system based on medieval traditions. Equally in flux was the nature of knowledge, with intense debates taking place on the appropriate methods for its acquisition.

Such was the background to Hooke's *praxes* of reading, drawing, and building. He thought that knowledge could best be attained by 'the perusall of Bookes, the consulting of men & the Examination and tryall of things' but these were equally valid for architecture. He had a unique ability to traverse between different fields and social strata. Unlike other virtuosi who sought to fix the image of an ideal architect, he chose to downplay his gentlemanly roots, presenting himself as a 'mechanick genius', highlighting his alignment with experimental philosophy while playing on the ambiguities surrounding the word 'mechanic'. He perused books from the continent for innovative construction techniques unknown to local craftsmen but remained aware of the value of the latter's medieval traditions which at times proved to be more effective than any new methods he could develop, such as in the Fleet Canal project.

For Hooke, the world had a materiality and knowledge of it was mediated physically or mechanically—understanding nature involved recreating it in an experiment or else observing it via instruments. This 'tryall of things' and the empirical approach he adopted in his experimental philosophy is evident throughout his various *praxes*. Rather than using drawing as a representational tool, for instance, Hooke at times reconstructed experiments on paper with a compass and rule. He used models to experiment on, but also used architecture itself as an instrument: for instance, the Monument to the Great Fire of London was meant to double as a zenith telescope. More significantly, for architecture, this experimental approach translated into the idea that buildings could have direct effects on their inhabitants, so that the innovative fenestration system of Bethlem Hospital, for example, could help patients 'air their lunacy'. This idea was a necessary step before the later use of architecture in social engineering.

In Hooke's case, the shared *praxes* of reading, drawing, and building, allowed affinities and cross-pollinations to develop between natural philosophy and architecture, creating a reciprocity that

went beyond architecture being a 'practical application' of scientific knowledge. Yet the phenomenon of 'scientist-architects' was short lived, and during the ensuing centuries when architecture developed as a discreet field, it lost most of its epistemological value.

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Figure III-128. Hooke, 'Elevation and plan, in ink and ink-wash, of the Somerset House stables built for Queen Catherine of Braganza', 1669 or 1670. © The British Library Board, Add. MS 5238, no. 89.

Figure III-129. Hooke[?], 'Ink and ink-wash elevation of a niche, perhaps in a chapel', n.d. © The British Library Board, Add. MS 5238, no. 90.

Figure III-130. Hooke[?], 'Ink and ink-wash elevation of a niche', n.d.; detail. © The British Library Board, Add. MS 5238, no. 91.

Figure III-131. Anon. (engraver), Dummer (draughtsman), 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Add. MS 5238, no. 92.

Figure III-132. cf. Dummer, 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Lansdowne MS 847, fol. 47.

Figure III-133. Anon., 'Large drawing, in ink and colour ink-wash, of an elevation of an unidentified institutional building', n.d. © The British Library Board, Add. MS 5238, no. 93.

c. Add. MS 5262

Figure III-134. Hooke, 'Snake-stones (ammonites)', n.d.; detail. © The British Library Board, Add. MS 5262, no. 152, reproduced in Sachiko Kusukawa, 'Drawings of Fossils by Hooke and Richard Waller', *Notes and Records of the Royal Society* 67 (2013), p. 124.

Figure III-135. Hooke, 'Nautilus shells', n.d. © The British Library Board, Add. MS 5262, no. 153, reproduced in ibid., p. 125.

Figure III-136. Hooke, 'Helmet and button stones', n.d. © The British Library Board, Add. MS 5262, no. 154, reproduced in ibid.

Figure III-137. Hooke, 'Various fossils', n.d. © The British Library Board, Add. MS 5262, no. 155, reproduced in ibid., p. 126.

Figure III-138. Hooke, 'Various fossils', n.d. © The British Library Board, Add. MS 5262, no. 156, reproduced in ibid., p. 127.

Figure III-139. cf. Richard Waller, 'Petrified nautilus shell', n.d. © The British Library Board, Add. MS 5262, no. 158, reproduced in ibid., p. 129.

Figure III-140. cf. Hunt, 'Prodigious gravell stone cutt from Francis Dugud', 1675; 'A stone extracted of the bladder of a woman', 1690. © Royal College of Physicians, MS 618, no. 37.

d. Add. MS 57495

Figure III-141. John Covel (previously attributed to Hooke), 'Sketches of coins and insects', *c.* 1660–1661. © The British Library Board, Add. MS 57495, fol. 112v.

Figure III-142. Covel (previously attributed to Hooke), 'Sketches of insects', 1660–1661. © The British Library Board, Add. MS 57495, fol. 113v.

Figure III-143. Covel, 'Sketch of a tick', 1660–1661, detail. © The British Library Board, Add. MS 57495, fol. 113v.

Figure III-144. cf. Hooke, *Micrographia* (London, 1665), Schema XXXIII, Fig. 2.

Figure III-145. Covel, 'Drawing of a *trombidium holosericeum* (red velvet mite) and a 1574 gold coin from the reign of Murad III', *c.* 1660–1661, detail. © The British Library Board, Add. MS 57495, fol. 112v.

Figure III-146. cf. Covel, '*Lotus subbiflorus*[?]', detail. © The British Library Board, Add. MS 57495, fol. 53r.

Figure III-147. Covel 'Sketches of insects', 1660–1661, detail. © The British Library Board, Add. MS 57495, fol. 113v.

Figure III-148. cf. Covel, 'Oration in honour of Charles II's restoration', 1661. © The British Library Board, Add. MS 22910, fol. 9r.

Figure III-149. cf. Covel, 'Ink wash drawing of a caterpillar', n.d. © The British Library Board, Add. MS 57495, fol. 117r.

Figure III-150. cf. Covel[?], 'Drawing of an unidentified bovine animal, n.d. © The British Library Board, Add. MS 22910, fol. 221r.

e. Sloane MS 1039

Figure III-151. Hooke's copy of his letter "Sent by Dan. Osburn Esq. to his Brother July the 10 1684," with sketches illustrating the use of a quadrant described in the letter. © The British Library Board, Sloane MS 1039, fol. 100r-v.

Figure III-152. cf. Hooke, *Animadversions on the first part of the* Machina coelestis of . . . *Johannes Hevelius* (London, 1674) in Hooke's *Lectiones Cutlerianae* (London, 1679), detail from table 1.

Figure III-153. Hooke, 'Memorandum for 17 Oct. 1682'. © The British Library Board, Sloane MS 1039, fol. 153r, detail.

Figure III-154. Hooke, 'Memorandum for 27 Oct. 1682'. © The British Library Board, Sloane MS 1039, fol. 154r, detail.

Figure III-155. Hooke, 'Memorandum for 25 June 168[6?], with a sketch of the seal of Johann Joachim Becher's *societatis psychosophicae*'. © The British Library Board, Sloane MS 1039, fol. 166r, detail.

Figure III-156. Hooke, 'Plan of an unidentified building', n.d. © The British Library Board, Sloane MS 1039, fol. 167.

f. Sloane MS 1048

Figure III-157. Hooke[?], sketch on the verso of 'Mr. Hooke's certificate', 16 May 1682; detail. © The British Library Board, Sloane MS 1048, fol. 62v.

g. Sloane MS 4024

Figure III-158. Hooke, 'Microscopic view of a yellow sunflower dust' and 'Elliptic symbol', diary entries for 16 and 18 Aug. 1689. © The British Library Board, Sloane MS 4024, fol. 43r.

Figure III-159. Hooke, 'Symbol of spectacle frames', diary entry for 29 Aug. 1689. © The British Library Board, Sloane MS 4024, fol. 45r.

Figure III-160. Hooke, 'Symbol of a bowl', diary entry for 12 Sep. 1689. © The British Library Board, Sloane MS 4024, fol. 49r.

h. RP 9026

Figure III-161. cf. Tables 1 and II in *A Description of helioscopes, and some other instruments made by Robert Hooke* (London, 1676) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in British Library, RP 9026, nos. 1 & 2.

Figure III-162. cf. Tables I & 2 of *Animadversions on the first part of the* Machina coelestis *of . . . Johannes Hevelius* (London, 1674) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in British Library, RP 9026, nos. 3 & 4.

Figure III-163. cf. Tables I and III of *Lampas: or, descriptions of some mechanical improvements of lamps & waterpoises* (London, 1677) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in British Library RP 9026, nos. 5 & 6.

ii. 3. British Museum, London

Figure III-164. Hooke (attrib.) or Pearce (attrib.), '[Elevation of a 17thC building with cupola Pen and brown ink, with grey wash, over graphite]', n.d. © Trustees of the British Museum, Ee,2.119, AN1265760001.

Figure III-165. cf. Wren, 'Study for the dome of St. Paul's Cathedral using a cubic parabola', *c.* 1690. © Trustees of the British Museum, 1881,0611.203, AN290173001.

Figure III-166. Wren, 'Design for the finial of the Monument', *c.* 1675. © Trustees of the British Museum 1881,0611.205, AN290174001.

ii. 4. Cambridge University Library

Figure III-167. a. Hooke's sketch of the 66-foot telescope in his letter to Hevelius, *c.* 20 Feb. 1667. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/117v.

Figure III-167. b. Hooke, 'Letter to Hevelius regarding telescopic sights', *c.* May 1668; detail. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/129v.

Figure III-168. cf. a. Oldenburg's notes on Hooke's letter to Hevelius, Feb. 1667; detail showing the sketch. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/116r.

Figure III-168. cf. b. Author's collage of the two sketches (Figures III-167. a and III-168. cf. a), showing their near-identical size and composition. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/116r and Add. 9597/13/5/117v.

Figure III-168. cf. c. A diagram of Hooke's sketch, published in Stephen Jordan Rigaud, ed., *Correspondence of Scientific Men of the Seventeenth Century* (Oxford: University Press, 1841), vol. 1, pl. 2, fig. 2.

Figure III-169. Hooke, 'Instrument to measure gravitational differences', sketched in the attachment to his 21 March 1666 letter to Robert Boyle. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/118v.

Figure III-170. Hooke, 'Diagram of a telescope', 1667[?]. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/122av.

Figure III-171. Hooke, 'Drawings related to experiments conducted on 11 July 1683, 9 and 16 Jan. 1684'. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/135r, 143v, 145r.

Figure III-172. Hooke, 'Magnetical orbs formed around a terrella', 26 Feb. 1674. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/155a.

ii. 5. [Cambridge] Trinity College, University of Cambridge

Figure III-173. Hooke, detail from 'Hook's musick scripts' [notes on music and an alphabetical musical notation], 1671–1676. Source: Trinity College, Cambridge, MS O.11a.111a.

Figure III-174. Hooke, detail from 'A new sunopsis of musicke' [notes on music and an alphabetical musical notation], 1671–1676. Source: Trinity College, Cambridge, MS O.11a.111b.

Figure III-175. Hooke, 'A new sunopsis of musicke', 1671–1676. Source: Trinity College, Cambridge, MS O.11a.112.

Figure III-176. Hooke, 'Laws of Circular motion', 1685, detail. Source: Trinity College, Cambridge, MS O.11a.116b.

Figure III-177. Hooke, 'Laws of Circular motion', 1685. Source: Trinity College, Cambridge, MS O.11a.116d.

Figure III-178. Hooke, 'Laws of Circular motion', 1685, recto and detail from the verso. Source: Trinity College, Cambridge, MS O.11a.116f.

Figure III-179. Hooke, 'Notes on velocity and motion', n.d. Source: Trinity College, Cambridge, MS O.11a.119.

Figure III-180. Hooke, 'Notes on velocity and motion', n.d. Source: Trinity College, Cambridge, MS O.11a.120(r).

Figure III-181. Hooke, 'Sketch of an unknown building', n.d. Source: Trinity College, Cambridge, MS O.11a.120(v).

ii. 6. [Cambridge] Whipple Library, University of Cambridge

Figure III-182. Hooke, 'Notes on Pierre de Fermat's *Varia opera mathematica* (Toulouse, 1679)', after 1681. Source: Whipple Library, Cambridge, classmark STORE 57:20.

Figure III-183. Hooke, 'Notes on Fermat's theory of refraction', after 1681. Source: Whipple Library, classmark STORE 57:20.

ii. 7. Cherokee Ranch and Castle Foundation, Colorado, USA [Bute Collection]

Figure III-184. Hooke (attrib.), 'Plan and section looking west of St. Benet, Thames Street: design A (with attic)', n.d. Source: John Summerson, 'Drawings of London Churches in the Bute Collection: A Catalogue', *Architectural History* 13 (1970), fig. 10 (Bute no. 19).

Figure III-185. Hooke (attrib.), 'East elevation of St. Benet, Thames Street: design A (with attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11a (Bute no. 20).

Figure III-186. Hooke (attrib.), 'Definitive version of the east elevation of St. Benet, Thames Street: design A (with attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11b (Bute no. 21).

Figure III-187. Hooke (attrib.), 'East elevation of St. Benet, Thames Street: design B (without attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11c (Bute no. 22).

Figure III-188. Hooke (attrib.), 'Section looking west of St. Benet, Thames Street: design B (without attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11d (Bute no. 23).

Figure III-189. Hooke (attrib.) [previously attrib. Wren], 'Plan suitable for both designs A and B, St. Benet, Thames Street', n.d. Source: John Harris, *A Catalogue of British Drawings for Architecture, Decoration, Sculpture and Landscape Gardening 1550–1900 in American Collections* (Upper Saddle River, NJ, 1971), pl. 227 (Bute no. 24).

Figure III-190. Hooke (attrib.), 'Project for St. Clement Danes: plan', n.d. Source: Summerson, 'Drawings of London Churches', fig. 12 (Bute no. 27).

Figure III-191. Hooke (attrib.), 'Project for St. Clement Danes: West elevation', n.d. Source: Summerson, 'Drawings of London Churches', fig. 13 (Bute no. 28).

ii. 8. Cumbria Archive Centre, Carlisle

Figure III-192. Edward Pearce or Pierce (previously attrib. to Hooke), 'Elevation and partial plan of a design for a new mansion', *c.* 1680–1690. Source: DLONS/L11/4/1, Cumbria Archive Service, Carlisle.

ii. 9. Lincolnshire Archives, Lincoln

Figure III-193. Anon., 'Modell of St. Pauls', n.d. Source: Lincolnshire Archives, Lincoln, 1-Worsley/35, p. 33 © Lord Yarborough.

ii. 10. London Metropolitan Archives

Figure III-194. Hooke, 'Scheme shewing the proportions of velocity, time, power and space', n.d. Source: LMA, CLC/495/MS01757 no. 13.

Figure III-195. Hooke[?], 'Proposed design for a thermometer', n.d. Source: LMA, CLC/495/MS01757 no. 20.

Figure III-196. Hooke and John Oliver (examined by), 'Plan of Honey Lane Market with dimensions of the roads, adjoining areas, and the stalls', 3 Nov. 1692. Source: LMA, COL/PL/02/C/009/a.

Figure III-197. Hooke, 'Invention horizontall sayles by a poysed and turning sayle', diary entry for 26 Sep. 1674. Source: LMA, CLC/495/MS01758, p. 69; https://goo.gl/rqJt9z.

Figure III-198. Hooke, 'Saw new way of microscope. Very simple and pretty', diary entry for 3 Dec. 1674. Source: LMA, CLC/495/MS01758, p. 71; https://goo.gl/rqJt9z.

Figure III-199. Hooke, 'Way of fixing double springs to the inside of the balance wheel', diary entry for 8 Mar. 1675. Source: LMA, CLC/495/MS01758, p. 76; https://goo.gl/rqJt9z.

Figure III-200. Hooke, 'Pocket watch with balance cut into two', diary entry for 13 June 1675. Source: LMA, CLC/495/MS01758, p. 80; https://goo.gl/rqJt9z.

Figure III-201. Hooke, 'Philosophical scales', diary entry for 3 Sep. 1675. Source: LMA, CLC/495/MS01758, p. 83; https://goo.gl/rqJt9z.

Figure III-202. Hooke, 'Invention for the best way for a circular fly', diary entry for 12 Oct. 1675. Source: LMA, CLC/495/MS01758, p. 86; https://goo.gl/rqJt9z.

Figure III-203. Hooke, 'Wren's hypothesis of a light pulse and wave', and 'Spurs used in Holland to walk in frosty weather', diary entries for 1 Jan. 1676. Source: LMA, CLC/495/MS01758, p. 91; https://goo.gl/rqJt9z.

Figure III-204. Hooke, 'Jonas Moore's explanation of a geometric problem using a parallelogram with one side ascew', diary entry for 7 Jan. 1676. Source: LMA, CLC/495/MS01758, p. 92; https://goo.gl/rqJt9z.

Figure III-205. Hooke, 'Plan of the menagerie at Versailles', diary entry for 13 May 1676. Source: LMA, CLC/495/MS01758, p. 98; https://goo.gl/rqJt9z.

Figure III-206. Hooke, 'Ellipsical appearance of the sun at dawn', diary entry for 15 June 1676. Source: LMA, CLC/495/MS01758, p. 100; https://goo.gl/rqJt9z.

Figure III-207. Hooke, 'Invention of a planetary line on a hyperbolic conoid', diary entry for 22 Aug. 1676. Source: LMA, CLC/495/MS01758, p. 102; https://goo.gl/rqJt9z.

Figure III-208. Hooke, 'Reine's contrivance for cementing glass plates in a furnace', diary entry for 30 Mar. 1677. Source: LMA, CLC/495/MS01758, p. 112; https://goo.gl/rqJt9z.

Figure III-209. Hooke, 'Watch with a spring[?]', diary entry for 21 June 1677. Source: LMA, CLC/495/MS01758, p. 115; https://goo.gl/rqJt9z.

Figure III-210. Hooke, 'Papin's wind gun' and 'Hoskins's way of rinsing fine linen', diary entries for 4 and 6 Oct. 1677. Source: LMA, CLC/495/MS01758, p. 121; https://goo.gl/rqJt9z.

Figure III-211. Hooke, 'Plan and elevation of Porcenna's tomb', diary entry for 17 Oct. 1677; detail. Source: LMA, CLC/495/MS01758, p. 122; https://goo.gl/rqJt9z.

Figure III-212. Hooke, 'Plan of Hagia Sophia', diary entry for 14 Nov. 1677; detail. Source: LMA, CLC/495/MS01758, p. 123; https://goo.gl/rqJt9z.

Figure III-213. Hooke, 'Hooke and Wren's philosophical spring scales', diary entry for 21 Aug. 1678. Source: LMA, CLC/495/MS01758, p. 135; https://goo.gl/rqJt9z.

Figure III-214. Hooke, 'Streete's reflecting instrument[?]', diary entry for 31 Aug. 1680. Source: LMA, CLC/495/MS01758, p. 153; https://goo.gl/rqJt9z.

ii. 11. [Oxford] All Souls College, Codrington Library, University of Oxford

Figure III-215. Hooke (attrib.), 'Elevation of the preliminary design of the Monument', 1671. Source: ASC, AS II.71, reproduced in Geraghty, *Architectural Drawings*, p. 259. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-216. Edward Pearce (previously attrib. to Hooke), 'St. Edmund King and Martyr, elevation facing Lombard Street', *c.* 1670. Source: ASC, AS II.44, reproduced in Geraghty, *Architectural Drawings*, p. 86. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-217. Hooke (attrib.), 'West elevation of St. James, Piccadilly', n.d. Source: ASC, AS II.45, reproduced in Geraghty, *Architectural Drawings*, p. 95. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-218. Hooke (attrib.), 'Half cross section, looking east, for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS IV.78, reproduced in Geraghty, *Architectural Drawings*, p. 93. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-219. Hooke (attrib.), 'Part long section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS IV.79, reproduced in Geraghty, *Architectural Drawings*, p. 93. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-220. Hooke (attrib.), 'Revised half cross section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS I.74, reproduced Geraghty, *Architectural Drawings*, p. 94. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-221. Hooke (attrib.), 'Revised part long section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS I.73, reproduced in Geraghty, *Architectural Drawings*, p. 94. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-222. Hooke (attrib.), 'South elevation of St. Benet, Thames Street (Paul's Wharf)', *c.* 1677. Source: ASC, AS I.63, reproduced in Geraghty, *Architectural Drawings*, p. 99. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-223. Hooke (attrib.), 'Section looking west of St. Benet, Thames Street (Paul's Wharf)', *c.* 1677. Source: ASC, AS I.59, reproduced in Geraghty, *Architectural Drawings*, p. 100. By permission of the Warden and Fellows of All Souls College, Oxford.

Figure III-224. Hooke (attrib.), 'Elevation of an unidentified building, probably the Busby Library at Westminster School', *c.* 1681. Source: ASC, AS IV.89, reproduced in Geraghty, *Architectural Drawings*, p. 235. By permission of the Warden and Fellows of All Souls College, Oxford.

ii. 12. [Oxford] Bodleian Library, University of Oxford

Figure III-225. Hooke, 'Partial elevation of Bethlem Hospital', n.d. Source: Bodl., Gough Maps 44, no. 119 on fol. 61.

Figure III-226. John Aubrey, 'Porsenna's Monument according to Mr Rob. Hooke RSS', n.d.; detail. Source: Bodl., MS Top. Gen. c. 25, fol. 9b.

Figure III-227. cf. 'Porsena's Tombe ' in John Greaves, *Pyramidographia* (London, 1646), pl. facing p. 67.

ii. 13. [Oxford] Worcester College, University of Oxford

Figure III-228. Hooke (attrib.), 'Design for a Country House with Ogee Dome, with Subsidiary Studies of the Dome and Entablature', n.d. Source: Worcester College, Oxford, Colvin 525.

ii. 14. Royal College of Physicians, London

Figure III-229. Edward Tyson and Hooke [?], 'Drawings of a dissected porpoise', 1680. © Royal College of Physicians, MS 618, nos. 3, 4 & 5.

Figure III-230. Anon. (engraver), Tyson, *Phocaena, or the anatomy of a porpess* (London, 1680), pl. 2.

Figure III-231. Tyson and Hooke [?], preparatory drawing for engraving, 1680. © Royal College of Physicians, MS 618, no. 56.

Figure III-232. cf. Anon. (engraver), Tyson, *Phocaena, or the anatomy of a porpess* (London, 1680), pl. 1.

ii. 15. Royal Institute of British Architects, London

Figure III-233. Hooke (attrib.), 'Design for a military building', n.d. Source: RIBA, SA11/3.

Figure III-234. James Gibbs[?], 'Plan fragment of Ragley Hall, Warwickshire', *c.* 1750[?]. Source: RIBA, SD12/14a.

Figure III-235. Gibbs[?], 'Plan fragment of Ragley Hall, Warwickshire', *c.* 1750[?]. Source: RIBA, SD12/14b.

Figure III-236. cf. Gibbs[?], 'Plan fragments of Ragley Hall, Warwickshire', *c.* 1750[?]. Oriented to match Gibbs's survey drawing on the right. Author's collage of RIBA, SD12/14a and SD12/14b.

Figure III-237. cf. Gibbs, 'Ragley Hall, plan of the principal floor', *c.* 1750. Source: British Library, Add. MS 31323 W3; reproduced from Patricia Smith, "Contriving Lord Conway's house': Who Really Designed Ragley Hall?', *Georgian Group Journal* 21 (2013), p. 3.

ii. 16. Royal Society of London

Figure III-238. cf. Richard Towneley, 'Micrometer installed on a telescope' and 'Stand', 1667. © Royal Society, Cl.P/2/13, fols. 1r & 2r.

Figure III-239. Hooke, 'Pencil and ink drawing of Towneley's Micrometer', 1667. © Royal Society, MS Cl.P/2/13, fol. 3r.

Figure III-240. Hooke, 'Preparatory drawing for the engraver of Towneley's micrometer', 1667. © Royal Society, Cl.P/2/13, fol. 4r.

Figure III-241. cf. Anon., 'Towneley's micrometer', 1667. Source: *Philosophical transactions*, vol. 2, no. 29 (11 Nov. 1667), pl. facing p. 541.

Figure III-242. cf. Anon., 'The engraving from the bottom section of the engraving cut and glued © Royal Society, RBO/3/65, p. 226.

Figure III-243. cf. Adrien Auzout's micrometer published in Auzout, *Maniere exacte.* (Paris, 1667).

Figure III-244. Hooke, 'Late Observations of Saturn', 29 June 1666 [observation made], 11 July 1666 [paper read]; detail. © Royal Society, Cl.P/8i/18, fol. 38r.

Figure III-245. cf. *Philosophical transactions*, vol. 1, no. 12 (2 July 1666), pl. facing p. 231.

Figure III-246. Hooke, 'For the better making a history of the weather', 1663; detail. © Royal Society, Cl.P/20/02, fol. 3v.

Figure III-247. cf. Leon Battista Alberti, 'Anemometer', published in *Opuscoli morali* (Venice, 1568), p. 253.

Figure III-248. cf. Leonardo da Vinci, detail showing anemometer; *c.* 1478–1519. Source: Biblioteca Leonardiana, Codex Atlanticus, fol. 675r; https://goo.gl/p1GTvJ.

Figure III-249. cf. *Philosophical transactions*, vol. 2, no. 24 (8 Apr. 1667), pl. facing p. 433.

Figure III-250. cf. Thomas Sprat, *History of the Royal-Society of London* (London, 1667), pl. facing p. 173.

Figure III-251. Hooke, 'Experiments try'd with glass balls', 26 Sep. 1662. © Royal Society, Cl.P/20/03, fol. 5r.

Figure III-252. Hooke, 'Observables in the six branched figures in frozen urine', 10 Dec. 1662. © Royal Society, Cl.P/20/06, fol. 10r.

Figure III-253. cf. Hooke, *Micrographia* (London, 1665), Schem. VIII.

Figure III-254. Hooke, 'An account of some tryals for finding how much the pressure of water is increased, by the descent of heavier or the ascent of lighter bodys therein', 14 Jan. 1663. © Royal Society, Cl.P/20/09, fols. 15r-v.

Figure III-255. Hooke, 'Of refraction of ice', 11 Feb. 1663, detail. © Royal Society, Cl.P/20/11, fol. 19r.

Figure III-256. Hooke, 'An instrument for finding the force of falling bodies', 18 Feb. 1663, detail. © Royal Society, Cl.P/20/12, fol. 20r.

Figure III-257. Hooke, 'Of the Chinois cart with one wheel', 1 Apr. 1664. © Royal Society, Cl.P/20/15, fol. 27v.

Figure III-258. Hooke, 'Of exhausting air out of water, &c.', 3 June 1664. © Royal Society, Cl.P/20/19, fol. 33r.

Figure III-259. Hooke, 'Of the uniting & mixing of air & water, &c.', 1 and 8 July 1663. © Royal Society, Cl.P/20/20, fol. 34.

Figure III-260. Hooke, 'A breif . . . description of Cavallerius his *Hydrocontisterium novum*', 22 July 1663. © Royal Society, Cl.P/20/21, fol. 35r.

Figure III-261. Hooke, 'An engine for determining the force of gunpowder by weight', 7 Sep. 1663. © Royal Society, Cl.P/20/22, fol. 35r.

Figure III-262. Hooke, 'The way preferred to sound the depths of the sea', 30 Sep. 1663. © Royal Society, Cl.P/20/23, fol. 39r.

Figure III-263. cf. *Philosophical transactions*, vol. 1, no. 9 (12 Feb. 1666), pl. facing p. 147.

Figure III-264. Hooke, 'Instrument to describe plane dials', 21 Mar. 1667. © Royal Society, Cl.P/20/31, fol. 49v.

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Figure IV-208. Hooke[?], 'Elevation of an unidentified building', n.d., detail. Source: Warwickshire C.R.O., CR2017/B1/6.

ii. 30. Alterations to Lady Ranelagh's House in Pall Mall, London

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Figure IV-210. Kip, 'A Prospect of the City of London, Westminster and St. James' Park', 1710, detail. Source: The Metropolitan Museum, Elisha Whittelsey Collection, accession no. 59.600.3; https://goo.gl/3F73ev.

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Figure IV-212. Augustus Charles Pugin & Thomas Rowlandson, 'Auction sale of pictures at Christie's, 125 Pall Mall, London', 1808. Source: RIBA, EW E.e.315/1; RIBA15426.

ii. 31. Alterations to Lady Ranelagh's Chiswick House, London

Figure IV-213. Kip and Knyff, 'Bird's eye view of old Chiswick House, *c.* 1698–1699'; *Britannia illustrata* (London, 1707), pl. 30. Source: John Harris, *The Palladian Revival* (New Haven, CT, 1994), p. 52.

ii. 32. House for Walter Yonge in Devon[?]

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Figure IV-214. Loggan, 'Magdalene College, Cambridge', from *Cantabrigia illustrata*, 1690. Source: Robert Willis and John Willis Clark, *The Architectural History of the University of Cambridge* (Cambridge, 1886), vol. 2, fig. 4.

Figure IV-215. Anon., 'West front of the Pepys building', 1880. Source: Willis and Willis Clark, *The Architectural History of the University of Cambridge* (Cambridge, 1886), vol. 2, fig. 5.

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Figure IV-217. Hooke, 'Elevation of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. © The British Library Board, Add. MS 5238, no. 51.

ii. 34. Church and Port in Whitehaven, Cumbria

Figure IV-218. Plan of Whitehaven, n.d. Source: Daniel Lysons and Samuel Lysons, *Magna Britannia, vol. 4, Cumberland* (London, 1816), fig. 31 on p. 22.

Figure IV-219. Matthias Read (painter), 'Prospect View of Whitehaven, Cumbria, showing Flatt Hall', *c.* 1730–1735 (detail). Source: Yale Center for British Art, Paul Mellon Collection, accession no. B1981.25.515; https://goo.gl/ZJBfiQ.

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ii. 35. Church of St. Mary Magdalene in Willen, Buckinghamshire

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Figure IV-222. Hooke, 'Alternative design for the church in Willen', *c.* 1678. Source: Warwickshire C.R.O., CR2017/B1/3.

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ii. 36. House for Edward Conway, Ragley Hall in Warwickshire

Figure IV-229. Hooke, 'An early design for Ragley Hall', *c.* 1679. © The British Library Board, Add. MS 5238, no. 60.

Figure IV-230. James Gibbs[?], 'Plan fragments of Ragley Hall, Warwickshire', *c.* 1750[?]. Source: Author's collage of RIBA, SD12/14a and SD12/14b.

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ii. 37. House for William Jones, Ramsbury Manor in Wiltshire

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Figure IV-236. Anon., 'New Bedlam in Moor-fields', n.d., detail. Source: Wellcome, L0012307.

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ii. 38. Boone's Chapel, Lewisham, London

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Figure IV-241. North wing of Easton Neston, n.d. Source: Downes, 'Hawksmoor's House at Easton Neston', *Architectural History* 30 (1987), fig. 18.

Figure IV-242. Hooke[?], 'Elevation of an unidentified building', n.d. [cropped] Source: Warwickshire C.R.O., CR2017/B1/6.

ii. 40. Almshouses for Seth Ward, Buntingford, Hertfordshire

Figure IV-243. Anon., 'Ward's hospital, Buntingford, from the East'. Source: William Page, ed., The Victoria History of the Counties of England, Hertfordshire (London, 1914), vol. 4, p. 79.

ii. 41. House for Robert Southwell, Spring Gardens, London

Figure IV-244. William Morgan, 'London &c. actually surveyed', 1682, detail. Source: Library of Congress, Geography and Map Division, Washington, DC, call no. G5754.L7 1682 .M6 1904; https://goo.gl/aaxygo.

Figure IV-245. Kip, 'A Prospect of the City of London, Westminster and St. James' Park', 1710, detail. Source: The Metropolitan Museum, Elisha Whittelsey Collection, accession no. 59.600.3; https://goo.gl/3F73ev.

ii. 42. Boughton House, Northamptonshire

Figure IV-246. Anon., 'Boughton House, north wing', n.d. Source: Downes, *English Baroque Architecture* (London, 1966), pl. 134.

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Figure IV-248. Pierre Puget, 'La Place Royale de Marseille', 1686. Source: Pierre Puget: *Peintre, Sculpteur, Architecte, 1620–1694* ([Marseille, 1994]), fig. 115 on p. 249.

Figure IV-249. Anon., 'The Stable Block, Boughton House', n.d. Source: T. V. Murdoch, *Boughton House: the English Versailles* (London, 1992), fig. 57 on p. 62.

ii. 43. Lowther [St. Michael's] Church

Figure IV-250. Thomas Machell, 'Sketch of Lowther Church', *c.* 1686. Source: Colvin, Crook, and Friedman, eds., *Architectural Drawings from Lowther Castle, Westmorland, Architectural History Monographs: No. 2.* ([London], 1980), no. 25.

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ii. 44. Petworth House, Sussex

Figure IV-252. Anon., 'Petworth House in Sussex, view of the west front with forecourt', *c.* 1695, detail. Source: Wikimedia commons; https://goo.gl/F8HicJ.

Figure IV-253. Wren, 'Preliminary design for Winchester Palace', 1682–1683. Source: Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), p. 11, fig. 3.

ii. 45. House for [Edward?] Gould, Highgate, London

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ii. 46. House for Richard Vaughan at Shenfield Place, Brentwood, Essex

Figure IV-254. Old Shenfield Place, *c.* 2017. Source: Amba Care Homes Group website; https://goo.gl/KtDUQY.

ii. 47. Aske's Almshouses [or Hospital], Hoxton, London

Figure IV-255. John Harris (engraver), 'The East Prospect of the Haberdashers Hospitall at Hoxton Founded by Robert Aske Esqr', 1715. Source: Victoria & Albert Museum, London, no. E.4841-1923; https://goo.gl/m3HGw2.

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Figure IV-262. Hooke, 'Plan and elevation of a small unidentified building', n.d. © The British Library Board, Add. MS 5238, no. 4.

ii. 48. Royal Dockyard in Hamoaze, Plymouth

Figure IV-263. Anon. (engraver), Edmund Dummer (draughtsman), 'Fourth draught: engraved elevation and plan of the officers' dwelling houses in Plymouth', 1694. © The British Library Board, Add. MS 5238, no. 79.

Figure IV-264. Dummer, 'Fourth draught: elevation and plan of the officers' dwelling houses in Plymouth', 1694. © The British Library Board, Lansdowne MS 847, fol. 46.

Figure IV-265. Anon. (engraver), Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694. © The British Library Board, Add. MS 5238, no. 81.

Figure IV-266. Dummer, 'Eighth draught: plan and elevations of Plymouth Yard', 1694. © The British Library Board, Lansdowne MS 847, fol. 50.

Figure IV-267. Anon. (engraver), Dummer (draughtsman), 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Add. MS 5238, no. 92.

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Figure IV-269. Dummer, 'View of his majest's dock yard at Plymouth', 1698. © The British Library Board, King's MS 43, fol. 130.

Figure IV-270. Anon. 'The officers' terrace, South Yard, Devonport Royal Dockyard', *c.* 1902. Most of this building was bombed in 1944; only the northern end is extant. Source: Tom Bowden, 'The Plymouth Blitz in 1941', 2011; https://goo.gl/vB6Mmd.

Figure IV-271. John Hanway, 'Elevation of the South Front of the Grand Storehouse at the Tower of London', *c.* 1710. Source: Government Art Collection, GAC no. 45; https://goo.gl/jf79p8.

Figure IV-272. Anon., 'Carved pediment of the Grand Storehouse at the Tower of London, with the arms of William III', n.d. Source: *An Inventory of the Historical Monuments in London*, vol. 5, East London (London, 1930), pl. 133.

Figure IV-273. Hooke (attrib.), 'Design for a military building', n.d. Source: RIBA, SA11/3.

ii. 49. Sluices for Southwell at Kings Weston, Bristol

Figure IV-274. Captain Grenville Collins, 'Visit of King William III to Kings Weston; view from the Severn estuary, looking towards river Avon', 1690. Source: Kings Weston Action Group, 'Sir Robert Southwell'; https://goo.gl/6ikuAQ.

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Figure IV-276. Hooke, 'Waterwork nearly finished by Mr. Aldersey at Hackney', 2 June 1686. © Royal Society, Cl.P/20/71.

ii. 50. Church of St. Nicholas, Lutton, Lincolnshire

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ii. 51. Kiveton Park, Yorkshire

Figure IV-277. J. Badeslade and J. Rocque (engravers), 'Kiveton Park, Yorkshire', engraving from *c.* 1739, detail. Source: Downes, *English Baroque Architecture* (London, 1966), pl. 147.

ii. 52. Burley-on-the-Hill, Rutland

Figure IV-278. Neale (engraver), 'Burley from the south', 1822. Source: Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), fig. 178 on p. 112.

Figure IV-279. Anon., 'An old aerial view, showing the extent of the colonnades and forecourt', n.d. Source: Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), fig. 181 on p. 114.

ii. 53. Kneller Hall [Whitton House], Middlesex

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Figure IV-282. Hooke (attrib.) or Pearce (attrib.), 'Elevation of a 17thC building with cupola Pen and brown ink, with grey wash, over graphite', n.d., detail. © Trustees of the British Museum, Ee,2.119, AN1265760001.

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Robert Hooke's *Praxes:* Reading, Drawing, Building

Yelda Nasifoglu

— VOLUME 2 —

ANNOTATED CATALOGUE OF PERTINENT MATERIAL

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ii. 12. [Oxford] Bodleian Library, University of Oxford

ii. 13. [Oxford] Worcester College, University of Oxford

ii. 14. Royal College of Physicians, London

ii. 15. Royal Institute of British Architects, London

ii. 16. Royal Society of London

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1. Hooke and John Oliver to the Court of Carpenters, 27 Jan. 1671.

2. Hooke, Oliver, and Wren, 'Rates to be paid to masons at Fleet Ditch', 9 Oct. 1674.
3. Hooke, rates allowed for masons' work for churches, 14 Oct. 1674.
4. Hooke, autograph survey of the Monument, 10 July 1679.
5. Hooke, 'Report of a survey of a wall . . . adjoining . . . Christ's Hospital', 16 Dec. 1680.
6. 'Mr Hooke's Certificate', 16 May 1682.

iii. Other

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2. Royal Society meeting minutes, 1666-1669; selected extracts on brick-making.
3. Royal Society meeting minutes, 1686–1696; selected extracts.
4. John Aubrey, *Naturall historie of Wiltshire*, 1656–1691; extracts.
5. Aubrey, *Monumenta Britannica*, 1665–1693; extracts.

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Book lists

CHAPTER II – READING

ii. Book lists

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This list, which is organised by folio number of the manuscript, is extracted from Richard Busby, 'A Catalogue of all my ⌜best⌝ Bookes both in the Upper & Lower Study in Order as they stand in the Severall Presses, every Booke being mark't wi^th^ black lead where it stands. Note except bookes which are not yet marked', n.d., Westminster School Archives[1]

Vol. Pres. Shel. book[2]

[fol. 12r]

4. 5. 2. 2. Theodosij Sphærica Græce J. Pena Lat. reddit. [1558; *BH*]

4. 3. Arithmetica Boetij & Stifelij. Norimburg. 1544. [1521; *BH*]

4. 4. Lud. Cluenlen de circulo adscripta [1619; *BH*]

8. 5. Sim. Stevin L'arithmetique &c. [1625; *BH*]

8. 6. Cursus Mathematicus per Pierre Herigone. vol. 6. lib. 2 [n.d.; *BH*]

8. 14. Oughtredi Clavis Mathematica. [1652; *BH*]

8. 15. Circuli quadratura par La lovera.

8. 17. P. Gassendi institut. Astronomica & Galilei nuntius [Galileo, 1653; *BH*]
Sidereus. Et. Jo. Kepleri Dioptricæ.

[1] Regarding the selection of books: since Hooke left Westminster School for Christ Church, Oxford, sometime around 1653, books known to have been published after then are not included. If a book is also listed in *BH*, this is indicated in brackets at the end of the title, e.g. [*BH*]; in cases where the publication date is not given in Busby's catalogue, the date of the copy in *BH* is indicated, e.g. [1558; *BH*].

In the transcriptions, notes regarding the books' next destination or the underlining of some of the volumes were ignored. The reader should note that the book numbers were not always in sequence or continuous.

[2] 'Vol.' is referring to the size of the book (e.g. F for folio, 4 for quarto, 8 for octavo, etc.), and 'Pres.' to the 'press' or bookcase number.

[fol. 12v]

8. 18. Euclidis Elementa per Clavium. vol. 2. [1611; *BH*]

4. 27. G. Hensij Com*m*entarius in Procli Sphaeram. [1553; *BH*]

4. 25. Pitisci Trigonometria &c. [n.d.; *BH*]

4. 29. Rog. Bacon. Perspectiva. per Jo: Combachium. 1614. [*BH*]

4. 30. Aristotelis loca Mathemat. per Jos. Blankanu*m*. lib. 2. [1615; *BH*]

4. 32. Barlaami Logistica Græci cum Scholij Jo: Chamberi Lat. [1600; *BH*]

4. 33. Geometriæ Clavis Algebra per Jac. Billy. [1643; *BH*]

4. 34. Algebra Clavij [1609; *BH*]

4. 35. Questiones Geometricæ in Euclidis & P. Ramii per P. Riff. 1600.

2. Theses in Opticam Isagocicæ per P. Chesnecopheru*m*. [1593; *BH*]

4. Usus & fabrica circini proport. per Capram.

5. Speculu*m* Polytechnum Mathemat. per Jo: Faulhaberum. [1610; *BH*]

6. De Octantis instrumenti Mathemat. Astronom.

Geogr. Nautis, Architect. &c. per Hofman.

7. Rob. Norman of *th*e Loadstone & Navigation.

4. 36. Reinholdi Tabulæ Prutenicæ cælest. motum. 1562. lib. 2. [1585; *BH*]

4. 37. Jo: Kepler de Cometis lib. 3 Astranom. Physic. & Astralogicus. [1619; *BH*]

2. A Treatise of magnetical bodies & motions.

3. T. Brahæ his Astranom. conjecture new Star in Cassiop. anno. 1572.

4. The new Star of *th*e North shining upon the victorius

King of Sweden. K. James of Scotland his Letter

to T. Brah. congratulatory.

[fol. 13v]

F. 5. 4. 1. Gilbertus de Magnete. [1600; *BH*]

F. 2. Vieta de numerosa Potestatu*m* resolut. seu algebra nova. [1644; *BH*]

F. 3. Vieta responsum ad Romani Problema.

F. 4. Vieta in artem Analyticem Isagoge. [1591; *BH*]

F. 8. Riccioli Almagestum. Bononiæ. 1651. vol. 2. [*BH*]

F. 8. Riccioli Almagest. volumen primu*m*. [*BH*]

F. 13. Theon in Ptolemæi cælesi. motu*m* Com*m*ent. Græce. [1538; *BH*]

F. 14. Alhazen Opticæ per Risnerum. [1572; *BH*]

F. 15. H. Briggij Arithmetica, Logarith. siue Logarithmoru*m* chiliades 30 &c. [1624; *BH*]

F. 16. H. Briggij Trigonometria.

F. 17. Harriot. Ars analytica ad æquat. Algebr. [1631; *BH*]

F. 18. Vieta Op. per Fr. Schooten. [1646; *BH*]

F. 19. Euclidis Elementa Gr. & Lat. [*BH*]

F. 20. Ghetaldi Mathematica. Romæ. 1630. [*BH*]

F. 21. L. Pæti de mensuris & ponderib. Roman. & Græcis.

F. 22. Jo: de Monte Regio & G. Purbachij Epitome. [1543; *BH*]
in Ptolemæi magn. compositionem &c.

F. 23. Diphanti Arithmet. cu*m* Coment. Gr. & Lat. Claud. Gasp. Bacheli. ⌜lib 2⌝ [1621; *BH*]

F. 25. Christop. Clavij Bambergens. Op. Mathemat. vol. 5. [1611; *BH*]

[fol. 14v]

4. 6. 2. 8. Adr. Romanus in Problema Apollonia cum duo datis 3^{bus}
circulis quæritus 4^{tus} ad omnib. Mathemat. propositu*m*. &c.

Chapter II – Reading

[fol. 15r]

F. 6. 4. 1. Marini Merseni Harmonicoru*m*. Lutet. 1636. [*BH*]

[fol. 19r]

8. 8. 6. 5. Vitruvius de Architectura. 1522.

[fol. 20r]

8. 9. 1. 22. Jo: Greaves Description of *th*e Egyptian Pyramids [1646; *BH*]

8. 23. Diggs his Workes Mathematicall, as Algebra,

Military Discipline &c. [1579; *BH*]

2. Reccords Geometricall conclusions

3. L. Diggs of measuring as also several Tables &c.

4. Jo: Dee Pararallatiucus nucleus.

4. 24. Jo: Gregories Works . . .

The Description & use of the Terrestiall

Globe, Maps, & Charts.

[fol. 22v]

8. 10. top 21. Bp. Wilkins Discovery of a new world in *th*e Moon [1640; *BH*]

Discovery of a new Planet that *th*e Earth may be a Planet

[fol. 26r]

4. 10. 4. 28. Sr. Fr. Bacon Advancement of Learning. 1633. [1629 & 1640; *BH*]

[fol. 30r]

4. 12. top. 1. Rob. Record The Castle of Knowledge Mathem. lib. 2

3. Edm: Gunther Workes Mathemat.

4. Pet. Pitati Compendium annuæ Solaris adq Lunaris. [1568; *BH*]

[fol. 30v]

4. 12. top. 6. De Sp[h]æra Græcè & Zieglerus, Proclus, Berosus, Aratiæ &c.

4. 7. Pet. Rami Arithmet. & Geomet. lib. Et Jac. Peletarij [1627; *BH*]
de usu Geometriæ.

4. 8. Jo. Bamberg: Procli Sphæra Gr & Lat [1553; BH]

4. 8. Jo. Henischis Coment. in Sphæram Procli.

8. 9. Jo: Chilmead a Treatise of the Globes.

12. 10. G. Gyraldi de annis & mensibus cæterisque temporum partibus

12. 11. G. Oughtred. Clavis Mathemat. lib. 2 [1652; *BH*]

12. 14. Jo: Buteon quadratura Circuli in quo defenditur Archimedes. [1559; *BH*]

12. 15. A. Vlacq Tables de Sinus Tangentes, Secantes & Logarith.

4. 16. Wm. Oughtred. Circles of Proportion, Dyalling, Navigation &c
translated by Foster. [1632; *BH*]

4. 24. Fr. Schooten De Organica conicarum Sectionum
in plano descriptione

4. 25. Christ. Scheiner Fundamentum opticum. Jo: Kepleri [1652; *BH*]
Dioptrice &c. W. Snellij Cyclometricus.

4. 26. H. Broughton. Epist. variæ et variarum Linguarum
de Byzantiacis Hebrais.
Chr. Scheiner Refractiones cælestes sine solis [1617; *BH*]
Ecliptici phænomina.
Chr. Scheiner Sol Ellypticus. &c.
Jo: Kepleri admonitio ad Astronomos rerumque cælestium.

Jo: Kepleri ad Epist. Bartschij de Computatione Ephemerid.

[fol. 31r]

4. 12. top. 27. Fr. Maurolicus de lumine & umbra. [1617; *BH*]

4. 28. Jo: Broscij Apologia pro Aristotele & Euclide contra Pet. Ramum & de numeris perfectis.

4. 29. Is. Vossius de Lucis natura et proprietate. [1602; *BH*]

4. 30. Albategnius de numeris Stellaru*m* & motibus. [1537; *BH*]

4. 31. Ant. Magini novæ Cælest. Orbiu*m* Theoricæ. [1608; *BH*]

4. 32. Pet. Gassendi de apparente magnitudine solis humilis et Sublimis et de motu impresso a motore translato

4. 33. Christoph. Claviij Astrolabium. [1593; *BH*]

4. 34. Alex. Anderson Exercitationum Mathematicum.
Consura Propositionum ad Sacram facultat. Theologiæ
Parisiensena allaturam per D. Partricium.
G. Lud. Frobenij Cyclometria &c.

4. 35. Seth. Calvisij opus Chronolog. uniuersum.

12. 36. Pet. Hablima The Square & Cube Root made easy &c.

4. 37. Cap^{t}. Dan. Newhouse. The whole Art of Navigation.

4. 38. Jo: Clavij Com*m*entar. in Sphæra*m*, Jo. de S. Bosco. lib. 2.
39. Jo: Arch: Cant. Perspectivæ communis.
2. Rog. Baconis Perspectivæ, per Jo: Combatium [1614; *BH*]
3. Prælectiones 13. in princep. Elementa Euclidis, per Jo: Savilium. [1621; *BH*]
4. Barten Holyday de anima &c.

40. Jac. Gregonij Exercitationes Geometricæ

4. 41. Tho. Anglo. De Mundo Dialogus tres, materia, forma, Causæ. &c.

4. 42. Jo. Alph. Borelli Di Motu Animalium & Romæ. 1640 [1680; *BH*]

12. 1. 0. Pet. Laurembergi Institut. Arithmet. &c.

12. 12. 1. 1. Dary's Mathematicall Miscellanies

16. 2. Edm. Wingates Construction of Logarith. Tables. [1648; *BH*]

12. 4. Christ. Ustisij Arithmeticæ, Logicis Legibus deducta

12. 5. G. Frisij Arithmeticæ Methodus lib. 4 [1582; *BH*]

12. 9. Jac. Fabri in Arithm. Boetij Epitome

16. 10. Neperus in numerationes per Virgulas. Eng. & Lat. 2 lib. [1626; *BH*]

8. 11. Edm. Wingates Arithmetique. lib. 2. [1650; *BH*]

8. 13. Records Arithmetique by Dee & Mellis.

8. 14. Sr. Jonas Moores Arithmetique

8. 15. Arthur Hopton Concordence of time. lib. 2. [1635; *BH*]

12. 16. G. Frisius de usu Globis

17. Jo: de Sacro Bosco de Sphæra lib 4 [1594; *BH*]

[fol. 31v]

12. 12. 1. 21. Adr. Metius de Doctrina Sphæræ.

12. 22. Georg. Purbachij Theoricæ novæ Lunæ. [1591; *BH*]

20. 23. Hues De Globis & P. Bertij Geograph. lib. 4. [1594; BH]

4. 25. Edw. Wingates description of the Sphære.

8. 26. Blaeu de usu Globis & Sphær.

4. 27. N. Carpenter Sphæricæ & Topic. Geography

12. 28. Wm. Websters Arithmetique.

12. 29. I. de Sacro Basco de anni ratione.

12. 30. Barth. Sconbornij Calendarium, Witeber. 1547.

4. 33. P. Eberi Calendarium, Viteberg. 1573.

4. 34. Blundevills Mathematicall Miscellanies. 1636.

4. 35. Ric. Norwood of Trigonometry. 1651. [later editions in *BH*]

4. 36. Barth. Pitiseus Trigonometry transl. by Ra. Handson. [*BH*]

37. Euclidis Elementa, Greeke Lat. & Engl. lib. ⌜6⌝. Rud. Engl.

38. 39. 40. Rhodius Lat. Mercator Lat. Cajanus Græc. Fournier Lat.

4. 46. Euclidis data. Græc. & Lat. per Claud. Hardy [1645; *BH*]

4. 47. P. Gassendi Institutio Astranomica.

4. 48. Jo: Clavij Com*m*entor. in Sphæra*m* Jo. de S. Bosco. lib. 2. [1607; *BH*]

4. 50. Perspectivæ Communis Jo: Arch. Episc. Cantuar. [1592; *BH*]

2. Rog. Baconis Perspectiva per Jo. Combachium [1614; *BH*]

3. Prælectiones 13. in princip. Elementa Euclidis. p^{r} H. Savilium. [1621; *BH*]

4. Barten Holyday De anima &c.

[fol. 32r]

4. 12. 1. 70. Orontij Arithmetiæ Practicæ &c.

4. 71. Jo. Harpar The Jewell of Arithmetique

[fol. 32v]

16. 12. 2. 47. Jo: Bainbrigij Astronom. Canicularia. per Jo: Gravium. [1648; *BH*]

16. 48. Jo: Junius De Temporæ, ortu & occasu Stellarum & de Globis usu.

[fol. 33r]

8. 12. 2. 49. 2. Tabulæ Solares & Lunares Tychonianæ.

3. Trigonometria Sphæricoru*m* Logarithmet. per Nic. Hauffman.

[fol. 35r]

20. 13. 1. 29. Fr. Ld. Bacon. Novu*m* Organu*m* Scientia*m*. 1650. [*BH*]

[fol. 35v]

12. 13. 2. 12. Honteri Rudimentoru*m* Cosmographicaru*m* cu*m* Tabellis Geograph.

16. 13. Roma illustrata sive Antiquit. Rom. breviaru*m* G. Trabicio. lib. 2

12. 16. Tho Lydiat de varijs annorum formis. [1607; *BH*]

Et Prælectio Astronomica.

[fol. 36r]

8. 13. 3. 9. Orbis Terraru*m* Synoptica Epitome cum Geographia Poetic [1586?; *BH*]

[fol. 36v]

4. 13. 4. 6. Abrah. Ortelij Thesaurus Geographicus

4. 7. Ptolomæi Geograph. univers. per Maginu*m*

[fol. 37r]

F. 13. 5. 18. Ortelij Geographia.

ii. 2. LIST OF ARCHITECTURAL AND RELATED TITLES FROM THE C. 1675 MANUSCRIPT CATALOGUE OF HOOKE'S LIBRARY

This list, which is organised by folio number of the manuscript, is extracted from Hooke, 'A Catalogue of the Books of R. H.', c. 1675, BL, Sloane MS 949.[3]

[fol. 3v]

Dutch Perspective & limning of Lauten/sack the Goldsmith. frankfurt 1564

*Heinrich Lautensack, *Des circkels unnd richtscheyts* (Frankfurt, 1564). (Not in *BH* but Hooke's copy is extant; see *RHBdb*, extra_BH_16.)

Sandersons Graphice. Lond 1658

William Sanderson, *Graphice, the use of the pen and pensil. Or, the most excellent art of painting: in two parts* (London, 1658). (*RHBdb*, auct_BH_1889. In July 1675, Hooke borrowed from "Faithorne a book of Limning" and copied it. It was likely Sanderson's book since Faithorne's own title was about engraving only (*Diary i*, p. 169, 170).)

[fol. 4r]

Architect: del Paladio. Ven: 1642:

Andrea Palladio, *L'Architettura, divisa in quattro libri* (Venice, 1642). (*RHBdb*, auct_BH_310.)

Architettura di Serlio Venet. 1584

*Sebastiano Serlio, *Tutte l'opere d'architettura* (Venice, 1584). (Not in *BH*, however there is a quarto dated 1574, *RHBdb*, auct_BH_898, which may be the copy Hooke noted reading on 22 September 1672 (*Diary i,* p. 8).)

Vitruvico Barbari Venet 1567

Vitruvius, *De architectura libri decem, cum commentariis Danielis Barbari* (Venice, 1567). (*RHBdb*, auct_BH_313; Hooke received this copy from Blackburne on 20 October 1673 (*Diary i*, p. 66).)

[3] Note that the text in bold is a transcription of the listing in the manuscript, and is followed by the title, author, place and date of publication. As most of these are not actual editions I have consulted, and therefore cannot be certain about the publishers' names, I have elected to use shorter bibliographical entries.

'*' denotes that the book is not listed in *BH*. For those that are, or in cases where Hooke's copy is extant, codes such as '*RHBdb*, extra_BH_16' or '*RHBdb*, auct_BH_310' refer to their id in *Robert Hooke's Books Database*, http://www.hookesbooks.com.

[fol. 4v]

a book of Drawing & limning Londd. 1666

A book of drawing, limning, washing or colouring of maps and prints: and the art of painting, etc. (London, 1666). (*RHBdb*, auct_BH_1890.)

Leonardo di Vinci di Pittura. Parigi 1651.

Leonardo da Vinci, *Trattato della pittura* (Paris, 1651). (*RHBdb*, auct_BH_318.)

Bessonij theatrum mach: - 1602

Jacques Besson, *Teatro de los instrumentos y figuras matematicas y* (Lyon, 1602). (*RHBdb*, auct_BH_307.)

unbound[4]

Theatru*m* machinaru*m* Bocleri/norimberga. 1662

Georg Andreas Böckler, *Theatrum machinarum novum* (Nuremberg, 1662). (*RHBdb*, auct_BH_320.)

Vingbones Architecture in dutch.

Philips Vingboons, *Gronden en afbeeldsels der voornaamste gebouwen van alle die Philips Vingboons geordineert heeft* (Amsterdam, 1665). (*RHBdb*, auct_BH_2534.)

Muets 1st part french - - -

Pierre Le Muet, *Manière de bastir, pour touttes sortes de personnes* (Paris, 1623). (*RHBdb*, auct_BH_2539. Hooke noted purchasing his copy on 7 November 1674 (*Diary i*, p. 129).)

Alberti Dureri Opera - - - 1

Albrecht Dürer, *De symmetria partium in rectis formis humanorum corporum* (Nuremberg, 1534); and *Elementa geometria* (Paris, 1532). (*RHBdb*, auct_BH_262 and auct_BH_263 [braced as one lot in *BH*]).

The Large French Vitruvius

Vitruvius, *Les dix livres d'architecture de Vitruve, corrigez et nouvellement traduits en françois avec des notes et des figures*, trans. by Claude Perrault (Paris, 1673). (*RHBdb*, auct_BH_315.)

Dees Euclid

Euclid, *The elements of geometrie of the most auncient philosopher Euclide of Megara*, trans. by Henry Billingsley, with a 'Mathematicall preface' by John Dee (London, 1570).

[4] During this period, most books were sold in loose sheets; it was up to the purchaser to have them bound, which they sometimes did with other titles to save on costs. Hooke listed his unbound folios under this sub-title on fol. 4v, presumably the list continues on other folios with bound volumes.

(*RHBdb*, auct_BH_1877. Hooke noted purchasing his copy on 16 February 1675 (*Diary i*, p. 147).)

[fol. 5r]

Stoneheng of Inigo Jones.

Inigo Jones, *The most notable antiquity of Great Britain, vulgarly called Stone-Heng, on Salisbury Plain* (London, 1655). (*RHBdb*, auct_BH_1814.)

Mariots prospects -

*Jean Marot, *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot* [Grand Marot], (n.d., n.p.). (Not in *BH*, however a print from the series, with Hooke's inscription, has survived among his papers at the British Library; see Figure III-88. It is possible, however, that the print was issued separately.)

[quartos]

[fol. 6r]

Richards Architecture --

Andrea Palladio, *The first book of architecture by Andrea Palladio translated out of Italian . . . by Godfrey Richards* (London, 1663). (*RHBdb*, auct_BH_2084.)

[fol. 7r]

The descript*io*n of *th*e Escuriall 1671

*Francisco Santos, *The Escurial, or a description of that wonder of the world for architecture and magnificence of structure . . . lately consumed by fire* (London, 1671).

Gerbiers Fortification – Lon 1648

*Balthazar Gerbier, *Interpreter of the academie for forrain languages, and all noble sciences, and exercises, concerning military architecture or fortifications* (London, 1648).

[fol. 7v]

Norwoods fortificatio*n*. Lond. 1639

Richard Norwood, *Fortification; or, architecture military* (London, 1639). (*RHBdb*, auct_BH_2085.)

Roberts about St Giles River. Lon 164[?]

*Walter Roberts, *Sir Walter Roberts his answer to Mr. Fords book, entituled, a designe for bringing a navigable river, from Rickmansworth in Hartfordshire to St. Giles in the Fields* (London, 1641).

[fol. 8r]

Bates Mysterys of Art & Nature L. 1635

John Bate, *The mysteryes of nature, and art* (London, 1635). (*RHBdb*, auct_BH_2083.)

[fol. 8v]

Wottons Elements of Archi 1624

*Henry Wotton, *The elements of architecture* (London, 1624).

[fol. 9r]

Stowes Survey of Lond. 1603

John Stow, *A survay of London* (London, 1603). (*RHBdb*, auct_BH_1983.)

[fol. 9v]

The fire Act. –

*[Presumably the first or second Act of the Parliament for the Rebuilding of London].

[fol. 10r]

Pallais de Marot. -

Jean Marot, *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot* [Petit Marot], (n.d., n.p.). (*RHBdb*, auct_BH_469. See also Figure III-88.)

ii. 3. LIST OF ARCHITECTURAL AND RELATED TITLES OWNED OR BORROWED BY HOOKE

This list, which is organised by author, is mainly compiled from Bibliotheca Hookiana *(the auction catalogue of Hooke's library), with additional titles from BL, Sloane MS 949 (the c. 1675 autograph list of his books), diary entries, and at least one extant book not noted anywhere else*.[5]

A Book of Drawing, Limn. Wash. &c. of Mapps and Prints [Lond.] 1666. (*BH*, p. 40, lot 107.)

A book of drawing, limning, washing or colouring of maps and prints: and the art of painting, etc. (London, 1666). (*RHBdb,* auct_BH_1890; also listed in Sloane MS 949.)

Prospettiva Practica di Piet. Accolti, con Fig. Finen. 1625. (*BH*, p. 7, lot 274.)

Pietro Accolti, *Lo Inganno de gl' occhi* (Firenze, 1625). (*RHBdb,* auct_BH_295.)

L'Architttura di Leon. Batt. Alberti, con Fig. Ven. 1565. (*BH*, p. 20, lot 538.)

Leon Battista Alberti, *L'architettura di Leonbatista Alberti tradotta in lingua Fiorentina da Cosimo Bartoli* (Venice, 1565). (*RHBdb,* auct_BH_897.)

Bern. Baldus de Verbor. Vitravianor. Significatione Aug. Vind. 1612. (*BH*, p. 20, lot 540.)

Bernardino Baldi, *De verborum Vitruvianorum significatione* (Augsburg, 1612). (*RHBdb,* auct_BH_899.)

Descriptio Columne Trajani. (*BH*, p. 54, lot 18.)

Pietro Santo Bartoli, *Colonna Traiana eretta dal senato, e popolo romano all'imperatore Traiano Avgvsto nel suo foro in Roma* (Rome, 1673); or Raffaele Fabretti, *De Columna Traiani syntagma* (Roma, 1683). (*RHBdb*, auct_BH_2550.)

Jo. Bates Mysteries of Art and Nature 1635. (*BH*, p. 44, lot 136.)

John Bate, *The mysteryes of nature, and art* (London, 1635). (*RHBdb,* auct_BH_2083; also listed in Sloane MS 949.)

[not in *BH*; extant book, not listed anywhere]

William Bedwell, *Mesolabium architectonicum that is, a most rare, and singular instrument, for the easie, speedy, and most certaine measuring of plaines and solids by the foote: necessary to be knowne of all men whosoever, who would not in this case be notably defrauded* (London, 1631). (Hooke's copy is extant; see *RHBdb*, extra_BH_4.)

[5] Note that the text in bold is a transcription of the lot from *BH*, or a reference to its source. It is followed by the book's title, author, place and date of publication. As noted in footnote 3, shorter bibliographical entries are used, and the book's *RHBdb* id number, where available, is indicated.

Le Vitte di Pittori, Scultori & Architetti Moderni da Gio. Piet. Bellori, cum Fig. Rom. 1672. (*BH*, p. 14, lot 278.)

Giovanni Pietro Bellori, *Le vite de' pittori, scultori et architetti moderni* (Rome, 1672). (*RHBdb*, auct_BH_620.)

Teatro de los Instrum. y Fig. Math. y Mecanic. por D. Bessoni, con Fig. Leon. 1602. (BH, p. 7, lot 286.)

Jacques Besson, *Teatro de los instrumentos y figuras matematicas y* (Lyon, 1602). (*RHBdb*, auct_BH_307; also listed in Sloane MS 949.)

Abraham Bloemaerts Book of Drawings. (*BH*, p. 41, lot 138.)

Abraham Bloemaert, *Prima pars, 't eerste deel van de teeken-konst* (Amsterdam, 1611) [?]. (*RHBdb*, auct_BH_1922.)

[not in *BH*; *Diary i*, 'Blondells book' borrowed on 24 June 1676]

Blondel, *Cours d'architecture* (Paris, 1675)[?].[6]

Geo. Andr. Bocklern Architectura curiosa nova, cum Fig. Norimb. 1664. (*BH*, p. 7, lot [2]91.)

Georg Andreas Böckler, *Architectura curiosa nova* (Nuremberg, 1664). (*RHBdb*, auct_BH_312.)

Geo. Andr. Bockleri Theatrum Machinar. exhibens Opera Molaria & Aquatica, cum Fig. Norimb. 1662. (*BH*, p. 7, lot 299.)

Georg Andreas Böckler, *Theatrum machinarum novum* (Nuremberg, 1662). (*RHBdb*, auct_BH_320; also listed in Sloane MS 949.)

Des Manieres de graver en Taille Douce par A. Boste. avec Fig. Paris 1645. (*BH*, p. 31, lot. 444.)

Abraham Bosse, *Traité des manières de graver en taille-douce* (Paris, 1645). (*RHBdb*, auct_BH_1434. Hooke purchased a copy of "Bosses Gravings," presumably this book, for 5*s* 10*d* from Davies on 17 May 1677 (*Diary i*, p. 291).)

A. Bosse de Manieres de Peinture, &c. avec Fig. Paris 1649. (*BH*, p. 37, lot. 245.)

Abraham Bosse, *Sentimens sur la distinction des diverses manieres de peinture, dessein & graveure, & des originaux d'avec leurs copies* (Paris, 1649). (*RHBdb*, auct_BH_1730.)

La Pratique du Trait à preuves de M. Desargies par A. Boste. Paris 1643. (*BH*, p. 31, lot. 441.)

Abraham Bosse, *La pratique du trait à preuves, de Mr Desargues Lyonnois, pour la coupe des pierres en l'architecture* (Paris, 1643). (*RHBdb*, auct_BH_1431.)

[6] Anthony Geraghty, 'Robert Hooke's Collection of Architectural Books and Prints', *Architectural History* 47 (2004), pp. 113-125, p. 115.

Alex. Brown, of Drawing, Paint Limn. and Etch. with Fig. [Lond.] 1669. (*BH*, p. 40, lot. 105.)

Alexander Browne, *Ars pictoria: or, an academy treating of drawing, painting, limning and etching* (London, 1669). (*RHBdb*, auct_BH_1888.)

Lionardi di Vinci della Pittura, con Fig. Parig. 1651. (*BH*, p. 7, lot 297.)

Leonardo da Vinci, *Trattato della pittura* (Paris, 1651). (*RHBdb*, auct_BH_318; also listed in Sloane MS 949.)

Nouvelle Inventice de lever l'Eau plus haut que sa source par Isaac de Caus. avec des Fig. (*BH*, p. 7, lot. 298.)

Isaac de Caus, *Nouvelle invention de lever l'eau plus haut que sa source, avec quelques machines mouvantes par le moyen de l'eau, et un discours de la conduite d'ycelle* (London, 1644). (*RHBdb*, auct_BH_319.)

Algemeene Manier van de H. de Sargues, tot de practiik de Perspectiven Amst. 1664. (*BH*, p. 30, lot. 394.)

Girard Desargues, *Algemeene manier van de Hr. Desargues tot de practijck der perspectiven, gelijck tot die der meet-kunde, met de kleyne voet-maat, mitsgaders der plaatsen, en proportien van de stercke en flaauwe rakingen, of kleuren* (Amsterdam, 1664). (*RHBdb*, auct_BH_1383.)

Architectura per Windel. Dieterlin Pictorem Argent. Belg. cum Fig. 1598. (*BH*, p. 7, lot. 290.)

Wendel Dietterlin, *Architectura von außtheilung, symmetria und proportion der fünff seulen und aller darauß volgender kunst arbeit, von fenstern, caminen, thurgerichten, portalen, bronnen und epitaphien* (Nuremberg, 1598). (*RHBdb*, auct_BH_311.)

[not in *BH*; *Diary i*, book borrowed on 20 July 1676]

Charles-Alphonse Du Fresnoy, *L'art de peinture de C. A. du Fresnoy, traduit en François, enrichy de remarques, augmenté d'un dialogue sur le coloris, & de plusieurs figures d'Academie*, seconde edition (Paris, 1673). (Hooke borrowed a copy of this book from 'Mr. Knox' on 20 July 1676 (*Diary i,* p. 243).)

Alb. Durer de Symmet. partium in rectis formis hum. Corp. — Geometria, cum fig. Nor. 1534 (*BH*, p. 6, lot 243.)

Albrecht Dürer, *De symmetria partium in rectis formis humanorum corporum* (Nuremberg, 1534); and *Elementa geometria* (Paris, 1532). (*RHBdb*, auct_BH_262 and auct_BH_263 [braced as one lot in *BH*]; also listed in Sloane MS 949.)

John Evelyns Dis. of Forrest Trees and Propag. of Timber 1670. (*BH*, p. 41, lot 129.)

John Evelyn, *Sylva, or a discourse of forest-trees, and the propagation of timber* (London, 1670). (*RHBdb*, auct_BH_1913.)

Euclid's Elem. with Annot. and a Pref. by Jo. Dee, with Fig. [Lond.] 1570. (*BH*, p. 40, lot 94.)

Euclid, *The elements of geometrie of the most auncient philosopher Euclide of Megara*, trans. by Henry Billingsley, with a 'Mathematicall preface' by John Dee (London, 1570). (*RHBdb*,

auct_BH_1877; also listed in Sloane MS 949. Hooke noted purchasing his copy for 25*s* on 16 February 1675 (*Diary i*, p. 147). Hooke owned multiple editions of Euclid's *Elements of geometry*; this particular one is included in this list due to the architectural content of John Dee's 'Preface'.)

Sculptura, or the Art Chalcography 1662. (*BH*, p. 51, lot. 312.)

John Evelyn, *Sculptura, or, the history, and art of chalcography and engraving in copper with an ample enumeration of the most renowned masters and their works : to which is annexed a new manner of engraving, or mezzo tinto, communicated by His Highness Prince Rupert to the authour of this treatise* (London, 1662). (*RHBdb*, auct_BH_2417.)

W. Faithorn's Art of Graving and Etching 1662. (*BH*, p. 51, lot. 313.)

William Faithorne, *The art of graveing and etching, wherein is exprest the true way of graveing in copper. Allso the manner & method of that famous Callot, & Mr. Bosse in their severall ways of etching* (London, 1662). (*RHBdb*, auct_BH_2418.)

Des Principes de l'Architecture, de la Sculpture, de la Peinture, &c. avec des Figures. Par. 1676. (*BH*, p. 20, lot 537.)

André Félibien, *Des principes de l'architecture, de la sculpture, de la peinture, et des autres arts qui en dependent. Avec un dictionnaire des termes propres à chacun de ces arts* (Paris, 1676). (*RHBdb*, auct_BH_896. Hooke borrowed a copy of this book from Boyle in late 1676 before finally purchasing his own copy in March 1677 (*Diary i*, pp. 254, 257, 262-263, 266, 278).)

Alex. Francine's Architecture Publish. by R. Prick, with Fig. [Lond.] 1669. (*BH*, p. 40, lot 113.)

Alexandre Francine, *A new book of architecture wherein is represented fourty figures of gates and arches triumphant, composed of different inventions, according to the five orders of columnes. Viz. the Tuscane, Dorick, Ionick, Corinthian and Composite. By Alexander Francine, . . . set forth by Robert Pricke for the use and benefit of all ingenious workmen that are concerned in eminent building* (London, 1669). (*RHBdb*, auct_BH_1896.)

F. Freart's Paral. of Ancient. Arch. with the M. by J. Evelyn, with C. [Lond.] 1694.[7] (*BH*, p. 40, lot 109.)

Roland Fréart and John Evelyn, *A parallel of the antient architecture with the modern, in a collection of ten principal authors who have written upon the five orders . . . written in French by Roland Freart, sieur de Chambray; made English for the benefit of builders. To which is added an account of architects and architecture, in an historical and etymological explanation of certain tearms particularly affected by architects ; with Leon Baptista Alberti's treatise* Of statues (London, 1664). (*RHBdb*, auct_BH_1892.)

[7] The date is a typo.

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 7r]

Balthazar Gerbier, *Interpreter of the academie for forrain languages, and all noble sciences, and exercises, concerning military architecture or fortifications* (London, 1648).

[Jo. Greaves] Descript. of the Cyramads in Aegypt 1646. (*BH*, p. 46, lot 89.)

John Greaves, *Pyramidographia: or, a description of the pyramids in Ægypt* (London, 1646). (*RHBdb*, auct_BH_2193; Hooke purchased his copy from Richard Smith's auction in 1682.)

Inigo Jones's Stoneheng restored, with Fig. [Lond.] 1655. (*BH*, p. 39, lot 31.)

Inigo Jones, *The most notable antiquity of Great Britain, vulgarly called Stone-Heng, on Salisbury Plain* (London, 1655). (*RHBdb*, auct_BH_1814; also listed in Sloane MS 949.)

[not in *BH*; *Diary ii*, purchased on 26 Apr. 1693]

Athanasius Kircher, *Turris Babel* (Amsterdam, 1679).

Jac. Lauri Antiquae Urbis (Romae) Splendor. cum Figur. & Descriptione Imaginum, in Lat. Ital. & Gall. [Rom.] 1612. (*BH*, p. 2, lot 50.)

Giacomo Lauro, *Antiquae urbis splendor . . . imaginum descriptio . . . Addita est brevis quaedam et succinta imaginum explicatio . . . ex historiarum monumentis ostenditur* (Rome, 1612). (*RHBdb*, auct_BH_58.)

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 3v]

Heinrich Lautensack, *Des circkels unnd richtscheyts* (Frankfurt, 1564). (Hooke's copy is extant; see *RHBdb*, extra_BH_16.)

S. Lee's Temp. of Solomon pourtrait. by Scrip. Light with Fig. [Lond.] 1665. (*BH*, p. 38, lot 7.)

Samuel Lee, *Orbis miraculum; or the Temple of Solomon pourtraied by scripture-light; wherein all its famous buildings, the pompous worship of the Jews, with its attending rites and ceremonies; the several officers employed in that work, with their ample revenues: and the spiritual mysteries vailed under all, are treated at large* (London, 1665). (*RHBdb*, auct_BH_1790. For Hooke's extant copy of the 1659 edition of this book, see *RHBdb*, extra_BH_17.)

Maniere de Bastir par P. le Muet, avec Fig. Par. 1623. (*BH*, p. 53, lot 7.)

Pierre Le Muet, *Manière de bastir, pour touttes sortes de personnes* (Paris, 1623). (*RHBdb*, auct_BH_2539; also listed in Sloane MS 949. Hooke noted purchasing his copy on 7 November 1674 (*Diary i*, p. 129).)

John Lightfoots Temple as it stood in the Days of our Saviour 1650. (*BH*, p. 42, lot 45.)

John Lightfoot, *The Temple: especially as it stood in the dayes of our saviour* (London, 1650). (*RHBdb*, auct_BH_1986.)

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 5r]

Jean Marot, *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot* [Grand Marot], (n.d., n.p.). (Not in *BH*, however a print from the series, with Hooke's inscription, has survived among his papers at the British Library; see Figure III-88. It is possible, however, that the print was issued separately.)

Recueil des Plans Profils & Elevations des plusieurs Palais, Chasteaux, &c. batis dans Parts, par J. Marot. avec tres belles Figures. (*BH*, p. 10, lot 137.)

Jean Marot, *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot* [Petit Marot], (n.d., n.p.). (*RHBdb*, auct_BH_469; also listed in Sloane MS 949. See also Figure III-88.)

Ger. Melder van de Fortificatie en Battalions Utr. 1658. (*BH*, p. 56, lot 20.)

Gerard Melder, *Van de fortificatie en bataillons &c.* (Utrecht, 1658). (*RHBdb*, auct_BH_2666.)

Sir John Moor's Modern Fortification Lond. 1673. (*BH*, p. 51, lot 319.)

Jonas Moore, *Modern fortification: or, Elements of military architecture. Practised and designed by the latest and most experienced ingeneers of this last age, Italian, French, Dutch, and English. And the manner of defending and besieging forts and places. With the use of a joynt-ruler or sector, for the speedy description of any fortification* (London, 1673). (*RHBdb*, auct_BH_2424; Hooke bought his copy on 18 July 1673 (*Diary i*, p. 51).)

[not in *BH*; *Diary i*, purchased on 30 Aug. 1672]

[Samuel Morland], [*Four diagrams of fortifications*] (London?, 1670?). (On 30 August 1672 (*Diary i*, p. 6), Hooke noted buying "Sir S. Moreland of fortifications," but it has not been possible to match it to an extant edition.)

Jos. Moxons Mechanick Exercises, 2 vol. with fig. 1683 (*BH*, p. 44, lot 143.)

Joseph Moxon, *Mechanick exercises, or, the doctrine of handy-works* (London, 1683). (*RHBdb*, auct_BH_2090.)

Jos. Moxon's Practical Perspective, with Fig. wants the Tit. (*BH*, p. 40, lot 108.)

Joseph Moxon, *Practical perspective; or perspective made easie . . . Usefull for all painters, engravers architects, &c. and all others that are any waies inclined to speculatory ingenuity* (London, 1670). (*RHBdb*, auct_BH_1891.)

R. Norwoods Fortificat. or Architecture Military 1639. (*BH*, p. 44, lot 138.)

Richard Norwood, *Fortification; or, architecture military* (London, 1639). (*RHBdb*, auct_BH_2085; also listed in Sloane MS 949.)

Bern. Palissy de la Nature des Eaux & Fonteides, &c. [Par.] 1580. (2 copies: *BH*, p. 28, lot 300, and p. 32, lot 477.)

Bernard Palissy, *Discours admirables, de la nature des eaux et fonteines, tant naturelles qu'artificielles, des metaux, des sels et salines, des pierres, des terres, du feu & des emaux* (Paris, 1580). (*RHBdb*, auct_BH_1285 and auct_BH_1467.)

I 4 Libri dell' Architettura di Andr. Palladio, con Fig. Ven. 1601. (*BH*, p. 7, lot 288.)

Andrea Palladio, *I quattro libri dell'architettura* (Venice, 1601). (*RHBdb*, auct_BH_309.)

L'Architettura di Andr. Palladio con Fig. Ven. 1642. (*BH*, p. 7, lot 289.)

Andrea Palladio, *L'Architettura, divisa in quattro libri* (Venice, 1642). (*RHBdb*, auct_BH_310; also listed in Sloane MS 949.)

Andr. Palladios Architecture, by G. Richard 1663. (*BH*, p. 44, lot 137.)

Andrea Palladio, *The first book of architecture by Andrea Palladio translated out of Italian . . . by Godfrey Richards* (London, 1663). (*RHBdb*, auct_BH_2084; also listed in Sloane MS 949. Hooke saw this copy at Prick's on 7 October 1675 (*Diary i*, p. 185).)

J. Vestigi del l'Antichita di Roma raccolti & ritratti in Perspittiva da Stef. Du Perac. con molti Fig. Rom. 1653. (*BH*, p. 2, lot 49.)

Étienne du Pérac, *I Vestigi dell' antichità di Roma raccolti et ritratti in perspettiva con ogni diligentia da Stefano Du Perac Parisino* (Rome, 1653). (*RHBdb*, auct_BH_57.)

The City and Country Purchaser and Builder Lond. (*BH*, p. 51, lot 308.)

S[tephen] P[rimatt], *The city and countrey purchaser and builder. Shewing: the value of any ground lying in the ruines of the City of London. An exact computation of the charge of building, according to an Act of Parliament, in any place thereof. Platforms; for all sorts of edifices. Inspections into materials, and all artificers incident thereunto. Rules to determine all differences between landlord and tenant. Whereunto is added, the art of surveying. The value of all lands in England; all mines, leases, &c. and useful tables thereunto. A most easie method to measure any superficies, and solids.* (London, 1667, 1668, or 1680). (*RHBdb*, auct_BH_2413.)

Iconologie ou Explicat. des Images, &c. des Vertues, des Vices, &c. avec Fig. par J. de Bie, & Moralisées, par J. Baudovin Par. 1677. (*BH*, p. 9, lot 48.)

Cesare Ripa, *Iconologie, ou nouvelle explication de plusieurs images, emblemes, & autres figures hyerogliphiques des vertus, des vices, des arts, des sciences, des causes naturelles, des humeurs differentes, des passions humaines, &c.* (Paris, 1677). (*RHBdb*, auct_BH_380. Hooke had borrowed a copy of this book from the Arundel Library, returning it on 26 January 1677 along with other titles (*Diary i*, p. 270).)

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 7v]

Walter Roberts, *Sir Walter Roberts his answer to Mr. Fords book, entituled, a designe for bringing a navigable river, from Rickmansworth in Hartfordshire to St. Giles in the Fields* (London, 1641).

Palazzi di Genoua, con multi Figuri. (*BH*, p. 7, lot 296.)

Pietro Paolo Rubens, *Palazzi di Genova* (Antwerp, 1622?). (*RHBdb*, auct_BH_317. Hooke had borrowed a copy of this book from the Arundel Library, returning it on 26 January 1677 along with other titles (*Diary i*, p. 270).)

W. Salmer's Art of Drawing, Engraving, &c. 1672. (*BH*, p. 51, lot 311.)

William Salmon, *Polygraphice; or the art of drawing, engraving, etching, limning, painting, washing, varnishing, colouring and dying. In three books* (London, 1672). (*RHBdb*, auct_BH_2416.)

Will. Sanderson's Use of the Pen and Pencil [Lond.] 1658. (*BH*, p. 40, lot 106.)

William Sanderson, *Graphice, the use of the pen and pensil. Or, the most excellent art of painting: in two parts* (London, 1658). (*RHBdb*, auct_BH_1889; also listed in Sloane MS 949. In July 1675, Hooke borrowed from "Faithorne a book of Limning" and copied it. It was likely Sanderson's book since Faithorne's own title was about engraving only (*Diary i*, p. 169, 170).)

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 7r]

Francisco Santos, *The Escurial, or a description of that wonder of the world for architecture and magnificence of structure . . . lately consumed by fire* (London, 1671).

Louis Savot l'Architecture Francoise Paris 1624. (*BH*, p. 31, lot 438.)

Louis Savot, *L'architecture françoise des bastimens particuliers* (Paris, 1624). (*RHBdb*, auct_BH_1428.)

[L'Architettura] Di Sebast. Serlio, con Fig. Ven. 1574. (*BH*, p. 20, lot 539.)

Sebastiano Serlio, *Tutte l'opere d'architettura* (Venice, 1574). (*RHBdb*, auct_BH_898; a 1584 edition is listed in Sloane MS 949. This may be the copy Hooke noted reading on 22 September 1672 (*Diary i,* p. 8).)

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 4r]

Sebastiano Serlio, *Tutte l'opere d'architettura* (Venice, 1584). (Not in *BH*, however there is a quarto dated 1574, *RHBdb*, auct_BH_898, which may be the copy Hooke noted reading on 22 September 1672 (*Diary i,* p. 8).)

Jo. Smith's Art of Painting 1676. (*BH*, p. 51, lot 314.)

John Smith, *The art of painting. Wherein is included the whole art of vulgar painting, according to the best and most approved rules for preparing an laying on of oyl colours. The whole treatise being so full, compleat, and so exactly fitted to the meanest capacity, that all persons whatsoever may by the directions contained therein be sufficiently able to paint in oyl colours, not only sun-dials, but also all manner of timber work, whether posts, pales, pallisadoes, gates, doors, windows, wainscotting, border boards for gardens, or what ever else requires either use, beauty, or preservation from the violence or injury of weather* (London, 1676). (*RHBdb*, auct_BH_2419.)

Enchiridon of Fortification. Lond. (*BH*, p. 51, lot 321.)

Nicholas Stone, *Enchiridion of fortification, or a handfull of knowledge in martiall affaires* (London, [1645]). (*RHBdb*, auct_BH_2426.)

Stows Survey of London 1603. (*BH*, p. 42, lot 42.)

John Stow, *A survay of London* (London, 1603). (*RHBdb*, auct_BH_1983; also listed in Sloane MS 949.)

[Guidi Ubaldi] Perspectivae Libri sex Pisauri 1600. (*BH*, p. 6, lot 228.)

Guidiubaldi e' marchionibus montis perspectiuae libri sex (Pesaro, 1600). (*RHBdb*, auct_BH_247.)

Regola delli 5 Ordini d'Arch. Di M. Giac. Barozzi, &c. con Fig. Amst. 1648. (*BH*, p. 7, lot 287, folio.)

Giacomo Barozzi da Vignola, *Regola delli cinque ordini d'architettura* (Amsterdam, 1648). (*RHBdb*, auct_BH_308. Note that not many copies of this folio edition appear to have survived; there was a Venice 1648 edition and several Amsterdam editions printed prior to 1648, making it possible the date or the place of publication may have been misprinted in *BH*.)

Reigles des 5 Ordres d'Architect de Vinole, revenes par le Muet. Amst. (*BH*, p. 31, lot 439, octavo.)

Giacomo Barozzi da Vignola, *Reigles des cinq ordres d'architectvre de Vignolle. Reveues augmentees et reduittes de grand en petit, par le Muet* (Amsterdam, 1658[?]). (*RHBdb*, auct_BH_1429; Hooke noted purchasing "Muets epitomy of Vignola" for 1*s* on 6 November 1673 (*Diary i*, p. 68).)

Gronden en Afbeel dselo der voornaemste Gebowen, van alle die Phil. Vingboon's Amst. 1665. (*BH*, p. 53, lot 2.)

Philips Vingboons, *Gronden en afbeeldsels der voornaamste gebouwen van alle die Philips Vingboons geordineert heeft* (Amsterdam, 1665). (*RHBdb*, auct_BH_2534; also listed in Sloane MS 949. Hooke purchased his copy on 7 November 1674 (*Diary i*, p. 129).)

M. Vitruvii Pollion. de Architectura lib. x cum Com. & Fig. &c. Ven. 1567. (*BH*, p. 7, lot 292.)

Vitruvius, *De architectura libri decem, cum commentariis Danielis Barbari* (Venice, 1567). (*RHBdb*, auct_BH_313; also listed in Sloane MS 949. Hooke received this copy from Blackburne on 20 October 1673 (*Diary i*, p. 66).)

[M. Vitruvii Pollion. de Architectura] Belgicè, per D. Gualtherum H. Rivium, cum Fig. Bas. 1575. (*BH*, p. 7, lot 293.)

Vitruvius, *Des allernamhafftigisten vnnd hocherfarnesten römischen architecti vnnd kunstreichen werck oder bawmeysters Marci Vitruuij Pollionis zehen bücher von der architectur und künstlichem bawen . . . Erstmals verteutsch, und in truck verordnet durch D. Gualtherum H. Rivium* (Basel, 1575). (*RHBdb*, auct_BH_314. This is the second edition of Walther Ryff's German translation; Hooke's copy, which is extant at the Smithsonian Library, is inscribed in his hand with the acquisition date 8 November 1689.)

M. Vitruvius de Architectura, cum Fig. Titulus deest. (*BH*, p. 31, lot 440.)

Vitruvius, [unknown Latin edition]. (*RHBdb*, auct_BH_1430.)

Les x Livres d' Architecture de Vitruve, Corrigez & Traduits en Francois, avec des Notes & des Figures Par. 1673. (*BH*, p. 7, lot 294.)

Vitruvius, *Les dix livres d'architecture de Vitruve, corrigez et nouvellement traduits en françois avec des notes et des figures*, trans. by Claude Perrault (Paris, 1673). (*RHBdb*, auct_BH_315; also listed in Sloane MS 949.)

Architecture de Vitruve en Abrege par M. Porault Amst. 1681. (*BH*, p. 31, lot 443.)

Vitruvius, *Architecture generale de Vitruve reduite en abregé, par Mr. Perrault de l'Academie des Sciences à Paris. Derniere edition enrichie de figures en cuivre* (Amsterdam, 1681). (*RHBdb*, auct_BH_1433.)

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 8v]

Henry Wotton, *Elements of architecture* (London, 1624).

[not in *BH*; BL, Sloane MS 949, *c.* 1675, fol. 9v]

The fire act. [Presumably the first or second Act of the Parliament for the Rebuilding of London].

CHAPTER III – DRAWING

Annotated list of prints and manuscript drawings among Hooke's papers or that have been attributed to him

CHAPTER III – DRAWING

ii. Annotated list of prints and manuscript drawings among Hooke's papers or that have been attributed to him

ii. 1. BIBLIOTHÈQUE NATIONALE DE FRANCE, PARIS

Figure III-1. Robert Hooke, 'Sketch of the 60-foot telescope', attached to a letter dated 27 February 1667 from Henry Oldenburg (*c.* 1619–1677) to Johannes Hevelius (1611–1687). Source: 'Lettres originales adressées à Jean Hévélius', vol. III (O-Z), Bibliothèque Nationale de France, Département des manuscrits, NAL 1641, fol. 10r; https://goo.gl/Gl9HHg.

After the publication of Galileo Galilei's *Sidereus nuncius* (1610) and Johannes Kepler's *Dioptrice* (1611), the use of the refracting telescope for astronomical research became increasingly common throughout the seventeenth century. Its adaptation was at first slow. Telescopes were prohibitively expensive, and given the difficulties in casting glass with minimal imperfections and grinding lenses evenly, their qualities varied significantly. Frustrated with the lack of necessary craft expertise, and following Galileo's example, a number of astronomers set out to make their own telescopes. As the idea gained more purchase that the quality of the instrument was essential for the authority of the discoveries made with it, much was at stake in the production and description of telescopes.[8]

As evidenced in the correspondence of Henry Oldenburg (*c.* 1619–1677), Secretary to the Royal Society, one of the many telescope-themed discussions among the *virtuosi* during the mid-1660s was the long telescope. With refracting telescopes, achieving greater magnification of distant objects required an increase in focal length, i.e. the distance between the objective lens and the focal point, resulting in ever longer telescopes.[9] The Polish astronomer Johannes

[8] Galileo Galilei, *Siderevs nvncivs magna, longeqve admirabilia spectacula pandens* . . . (Venice: Apud Thomam Baglionum, 1610); Johannes Kepler, *Dioptrice* (Augsburg: Typis Davidis Franci, 1611). A useful starting point on telescopes during this period is Albert Van Helden, 'The Telescope in the Seventeenth Century', *Isis* 65 (1974), pp. 38-58. On the contemporary debates regarding the relationship between the quality of an instrument and the discoveries made with it, see Mario Biagioli, *Galileo's Instruments of Credit: Telescopes, Images, Secrecy* (Chicago: University of Chicago Press, 2006); Janet Vertesi, 'Instrumental Images: The Visual Rhetoric of Self-presentation in Hevelius's Machina Coelestis', *The British Journal for the History of Science* 43 (2010), pp. 209-243.

[9] A. Rupert Hall and Marie Boas Hall, eds., *The Correspondence of Henry Oldenburg*, 13 vols. (Madison, WI: University of Wisconsin Press, 1965–1975) (hereafter *Oldenburg Correspondence*); see especially vol. 3 (1666–1667).

Hevelius (1611–1687) had been one of the first to publish on the subject, describing in *Selenographia* (Gdańsk, 1647) the twelve-foot telescope he had constructed and used in his observatory in Danzig. He would continue developing increasingly longer versions, erecting in the early 1670s the 150-foot telescope illustrated in the famed engraving in *Machinae coelestis pars prior* (Gdańsk, 1673) (**Figure III-2. cf**).[10]

During 1666, the topic of long telescopes, especially rumours about a 120-foot one being constructed by Tito Livio Burattini (1617–1681), an Italian philosopher in charge of the mint in Poland, came up several times in the correspondence between Hevelius and Oldenburg.[11] In his 19 October 1666 letter to Oldenburg, explaining that he was too preoccupied by his observations of fixed stars to work on "the advancing of Telescopes," Hevelius inquired about obtaining a 60-foot telescope at a reasonable rate and requested details regarding the lenses, materials used for the tubes, and the mounting structure. As his request was preceded by his compliments to Hooke for the latter's "remarkable observations both of Jupiter and Mars with his excellent telescope," Hevelius was most likely referring to the 60-foot telescope Hooke had reported using for his 1666 observations of Mars, Jupiter, and Saturn (**Figures III-244 and III-321**), published in the 2 July 1666 issue of the *Philosophical Transactions* (**Figure III-245. cf**).[12]

For an overview of the development of the long telescope, see Silvio A. Bedini, 'The Aerial Telescope', *Technology and Culture* 8 (1967), pp. 395-401. While Bedini uses the term 'aerial' to refer to long tube telescopes in general, van Helden argues that during the period it usually referred to the tubeless type; see Van Helden, 'The Telescope in the Seventeenth Century', p. 47.

[10] Johannes Hevelius, *Selenographia: sive, lunae descriptio; atque accurata, tam macularum ejus, quam motuum diversorum, aliarumque omnium vicissitudinum, phasiumque, telescopii ope deprehensarum, delineatio* . . . (Gdańsk: Autoris sumtibus, typis Hünefeldianis, 1647); *Machinae coelestis pars prior; organographiam, sive instrumentorum astronomicorum omnium, quibus auctor hactenus sidera rimatus, ac dimensus est, accuratam delineationem, et descriptionem, plurimus iconibus, aeri incisis, illustratam & exornatam, exhibens* . . . (Gdańsk: Auctoris typis, & sumptibus, imprimebat Simon Reiniger, 1673). On Hevelius's long telescope, see Giuseppe Monaco, 'Alcune considerazioni sul "maximus tubus" di Hevelius', *Nuncius* 13 (1998), pp. 533-550.

Note that figures with numbers suffixed with 'cf' (e.g. Figure III-2. cf) do not originate from Hooke's archives; they are provided for purposes of comparison.

[11] Hevelius and Oldenburg had been in contact since at least 1663; see letter 262 in *Oldenburg Correspondence*, vol. 2. For their correspondence regarding long telescopes, see letters 503, 541, 562, and 578 in ibid., vol. 3.

[12] Letter no. 578 in ibid., vol. 3, p. 256; extracts from Hevelius's letter were published in the *Philosophical Transactions* vol. 1, no. 19 (19 November 1666), pp. 346-349. For Hooke's reports of planetary observations, see 'The particulars of those observations of the Planet Mars, formerly intimated to have been made at London in

Oldenburg forwarded Hevelius's requests to Hooke who responded *c.* 20 February 1667 with a letter and sketch, now Cambridge University Library, Add. 9597/13/5/117v (**Figure III-167. a**).[13] Hooke described his telescope as a tube of about 66 or 68 feet in length, made up of two 33-foot long wooden square tubes with 10" sides, and bound together with thin plates of iron, under which he had placed several "square portions or cells of *th*e form *A*" (sketched on the drawing as a circle circumscribed by a square) serving "to keep off adventitous rayes & to keep the sides of *th*e tubes square & steady." Holding the two tubes together was a 2 to 3-foot long square box placed in the middle, constructed of thicker boards of wood bound with iron. Two 6-foot long boards of wood were joined at the top over which

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the months of February and March a[nno] 1665/6', *Philosophical transactions* 1 (1666), pp. 239-242; 'Some observations lately made at London concerning the Planet Jupiter & a late observation about Saturn made by the same', *Philosophical transactions* 1 (1666), pp. 245-247.

Hooke had access to both a 36-foot telescope, which he reported using for his observations of Mars, and a 60-foot telescope, which he first mentioned using as early as May 1665. In the Preface to *Micrographia*, he had proposed an engine for grinding spherical glasses, which was subsequently criticized by the French savant Adrien Auzout, an extract of whose letter was translated into English and published as 'Considerations of Monsieur Auzout upon Mr. Hook's new instrument for grinding of optick-glasses', *Philosophical transactions* 1 (1665), pp. 57-63. In his response to Auzout's comments, Hooke mentioned using telescopes of several lengths, including "a 60 foot Tube;" see 'Mr. Hook's answer to Monsieur Auzout's considerations, in a letter to the Publisher of these Transactions', *Philosophical transactions* 1 (1665), pp. 64-69. Hooke's letter is reprinted as no. 373 in *Oldenburg Correspondence*, vol. 2.

Secondary sources on Hooke's long telescope include Jim Bennett, 'Hooke's Instruments for Astronomy and Navigation', in *Robert Hooke: New Studies*, ed. Michael Hunter and Simon Schaffer (Woodbridge: The Boydell Press, 1989), pp. 21-32; 'Hooke's Instruments', in *London's Leonardo: The Life and Work of Robert Hooke* (New York: Oxford University Press, 2003), pp. 63-104; 'The Instruments', in *The Image of Restoration Science: the Frontispiece to Thomas Sprat's History of the Royal Society (1667)* ed. Michael Hunter (New York: Routledge, 2016); A. D. C. Simpson, 'Richard Reeve — the 'English Campani' — and the Origins of the London Telescope-Making Tradition', *Vistas in Astronomy* 28, Part 1 (1985), pp. 357-365; Hideto Nakajima, 'Robert Hooke as an Astronomer: Hooke's Optical Research and Instruments in Their Historical Context', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 49-62.

[13] Until recently, this letter was in the private collection of the Earls of Macclesfield whose collection was sold at a Sotheby's auction in 2008. The letter has been reproduced as no. LXIX in Stephen Jordan Rigaud, ed., *Correspondence of Scientific Men of the Seventeenth Century, Including Letters of Barrow, Flamsteed, Wallis, and Newton, Printed from the Originals in the Collection of the Right Honourable the Earl of Macclesfield* (Oxford: University Press, 1841), pp. 179-182, with a diagram of Hooke's sketch printed as pl. 2, fig. 2 (Figure III-168. cf. c); and as no. 613 in *Oldenburg Correspondence*, vol. 3. While Rigaud dates Hooke's letter to the summer of 1666, the editors of the Oldenburg correspondence point out that Oldenburg did not receive Hevelius's letter until November 1666, and provide the *c.* 20 February 1667 as a placeholder for any date between then and 27 February 1667 when Oldenburg responded with Hooke's notes; see ibid., vol. 3, p. 349.

rope was stretched to keep the telescope straight without warping. The whole construct was "hung by a handle after the manner of a pair of scales" balancing each side, while a "tackle" was used to adjust the height of the telescope "by the strength of one man only." The whole tube being about 200 pounds, once hoisted, it was "manageable with the greatest facility imaginable," Hooke boasted. In terms of the price, Hooke had found that the objective lens cost at least "25 pounds sterling and the Eyeglasses . . . 40 or 50 shillings more."[14]

Oldenburg, before composing his response to Hevelius in Latin, made his own notes on Hooke's letter and copied the sketch (**Figure III-168. cf. a**), most likely tracing it or using an instrument, considering the strikingly identical size and composition of the two drawings when they are overlaid (**Figure III-168. cf. b**). In an apparent attempt to create a clearer correspondence between the drawing and the textual description of the telescope, Oldenburg applied labels to both Hooke's sketch (**Figure III-167. a**) and his own copy (**Figure III-168. cf. a**), in the process making a few labelling mistakes, necessitating the production of a third sketch.[15] This final, more detailed drawing (**Figure III-1**) was attached to the letter Oldenburg sent to Hevelius on 27 February, though not before it was used in the celebrated frontispiece engraved by Wenceslaus Hollar for Thomas Sprat's *History of the Royal Society* (London, 1667) (**Figure III-3. cf**).[16]

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[14] *Oldenburg Correspondence*, vol. 3, pp. 348-349. Regarding the contemporary cost of telescopes, a useful reference is the list provided by Richard Reeve (discussed below) in his 11 March 1660/1 letter to Henry Power, where the price of a 36-foot telescope with convex glasses is listed at 30 pounds; see BL, Sloane MS 1326, fol. 24r. This price list is also reproduced in Reginald S. Clay and Thomas H. Court, 'Note on The Introduction of The Field Lens in The Microscope; Dr. Henry Power and His Letters', *Journal of Microscopy* 54 (1934), pp. 23-28, at p. 27.

[15] The interpretation of the reason for producing a third sketch is by Bennett, 'The Instruments'. The description provided by Oldenburg as an annotation on Hooke's letter, reads "*F* a litle Cylinder, on w*hi*ch *th*e end of *th*e long rope *FE* is roled, thereby to shorten or lengthen it, according as ye bending of *th*e tube in ye midle requireth: *GG* another smaller cord, wound about *th*e former rope and *th*e tube, by *th*e stretching or slackning of w*hi*ch the two parts of *th*e tube are reduced to a straitnes, as occasion requires," as transcribed by the editors in *Oldenburg Correspondence*, vol. 3, p. 349. The identification of Oldenburg's hand on Hooke's letter is both from Rigaud, *Correspondence of Scientific Men*, p. 182 and *Oldenburg Correspondence*, vol. 3, p. 349.

[16] Oldenburg's letter is reproduced as no. 614 in *Oldenburg Correspondence*, vol. 3. Thomas Sprat, *The history of the Royal-Society of London, for the improving of natural knowledge* (London: Printed by T. R. for J. Martyn . . . , and J. Allestry . . . , Printers to the Royal Society, 1667); the most recent scholarship on Sprat's frontispiece is Michael Hunter, *The Image of Restoration Science: The Frontispiece to Thomas Sprat's History of the Royal Society (1667)* (New York: Routledge, 2016), see especially Jim Bennett's essays on 'The Instruments'.

The 60-foot telescope may have been Hooke's last collaboration with Richard Reeve or Reeves (*d.* 1666), the leading optical instrument maker in London at the time.[17] Early in the 1640s, Reeve had been recruited by Charles Cavendish (1595?–1654) and John Pell (1611–1685) to grind hyperbolic lenses for a telescope they attempted to create following Descartes's recommendations. That project appears to have failed, but later in the decade, under the patronage of Paul Neile (*bap.* 1613, *d.* 1682x6), he embarked on a new one to develop telescopes with ever increasing magnification.[18] In 1650, he provided the telescopes for Seth Ward's observatory at Wadham College in Oxford, and by 1652 he was commercially selling compound microscopes used by the likes of Christopher Wren, Henry Power, Samuel Pepys, and of course Hooke. After Wren was appointed the Gresham Professor of Astronomy, a long telescope by Reeve was installed in the courtyard of the College. In September 1664, it was replaced by a new 36-foot one installed for Hooke's use (**Figure III-281**) and is presumably the one he used for his aforementioned Mars observations in February and March 1666 (**Figures III-245 and III-321**)**.** By June 1666, it was replaced by the 60-foot telescope discussed above.[19]

One of the challenges of such long telescopes was the stability of their support mechanism. To his lengthy description of the installation in the College courtyard, Hooke added one more drawing: a copy of a sketch sent as an attachment to a *c.* 1661 letter from Robert Southwell to Robert Boyle, illustrating a telescope used in Prince Leopoldo's court in Florence to make observations of Saturn.[20] There are some differences between the two

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[17] Indeed, Hooke's first encounter with Thomas Hobbes was at Reeve's workshop where Hobbes had accompanied William Cavendish to assist with the purchase of a telescope. In his letter dated 3 July 1663 to Boyle, Hooke wrote "I was, I confess, a little surprised at first to see an old man [Hobbes was 75 years old at that time] so view me and survey me every way, without saying any thing to me;" Robert Boyle, *The Correspondence of Robert Boyle*, ed. Michael Hunter, Antonio Clericuzio, and Lawrence Principe, 7 vols. (London: Pickering & Chatto, 2001), vol. 2, p. 97 (hereafter *Boyle Correspondence*).

[18] On the history of seventeenth-century attempts at grinding hyperbolic lenses, see D. Graham Burnett, 'Descartes and the Hyperbolic Quest: Lens Making Machines and Their Significance in the Seventeenth Century', *Transactions of the American Philosophical Society* 95 (2005), pp. 1-152.

[19] On Reeve, see 'Reeve, Richard (*d.* 1666)', *ODNB*; Clay and Court, 'Introduction of The Field Lens'; Simpson, 'Richard Reeve'; G. Clifton, 'The Spectaclemakers' Company and the Origins of the Optical Instrument-Making Trade in London', in *Making Instruments Count: Essays on Historical Scientific Instruments presented to Graham L'Estrange Turner*, ed. R. G. W. Anderson, Jim Bennett, and W. F. Ryan (Aldershot, 1993), pp. 341-364. For Hooke's detailed description of the 36-foot telescope, see RS, Cl.P/20/61.

[20] Southwell's letter is transcribed in *Boyle Correspondence*, vol. 1, pp. 457-460.

drawings; the one among Hooke's papers (**Figure III-282**) is labelled and ink washed, whereas the other (**Figure III-283**), currently bound in a volume of Southwell's manuscripts, is plain. Both show signs that they were folded, however, indicating that they may have been attachments at some point. Considering that Southwell notes in his letter that he was venturing "to make Some rude construction of" the telescope, and refers to the labels in the drawing, **Figure III-282** may be attributed to him. But it is not possible to rule out that there may be a lost original, and these two drawings are copies.

There is one more drawing of a telescope among Hooke's notes on the subject.[21] In 1684, Christiaan Huygens (1629–1695) presented his design for a tubeless aerial telescope in *Astroscopia compendaria* (The Hague, 1684). Hooke read his account of the book, now RS Cl.P/20/62, at the 25 June 1684 Royal Society meeting, though the minutes only note it as him reading "a paper of remarks about the manner of observing with long telescope-glasses without a tube."[22] It was perhaps for this presentation that Hooke replicated (**Figure III-284**) Huygens's engraved illustration (**Figure III-285. cf**) of a tubeless telescope. Save for a detail on the pole, where a vertical opening is extended downwards, the drawings are almost identical, once again hinting at the use of special drawing techniques or instruments.

Figure III-2. cf. 150-foot telescope in Hevelius, *Machinae coelestis* (Gdańsk, 1673), fig. AA. Source: Wikipedia Commons, https://goo.gl/TmmuFM.

Consult the notes for Figure III-1.

Figure III-3. cf. Wenceslaus Hollar (engraver), John Evelyn (designer), 'Frontispiece of Thomas Sprat's *The history of the Royal Society of London* (London, 1667)'; detail showing the telescope.

Source: Wellcome Library, London, L0076260.

Consult the notes for Figure III-1.

[21] Some of Hooke's notes on telescopes were published posthumously as Robert Hooke, 'Discourse concerning telescopes and microscopes; with a short account of their inventors, read in February 1691–2', in *Philosophical Experiments and Observations of the late Eminent Dr. Robert Hooke . . . And Other Eminent Virtuoso's in his Time*, ed. W. Derham (London: Publish'd by W. Derham, F.R.S. Printed by W. and J. Innys, Printers to the Royal Society . . . , 1726), pp. 257-268.

[22] Birch, vol. 4, p. 308. The book was formally presented to the Society at the next meeting by Henri Justel (1620–1693); ibid., pp. 309, 318.

ii. 2. BRITISH LIBRARY, LONDON

a. Inserts in Printed Books

Figure III-4. Hooke, 'Copy of the illustration and text of the missing title-page of the 'January Hebdomas prima' section', n.d.; detail. Folio inserted between pages 126 and 127 in Hooke's copy of Joannes Ciermans, *Disciplinae mathematicae* (Louvain, 1640). BL, shelfmark 531.n.16.

It is unclear when Hooke purchased this practical mathematics textbook written by the Jesuit mathematician Joannes Ciermans (1602-1648).[23] It does not bear an acquisition note, does not appear in the *c.* 1675 catalogue Hooke prepared of his library, nor is it mentioned in the extant diaries, making it possible it was purchased during one of the lacunae.[24] There were not too many copies of this book circulating in England at the time, but one went on sale at the November 1684 auction of Jonas Moore's library, and it is plausible that Hooke acquired it then.[25]

At the time, imperfect copies of books were a common occurrence and indeed on the rear fly-leaf, Hooke noted that the book was missing the title page of the 'Hebdomas prima of January'. In the folio inserted between pages 126 and 127 (**Figure III-4**), Hooke replicated the title-page illustration (**Figure III-5. cf**) with a rough sketch and provided the original text in manuscript. Compared to the precision he employed in replicating Kepler's illustrations (**Figures III-304 to III-307. cf**) in a presumably similarly imperfect book, the figural sketch is elementary at best. Content with being simply suggestive of the layout, it pays slightly more attention to the instruments and gears surrounding the putto.

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[23] Joannes Ciermans, *Disciplinae mathematicae traditae anno Institutae Societatis Iesu Seculari* (Louvain: Apud Everardum de Witte, 1640); a digitised version is available online at https://goo.gl/qK9u1Y. On Ciermans, see G. H. W. Vanpaemel, 'Jesuit Science in the Spanish Netherlands', in *Jesuit Science and the Republic of Letters*, ed. Mordechai Feingold (Cambridge, MA: The MIT Press, 2003), pp. 389-432, at pp. 399-404; Patricia Radelet-de Grave, 'Guarini et la structure de l'Univers', *Nexus Network Journal* 11 (2009), pp. 394-404, at pp. 394-404. On Hooke's copy of the book (*RHBdb*, auct_BH_264), see also 'Part II.2' of William Poole, Felicity Henderson, and Yelda Nasifoglu, 'Editors' Introduction to Robert Hooke's Books Database' (2015), http://www.hookesbooks.com/editors-introduction/.

[24] Hooke's autograph library catalogue is now BL, Sloane MS 949; see Chapter II.

[25] Edward Millington, *Bibliotheca mathematica optimis libris diversarum linguarum refertissima: unà cum variis philologicis, historicis & geographicis adornata honoratissim. equitis Jonae Mori . . . quorum auctio habenda est Londini . . . tertio die Novembris, 1684* (London: [Edward Millington], 1684), p. 1. The copy listed in the Moore auction is dated 1645, matching the date of Hooke's copy, emended with a manuscript note from 1640 to 1645.

Figure III-5. cf. Original illustration in the title page of 'January Hebdomas prima' in Ciermans, *Disciplinae mathematicae* (Louvain, 1640), fol. 31r. Source: Leuven University Library, PRECB0001.

Consult the notes for Figure III-4.

Figure III-6. Two sketches ('Colour drawing of a tulip in a terracotta jug' and 'Figural drawing') pasted in the copy of Heinrich Lautensack, *Des circkels unnd richtscheyts* (Frankfurt, 1564) attributed to Hooke. Source: BL, shelfmark 536.I.21.(5).

This particular copy of the German painter and goldsmith Heinrich Lautensack's manual on practical geometry does not bear any acquisition notes or other markings identifiably in Hooke's hand, but it has been attributed to him by Giles Mandelbrote based on other criteria.[26] Indeed Hooke's *c.* 1675 library catalogue lists a '[High] Dutch Perspective & limning of Lautensack, Goldsmith. Frankfurt 1564' on fol. 3v, although it appears this copy was lost or lent to someone by 1703 as the book is not listed in *BH*.[27]

Several cuttings and anonymous sketches can be found pasted into this book. On the verso of the title page is an ink and ink-wash drawing of a red and white tulip, perhaps a *semper augustus*, in a terracotta jug **(Figure III-6)**. It is difficult to make an attribution based solely on stylistic grounds so it will be helpful to contextualise this drawing. Though it had been a few decades since the so-called 'tulipomania' of 1637, tulips were still exotic and expensive during this period.[28] Hooke did design several gardens for his gentleman clients and therefore would

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[26] Heinrich Lautensack, *Des circkels unnd richtscheyts, auch der perspectiva, und proportion der menschen und rosse, kurtze, doch gründtliche underweisung, deß rechten gebrauchs* . . . (Frankfurt: [n.p.], 1564). On Lautensack, see Sibylle Gluch, 'The Craft's Use of Geometry in 16th c. Germany: A Means of Social Advancement? Albrecht Dürer & After', *Anistoriton Journal, Essays* 10 (2007), pp. 1-16; Sibylle Gluch, 'Geometrie - Fortifikation - Menschliche Proportion: Zu Kontext und Wirkung der Technischen Schriften Albrecht Dürers' (unpub. D.Phil. diss., University of Birmingham, 2006), p. 234.

For the copy's attribution to Hooke, see Giles Mandelbrote, 'Sloane's Purchases at the Sale of Robert Hooke's Library', in *Libraries Within the Library*, ed. Giles Mandelbrote and Barry Taylor (London: British Library, 2009), pp. 98-145, p. 130. See also the editors' notes in *RHBdb*, extra_BH_16.

[27] See 'Part II. 3. Notes on blank folios and book margins' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'; during this period, German was often referred to as 'High Dutch'.

[28] On the interest in tulips at the time, a useful starting point is Marina Bianchi, 'In the Name of the Tulip. Why Speculation?', in *Consumers and Luxury: Consumer Culture in Europe 1650-1850*, ed. Maxine Berg and Helen Clifford (New York: Manchester University Press, 1999). On tulips in science and art, see also Anne Goldgar, 'Nature as Art: The Case of the Tulip', in *Merchants & Marvels: Commerce, Science, and Art in Early Modern*

have been interested in plants beyond his natural philosophical work, but it is noteworthy that the drawing is not of a plant but of a cut flower. And while the same page bears a fragment of the frontispiece of the English translation of Scipion Dupleix's *The resolver, or curiosities of nature* (London, 1635), which included information on gardening, Hooke does not appear to have owned a copy.[29] It is perhaps more likely that the tulip drawing originates from the continent. It is reminiscent of the watercolours by the German artist Georg Flegel (1566–1638) who was known for his still-life paintings, and produced a series of drawings of plants and flowers, some of them tulips, in 1630.[30] His watercolours (e.g. **Figure III-7.cf**) are more detailed than this particular sketch but they may have provided an inspiration for it.[31] Flegel was hardly the only artist painting tulips; the watercolours of the Dutchmen Pieter Holsteyn, the Younger (*c.* 1614–1673) are equally reminiscent of this drawing.

Another manuscript sketch pasted in this book can be found on sig.)(iij. It is the sketch of a head of a young male or female in profile **(Figure III-8)**. This drawing has been attributed to Hooke by Matthew Hunter.[32] It does, however, appear to be more sophisticated than some of the other figural drawings that can be confidently attributed to Hooke.[33]

In addition to these two manuscript drawings, the book contains various other cuttings from print sources, such as the five 'kunst calendar' illustrations on fol. 31v (Brachmonat, Herbstmonat, Weinmonat, Wintermonat, Christmonat), a geometric diagram of a horse presumably by, or inspired by, Dürer on fol. 34v, and multiple cut-outs from Luis de Granada's *Devotissime meditationi per I Giorni della settimana tanto per la mattina, come per la sera* (Ferrara, 1578).[34]

Europe, ed. Pamela H. Smith and Paula Findlen (New York: Routledge, 2002), pp. 324-46; Paul Taylor, *Dutch Flower Painting 1600–1720* (New Haven, CT: Yale University Press, 1995).

[29] Scipion Dupleix, *The resoluer; or curiosities of nature written in French by Scipio Du Plesis counseller and historiographer to the French King. Vsefull & pleasant for all* (London: Printed by N. & I. Okes, 1635).

[30] L. Behling, 'Zeichnungen Georg Flegels im Berliner Kupferstichkabinett', *Berliner Museen* 60 (1939), pp. 46-50; see also the exhibition catalogue Michael Roth et al., *Georg Flegel: Die Aquarelle* (Munich: Prestel, 2003). Some of Flegel's watercolours are available online at https://goo.gl/OOo6Zd.

[31] Furthermore, from *c.* 1592 until his death, Flegel lived in Frankfurt where the book had been published so a previous owner of this copy may have had access to his drawings.

[32] Matthew C. Hunter, 'Hooke's Figurations: A Figural Drawing Attributed to Robert Hooke', *Notes and Records of the Royal Society* 64 (2010), pp. 251-260, at p. 253.

[33] See the first part of this chapter on Hooke's difficulties with figural drawings.

[34] See the editors' notes in *RHBdb*, extra_BH_16.

Figure III-7. cf. Georg Flegel, 'Watercolour drawing of two tulips', 1630. Source: Staatlichen Museen zu Berlin, KdZ 7578.

Consult the notes for Figure III-6.

Figure III-8. Hooke (attrib.), 'Figural drawing' pasted on sig.)(iij in the copy of Lautensack, *Des circkels unnd richtscheyts* . . . (Frankfurt, 1564); detail. Source: BL, shelfmark 536.I.21.(5).

Consult the notes for Figure III-6.

Figure III-9. Hooke, 'Various notes', recto and verso of the folio bound in his copy of Pietro Accolti's *Lo inganno de gl' occhi* (Firenze, 1625). Source: BL, shelfmark 536.I.21.(6).

Hooke purchased this book from bookseller Moses Pitt's auction of Gijsbert Voet's library in December 1678, thus the notes and sketches can be dated to sometime after then.[35] The recto includes a sketch of a device resembling a rotary press, very similar to the cipher cylinder that would later be invented by Thomas Jefferson (1743–1826). It is likely the 'contrivance' or 'method' for printing books that Hooke explained to Pitt and Sir John Hoskins (1634–1705) on 13 and 14 March 1679.[36] It also includes Hooke's rough sketch of his own coat of arms, with only one of the four escallops drawn in the escutcheon, with a bigger more detailed escallop drawn next to the printing device.[37]

Other ideas Hooke noted include 'An engine by which a wagon coach &c. may be drawn up hill & down hill w*i*th equall strength', 'A neat true easy exact plain motion by 2 plain Marbles', 'Whether ye doctrine of triangles & measuring of angles may not be done by conick sections', and on the verso, 'What if we suppose libratio in *th*e earth which will returne by a line of signes fro*m* capr*icorn* to cancre', with diagrammatic sketches for 'one mold to grind all glasses'.

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[35] Pietro Accolti, *Lo inganno de gl'occhi, prospettiva pratica* (Firenze: Appresso Pietro Cecconcelli, 1625). See, 'Appendix B: Hooke's Purchases from Moses Pitt's Auction in 1678' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

[36] See the editors' notes in *RHBdb*, auct_BH_295, and 'Part II. 3. Notes on blank folios and book margins' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'. For further information on Hooke's interest in printing techniques, see the annotations for Figure III-46.

[37] Hooke's coat of arms is briefly addressed in Chapter I.

b. Add. MS 5238

This volume, also erroneously referred to as Sloane MS 5238 in some sources, is a bound album of drawings and prints compiled by Hans Sloane (1660–1753). A later contemporary of Hooke, Sloane was a successful physician and collector who, by as early as 1703, had built a reputation for having "one of, if not, *th*e finest collection of raritys in any private persons hands in Europe."[38] Sloane collected objects from around the world: not only printed books, manuscripts, prints and drawings, but also natural specimens, coins, antiquities, and other items of curiosity.[39] In his will, aware of the value of keeping his collection of over 71,000 objects together, Sloane offered it to the British nation in exchange for £20,000—a quarter of its estimated value—for his heirs. As it was acquired, it became one of the founding collections of the British Museum which opened to the public in 1759.[40] When the British Library was founded in 1972, the book collection of the Museum was transferred there. Of Sloane's numerous print and drawing albums, some have remained at the Museum while in other cases only a few folios were left behind; for example, nos. 61 and 62 (**Figures II-81 and III-82**) in Add. MS. 5238 still remain at the British Museum.

When the Sloane collection was initially acquired, the manuscripts were catalogued as Sloane MSS 1 through 4100, with subsequent volumes listed under 'Additional' or 'Add.', starting at 4101. Of the latter, Add. MSS 5018-5027 and 5214-5308, including the current manuscript, are also of Sloane provenance. Remaining the most complete catalogue of these manuscripts is the 1832 hand-written 'Catalogue of the Additions Made to the Department of Manuscripts Since the Publication of Mr.

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[38] Folger Library, v.b.267, after p. 484, fol. 1v. In this same letter, Copley reported on the worrying state Hooke was in during his last days: "Dr Hooke is very crazy much concern'd for fear he should outlive his Estate. He hath starved one old woman allready, & I believe he will endanger himself to save six pence for any thing he wants."

[39] On Sloane, see *ODNB*, and the forthcoming biography by James Delbourgo, *Collecting the World: Hans Sloane and the Origins of the British Museum* (Harvard University Press, 2017). On his collecting practices, see James Delbourgo, "Exceeding the Age in Every Thing': Placing Sloane's Objects', *Spontaneous Generations: A Journal for the History and Philosophy of Science* 3 (2009), pp. 41-54; M. A. E. Nickson, 'Hans Sloane, Book Collector and Cataloguer, 1682-1698', *British Library Journal* 14 (1988), pp. 52-89; Kim Sloan, 'Sloane's 'Pictures and Drawings in Frames' and 'Books of Miniature & Painting, Designs, &c.", in *From Books to Bezoars: Sir Hans Sloane and his Collections*, ed. Alison Walker, Arthur Macgregor, and Michael Hunter (London: The British Library, 2012), pp. 168-189; Kim Sloan, 'Sir Hans Sloane's Pictures: The Science of Connoisseurship or the Art of Collecting?', *Huntington Library Quarterly* 78 (2015), pp. 381-415. Sloane, who frequented book auctions, was present at Hooke's and made numerous purchases; see Mandelbrote, 'Sloane's Purchases'.

[40] It bears mentioning that the first home of the Museum, Montague House in Bloomsbury, was one of the stately homes Hooke had built; see Chapter IV, ii. 19.

Ayscough's Catalogue in 1782' available on-site in the Manuscripts reading room of the current Library.[41] In the latter catalogue, Add. MS 5238 is described simply as 'Architectural and other Drawings, by Dr. Hook, Roe, and others' with a list of contents that is light on detail for most of the items. Sloane's catalogue of his own library has survived but unfortunately does not contain that much more information. In his list of *miniatura*, i.e. volumes of drawings and prints, there are several duplicate entries with Hooke's name, hinting at the distinct possibility that the current volume is assembled from at least two separate albums. In Sloane MS 3972C IV, fol. 16r, there are two entries:

> Min. 44. A book of drawings & designs of Architecture by Dr. Hook &c.
>
> Min. 61. A book of drawings & designs of Architecture Chiefly by Dr Hook, Roe, &c.

In a later catalogue in Sloane MS 3972 C VI, these are re-listed on fols. 242v and 243r with slightly more detail and under new manuscript numbers:

> Min [44] 101. Drawings and designs relating to architecture by Dr Hook &c. fo*lio.*
>
> Min. [61] 103. Drawings and designs of the Monument & Designes relating to Architecture, draughts of the River Thames's wharf chiefly by Dr. Hook, Roe and others, with some other original drawings by several Masters – first by Rr. Bradley 1722 part of a Roman Pavement found at Wood Chester in Gloster- fo*lio*.[42]

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[41] The first printed catalogue was Samuel Ayscough, *A catalogue of the manuscripts preserved in the British Museum hitherto undescribed: consisting of five thousand volumes; including the collections of Sir Hans Sloane, Bart. the Rev. Thomas Birch, d. d. and about five hundred volumes bequeathed, presented, or purchased at various times*, 2 vols. (London: Printed for the Compiler, by John Rivington . . . , 1782). It does not appear to have included Add. MS 5238 however some of the individual drawings are listed under different subject headings in John Holmes and Frederic Madden, *Catalogue of the Manuscript Maps, Charts, and Plans, and of the Topographical Drawings in the British Museum*, 3 vols. (London: Printed by Order of the Trustees, 1844–1861). A later catalogue of just the Sloane manuscripts was published in 1904 but unfortunately it only included Sloane MSS 1-4100; see Edward J. L. Scott, *Index to the Sloane Manuscripts in the British Museum* (London: Printed by Order of the [British Musem] Trustees, 1904). Note that the current online catalogue of the British Library also does not list the Add. manuscripts with Sloane provenance.

An outdated list of Hooke's manuscripts is provided in Geoffrey Keynes, *A Bibliography of Dr. Robert Hooke* (Oxford: Clarendon Press, 1960), but it only lists a handful of his British Library manuscripts and does not include Add. MS 5238.

[42] As transcribed by Kim Sloan in 'Typescript of All 'Miniatura' Listed in Sloane's Own MS Catalogue of His Library (BL Sloane MS 3972C IV and MS 3972C VI)' (unpub. work, May 2010); I thank Dr. Sloan for sharing her unpublished transcription.

In this second catalogue, on fol. 241v, there is also one other item mentioning Hooke, an album Sloane must have purchased after making the first catalogue:

> Min. [28] 7. A large folio containing Maps of different parts of the world, most of which are done on vellum, others with a pen on paper, others with India Ink. Among wch. the ruins of City of London after the Fire, Sev*eral*l. maps of Carolina, some Mathematical draughts some of them by Dr Robert Hook. Fo*lio*. max.

From these entries, it is possible to ascertain that Sloane assembled the current volume from nos. 44 and 61, with presumably parts of no. 28 thrown in; thus Add. MS 5238 has not descended directly from Hooke's papers, making it challenging to attribute its contents to him with any certainty, in the absence of further internal or external evidence.[43] Moreover, it is impossible to know whether some of these "original drawings by several Masters" were collected by Hooke himself and kept among his papers or whether Sloane added them from the many other *miniatura* he catalogued as containing "Designs by Severall masters."[44]

Figure III-10. Anon., 'A painting of the fireworks display designed by Martin Beckman to celebrate the birth of Prince of Wales in 1688'. Source: BL, Add. MS 5238, no. 1.

> This hand-painted illustration spread over two folio pages can be confidently identified as depicting the July 1688 celebration of the birth of Prince of Wales. The fireworks display on the Thames was designed by the military engineer Martin Beckman (1634/5–1702) who had also overseen the pyrotechnics for the coronation of James II three years earlier. The King, who had ascended to the throne when his brother Charles II (1630–1685) died without a legitimate heir, was openly Catholic in Protestant England. The birth of his son, bringing the prospect of a Catholic heir, led to a revolt and merely months after this pageant, James II would be deposed in the Glorious Revolution.[45] The close resemblance between this drawing and the 1688 mezzotint of the event made by Bernard Lens II and published by Beckman

[43] For a similar cautionary note, see 'Part II.3' of Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

[44] See, for instance, the descriptions of Min. 40 through 43 in Sloane MS 3972C IV, fol. 16r.

[45] On the revolt caused by the celebration of the birth of the prince, see Simon Werrett, *Fireworks: Pyrotechnic Arts & Sciences in European History* (Chicago, IL: University of Chicago Press, 2010), p. 88.

(Figure III-11. cf) suggests the possibilities that this is either a painted copy or was a sketch by Bernard Lens in preparation of that print.[46]

Figure III-11. cf. Bernard Lens II (engraver), Martin Beckman (publisher), 'A view of the fireworks on the Thames to celebrate the birth of the son of James II, on 10 June 1688'. Source: BM, 1880,1113.1354, AN589827001.

Consult the notes for Figure III-10.

Figure III-12. Anon., 'Sketch of a female head in chalk'. Source: BL, Add. MS 5238, no. 2r.

Considering the artist's high level of competence, this is probably one of the "other original drawings by several Masters" noted by Sloane.

Figure III-13. Jacques Androuet Du Cerceau (workshop of), 'Longitudinal section through a domed Roman structure', print from *Temples et habitations fortifiés* (*c.* 1545-1550). Source: BL, Add. MS 5238, no. 2v.

This is a folio size print of a longitudinal section through a domed Roman structure with an oculus in its apex. It is reminiscent of the woodcuts in *Quinto libro d'architettura* (first ed. Paris, 1547) by Sebastiano Serlio (1475/1490–1553/1557), the book on temples from his architectural treatise. Indeed, the drawing can be traced to a work that was very much influenced by Serlio: the series of prints descriptively titled *Temples et habitations fortifiés* (*c.* 1545–1550) and attributed to the workshop of Jacques Androuet Du Cerceau (1511–*c.* 1586). This series was printed both in folio and octavo formats, identified respectively as 'Grands temples' and 'Petits temples' by Henry de Geymüller, who, critical of the technique, attributed the folios to the workshop rather than to du Cerceau himself.[47]

If this print is from Hooke's collection, it is not certain whether he may have also owned some of the other fifty plates of the series which included a plan and an elevation of

[46] Bernard Lens was a drawing master; a copy of the published mezzotint is now BM 1880,1113.1354.

[47] Of the 'Grand temples' series, Geymüller notes that "l'exécution, très négligée et avec des hachures écartées pour faire le moins de travail possible, rappelle celle des bois de l'ouvrage de Serlio (temples);" see Henry de Geymüller, *Les Du Cerceau, Leur Vie et Leur Ouvre* (Paris: Jules Rouam, 1887), p. 308. See also André Linzeler, *Inventaire du fonds français, graveurs du seizième siècle. Tome premier, Androuet du Cerceau - Leu* (Paris: Bibliothèque Nationale, 1932), p. 57.

this temple, or project 'D' (**Figures III-14. cf and III-15. cf**).[48] Art historian Myra Nan Rosenfeld, observing the similarities between the printed plan and a *c.* 1530 drawing by an unknown Italian artist of the ground plan of the *Serapaeum* of Hadrian's Villa at Tivoli, considers project 'D' to be a *Serapaeum* or at least an "example of Du Cerceau's creative interpretation of classical antiquity," where gaps in knowledge about the building's original structure and configuration are filled with contemporary elements such as a modern Italian façade inspired by Serlio, and the transformation of the half-dome into a full one.[49]

Hooke was especially interested in arches and domes; he was, after all, the first to expose the mechanical workings of the catenary arch and may have had some involvement in the design of the dome of St. Paul's Cathedral (**Figure III-165. cf**).[50] He may have taken a particular interest in this Du Cerceau print as a model or inspiration. This would fit well within the Italian tradition of the 'model book' dating as far back as the third quarter of the fifteenth century: architects would study the principles of architecture by drawing Roman buildings, and sometimes these drawings would be bound into so-called 'model books' to be consulted as inspiration for the design of modern buildings. While initially these were hand-drawn, Rosenfeld has argued that Du Cerceau's *Temples et habitations fortifiés*, along with his *Détails d'ordres d'architecture*, are examples of printed versions of such model books.[51] Having never gone on the Grand Tour or known to have taken any other foreign trips, unlike his colleague Wren, Hooke would have particularly benefited from such books and prints to learn about design and architecture.

Figure III-14. cf. Du Cerceau (workshop of), 'Plan', from Temples et habitations fortifiés (*c.* 1545-1550). Source: CCA, NA44.S485.A74 1547, fol. 83r.

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[48] The projects in the series are labeled A through R. In the 'Petit temples' series, all three drawings (plan, section, elevation) are illustrated on one sheet, with this particular project labeled as 'E'.

[49] Myra Nan Rosenfeld, 'From Drawn to Printed Model Book: Jacques Androuet Du Cerceau and the Transmission of Ideas from Designer to Patron, Master Mason and Architect in the Renaissance', *RACAR: revue d'art canadienne / Canadian Art Review* 16 (1989), pp. 131-145, 219-250, pp. 140, 231-33. *Serapaeum* is a temple dedicated to the Graeco-Egyptian god Serapis.

[50] See also the annotations for Figure III-165. cf. A crude sketch, presumably a copy of one made either by John Aubrey or by Hooke himself, that purports to be Hooke's plan for an economical way to build the dome as "a Rotundo, thus without any Pillar height 6 hundred foot" displays a faint configurational similarity to the plan of this *Serapaeum*; see Figure III-190.

[51] Rosenfeld, 'From Drawn to Printed Model Book', p. 137.

Consult the notes for Figure III-13.

Figure III-15. cf. Du Cerceau (workshop of), 'Front elevation', print from Temples et habitations fortifiés (c. 1545-1550). Source: CCA, NA44.S485.A74 1547, fol. 84r.

Consult the notes for Figure III-13.

Figure III-16. Richard Bradley, 'Partial drawing of a Roman pavement discovered in the churchyard of Woodchester in Gloucester', 1722. Source: BL, Add. MS 5238, no. 3.

As it is dated nearly two decades after Hooke's death, this drawing must have originated from one of Sloane's later acquisitions. Text in the upper part of the drawing reads: "Part of a Roman Pavement found in the Church Yard at Wood:Chester/ near Minchinghampton in GlocesterShire Delineated and/ colour'd upon the Spot by ~ R. Bradley. July 31.1722." This drawing was reproduced in Le comte de Caylus, *Recueil d'antiquités egyptiennes, etrusques, grecques et romaines* (Paris, 1756), tome second, planche CXXVI, with an explanatory note on pages 407-408. In his explanation of how the drawing reached him, de Caylus wrote that it had first been sent to M. l'Abbé Bignon, later ending up among the papers of M. de Gravelle (a counselor to the Parliament), after whose death it reached the hands of M. Mariette, through whom de Caylus obtained it. He added that it was accompanied by a note in English, which he translated into French, explaining that the pavement was unearthed at the expense of Edmond Brown Bodborough Esq. and was drawn on site by "R. Brodley." A 1756 copy by Priscilla Combe is currently at the British Library in the King George III Topographical Collection, shelfmark K.Top.13, no. 101c **(Figure III-17. cf)**.

Figure III-17. cf. Priscilla Combe, 'Part of a Roman pavement found in the church yard at Woodchester', 1756. Source: BL, King George III Topographical Collection, shelfmark K Top Vol. 13, no. 101c.

Consult the notes for Figure III-16.

Figure III-18. Hooke, 'Plan and elevation of a small unidentified building', n.d. Source: BL, Add. MS 5238, no. 4.

Drawn in ink and ink wash, this building is almost a cube in plan, spanning approximately 20' in width and length. The arrangement of the two drawings on the sheet is peculiar as they lack

any alignment. The depiction of a completely flat roof is further puzzling, as are the large windows and doors. The chimney, visible in the elevation, is not reflected in the plan, which does not feature any fireplaces. It is possible that the drawing is of a modular unit, perhaps an individual apartment in an almshouse.[52]

Figure III-19. Hooke, 'Elevation of a large urn on a base', n.d. Source: BL, Add. MS 5238, no. 5.

Presumably in Hooke's hand, and sketched in pencil, this faint drawing of an urn features different profiles on either side of its base, making likely that it is a design drawing rather than a survey of an existing one. The urn has what appears to be a valve mechanism in its centre connected to a pipe extending to the top. If not a scientific instrument—for Hooke did note on 6 November 1673 that he had shown "two Experiments of fountains" and elsewhere lectured on clepsydra—the drawing may be depicting a more ornamental type for one of the gardens he designed for several of his clients.[53] For instance, on 7 July 1672, he noted that he had finished William Turner's fountain, on 1 October 1675 that he "Drew Urne contrivd for Sir. R. Redding," for which a model may have been made ten days later, and on 15 April 1676 that he had told his client Montagu about his "contrivance for . . . fountaine with semicircular steps."[54] Given his work in mechanics and architecture, Hooke owned numerous books featuring urns and fountains, some more technical than others, by Hero of Alexandria, Isaac de Caus, John Bate, and Georg Andreas Böckler.[55] The latter's *Architectura curiosa nova* (Nuremberg, 1664), for example, included numerous illustrations of urns and fountains far more ornamental than the one depicted here.[56]

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[52] See also Chapter IV, ii. 47, on Aske's Almshouses.

[53] *Diary i*, p. 68. See also Robert Hooke, *Lampas, or, descriptions of some mechanical improvements of lamps & waterpoises together with some other physical and mechanical discoveries* (London: Printed for John Martyn . . . , 1677).

[54] *Memoranda*, p. 143; *Diary i*, pp. 68, 184, 186, 226. On Hooke's work for Turner, Redding or Reading, and Montagu, see Chapter IV, ii. 15, ii. 23, and ii. 19 respectively. It is also possible that the model of the urn was for the Monument; see Matthew Walker, 'The Limits of Collaboration: Robert Hooke, Christopher Wren and the Designing of the Monument to the Great Fire of London', *Notes and Records of the Royal Society* 65 (2011), pp. 121-143, p. 135.

[55] See *RHBdb*, auct_BH_859, auct_BH_885, auct_BH_892, auct_BH_912, auct_BH_913, auct_BH_319, auct_BH_2083, auct_BH_312, and auct_BH_320.

[56] Georg Andreas Böckler, *Architectura curiosa nova. Das ist: neue/ ergötzliche/ sinn-und kunstreiche/ auch nützliche Bau- und Wasser-Kunst* (Nuremberg: Fürst, 1664); *RHBdb*, auct_BH_312.

Figure III-20. Hooke, 'Ink wash drawing of an axe head', n.d. Source: BL, Add. MS 5238, no. 6.

On the lower right corner of this ink wash drawing of an axe head is a manuscript note in Hooke's hand: "V. C Leigh. Hist. Nat. Lan." It refers to Charles Leigh's *the Natural history of Lancashire, Cheshire, and the Peak, in Derbyshire* (Oxford, 1700), where in book I, plate 4, a top view of a similar axe head was reproduced as figure 3 (**Figure III-21. cf**). Leigh described the object as "a Copper Instrument not much unlike the Head of an Ax; the like to these Dr. Plot observed in Staffordshire, but not of so large a Size."[57] He concluded that due to its size and shape, it must have been Indian rather than Roman as Robert Plot (*bap.* 1640, *d.* 1696) had conjectured about a similar object **(Figure III-22. cf)** in his *Natural history of Stafford-shire* (Oxford, 1686).[58] It is difficult to speculate why Hooke would have produced this drawing, as it is clearly not the one reproduced in Leigh's book. One possibility is that he may have seen one himself and drawn it before spotting a similar one in Leigh's book, noting it as 'V*ide*'.

Figure III-21. cf. Charles Leigh, *The natural history of Lancashire, Cheshire, and the Peak in Derbyshire* (Oxford, 1700), detail from pl. 4, fig. 3.

Consult the notes for Figure III-20.

Figure III-22. cf. Robert Plot, *The natural history of Stafford-shire* (Oxford, 1686), detail from pl. xxxiii (facing p. 404).

Consult the notes for Figure III-20.

Figure III-23. Hooke, 'Pencil and ink drawing of a woman and child', n.d. Source: BL, Add. MS 5238, no. 7.

Most likely in Hooke's hand, this drawing appears to be a copy, perhaps of an engraving, and was probably produced as a drawing exercise. While the figural features, such as the woman and child's faces, are drawn in a more competent manner, the architectural elements on the left seem rather problematic in terms of perspective and shading.

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[57] Charles Leigh, *Natural history of Lancashire, Cheshire, and the Peak, in Derbyshire: with an account of the British, Phoenician, Armenian, Gr. and Rom. antiquities in those parts* (Oxford: Printed for the author . . . , 1700), p. 181.

[58] Ibid., pp. 181-182; Robert Plot, *The natural history of Stafford-shire* (Oxford: Printed at the theater, 1686), p. 404 and figure 6 on table 33 facing the page. A copy of Plot's book is listed in *BH*, but Leigh's is not; see *RHBdb*, auct_BH_2673.

Figure III-24. Hooke or Harry Hunt[?], 'Pencil drawing of a young woman [Grace?]', *c.* 1672-1677. Source: BL, Add. MS 5238, no. 8r.

Hooke's niece Grace had already arrived in London by the time his extant diaries begin in March 1672. Earlier in the year, Hooke's older brother John, a grocer back in the Isle of Wight, had sent his then twelve-year old daughter to live with her uncle in London. There are several references to pictures of Grace in the diaries. Indeed, the first mention of her name, on 24 March 1672, is on what has been interpreted to be a to-do list: "Gr[ace] picture." On 26 December 1674, Hooke noted in his diary that his assistant Harry Hunt (*d.* 1713) drew Grace's picture, and a few years later, on 20 May 1677, Hooke himself "Drew Grace's Picture at Harrys."[59] Whether the three drawings reproduced here are the ones mentioned in the diaries is impossible to know for certain, of course, but one clue might be Grace's necklace—on 31 August 1672, Hooke noted purchasing a "Necklace of Pargeter" for Grace.[60] If it looked like the necklace depicted in nos. 8r or 23 (**Figures III-24 and III-44**), these might indeed be her portraits.

The composition and styling of no. 9 (**Figure III-26**) bear some resemblance to the portrait of Antoni van Dyck's wife Maria Ruten, whose portrait (**Figure III-27. cf**) had been etched by William Faithorne (*c.* 1620–1691) and was reproduced in William Sanderson's instructional book on drawing and painting, *Graphice* (London, 1658), of which Hooke owned a copy at the time of his death.[61] Hooke knew Faithorne, whose shop he visited often to peruse books on art and architecture, and on 12 July 1675, he borrowed from him "a book of Limning," which was almost certainly Sanderson's book.[62]

Figure III-25. Hooke[?], 'Pencil drawing of a boy or young man', n.d. Source: BL, Add. MS 5238, no. 8v.

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[59] *Memoranda*, pp. 132, 136; *Diary i*, pp. 138, 291.

[60] *Diary i*, p. 8. There are several references to Pargeter or Pargiter in the Diary, but there is not enough information to identify him.

[61] William Sanderson, *Graphice. The use of the pen and pensil. Or, the most excellent art of painting: in two parts* (London: Printed for Robert Crofts . . . , 1658), facing p. 41, *RHBdb*, auct_BH_1889. Hooke also personally knew Faithorne.

[62] *Diary i*, pp. 165, 168, 169, 263. Faithorne had also written about drawing but it was specifically about engraving; William Faithorne, *The art of graveing and etching wherein is exprest the true way of graueing in copper. Allso The manner & method of that famous Callot & Mr. Bosse in their seuerall ways of etching* ([London]: Willm. Faithorne, 1662). This book is listed in the *c.* 1675 manuscript catalogue of Hooke's library; see Chapter II.

This figural drawing, drawn on the verso of Figure III-24, displays similar rendering techniques as the latter and was likely drawn by the same person, presumably Hooke.

Figure III-26. Hooke or Hunt[?], 'Pencil drawing of a young woman [Grace?]', *c.* 1672-1677. Source: BL, Add. MS 5238, no. 9.

Consult the notes for Figure III-24.

Figure III-27. cf. William Faithorne (etcher), 'Maria Ruten, wife of Antoni van Dyck', n.d. William Sanderson, *Graphice* (London, 1658), facing p. 41.

Consult the notes for Figure III-24.

Figure III-28. Hooke[?], 'Pencil and crayon sketch of a man [self-portrait?]', n.d. Source: BL, Add. MS 5238, no. 10.

Although the man in this portrait is much leaner, with a sharper jawline and chin, he bears some familial resemblance to the young woman depicted in nos. 8r and 9 (**Figures III-24 and III-26**). If the latter is Grace, it is possible (however remotely) that this may be a self-portrait by Hooke. The shading of the face in dark grey crayon is unusual and unique, and is perhaps meant to illustrate shadows from an artificial light source such as a candle.

Figure III-29. Hooke[?], 'Drawing of a man, possibly a Native American', n.d. Source: BL, Add. MS 5238, no. 11.

A pencil and ink drawing of a man, possibly a Native American, with his back turned and holding a shovel. Parts meant to be lighter in colour are drawn with dotted lines. Hooke's interest in travel literature makes it possible this is copied from, or was created for, a book on the Americas.

Figure III-30. Anon., 'Portrait, possibly an etching, of a woman in profile with a hand over her shoulder', n.d. Source: BL, Add. MS 5238, no. 12.

Considering the artist's high level of competence, this is probably one of the "other original drawings by several Masters" noted by Sloane.

Figures III-31 and III-32. Hooke[?], 'Portrait of a young man, in pencil and white chalk' and 'Pencil sketch of a boy', n.d. Source: BL, Add. MS 5238, nos. 13r and 13v.

These pencil drawings, possibly of the same youth at different ages, appear to be in a hand similar to that of nos. 8r, 8v, and 9 **(Figures III-24 to III-26)**. There is not enough information to identify the sitter.

Figure III-33. Hooke, 'Pencil sketches of parts of an instrument', 1676[?]. Source: BL, Add. MS 5238, no. 14.

This faint pencil sketch illustrates what may have been parts of a scientific instrument. A bell-shaped object, perhaps made of glass or metal, is hung from its rim from a wooden frame, while two fragments are quickly sketched to show different types of joints, one in metal, the other in wood. If the object was made of glass, it may have been related to the air pump Hooke was working on at the time. If made of metal, it could have been part of the 'air kettle' or digester he was designing in 1676. On 5 July, Robert Bird, the brazier, had finally brought him the finished kettle, and the next day Hooke noted "Joyner made frame for kettle."[63] Without knowing what the 'air-kettle' looked like, it is impossible to know whether this might be the frame he was referring to.

Figure III-34. Hooke, 'Fragment of an ink drawing, cut into the shape of a disk', n.d. Source: BL, Add. MS 5238, no. 15.

This round piece of paper with a hole burnt in the middle is cut out of what appears to be scrap paper featuring a sectional drawing. There are some very faint numbers, perhaps an '8' penciled on one of the curves, and a '5' in ink at the bottom right corner but there is not sufficient information to make an interpretation of the content of the drawing.

Figure III-35. Hooke[?], 'Pencil sketches of legs with some parts hatched in ink', n.d. Source: BL, Add. MS 5238, no. 16.

These and some of the following sketches appear to be exercises in drawing, specifically in shading with the type of hatch patterns used in engraving. At the time of his death, Hooke

[63] *Diary i,* p. 240. On the air kettle, see Rob Iliffe, 'Material Doubts: Hooke, Artisan Culture and the Exchange of Information in 1670s London', *British Journal for the History of Science* 28 (1995), pp. 285-318, p. 304.

owned numerous instructional books on drawing, some of which were already listed in the *c.* 1675 manuscript catalogue he made of his library.[64] In particular, the 'Book of drawings' or *Prima pars, 't eerste deel van de teeken-konst* (Amsterdam, 1611) by the Dutch artist and engraver Abraham Bloemaert (1566–1651), the compilation of engravings by the drawing master Alexander Browne (*d.* 1706), or extracts from Albrecht Dürer's work published by Thomas Jenner (*fl.* 1618–*d.* 1673) would have provided Hooke with plenty of examples to follow (e.g. **Figure III-36. cf**).[65]

Figure III-36. cf. Abraham Bloemaert, *Prima pars, 't eerste deel van de teeken-konst* (Amsterdam, 1611), no. 126.

Consult the notes for Figure III-35.

Figure III-37. Anon., 'Ink sketch of a man', n.d. Source: BL, Add. MS 5238, no. 17.

This is a highly skilled sketch, using hatch patterns and dots for shading; only the figure's face is developed with the rest of the bust drawn in outline. While Hooke was a competent artist, there is no evidence to suggest he ever achieved this level of skill in figural drawing, thus this may be yet another example of the "other original drawings by several Masters" noted by Sloane.[66] Another possibility is that given the drawing's proximity to other exercises, Hooke may have purchased this drawing as an example to follow.

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[64] See Chapter II.

[65] Abraham Bloemaert, Prima pars, 't eerste deel van de teeken-konst (Amsterdam: Joachim Ottens, 1611); Thomas Jenner, A book of dravving, limning, vvashing or colouring of maps and prints and the art of painting, with the names and mixtures of colours used by the picture-drawers. Or, the young-mans time well spent (London: Printed by M. Simmons, for Thomas Jenner . . . , 1666); Alexander Browne, Ars pictoria: or an academy treating of drawing, painting, limning, and etching. To which are added thirty copper plates expressing the choicest, nearest and most exact grounds and rules of symmetry; collected out of the most eminent Italian, German, and Netherland authors (London: Printed by J. Redmayne, for the Author . . . , 1669). Subsequent editions of Jenner's compilation were printed under the title Albert Durer Revived. Bloemart's 'Book of drawings' listed in BH has no place or date of publication indicated, so while in Figure III-37. cf an example from Bloemaert, Prima pars, 't eerste deel van de teeken-konst is given, it is unclear exactly which edition Hooke owned. It bears mentioning here that most of the books related to engraving in Hooke's library were published after Micrographia and therefore would not have been very useful in terms of providing instruction. For more, see Chapter II on Hooke's library.

[66] See the first part of this chapter on Hooke's difficulties with figural drawings.

Figure III-38. Hooke[?], 'Pencil copy of an engraving or painting', n.d. Source: BL, Add. MS 5238, no. 18.

Considering the similarities in the rendering of the hair and facial features to Figures III-23 to III-26, this drawing is probably in Hooke's hand, though from an earlier period. The costumes, especially the wide-brimmed cavalier hats, suggest it may be a copy of a French painting or drawing. Parts of it, such as the pastoral landscape, are better rendered than other details such as the figures' hands which are amateurish at best.

Figure III-39. Hooke, 'Ink and ink wash sketch of young man in profile', n.d. Source: BL, Add. MS 5238, no. 19.

This sketch of a young man in profile, drawn with lines in brown ink and washed in grey, appears to be an experiment in drawing; the face, neck and arm are shaded with hatches and dots, while the hair and clothing are detailed in wash. The combination of brown ink and grey wash has been used by Hooke in other drawings (e.g. **Figures III-80, III-119, III-134 to III-138, III-261, III-262, III-291, III-322**, etc.). It was also favoured by Faithorne, at least in some of the drawings attributed to him (e.g. **Figure III-40. cf**), from whom Hooke may have learnt the technique.

Figure III-40. cf. Faithorne (attrib.), 'Design for a book illustration', n.d., detail. Source: The Elisha Whittelsey Collection, The Metropolitan Museum of Art, 50.605.47.

Consult the notes for Figure III-39.

Figure III-41. Hooke[?], 'Ink sketch of a peacock', n.d. Source: BL, Add. MS 5238, no. 20.

This half-finished sketch of a peacock or similar bird is likely another example of Hooke's exercises in shading with lines in the style of etching; similar to nos. 16 and 19 (**Figures III-35 and III-39**).[67]

Figure III-42. Hooke or David Loggan[?], 'Ink sketch of a man', n.d. Source: BL, Add. MS 5238, no. 21.

[67] I thank Stephen Johnston for his suggestion of the bird species.

This is a very competent portrait sketched in ink, and shaded with lines and points. It is either an example of Hooke's work from a later, more mature stage, or a drawing he acquired as an example to follow. On 12 April 1676, for instance, Hooke noted that David Loggan (1634–1692) had given him a picture of Richard Allestree, though whether this was an engraving or an ink sketch is unclear. On Loggan, see also the notes for **Figure III-83**.[68]

Figure III-43. Anon., 'Pencil portrait of a man, perhaps Thomas Hearne (1678–1735)', n.d. Source: BL, Add. MS 5238, no. 22.

This pencil sketch bears the manuscript note "Q[uer]y: if Tom Hearne./ Th. M. 1831" at the bottom of the sheet. If 'Honest Tom Hearne', mentioned in the Sloane catalogue in relation to this note, is the antiquary and diarist Thomas Hearne (*bap.* 1678, *d.* 1735), his dates are quite late for this drawing to be confidently attributed to Hooke but it is not an impossibility. Some of the facial features do resemble the portrait of Hearne engraved by George Vertue in 1723 after a drawing by Peter Tillemans (cf. BM, no. 1951,1110.111), but it is difficult to be certain.

Figure III-44. Hooke or Hunt[?], 'Pencil and ink portrait of a young woman [Grace?]', *c.* 1672-1677. Source: BL, Add. MS 5238, no. 23.

Consult the notes for Figure III-24.

Figure III-45. Hooke, 'Small prints of a woodcut image of Hercules, illustrating heroic virtue', n.d. Source: BL, Add. MS 5238, nos. 24 to 28.

These five prints are likely the results of an experiment in 'counterproof' printing, when a blank sheet is pressed against a freshly-printed page to produce a copy in reverse. It is likely that no. 24, which is not reversed, was printed first, and nos. 26-28 (in red ink) were obtained by pressing blank sheets against no. 24, the print becoming lighter with each copy.[69] The woodcut is likely from or for an emblem book as it is similar to illustrations of 'heroic virtue' in such texts from this period.

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[68] *Diary i*, p. 225.

[69] Refer also to Boris Jardine's research on the use of the counterproof technique by mathematical instrument makers during the period; e.g. 'It's only a paper rule? William Oughtred, Elias Allen, and the Invention of the Slide Rule' presented at the BSHM conference in York, on 7 April 2017.

Figure III-46. Hooke, 'Ink sketch of a rolling press', 1679[?]. Source: BL, Add. MS 5238, no. 29.

The Royal Society's Baconian project of writing a 'History of Trades' had included investigations into techniques of printing.[70] A relatively new invention at the time was the rolling press, about which the French artist and printmaker Abraham Bosse had written a detailed account in his *Traicté des manieres de graver* (Paris, 1645).[71] John Evelyn was asked to make a presentation about the device, and indeed his 14 May 1662 lecture 'the Construction of t*h*e Rowling Press. & manner how to worke off *th*e Plates', a translation of Bosse's description, still survives in the Archives of the Royal Society as Cl.P./3i/2. Evelyn, in his book *Sculptura* (London, 1662), despite adding a section on another invention, namely Prince Rupert's 'new way of Engraving, or Mezzo Tinto', did not include the rolling press and explained his reason in the 'Advertisement' appended at the end:[72]

> It was my intention to have added it [i.e., the translation of Bosse's text] to this History of mine, as what would have render'd it a more accomplish'd Piece; but, understanding it to be also the design of Mr. Faithorn, who had (it seems) translated the first part of it, and is himself by Profession a Graver, and an excellent Artist; that I might neither anticipate the Worlds expectation, nor the Worksmans pains, to their prejudice, I desisted from printing my Copy, and subjoining it to this discourse.[73]

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[70] On the history of trades project, see James W. P. Campbell, 'Wren, Architectural Research and the History of Trades in the Early Royal Society', in *Architecture, Cultural History, Autobiography* (Oxford: Voltaire Foundation, University of Oxford, 2008), pp. 9-27; Kathleen H. Ochs, 'The Royal Society of London's History of Trades Programme: An Early Episode in Applied Science', *Notes and Records of the Royal Society of London* 39 (1985), pp. 129-158.

[71] Abraham Bosse, *Traicté des manieres de graver en taille dovce svr l'airain* (Paris: Ches ledit Bosse, 1645). Hooke, who owned a copy of the book (*RHBdb*, auct_BH_1434), may have purchased it on 17 May 1677 when he noted "Bosses Gravings 5s. 10d." among the books Davys had brought for him from France; *Diary i*, pp. 283, 290, 291.

[72] John Evelyn, *Sculptura, or, the history, and art of chalcography and engraving in copper with an ample enumeration of the most renowned masters and their works : to which is annexed a new manner of engraving, or mezzo tinto, communicated by His Highness Prince Rupert to the authour of this treatise* (London: Printed by J. C. for G. Beedle, and T. Collins . . . , and J. Crook, 1662); for Hooke's copy of the book, see *RHBdb,* auct_BH_2417.

[73] Ibid., [3 unnumbered pages affixed to the end of the book]. Evelyn's recipe for "Ink for the Rolling-Press" was printed later in W[illiam] Derham, ed., *Philosophical experiments and observations of the late eminent Dr.*

Indeed, Faithorne, already mentioned above, would soon publish a translation of Bosse's work as *Art of graveing and etching* ([London], 1662) albeit once again without the section on the rolling press.[74]

Among the other Royal Society fellows interested in printing techniques was Christopher Wren who invented his own version of this type of press, which Oldenburg described in his commonplace book:

> Ch. Wrens way of printing.
>
> Take a thin bras-plate as thin as paper, cover it with etching varnish, let it be etchd upon with a hand carefull not to close any letter : the aqua fortis must be so strong as to corrode ye plate quite through : then turne the plate and lay it upon another thick plate cover'd all over with printers ink, and so after ye usual manner passe it through ye roling presse.[75]

On 2 December 1669, Hooke would present a picture he had produced "after the expeditious manner of Dr. Wren."[76]

Hooke, too, was interested in new printing techniques, inventing a few of his own. On 26 August 1673, he told one of King's men of his "new way of making batts[?] to print with the Rowl presse."[77] On 29 June 1674, he noted that he had "Invented the way of printing with the common press pictures made with Pinns."[78] A few years later, he would sketch one of his inventions on a blank sheet bound into his copy of Pietro Accolti's *Lo inganno de gl' occhi, prospettiva pratica*. This "way to print one-single coppy as fast as write it to send &c." **(Figure III-9)** was a small rotary press similar to Thomas Jefferson's cipher cylinder that would not

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Robert Hooke . . . and other eminent virtuoso's in his time (London: Printed by W. and J. Innys . . . , 1726), pp. 188-190.

[74] Faithorne, *The art of graveing and etching wherein is exprest the true way of graueing in copper. Allso The manner & method of that famous Callot & Mr. Bosse in their seuerall ways of etching*. Hooke knew Faithorne, who had engraved a plate for him in 1674, and owned a copy of his book on engraving; *RHBdb*, auct_BH_2418.

[75] RS, MS 1, fol. 173v. See also Adrian Johns, *The Nature of the Book: Print and Knowledge in the Making* (Chicago: The University of Chicago Press, 1998), p. 463, esp. n34.

[76] Birch, vol. 2, p. 409.

[77] *Diary i*, p. 57.

[78] Ibid., pp. 109-110. A few weeks later, he would tell Hoskins of his "way of Pictures by pin wire;" Ibid., p. 112.

be invented for at least another hundred years, and may well have been the "Contrivance for tinplates for Rolling presse" Hooke would speak to Hoskins and Wren about in March 1679.[79] The particular sketch (Figure III-45) that has survived among Hooke's papers may be related to any one of these inventions or contrivances.

Figure III-47. Hooke[?], 'Small elevation sketch of an unidentified building', n.d. Source: BL, Add. MS 5238, no. 30.

While it has not been possible to identify the building or project depicted in Figure III-47, it does bear some resemblance to Hawksmoor's drawing for a *c.* 1695 design for Whitehall Palace (**Figure III-48. cf (b)**). It is highly doubtful Hooke had anything to do with the latter project; yet considering the similarity of the windows to Wren's design for Trinity College library at Cambridge (**Figure III-48. cf (a)**), it is possible that the sketch is instead connected to Wren.

Figure III-48. cf. (a) Wren, 'Elevation of Trinity College Library', *c.* 1675, detail. **(b)** Hawksmoor, 'West elevation of an alternative design for Whitehall Palace', *c.* 1695, detail. Source: ASC, AS I.46 and AS V.8, reproduced in Geraghty, *Architectural Drawings*, pp. 35, 184.

Consult the notes for Figure III-47.

Figure III-49. Anon., 'Manuscript map of the southern tip of South America', 1678. Source: BL, Add. MS 5238, no. 31.

A manuscript map of the southern tip of South America, showing 'Magellanica', 'Patago', etc., with a vignette at the bottom. Probably copied from an original or a book, it bears the date 1678, the name 'John Buckler', and random scribblings.

Figure III-50. Hooke[?], 'Pencil drawing of a woman next to an architectural profile', after 1675[?]. Source: BL, Add. MS 5238, no. 32.

This pencil drawing of a woman with geometricized features—posed with one arm on her side with an open palm and the other arm behind her back—is clearly inspired by Albrecht Dürer's

[79] Ibid., p. 403.

studies of the proportions of the human body **(Figure III-51. cf)**, of which Hooke purchased a copy in 1675.[80]

Barely visible in the reproduction, the female figure is shown, with horizontal lines, correlating to faintly-drawn architectural profiles. The anthropomorphic connection between the body and architecture could be a reference to Vitruvius or perhaps to the first English treatise on architecture, John Shute's *The first and chief grounds of architecture* (London, 1563), where the orders were associated with various human figures. It should be noted, however, that the architectural profiles in this drawing do not appear to be referring to the classical orders, and Hooke did not own a copy of Shute's book.[81] Whether Hooke may have had access to other illustrations or texts on anthropomorphic correlations in architecture, such as Francesco di Giorgio Martini's *Trattato di architettura*, which was only available in manuscript, or Gabriel Krammer's *Architectvra* (Prague, 1600) (**Figure III-52. cf**), is open to speculation or further research, but the peculiar association between the Ionic volutes and female breasts may be original to Hooke.[82]

Figure III-51. cf. Albrecht Dürer, *Vier bücher von menschlicher proportion* ([Nuremberg], 1528), sig. R[i]v.

Consult the notes for Figure III-50.

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[80] While inspired by Dürer, the drawing does not appear to be an exact copy of any of his originals, in print or in manuscript, although I have only been able to compare it to the manuscripts at the British Museum and the British Library. See, for example, BM 1846,0613.7 and 1846,0613.8. On 23 July 1675, Hooke recorded purchasing "Alb. Durers works for 4sh" from a bookseller in Duck Lane; see *Diary i*, p. 170. It is listed in the *c.* 1675 manuscript catalogue Hooke prepared of his library.

Another book Hooke owned, Lautensack, *Des circkels unnd richtscheyts, auch der perspectiva, und proportion der menschen und rosse, kurtze, doch gründtliche underweisung, deß rechten gebrauchs . . .* (*RHBdb*, extra_BH_16), a manual on practical geometry and perspective listed on fol. 3v in Sloane MS 949, included Dürer's work on the proportions of the human body. However, Hooke's imperfect copy, which has survived, is missing these latter parts, i.e. 'Der dritte Theil von der Proportionen der Menschen' and 'Anfang der Proportz dess Rossz oder Pferdts' (fols. 33-54). See Chapter II on Hooke's library.

[81] John Shute, *The first and chief groundes of architecture vsed in all the auncient and famous monymentes with a farther & more ample defense vppon the same, than hitherto hath been set out by any other* (London: Published by Iohn Shute, paynter and archytecte; [printed] by Thomas Marshe, 1563).

[82] Gabriel Krammer, *Architectvra von den fvnf sevlen sambt iren ornamenten vnd zierden, als nemlich Tuscana. Dorica. Ionica. Corintia. Composita* (Prague: n.p., 1600). Although it is unlikely Hooke would have been aware of Francesco di Giorgio Martini's work, which was circulated in manuscript, it cannot be completely ruled out since he later had access to the Arundel library a great portion of which had been collected in Italy; see Chapter II on Hooke's access to books.

Figure III-52. cf. Gabriel Krammer, 'Thuscana II', *Architectvra* (Prague, 1600), pl. 3, detail.

Consult the notes for Figure III-50.

Figure III-53. Hooke, 'Survey of an unidentified lot', after 1666. Source: BL, Add. MS 5238, no. 33.

There are no identifying marks in this survey drawing to help determine the location it is referring to. It is drawn in ink with some lines and numbers in pencil; dimensions delineate an area of 63'-6" (or 66'-6" on the right side) by 76'-6". It is most likely produced during Hooke's City Surveyorship, thus after 1666.

Figure III-54. Hooke, 'Preparatory drawing for *An attempt to prove the motion of the earth*', *c.* 1674. Source: BL, Add. MS 5238, no. 34.

This is a preparatory drawing for an unnumbered plate in Hooke's *Attempt to prove the motion of the earth* (London, 1674).[83] The final engraving (**Figure III-55. cf**) is a composite of eight figures, and besides parallax diagrams and illustrations of micrometers, it shows the large zenith telescope Hooke built in his quarters at Gresham College. This drawing, which contains six figures, is less detailed than the final version. For instance, the section showing the zenith telescope is but a faint outline. It also has different figure numbers, which must have changed with the addition of the two figures. But since the arrangement of the figures on the page is identical, though of course reversed, it must have provided the basis for the final version.

Figure III-55. cf. The engraved plate as printed in Hooke, *An attempt to prove the motion of the earth* (London, 1674).

Consult the notes for Figure III-54.

Figure III-56. Hooke, 'Sketch of a barrel', n.d. Source: BL, Add. MS 5238, no. 35.

This perspectival sketch, in ink, of what appears to be a barrel placed on a table is particularly interesting because of the clumsiness of the technique: none of the elements in the drawing, be it the floor grid, the table, or the barrel, seem to share the same vanishing point.[84] There

[83] [Tabula II] in Robert Hooke, *An attempt to prove the motion of the earth from observations made by Robert Hooke Fellow of the Royal Society* (London: Printed by T.R. for John Martyn Printer to the Royal Society . . . , 1674).

[84] See section i in this chapter on Hooke's difficulties with perspectival drawings.

appears to be a pen and ink pot on the table, and a knife-shaped object floating on the upper right-hand side. It might be connected to one of Hooke's lectures on the history of trades.

Figure III-57. Hooke, 'Drawing of a triangle', n.d. Source: BL, Add. MS 5238, no. 36.

There is not enough information in this drawing of a right-angle triangle to be sure of its use. It may have been a reference tool for perspectival drawing, or for finding proportions. It is lightly scored to divide the shorter vertical line equally into 4 but the subdivisions in the longer line seem uneven.

Figure III-58. Hooke, 'Geometric sketches and calculations', n.d. Source: BL, Add. MS 5238, no. 37r-v.

These geometric sketches and proportional calculations are possibly notes on a mathematical book as they resemble similar sketches among Hooke's notes on Guillaume de l'Hôpital's *L'Analyse des infiniment petits, pour l'intelligence des lignes courbes* (Paris, 1696), now Royal Society, Cl.P./20/87 (**Figure III-290**). They are also comparable to the manuscript folios of sketches and calculations in Hooke's hand, inserted into his copy of Pierre de Fermat's *Varia opera mathematica* (Toulouse, 1679), now Whipple Library, University of Cambridge, classmark STORE 57:20 (**Figures III-182 and III-183**).[85]

Figure III-59. Hooke, 'Drawing of a triangle divided into squares', n.d. Source: BL, Add. MS 5238, no. 38.

This simple right-angle triangle divided into squares is likely an aid for perspectival drawing, or base work for a floor pattern.

Figure III-60. Anon., 'Partial drawing of a young man's face', n.d. Source: BL, Add. MS 5238, no. 39.

This portrait, in pencil and flesh coloured chalk, shows similarities to no. 22 (**Figure III-43**) both in terms of composition and technique. The two drawings are likely from the same hand, albeit probably not Hooke's. The use of colour in **Figure III-60** is reminiscent of some of

[85] See the illustrations in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

Harry Hunt's natural philosophical illustrations (e.g. **Figure III-140. cf**) but there is no external proof to make this anything more than speculation.

Figure III-61. Hooke[?], 'Ink drawing of a group of four people', n.d. Source: BL, Add. MS 5238, no. 40.

Based on the slightly flattened facial details, observable in other drawings that can be confidently attributed to Hooke (e.g. **Figure III-291**), there is a strong likelihood it is in hand.

Figure III-62. Anon., 'Ink drawing of an old man and saintly figure', n.d. Source: BL, Add. MS 5238, no. 41.

This drawing is likely a copy of an engraving or painting. The same shading techniques were used by Hooke in other sketches, but this drawing stands out as more sophisticated than any of the other figural drawings that can be confidently attributed to him.

Figure III-63. Hooke[?], 'Pencil sketch of a bucolic setting', n.d. Source: BL, Add. MS 5238, no. 42.

This pencil sketch of a bucolic setting featuring Pan and Daphnis, with nymphs and an architectural ruin in the background, is probably a copy of a painting or engraving. The rendering of the facial features is reminiscent of other drawings in Hooke's hand, and if it can indeed be attributed to him, it shows marked improvement in perspectival drawing.

Figure III-64. Anon., 'Ink drawing of a woman', n.d. Source: BL, Add. MS 5238, no. 43.

Bearing some similarities to **Figure III-61**, this drawing is likely a sophisticated copy of an engraving, if not an original 'master's drawing.

Figure III-65. Oliviero Gatti (engraver) after Guercino (artist), 'The bust of an old man, a boy, and a young woman', published in Guercino's book of drawings (Bologna, 1619). Source: BL, Add. MS 5238, no. 44.

This print can be confidently identified as an engraving by Oliviero Gatti who published a book of Guercino's drawings in Bologna in 1619. The profiles of two of the figures, the old man and boy, were copied and slightly altered to generate **Figure III-333**; if the latter is in

Hooke's hand, it is likely that he had acquired this drawing himself rather than it being added to his papers later on by Sloane.

Figure III-66. Anon., 'Ink wash drawing of a geometric object', n.d. Source: BL, Add. MS 5238, no. 45.

This ink wash drawing is of a geometric object, perhaps a toy, vase, or other decorative item, with tulip motifs reminiscent of Ottoman Iznik patterns. The base is octagonal and at the top is a truncated cone.

Figure III-67. Anon., 'Copy of a French print or painting', n.d. Source: BL, Add. MS 5238, no. 46.

This is likely another copy of a print or painting. It features two groups of figures in the foreground, including a crowned female kneeling and a castle in the background. The figures are clothed in styles suggestive of a setting in France, except for the left-most one oddly missing his trousers.

Figure III-68. Hooke (attrib.), 'Elevation of Peter Noorwits's New Church in The Hague', n.d. Source: BL, Add. MS 5238, no. 47.

This colour ink-wash drawing of a church elevation is identified, underneath the folio, as "New Church, The Hague, 1649-1656 by Peter Noorwits; elevation N. side, copy." Indeed, it appears to be the north elevation of Nieuwe Kerk, a Protestant church built on an octagonal plan by Pieter Noorwits in the 1650s.[86] The drawing has been attributed to Hooke who may have copied it as a drawing exercise or to keep it as a model for his own designs.[87] However, he may have also purchased or otherwise acquired it; for instance, on 5 March 1672, he noted in his diary "Popes. Dutch Ch[urch]."[88] As is typical with Hooke, he did not elaborate any further than that, so while it is possible to interpret the entry as Walter Pope (*bap.* 1628, *d.* 1714), the

[86] Philosopher Baruch Spinoza (1632-1677) was buried in its churchyard.

[87] Kerry Downes, *Christopher Wren* (London: Allen Lane The Penguin Press, 1971), p. 150; Matthew Walker, 'Architectus Ingenio: Robert Hooke, the Early Royal Society, and the Practices of Architecture' (unpub. diss., University of York, 2009), p. 87.

[88] *Memoranda*, p. 139.

Gresham professor of astronomy, giving him this drawing, it can equally mean that he lent it to Hooke, or that they discussed an entirely different Dutch church.[89]

This drawing has been erroneously reproduced as "A design of a church by Hooke" in reference to his 30 January 1679 entry recording that he "gave Sir J. Louther a Designe of church . . . and estimate."[90]

Figure III-69. Anon., 'Ink sketch of a town, possibly in northern Italy', n.d. Source: BL, Add. MS 5238, no. 48.[91]

This faint ink sketch of a town with a castle on the hill, possibly in northern Italy or western Balkans, bears some resemblance to *c.* 1643–1644 travel sketches by Wenceslaus Hollar (1607–1677). A scrapbook of his drawings of various places in Europe, now University of Manchester Library, Rylands Collection, English MS 883, contains similar sketches, some more, others less developed than this one; e.g. https://goo.gl/PkERcm.

Figure III-70. Hooke[?], 'Artist monograms with dates', n.d. Source: BL, Add. MS 5238, no. 49.

Possibly created as an aide for collecting prints, this folio lists thirty-seven artists' monograms, most of them noted with dates ranging between 1501 and 1592. The first one can be quickly recognised as Albrecht Dürer's, and though none of the artists are identified, some of the other monograms may be attributed to Henri Aldegrever (*c.* 1502–1555/1561), Albrecht Altdorfer (*c.* 1480–1538), Hans Sebald Beham (1500–1550), and Lucas Cranach, the Elder (1472–1553).[92] There is not enough of a sample to be able to identify the handwriting but there is no compelling reason not to attribute this to Hooke who was an avid collector of prints.

Figures III-71 and III-72. Hooke, 'Plan and elevation of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. Source: BL, Add. MS 5238, nos. 50 and 51.

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89 For biographical details, see 'Pope, Walter (bap. 1628, d. 1714)', *ODNB*.

90 *Diary i*, pp. 395, 397.

91 I am indebted to Bronwen Wilson for her help in identifying the geographical region in this drawing.

92 François Brulliot, *Dictionnaire des Monogrammes, Marques Figurées, Lettres Initiales, Noms Ambrégés etc.*, 3 vols. (Munich: L'institut literaire artistique de la librairie de J. G. Cotta, 1832–1834), pp. 2, 53, 92, 433. Artist dates are from collections database of The Metropolitan Museum of Art, New York; https://goo.gl/pMhVuB.

These drawings depict Hooke's unrealised design for Christ's Hospital Writing School. They are discussed under 'Christ's Hospital' in Chapter IV.

Figure III-73. Hooke, 'Three exercises in one-point perspective drawing', n.d. Source: BL, Add. MS 5238, nos. 52, 53r, and 53v.

Perhaps self-conscious about his difficulties with sketching in perspective (e.g. **Figures III-56, III-281, and III-291**), Hooke may have tried to hone his skills with these exercises.[93]

Figure III-74. Hooke, 'Elevation of a row of buildings, with alternative designs', *c.* 1677. Source: BL, Add. MS 5238, no. 54.

This unusual elevation of a five-storey building (including the cellar and the roof), with six alternative bays of three windows each; includes five options for wrought iron balustrades, two different cornice designs, and two types of roofs with three different window designs. It may have been one of the presentation drawings of the London houses Hooke built for John Hervey (1616–1680) for whom he noted preparing a "draught of 7 houses" on 18 September 1677. It may also be related to nos. 6 and 7, St. James Square, he helped finish for Hervey and Richard Jones (1641–1712). On these projects, see Chapter IV, ii. 28.

Figure III-75. Hooke, 'Presentation drawing for the Bethlem Hospital', *c.* 1674. Source: BL, Add. MS 5238, no. 55.

Hooke was working on his preliminary design for Bethlem Hospital in the summer of 1674, and at the 3 July meeting of the Court of Governors, presented "Twoe Plottes concerning of the New House for Lunatikes."[94] Two extant presentation drawings, in ink and colour wash, of the central and end pavilions are either the very drawings mentioned at the meeting or date from the same period. This particular elevation of the end pavilion (**Figure III-75**) is marked 'Bedlam' at the bottom left corner. The drawing of the central pavilion, which was somehow separated from this bundle, is now Bodl., Gough Maps 44, no. 119 (**Figure III-225**).

[93] Hooke's difficulties with drawing in perspective is discussed in the first part of this chapter.

[94] Minutes of the Court of Governors of Bridewell and Bethlem Hospitals for 3 July 1674; Bethlem Museum of the Mind, Bcb-13, p. 9; https://goo.gl/4gKjzx. See Chapter IV, ii. 16, on Bethlem Hospital.

Figure III-76. Hooke, 'Presentation drawing of an unidentified building, possibly Montagu House', 1686[?]. Source: BL, Add. MS 5238, no. 56.

> Presentation drawing of an elevation, in ink and colour wash. It is unidentified but is widely assumed to be an alternative design for Montagu House in Bloomsbury, with a triangular pediment supported by Corinthian columns on the third floor. *See ii. 19 in Chapter IV on Montagu House.*

Figure III-77. Hooke, 'Preliminary design for the Royal College of Physicians', *c.* 1671. Source: BL, Add. MS 5238, no. 57.

> This undated partial elevation, in ink, of a 70' wide building, is most likely a preliminary design from *c.* 1671 for the main building of the Royal College of Physicians.[95] The elevation features ionic columns on the ground floor, a stone balustrade, urns, and two figural sculptures on the upper floor, the central part of which is topped with a segmental pediment with figures on either side. The windows are ink-washed. Though difficult to see, pencil sketches on the elevation illustrate changes that were later adopted in the final design, such as columns and swags on the upper floor and a pointed pediment replacing the segmental one with the reclining figures on either side. A note underneath the scale on the left corner reads "Six in one Inch[?]." The drawing correlates to the elevation/section of the same design, now Warwickshire C.R.O., CR2017/B1/4 (**Figure III-337**).

Figure III-78. Hooke, 'Partial plan of St. Mary-le-Bow church', *c.* 1670. Source: BL, Add. MS 5238, no. 58.

> This is a partial plan, in pencil, of St. Mary-le-Bow church, with areas marked 'Bow Church', 'Court of Arches', '*Th*e Minister's house', and 'Bow Steple', with unmarked quarters facing Cheapside at the bottom and Bow Lane on the left. The configuration of the current St. Mary-le-Bow church is different, so this plan was not adopted for its rebuilding. If it "represents

[95] Colvin, *BDBA* (2008), p. 535. See Chapter IV, ii. 10, on the Royal College of Physicians.

what may have been the first thoughts for using this area" as Paul Jeffery has interpreted it, it can be dated to *c.* 1670.[96]

Figure III-79. Hooke, 'Elevation and plan of an alternative design for St. Mary Magdalene church in Willen', *c.* 1678. Source: BL, Add. MS 5238, no. 59.

This presentation drawing featuring an elevation and plan, and marked 'Dr Busbeys church' in the lower right-hand corner in an unknown hand, can be confidently identified as an alternative design for the St. Mary Magdalene church Hooke built in Willen for Dr. Richard Busby, his former headmaster at Westminster School.[97] According to his diaries, Hooke created at least three different designs: on 22 November 1678 he recorded working "all day about Dr. Busby's module of a church," which he showed to Busby the next day; on 28 March 1679 he made a 'draught'; and on 21 April 1679 he recorded "Drew designe for Dr Busbys church."[98] This particular design with the Greek cross configuration, was ultimately not adopted, nor was the other extant elevation, now Warwickshire C.R.O., CR2017/B1/3 (Figure III-340). See Chapter IV, ii. 35, for Hooke's work on the Church of St. Mary Magdalene in Willen.

Figure III-80. Hooke, 'An early design for Ragley Hall', *c.* 1679; detail. Source: BL, Add. MS 5238, no. 60.

This elevation, in ink and ink wash, of a stately mansion or institutional building is thought to be one of Hooke's early designs for Ragley Hall for Edward Conway.[99] Diary entries and extant letters show that Hooke produced several schemes; this drawing may have survived because it was not adopted. See Chapter IV, ii. 36, for Hooke's work on Ragley Hall.

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[96] Paul Jeffery, *The City Churches of Sir Christopher Wren* (London: Continuum International Publishing Group, 1996), p. 93, regarding the final design, see pp. 278-84. See Chapter IV, ii. 5, for Hooke's work on the City Churches.

[97] See Chapter IV, ii. 24, for Hooke's work at Westminster Abbey and School.

[98] *Diary i*, pp. 385, 405, 407.

[99] This drawing has been suggested as an unrealised design for Ragley Hall by Arthur Oswald, 'Ragley Hall, Warwickshire -- I & II', *Country Life* (1958), pp. 938-941, 1006-1009, at p. 941; Peter Leach, 'Ragley Hall Reconsidered', *The Archaeological Journal* 136 (1979), pp. 265-268, pl. LXVIII.A; Mark Girouard, 'The Formal House: 1630–1720', in *Life in the English Country House: A Social and Architectural History* (New York: Penguin Books, 1980), pp. 119-162, at p. 130.

Figure III-81. Nicolaas Hogenberg (etcher), 'Entry of Pope Clement VII and Emperor Charles V into Bologna', *c.* 1530. Previously BL, Add. MS 5238, no. 61; now BM, SL,5238.61.

> This etching was separated from Add. MS 5238 when some of the collections of the British Museum were transferred to the British Library; and thus it is currently BM, SL,5238.61 [i.e. Sloane MS 5238, no. 61]. A note fixed in its place reads "The sheet of the Procession of the Coronation of the Emperor Charles the V bearing the signature EE on which is depicted the Emperor & Pope Clement VII under a canopy of State was transferred to the Print Department January 28. 1847 [2 signatures]." It is a *c.* 1530 etching by Nicolaas Hogenberg (active *c.* 1500–1539) and is described in the British Museum catalogue as "Plate 27 of the Entry of Pope Clement VII and Emperor Charles V into Bologna on 24 February 1530; both on horseback, the pope left, the emperor right, underneath a baldachin, surrounded by footsoldiers."[100] The lettering at the bottom reads 'CLEMENS VII PONT MAX IMP CAES CAROLUS VPF AUG/ NICOLAUS HOGENBERGUS MONACHENSIS F/ EE'.

Figure III-82. Agostino Veneziano (engraver), 'The arch of Constantine in Rome', 1515-1550. Previously BL, Add. MS 5238, no. 62; now BM, SL,5238.62.

> This is another folio that was removed from Add. MS 5238 when some of the collections of the British Museum were transferred to the British Library; it is currently BM, SL,5238.62 (i.e. Sloane MS 5238, no. 62). A note fixed in its place reads "No. 62 The Arch of Constantine Attributed to Agostina Veneziano. See Bartsch Vol XIV p 385.537. Transferred to the Print Room January 28th 1847 [2 signatures]." This print, attributed to the Italian engraver Agostino Veneziano (active *c.* 1509–1536) was published by Antonio Salamanca in 1515-1550.[101] The British Museum description reads, "The arch of Constantine in Rome, surmounted by a putto with a scroll" on which is lettered "Arco de Constantino in Roma. Ant Salamanca excudebat."

Figure III-83. Loggan[?], 'Partial portrait of Michiel Adriaenszoon de Ruyter', n.d. Source: BL, Add. MS 5238, no. 63.

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[100] On Hogenberg, see 'Nicolaas Hogenberg (Biographical details)' in *British Museum Collection Online*, https://goo.gl/TX5tZQ.

[101] See 'Agostino Veneziano (Biographical details)' in ibid.

This is a pencil and ink wash portrait of the Dutch admiral Michiel Adriaenszoon de Ruyter (1607–1676) who had fought in the Anglo-Dutch wars; he was particularly renowned for his surprise attack on Chatham Harbour in 1667. The drawing is either one of the original preparatory sketches later engraved by Abraham Blooteling (1640–1690) (**Figure III-84. cf**), or is a copy of the engraving. There is no corroborating evidence for this but it is possible that the sketch is by David Loggan (1634–1692), whose portrait of Thomas Barlow (**Figure III-85. cf**) bears stylistic resemblances to this drawing. The engraving, and consequently this drawing, are thought to be based on a painting or drawing by the Dutch artist Jan Andries Lievens (1644–1680). Indeed, an almost identical engraving (BM, 1908,1203.23) indicates that it was "J.Lievensz Pinxit./ A.Blotelingh fecit." Blooteling had likely apprenticed with Cornelis van Dalen, the younger (see **Figure III-87. cf**); he was brought to England by Prince Rupert in 1673 and knew Loggan (1634–1692)."[102]

Figure III-84. cf. Abraham Blooteling (engraver), 'Portrait of de Ruyter', c. 1655-1690. Source: BM, 1869,0710.2.

Consult the notes for Figure III-83.

Figure III-85. cf. Loggan, 'Portrait of Thomas Barlow, Bishop of Lincoln', c. 1672. Source: BM, Gg,1.477.

Consult the notes for Figure III-83.

Figure III-86. Anon., 'Charcoal and crayon copy of a portrait of Franciscus Sylvius (Franz de la Boë) (1614–1672)', n.d. Source: BL, Add. MS 5238, no. 64.

This is an undated copy of a portrait of the Dutch physician Franz de le Boë (1614–1672), also known by his Latinised name Franciscus Sylvius.[103] It was most likely drawn from the

[102] See 'Abraham Blooteling (Biographical details)' and 'David Loggan (Biographical details)' in ibid. On Blooteling, see also Mary Bryan H. Curd, 'Making a Fine Impression: Abraham Blooteling and his Fellow Engravers, 1673–1684', in *Flemish and Dutch Artists in Early Modern England: Collaboration and Competition, 1460-1680* (Ashgate, 2010); some of his works are reproduced in Antony Griffiths and Robert A. Gerard, *The Print in Stuart Britain, 1603-1689* (London: British Museum Press, 1998), pp. 224-228. *Diary i*, p. 225.

[103] On de le Boë, see 'Sylvius, Franciscus Dele Boë', in *Complete Dictionary of Scientific Biography, vol. 13* (Charles Scribner's Sons, 2008), pp. 222-223.

1659 engraving by Cornelis van Dalen, the younger **(Figure III-87. cf)**; indeed, a note below this folio reads "From Deleboe Sylvius for or from engr. by Cornelis von Dalem."

Sylvius, a professor of medicine at Leiden in 1658, was an accomplished anatomist, especially of the brain, and a representative of the 'iatrochemical school' of Paracelsus and J. B. van Helmont. He was also a correspondent of the Royal Society, exchanging several letters with Oldenburg in 1667, 1668, and 1671. Indeed, this is presumably one of the copies of the portrait he enclosed with his 23 May 1671 letter to Oldenburg, writing:

> And since some Englishmen returning home at the same time have asked for my engraved portrait I judged it would not be unwelcome to you if I send you a couple of copies of the same thing, in case it should reach you quicker by some other means, than straight from myself, at the same time begging you for a copy of yours, should it have been done.[104]

Figure III-87. cf. Cornelis van Dalen, the younger (engraver), 'Portrait of Franciscus Sylvius', 1659. Source: BM, 1864,0714.17.

Consult the notes for Figure III-86.

Figure III-88. Jean Marot (engraver) and Pierre Mariette, the younger (printer), 'Elevation / section of Château of Coulommiers-en-Brie by Salomon de Brosse', 1677. Source: BL, Add. MS 5238, no. 65.

This engraving can be identified as an elevation/section of the Château of Coulommiers-en-Brie (or Colombières en Brie) built by the architect Salomon de Brosse (1571–1626) for Catherine de Gonzague, Duchess of Longueville. It must have been based on de Brosse's original drawing as some of its features differ from the building that was eventually constructed.[105]

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[104] *Oldenburg Correspondence*, vol. 8, p. 49 (letter no. 1698); the drawing is reproduced as pl. 1.

[105] On de Brosse, see Rosalys Coope, *Salomon de Brosse and the Development of the Classical Style in French Architecture from 1565 to 1630* (University Park, PA: The Pennsylvania State University Press, 1972). On this building, see ibid., pp. 93-109, and on Marot's engravings, pp. 96-97. A description of the Château is also given in Jacques Pannier, *Un Architecte Français au Commencement du XVIIe Siècle: Salomon de Brosse* (Paris: Librairie Centrale d'Art et d'Architecture, 1911), pp. 162-165. The building was demolished in 1738, though some fragments of it are still extant.

The inscriptions in the lower left corner, 'Iean Marot fecit' in print and 'P. Mariette 1677' in manuscript in Hooke's hand, identify the artist as the Parisian engraver and architect Jean Marot (1619-1679), and the printer as Pierre Mariette, the younger (1634–1716). Marot, whose engravings of both his own works and those of others were highly popular during his own time, published numerous works, one of which was *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot*, printed in two sizes and dubbed 'Grand Marot' and 'Petit Marot' by scholars.[106] The first edition of the folio-sized 'Grand Marot', printed without a date, or author or publisher names, included 164 plates. The large size of the engraving in question would have made it more appropriate to be printed in this edition, however of this building only a 'Plan du chasteau de Coulommiers en Brie, bati par le Sr de Brosses' was included.[107] On the other hand, the quarto-sized 'Petit Marot', of which Hooke owned a copy, contained four drawings of the Château (**Figures III-89. cf. a-d**). One of these, titled 'Profil du dedans de la cour du Chasteau de Colombieres en Brie' (**Figure III-89. cf. c**), appears to be an elevation/section of the same courtyard looking in the other direction.[108] The folio drawing in Hooke's collection (**Figure III-88**) displays the mansard-style roof of the wing, a quadrilateral dome for the corps-de-logis, and the dome and lantern of the Capuchin church. The arched pediments and an entrance flanked by two niches appear to have provided some inspiration for the following drawing of an unidentified building (**Figure III-90**). Two reclining figures on a pediment was a feature used by Hooke at Bethlem

[106] On Marot, see A. Mauban, *Jean Marot: Architecte et Graveur Parisien* (Paris: Les Editions d'Art et d'Histoire, 1944); for a bibliography of his prints, see M. H. Destailleur, *Recueil d'estampes relatives a l'ornamentation des appartements aux XVI, XVII et XVIII siecles* (Paris: Rapilly, Libraire et Marchand D'Estampes, 1863), vol. 1, pp. 40-42. Copies of 'Grand Marot' and 'Petit Marot' are available online via Gallica at https://goo.gl/xTgWCB and https://goo.gl/Bn7QkU respectively.

[107] On the 'Grand Marot' and 'Petit Marot', including lists of their contents, see Mauban, *Jean Marot*, pp. 76-115. The second edition of 'Grand Marot', comprised of 227 plates, was published by Jean Mariette (1660-1742) in 1727, thus long after Hooke's death.

[108] In March 1675, Hooke noted taking "Vitruvius and Marots subscriptions from Oldenburg" and two days later paying him 17s for "Marot's book," but he may have been referring to the 'Petit Marot' in his collection; see *Diary i*, p. 154. Six years later, writing to his friend Edmond Halley (1656–1742) then travelling in France, Hooke requested "the 4 last tracts of Monr Marrot" but he may have been referring to another author; see the editors' notes for *RHBdb*, auct_BH_469.

Hospital and the preliminary design of the Royal College of Physicians (**Figure III-77**) but they predate this drawing.

Interestingly, this print is not listed in the secondary scholarship on Marot's works nor among the extant documents and prints related to the building, although de Brosse scholar Coope did take note of an extremely rare untitled engraving of the building with the inscription 'J. Marot fecit'.[109] Early Modern engravings and prints are difficult to track down, as they were often issued without a title page or simply included the author's name and address; the prints were often kept unbound, with individual folios ending up on the market. Marot also customised sets according to the purchaser's tastes, making it difficult to refer to a proper 'edition'.

The survival of this rare engraving among Hooke's papers, along with his note that it was published by Mariette in 1677, may prove to be helpful for scholarship on Marot, de Brosse, and the circulation of architectural prints.

Figure III-89. cf. a-d. Jean Marot, 'Château de Colombières en Brie', n.d. Printed in *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot* ([n.p.], [n.d.]), fols. 20, 21, 22, and 22 [last folio number is repeated]. Source: Bibliothèque nationale de France, département Estampes et photographie, 4-HA-7 (A).

Consult the notes for Figure III-88.

Figure III-90. Hooke[?], 'Presentation drawing with an elevation and partial plan of an unidentified building', after 1677[?]. Source: BL, Add. MS 5238, no. 66.

When this unsigned and undated drawing was published by the Wren Society, it was unsurprisingly attributed to Wren, and on account of the use of mullioned windows, dated to before 1688 when he reportedly switched to sash windows. It was simply described as a 'facade of a house' with 90 feet frontage.[110]

[109] Coope, *Salomon de Brosse and the Development of the Classical Style in French Architecture from 1565 to 1630*, p. 221.

[110] Wren Society, vol. 4, p. 9; vol. 5, p. 11 and pl. 27.

It was subsequently published in the Oldenburg correspondence as "Wren's presumed sketch for the Royal Society's building in the Strand." The editors were referring to the 1667-1668 plans to construct a dedicated building for the Society, which, after the Great Fire, had been forced to move from Gresham College to Arundel House.[111] Henry Howard (1628–1684), who would later bequeath his library to the Society, had promised them a 100' by 40' lot next to Arundel House, facing the Strand.[112] Wren was asked to produce a design. The drawing is lost but his description of the building survives in his 7 June 1668 letter, and in contrast to this drawing, it was described as taking up the whole 100' width of the lot and had a cupola.[113]

The drawing style is sophisticated and the design borrows several features from Château of Coulommiers-en-Brie depicted in the Marot print (**Figure III-88**), such as the entryway flanked by two niches, and the use of the segmental pediment. With such variance in Hooke's drawing style, it is difficult to determine whether it is in its hand.

Figure III-91. Anon., 'Tower of St. Mary-le-Bow', n.d. Source: BL, Add. MS 5238, no. 67.

St. Mary-le-Bow church was one of the many to be severely damaged during the Great Fire. Restoration of its tower had already begun by the time Wren was engaged in the rebuilding of the church in June 1670. The old tower soon proved to be too unstable to restore, prompting the Rebuilding Commission to order a new one to be constructed, either on the old foundations or on a suitable adjacent site. An initial design featuring a loggia was produced but was replaced by another drawn by Edward Woodroofe *c.* 1671-1672—it is considerably shorter than the final version, but shares enough features to be considered a preliminary design. The contract for the rebuilding of the tower was signed in 1672 but changes continued

111 *Oldenburg Correspondence*, vol. 4, plate iv, facing p. 239. On this project, see Jim Bennett, 'Wren's Last Building?', *Notes and Records of the Royal Society of London* 27 (1972), pp. 107-118 and Michael Hunter, 'A "College" for the Royal Society: The Abortive Plan of 1667-8', in *Establishing the New Science: The Experience of the Early Royal Society* (New Hampshire, CT: The Boydell Press, 1989), pp. 156-184. See Chapter IV, ii. 2, for Hooke's work on the Colleges for the Royal Society.

112 *Oldenburg Correspondence*, vol. 4, p. 437

113 Wren's letter, the original of which is in the Royal Society Archives, has been transcribed in ibid., vol. 4, pp. 454-455, as well as Birch, vol. 2, pp. 290-291.

to be made while the tower was under construction.[114] In 1679, the 9'-long weathervane, a gilt-dragon with a red cross on its wings symbolising London, was built, and the following year the tower was deemed finished.[115]

This undated presentation drawing of the tower among Hooke's papers at the British Library (**Figure III-91**) is one of five manuscript copies.[116] It features four plans, an elevation, and a half-section. A nearly-identical one among Wren's archives, now All Souls College, AS II.76 (**Figure III-92. cf**), has been attributed to Hawksmoor and is thought to have been created in preparation of a 1726 engraving by Henry Hulsbergh (**Figure III-95. cf**), and indeed it bears pencil sketches of the cartouche.[117] Two other manuscript copies, also undated, are now Bodl., Rawlinson Prints a. 2, fol. 30 (**Figure III-93. cf**) and Bodl., Gough Maps 44, no. 69 (**Figure III-94. cf**), the latter attributed to "one of Wren's draughtsmen" by Colvin.[118]

These four drawings bear slight variations between them, but a fifth one features a full section. Jeffrey considers this version, now BL, King George III Topographical Collection, K.Top23.27.b **(Figure III-96. cf)**, to be the earliest.[119] While it remains undated, if it was used by Colen Campbell (1676-1729) for his preparatory drawing **(Figure III-97. cf)** for the engraving published in *Vitruvius Britannicus* **(Figure III-98. cf)**, it would date to sometime

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[114] Sources on St. Mary-le-Bow include Jeffery, *City Churches of Wren*, pp. 279-284; Angelo Hornak, *After the Fire: London Churches in the Age of Wren, Hooke, Hawksmoor and Gibbs* (London: Impernel Press Ltd., 2016), pp. 180-187. For drawings of the church among Wren's archive at All Souls College, see Anthony Geraghty, *The Architectural Drawings of Sir Christopher Wren at All Souls College, Oxford: A Complete Catalogue* (Burlington, VT: Lund Humphries, 2007), pp. 87-89.

While digging for the foundations of the new tower, Wren discovered a Roman causeway 18 feet below the ground. For his notes on this discovery, see "Of London in ancient Times, and the Boundary of the Roman Colony, discern'd by the Surveyor, after the great Fire" in Christopher Wren, ed., *Parentalia: or, memoirs of the family of the Wrens* (London: Printed for T. Osborn, 1750), p. 265. For recent scholarship on these notes, see Lydia Soo's annotations in *Wren's "Tracts" on Architecture and Other Writings* (New York: Cambridge University Press, 1998), pp. 22-23.

[115] Hornak, *After the Fire*, p. 185.

[116] Previously published in Wren Society, vol. 9, pl. 26. The list of manuscript versions of the drawing can be found in H. M. Colvin, *Architectural Drawings in the Bodleian Library* (Oxford: Oxford University Press, 1952), p. 5.

[117] Geraghty, *Architectural Drawings of Wren*, p. 89. This drawing was also previously published in Wren Society, vol. ix, pl. 25, and Hulsbergh's engraving, in Wren Society, vol. 18, pl. 20.

[118] Colvin, *Architectural Drawings in the Bodleian Library*, p. 5 (drawing no. 8).

[119] Jeffery, *City Churches of Wren*, p. 283. The drawing is available online at https://goo.gl/9mSbGx.

before 1717, although it should be noted that there are noticeable differences between the drawings.[120]

The tower's construction had ended 23 years before Hooke's death. Considering that none of the five drawings of the tower are dated, we cannot conclusively rule out that Add. MS 5238, no. 67 (**Figure III-91**) is in Hooke's hand. But it seems unlikely, especially if they were used for engravings published in 1717 or 1726, i.e., long after Hooke's death. The drawing may have been one of those Sloane added to the bundle.[121]

Figure III-92. cf. Hawksmoor (attrib.), 'Tower of St. Mary-le-Bow', c. 1726. Source: ASC, AS II.76.

Consult the notes for Figure III-91.

Figure III-93. cf. Anon., 'Tower of St. Mary-le-Bow', n.d. Source: Bodl., Rawlinson Prints a. 2, fol. 30.

Consult the notes for Figure III-91.

Figure III-94. cf. Office of Christopher Wren (attrib.), 'Steeple of St. Mary-le-Bow', n.d. Source: Bodl., Gough Maps 44, no. 69.

Consult the notes for Figure III-91.

Figure III-95. cf. Henry Hulsbergh (engraver), 'Plans, Elevation & Profile of Bow-Steeple: London', n.d. Source: Bodl., Gough Maps 20, no. 44c.

Consult the notes for Figure III-91.

Figure III-96. cf. Anon., 'Tower of St. Mary-le-Bow', n.d. Source: BL, King George III Topographical Collection, K.Top23.27.b.

Consult the notes for Figure III-91.

Figure III-97. cf. Colen Campbell, 'Preparatory drawing of Church of St Mary-le-Bow, Cheapside, City of London', *c.* 1717. Source: RIBA pix, RIBA68780, VOS/50 folio 10.

Consult the notes for Figure III-91.

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[120] Colen Campbell, *Vitruvius Britannicus, or, the British architect, containing the plans, elevations, and sections of the regular buildings, both publick and private, in Great Britain* . . . (London: Sold by the author . . . , 1717), vol. 2, pl. 26.

[121] See the introductory notes above for BL, Add. MS 5238.

Figure III-98. cf. Campbell, 'Church of St Mary-le-Bow, Cheapside, City of London', *Vitruvius Britannicus* (London, 1717), vol. 2, pl. 26.

Consult the notes for Figure III-91.

Figure III-99. Hollar, 'Partial print of an engraving of the tower of Saint Rumbold's Cathedral in Mechelen', 1649. Source: BL, Add. MS 5238, no. 68.

This printed engraving of a Gothic tower (**Figure III-99**), titled 'Ektuπon turris elegantissimae S. Rumoldi Mechliniae, si, ut exhibetur hoc in typo, tandem aliquando perficiatur. Den Torre van Ste Rombaut tot Mechelen, so denseluen met der tyt [Zyt?] naer syne eerste voorghenomen Modelle volmaeckt moet worden', can be confidently identified as the 1649 Wenceslaus Hollar engraving (**Figure III-100. cf**) of the still-incomplete tower of Saint Rumbold's Cathedral in Mechelen. The original engraving was printed in two sections and then pasted together. Add. MS 5238, no. 68 is the top portion (the unbuilt section); the missing bottom part bears the inscription 'Wenceslaus Hollar fecit. Aº. 1649.'.[122]

Figure III-100. cf. Hollar, 'Engraved print of the tower of Saint Rumbold's Cathedral in Mechelen', 1649. Source: University of Toronto, The Wenceslaus Hollar Digital Collection, Hollar_k_0866.

Consult the notes for Figure III-99.

Figure III-101. Hooke, 'Elevation of the Cheapside Obelisk', 1680. Source: BL, Add. MS 5238, no. 69.

Hooke had been asked to work with Wren on the new water distribution conduit to be installed at Cheapside near Foster Lane. He noted discussing the "Draught of Conduit" with Wren on 16 February 1680, and visiting the Lord Mayor of London "with draught of obelisk" the next day, connecting the two projects.

These three presentation drawings appear to be for the Cheapside obelisk, in ink and ink-wash, each featuring a different base and pinnacle. In **Figure III-101**, the scale on the

[122] On this drawing, see Richard Pennington, *A Descriptive Catalogue of the Etched Work of Wenceslaus Hollar, 1607–1677* (New York, NY: Cambridge University Press, 1982), p. 142. A high-resolution scan of the full print can be consulted online via the University of Toronto Wenceslaus Hollar Digital Collection at https://goo.gl/XzoyHf.

right-hand side suggests a height of about 91' for the structure, but a note in pencil on the lower left reads "not halfe soe bigge/ the panels Larger'. That must have been one of the changes discussed at the 17 February meeting as Hooke appears to have made the necessary alterations, e.g. reduced the height to 50', and delivered a "new Draught of Obelisk" (**Figure III-105 or III-106**) on 24 February. After the 5 March entry noting discussions with the mayor and then the Committee of City Lands, there are no other mentions of the obelisk, and the conduit does not appear to have been completed.[123]

Figure III-102. Christopher Wren (attrib.), 'Partial elevation of the top portion of the Monument with a statue of Augusta', 1675. Source: BL, Add. MS 5238, no. 70.

Hooke was responsible for the design and construction of the Monument to the Great Fire of London, built between 1671 and 1679; **Figures III-104 and III-215** are thought to be Hooke's preliminary designs. In 1675, in his report regarding the design of the finial, Wren, in his capacity as the King's Surveyor General, presented alternative designs featuring a statue of August (**Figure III-102**), a flaming urn bearing the arms of the City (**Figure III-103**), a phoenix emerging from the flames (**Figure III-166**), and two different versions of a design featuring a ball (**Figures III-111 and III-112. a**). Hooke also prepared a separate urn finial accommodating a zenith telescope (**Figure III-314**). See Chapter IV, ii. 6 in this dissertation.

Figure III-103. Wren (attrib.), 'Partial elevation of the top portion of the Monument with an urn', 1675. Source: BL, Add. MS 5238, no. 71.

Consult the notes for Figure III-102 and see Chapter IV, ii. 6, in this dissertation.

Figure III-104. Hooke, 'Partial elevation of the base of the Monument', c. 1671. MS 5238, no. 72.

Consult the notes for Figure III-102 and see Chapter IV, ii. 6, in this dissertation.

Figure III-105. Hooke, 'Partial elevation of the Cheapside Obelisk', 1680. Source: BL, Add. MS 5238, no. 73.

Consult the notes for Figure III-101.

[123] *Diary i*, pp. 438, 439, 440. See also Stephen Inwood, *The Man Who Knew Too Much: The Strange and Inventive Life of Robert Hooke, 1635–1703* (London: Pan Macmillan, 2003), p. 282; Michael Cooper, *Robert Hooke and the Rebuilding of London* (Phoenix Mill, UK: Sutton Publishing, 2005), p. 184.

Figure III-106. Hooke, 'Elevation of the Cheapside Obelisk', 1680. Source: BL, Add. MS 5238, no. 74.

Consult the notes for Figure III-101.

Figures III-107. Hooke[?], 'Copy of Pietro Santo Bartoli's plans and section/elevation of Trajan's Column', 1677[?]. Source: BL, Add. MS 5238, no. 75.

These plans of a column cut at various heights (the square base at the ground level, staircase leading to the top, fluted length, and the viewing level with balustrade) have sometimes been attributed to the Monument to the Great Fire but they are in fact directly copied from Pietro Santo Bartoli's *Colonna Traiana* (Rome, *c.* 1673) (**Figures III-108. cf, III-110. cf, and III-116. cf**).[124] In the copied drawings, the dimension lines are drawn but the numbers, labels, and titles are left blank.[125]

There are several references to Trajan's column in Hooke's diaries: on 16 March 1676, he noted seeing a "Dutch Columna Trajana," and later in the year that "Rider promised to Lend Trajans Column." In April 1677, he "set Tom to coppy Trajans Column," although considering the sophistication of these drawings, his youthful assistant Tom Gyles likely did only minimal work.[126] It has been suggested that the drawings may have been copied by Hooke's more able assistant, Thomas Crawley, instead.[127] While this cannot be summarily ruled out, it should be noted that Hooke first heard of Crawley from Charles Scarburgh on 8 July 1677, i.e. three months after setting 'Tom' to copy the drawings, and always referred to him by his last name.[128]

Figure III-108. cf. Bartoli, 'Plans of Trajan's Column', *Colonna Traiana* (Rome, *c.* 1673), fol. 8.

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[124] Pietro Santi Bartoli, *Colonna Traiana eretta dal Senato, e popolo romano all'imperatore Traiano Avgvsto nel svo foro in Roma* (Rome: Gio. Giacomo de Rossi, [c. 1673]). The folios are not numbered; these folios are the 8th and 9th beginning with the title-page. Bartoli's drawings have also been identified in John E. Moore, 'The Monument, or, Christopher Wren's Roman Accent', *The Art Bulletin* 80 (1998), pp. 498-533.

[125] A manuscript note, in pencil, in the upper margin of no. 80 (Figure III-114) reads "Trajan Pillar: See MS. Add. 15,505, f. 25," referring to another copy of the drawing in the BL manuscript collections.

[126] *Diary i,* pp. 220, 261, 285.

[127] Geraghty, 'Robert Hooke's Collection', p. 118.

[128] Gyles contracted smallpox and died on 12 September that year; *Diary i*, p. 312; Inwood, *Man Who Knew Too Much*, pp. 255-256. It is plausible that Crawley completed the drawings at a later date, but there is no evidence to support or contradict that.

Consult the notes for Figure III-107.

Figure III-109. Hooke[?], 'Copy of Bartoli's plans of Trajan's Column', 1677[?]. Source: BL, Add. MS 5238, no. 76.

Consult the notes for Figure III-107.

Figure III-110. cf. Bartoli, 'Plans of Trajan's Column', *Colonna Traiana*, fol. 9.

Consult the notes for Figure III-107.

Figure III-111. Edward Woodroofe (attrib.), 'Partial elevation of the top portion of the Monument', 1675; details. Source: BL, Add. MS 5238, no. 77.

These two drawings (**Figures III-111 and III-112. a**) illustrating alternative designs featuring 'giant triglyph finials' for the top of the Monument have been attributed to Woodroofe by Kerry Downes, and Geraghty has dated them to *c.* 1675 when the design of the top portion was being finalised.[129]

Figure III-112. a. Woodroofe (attrib.), 'Elevation of the Monument with an alternative design of the top portion pasted', 1675. Source: BL, Add. MS 5238, no. 78 [the finial design pasted at the top].

Consult the notes for Figures III-102, III-111, and see Chapter IV, ii. 6, in this dissertation.

Figure III-112. b. Hooke[?], 'Elevation of the Monument up to the finial', 1675. Source: BL, Add. MS 5238, no. 78.

Consult the notes for Figures III-102, III-111, and see Chapter IV, ii. 6, on Hooke's work on the Monument to the Great Fire of London.

Figure III-113. Anon. (engraver), Edmund Dummer (draughtsman), 'Fourth draught: engraved elevation and plan of the officers dwelling houses in Plymouth', 1694. Source: BL, Add. MS 5238, no. 79.

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[129] Kerry Downes, *The Architecture of Wren* (Toronto: Granada, 1982), pp. 66, 124n142; Anthony Geraghty, 'Edward Woodroofe: Sir Christopher Wren's First Draughtsman', *The Burlington Magazine* 143 (2001), pp. 474-479, pp. 478-479. On Woodroofe, see Kerry Downes, 'Sir Christopher Wren, Edward Woodroffe, J. H. Mansart, and Architectural History', *Architectural History* 37 (1994), pp. 37-67; Geraghty, 'Edward Woodroofe: Sir Christopher Wren's First Draughtsman'. See also Chapter IV, ii. 6, on Hooke's work on the Monument to the Great Fire of London.

That engravings depicting various structures in Plymouth are among Hooke's papers has been interpreted as a sign of his contribution to the design of the buildings, especially in light of the resemblance between the officers' dwelling house (**Figure III-113**) and Bethlem Hospital. The Plymouth yards and Hooke's involvement, or lack thereof, are discussed at length in Chapter IV, ii. 48, but it should be briefly noted here that all extant documents point to Edmund Dummer (1651–1713) as the designer of the dockyards. The engravings are based on original drawings in his hand (**Figures III-114. cf, III-118. cf, III-132. cf**) and other documents such as surveys and reports strengthen his identification as the architect.

Figure III-114. cf. Dummer, 'Fourth draught: elevation and plan of the officers dwelling houses in Plymouth', 1694. Source: BL, Lansdowne MS 847, fol. 46.

Consult the notes for Figure III-113.

Figure III-115. Hooke[?], 'Copy of Bartoli's section / elevation of Trajan's Column', 1677[?]. Source: BL, Add. MS 5238, no. 80.

Consult the notes for Figure III-107.

Figure III-116. cf. Bartoli, 'Section / elevation of Trajan's Column', *Colonna Traiana*, fols. 3-5 pasted together.

Consult the notes for Figure III-107.

Figure III-117. Anon. (engraver), Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694. Source: BL, Add. MS 5238, no. 81.

Consult the notes for Figure III-113.

Figure III-118. cf. Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694. Source: BL, Lansdowne MS 847, fol. 50.

Consult the notes for Figure III-113.

Figure III-119. Hooke, 'Plan in ink and ink-wash of the north embankment of river Thames, from the Tower dock to Whitefryers Lane', *c.* 1672. Source: BL, Add. MS 5238, no. 82.

Consult the notes for Figure III-331.

Figure III-120. Hooke, 'Plan in ink of the north embankment of river Thames, from the Tower dock to Whitefryers Lane', *c.* 1672. Source: BL, Add. MS 5238, no. 83.

Consult the notes for Figure III-331.

Figure III-121. Hooke, 'Survey of wharves along the River Thames from Blackfryers to Tower Dock, with locations of public landing stairs', *c.* 1672. Source: R. T. Gunther, *Early Science in Oxford*, vol. 10 (Oxford, 1935), pp. 62-63.

Consult the notes for Figure III-331.

Figure III-122. Anon., 'Copy of Kip and Knyff's engraving of Haigh Hall, Lancaster', n.d. Source: BL, Add. MS 5238, no. 84.

This incomplete copy of Kip and Knyff's engraving of 'Haigh Hall in Lancaster, seat of Sir Roger Bradshaigh Baronet' **(Figure III-123. cf)** is interesting, in that some of the design details, such as the ground floor windows and the garden layouts do not match the engraving. The perspective is problematic enough to attribute the drawing to Hooke but several problems then arise.[130] If it is a copy he made, the engraving was published in *Brittania illustrata* in 1707, four years after Hooke's death, so it would have to have been prepared and printed on its own quite a few years prior. If the building and the gardens were designed by Hooke, there is no information linking him to the client, the Bradshaigh or Bradshaw family, nor is there much information on the building, which has since been demolished.

Figure III-123. cf. Kip and Knyff, 'Bird's eye view of Haigh Hall in Lancaster, seat of Sir Roger Bradshaigh Baronet', *Britannia illustrata* (1707), detail. Source: Achenbach Foundation for Graphic Arts, accession no. 1963.30.26697, https://goo.gl/JZWckT.

Consult the notes for Figure III-122.

Figure III-124. Anon., 'Elevation, in ink and ink-wash, of part of a column bearing initials RW', 1680. Source: BL, Add. MS 5238, no. 85.

[130] On Hooke's problems with perspective, see the first part of this chapter.

This drawing of a part of a column bearing the date '1680' and initials 'RW' at the top, is not readily recognisable. It is dated 16[?] April 1680 and signed with the initials ARME[?], but not in Hooke's hand. Further information is needed to properly identify it.

Figure III-125. Anon., 'Elevation, in ink and ink-wash, of a small building, perhaps a musical or theatrical pavilion', n.d. Source: BL, Add. MS 5238, no. 86.

This anonymous building is quite likely a musical or theatrical pavilion given some of the decorative elements. The hand is similar to that in no. 93 (**Figure III-133**); if they belong to Hooke, then they are surprisingly sophisticated compared to some of his other architectural drawings. **Figure III-127** appears to be a plan view of the same building.

Figure III-126. Hooke[?], 'Elevation of a window with a triangular pediment', n.d. Source: BL, Add. MS 5238, no. 87.

This drawing remains unidentified.

Figure III-127. Anon., 'Plan of a small oval building', n.d. Source: BL, Add. MS 5238, no. 88.

This drawing remains unidentified; it is possibly the plan of the building depicted in elevation in no. 86 (**Figure III-125**).

Figure III-128. Hooke, 'Elevation and plan, in ink and ink-wash, of the Somerset House stables built for Queen Catherine of Braganza', 1669 or 1670. Source: BL, Add. MS 5238, no. 89.

As Hooke's extant diaries only begin in 1672, and construction records for this building are lost, this drawing is the only proof that Hooke built the stables at the old Somerset House for Queen Catherine of Braganza (1638–1705), Charles II's wife. The sophistication of the drawing, as well as the close resemblance between what was eventually built, show that this may have been a presentation drawing for approval, making its survival quite remarkable. On the Somerset House stables, see Chapter IV, ii. 4.

Figure III-129. Hooke[?], 'Ink and ink-wash elevation of a niche, perhaps in a chapel', n.d. Source: BL, Add. MS 5238, no. 90.

This drawing remains unidentified but is possibly an interior detail of a chapel.

Figure III-130. Hooke[?], 'Ink and ink-wash elevation of a niche', n.d.; detail. Source: BL, Add. MS 5238, no. 91.

> This elevation of a niche, topped with an elliptical arch, pediment and bust, remains unidentified. Pencil lines of construction are visible.

Figure III-131. Anon. (engraver), Dummer (draughtsman), 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. Source: BL, Add. MS 5238, no. 92.

> *Consult the notes for Figure III-113.*

Figure III-132. cf. Dummer, 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Lansdowne MS 847, fol. 47.

> *Consult the notes for Figure III-113.*

Figure III-133. Anon., 'Large drawing, in ink and colour ink-wash, of an elevation of an unidentified institutional building', n.d. Source: BL, Add. MS 5238, no. 93.

> This large drawing, spread over two pages, presents an unidentified institutional building, most likely for the navy. The draughtsmanship is similar to no. 86 **(Figure III-125)**. Some of the mannerist details such as broken pediments are reminiscent of Hawksmoor, including the Ionic columns capitals with festoons that are similar to those on the King William Building at Greenwich Hospital. All three orders are used; Doric on the sides, Ionic at the central entrance, and Corinthian supporting the main pediment. The central entrance is adorned with a coat of arms with canons and flags. Pictures of various scenes are painted in frames and adorn the facade.

c. Add. MS 5262

Figures III-134 to III-138. Hooke, 'Snake-stones (ammonites)', 'Nautilus shells', 'Helmet and button stones', and 'Various fossils', n.d. Source: BL, Add. MS 5262, nos. 152-156, reproduced in Sachiko Kusukawa, 'Drawings of Fossils by Hooke and Richard Waller', *Notes and Records of the Royal Society* 67 (2013), pp. 124-127.

Figure III-139. cf. Richard Waller, 'Petrified nautilus shell', 1687[?]. Source: Add. MS 5262, no. 158, reproduced in Kusukawa, 'Drawings of Fossils', p. 129.

Figure III-140. cf. Hunt, 'Prodigious gravell stone cutt from Francis Dugud', 1675; 'A stone extracted of the blad*d*er of a woman', 1690.

> The connection and reciprocation between techniques of representation and their philosophical and cultural contexts have been subjects of study in histories of art and architecture during at least the past four decades. Social constructivist approaches in the history of science especially throwing doubt into the hallowed concept of objectivity, historians have also turned their attention to the visual culture of science, studying techniques of image production and the rhetorical value of representation.[131] Given this interest in scientific illustration, there has been increased focus in the publication of the *Philosophical transactions*, and images produced and consumed within the milieu of the Royal Society.[132]

[131] It would be impossible to fit into a footnote all the scholarship that has accumulated on these subjects. To list but a few pioneering or exemplary works, in architecture see Alberto Pérez-Gómez, *Architecture and the Crisis of Modern Science* (Cambridge, MA: The MIT Press, 1983), Alberto Pérez-Gómez and Louise Pelletier, *Architectural Representation and the Perspective Hinge* (Cambridge, MA: The MIT Press, 1997); in art, Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1983); and in the history of science, Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007); Steven Shapin and Simon Schaffer, *Leviathan and the Air-pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press, 1985).

[132] Most recent literature on visual representation techniques used in the context of the Royal Society include Nathan Flis, 'Drawing, Etching, and Experiment in Christopher Wren's Figure of the Brain', *Interdisciplinary Science Reviews* 37 (2012), pp. 145-160; Matthew C. Hunter, *Wicked Intelligence: Visual Art and the Science of Experiment in Restoration London* (Chicago: The University of Chicago Press, 2013); Hunter, *The Image of Restoration Science*; Sachiko Kusukawa, 'Picturing Knowledge in the Early Royal Society: The Examples of Richard Waller and Henry Hunt', *Notes and Records of the Royal Society* 65 (2011), pp. 273-294; Anna Marie Roos, 'The Art of Science: A "Rediscovery" of the Lister Copperplates', *Notes and Records of the Royal Society of London* 66 (2012), pp. 19-40; Alexander Wragge-Morley, 'Restitution, Description and Knowledge in English Architecture and Natural Philosophy, 1650–1750', *ARQ* 14 (2010), pp. 247-254; Alexander Wragge-Morley, '"Vividness" in English Natural History and Anatomy, 1650–1700', *Notes and Records of the Royal Society* 66 (2012), pp. 341-356.

For recent studies of continental examples, see David Freedberg, 'Pictures and Order', in *The Eye of the Lynx: Galileo, His Friends and the Beginnings of Modern Natural History* (Chicago: Chicago University Press, 2002), pp. 349-416; Sachiko Kusukawa, *Picturing the Book of Nature: Image, Text, and Argument in Sixteenth-Century Human Anatomy and Medical Botany* (Chicago, IL: University of Chicago Press, 2012); Sachiko Kusukawa and Ian Maclean, eds., *Transmitting Knowledge: Words, Images, and Instruments in Early Modern Europe* (New York: Oxford University Press, 2006); Domenico Bertoloni Meli, 'The Collaboration between Anatomists and Mathematicians in the Mid-Seventeenth Century with a Study of Images as Experiments and Galileo's Role in Steno's "Myology"', *Early Science and Medicine* 13 (2008), pp. 665-709; Volker Remmert, *Picturing the Scientific Revolution*, trans. Ben Kern (Philadelphia: Saint Josephs University Press, 2011); Vertesi, 'Instrumental Images:

Hooke's *Micrographia* (London, 1665) (**Figures I-1 to I-5**) was at the cutting edge of scientific illustration at the time and brought him national and international fame. The diarist Samuel Pepys (1633–1703), who described him as "the most, and promises the least, of any man in the world that ever I saw," noted staying up until two o'clock in the morning to read "Mr. Hookes Microscopicall Observacions, the most ingenious book that ever I read in my life."[133] As a pioneering work in the Royal Society's visual programme, *Micrographia* and Hooke's graphical techniques in general have been under scholarly scrutiny during the past few decades.[134]

The Visual Rhetoric of Self-presentation in Hevelius's Machina Coelestis'; Janet Vertesi, 'Picturing the Moon: Hevelius's and Riccioli's Visual Debate', *Studies in History and Philosophy of Science* 38 (2007), pp. 401-421.

[133] 21 January and 15 February 1665; Robert Latham and William Matthews, eds., *The Diary of Samuel Pepys*, 11 vols. (University of California Press, 1971–1983), vol. 6, pp. 18, 36. For biographical details, see 'Pepys, Samuel (1633–1703)', *ODNB*.

[134] Secondary literature on *Micrographia* include Michael Aaron Dennis, 'Graphic Understanding: Instruments and Interpretation in Robert Hooke's Micrographia', *Science in Context* 3 (1989), pp. 309-364; Meghan C. Doherty, 'Discovering the "True Form:" Hooke's Micrographia and the Visual Vocabulary of Engraved Portraits', *Notes and Records of the Royal Society* 66 (2012), pp. 211-234; John T. Harwood, 'Rhetoric and Graphics in Micrographia', in *Robert Hooke: New Studies*, ed. Michael Hunter and Simon Schaffer (Wolfeboro, NH: The Boydell Press, 1989), pp. 119-147; Christa Knellwolf, 'Robert Hooke's Micrographia and the Aesthetics of Empiricism', *The Seventeenth Century* 16 (2001), pp. 177-200; Ian Lawson, 'Crafting the Microworld: How Robert Hooke Constructed Knowledge About Small Things', *Notes and Records of the Royal Society* 70 (2016), pp. 23-44; Domenico Bertoloni Meli, 'The Representation of Insects in the Seventeenth Century: A Comparative Approach', *Annals of Science* 67 (2010), pp. 405-429; Janice Neri, 'Between Observation and Image: Representations of Insects in Robert Hooke's Micrographia', in *The Art of Natural History: Illustrated Treatises and Botanical Paintings, 1400-1850*, ed. Therese O'Malley and Amy R. W. Meyers (New Haven, CT: Yale University Press, 2008), pp. 83-107; Janice Neri, *The Insect and the Image: Visualizing Nature in Early Modern Europe, 1500–1700* (Minneapolis: University of Minnesota Press, 2011); Nick Wilding, 'Graphic Technologies', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate Publishing Company, 2006), pp. 123-134.

On Hooke's representational techniques, most of the recent work is from art historian Matthew C. Hunter; see his 'Experiment, Theory, Representation: Robert Hooke's Material Models', in *Beyond Mimesis and Convention*, ed. Roman Frigg and Matthew C. Hunter (New York: Springer, 2010), pp. 193-219; 'Hooke's Figurations: A Figural Drawing Attributed to Robert Hooke'; 'Mr. Hooke's Reflecting Box', *Huntington Library Quarterly* 78 (2015), pp. 301-328; 'Picture, Object, Puzzle, Prompter: Devilish Cleverness in Restoration London', *Art History* 36 (2013), pp. 546-567; 'The Theory of the Impression According to Robert Hooke', in *Printed Images in Early Modern Britain*, ed. Michael Hunter (Burlington, VT: Ashgate, 2010), pp. 167-190; *Wicked Intelligence*. Further literature, specifically on Hooke's insect and fossil drawings, include Meli, 'Representation of Insects'; Janice Neri, 'Some Early Drawings by Robert Hooke', *Archives of Natural History* 32 (2005), pp. 41-47; Neri, *The Insect and the Image: Visualizing Nature in Early Modern Europe, 1500–1700*; Sachiko Kusukawa, 'Drawings of Fossils by Robert Hooke and Richard Waller', *Notes and Records of the Royal Society* 67 (2013), pp.

These particular drawings by Hooke (**Figures III-134 to III-138**) and the editor of his *Posthmuous works* (1705), Richard Waller (*d.* 1714) (**Figure III-139. cf**) were discovered by historian Sachiko Kusukawa among Sloane's papers at the British Library. They are bound in a volume of other (unrelated) natural historical illustrations, although whether they were organised by Sloane himself or a later curator remains unknown. Considering Hooke's "well-known graphic versatility," Kusukawa notes the difficulty in dating them on stylistic grounds.[135]

Hooke's sketches of snake-stones, nautilus shells, helmet and button stones, and various fossils had somehow made their way into Sloane's collection after or perhaps even before Hooke's death. As Waller was editing the *Posthumous works* (1705), they were lent to him by Sloane; to Hooke's five plates (**Figures III-134 to III-138**), Waller added two of his own (e.g. **Figure III-139. cf**) and used them to illustrate Hooke's lectures on earthquakes.[136] Waller had reportedly attached his drawings to a letter dated 17 August 1687 to Hooke; that letter has not survived but two others from the same period have in the archives of Trinity College, Cambridge. One detail to note is that both of these letters have visible fold marks, indicative of their being sent by post, but Waller's sketches do not seem to have been folded, except perhaps the one reproduced here as **Figure III-139. cf** which appears to have been folded in half. Unless their fold marks became imperceptible over the years, this could mean that the drawings were copied by Waller at a later date, perhaps arranging his individual sketches on folios to emulate Hooke's layouts, to be engraved for *Posthumous works*.

123-138. Note that I question Neri's attribution of these 'early drawings'; see the annotations for Figures III-141 and III-142 below.

For non-figural, and more 'praxis' oriented approaches to Hooke's drawings, see Iliffe, 'Material Doubts'; Stephen Johnston, 'Wren, Hooke and Graphical Practice', *Journal for the History of Astronomy* 41 (2010), pp. 381-392.

[135] Kusukawa, 'Drawings of Fossils', pp. 123-124, 129.

[136] Robert Hooke, *The posthumous works* (London: Printed by Sam. Smith and Benj. Walford . . . , 1705); the drawings are inserted between pp. 282-287. The lectures on earthquakes are dated 1668, but as Kusukawa points out, it is unclear whether the sketches were prepared then or at a later date; Kusukawa, 'Drawings of Fossils', p. 132.

On Waller, see also Margaret J. M. Ezell, 'Richard Waller, S. R. S.: "In the Pursuit of Nature"', *Notes and Records of the Royal Society* 38 (1984), pp. 215-233; Kusukawa, 'Picturing Knowledge in the Early Royal Society'.

In his lectures on earthquakes, Hooke had argued that fossils had an organic origin—an idea that was not completely new but still controversial when Hooke revived it.[137] Kusukawa highlights Hooke's techniques of representation with pen, grey wash, and brown ink, interpreting them as Hooke's attempt at strengthening this theory.[138] Hooke appears to have taught the same techniques to his former assistant Harry Hunt (*d.* 1713), who used them to illustrate, albeit with much more colour, stones of a proven biological source: the bladder (**Figure III-140. cf**).[139]

d. Add. MS 57495

Figures III-141 and III-142. John Covel (previously attributed to Hooke), 'Sketches of coins and insects', *c.* 1660–1661. Source: BL, Add. MS 57495, fols. 112v and 113v.

Figure III-143. Covel, 'Sketch of a tick', 1660–1661, detail. Source: BL, Add. MS 57495, fol. 113v.

Figure III-144. cf. Hooke, *Micrographia* (London, 1665), Schema XXXIII, Fig. 2.

Figure III-145. Covel, 'Drawing of a trombidium holosericeum (red velvet mite) and a 1574 gold coin from the reign of Murad III', c. 1660–1661, detail. Source: BL, Add. MS 57495, fol. 112v.

Figure III-146. cf. Covel, 'Lotus subbiflorus [?]', detail. Source: BL, Add. MS 57495, fol. 53r.

Figure III-147. Covel, 'Sketches of insects', 1660–1661, detail. Source: BL, Add. MS 57495, fol. 113v.

Figure III-148. cf. Covel, 'Oration in honour of Charles II's restoration', 1661. Source: BL, Add. MS 22910, fol. 9r.

Figure III-149. cf. Covel, 'Ink wash drawing of a caterpillar', n.d. Source: BL, Add. MS 57495, fol. 117r.

Figure III-150. cf. Covel[?], 'Drawing of an unidentified bovine animal', n.d. Source: BL, Add. MS 22910, fol. 221r.

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[137] On earlier discussions of the organic hypothesis, see William Poole, 'Fossils and Extinction', in *The World Makers: Scientists of the Restoration and the Search for the Origins of the Earth* (Oxford: Peter Lang Ltd, 2010), pp. 115-133, p. 117.

[138] Kusukawa, 'Drawings of Fossils', pp. 134-135.

[139] See the first part of this chapter on Hooke's techniques of drawing, especially figural drawings. On Hunt, see Kusukawa, 'Picturing Knowledge in the Early Royal Society'.

Sketches of insects and coins (**Figures III-141 and III-142**), dating to *c.* 1660–1661 and bound in a commonplace book of John Covel or Colvill (1638–1722), have been attributed to Hooke by the late art historian Janice Neri.[140] The volume, now BL, Add. MS 57495, contains various notes dated between 1660 and 1713, along with drawings of insects, animals, plants, and coins, as well as wax impressions of seals. The notes are in several hands, some belonging to Covel from different dates, and some are signed by the botanist and entomologist James Petiver (*c.* 1665–1718) whose help Covel appears to have sought in identifying some of the plants and insects.[141]

Since Neri's attribution, Hooke's authorship of these sketches has been taken for granted, though with some unease even shared by Neri herself. The main reason for the hesitation is the lack of any external evidence explaining how Hooke's sketches could have ended up in Covel's notebook; another is the discrepancy between the depictions of some of the insects. For instance, despite their similar poses, in Covel's notebook the pseudoscorpion (**Figure III-143**) is illustrated with six legs whereas it has eight in Hooke's *Micrographia* (**Figure III-144**). There are also some inconsistencies in terms of the dates; the drawing in Covel's notebook is dated 11 April 1661 whereas Hooke mentions observing the rare insect "one day in September."[142] Even if these caveats are ignored and Hooke's authorship is accepted, these

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[140] Neri, 'Some Early Drawings by Robert Hooke'; 'Between Observation and Image: Representations of Insects in Robert Hooke's Micrographia'; *The Insect and the Image: Visualizing Nature in Early Modern Europe, 1500–1700*, pp. 105-138.

Literature on seventeenth-century studies of insects is extensive but for a comparison between drawings by Hooke, Francesco Stelluti, Giovanni Battista Hodierna, Francesco Redi, Marcello Malpighi, and Jan Swammerdam, see Meli, 'Representation of Insects'. Taxonomically, insects and arachnids belong to different classes, but here 'insect' will be used as a generic term for both.

[141] Neri dates Petiver's notes, often signed with 'PET', to after 1711 due to his mentioning of a trip to the Netherlands; see 'Some Early Drawings by Robert Hooke', pp. 46, 47n9. Matthew Hunter further narrows the date to 1716 when Petiver asked Covel to borrow his manuscript; see Hunter, *Wicked Intelligence*, pp. 128, 258n8, and Petiver's 29 June 1716 letter in volume 2 of Covel's correspondence now BL, Add. MS 22911, fol. 213.

[142] Neri, 'Some Early Drawings by Robert Hooke', p. 44; Robert Hooke, Micrographia, or, some physiological descriptions of minute bodies made by magnifying glasses with observations and inquiries thereupon (London: Printed by Jo. Martyn and Ja. Allestry . . . , 1665), p. 207.

Neri's attribution has been largely accepted and cited in scholarship on the subject; see Lawson, 'Crafting the Microworld: How Robert Hooke Constructed Knowledge About Small Things'; Doherty, 'Discovering the "True Form:" Hooke's Micrographia and the Visual Vocabulary of Engraved Portraits'; Hunter, *Wicked Intelligence*.

sketches present a peculiar problem: they are far less sophisticated than Hooke's other extant drawings near this period. It may be possible to argue that these may have been rough draughts made at the moment of observation, with the intention that they would be re-drawn at a later date. However, if we consider his sketch for the 'Observables in the six branched figures in frozen urine' from 10 December 1662 (**Figure III-252**) also to be a rough draft, it would still mean Hooke's drawing skills improved exponentially within the span of a year-and-a-half. This is not impossible as Hooke certainly owned practical books on drawing to hone his skills, yet with no extant diaries until 1672, it is difficult to know whether he purchased or owned any of them by 1661.[143] Considering the influence these sketches have had on recent scholarship on Hooke's drawing practices, further scrutiny of Covel's manuscript is needed to prevent any misleading conclusions.

First it should be noted that it is unlikely Covel and Hooke personally knew each other. Three years younger than Hooke, Covel was born in Suffolk and was admitted to Christ's College, Cambridge, in 1654, at a time when it was home to Cambridge Platonism; Henry More (1614–1687) had been a fellow since 1641 and Ralph Cudworth (1617–1688) would be elected master of the College seven months after Covel's admission.[144] Covel received his BA in 1658, was elected fellow to the College the following year, and was awarded his MA in 1661. After studying medicine for some time, he instead pursued a career in the Church, and was appointed Chaplain to the Levant Company in 1670.[145] He was stationed in Constantinople until 1677, and during his stay, travelled extensively in Asia Minor, recording numerous buildings, inscriptions, traditional costumes, animals, and plants.[146] After a decade of various

[143] See Chapter II on Hooke's library and the first part of this chapter on Hooke's drawing skills. See also the annotations for Figures III-134 to III-138 above on Hooke's fossil drawings.

[144] 'Covel [Colvill], John (1638–1722)', *ODNB*. On Covel's studentship at Christ's College, see Marilyn Ann Lewis, 'The Educational Influence of Cambridge Platonism: Tutorial Relationships and Student Networks at Christ's College, Cambridge, 1641-1688' (unpub. diss., Birkbeck (University of London), 2011), pp. 205-207.

[145] Prior to his appointment, Covel was vying for a position as secretary to the British Ambassador to the Levant. Though this is a conjecture, Covel's interest in the East and all its learned treasures (many of the Greek manuscripts he collected are now at the British Library) might have been an influence of his college tutor, Ralph Widdrington (1614/15–1688), who had been appointed professor of Greek in 1654. On Widdrington's circle of tutorship at Christ's College, see ibid., pp. 193-220.

[146] His travel diaries are now BL, Add. MSS 22912–22914. For extracts, see 'II - Extracts from the Diaries of Dr. John Covel, 1670–79', in *Early Voyages and Travels to the Levant. . . . with Some Account of the Levant Company of Turkey Merchants*, ed. J. T. Bent (London: Printed for the Hakluyt Society, 1893), pp. 99-287. Most recent scholarship on Covel's travel books is Lydia Soo, 'The English in the Levant: Social Networks and the Study

other employments, including chaplaincy to the princess of Orange, Covel returned to Cambridge as university vice-chancellor, and master of Christ's College, the latter a position he held until his death. Given the differences between their career trajectories and social settings, Covel and Hooke may have never crossed paths; he receives no mention in the diaries, nor is there any known correspondence between the two. However, it is likely Covel knew *of* Hooke through the latter's popular publication *Micrographia*, which may have influenced Covel's later drawing style (**Figure III-149. cf**), or perhaps through the quarrel between More and Hooke.[147] Furthermore, despite his botanical and entomological interests, Covel does not appear to have corresponded with the Royal Society, which is surprising as it is easy to imagine that they would have been interested in Covel's observations from the Levant (e.g. **Figure III-150. cf**).[148]

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of Architecture', in *'The Mirror of Great Britain' National Identity in Seventeenth-Century British Architecture*, ed. Olivia Horsfall Turner (Reading, UK: Spire Books Ltd, 2012), pp. 209-231.

[147] The inspiration for Covel's drawing of the caterpillar (Figure III-149. cf) may also have come from Thomas Moffet's posthumously-published *Insectorum, sive minimorum animalium theatrum* (London, 1634) which featured sophisticated woodcuts; see, for instance, the caterpillar balanced on a branch on p. 182. The 1724 auction catalogue of Covel's library does not feature *Micrographia*, but Moffet's book is indeed listed as lot 469 in Christopher Cock, *A catalogue of the entire library of that reverend and learned antiquary Dr. John Covel, late master of Christ-College in Cambridge, and chancellor to the Cathedral Church of York. consisting of a very valuable collection of the most celebrated critical authors, ancient and modern, the classics . . . which will be sold by auction . . . on Monday the 9th. of this instant March* ([London]: n.p., [1724]), p. 28.

Interestingly, Hooke's name also does not appear in the authors' index in the manuscript catalogue of Covel's library prepared by Humfrey Wanley (1672–1726) in 1716; now BL, Add MS 70485. Wanley, the keeper of the Harleian library, had made this catalogue during negotiations between Covel and Lord Harley for the purchase of Covel's large collection of manuscripts. It is unclear how thorough the catalogue is, although it should be noted that other microscopists such as Anton van Leeuwenhoek (1632–1723), Martin Lister (1639–1712), and Jan Swammerdam (1637–1680) are indeed listed.

As for the quarrel between More and Hooke, the latter attacked More's idea of a 'Hylarchick Spirit' as an unintelligible and confusing explanation for phenomena that could easily be explained by "the common and known Rules of Mechanicks;" Hooke, *Lampas*, p. 33; and Henry More, *Remarks upon two late ingenious discourses: the one, an essay touching the gravitation and non-gravitation of fluid bodies; the other, touching the Torricellian experiment by Sir Matthew Hale, so far as they may concern any passages in his Enchiridion metaphysicum* (London: Printed for Walter Kettilby, 1676), chapters 11-13.

[148] As there is no thorough study of Covel's life and work, any detailed information would need to be obtained from extensive primary sources, the scrutiny of which is outside of the scope of this dissertation. A cursory look at the volumes of Covel's correspondence at the British Library and searches through the Royal Society Archives database did not reveal any letters between Covel and the Society. Neither did searches in the printed volumes of Oldenburg's correspondence or Birch's volumes of the history of the Royal Society reveal

These particular sketches and notes (**Figures III-141 and III-142**) are dated between 28 July 1660 and 17 July 1661.[149] In 1660, Covel was at Christ's College, Cambridge, while Hooke was in Oxford assisting Boyle. With no extant diaries from this period, it is impossible to know the extent of Hooke's activities but he may indeed have engaged in microscopical studies. He would not have been alone. In late 1660 or early 1661, Wren produced a set of microscope-aided drawings of insects, presenting them to the newly-restored King.[150] Charles II was so impressed that Wren was asked by the Royal Society "in the king's name . . . to continue the description of several insects," a task which he apparently declined, prompting Robert Moray (1608/9?–1673) to assign it to Hooke and a still-unidentified "Vander Diver" in August 1661.[151] If, as Neri has suggested, these 1660–1661 sketches are in Hooke's hand, it is possible that, though not yet a Royal Society member, he was sought because he was already engaged in producing such illustrations.[152]

In the early 1660s, another alumnus of Christ's College, Cambridge, was keenly making his own microscopical observations in Halifax. Henry Power (*c.* 1626–1668) was an active correspondent of the Royal Society, and attended their 24 June 1663 meeting where he "produced several microscopical observations made by himself." Subsequently, Wilkins,

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any references to Covel. However, future discoveries of a misfiled letter between Hooke and Covel, or of a mention of Covel's name in the unpublished journals of the Royal Society are, of course, not impossible.

149 For Neri's transcription of the notes, see 'Some Early Drawings by Robert Hooke', pp. 46-47.

150 Wren's drawings are unfortunately lost though they have been much sought after. It appears even Sir William Osler (1849–1919) was inquiring about their fate with a *c.* 1908 letter to Windsor Castle. The reply from Evelyn Heaton-Smith, still attached to the front flyleaf of his copy of the 1667 edition of *Micrographia* in the Osler Library at McGill University, indicates that "Sir Richard Holmes who was Librarian until 2 years ago . . . thought that if ever they had been in the possession of the royal family, they were very probably included in the King's Library which George III gave to the nation, & which is now at the British Museum. If they are not there he said they might be at South Kensington [now Victoria & Albert Museum], but he thought the Museum the more likely place;" call number folio WZ 250 H782m 1667.

151 Birch, vol. 1, p. 21. See also Wren, *Parentalia: or, memoirs of the family of the Wrens*, pp. 210-211. For secondary sources on *Micrographia*, see footnote 134.

152 Wren's attempts would still have pre-dated Hooke's however. On 17 September 1655, Wren mentioned to Samuel Hartlib a book he was "preparing with Pictures of observ*ations* microscop*ical*;" see 'Ephemerides 1655 Part 4', Hartlib Papers, 29/5/46B; https://goo.gl/R3jQV5.

When Hooke paid homage to Wren in the Preface of *Micrographia* as the first person to ever attempt such drawings, he was likely referring to this previous project of Wren's: "I first set upon this Enterprise, yet still came to it with much Reluctancy, because I was to follow the footsteps of so eminent a Person as Dr. Wren, who was the first that attempted any thing of this nature; whose original draughts do now make one of the Ornaments of that great Collection of Rarities in the Kings Closet;" Hooke, *Micrographia*, [g2r].

Wren, and Hooke were appointed to join him to make "more observations of the like nature."[153] It is unclear whether Power's presentation included any drawings of insects; in his *Experimental philosophy, in three books* (London, 1664; *imprimatur* dated 5 August 1663) he would instead mostly opt for lengthy descriptions of his observations of the flea, the bee, various types of flies, lice, spiders, mites, and other insects, announcing at the end of the 'Microscopical observations' section that the reader "may expect shortly from Doctor Wren, and Master Hooke, two Ingenious Members of the Royal Society at Gresham, the Cuts and Pictures drawn at large, and to the very life of these and other Microscopical Representations."[154] Power had been keeping tabs on the progress of Hooke's *Micrographia* through his correspondence with the Royal Society printers John Martyn (1617/18–1680) and James Allestry (*d.* 1670), who printed both of their books. In a letter dated 7 August 1663, Martyn informed Power "Wee have as yett but 2 plates of Mr. Hooke's w*h*ich I have put out to 2 of *th*e best Gravers wee have in Towne, tomorrow I am to Call for more." Two weeks later Allestry updated him, noting "Mr. Hooke hath given mee three Cutts of his Booke w*h*ich are at the Gravers."[155] These letters, which seem to have eluded secondary scholarship, illustrate that Martyn and Allestry were actively liaising between Hooke and the engravers, and that, while he himself did not publish elaborate illustrations, Power was not entirely uninterested in the visual representations of microscopical observations.[156]

Although Power had overlapped with Covel for only one year, being members of the same college, it is likely they would have known one another. Their shared interests may have been purely coincidental, however, and there is no specific evidence of microscope-related activities taking place at Christ's College. Indeed, Covel's interests may have been more related to insects than microscopes, and he may have simply utilised magnifying glasses for his observations.

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153 Birch, vol. 1, p. 266.

154 Henry Power, *Experimental philosophy, in three books containing new experiments microscopical, mercurial, magnetical: with some deductions, and probable hypotheses, raised from them, in avouchment and illustration of the now famous atomical hypothesis* (London: Printed by T. Roycroft, for John Martin, and James Allestry, 1664), p. 83. Power only provided three rudimentary wood-cuts of his microscopical observations: eyes of a field spider, silk ribbons, and corn poppy seeds; see pp. 13, 46, and 49.

155 BL, Sloane MS 1326, fols. 40r and 39r.

156 I was unable to find any insect drawings among Power's papers at the British Library.

Lack of external evidence connecting Covel and Hooke, something Neri herself was aware of, is of course not proof in itself.[157] Thus, secondly, internal evidence from the notebook itself needs to be assessed. Neri based her attribution on several criteria but principally on the handwriting, drawing attention to Hooke's use of the Greek epsilon (ε) for lowercase 'e' in his papers at the Royal Society.[158] It bears mentioning that Hooke was not unique in doing so, nor was his handwriting consistent; and while his later hand shows some resemblances to the notes on fols. 112v and 113v, there are also enough differences to keep an open mind about the authorship.[159] Additionally, the hand attributed to Hooke appears in other parts of the notebook, e.g. on fols. 2r-3v, 113r, 116r, 117v, which is not easy to explain, especially considering some of these are dated 1671, at least a decade after the insect sketches. As an example of how unreliable attributions based on handwriting can be, there is also the uncanny similarity between Hooke and Petiver's to consider. Given Petiver was born *c.* 1665, he can be ruled out as the author of these early sketches, but the similarities between their handwritings, which have even caused one of Hooke's manuscripts to be misattributed to Petiver, do highlight how problematic it can be to attribute a text in this manner without corroborating evidence.[160]

It is likely this notebook dated to Covel's student years, and that he later filled the empty pages with notes taken during different periods of his life. Overall the notes are chronologically out of order, with some sections reversed, showing that the notebook was

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[157] Neri pointed out the lack of an apparent connection in 'Some Early Drawings by Robert Hooke', p. 46.

[158] Ibid., p. 47n5. Felicity Henderson and Sachiko Kusukawa have separately informed me of their doubts regarding Neri's attribution; email communications, 2 May and 8 June 2017, respectively. Henderson, who is an expert in Hooke's handwriting, specifically rejects that the notes, and consequently the drawings, are in his hand.

[159] There are not many extant dated samples of Hooke's hand from 1660 or 1661. One of the closest is 'Finding out the resistance of *th*e air to bodys mov*e*d through it' dated 4 March 1662, now Royal Society, Cl.P/20/01, however it is written in a neat hand making it difficult to compare it to these rough notes.

[160] For the resemblance between their handwritings, see, for instance, Petiver's notes in BL, Sloane MS 3330.

Hooke's notes on the plates of the English translation of Swammerdam's ephemeron book, now BL, Sloane MS 4019, fols. 12r-15v, are attributed to Petiver in the BL online manuscripts catalogue. The notes are not verbatim from the 1681 published version, and are sometimes summarised, allowing the possibility that Hooke may have helped with Lodwick's translation from Dutch, at least as far as the illustrations are concerned. Cf. Jan Swammerdam, *Ephemeri vita: or the natural history and anatomy of the ephemeron a fly that lives but five hours* (London: Printed for Henry Faithorne, and John Kersey . . . , 1681).

used from either end. The notes on folios 4r-21v, written in a neat hand and organised under 'Prolegomenon', 'De logica', and 'De voce', most probably date to Covel's undergraduate years at Christ's College. Immediately following these are Covel's notes, in a much later hand, on the early church, which are perhaps his research towards *Some account of the Greek church* (Cambridge, 1722), published just before his death.[161] These are in turn followed by botanical drawings in Covel's competent hand, with explanatory notes indicating that at least some of them date to the period when he acted as the Chaplain to the Levant Company in Istanbul.[162] On the other side of the volume are notes on fish, birds, and other animals, as well as the insect sketches in question (**Figures III-141 and III-142**).

As it can be discerned from this notebook, as well as his travel journals and other papers at the British Library, Covel was a skilled draftsman (e.g. **Figures III-149. cf and III-150. cf**). A careful look at one of the sketches attributed to Hooke, for instance of a *trombidium holosericeum* or 'red velvet mite' on fol. 112v, reveals a style similar to that in some of Covel's botanical drawings, for instance of a *lotus subbiflorus* on fol. 53r (**Figure III-146. cf**). That it is arranged on the same page as an Ottoman gold coin minted in 1574 during the reign of Murad III, strengthens Covel's connection to the insect drawings. Furthermore, a comparison between the handwriting in Covel's 1661 oration in honour of Charles II's restoration (**Figure III-148. cf**) and the insect sketches (e.g. **Figure III-147**) reveals close similarities in the rendition of the letters A, d, e, p, and the long s's. While all of these point to Covel as the author of the sketches, none of them explain the initials RH marking some of them. While in no way certain, one candidate may be 'R Huntington', with whom Covel corresponded.[163] Discovery of further evidence might reveal a connection between Covel and Hooke, but it would only make a difference in terms of the identification of 'RH'. The similarities of the

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[161] John Covel, *Some account of the present Greek church: with reflections on their present doctrine and discipline; particularly in the eucharist, and the rest of their seven pretended sacraments, compared with Jac. Goar's notes upon the Greek ritual, or Ευχολόγιον* (Cambridge: Cambridge University, 1722).

[162] See, for instance, fol. 30v that has an ink and ink wash drawing of the leaf of a horse chestnut tree, dated 24 April 1671 in 'Perae' and signed with Covel's initials. Pera, now called Beyoğlu, is a district in Istanbul.

[163] Undated letter from Huntington to Covel; BL, Add. MS 22910, fols. 43-44. The letter is dated 25 January, though no year is indicated; internal evidence, such as mentions of Aleppo, suggest 1671.

I was unable to convincingly match the initials noted in the insect sketches to any College fellows, but considering they were mostly dated out of term, he may have been outside of Cambridge when he made these observations.

drawing style to some of his other sketches, and of the handwriting to his 1661 manuscript, strongly suggest that they were in Covel's hand.

e. Sloane MS 1039

Figure III-151. Hooke's copy of his letter "Sent by Dan. Osburn Esq. to his Brother July the 10 1684," with sketches illustrating the use of a quadrant described in the letter. Source: Sloane MS 1039, fol. 100r-v.

Henry Osborne was a mathematical practitioner based in Dardistown near Drogheda in Ireland, and had published a short tract on land surveying about three decades earlier.[164] He had a keen interest in telescopes; indeed the experimental philosopher William Molyneux (1656-1698), founder of the Dublin Philosophical Society, would dedicate the second part of his *Dioptrica nova* (1692) to Osborne, crediting discussions with the latter on telescopic sights and micrometers for his initial interests in the subject.[165]

With this 10 July 1684 letter, Hooke was replying to Osborne's from 26 December 1683 thanking Hooke for the quadrant he had sent, and requesting help with a few features. The quadrant was likely similar to the one depicted in table 1 **(Figure III-152. cf)** in Hooke's *Animadversions on the first part of the* Machina coelestis *of . . . Johannes Hevelius* (London, 1674). As this is Hooke's own copy of his reply, it remains unknown what the original letter looked like, but the integration of text and drawing is noteworthy. This may have been Hooke's scratch paper on which he had made the sketches before neatly explaining them in the letter he sent to Osborne. Alternatively, this may have been how he composed the letter, working simultaneously on the sketches and their descriptions, which would explain why some of the text and drawings overlap.

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[164] Henry Osborne, *A more exact way to delineate the plot of any spacious parcel of land as baronies, parishes, and town-lands, as also of rivers, harbours and loughs, &c. than is as yet in practice: also a method or form of keeping the field-book, and how to cast up the superficial content of a plot most exactly* (Dublin: William Bladen, 1654); on Osborne and on surveying in Ireland especially after the 1652 Act of Settlement, see Charles Webster, *The Great Instauration: Science, Medicine and Reform, 1626–1660*, 2nd ed. (New York: Peter Lang, 2002), pp. 435-444.

[165] William Molyneux, *Dioptrica nova, a treatise of dioptricks in two parts: wherein the various effects and appearances of spherick glasses, both convex and concave, single and combined, in telescopes and microscopes, together with their usefulness in many concerns of humane life, are explained* (London: Ben. Tooke, 1692), pp. 188-189; Molyneux's dedication to Osborne is dated 17 April 1690.

Figure III-152. cf. Hooke, *Animadversions on the first part of the* Machina coelestis *of . . . Johannes Hevelius* (London, 1674) in Hooke's *Lectiones Cutlerianae* (London, 1679), detail from table 1.

Consult the notes for Figure III-151.

Figure III-153. Hooke, '*Memorandum* for 17 Oct. 1682'. Source: BL, Sloane MS 1039, fol. 153r.

In a list of ideas, quickly jotted down in the morning of 17 October 1682, Hooke included a cryptic note that might be about the use of a perpendicular telescope at sea. The small sketch and the mention of a 'box' suggests the note may also be referring to perpendicular rules for his camera obscura.

Figure III-154. Hooke, '*Memorandum* for 27 Oct. 1682'. Source: BL, Sloane MS 1039, fol. 154r.

Hooke's 27 Oct. 1682 *memorandum* on calculating the area under a rhomb line. With the assumption that "the areas of the Rhom*bline*s are the hyperbolick areas on the superficies of a cylinder," Hooke provides a diagram of Gregoire de Saint-Vincent's method of dividing and calculating the areas of the hyperbola, probably from the second book of the Jesuit mathematician's treatise on the quadrature of the circle, *Opus geometricum quadraturae circuli et sectionum coni decem libris comprehensum* (Antwerp, 1647; auct_BH_274).[166] Hooke had purchased a copy on 2 October 1675, although he was already lending Colwell the first part as early as January 1673 so he may have also owned a separate copy of the first book.[167]

Figure III-155. Hooke, '*Memorandum* for 25 June 168[6?], with a sketch of the seal of Johann Joachim Becher's *societatis psychosophicae*'. Source: BL, Sloane MS 1039, fol. 166r.

Hooke's interest in private philosophical clubs date to at least the middle of 1675; indeed, on 1 January 1676, he and several others at the Royal Society actually formed a 'New

[166] Gregoire de Saint-Vincent, *Opus geometricum quadraturae circuli et sectionum coni decem libris comprehensum* (Antwerp: Apud Ioannem et Iacobvm Mevrsios, 1647); Hooke's copy is *RHBdb*, auct_BH_274. Although de Saint-Vincent had failed at the impossible task of quadrature of the circle, his works yielded many useful solutions to calculations of curves.

[167] *Diary i*, pp. 23, 37, 184. Gregoire de Saint-Vincent, *Opus geometricum posthumum ad mesolabium per rationum proportionalium novas proprietates* (Ghent: Typis Balduini Manilis . . . , 1668); Hooke's copy is *RHBdb*, auct_BH_275.

Philosophicall Clubb' which resolved to meet in complete secrecy.[168] Although the club did not last very long, Hooke apparently remained interested in such societies, so when Theodore Haak (1605-1690) told him about *societatis psychosophicae*, he noted it down in a memorandum. It was "A new society intended to be founded by Johan: Joach Becker invented by himself." Hooke explained the acronym in the seal, GEMVT, as a combination of G for Gott (*deus*), E for Engel (*angelus*), M for mensch (*homo*), V for Vieh (*brutum*), and T for Teufel (*diabolus*), with Gemut meaning *mens*, Latin for mind or intellect. Hooke would have been familiar with the German physician and chemist Johann Joachim Becher (1635-1682), now perhaps best known for his phlogiston theory. 'Dr Beckerus' had dedicated his book on the pendulum clock to the Royal Society, which discussed it on 26 February 1680, with Hooke's irritation noted in the minutes.[169]

Figure III-156. Hooke, 'Plan of an unidentified building', n.d. Source: BL, Sloane MS 1039, fol. 167.

This plan, in Hooke's hand, of an unidentified house, is a working sketch, with guidelines laid out in pencil and the overall composition of the rooms sketched below. The building, which appears to be a small, 7-bay mansion, contains two staircases and rooms labeled, in pencil, 'Closet', 'Little parlor, 'Dining Room', 'Hall', and 'Drawing Room'. There is no scale but two area calculations, 42 by 31 and 38 by 44 are given on the upper right corner. While the layout with the elongated wings on either side of the main building resembles that of Montagu House, this plan is too small to be related to that building.

f. Sloane MS 1048

Figure III-157. Hooke, sketch on the verso of 'Mr. Hooke's certificate', 16 May 1682. Sloane MS 1048, fol. 62v.

On the recto of this folio is a draught report Hooke probably dictated to an amanuensis during his visit to Guildhall on 16 May 1682.[170] It is in regard to damages from heavy rain accumulation due to insufficient drainage at one of the properties owned by Nicholas Barbon

168 *Diary i*, p. 205.

169 Birch, vol. 4, pp. 16-17.

170 In his diary, Hooke noted meeting with John Lawrence (*d.* 1692) at Guildhall and receiving payments for work; see *Memoranda*, p. 153.

(1637/1640–1698/9). Barbon, an honorary fellow of the Royal College of Physicians, was a major figure in the rebuilding of London; he advocated free trade, pioneered fire insurance, and remained a contentious figure among the learned or genteel society.[171] On the verso of the report, along with the identification 'Mr. Hooke's Certificate', is this pencil sketch of a pump, almost certainly in Hooke's hand. It might represent a mechanical solution Hooke proposed to the problem of heavy rain accumulation mentioned in the report, but there is not enough information to be sure.

g. Sloane MS 4024

Figures III-158 to 160. Hooke, diary entries for 16 and 18 Aug. 1689, 29 Aug. 1689, and 12 Sep. 1689. Sloane MS 4024, fols. 43r, 45r, 49r.

Sloane MS 4024 is a pocket-sized manuscript containing Hooke's later diary; it was transcribed and reproduced by Robert T. Gunther in 1935 and is abbreviated as *Diary ii* in this dissertation. It contains far fewer images than Hooke's earlier diary (**Figures III-197 to 214**), but the latter was in a generous folio format so this may be at least partly ascribed to a lack of space. Indeed, the few images that Hooke uses serve mostly as icons; for instance, the spectacles (**Figure III-159**) and the bowl (**Figure III-160**) simply stand in for the word rather than illustrate anything further. The two exceptions are the microscopic view of "the yellow Dust of Sunflower, like amber balls with prickles" on 16 August 1689, and two days later, the small mathematical diagram probably showing elliptical motion (**Figure III-158**).

h. RP 9026

RP 9026 is composed of six colour photocopies of the proof plates engraved from drawings by Hooke, illustrating the inventions announced in his *Lectiones Cutlerianae* (London, 1679). The current location

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[171] Barbon gets a few unqualified mentions in Hooke's earlier diary. On Barbon, see 'Barbon, Nicholas (1637/1640–1698/9)', *ODNB*; Matthew C. Hunter, 'Architecture of Science and the Science of Architecture', in *Wicked Intelligence: Visual Art and the Science of Experiment in Restoration London* (Chicago: The University of Chicago Press, 2013), pp. 188-221; Elizabeth McKellar, *The Birth of Modern London: The Development and Design of the City 1660–1720* (New York: Manchester University Press, 1999), in *passim*.

John Lowther (*bap.* 1642, *d.* 1706), F.R.S., however, found Barbon's speculative building practices inspirational for his own development of the port town of Whitehaven; see Sylvia Collier and Sarah Pearson, *Whitehaven 1660–1800. A New Town of the Late Seventeenth Century: a Study of Its Buildings and Urban Development* (London: Her Majesty's Stationary Office, 1991), p. 27 and Chapter IV, ii. 34, in this dissertation.

of the original proof plates is not indicated, though it is presumably outside of the UK as they were deposited in 2006 with the British Library's collection of 'Copies of Exported Manuscripts Deposited under Government Export Regulations'. The file is restricted with no photography allowed, thus only reproductions of the final printed versions are provided here for reference.

The proofs were likely created between 1674 and 1677 when the individual lectures were prepared. Hooke was very hands-on with the production of his plates and there are numerous diary entries illuminating the different stages of the process. To give an example: on 1 August 1674, at his printer John Martyn's place, Hooke noted seeing proof of a plate prepared by the engraver William Faithorne (*c.* 1620-1691).[172] The next day he 'lettered' it, probably adding labels and text, and the following day took the plate back to Martyn's for Faithorne to finish.[173] Hooke did not specify the name of that book but two years later noted giving William Sherwin (*c.* 1645-after 1709), another London engraver, the last plate of *Lampas*.[174]

Figure III-161. cf. Tables 1 and II in *A Description of helioscopes, and some other instruments made by Robert Hooke* . . . (London, 1676) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in BL, RP 9026, nos. 1 and 2.

> Both proofs (RP 9026, nos. 1 and 2) contained manuscript corrections to the labels. Additionally, table 1 had an illegible note in the margin and shading was added to one of the boxes.

Figure III-162. cf. Tables I & 2 of *Animadversions on the first part of the Machina coelestis of . . . Johannes Hevelius . . . ; Together with an explication of some instruments made by Robert Hooke* (London, 1674) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in BL, RP 9026, nos. 3 and 4.

> Neither of the proofs (RP 9026, nos. 3 and 4) contained any numbers, and there were no apparent manuscript additions**.**

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[172] On Faithorne and other renowned London engravers of the era, see Griffiths and Gerard, *The Print in Stuart Britain, 1603-1689*, pp. 125-128, *passim*. A more general source is Michael Bryan, *Dictionary of Painters and Engravers, Biographical and Critical* (London: George Bell and Sons, 1889).

[173] *Diary i*, p. 115.

[174] *Diary i*, pp. 247-248. On Sherwin, see Griffiths and Gerard, *The Print in Stuart Britain, 1603-1689*, pp. 212-214.

Figure III-163. cf. Tables I and III of *Lampas: or, descriptions of some mechanical improvements of lamps & waterpoises. Together with some other physical and mechanical discoveries. Made by Robert Hooke* . . . (London, 1677) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in BL RP 9026, nos. 5 and 6.

Figure 2 in the proof of Table I (RP 9026, no. 5) was missing some shading. The proof of Table III (RP 9026, no. 6) lacked the table number but otherwise appeared to be identical to the printed version.

ii. 3. BRITISH MUSEUM, LONDON

Figure III-164. Hooke (attrib.) or Pearce (attrib.), '[Elevation of a 17thC building with cupola Pen and brown ink, with grey wash, over graphite]', n.d. Source: BM, Ee,2.119, AN1265760001.

There is no information about the provenance of this anonymous drawing. It appears to have been acquired by the British Museum sometime between 1753 and 1833, though it is not known by what means. Described as an "Elevation of a 17thC building with cupola Pen and brown ink, with grey wash, over graphite," it is a drawing of a stately building with a central cupola topped with an urn, two smaller concave cupolas at the end bays, and balustrades at roof level. Although it is unclear whether the attribution to Hooke originated from John Harris, he identified it as being by "Robert Hooke, or Office of Sir Christopher Wren" in a short essay on Kneller Hall in Middlesex.[175] The architect of Kneller Hall, which was built *c.* 1709 for the English court painter Godfrey Kneller remains unknown though Harris conjectures that it might have been by Wren or one of his associates, and insinuates that Hooke's design may have been an immediate antecedent. Geraghty, on the other hand, suggests that the drawing may instead be by Edward Pearce who was supplying a design for the Arundel House *c.* 1676.[176] See also Chapter IV, ii. 53, on Kneller Hall.

[175] John Harris, 'Kneller Hall, Middlesex', in *The Country Seat: Studies in the History of the British Country House, Presented to Sir John Summerson on his Sixty-Fifth Birthday Together with a Select Bibliography of his Published Writings*, ed. Howard Colvin and John Harris (London: Allen Lane The Penguin Press, 1970), pp. 81-84, at p. 83.

[176] Geraghty, *Architectural Drawings of Wren*, p. 205.

Figure III-165. cf. Wren, 'Study for the dome of St. Paul's Cathedral using a cubic parabola', *c.* 1690. Source: BM, 1881,0611.203, AN290173001.

> At the 8 December 1670 meeting of the Royal Society, Hooke brought in an architectural problem: if the height of an arch and the distance between its two pillars were known, what would be its proper shape? He had a solution in mind, of course, and said he would share his 'demonstration', i.e. mathematical proof, with the president. A week later, he "represented the mechanical way of making an arch of such a figure" and claimed he had given his demonstration to the president. Subsequent attempts at persuading him to share his demonstration with the Society were unsuccessful, even after it was announced that Wren had handed in his own alleged proof.[177]
>
> It is generally accepted that neither Hooke nor Wren were able to prove the catenary, but no other seventeenth-century mathematician was able to either. The lack of a mathematical proof did not prevent experimenting with physical models to work out the correct shape mechanically, however, and a year later, Hooke was able to produce "the representation of the figure of the arch of a cupola for the sustaining such and such determinate weights, and found it to be a cubico parabolical conoid, adding, that by this figure might be determined all the difficulties in architecture about arches and butments."[178] The cubico parabolical conoid was formed by rotating the curve $y=x^3$ around the y axis, but it did not exactly yield a three-dimensional catenary arch. This would not have mattered in practical terms, however. Despite all the interest in the mathematics of these shapes, Wren would still work with models since, as Campbell points out "Structural mechanics was in its infancy and it was not yet possible to use mathematics alone to calculate whether a masonry building would stand up."[179]

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[177] Birch, vol. 2, pp. 461, 464, 465. Sources on Hooke and Wren's work on the catenary arch include Philippe Block, Matt DeJong, and John Ochsendorf, 'As Hangs the Flexible Line: Equilibrium of Masonry Arches', *Nexus Network Journal* 8 (2006), pp. 13-24; James W. P. Campbell, 'Catenary Curves and Parabolic Conoids', in *Building St. Paul's* (London: Thames & Hudson, 2007), pp. 138-144; Jacques Heyman, 'Hooke's Cubico-Parabolical Conoid', *Notes and Records of the Royal Society* 52 (1998), pp. 39-50; Gordon Higgott, 'Wren Office Drawings', https://goo.gl/tbPpZE. See also the notes on vaults and domes in Soo, *Wren's "Tracts" on Architecture and Other Writings*, pp. 149-152, and *passim*.

For a brief introduction to the European context, see John Bukowski, 'Christiaan Huygens and the Problem of the Hanging Chain', *The College Mathematics Journal* 39 (2008), pp. 2-11.

[178] Birch, vol. 2, p. 498 [misprinted as 984]; Campbell, 'Catenary Curves and Parabolic Conoids'.

[179] Ibid., p. 144. While it was not yet possible in practical terms, the interest in bridging the gap between mathematical shape and material reality persisted. On 8 January 1674, mathematician John Wallis, for instance,

Hooke continued to work on the arch problem until he came up with a mechanical solution a few years later. To buy himself time to work out a mathematical proof, and to be able to claim priority later, he published it as an anagram in his *A description of helioscopes* (London, 1676). It read, as deciphered by Richard Waller in his biographical preface to Hooke's posthumous works: "Ut pendet continuum flexile, sic stabit contiguum rigidum inversum," i.e. "As hangs the flexible line, so but inverted will stand the rigid arch."[180]

By this time, Hooke had already told Wren about his solution. On 5 June 1675, he noted in his diary "[Wren] was making up of my principle about arches and alterd his module by it," which was interpreted in the past as Wren using Hooke's catenary arch for the dome of St. Paul's.[181] Campbell has cast some doubt on that assumption by pointing out that an arch and a dome are very different structures, and that it was too early for this entry to be referring to the dome of St. Paul's anyway.[182] Whatever the topic of their discussion that day was, when it came to designing the dome, Wren may have tried to make use of Hooke's idea of the cubico parabolical conoid, as it can be seen in his sectional study **(Figure III-165. cf)**. But even with

told Hooke about "his calculating the Distance of the arches analytically;" *Diary i*, p. 79. For a long time by then, Wallis had also been interested in 'reciprocal grillage structures', e.g. the so-called 'Serlio floor'. He had even presented a model of it to the King in 1660, and ten years later published his pioneering structural analysis of it in John Wallis, *Mechanica, sive, de motu, tractatus geometricus* (London: Gulielmi Godbid; impensis Mosis Pitt . . . , 1670). It was later re-published in his John Wallis, *Opera mathematica* (Oxford: Theatro Sheldoniano, 1695), this time with an illustration. See also Guy T. Houlsby, 'John Wallis and the Numerical Analysis of Structures', *Nexus Network Journal* 16 (2014), pp. 207-217.

180 "The true Mathematical and Mechanichal form of all manner of Arches for Building, with the true butment necessary to each of them. A Problem which no Architectonick Writer hath ever yet attempted, much less performed. abccddeeeee f gg iiiiiiii llmmmmnnnnnooprr sssttttttuuuuuuuux;" Robert Hooke, *A description of helioscopes and some other instruments* (London: Printed by T.R. for John Martyn . . . , 1676), p. 31. Waller, p. xxi; Waller noted it as the "Linea Catenaria."

181 *Diary i*, p. 163.

182 Campbell, 'Catenary Curves and Parabolic Conoids', p. 142. A more likely scenario is that they were discussing foundations. At this time, Hooke was designing inverse arches for the foundations of Montagu House, a technique he had learnt from Alberti's book (see Chapter II), and it was discovered in 1970 that Wren had used the same for the Trinity College Library. The 'principle about arches' was very likely related to foundations rather than St. Paul's dome; David McKitterick, ed., *The Making of the Wren Library, Trinity College, Cambridge* (New York: Cambridge University Press, 1995), pp. 40-41.

a rational formula at hand, Wren wanted to ensure that the design worked, and ended up having large scale models constructed for extensive testing.[183]

Figure III-166. Wren, 'Design for the finial of the Monument', *c.* 1675. Source: BM, 1881,0611.205, AN290174001.

Consult the notes for Figure III-102, and see Chapter IV, ii. 6, on Hooke's work on the Monument to the Great Fire of London.

ii. 4. [CAMBRIDGE] CAMBRIDGE UNIVERSITY LIBRARY[184]

Figure III-167. a. Hooke's sketch of the 66-foot telescope in his letter to Hevelius, *c.* 20 February 1667. CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/117v.[185]

Consult the notes for Figure III-1.

Figure III-167. b. Hooke, 'Letter to Hevelius regarding telescopic sights', *c.* May 1668. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/129v.

Note that the description of this letter in the CUL manuscript catalogue as "Oldenburg's draft Latin translation of Hooke's paper on telescope sights, for Hevelius" is incorrect; in fact, the letter is in English and in Hooke's hand, although the subject matter (telescopic sights) is indeed correct. Oldenburg's note indicates that it was translated and sent to Hevelius on 11 May 1668; that letter in turn has been translated back into English and reproduced in the

[183] Campbell, 'Catenary Curves and Parabolic Conoids', p. 144. See also Anthony Gerbino and Stephen Johnston, *Compass and Rule: Architecture as Mathematical Practice in England, 1500–1750* (New Haven, CT: Yale University Press, 2009), pp. 100-104.

If we are to take a piece of historical hearsay seriously, Hooke may have been bragging at some point that "he would under*t*ake to build St. Pauls church, with a Rotundo, this without any Pillar . . . at the same charge that Sr. Christopher Wren does his Modell." Hooke's characteristic boastfulness aside, this may have been a not-so-veiled criticism of Wren's propensity to order expensive models. On the quote, see the notes below for Figure III-191.

[184] Note that there are further sketches in Hooke's hand in CUL, Add. 9597/13/5, however I was unable to access them in time to include in this dissertation.

[185] The letter has been transcribed and reproduced in Rigaud, *Correspondence of Scientific Men*, vol. 1, pp. 179-182; Hooke's illustration was diagrammatically reproduced as pl. 2, fig. 2 (Figure III-168. cf. c).

Oldenburg correspondence.[186] Hooke had also drawn a telescopic sight in his illustration of the telescope installed in the yard of Gresham College; see **Figure III-281**. *See also the notes for Figure III-1.*

Figure III-168. cf. a. Oldenburg's notes on Hooke's February 1667 letter to Hevelius, with his copy of Hooke's sketch. CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/116r.

Consult the notes for Figure III-1.

Figure III-168. cf. b. Author's collage of the two sketches, showing their near-identical size and composition. CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/116r and 117v.

Consult the notes for Figure III-1.

Figure III-168. cf. c. A diagram of Hooke's sketch in Figure III-165, published in Stephen Jordan Rigaud, ed., *Correspondence of Scientific Men of the Seventeenth Century* (Oxford, 1841), vol. 1, pl. 2, fig. 2.

Consult the notes for Figure III-1.

Figure III-169. Hooke, 'Instrument for measuring gravitational differences', sketched in the attachment to his 21 March 1666 letter to Robert Boyle. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/118v.

At the 21 March 1666 meeting of the Royal Society, Hooke read a paper on gravity. Back in December 1662, he had attempted at measuring differences in gravity "removing *th*e Body further from *th*e Surface of t*h*e Earth upwards;" i.e. literally by conducting his experiment at the top of Westminster Abbey.[187] For his experiment in 1666, he devised an instrument for measuring gravitational differences; a sketch of it, alongside a copy of his paper, were entered into the Record Book of the Royal Society (**Figure III-323**). On the same day, Hooke wrote to Robert Boyle in Oxford, attaching a copy of the paper, sketching the instrument in the lower right-hand corner (**Figure III-169**).[188]

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[186] *Oldenburg Correspondence*, vol. 4, pp. 393-398.

[187] Hooke's paper, dated 24 December 1662, is now RS, Cl.P/20/07.

[188] For the most recent transcription of Hooke's letter and paper on gravity, see *Boyle Correspondence*, vol. 5, pp. 119-124.

Figure III-170. Hooke, 'Diagram of a telescope', 1667[?]. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/122av.

The CUL manuscript catalogue identifies this sketch simply as 'a diagram of a telescope'. On the recto of the folio are some calculations, along with the note, in Hooke's hand, 'Dr Clark'. The latter most likely refers to the physician and anatomist Timothy Clarke (*d.* 1672), who was one of the original fellows of the Royal Society, however there is no indication that these notes are related to the sketch.[189] The folio is bundled with a three-page manuscript titled 'Experiments and observations recommended to Mr. Hook', thought to date around 1667, and may be related to one of thirty-eight recommendations.

Figure III-171. Hooke, 'Drawings related to experiments conducted on 11 July 1683, 9 and 16 Jan. 1684'. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/135r, 143v, 145r.

These drawings are in Hooke's manuscript accounts of the experiments and discourses he made before the Royal Society in 1683 and 1684. They are presumably in his hand, although it cannot be ruled out that some help may have been provided by an assistant. The sketch on the left is a way to prevent a heavy object held up by a rope or chain from falling down in the event of a breakage, the ones in the middle and on the right are two types of scales for measuring weight.[190]

Figure III-172. Hooke, 'Magnetical orbs formed around a terrella', 26 Feb. 1674. Source: CUL, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/155a.

Attached to this undated drawing is Hooke's description of one of his terrella experiments dating to the 26 February 1674 meeting of the Royal Society.[191] Presumably it was prepared for that meeting or for one of the subsequent experiments Hooke conducted with the spherical

[189] For biographical details, see 'Clarke, Timothy (d. 1672)', *ODNB*.

[190] These experiments are described in Birch vol. 4, pp. 214, 245, 250; and Derham, *Philosophical experiments and observations*, pp. 109-110, 118-123, the latter with reproductions of the images on pp. 109, 118, 122.

[191] Birch, vol. 3, p. 128; see also pp. 130, 133, 137.

magnet. The experiment involved tracing "the inclination of the lines of direction to the axis of the terrella." The latter was fit into a hole cut into a round table on which a large skin of parchment was stretched like a drum head. When fine iron filings were sprinkled on the parchment, they arranged themselves into "magnetical orbs" which were judged to be of a single oval figure of different sizes. However, Hooke noted that this was a just guess and further experiments would need to be conducted to verify their exact shape. Interestingly, previous experiments dating back to 1666 did not question their oval figure.[192]

ii. 5. [CAMBRIDGE] TRINITY COLLEGE, UNIVERSITY OF CAMBRIDGE

Figures III-173 to III-175. Hooke, detail from 'Hook's musick scripts' (notes on music and an alphabetical musical notation), 1671-1676. Trinity College, Cambridge, MS O.11a.1[11a], O.11a.1[11b], and MS O.11a.1[12].

Hooke's Trinity manuscripts on music have been studied by Jamie C. Kassler and David R. Oldroyd, and his other tract, 'A curious dissertation concerning the causes of the power & effects of music', now Cl.P/2/31 and 32 at the Royal Society, by Penelope Gouk.[193] See also **Figure III-288** below for his work on a 'mathematical language'.

Figures III-176 to III-180. Hooke, 'Laws of Circular motion', 1685; 'Notes on velocity and motion', n.d. Trinity College, Cambridge, MS O.11a.1[16b], O.11a.1[16d], MS O.11a.1[16f], MS O.11a.119, O.11a.1[20(r)].

Hooke's notes on circular motion are often studied in the context of his work on orbital dynamics as well as his priority dispute with Newton. While the subject is not treated at length here, his mathematical drawings are discussed in general terms in the first part of this chapter. For other related drawings, see **Figures III-194, III-274, III-275, III-277, and III-353 to III-355. cf**.[194]

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[192] See especially Birch, vol. 2, pp. 85, 88.

[193] Jamie C. Kassler and David R. Oldroyd, 'Robert Hooke's Trinity College 'Musick Scripts', his Music Theory and the Role of Music in his Cosmology', *Annals of Science* 40 (1983), p. 559. See also Jamie C. Kassler, *Inner Music: Hobbes, Hooke and North on Internal Character* (Madison, NJ: Fairleigh Dickinson University Press, 1995); Penelope Gouk, 'The Role of Acoustics and Music Theory in the Scientific Work of Robert Hooke', *Annals of Science* 37 (1980), pp. 573-605.

[194] Secondary literature on the subject include Ofer Gal, 'Hooke's Programme: Final Thoughts', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 33-

Figure III-181. Hooke, 'Sketch elevation of an unknown building, drawn on the verso of notes on velocity and motion', n.d.. Trinity College, Cambridge, MS O.11a.1[20(v)].

On the verso of his undated notes on velocity and motion, Hooke has roughly sketched this elevation. As his notes are undated, it is difficult to associate the drawing with any particular project, but it does bear some resemblance to Merchant Taylors' School (Chapter IV, ii. 18) which Hooke designed in 1674. If the notes are from the same period as the others on circular motion, which have been dated to 1685, this would be too early. With no extant diaries between mid-1683 and late 1688, it would be difficult to find another candidate. There is a similar, albeit more detailed, sketch among Hooke's papers at the British Library (**Figure III-47**); it too remains undated.

ii. 6. [CAMBRIDGE] WHIPPLE LIBRARY, UNIVERSITY OF CAMBRIDGE

Figures III-182 and III-183. Hooke, 'Notes on Pierre de Fermat's *Varia opera mathematica* (Toulouse, 1679)', after 1681. Whipple Library, University of Cambridge, classmark STORE 57:20.

Inserted in Hooke's copy of Pierre de Fermat's *Varia opera mathematica* (Toulouse, 1679) are four loose folios with manuscript calculations and mathematical sketches in his hand.[195] Of these, **Figure III-183** is an illustration of Fermat's theory of refraction. Written in an unusually neat hand, Hooke may have prepared it for his presentation of the book to the Royal Society.[196]

48; Michael Nauenberg, 'Hooke, Orbital Motion, and Newton's Principia', *American Journal of Physics* 62 (1994), pp. 331-350; Michael Nauenberg, 'Robert Hooke's Seminal Contribution to Orbital Dynamics', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 3-32; Louise Diehl Patterson, 'Hooke's Gravitation Theory and Its Influence on Newton. I: Hooke's Gravitation Theory', *Isis* 40 (1949), pp. 327-341; Patri J. Pugliese, 'Robert Hooke and the Dynamics of Motion in a Curved Path', in *Robert Hooke: New Studies*, ed. Michael Hunter and Simon Schaffer (Woodbridge: The Boydell Press, 1989), pp. 181-205. Also of interest, although they do not cover Hooke's manuscript drawings, is Ofer Gal and Raz Chen-Morris, 'Nature's Drawing: Problems and Resolutions in the Mathematization of Motion', *Synthese* 185 (2012), pp. 429-466.

[195] Pierre de Fermat, *Varia opera mathematica* (Toulouse: Apud Joannem Pech, 1679); *RHBdb* auct_BH_277. The folios are inserted between pp. 44 & 45, 62 & 63, 64 & 65, and 158 & 159; I am grateful to Anna Jones, the Whipple Librarian, for her help in locating these manuscript notes and providing me with photographs.

[196] In his 1690 lecture on Huygens's *Traité de la lumière* (Lyon, 1690), now Trinity College, Cambridge MS 0.11a.1[14A-B], Hooke noted that he had shown a demonstration of Fermat's theory of refraction a few years prior. For more on Hooke's notes on Fermat, see 'Part II. 2. Manuscript inserts' in Poole, Henderson, and Nasifoglu,

He had purchased the book in June 1681 from the mathematician John Collins, so the notes date to sometime after then.[197] See also **Figure III-290** and the annotations for **Figure III-58**.

ii. 7. CHEROKEE RANCH AND CASTLE FOUNDATION, COLORADO, USA [BUTE COLLECTION]

Wren's drawings and collection of antiquities, which had been inherited by his son, were sold at auction in 1749 after the latter's death. More than a hundred of the drawings, related to Wren's work on the London churches, St. Paul's Cathedral, Whitehall, and other projects, were purchased by the 3rd Duke of Argyll. After his death, these were acquired by the 3rd Earl of Bute and eventually passed onto the 5th Marquess of Bute whose collection of architectural drawings were sold at a Sotheby's auction in 1951. A large proportion of the drawings in the Bute collection ended up being divided among different purchasers. Some of the lots were eventually acquired by Mrs. Tweet Kimball in Colorado, and ended up at the Cherokee Ranch and Castle Foundation.[198]

Eight of the drawings that made their way to Colorado have been attributed to Hooke by Geraghty; they are all related to the London Parish Churches (Chapter IV, ii. 5). Unable to study the drawings in person, I have had to rely on the catalogues by Summerson and Geraghty for their descriptions. The images are sourced from Summerson and Harris, as indicated:[199]

Figure III-184. Hooke (attrib.), 'Plan and section looking west of St. Benet, Thames Street: design A (with attic)', n.d. Source: Summerson 'Drawings of London Churches', fig. 10 (Bute no. 19).

Figure III-185. Hooke (attrib.), 'East elevation of St. Benet, Thames Street: design A (with attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11a (Bute no. 20).

'Editors' Introduction'. On Fermat, see Michael Sean Mahoney, *The Mathematical Career of Pierre de Fermat, 1601–1665* (Princeton: Princeton University Press, 1994).

197 *Memoranda*, p. 149.

198 John Summerson, 'Drawings of London Churches in the Bute Collection: A Catalogue', *Architectural History* 13 (1970), pp. 30-42, 93-118, pp. 30-31; Geraghty, *Architectural Drawings of Wren*, p. 7. The latter source includes an extensive catalogue of Wren's other drawings now at All Souls College, where Wren had been a fellow. For the collection of over two hundred drawings related to St. Paul's, see Higgott, 'Wren Office Drawings'. See also Figures III-215 to III-223.

199 Geraghty, *Architectural Drawings of Wren*, p. 100; Summerson, 'Drawings of London Churches in the Bute Collection: A Catalogue', p. 35, figs. 10, 11a-11d; John Harris, *A Catalogue of British Drawings for Architecture, Decoration, Sculpture and Landscape Gardening 1550-1900 in American Collections* (Upper Saddle River, NJ: The Gregg Press, 1971), pl. 227.

Figure III-186. Hooke (attrib.), 'Definitive version of the east elevation of St. Benet, Thames Street: design A (with attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11b (Bute no. 21).

Figure III-187. Hooke (attrib.), 'East elevation of St. Benet, Thames Street: design B (without attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11c (Bute no. 22).

Figure III-188. Hooke (attrib.), 'Section looking west of St. Benet, Thames Street: design B (without attic)', n.d. Source: Summerson, 'Drawings of London Churches', fig. 11d (Bute no. 23).

Figure III-189. Hooke (attrib.) [previously attrib. Wren], 'Plan suitable for both designs A and B, St. Benet, Thames Street', n.d. Source: John Harris, *A Catalogue of British Drawings*, pl. 227 (Bute no. 24).

Figure III-190. Hooke (attrib.), 'Project for St. Clement Danes: plan', n.d. Source: Summerson, 'Drawings of London Churches', fig. 12 (Bute no. 27).

Figure III-191. Hooke (attrib.), 'Project for St. Clement Danes: West elevation', n.d. Source: Summerson, 'Drawings of London Churches', fig. 13 (Bute no. 28).

ii. 8. CUMBRIA ARCHIVE CENTRE, CARLISLE

Figure III-192. Edward Pearce (previously attrib. to Hooke), 'Elevation and partial plan of a design for a new mansion', *c.* 1680–1690. DLONS/L11/4/1, Cumbria Archive Service, Carlisle.

> Currently among the papers of the Lowther family, Earls of Lonsdale, at Cumbria Archive Service in Carlisle, this drawing was first attributed to Hooke by the art historian Howard Colvin in the 1978 edition of his *Biographical Dictionary of British Architects*.[200] Two years later, Colvin reproduced it in a small catalogue of drawings from Lowther Castle as an 'Elevation and partial plan of a design for a new mansion, attributed to Robert Hooke'. At the time, Colvin's justification for the attribution was that "not only is the scale figured in [Hooke's] hand, but such features as the pronounced chimney-stacks, the dormer windows and the balustrade recall Escot House, Devonshire (*c.* 1680–88), of which he was probably the architect, while the cupola is almost identical to that on the street-screen of Montagu House,

[200] Colvin, *BDBA* (1978), p. 430. Colvin did not mention this drawing in the 1954 first edition of his book; see Colvin, *BDBA* (1954), pp. 295-297.

the Bloomsbury residence of Ralph, 1st Duke of Montagu, which Hooke designed in 1675–79."[201]

The heavily-damaged presentation drawing features an elevation and partial plan of what is thought to be an unrealized design for the rebuilding of Lowther Hall which John Lowther was planning *c.* 1690.[202] The fact that there were two 'John Lowther's (i.e., Sir John Lowther, first Viscount Lonsdale (1655–1700), and his cousin Sir John Lowther (*bap.* 1642, *d.* 1706), second Baronet of Whitehaven) has caused some understandable confusion in the secondary scholarship; this is addressed in Chapter IV, ii. 34 and ii. 43. The references in the diary to 'Lowther' likely refer to the latter cousin, 'Lowther of Whitehaven', who was an active fellow of the Royal Society since his election in 1664. On the other hand, 'Lowther of Lonsdale', for whom the Hall was being built, would not be elected fellow for another thirty-five years.

Indeed, in the 2008 edition of *A Biographical Dictionary of British Architects*, Colvin changed the attribution of the drawing in question to Edward Pearce or Pierce (*c.* 1635-1695) noting that "the scale is identical to the scales on drawings by him, notably for the Bishop's Palace at Lichfield" the rebuilding of which Pearce had supervised in 1686-7.[203] Pearce was an accomplished sculptor and mason, working with Roger Pratt at Horseheath Hall in Cambridge in 1665, and after the Great Fire, with Wren on the City churches and St. Paul's Cathedral.[204] He was also occasionally employed as a draughtsman by Wren and Hooke, though it remains unclear whether he designed the details he was tasked with drawing.[205]

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[201] Howard Colvin, J. Mordaunt Crook, and Terry Friedman, eds., *Architectural Drawings from Lowther Castle, Westmorland*, Architectural History Monographs: No. 2 ([London]: Society of Architectural Historians of Great Britain, 1980), pp. 23-24, pl. 3a. See Chapter IV, ii. 19, on Montagu House. Escot House was later de-attributed; see chapter IV, ii. 32.

[202] Colvin, *BDBA* (1978), p. 430; Colvin, Crook, and Friedman, *Architectural Drawings from Lowther Castle, Westmorland*, p. 23.

[203] Colvin, *BDBA* (2008), p. 793. In addition to the Bishop's Palace, Pearce is credited as the sole designer of the Pillar at Seven Dials in London. Incidentally, the Bishop's Palace does bear some resemblance to the design of a country house, the drawing of which is now at Worcester College, Oxford; see Figure III-214.

[204] For Pearce's involvement in the City churches, e.g. St. Andrew Holborn, St. Clement Danes, St. Lawrence Jewry, St. Mary-le-Bow, and St. Thomas the Apostle in Southwark, see Jeffery, *City Churches of Wren*.

[205] Colvin notes that some of Pearce's drawings published in *Wren Society*, vol. 17 as pls. 22, 23, 24, and 26 were wrongly attributed to his friend and colleague William Talman (1650-1719). In his will, Pearce had stipulated that Talman could select and keep items from his collection of books, drawings, and plaster figures.

ii. 9. LINCOLNSHIRE ARCHIVES, LINCOLN

Figure III-193. Anon., 'Modell of St. Pauls', n.d. Source: Lincolnshire Archives, Lincoln, 1-Worsley/35, p. 33.

A commonplace book at Lincolnshire Archives, currently 1-Worsley/35, contains a rudimentary sketch labelled 'Modell of St. Pauls'. It is a plan view of St Paul's dome, as supposedly proposed by Hooke, accompanied by the explanatory note:

> Mr. Rich*ard* Hooke says that he would und*er*take
> to build St. Pauls church, with a Rotundo, this
> without any Pillar.
> Height 6 hundred feet from the top whereof
> might be seen all England, and that he would
> do this at the same charge that Sr. Christopher
> Wren do*e*s his Modell.
> M*emoran*d*u*m 'twas Sr. J*ohn* Hoskins that first hinted this
> notion.[206]

While perhaps a piece of historical hearsay, this note is nonetheless important for its hint that Hooke's characteristic competitiveness extended into his friendship with Wren, whom he has always appeared to have had the utmost respect for, referring to him as 'Sir Wren' even in his private diaries. Here there is implicit criticism of the cost of Wren's 'Great Model', which was built at a scale of 1:25 by William Cleere in 1674 for the vast sum of £600.[207] The projected height of six hundred feet, more than twice that of the current dome, is a substantial exaggeration, as is the supposed visibility of all of England from the top of the dome. The idea of a rotunda without any pillars is difficult to interpret. It may have been a misunderstanding of Hooke's idea of the catenary arch, or perhaps it was meant to refer to a structure in the

When Talman's collection eventually ended up in various repositories including the British Museum, he was assumed to be the author of Pearce's drawings; see Colvin, *BDBA* (2008), p. 793.

[206] Lincolnshire Archives, Lincoln, 1-Worsley/35, p. 33.

[207] This model is still on display at St. Paul's Cathedral; see https://goo.gl/QE8R9p.

style of Hagia Sophia, which Hooke was actively interested in in 1677 **(Figure III-212)**. It could also be suggesting the type of dome featured in a print among Hooke's papers at the British Library **(Figure III-13)**. It is impossible to know whether Hooke ever owned the plan corresponding to this longitudinal section but there are faint similarities between this crude sketch and the woodcut plan from the workshop of du Cerceau **(Figure III-14. cf)**.

All of this assumes that the note, indeed one that refers to Hooke as 'Richard', can be considered reliable, thus an assessment of its source is crucial. Judging from the mention of Sir John Hoskins and the fact that most of the surrounding texts are extracts from John Aubrey's *The natural history of Wiltshire*, the note can be reliably traced back at least to Hooke's close friend Aubrey. The latter's book on Wiltshire remained in manuscript until it was published in a heavily abridged form in 1847, so the author of this commonplace book in which the note appears must have had access to Aubrey's manuscript, a fair-hand copy of which had been deposited at the Royal Society in 1691.[208] There is limited information about the authorship of the manuscript, which is part of a collection inherited from the antiquary and politician Sir Richard Worsley (1751–1805) and has been loaned to Lincolnshire Archives since 1957.[209] It is composed of two parts in two separate handwritings: the first one containing extracts and recipes some of which can be traced to Aubrey's works, and the second extracts from Thomas Sprat's *The history of the Royal Society of London* (London, 1667).[210] The Lincolnshire archivists' report suggests that the handwriting in the latter section may belong to Henry Worsley (1651–1733), who was elected to the Royal Society in 1705, a fellowship that would have given him access to their library and manuscript collections, including the fair-hand copy of Aubrey's text.[211] The handwriting in the first part, where the sketch and accompanying note appear, remains unidentified. A further difficulty is posed by the fact that the sketch and note

[208] The 1691 copy is now RS, MS 92, and was the basis of John Aubrey, *The Natural History of Wiltshire by John Aubrey, F.R.S. (Written between 1656 and 1691)*, ed. John Britton (London: Wiltshire Topographical Society, 1847).

[209] Benjamin Worsley (1617/18–1677), who had been active in the early years of the Royal Society, does not appear to be a relation.

[210] Sprat, *History of the Royal-Society*.

[211] *Archivists' Report 15 (19th March 1963 – 31st March 1964)*. For Worsley's dates of birth and death, as well as of his election to the Royal Society, see Thomas Thomson, *History of the Royal Society, from Its Institution to the End of the Eighteenth Century* (London: Printed for Robert Baldwin, 1812), p. xxxi of the Appendix.

are not in any of the known extant manuscripts of Aubrey's *Natural history of Wiltshire*.[212] This makes it likely that some of the extracts, including the sketch and note, were taken from 'Hypomnemata Antiquaria B', the second volume of Aubrey's book, which has been lost ever since it was borrowed by his brother William in 1703 from the Ashmolean Museum and was never returned.

ii. 10. LONDON METROPOLITAN ARCHIVES

Figure III-194. Hooke, 'Scheme shewing the proportions of velocity, time, power and space', n.d. Source: LMA, CLC/495/MS01757 no. 13.

This chart is unusual for its time in terms of graphical representation. It is reminiscent of some of the illustrations in Leonardo da Vinci's notebook in the Arundel collection (**Figure III-278**), which Hooke had access to.[213]

Consult also the notes on ***Figure III-277*** *below.*

Figure III-195. Hooke, 'Proposed design for a thermometer', n.d. Source: LMA, CLC/495/MS01757 no. 20.

This drawing, which does not appear in any secondary literature, seems to be a design for a type of spiral thermometer. A manuscript note, *not* in Hooke's hand, reads "Sir, Q*uery* whether the Shades of this scheme is to be observ'd, and whether it may be contracted," suggesting it was expected to be engraved. There is also a pencil sketch of a more regular type of thermometer. On the verso there are several notes; "No 2 Refer to thermomet." seems to refer to the second issue of the *Philosophical Transactions* where there was a discussion about thermometers. Another note "Place this to follow Nr 85" is less helpful; if it is referring to the *Philosophical Transactions*, an illustration immediately following issue 85 is difficult to find. "Fig.

[212] Aubrey's original manuscript of his book on Wiltshire is now Bodl., MSS Aubrey 1 and 2; for its description, see *A Summary Catalogue of Western Manuscripts in the Bodleian Library at Oxford*, (Oxford: Oxford University Press, 1937), p. 1138.

[213] I am grateful to Matthew Landrus for alerting me to the similarity between Hooke and da Vinci's drawings.

18" noted in red ink might be referring to a publication, though not one that is readily discoverable.[214]

Figure III-196. Hooke and John Oliver (examined by), 'Plan of Honey Lane Market with dimensions of the roads, adjoining areas, and the stalls', 3 Nov. 1692. Source: LMA, COL/PL/02/C/009/a.

The fact that this drawing was examined by Hooke and Oliver as late as 1692, shows that Hooke remained active in his role as the City Surveyor well beyond the immediate post-fire period.

Figures III-197 to III-214. Hooke, 'Diary kept from 10 Mar. 1672 to 16 May 1683'. Source: LMA, CLC/495/MS01758, pp. 69, 71, 76, 80, 83, 86, 91, 92, 98, 100, 102, 112, 115, 121, 122, 123, 135, 153; https://goo.gl/rqJt9z.

Extracts from 26 Sep. 1674 ('Invention horizontall sayles by a poysed and turning sayle'), 3 Dec. 1674 ('Saw new way of microscope. Very simple and pretty'), 8 Mar. 1675 ('Way of fixing double springs to the inside of the balance wheel'), 13 June 1675 ('Pocket watch with balance cut into two'), 3 Sep. 1675 ('Philosophical scales'), 12 Oct. 1675 ('Invention for the best way for a circular fly'), 1 Jan. 1676 ('Wren's hypothesis of a light pulse and wave'), 7 Jan. 1676 ('Jonas Moore's explanation of a geometric problem using a parallelogram with one side ascew'), 13 May 1676 ('Plan of the menagerie at Versailles'), 15 June 1676 ('Ellipsical appearance of the sun at dawn'), 22 Aug. 1676 ('Invention of a planetary line on a hyperbolic conoid'), 30 Mar. 1677 ('Reine's contrivance for cementing glass plates in a furnace'), 21 June 1677 ('Watch with a spring[?]'), 4 and 6 Oct. 1677 ('Papin's wind gun' and 'Hoskins's way of rinsing fine linen'), 17 Oct. 1677 ('Plan and elevation of Porcenna's tomb'), 14 Nov. 1677 ('Plan of Hagia Sophia'), 21 Aug. 1678 ('Hooke and Wren's philosophical spring scales'), 31 Aug. 1680 ('Streete's reflecting instrument[?]').

[214] For other thermometer designs by Hooke, see Louise Diehl Patterson, 'Thermometers of the Royal Society, 1663–1768', *American Journal of Physics* 19 (1951), pp. 523-535. On spiral thermometers, see Bennett, 'The Instruments'.

ii. 11. [OXFORD] ALL SOULS COLLEGE, CODRINGTON LIBRARY, UNIVERSITY OF OXFORD

Figure III-215. Hooke (attrib.), 'Elevation of the preliminary design of the Monument', 1671. Source: ASC, AS II.71, reproduced in Geraghty, *Architectural Drawings*, p. 259.

Consult the notes for Figure III-102.

Figure III-216. Edward Pearce (previously attrib. to Hooke), 'St. Edmund King and Martyr, elevation facing Lombard Street', *c.* 1670. ASC, AS II.44, reproduced in Geraghty, *Architectural Drawings*, p. 86.

St. Edmund King and Martyr was one of the earliest London churches to be designed. This particular drawing was attributed to Hooke by the architectural historian John Summerson, who first identified one of the drawings of the Monument (**Figure III-215**?) as Hooke's via the latter's diary entries, and used its drawing style to attribute this elevation to him, concluding that "the street front of St Edmund, Lombard Street, was entirely his own work." The drawing was subsequently used to attribute other buildings with Dutch influence to Hooke, for instance by Giles Worsley to connect him to Wrest Park (Chapter IV, ii. 13). Assuming both that the drawing was in Hooke's hand and that that in itself connected him to the design of the church, Worsley noted how there were similarities "with Hooke's early design for St Edmund King and Martyr . . . [which] is derived from a Dutch design found in Vingboons, a characteristic source for Hooke, that does not appear to be found in the work of other architects."

The drawing has since been attributed to Edward Pearce (*c.* 1635-1695) by Geraghty, based on its treatment of "flaming urns and carved foliage" which are deemed similar to another drawing attributed to Pearce.[215]

Figures III-217 to III-223.

These and several other drawings from the Bute collection now deposited at the Cherokee Ranch and Castle Foundation in Colorado (**Figures III-184 to III-191**) have been attributed to Hooke by Geraghty, who has at the same time challenged the scope of Hooke's involvement in the actual design of the buildings in question.[216]

[215] John Summerson, *Architecture in Britain 1530 to 1830*, 9th ed. (New Haven, CT: Yale University Press, 1993), pp. 237-238; Worsley, pp. 20-21; Geraghty, *Architectural Drawings of Wren*, p. 86.

[216] See Chapter IV, ii. 5, for Hooke's work on the City Churches.

Figure III-217. Hooke (attrib.), 'West elevation of St. James, Piccadilly', n.d. Source: ASC, AS II.45, reproduced in Geraghty, *Architectural Drawings*, p. 95.

Figure III-218. Hooke (attrib.), 'Half cross section, looking east, for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS IV.78, reproduced in ibid., p. 93.

Figure III-219. Hooke (attrib.), 'Part long section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS IV.79, reproduced in ibid., p. 93.

Figure III-220. Hooke (attrib.), 'Revised half cross section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS I.74, reproduced in ibid., p. 94.

Figure III-221. Hooke (attrib.), 'Revised part long section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS I.73, reproduced in ibid., p. 94.

Figure III-222. Hooke (attrib.), 'South elevation of St. Benet, Thames Street (Paul's Wharf)', *c.* 1677. Source: ASC, AS I.63, reproduced in ibid., p. 99.

Figure III-223. Hooke (attrib.), 'Section looking west of St. Benet, Thames Street (Paul's Wharf)', *c.* 1677. Source: ASC, AS I.59, reproduced in ibid., p. 100.

Figure III-224. Hooke (attrib.), 'Elevation of an unidentified building, probably the Busby Library at Westminster School', *c.* 1681. Source: ASC, AS IV.89, reproduced in Geraghty, *Architectural Drawings*, p. 235.

> The building facade, and the overall shape of the window in the Busby Library are similar to what is depicted here, however the window as built is taller (or its width, narrower) than this version. This drawing may be depicting a preliminary design or else is related to a different building. See also the section on Westminster School, ii. 24 in Chapter IV.

ii. 12. [OXFORD] BODLEIAN LIBRARY, UNIVERSITY OF OXFORD

Figure III-225. Hooke, 'Partial elevation of Bethlem Hospital', *c.* 1674. Source: Bodl., Gough Maps 44, no. 119 on fol. 61.

> *Consult the notes for Figure III-75.*

Figure III-226. John Aubrey, 'Porsenna's Monument according to Mr Rob. Hooke RSS', n.d. Source: Bodl., MS Top. Gen. c. 25, fol. 9b.

Figure III-227. cf. 'Porsena's Tombe ' in John Greaves, *Pyramidographia* (London, 1646), pl. facing p. 67.

> On 4 October 1677, Hooke noted a discussion with Wren at Crown Tavern about Lars Porsena's monument. The description of the ancient Etruscan king's tomb had descended via Varro, who was quoted by Pliny the Elder in his *Natural Philosophy*. Antiquarian John Greaves (1602–1652) had included a section on the structure in his *Pyramidographia* (London, 1646), along with an illustration (**Figure III-227. cf**), which according to Aubrey Hooke did not approve.[217] It appears Hooke and Wren were initially discussing a textual account—"Wren gave a description, but comparing it with the words it agreed not," Hooke noted.[218] About two weeks later, they had another long discussion on the subject, though this time Wren had brought along his illustration of the structure. Hooke made a sketch of it in plan and elevation in his diary (**Figure III-211**), and the next day, he himself "Drew a rationall porcena."[219] Neither drawing has survived. Aubrey did pursue, but ultimately fail, to see Wren's draught which he had heard was four feet long, but he was able to record Hooke's version **(Figure III-226)** in his manuscript of *Monumenta Britannica*.[220]

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[217] Aubrey, *Monumenta Britannica*, 1665–1693; Bodl., MS Top. Gen. c. 25, fol. 8v.

[218] *Diary i*, p. 317; John Greaves, *Pyramidographia: or a description of the Pyramids in Aegypt* (London: Printed for George Badger . . . , 1646), pp. 64-67. On 'Greaves, John (1602–1652), astronomer and orientalist', *ODNB*. Hooke presumably had access to someone else's copy of Greaves's text since he did not purchase his until Richard Smith's auction in 1682; Felicity Henderson and William Poole, 'The Library Lists of Francis Lodwick FRS (1619–1694): An Introduction to Sloane MSS. 855 and 859, and a Searchable Transcript', *Electronic British Library Journal* (2009), pp. 1-162, at p. 13.

On Hooke and Wren's discussions regarding the mythical tomb, see William Poole, *John Aubrey and the Advancement of Learning* (Oxford: Bodleian Library, 2010), pp. 18-19; Soo, *Wren's "Tracts" on Architecture and Other Writings*, pp. 121-122, 193-195.

[219] "To Sir Chr. Wrens. Discoursd with him long of Porcena's tomb which he had thus drawn. a. signifying the Labyrinth and ground plat. B. the upright &c. of which see the figure [Figure211]. Discoursd also of Persepolis;" *Diary i*, pp. 320-321.

[220] Aubrey, *Monumenta Britannica*, 1665–1693; Bodl., MS Top. Gen. c. 25, fols. 7v, 9b. Aubrey also noted how "In the East Indies such another Monument is mentioned in a Book, which Mr Robert Hook hath;" ibid., fol. 9b.

ii. 13. [OXFORD] WORCESTER COLLEGE, UNIVERSITY OF OXFORD

Figure III-228. Hooke (attrib.), 'Design for a Country House with Ogee Dome, with Subsidiary Studies of the Dome and Entablature', n.d. Source: Worcester College, Oxford, Colvin 525.

This elevation, attributed to Hooke and described as "Design for a country house with ogee dome, with subsidiary studies of the dome and entablature," is currently among the architectural collections of Worcester College, Oxford. Though its previous provenance is unclear, it was sold at a Christie's auction in 2001, and appeared in the sale catalogue of the antiquarian booksellers Hugh Pagan Limited in 2003.[221]

The attribution appears to have been made, mostly based on stylistic grounds, both in terms of architectural design and drawing technique. Christie's lot description notes the apparent influence of contemporary Dutch architecture, especially through Philip Vingboon's *Gronden en afbeeldsels*, vols. 1 & 2, 1648-1674, which Hooke had purchased in 1674.[222] The similarity of the ogee dome to the one used by Hooke on the street screen of Montagu House appears to be another justification for the attribution. An additional observation made in the Hugh Pagan catalogue is of a resemblance between the rendering of the shadows of the dormer windows in this drawing and in some of those among BL Add. MS 5238.[223] The note 'Jones' inscribed in ink on the verso is interpreted to be possibly referring to Sir William Jones, Hooke's client for Ramsbury Manor, Wiltshire, a building for which no finished drawings are extant.[224] Also on the verso is an erased pencil note, possibly from late eighteenth century or early nineteenth century, connecting the drawing to John Webb's Amesbury House built in

[221] Hugh Pagan Limited, *Architecture and Illustrated Books*, Catalogue 45 (London: Hugh Pagan Limited, January 2003), pp. 54-56.

[222] Hooke purchased his copy (*RHBdb*, auct_BH_2534) on 7 November 1674; see *Diary i*, p. 129. See also Geraghty, 'Robert Hooke's Collection', p. 115. On the influence of Dutch architecture in England, including on Hooke's work, see H. J. Louw, 'Dutch Influence on British Architecture in the Late-Stuart Period, c. 1660–1714', *Dutch Crossing* 33 (2009), pp. 83-120; Nancy Halverson Schless, 'Dutch Influence on the Governor's Palace, Williamsburg', *Journal of the Society of Architectural Historians* 28 (1969), pp. 254-270; Alison Stoesser-Johnston, 'Robert Hooke and Holland: Dutch Influence on His Architecture', *Bulletin Koninklijke Nederlandse Oudheidkundige Bond* 99 (2000), pp. 121-137.

[223] *Architecture and Illustrated Books*, p. 55.

[224] Ibid. Louw notes a 1728 inventory of the Jones papers listing "Several Plans of a New House belonging to Sir Wm. Jones that either was built or to be built" which appear to be now lost; see H. J. Louw, 'New Light on Ramsbury Manor', *Architectural History* 30 (1987), pp. 45-49, at p. 49. See Chapter IV, ii. 37, for Hooke's work on Ramsbury Manor.

the 1650s. The catalogue notes that, despite the slight similarities, there are enough differences between the drawing and Webb's design, for the attribution to Hooke to stand.[225] In the margins of the drawing are pencil sketches of details for the domed turret, cornices, and entablature.

There are indeed similarities in the drawing style between this drawing and the ones in BL, Add. MS 5238, however the pencil sketch of the dome, drawn in perspective no less, appears to be more sophisticated than Hooke's other sketches. Additionally, the circular window in the pediment (i.e. in lieu of a coat of arms) is rather unusual, although a variation of it has been used in at least two drawings attributed to William Talman among the collections of Sir John Soane's Museum, London, namely SM volume 111/20 and 21.

ii. 14. ROYAL COLLEGE OF PHYSICIANS, LONDON

Figures III-229 and III-231. Edward Tyson and Hooke [?], 'Drawings of a dissected porpoise', 1680. Source: RCP, MS 618, nos. 3, 4 & 5.

Figures III-230. cf and III-232. cf. Anon. (engraver), Tyson, *Phocaena, or the anatomy of a porpess, dissected at Gresham Colledge* (London, 1680), pls. 2 and 1, respectively.

In 'A preliminary discourse concerning anatomy and a natural history of animals' prefacing his pamphlet *Phocaena, or The anatomy of a porpess dissected at Gresham Colledge* (London, 1680), Edward Tyson (1651–1708) noted his gratitude to Hooke:

> I must here acknowledge the kindness of my most Ingenious Friend Mr. Hook, and those worthy Persons, who gave me the opportunity of making the Observation; And his particular assisting me in designing 11 several of the figures, and other favours deserve my best Remembrance.[226]

[225] *Architecture and Illustrated Books*, p. 55.

[226] Edward Tyson, *Phocaena, or the anatomy of a porpess dissected at Gresham Colledge: with a praeliminary discourse concerning anatomy, and a natural history of animals* (London: Printed for Benjamin Tooke, 1680), pp. 10-11. For an analysis of the institutional context of the publication of Tyson's *Phocaena*, see Noah Moxham, 'Edward Tyson's Phocaena: A Case Study in the Institutional Context of Scientific Publishing', *Notes and Records of the Royal Society* 66 (2012), pp. 235-252. On Tyson, see also 'Tyson, Edward (1651–1708)', *ODNB*, and M. F. Ashley Montagu, *Edward Tyson, M.D., F.R.S., 1650–1708, and the Rise of Human and Comparative Anatomy in England: a Study in the History of Science* (Philadelphia, PA: The American Philosophical Society, 1943).

Indeed, it was Hooke who had first seen and procured the cetacean, begun the dissection at Garraways coffee house on 15 November 1679, and prepared a couple of preliminary drawings over the next few days, before being joined by others on the 18th when he noted "About porpesse with Tison, Beaumont, Hill, etc., Drew schemes."[227] It is not clear, however, if any of the drawings reproduced here from among Tyson's papers at the Royal College of Physicians (**Figures III-229 and III-231**) are actually from Hooke's hand, nor whether he helped with the preparations of the plates (**Figures III-230. cf and III-232. cf**). Some of the manuscript drawing techniques Hooke utilised, such as the ink wash, are recognisable, but as it can be gleaned from the numerous other drawings in the volume, it is obvious that Tyson himself was a superb draughtsman.[228]

ii. 15. ROYAL INSTITUTE OF BRITISH ARCHITECTS, LONDON

Figure III-233. Hooke (attrib.), 'Design for a military building', n.d. Source: RIBA, SA11/3.

This drawing of a 51-bay building has been attributed to Hooke by John Harris and Kerry Downes based on stylistic similarities to Bethlem Hospital. The royal coat of arms, equestrian figure, and other decorative elements suggest a military building. The RIBA catalogue further notes that the "royal and military nature of the design may connect it with Chelsea Hospital."[229] The drawing is nearly a meter long (320x925) and the only information about its provenance seems to be that it was purchased in 1962.[230]

Figures III-234 and III-237. cf. James Gibbs[?], 'Plan fragments of Ragley Hall, Warwickshire', *c.* 1750. Source: RIBA, SD12/14a and SD12/14b.

These two plan fragments have been attributed to Hooke in the RIBApix catalogue, however they are more likely to be fragmentary copies of James Gibbs's survey of Ragley Hall *c.* 1750, prepared prior to starting interior work. When they are collaged together **(Figure III-233.cf)** and compared to Gibb's full plan, now BL, Add. MS 31323 W[3] **(Figure III-234.cf)**, it is

[227] *Diary i*, pp. 430-431.

[228] Sachiko Kusukawa is more confident of Hooke's direct contribution; Kusukawa, 'Drawings of Fossils', p. 129.

[229] Jill Lever, ed., *Catalogue of the Drawings Collection of the Royal Institute of British Architects* (Gregg International Publishers Limited), p. 139.

[230] See Chapter IV, ii. 48, on Plymouth Dockyards.

possible to see that the plans match in scale, layout, and dimensions, and the drawing styles are almost identical.[231]

ii. 16. ROYAL SOCIETY OF LONDON

Hooke's drawings from the Royal Society have been studied by historians of science, and lately, by historians of art: they have been of interest in terms of Hooke's many inventions of scientific instruments, astronomical and meteorological observations, as well as techniques of representation.[232] Considering the scholarship already available, and that the Royal Society has recently embarked on a collaborative project of cataloguing all the illustrations in their early modern collection, only a selection of the following images are elaborated on.

Figure III-238. cf. Richard Towneley, 'Micrometer installed on a telescope' and 'Stand', 1667. Source: RS, Cl.P/2/13, fols. 1r & 2r.

Figure III-239. Hooke, 'Pencil and ink drawing of Towneley's Micrometer', 1667. Source: RS, MS Cl.P/2/13, fol. 3r.

Figure III-240. Hooke, 'Preparatory drawing for the engraver of Towneley's micrometer', 1667. Source: RS, Cl.P/2/13, fol. 4r.

Figure III-241. cf. Anon., 'Towneley's micrometer', 1667. Source: *Philosophical Transactions*, vol. 2, no. 29 (11 Nov. 1667), pl. facing p. 541.

Figure III-242. cf. Anon., 'The engraving from the bottom section of the engraving cut and glued. Source: RS, RBO/3/65, p. 226.

Figure III-243. cf. Adrien Auzout's micrometer published in Auzout, *Maniere exacte* (Paris, 1667).

One of the numerous priority disputes of the seventeenth century was over the invention of the telescope micrometer, a scaling device that enabled the precise measurement of

[231] On Gibbs's plan of the principal floor, see Leach, 'Ragley Hall Reconsidered', p. 266, pl. LXVIIIB; and Patricia Smith, "Contriving Lord Conway's house': Who Really Designed Ragley Hall?', *Georgian Group Journal* 21 (2013), pp. 1-14, p. 3. See Chapter IV, ii. 36, for Hooke's work on Ragley Hall.

[232] On Hooke's instruments, see Bennett, 'Hooke's Instruments for Astronomy and Navigation'; Bennett, 'Hooke's Instruments'; Bennett, 'The Instruments'. The most recent scholarship attempting to connect Hooke's representational techniques with his natural philosophical work, using many of Hooke's illustrations extant at the Royal Society, is Hunter, *Wicked Intelligence*.

astronomical objects. Such metrological challenges predated the use of telescopes; instruments fitted with various types of adjusting screws were used by al-Tūsī (*d. c.* 1213-1214), Ulugh Beg (1394-1449), Johannes Regiomontanus (1436-1476), and Tycho Brahe (1546-1601) to take dimensional and angular measurements.[233] After the development of the telescope, William Gascoigne (1612?–1644) of Yorkshire is thought to have been one of the first to fit one with a micrometer sometime around 1638. Despite his premature death during the Civil War, Gascoigne's invention reached posterity through his correspondence with his colleague William Crabtree (*bap.* 1610, *d.* 1644) and the descent of his papers and instruments to the antiquary Christopher Towneley (1604–1674). Through Towneley, who may have acted as a patron to Gascoigne, Crabtree, and other astronomers of the time, they ended up in the hands of his nephew Richard Towneley (1629-1707), who had a keen interest in experimental philosophy and the finances to support it.[234]

Gascoigne's micrometer remained relatively obscure until January 1667 when an extract of a letter from the French *savant* Adrien Auzout (1622-1691) was published in the *Philosophical Transactions*. In his letter to Henry Oldenburg, Auzout described taking measurements of the diameters of the sun, moon, and other planets via his method of "being

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[233] Randall C. Brooks, 'The Development of Micrometers in the Seventeenth, Eighteenth and Nineteenth Centuries', *Journal for the History of Astronomy* 22 (1991), pp. 127-173, pp. 127-128.

[234] On Gascoigne, see David Sellers, *In Search of William Gascoigne: Seventeenth Century Astronomer* (New York: Springer, 2012). On his use of the micrometer, see also Brooks, 'Development of Micrometers', p. 129; Van Helden, 'The Telescope in the Seventeenth Century', p. 55n93.

The identification of Christopher Towneley as a patron of the so-called 'northern astronomers' is attributed to Edward Sherburne; see the Appendix in *The Sphere of Marcus Manilius Made an English Poem with Annotations and an Astronomical Appendix* (London: Printed for Nathanael Brooke . . . , 1675), p. 93. On the descent of Gascoigne's papers, see Sellers, *In Search of William Gascoigne*, pp. 23-42; Brooks, 'Development of Micrometers', p. 129. Richard Towneley allowed Jonas Moore (1617–1679) and John Flamsteed (1646–1719) to consult the papers, of which extracts were edited by William Derham (1657–1735) and published as 'Extracts from Mr. Gascoigne's and Mr. Crabtree's Letters, proving Mr. Gascoigne to have been the Inventor of the Telescopick Sights of Mathematical Instruments, and not the French' in the *Philosophical Transactions* in 1717.

Richard Towneley, who is not in the *ODNB*, came from a wealthy Catholic family, and having inherited the estate as the eldest son, established himself at Towneley Hall. There, he assembled an impressive library and pursued his natural philosophical interests in air pressure, meteorology, and astronomy, collaborating with Henry Power (*c.* 1626–1668) and John Flamsteed (1646–1719); see Charles Webster, 'Towneley, Richard', in *Complete Dictionary of Scientific Biography* (Detroit, MI: Charles Scribner's Sons, 2008), pp. 444-445; Charles Webster, 'Richard Towneley, the Towneley Group, and Seventeenth Century Science', *Transactions of the Historic Society of Lancashire & Cheshire* 118 (1966), pp. 51-76.

able to divide one foot into 24000 or 30000 parts, scarce failing as much as in one only part" (Figure III-243. cf).[235] The priority of Auzout's invention had already encountered some opposition when his letter was read at the 9 January 1667 meeting, with Wren and Hooke relating the "several ways, which they had known long before, of taking the diameters of the planets to seconds" although they appear to have subsequently failed to produce the brief description they were asked to provide so that "it might be signified to the Parisian philosophers, that it was a thing not at all new among the English."[236] Three months later, another challenge to Auzout's claim arrived. In a letter addressed to the Gresham Professor of Rhetoric, William Croone or Croune (1633–1684), Richard Towneley wrote "I shall be look't upon as a great Wronger of our Nation, should I not let the World know, that I have, out of some scatter'd Papers and Letters, that formerly came to my hands of a Gentleman of these Parts, one Mr. *Gascoigne*, found out, That before our late Civil Wars, he had not only devised an Instrument of as great a power, as M. *Auzout*'s, but had also for some Years made use of it . . . "[237]

In the letter, which Croon presented to the Royal Society at the 4 April meeting, Towneley explained that he had three of Gascoigne's instruments, as well as his papers on another for taking angles. Towneley was further developing the latter device with the help of a watchmaker, describing it as "small, not exceeding in weight, nor much in bigness, an ordinary Pocket-Watch, exactly marking above 40000 Divisions in a *Foot*, by the help of two *Indexes*; the one shewing hundreds of Divisions, the other, Divisions of the hundred; every last Division, in my small one, containing $\frac{1}{10}$ of an Inch; and that so precisely, that, as I use it, there

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235 Adrien Auzout, 'An extract of a letter written Decemb. 28. 1666. By M. Auzout to the publisher, concerning a way of his, for taking the diameters of the planets, and for knowing the parallax of the moon . . . ', *Philosophical transactions* 1 (1667), pp. 373-375, at p. 373. For the original letter (Auzout to Oldenburg, 18 December 1666), see no. 589 in *Oldenburg Correspondence*, @vol. 3.

Auzout had been working on his micrometer with Jean Picard (1620–1682), whom he mentioned in his letter. Auzout published his treatise shortly afterwards as Adrien Auzout, *Maniere exacte pour prendre le diametre des planetes, la distance entre les petites etoiles, la distance des lieux, &c.* (Paris: Jean Cusson . . . , 1667), to which an engraving of his instrument was attached (Figure III-243. cf).

236 Birch, vol. 2, p. 139.

237 Richard Towneley, 'An extract of a letter, written by Mr. Richard Towneley to Dr. Croon, touching the invention of dividing a foot into many thousand parts, for mathematical purposes', *Philosophical transactions* 2 (1667), pp. 457-458, at p. 457.

goes above $2\frac{1}{2}$ Divisions to a *Second*."[238] Towneley offered to provide a better description along with observations made by Gascoigne or himself using the instrument—an offer that the Society enthusiastically took up.[239] Indeed the letter was subsequently published in the 6 May issue of the *Philosophical Transactions* with an editorial note that the description and observations were being solicited.

Towneley sent the micrometer itself, "consisting of a screw with indexes, &c.," along with a description and drawings (**Figure III-238. cf**) to the Royal Society.[240] Hooke presented these at the 25 July meeting, as well as, according to the meeting minutes, "an instrument of his own invention for the same purpose, but of more plain and easy use, it consisting of two threads and a ruler, whereby an inch is diagonally divided into five thousand parts, and might be with the same ease divided into forty thousand or more at pleasure; to which was to be fitted part of a tube, whose circle is divided into 360 degrees, and a thread passing through the diameter, which would serve to find the true position of any star, &c." Copies of both instruments were ordered for the repository, and Hooke promised to bring in "another invention of an instrument to measure diameters with great exactness" to the next meeting. The Society did not meet again until October, when they finally had the chance to examine more closely 'Mr. Gascoyne's instrument', which they judged to be "a very ingenious and useful contrivance," and Hooke's own invention, which was, he claimed, cheaper and easier to use.[241]

Six months later, the drawings and description of the micrometer were finally published in the *Philosophical Transactions* (**Figure III-241. cf**). The delay was blamed on the publisher and the engraver (as well as Towneley's distance from London), and a note of appreciation was added that "For the Draught of the *Figures*, representing the *New Instrument* it self, and the Description of the same, we are obliged to the ingenuity of Mr. *Hook*."[242] Indeed,

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[238] Ibid., p. 458.

[239] Birch, vol. 2, p. 164.

[240] Matthew Hunter discusses these drawings at length in 'Picture, Object, Puzzle, Prompter: Devilish Cleverness in Restoration London'; *Wicked Intelligence*.

[241] Birch, vol. 2, pp. 188-189, 198-199.

[242] Robert Hooke, 'A description of an instrument for dividing a foot into many thousand parts, and thereby measuring the diameters of planets to a great exactness . . . ', *Philosophical transactions* 2 (1667), pp. 541-544, 556, at p. 543.

Hooke had drawn an enlarged view of Towneley's device (**Figure III-239**) and had prepared the layout for the engraver (**Figure III-240**). The printed drawing came with the instruction to cut the moveable cover by the pricked line ('Fig: 2' at the bottom of **Figure III-241. cf**), and place it on the 'open' side of the enlarged micrometer ('Fig: 1' in the middle of **Figure III-241. cf**), pasting its bottom part to turn it into a flap, showing and hiding the interior of the device (**Figure III-242. cf**).[243]

In his explanation of this particular representational technique, Matthew Hunter adopts a more theoretical approach to connect it to an overall philosophy of visualisation, experimentation, and beyond.[244] It is perhaps more likely that Hooke was adapting similar cut-and-paste techniques that were already being used in architectural drawings, e.g. to present alternative designs, different floors levels, etc.[245] But long before this, there was also the tradition of assembling and pasting paper instruments, such as astrological volvelles, into manuscript texts. This was even extended into print in publications such as Peter Apian's *Astronomicum Caesareum* (Ingolstadt, 1540), and in the English context, Billingsley's edition of Euclid's *Elements of geometry* (London, 1570). In the latter, the geometric shapes were printed in plates, which the reader was instructed to cut out, glue, and fold into pop-up diagrams.[246]

Hooke's intense interest in this subject, beyond instrumentation, and his care in publishing someone else's invention, can perhaps be explained by his heated exchange a year earlier with Auzout, who had criticised Hooke's instrument for lens grinding. No doubt

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[243] The digitized copy of this plate among the collections of the Natural History Museum Library in London shows it assembled according to these instructions, with the issue number hand-written in ink on the lower left-hand side. Other digitized copies, such as the one made available by the Royal Society, show the plate as printed, with Fig. 2 still at the bottom of the page, and the issue number printed on the upper right-hand corner; Compare https://goo.gl/dgV6ML and https://goo.gl/PbyTLF with https://goo.gl/8PlPBG.

[244] Weaving together Hooke's work in anatomy and motion, and his astronomical and microscopical observations, Hunter concludes "where the wolf trap in *Micrographia* was only a mechanical extension of the hunter's bloody intent—and where art had been but a devious, transformative trick by which the artist stupefied his boggled beholder-victim—the ideational trapdoor that is the paper micrometer unexpectedly redirects the flow of its maker's intellection as it binds the interior, mental artifacts of experimental thought to the very physics of the stars;" *Wicked Intelligence*, p. 95.

[245] See, for example, Bodl., Gough Maps 41g, fol. 14, or Gough Maps 44, fol. 41.

[246] Hooke, 'A description of an instrument for dividing a foot into many thousand parts, and thereby measuring the diameters of planets to a great exactness . . . '. Hooke owned a copy of another Apian book with paper instruments; Peter Apian and Gemma Frisius, *Cosmographia* (Antwerp: Jean Bellère, 1584); auct_BH_602.

indignant, Hooke likely revelled in the opportunity for a national one-upmanship, taking care to include detailed drawings for his countryman to claim priority.[247]

Figure III-244. Hooke, 'Late Observations of Saturn', 29 June 1666 [observation made], 11 July 1666 [paper read]; detail. Source: RS, Cl.P/8i/18, fol. 38r.

For Hooke's telescopic works, see the annotations for Figure III-1. Hooke's notes and illustration for his observations of Saturn were published in the 2 July 1666 issue of the *Philosophical Transactions*; see **Figure III-245. cf**.

Figure III-245. cf. *Philosophical Transactions*, vol. 1, no. 12 (2 July 1666), pl. facing p. 231.

This plate illustrates 'The Particular Observations of the Planet Mars, formerly intimated to have been made [by Hooke] at London in the months of February and March 1665/6', 'Some observations lately made at London concerning the planet Jupiter [by Hooke on 26 June 1666]', and 'A late observation about Saturn made [on 29 June 1666] by the same', pp. 239-242, 245-47. In the articles, Hooke notes that the Mars observations were made with a 36-foot telescope, and the Jupiter and Saturn ones with a 60-foot one. For the manuscript of the Mars observations, see **Figure III-321**.

Figure III-246. Hooke, 'For the better making a history of the weather', 1663; detail. Source: RS, Cl.P/20/02, fol. 3v.

Figure III-247. cf. Leon Battista Alberti, 'Anemometer', published in *Opuscoli morali* (Venice, 1568), p. 253.

Figure III-248. cf. Leonardo da Vinci, detail showing anemometer; c. 1478-1519. Source: Biblioteca Leonardiana, Codex Atlanticus, fol. 675r; https://goo.gl/p1GTvJ.

Figure III-249. cf. *Philosophical Transactions*, vol. 2, no. 24 (8 Apr. 1667), pl. facing p. 433.

[247] Auzout, 'Considerations of Monsieur Auzout upon Mr. Hook's new instrument for grinding of optick-glasses'. It is important to also note Towneley's care in emphasizing Gascoigne's invention, which was essential for claiming priority as it would date the British invention several decades earlier than that of the French.

Figure III-250. cf. Thomas Sprat, *History of the Royal-Society of London* (London, 1667), pl. facing p. 173.

At the 13 August 1663 meeting of the Royal Society

> Dr. Wilkins put the company in mind to improve their former consideration of making a history of the weather, in order to build thereupon an art of prognosticating the changes thereof: And he suggested, that it might be recommended to some of the members of the society, to make constant observations, at least of the most considerable changes of weather: in order to which, Mr. Hooke was desired to engage herein, which he did.

The paper which **Figure III-244** illustrates may very well have been the one Hooke subsequently read on 7 October 1663 "concerning the observables for making a history of the weather." The table, entitled 'A scheme, at one view, representing to the eye a Modell of the Observations of the Weather for a whole Month', is one of Hooke's many attempts at clearly visualising data.[248] As for the illustration of the anemometer accompanying the paper, it is unclear whether Hooke had access to Leon Battista Alberti's complex version (**Figure III-247. cf**), invented around 1450 but published later in *Opuscoli morali* (Venice, 1568), or to Leonardo da Vinci's notes and criticisms on Alberti's device. Indeed, Hooke's version seems to function on the same principles as the one devised by da Vinci sometime between 1478 and 1519 (**Figure III-248. cf**), but the latter remained in manuscript, and presumably inaccessible.[249]

The illustration was later published in and in the 8 April 1667 issue of the *Philosophical Transactions* (**Figure III-249. cf**) and Sprat's *History of the Royal-Society of London* (London, 1667) (**Figure III-250. cf**).

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[248] Birch, vol. 1, pp. 300, 311. Most recent study of Hooke's various schemes for organising information is Richard Yeo, *Notebooks, English Virtuosi, and Early Modern Science* (Chicago, IL: The University of Chicago Press, 2014); on this particular scheme, see ibid., p. 228.

[249] Leon Battista Alberti, *Opuscoli morali* (Venice: Appresso Francesco Franceschi, 1568), p. 253. See also Kim Williams and Stephen R. Wassell, eds., *The Mathematical Works of Leon Battista Alberti* (Basel: Birkhäuser, 2010), pp. 134-136. Da Vinci's sketch is in Codex Atlanticus, fol. 675r; see *e-Leo: History of Science and Technology Digital Archive*, https://goo.gl/GPUmTj.

Figure III-251. Hooke, 'Experiments try'd with glass balls', 26 Sep. 1662. Source: RS, Cl.P/20/03, fol. 5r.

Hooke read an account of several of his experiments with glass balls at the 26 November 1662 meeting of the Society; his illustration and paper were later reproduced in Birch, vol. 1, pp. 127-130. He conducted further experiments with 'glass bubbles' at subsequent meetings.

Figure III-252. Hooke, 'Observables in the six branched figures in frozen urine', 10 Dec. 1662. Source: RS, Cl.P/20/06, fol. 10r.

Hooke read his observations "on the figures in frozen urine, frozen water, and snow; and those of the small shootings of hoar-frosts" at the 17 December 1662 meeting of the Society; they were printed in *Micrographia* (London, 1665) as observation xiv (pp. 88-93), and his drawings as schem. viii (**Figure III-253. cf**). Hooke's manuscript drawing of the 'six-branched' formations observed in frozen urine is one of the few original drawings from *Micrographia* to survive.

Figure III-253. cf. Hooke, *Micrographia* (London, 1665), Schem. VIII.

Consult the notes for Figure III-252.

Figure III-254. Hooke, 'An account of some tryals for finding how much the pressure of water is increased, by the descent of heavier or the ascent of lighter bodys therein', 14 Jan. 1663. Source: RS, Cl.P/20/09, fols. 15r-v.

Hooke's paper was later published in Birch, vol. 1, pp. 174-176.

Figure III-255. Hooke, 'Of refraction of ice', 11 Feb. 1663, detail. Source: RS, Cl.P/20/11, fol. 19r.

Hooke's experiment was later published in Birch, vol. 1, pp. 193-194.

Figure III-256. Hooke, 'An instrument for finding the force of falling bodies', 18 Feb. 1663, detail. Source: RS, Cl.P/20/12, fol. 20r.

This drawing and experiment were later published in Birch, vol. 1, pp. 195-197.

Figure III-257. Hooke, 'Of the Chinois cart with one wheel', 1 Apr. 1664. Source: RS, Cl.P/20/15, fol. 27v.

> At the 11 November 1663 meeting of the Society, Hooke presented "a scheme of an instrument to walk in upon the land or water, with swiftness after the manner of the wheel of a crane" of which further consideration, and if deemed possible a model, were ordered. Hooke then showed "the scheme of another engine for carriage, viz. of such a one, as goes with one wheel, and is drawn by one horse, so contrived, that it shall not fall, but be kept perpendicular, what way soever it moves, even on the declivity of a hill, &c. He was desired to have a model made thereof."[250]

Figure III-258. Hooke, 'Of exhausting air out of water, &c.', 3 June 1664. Source: RS, Cl.P/20/19, fol. 33r.

> Hooke presented this experiment at the 10 June 1663 meeting; it was later published, with the illustration, in Birch, vol. 1, pp. 254-255.

Figure III-259. Hooke, 'Of the uniting & mixing of air & water, &c.', 1 and 8 July 1663. Source: RS, Cl.P/20/20, fol. 34r.

> Hooke presented this experiment at the 16 July 1663 meeting of the Royal Society; it was later published, with Hooke's drawing of the instrument and description of the experiment, in Birch, vol. 1, pp. 274-275.

Figure III-260. Hooke, 'A breif . . . description of Cavallerius his *Hydrocontisterium noum*', 22 July 1663. Source: RS, Cl.P/20/21, fol. 35r.

> The full title of this paper, with later insertions, is 'A breif Description ⌜made by Mr Hook⌝ of ⌜*th*e water raising Engine presented by his Highness, Prince Rupert, to the Society after *th*e way of⌝ Cavallerius his *Hydrocontisterium novum*'. It was later published, with the diagram and description of the engine, in Birch, vol. 1, pp. 287-288.

[250] Birch, vol. 1, p. 330.

Figure III-261. Hooke, 'An instrument for tryall of powder', 7 Sep. 1663. Source: RS, Cl.P/20/22, fol. 35r.

At the 24 August 1663 meeting of the Royal Society, Hooke "produced his explications of the new sounding instrument, and of the vessel, that fetched water from the bottom of the sea; and of the engine for determining the force of gunpowder by weight. He was directed to draw the figures in great against the next meeting, for the better satisfaction of the members."[251] This explains the particular presentation of this drawing, which takes up the whole sheet, without any surrounding text, with the instrument carefully drawn in ink and with grey shadows, and its parts simply labeled. Hooke presented his "scheme of the instrument" along with its explication at the 7 September 1663 meeting; both were later published in Birch, vol. 1, pp. 302-303.

Figure III-262. Hooke, 'The way preferred to sound the depths of the sea', 30 Sep. 1663. Source: RS, Cl.P/20/23, fol. 39r.

At the 10 June 1663 meeting of the Society, "Mr. Hoskyns desired some leads and balls for sounding without a line for one Mr. Jonas Moore going to Tangier: upon which the operator was ordered to provide four leads and two balls." At the 22 July meeting, Hooke was asked to think further about the challenge of finding the depth of water without a line, and a week later "produced several figures, both for sounding-instruments without a line, and for vessels to fetch up water from the bottom of the sea. He was desired, to give an explanation of these figures in writing; and the operator was ordered to make two models against the next meeting, one of the sounding instrument, and another of the water-drawing vessel, each after the draught of the first figure of each kind."[252]

After further discussions, on 30 September 1663, Hooke "brought in the description of the new ways contrived by him for sounding the depth of the sea without a line, and fetching water from any depth." Both drawings and the explanatory text were entered into the register and later published in the *Philosophical Transactions*, vol. 1, no. 9 (12 February 1666) (**Figure III-263. cf**), with the explanatory text titled 'An appendix to the directions for seamen bound

[251] Birch, vol. 1, p. 297.

[252] Birch, vol. 1, pp. 259, 280, 287, 297. See also Lisa Jardine, *Ingenious Pursuits: Building the Scientific Revolution* (New York: Anchor Books, 2000), p. 213.

for far voyages' (pp. 147-149), and again in vol. 2, no. 24 (8 April 1667) facing p. 433 (**Figure III-249. cf**), to illustrate 'For observations and experiments to be made by masters of ships, pilots, and other fit persons in their sea-voyages' (pp. 433-434). Later, they are also reproduced in Birch, vol. 1, pp. 307-308. See also Oldenburg's copy of Hooke's description and drawings (**Figure III-269**).

More than a decade later, Hooke collaborated on a proposal to complete the Tangier mole. Had their bid been accepted, the instruments and experiments with sounding instruments from this period would no doubt have been useful for that project.[253]

Figure III-263. cf. *Philosophical Transactions*, vol. 1, no. 9 (12 Feb. 1666), pl. facing p. 147.

Consult the notes for Figure III-262.

Figure III-264. Hooke, 'Instrument to describe plane dials', 21 Mar. 1667. Source: RS, Cl.P/20/31, fol. 49v.

This drawing is identified as an 'instrument to describe plane dials' by Gunther; the accompanying text and this illustration are printed in Gunther, *Early Science in Oxford*, vol. 6, pp. 297-299.

Figure III-265. Hooke, 'Wheel barometer', n.d. Source: RS, Cl.P/20/32.

This undated drawing, produced without an explanatory note, is of a wheel barometer that Hooke had been developing since 30 December 1663. He seems to have successfully built one around October 1664, and in March 1666 instructed Shortgrave to make one for Boyle.[254] The drawing was reproduced in *Micrographia* (London, 1665) (Figure III-266) and later also in Sprat's *History*.

Figure III-266. cf. Hooke, *Micrographia* (London, 1665), Schem. I., Fig: I.

Consult the notes for Figure III-265.

Figure III-267. Hooke, 'Constant level device', 14 Mar. 1667. Source: RS, Cl.P/20/33, fol. 53r.

[253] See Chapter IV, ii. 26, on the Tangier proposal.

[254] Bennett, 'The Instruments'.

On 6 February 1667, Hooke presented to the Society his new invention for maintaining a constant supply of oil in lamps; he was asked to provide a description and demonstration, which he finally did on 14 March. He would continue to develop and later publish his invention in *Lampas* (London, 1677) (**Figure III-268. cf**).

These drawings of the so-called 'constant level device' illustrate this earlier version. A related manuscript in the same folio, RS, Cl.P/20/47, contains Hooke's explanation of how "To make a Lamp that shall always keep *th*e surface of the oyle at the same height till all be spent," although it does not include any labels or seem to refer to these diagrams.[255]

Figure III-268. cf. Hooke, *Lampas* (London, 1677), pls. I & III, details.

Consult the notes for Figure III-267.

Figure III-269. Oldenburg, 'Copy of Hooke's way for sounding the depth of the sea without a line; and of fetching up water from any depth', after 1663. Source: RS, Cl.P/20/35, fols. 60v & 61r.

Although attributed to Hooke in the index to Cl.P/20 as well as in the online catalogue of the Royal Society archives, this is clearly Oldenburg's handwriting. The text is copied from no. 23 (**Figure III-262**) and the diagrams are obvious copies of the same, although it should be noted that the details are not identical and it was Hooke's drawings that were ultimately engraved.

Figure III-270. Hooke, 'An account of a viper', 2 Nov. 1664. Source: RS, Cl.P/20/37, fol. 63r.

At the 26 October 1664 meeting of the Society, "A viper was dissected, and it was observed, that besides a row of small sharp teeth on either side of its upper and under jaw, the viper had also two fang teeth in the upper jaw, which, upon being provoked, it would thrust and make stand out very far." Hooke produced two drawings of the viper's head: the original in colour, now RBO/3/22 (**Figure III-322**), and this copy (**Figure III-270**), both dated 2 November when Hooke presented his written account of the dissection to the Society.[256]

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[255] Hooke, *Lampas*; Gunther, *Early Science in Oxford*, vol. 6, pp. 292, 294-296; S. H. Joseph, 'Assessment of the Scientific Value of Hooke's Work', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 89-108, at pp. 97-102.

[256] Birch, vol. 1, pp. 478-479, 480-481. Hooke also sent an account of the dissection to Boyle in his letter dated 28 or 29 October 1664; *Boyle Correspondence*, vol. 2, pp. 370-371.

In 1683, Edward Tyson would dissect a rattlesnake; colour drawings (**Figure III-271. cf**) presumably in his hand would be engraved by Burghers and published in the *Philosophical Transactions*, vol. 13, no. 144 (10 February 1683) (**Figure III-272. cf**).

Figure III-271. cf. Tyson [?], 'Anatomy of a rattle-snake', 1683; detail. © Royal College of Physicians, MS 618, no. 6.

Consult the notes for Figure III-270.

Figure III-272. cf. M. Burghers (engraver), Tyson, 'Anatomy of a rattle-snake', 1683, *Philosophical Transactions* vol. 13, no. 144 (10 February 1683), pl. facing p. 25.

Consult the notes for Figure III-270.

Figure III-273. Hooke, 'Description of the manner of making salt at a Saltern in a Hampshire', 25 July 1666. Source: RS, Cl.P/20/40, fol. 69r.

Michael Hunter has identified the 'Description of the manner of making salt at a Saltern in a Hampshire', composed of several pages of text and this illustration, as Hooke's 25 July 1666 Cutlerian lecture on the history of trades.[257] These lectures were not part of the Royal Society meetings, thus their absence from the minutes and record books.[258]

Hooke had produced a similar presentation drawing five months earlier for his 25 July 1666 lecture on the felt-makers' trade (**Figure III-291**).[259] In that drawing, Hooke was struggling significantly with drawing in perspective. His skills appear remarkably improved in this drawing, perhaps because it was simpler or because he had practiced during the intervening period as some exercises for drawing in perspective are extant among his papers at the British Library (**Figure III-73**). See also part one in this chapter.

Figure III-274. Hooke, 'Motion in a curve', 23 May 1666. Source: RS, Cl.P/20/41, fol. 73r.

'Of *the* inflection of a direct Motion into a Curve by a supervening Attractive Principle' is Hooke's earlier work on concepts of attraction and gravity towards a hypothesis on the

[257] Hooke's lecture notes on the history of salterns, dated 25 July 1666 is now RS, Cl.P/20/42.

[258] Michael Hunter, *Establishing the New Science: The Experience of the Early Royal Society* (New Hampshire, CT: The Boydell Press, 1989), pp. 299-300, 300n74.

[259] For the date of the lecture on the felt-makers' trade, see ibid., p. 300.

motions of comets and planets. His paper, presented on 23 May 1666, was demonstrated with an experiment where "a pendulum [was] fastened to the roof of the room with a large wooden ball of lignum vitae on the end of it."[260]

Figure III-275. Hooke, 'Inclining pendulum', 21 Nov. 1666. Source: RS, Cl.P/20/41, fol. 74r.

Hooke read his account of inclining pendulums at the 21 November 1666 meeting of the Society. This large, neatly-drawn, illustration was probably being passed around while he was reading as the labels match the text of his lecture. The lecture was later printed in Birch, vol. 2, p. 126.

Figures III-276 and III-277. Hooke, 'Circular pendulum', 1667[?], details. Source: RS, Cl.P/20/53, detail of fol. 116r, and fols. 115v-116r.

In 1666 and 1667, Hooke made numerous presentations with circular pendulums. This drawing, which is more of an experiment conducted on paper than a representation, is a demonstration of the "isochronous motion of a conical pendulum."[261] It was part of his work on horology but Hooke could also adapt it to his work on planetary motion.

At a purely graphic-representational level, the drawing is reminiscent of some of da Vinci's studies of parabolic mirrors in Codex Arundel (**Figure III-278. cf**). Hooke would later have access to the manuscript via the Arundel Library. However, as Hooke's drawing is not dated and presumably he did not have immediate access to the material, the resemblance is likely coincidental.[262]

Figure III-278. cf. da Vinci, 'Studies of parabolic mirrors', 1503–1505. Source: BL, Arundel MS 263, fols. 86v-88r.

Consult the notes for Figure III-276 and III-277.

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[260] Gunther, vol. 6, pp. 265-268; Joseph, 'Assessment of the Scientific Value of Hooke's Work', pp. 97-102.

[261] Bennett, 'Hooke's Instruments', p. 72.

[262] I thank Matthew Landrus for alerting me to the similarities between Hooke and da Vinci's drawings, and Martin Kemp for the correct orientation of da Vinci's drawings. See also Simona Campbell, *Leonardo da Vinci: The Complete Works* (Cincinnati, OH: David and Charles, 2006), pp. 604-605.

Figures III-279 and III-280. Hooke, 'The flux and reflux of the sea according to Descartes [?]', n.d. Source: RS, Cl.P/20/55, fol. 119r-v.

> The catalogue of the Royal Society Archives identifies these drawings as being related to Descartes' work on the 'flux and reflux of the sea'. They are found with Hooke's copy of a letter regarding Alexandre Tinelis Castelet's *Lettre de Monsieur de Castelet a Monsieur l'abbé [Pierre] Bourdelot, dans laquelle il demontre que les raisons que Monsieur Descartes a données de flux & reflux de la mer sont fausses* (Paris, 1677).

Figure III-281. Hooke, 'Of a telescope stand set up in the yard of Gresham College', *c.* September 1664. Source: RS, Cl.P/20/61a, fol. 134r.

Figure III-282. Robert Southwell or Hooke[?], 'Figure of a way to manage Long Telescopes', n.d. Source: RS, Cl.P/20/61b.[263]

Figure III-283. Southwell or Hooke[?], 'Sketch of a telescope in Prince Leopoldo's court in Florence', attached to his letter to Robert Boyle, *c.* 1661. Source: RS, MS/248/21.

Figure III-284. Hooke, 'Copy of Huygens's engraving a tubeless aerial telescope', 25 June 1684. Source: RS, Cl.P/20/62.

Figure III-285. cf. Illustration of a 'Tubeless telescope' in Christiaan Huygens, *Astroscopia compendiaria* (The Hague, 1684), facing p. 8.[264]

> *For Figures III-281 to III-285. cf., consult the notes for Figure III-1.*

Figure III-286. Hooke, 'Account of Richard Norris's book about the Rhomb line', 2 Dec. 1685. Source: RS, Cl.P/20/68.

> This drawing is attached to Hooke's review of the mariner Richard Norris's pamphlet *The manner of finding the true sum of the infinite secants of an arch by and infinite series* (London, 1685).[265]

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[263] I am grateful to Rupert Baker, Katherine Marshall, and Keith Moore for their assistance in locating this drawing, which had been accidentally separated from Hooke's papers.

[264] Christiaan Huygens, *Astroscopia compendiaria, tubi optici molimine liberata* (The Hague: Apud Arnoldum Leers, 1684).

[265] Richard Norris, *The manner of finding of the true sum of the infinite secants of an arch, by an infinite series which being found and compared with the sum of the secants found, by adding of the secants of whole minutes . . . do plainly demonstrate*

Hooke presented his review, presumably along with this drawing, to the Royal Society on 2 December 1685. The note, in Hooke's hand, at the upper margin reads "The Rhombs of *th*e plain chart."

Figure III-287. Hooke, 'Waterwork nearly finished by Mr. Aldersey at Hackney', 2 June 1686. Source: RS, Cl.P/20/71.

Minutes of the Royal Society meeting on 2 June 1686 note that "Mr. Hooke shewed the draught and contrivance of a water engine at Hackney made by one Mr. Aldersey, wherein three pumps are moved by an axis with a triple crank by means of an over-shot wheel."[266]

Figure III-288. Hooke, 'Of mathematical language', *c.* 1686. Source: RS, Cl.P/20/72.

Mathematical and musical symbols, classification systems, and artificial languages were subjects of intense research and debate during this period. Hooke himself was trying to invent a way, a 'philosophical algebra', for producing knowledge; his 'mathematical language' (using a further mathematical analogy) was one of his attempts at organising knowledge towards this agenda. See also **Figures III-173 to III-175** for his work on musical notation.[267]

Figure III-289. Hooke, 'Proportion of velocity to distance', n.d. Source: RS, Cl.P/20/74.

These appear to be Hooke's notes on gravity and 'planetary ellipticall motion'. See also **Figures III-176 to III-180, III-194, III-274 to III-277, III-308 to III-310, and III-353** for some of his other sketches related to orbital or circular motion, velocity, etc.

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that Mr. Edward Wright's nautical planisphere is not a true projection of the sphere (London: Printed by Tho. James for the Author, 1685).

[266] Birch, vol. 4, p. 487.

[267] Secondary literature is quite extensive on these subjects; for studies that include Hooke's work, see Mary B. Hesse, 'Hooke's Philosophical Algebra', *ISIS: Journal of the History of Science in Society* 57 (1966), pp. 67-83; Rhodri Lewis, 'Hooke's Two Buckets: Memory, Mnemotechnique and Knowledge in the Early Royal Society', in *Ars Reminiscendi: Mind and Memory in Renaissance Culture*, ed. Donald Beecher and Grant Williams (Toronto: Centre for Reformation and Renaissance Studies, 2009), pp. 339-363; Rhodri Lewis, *Language, Mind and Nature: Artificial Languages in England from Bacon to Locke* (Cambridge: Cambridge University Press, 2007); Richard Yeo, 'Before Memex: Robert Hooke, John Locke, and Vannevar Bush on External Memory', *Science in Context* 20 (2007), pp. 21-47; Yeo, *Notebooks, English Virtuosi, and Early Modern Science.*

Figure III-290. Hooke, 'Notes to Marquis de l'Hôpital's *Analyse des infiniment petits* (Paris, 1696), after 1696. Source: RS, Cl.P/20/87.

Mathematical calculations accompanying Hooke's notes on de l'Hôpital's text in the same manuscript. See also Hooke's notes on Fermat in **Figures III-182 and III-183**, and the annotations for **Figure III-58**.

Figure III-291. Hooke, 'An Account of the felt-makers', 21 Feb. 1666. Source: RS, Cl.P/20/96.

This was an illustration for one of Hooke's Cutlerian lectures on the history of trades; in this particular case, on the making of felt. His lecture has been dated to 21 February 1666 based on a mention in Pepys's diary, and the notes accompanying this illustration to 1663. Hooke's description of the process has been explained further in a recent book on the history of the Feltmakers' Company.[268] See also **Figure III-273**.

Figures III-292 to III-303. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. Source: RS, Cl.P/24/88, fols. 282r, 283r-v, 284r, 285r, 286r, 287r-v, 288r-v, 290r, 291v, 292r, 293r, 295v, 296r, 297v, 298r, 299v, 300r, 301r, 302r-v, 303r, 305r, 306r, 307r-v, 308r-v, 309r-v, 310r.

These are Hooke's notes and sketches of his astronomical observations. They have been discussed by Matthew Hunter as examples of Hooke's experimental draftsmanship.[269]

Figure III-304. Hooke, 'Copies of illustrations from Book 2 of Johannes Kepler's *Harmonices mundi* (Linz, 1619)', 1675?. Source: RS, Cl.P/24/89, fols. 313-316.

Figure III-305. cf. Kepler, *Harmonices mundi* (Linz, 1619), unnumbered plates of illustrations from Book 2.

Figures III-306 and III-307. Hooke, 'Copies of illustrations from Book 2 of Johannes Kepler's Harmonices mundi (Linz, 1619)', 1675?. Source: RS, Cl.P/24/89, fols. 313-16, 317r.

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[268] Hunter, *Establishing the New Science*, p. 300; Rosemary Weinstein, *The History of the Worshipful Company of Feltmakers 1604–2004* (Chichester, UK: Phillimore & Co. Ltd., 2004), pp. xvii. See also Hunter, *Wicked Intelligence*, pp. 90-92.

[269] Hunter, *Wicked Intelligence*, pp. 28-34.

These geometric drawings, which have hitherto remained obscure, can be confidently identified as copies of the illustrations of Book 2 in Johannes Kepler's *Harmonices mundi* (Linz, 1619) (**Figures III-305. cf and III-307. cf**). Hooke had purchased a copy, presumably an imperfect one missing the illustrations, on 3 July 1675.[270]

Figures III-308 to III-310. Hooke, 'Mathematical sketches and calculations', n.d. Source: RS, Cl.P/24/89, fols. 318r-v, 319r, 320r.

These sketches remain unidentified but likely relate to Hooke's work on pendulums and elliptical motion.

Figure III-311. Hooke, 'Queries to Hevelius about comets and telescopic sights', n.d. Source: RS, EL/H3/68.

See also **Figures III-167. b, III-292 to III-303**.

Figure III-312. Hooke, 'An account of Francis Potter's invention of a cart with legs', 11 Mar. 1663, attached to a letter from Francis Potter to John Aubrey dated 22 Feb. 1663. Source: RS, EL/P1/40.

This rather amazing drawing is Hooke's illustration of Francis Potter's invention for cart legs, interpreting the latter's drawings (**Figure III-313. cf**). He read the lecture to the Society on 18 March 1663, finding the invention ingenious yet not practicable, and "noe ways soe convenient and useful as a Cart with wheels."

Figure III-313. cf. Francis Potter, 'Sketch of the leg of the cart', attached to a 22 Feb. 1663 letter from him to John Aubrey. Source: RS, EL/P1/39.

Consult the notes for Figure III-312.

Figure III-314. Hooke, 'Urn design for the Monument', 1675. Source: RS, MS 131/54.

Consult the notes for Figure III-102.

[270] *Diary i,* p. 167; see also 'Part II' in Poole, Henderson, and Nasifoglu, 'Editors' Introduction'.

Figure III-315. Hooke, 'Sketch of an engine to transport water', 1702. Source: RS, MS 248/17. **Figure III-316.** Hooke's assistant [unnamed], 'Sketch of an engine to transport water', attached to a letter dated 1702. Source: RS, MS 248/19.

Robert Southwell and his son Edward, who knew of Hooke's expertise in hydrostatics from their sluice project, sought his opinion on a water supply design for the estate of their neighbour Thomas Chester (1668-1705).[271] Joseph Gillmore, a mathematics teacher from Bristol, had been contracted to design an engine to transport water from a nearby pond to Chester's estate at Knole in Almondsbury, and Southwell presumably wondered whether he was up to the task. The five letters and two sketches regarding this project have largely been ignored, if not undiscovered, among Southwell's papers.[272]

Figures III-317 and III-318. Hooke, 'Figures observed in snow', 1662. Source: RS, MS 215/7 and RBO/2i/12, attachment to p. 63.

It is unclear whether Hooke knew of Kepler's work on the six-cornered snowflake. He was certainly interested in Kepler, actively purchasing his books, so that by the time of his death, there were 18 Keplerian titles in his library.

These drawings predate the diaries, so their references are impossible to determine. However, Hooke's drawing methods illustrate that he was clearly looking for a geometric principle in his observations of snowflakes; much like the way he was looking for Euclid under his microscope in *Micrographia* (London, 1665). On 21 May 1677, he noted that he had "alterd snowpiece" but it is unclear whether he was referring to these drawings.[273]

An attachment (**Figure III-319. cf**) to a letter communicated to the Society show similarly geometric constructions, with obvious differences in illustration methods.

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[271] See Chapter IV, ii. 49 for Hooke's work on the sluices at Kings Weston.

[272] Transcriptions of these letters are provided in Appendix i. 11-13. On Chester, see Robert Edmond Chester Waters, *Genealogical memoirs of the families of Chester of Bristol, Barton Regis, London, and Almondsbury, descended from Henry Chester, Sheriff of Bristol 1470* . . . (London: Reeves and Turner, 1881), 37-38.

Gillmore is an elusive figure; his identification as a mathematics teacher from Bristol is from his plan of the City of Bath printed in Robert Pierce's book on water therapy; see Robert Pierce, *Bath memoirs: or, observations in three and forty years practice, at the Bath, what cures have been there wrought* . . . (Bristol: Printed for H. Hammond . . . , 1697), facing p. 1.

[273] *Diary i,* p. 291. On the snowflake drawing, see also Hunter, *Wicked Intelligence*, pp. 49-51.

Figure III-319. cf. Anon., 'Copy of a letter communicated by James Hayes concerning some observations of snow fallen in March', 13 Mar. 1667. Source: RS, LBO/01/154, p. 403.

Consult the notes for Figures III-317 and III-318.

Figure III-320. Hooke, 'The scheme of the stones taken out of the Lord Belcarris his heart', 19 Aug. 1663. Source: RS, RBO/2i/66, p. 290.

At the 15 April 1663 meeting of the Royal Society, Robert Moray "communicated an account in Latin, of the dissection made of the body of the lord Belcarres, in whose heart was found two stones," and a few months later, at the 16 July and 5 August meetings, produced the actual two stones. At the latter meeting, he "desired, that the figure of them might be drawn; and Dr. Wilkins moved, that it might be taken in plaister: the care of both which was committed to Mr. Hooke."[274] Within two weeks, Hooke prepared the drawing which does not appear to have been engraved, but the text of the account was printed as 'Observables in the body of the Earl of Balcarres' in *Philosophical Transactions*, vol. 1, no. 5 (3 July 1665), pp. 86-87.

Figure III-321. Hooke, 'Concerning the disposition of the air and spots discovered in the planet Mars', 28 Mar. 1666. Source: RS, RBO/3/32, p. 98.

Hooke's Mars observations, made with a 36-foot telescope, were printed in the *Philosophical Transactions*, vol. 1, no. 11 (2 April 1666), p. 198, and no. 12 (2 July 1666), pp. 239-42; the illustrations, along with those of his observations of Jupiter and Saturn (**Figure III-244**), were printed on the plate facing p. 231 (**Figure III-245.cf**) in the latter issue. See also the annotations for **Figures III-1, III-244, and III-245. cf.**

Figure III-322. Hooke, 'An account of a viper', 2 Nov. 1664. Source: RS, RBO/3/22.

Consult the notes for Figure III-270.

Figure III-323. Hooke, 'Instrument to measure gravitational differences', 1666. Source: RS, RBO/3/31.

Consult the notes for Figure III-169.

[274] Birch, vol. 1, pp. 219, 276, 292.

Figure III-324. Hooke, 'The description of an instrument for collecting of the wind, or, for making the slower motions of the air more sensible', 12 Mar. 1668. Source: RS, RBO/3/79, p. 294.

In 1663, Hooke devised an anemometer 'For the better making a history of the weather' (Figure III-246) that was similar to one sketched by da Vinci in his Arundel manuscript. Hooke did not yet have access to the earl of Arundel's library, so this was likely a coincidence. Five years later, once again by coincidence, Hooke produced another instrument that was reminiscent of one that had been devised by da Vinci (**Figure III-325. cf**) for his study of winds, especially their movement over the mountains and through valleys. In his explanation of the instrument, Hooke did note that it was Croone's idea "to include a fan in a cylindrical vessel, and to divide the whole Circumference thereof into thirty-two or more equal parts," so in this particular case it was a collaborative inspiration.

Interestingly, by then working as a City Surveyor, Hooke thought the contrivance could easily be installed in a ball at the top of a steeple turret, so that "by the Air's blowing of a pipe contrived in it, the quarter and strength of the Wind may at all times either by night or day, be easily discovered." At the Society meeting, a suggestion was made that a similar invention could be used as an 'otacousticon', collecting the sounds dispersed in the air into a small pipe that could be applied to the ear to aid hearing.[275]

The drawing was reproduced in Birch, vol. 2, pl. iii. It is unclear whether this particular sketch, in the Record Book of the Society, was in Hooke's hand or a copy.

Figure III-325. cf. da Vinci, 'Study of the winds'. Source: Biblioteca Leonardiana, Codex Madrid II, fol. 74v.

Consult the notes for Figure III-324.

Figure III-326. Hooke, 'Observations of the spots appearing in the sun', 30 Aug. & 1 Sep. 1671. Source: RS, RBO/4/32, p. 107.

Like **Figure III-328** below, there is a marked difference between Hooke's presentation technique seen in this drawing (**Figure III-326**) and the ones he produced for the spots he observed on Mars (**Figure III-321**) four years earlier.

[275] RS, RBO/3/79, p. 295; Birch, vol. 2, pp. 257-258.

Figure III-327. cf. *Philosophical Transactions*, vol. 6, no. 77 (20 Nov. 1671), p. 2295.

Reproduction of **Figure III-326**.

Figure III-328. Hooke, 'Observations of Saturn on 26/16 September 1670', 16 Nov. 1671 (read to the Society on). Source: RS, RBO/4/33, p. 109.

There is a notable difference in the presentation technique when compared with **Figure III-244**, which used a pencil and ink combination and was similarly engraved (**Figure III-245. cf**). Here only ink lines are used for shading, and were replicated only minimally when published in the *Philosophical Transactions* (**Figure III-329. cf**).

Figure III-329. cf. *Philosophical Transactions*, vol. 5, no. 65 (14 Nov. 1670), pl. facing p. 2083.

Consult the notes for Figure III-328.

ii. 17. SIR JOHN SOANE'S MUSEUM, LONDON

Figure III-330. Hooke (attrib.), 'Presentation drawing of the west facade of the tower and spire of St Benet, Gracechurch Street, London', *c.* 1681. Sir John Soane's Museum, SM volume 111/2.

St. Benet Gracechurch was one of the city churches to be rebuilt after the fire; its reconstruction began in 1681 and was mostly complete by 1686 when it reopened for worship. The church was demolished in 1867-8.

Though it bears the inscription 'C[r]. Wrenn' in an unidentified hand, this presentation drawing of the west facade of the tower and spire has been attributed to Hooke by Paul Jeffery in his monograph on the City Churches, an attribution that is repeated in the online catalogue of Soane's Museum.[276] It has been compared with other drawings and designs also attributed to Hooke; specifically, a preliminary design for the west elevation of St. Clement Danes featuring a similar combination of obelisk spire and octagonal dome, pilasters at the belfry level, and a "grand columnar west door" (**Figures III-191**).[277]

[276] Jeffery, *City Churches of Wren*, pp. 131, 133; Sir John Soane's Museum Collection Online, SM Volume 111/2, https://goo.gl/4qESjY.

[277] See the curator's notes in Ibid.

It should be noted that there is no corroborating evidence directly connecting these drawings to Hooke; future discovery of other primary sources may confirm or deny these attributions. The hand equally resembles that in drawings attributed to Pearce, however the treatment of the flame in this drawing is somewhat different than in the two drawings attributed to him at Warwickshire C.R.O. (**Figures III-334 and III-335**).

ii. 18. SOCIETY OF ANTIQUARIES, LONDON

Figure III-331. Hooke (attrib.), 'An Actual Survey Plann or Draught of a Key to be left open from London Bridge to the Temple', *c.* 1673. Society of Antiquaries, Drawings, vol. 2, p. 20.[278]

This drawing was attributed to Hooke in a 1964 article by Rowland Pierce, whose research revealed that it had been presented to the Society of Antiquaries on 15 January 1724 by its then director John Talman (1677-1726), who himself had acquired it between 1717 and 1722.[279] The Society's meeting minutes recorded the presentation as "Mr Talman gave to the Society a long draught by the famous Mr Hook [the name is in a different ink] of the Shore or Strand of the River from Baynard Castle to London Bridge . . ."[280] It is drawn at a scale of 50' : 1" and is composed of three sheets joined together, altogether measuring 6" x 64 ¾"; it has been reproduced as Plate LXVII by Pierce. The drawing bears several inscriptions, which Pierce attributed to a later hand: 'A key to be left open from London Bridge to the Temple 40 foot broad' and 'Statut. 19 Car. 2^{d}.', the latter likely referring to the First Rebuilding Act of 1 October 1667 when the width of 40 feet was officially specified. On the page onto which the drawing is attached is the note 'An Actual Survey Plann or Draught of a Key to be left open

[278] See Chapter IV, ii. 9, on Hooke's work for the Thames embankment.

[279] S. Rowland Pierce, 'A Drawing for a Thames Embankment After the Great Fire, 1666, by Robert Hooke', *Antiquaries Journal* 44 (1964), pp. 233-241. Talman, who had been elected in 1717, presented other drawings to the Society; ibid., pp. 233, 239.

In 1719, Talman inherited a considerable collection of drawings, prints, and books from his father, William Talman (1650–1719), who had been Wren's colleague or, to be more accurate his rival, at the Royal Works. Admittedly this is a conjecture, one that Pierce avoids making, but this lineage opens up the possibility that the drawing may have descended via Wren or the Office of the Royal Works. On the Talmans, see 'Talman, John (1677-1726)' and 'Talman, William (1650-1719)' in Colvin, *BDBA* (2008).

[280] Pierce, 'Drawing for a Thames Embankment', p. 233. The authorial note regarding the ink is Pierce's.

from London Bridge to the Temple', apparently in the same hand as the other two inscriptions.[281]

In the drawing itself, most of the location and street names are noted in ink; a few of them are in pencil as are some dimensions mostly confirming the 40' width. The cancellations, with x's or hatches on inked areas, suggest that some changes were made after the drawing was produced, and that even though it was clearly a presentation drawing in grey and yellow ink wash, it was not the final version. Pierce noted two different hands, attributing one to Hooke and the other to Wren though with caveats citing the difficulty of identifying handwriting during this period. And given the numerous diary entries recording Hooke's surveys of different wharfs throughout that year, Pierce dated the drawing to *c.* 1673. Both of the assessments, regarding the handwriting and the date, seem valid.

In addition to this one at the Society of Antiquaries, several other drawings of the embankment have survived from the period. A proposed plan of the water line, at the same scale of 50' : 1", had been prepared by the City Surveyors, most likely by Hooke, and submitted to Wren for approval in his capacity as the King's Surveyor, on 4 May 1671. In July an order was issued for the design to be "described on a vellum draught" and for Wren and Hooke to present it to the King.[282] Eventually, when the 4 December 1671 "Letters Patent confirming the Design for making an open Wharf forty feet wide on the North side of the River Thames between London Bridge and the Temple and directing that no building should be erected within that distance from the River" was issued, the final drawing, now at the City Comptroller's Office, was attached to the document.[283] As it can be seen from the sample (**Figure III-332.cf**), it illustrates a proposal, an idealised version of the embankment, rather than a survey. The handwriting closely resembles Hooke's.

Three other drawings, surveys, are at the British Library, two of them among Hooke's papers as Add. MS 5238 nos. 82 and 83 (**Figures III-119 and III-120**). The handwriting is

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[281] Ibid. '19 Car. 2d.' refers to the 19th year of the official reign of Charles II, i.e. 1667.

[282] Sydney Perks, *The Water Line of the City of London After the Great Fire* (London: Taylor & Francis, 1935), pp. 24-25.

[283] Part of the letters patent and the attached plan are reproduced in Sydney Perks, 'The Scheme for a Thames Embankment after the Great Fire of London', *Journal of the Royal Institute of British Architects* 31 (1924), pp. 445-461, at pp. 453, 454. A transcription of the letters patent is available in Perks, *The Water Line*, pp. 35-38.

almost certainly Hooke's. Less detailed than the presentation drawing at the Society of Antiquaries, they illustrate all the keys and alleys from the Tower dock to Whitefryers. The two drawings in Add. MS 5238 are almost identical except for the addition of the grey ink wash in no. 82 (**Figure III-119**). On the verso of no. 83 **(Figure III-120)** is the inscription 'Water Line' in Hooke's hand; there is also a modern pencil note indicating that "A third copy of this Plan/ is in vol. ii. 43. of British Topography/ deposited in the Print Room./ [signature] June 1860." That copy has proven to be elusive but was luckily reproduced by Gunther (**Figure III-121**).[284] Gunther does not give the exact manuscript reference for the drawing but it must be 'Vol. ii, 43, Brit. Top.', rather than Add. MS 5238 no. 83 assumed by Pierce, as it also shows the public landing stairs and some of the areas of the embankment are straightened.[285] Since the Blackfryers staircase, illustrated in the drawing, was built sometime in 1672, and the dotted lines in this drawing appear to have been used in the *c.* 1673 presentation drawing at the Society of Antiquaries, we can date these three drawings to *c.* 1672.[286]

ii. 19. TATE BRITAIN, LONDON

Figure III-333. Hooke (attrib.), 'Figural study', *c.* 1660?. Source: Tate Britain, London, T10678.

This single folio of figural drawings has been attributed to Hooke by Matthew C. Hunter, who dates it to *c.* 1660. It appears to have been acquired by Tate Britain in 1996 with the purchase of A. P. Oppé's collection of British drawings and watercolours. As there is no record of how it entered Oppé's collection, Hunter speculates that the drawing may have been first purchased by Hans Sloane or otherwise entered the collection of Ralph Thoresby, then was bound with

[284] Robert T. Gunther, *Early Science in Oxford, Vol. X: The Life and Work of Robert Hooke (Part IV)* (Oxford: [Printed for the editor], 1935), pp. 62-63.

When the British Library was founded in 1972, the book collection of the British Museum was transferred there. Some items, selected in a seemingly random fashion, were left behind at the Museum, making it possible that 'Vol. ii, 43, Brit. Top.' is still there rather than at the British Library.

[285] Pierce noted that the shelfmark 'Vol. ii, 43, Brit. Top.' was from Gunther, however I was unable to find this reference. Pierce suggested that due to a rearrangement of the contents of the British Topographical volumes, the drawing, which he also had not been able to locate, might be misplaced Pierce, 'Drawing for a Thames Embankment', pp. 237n4, 238n1.

[286] On the Blackfryers staircase, see T. F. Reddaway, *The Rebuilding of London After the Great Fire* (London: Jonathan Cape, 1940), p. 282.

other drawings, before the sheet it was attached to was separated and was purchased sometime between 1900 and 1928 by Oppé.[287] As corroborative evidence, Hunter draws attention to the resemblance between these sketches and the small figural drawing pasted in the copy of Heinrich Lautensack, *Des circkels unnd richtscheyts* (Frankfurt, 1564) attributed to Hooke (**Figure III-8**).

As discussed in the first part of this chapter, and illustrated with the author's collage appended as 'Figure III-333. b', these sketches appear to be partly based on Oliviero Gatti's engraving (**Figure III-65**) of an original drawing by Guercino which had been published in a book of drawings in Bologna in 1619.

ii. 20. WARWICKSHIRE C.R.O.

There are a number of architectural drawings in Hooke's hand among the Feilding Papers at Warwickshire County Record Office (C.R.O.).[288] There is no provenance information on how they entered the Feilding collection, and as they were grouped together under 'architectural drawings', their context has been lost. There appears to be no direct connection between the Feilding family and Hooke, and his only indirect connection to Basil Feilding, second earl of Denbigh (*c.* 1608–1675), may be via a common acquaintance, William Dugdale (1605–1686).[289] Not all the drawings reproduced here have been attributed to Hooke but are included for future identification.

Figures III-334 and III-335. Edward Pearce (attrib.), 'Designs for two unidentified churches', n.d. Source: Warwickshire C.R.O., CR2017/B1/1 and 2.

These drawings have been attributed to Edward Pearce (*c.* 1630-1695) by Geraghty based on the draughtsmanship; in particular he identifies the depiction of the carvings and the flaming urns as idiosyncratic to Pearce. As he points out, Hooke on occasion hired Pearce as a draughtsman, which could very well explain the presence his drawings among Hooke's papers at Warwickshire C.R.O.[290] Comparing **Figure III-335** to Pearce's *c.* 1670 elevation of St.

[287] Hunter, 'Hooke's Figurations: A Figural Drawing Attributed to Robert Hooke', p. 8.

[288] I am grateful to archivists Rachael Marsay and David Hodgkinson for their help with the provenance of the 'Feilding of Newnham Paddox' Papers.

[289] 'Feilding, Basil, second earl of Denbigh (*c.* 1608–1675)', *ODNB*.

[290] Geraghty, *Architectural Drawings of Wren*, p. 86; Walker, 'Architectus Ingenio', p. 191.

Edmund King and Martyr (**Figure III-216**), Geraghty also notes that it is possibly an alternative design for the same church, which would date it to *c.* 1670.[291]

Figure III-336. Hooke, 'Alternative design for the church in Willen', *c.* 1678. Source: Warwickshire C.R.O., CR2017/B1/3.

In late 1678, Richard Busby (1606–1695), schoolmaster at Westminster School, commissioned Hooke to build a small parish church in Willen, Buckinghamshire. Hooke produced several designs in late 1678 and early 1679; finally, one of them was adopted and construction contracts were signed in September 1679. Two of Hooke's preliminary designs have survived among his papers; in addition to this elevation, there is also an elevation-plan combo at the British Library (**Figure III-79**). See Chapter IV, ii. 35, on the church in Willen.

Figure III-337. Hooke, 'Colledg [sic] front [Partial elevation of the Royal College of Physicians]', 1671. Source: Warwickshire C.R.O., CR2017/B1/4.[292]

This undated partial elevation/section in Hooke's hand is most likely a preliminary design from *c.* 1671 of the main building of the Royal College of Physicians. On its verso is the note 'Colledg [sic] front', presumably also in Hooke's hand. It correlates to the front elevation of the same design, now BL, Add. MS 5238, no. 57 (**Figure III-77**).

Figure III-338. Hooke, 'Section through the anatomy theatre of the Royal College of Physicians', 1676. Source: Warwickshire C.R.O., CR2017/B1/5.[293]

The construction of the main building of the Royal College of Physicians had started in 1671 but financial difficulties stalled the building of the anatomy theatre. Once funding was secured from the philanthropist John Cutler (1607/8–1693), Hooke designed the lower sections of the theatre and construction began in early 1675. On 6 January 1676, Hooke recorded drawing the "designe of Theatre" and on the 17th, agreeing with Hayward, the carpenter, "for circular

[291] Geraghty, *Architectural Drawings of Wren*, p. 86. In addition to the two drawings attributed to Pearce, a third similarly-composed one is currently AS I.60 among Wren's drawings at All Souls College, Oxford, and has been reproduced as no. 113 in ibid., p. 87 It had formerly been associated with St. Mary Abchurch but Geraghty proposes that it is instead a preliminary design for St. Lawrence Jewry, where Pearce was hired as a mason *c.* 1671. This could date all three drawings to *c.* 1671.

[292] See Chapter IV, ii. 10, for Hooke's work on the Royal College of Physicians.

[293] Ibid.

roof and turret" with 16 brackets and an oak cornice. This section and the accompanying plan (**Figure III-352**) likely date to this period. "9 & 8" and "9 & 9", written in pencil in the section, may be referring to the sizes of timber which are more visible in the plan. The 3-foot diameter brass ball, polished according to a recipe Hooke had heard about on 15 April 1676, was installed on 27 February 1677.[294]

Figure III-339. Hooke[?], 'Elevation of an unidentified building', n.d. Source: Warwickshire C.R.O., CR2017/B1/6.

This unidentified building might be a modest house or a service building.

Figure III-340. Hooke[?], 'Elevation of an unidentified building', n.d. Source: Warwickshire C.R.O., CR2017/B1/7.

This is likely an initial design drawing; it has been scored before being drawn in pencil. The building remains unidentified.

Figure III-341. Hooke[?], 'Elevation of an unidentified building, perhaps almshouses', n.d. Source: Warwickshire C.R.O., CR2017/B1/8.

This ink and ink wash drawing depicts a structure with individual units, each with a separate entrance. Although it does not look like any of the almshouses Hooke has been associated with, the use of a colonnade does bear some resemblance to Aske's almshouses.[295] It should also be compared with **Figure III-18**, which shows the elevation and plan of an individual unit. In terms of the draughtsmanship, this is a curious drawing; it may have been drawn with a faulty instrument, resulting in all the vertical lines to be at a slight angle. The textures depicting the materials, e.g. brick, glass, are also unusual.

Figures III-342.a to III-345. Anon., 'Various drawings', n.d. Source: Warwickshire C.R.O., CR2017/B1/9r to 17.

These are unidentified elevations of architectural details, e.g. staircase, windows, fences, and gates. CR2017/B1/16 (**Figure III-344.c**), which depicts two statues at a gateway, is competently executed.

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[294] *Diary i*, pp. 209, 212, 226, 276.

[295] See Chapter IV, ii. 47, for Hooke's work on Aske's almshouses.

Figure III-346. Anon., 'Fence and post with urn', n.d. Source: Warwickshire C.R.O., CR2017/B1/18.

In this presentation drawing of a fence and post with a flaming urn, the depiction of the flame is reminiscent of, but not identical to, a drawing attributed to Wren: the alternative design for the top of the Monument to the Great Fire of London (**Figure III-103**).

Figures III-347 and III-348. Prints from Jean Lepautre, *Portails d'Eglise a l'Italienne, nouvellement inventés & gravés par J. Lepautre*. A Paris, chez P. Mariette, avec privilége du Roy. Source: Warwickshire C.R.O., CR2017/B2/1 and 2.

These two prints appear to be from an undated series entitled *Portails d'Eglise à Italienne inuentés par J. le Pautre*. Jean Lepautre (1618-1682) was a prolific French engraver, and this particular set of his was published numerous times during the seventeenth century with slight variations, by Pierre Mariette in Paris and by Danckerts in Amsterdam, before being republished by 'Jombert, Libraire du Roy' in 1751. These particular versions are similar, but not identical, to the prints in Danckerts's series; of the latter, a digitised version from MAK (Österreichisches Museum für angewandte Kunst) may be consulted online.[296]

Figure III-349 to III-351. cf. Anon., 'Engraving of a Corinthian capital', n.d. Source: Warwickshire C.R.O., CR2017/B2/3.

This illustration of a Corinthian capital was used by Pierre Le Muet (1591-1669) in his *Traicté, des galleries, entrées, salles, antichambres, & chambres* (Paris, 1645) which was appended to his translation of Palladio. It appears as plate 9 in the section 'Demonstration de quelques figures des portes et croisees selon les cinq ordres d'Andre Palladio', and bears the title 'Chapiteau Corinthe' just below the bottom frame of the illustration (**Figure III-351. cf)**.[297]

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[296] E.g. MAK inventory nos. KI 1-658-248 and KI 1-658-258; https://goo.gl/wGXQHQ. See also Maxime Préaud, *Inventaire du Fonds Français, Graveurs du XVIIe Siècle, Tome 12: Jean Lepautre (Deuxième Partie)* (Paris: Bibliothèque Nationale de France, 1999), nos. 2118-2125; Franz Schestag, *Illustrirter Katalog der Ornamentstich-Sammlung des K. K. Österr. Museums für Kunst und Industrie* (Vienna: Verlag des K. K. Österr. Museums, 1871), pp. 197-198.

[297] Pierre Le Muet and Andrea Palladio, *Traicté des cinq ordres d'architecture, desquels se sont seruy les anciens. Traduit du Palladio augmenté de nouuelles inuentions pour l'art de bien bastir par le Sr. Le Muet* (Paris: F. Langlois, 1645), p. 166.

A copy of this engraving was used by Godfrey Richards in his edition of Palladio's *First book of architecture*. Rather than the original book, Richards based his translation on Le Muet's French edition and copied the latter's plates. His copy of plate 9 (**Figure III-350. cf**) bears the title 'The Corinthian Capitel' and is printed in the same section, 'Demonstration of some figures of doores and windowes, according to the five orders of Andrea Palladio. And are in the court of the Levure at Paris, the which express the beauty of the fair proportions before mentioned.'[298]

The print among Hooke's papers (**Figure III-349**) is almost identical to Richards's, featuring the same minor flaws such as the small vertical line at the bottom of the plate, the gap in the lower right and the squiggle in the upper right corners of the frame. As it lacks the title and page number, it may have been printed as a test or to be sold on its own. It also may have been meant to be used in another publication. Hooke was well-acquainted with Richards, a book and printseller, often visiting him in his shop to buy maps. During one of these visits, on 20 January 1675, Hooke spoke to him about Christopher Wase's translation of Vitruvius, and more than a year later encountered Wase himself at the shop, drily noting his inebriated state and his demand of £50 for the translation.[299] It is possible that Hooke obtained this print from Richards for his own use or as an illustration sample for a future and ultimately failed publication of the first English edition of Vitruvius.

Figure III-352. Hooke, 'Roof plan of the anatomy theatre of the Royal College of Physicians', 1676. Source: Warwickshire C.R.O., CR2017/B3.

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[298] Godfrey Richards, *The first book of architecture by Andrea Palladio translated out of Italian: with an appendix touching doors and windows, by Pr Le Muet translated out of French by G[odfrey] R[ichards] to which are added designes of floors lately made at Somerset-house; and the framing of houses after the best manner of English building, with their proportions and scantlings* (London: Printed by J. M. and sold by G. Richards . . . 1663), p. 179. The book was dedicated to Daniel Colwall (*d.* 1690), philanthropist and one of the earliest members of the Royal Society, having been elected fellow in January 1661; see 'Colwall, Daniel (*d.* 1690)', *ODNB*. Richards's translation was reprinted numerous times (e.g. 1668, 1676, 1683, 1693, 1700, etc.) with the 1700 edition featuring an oddly-drawn perspective of St. Paul's; see Eileen Harris and Nicholas Savage, *British Architectural Books and Writers, 1556–1785* (New York, NY: Cambridge University Press, 1990), pp. 352-354; Charles Hind and Irena Murray, 'Publishing Palladio and the Spread of Anglo-Palladianism', in *Palladio and His Legacy: a Transatlantic Journey*, ed. Charles Hind and Irena Murray (Venice: Marsilio, 2010), pp. 110-113; Rudolf Wittkower, *Palladio and English Palladianism* (New York: George Braziller), p. 78.

[299] *Diary i*, pp. 143, 250. Wase was a prolific translator; see 'Wase, Christopher (1627–1690)', *ODNB*.

A plan of the timber bracing of the anatomy theatre of the Royal College of Physicians. See the notes for the accompanying section (**Figure III-352**) above.

ii. 21. YALE UNIVERSITY, BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY

Figure III-353. Hooke, 'Letter to Newton', 9 Dec. 1679. Source: Yale University, Beinecke Rare Book and Manuscript Library, GEN MSS MISC, Group 2583, F-1.

Figure III-354. cf. Newton, 'Letter to Hooke', 28 Nov. 1679; detail. Source: Trinity College, Cambridge, MS R.4.48.5.

Figure III-355. cf. Newton, 'Letter to Hooke', 13 Dec. 1679; detail. Source: BL, Add. MS 37021, fol. 56r.

This letter (**Figure III-353**) is one of seven Hooke and Newton exchanged in 1679-1680.[300] Five of these letters had been in the collection of Trinity College, Cambridge, when Hooke's 9 Dec. 1679 letter and Newton's 13 December response surfaced in Sotheby auctions in 1918 and 1904 respectively.[301] While Hooke's letter was eventually acquired by Yale University, Newton's is now at the British Library as Add. MS 37021, fol. 56.

The correspondence has been studied by historians of science in the context of the development of gravitational theory but also of the priority disputes between the two philosophers, who were as renowned for their irascibility.[302] In this letter, in response to Newton's suggestion that heavy bodies descended in a spiral motion (**Figure III-354. cf**), Hooke explains his own idea of circular motion which is "nothing att all akin to a spirall but

[300] Hooke's letter has been transcribed and reproduced in Alexandre Koyré, 'An Unpublished Letter of Robert Hooke to Isaac Newton', *Isis* 43 (1952), pp. 312-337, at pp. 328-330; H. W. Turnbull, ed., *The Correspondence of Isaac Newton*, 7 vols., vol. 2 (New York: Cambridge University Press, 1960), letter 237, pp. 304-307.

[301] See also Hooke's papers at Trinity College Library, University of Cambridge, and Figures III-176 to III-180.

[302] Secondary literature on the subject include Koyré, 'An Unpublished Letter of Robert Hooke to Isaac Newton'; Gal, 'Hooke's Programme: Final Thoughts'; Nauenberg, 'Hooke, Orbital Motion, and Newton's Principia'; Nauenberg, 'Robert Hooke's Seminal Contribution to Orbital Dynamics'; Patterson, 'Hooke's Gravitation Theory and Its Influence on Newton. I: Hooke's Gravitation Theory'; Pugliese, 'Robert Hooke and the Dynamics of Motion in a Curved Path'. For a competing view to Nauenberg's, see Domenico Bertoloni Meli, 'Who is Afraid of Centrifugal Force?', *Early Science and Medicine* 10 (2005), pp. 535-543.

rather a kind Elleptueid."[303] In the upper diagram (**Figure III-353**), the outer circle is the plane of the equinox, or circumference of the earth, and a heavy object is being let go from point A which is at the top. The object is gravitationally attracted towards the centre (C), Hooke explains, but combined with the diurnal motion of the earth, it would move in the inscribed elliptical spiral. He uses the lower diagram to illustrate what he thinks would happen should the object be dropped at the 51° 31' latitude of London. In his subsequent response, dated 13 Dec. 1679, Newton sent the well-known diagram of his theory of orbital motion (**Figure III-355. cf**).

[303] Turnbull, *The Correspondence of Isaac Newton*, vol. 2, letter 237, pp. 304-307.

CHAPTER IV – BUILDING

Documentary analysis of architectural projects by or attributed to Hooke

CHAPTER IV – BUILDING

ii. Documentary analysis of architectural projects by or attributed to Hooke

INTRODUCTORY NOTE

The following is a documentary analysis of the architectural and other construction projects Hooke has been associated with. Rather than a regular catalogue of works with detailed descriptions of the projects, its objective is limited to assessing the primary evidence as well as the secondary scholarship for the attributions.

The main sources for the attributions are contemporary biographical notes by John Aubrey, Richard Waller, and Anthony Wood, as well as relatively more recent secondary literature from M. I. Batten, Howard Colvin, Margaret 'Espinasse, and Giles Worsley. Several additional attributions can be traced to the *National Heritage List for England* (NHLE) or various other secondary sources, and some are contributions by this dissertation.[304]

For each of the projects, all of the available primary sources, such as diary entries, correspondence, drawings, reports, craftsmen's invoices, and other documentation are listed, often with extracts from the relevant sections. Full transcriptions of some of the correspondence and reports are provided in the 'Appendix: Some available primary textual evidence of Hooke's architectural work' in Volume 2. One of the reasons for including the evidence, rather than simply referring to it or paraphrasing it in a few sentences, is to allow for a certain amount of transparency in how they were interpreted in this dissertation. The referencing process can sometimes be opaque, where a scholar can simply give a bibliographical citation to support a claim without explicating the content of that source—indeed, this is how the scholarship on Hooke's architectural work has become populated with spurious attributions. Moreover, there is often more than one way of reading this primary material; especially the diary entries are open to multiple interpretations. The reader should be able to judge for themselves whether they agree with the analysis or not. A second reason is to present, as clearly as possible, what sources were available at the time of writing this dissertation, in the event of

[304] M. I. Batten, 'The Architecture of Dr. Robert Hooke, F.R.S.', *The Walpole Society* 25 (1936–1937), pp. 83-113; entries on Hooke in Howard Colvin, *A Biographical Dictionary of British Architects, 1600–1840*, 1st ed. (London: John Murray (Publishers), 1954) and subsequent editions; Margaret 'Espinasse, *Robert Hooke* (Berkeley, CA: University of California Press, 1956), pp. 83-105; Giles Worsley, 'Taking Hooke Seriously', *Georgian Group Journal* 14 (2004), pp. 1-25. See also the list of abbreviations.

future discoveries that may require a renewed assessment. These extracts are then followed by a brief description and assessment of these sources.

Some of the attributions are supported by plenty of primary material—indeed, these are the projects most secondary literature on Hooke's architectural work concentrates on: Royal College of Physicians (ii. 10), Bethlem Hospital (ii. 16), Montagu House (ii. 19), and Aske's Almshouses (ii. 47), all in London; Church of St. Mary Magdalene in Willen (ii. 35); Ragley Hall in Warwickshire (ii. 36); and Ramsbury Manor in Wiltshire (ii. 37). Unrealised projects, such as the Colleges for the Royal Society in London and Chelsey (ii. 2), the completion of Tangier Mole (ii. 26), the rebuilding of the Navy Office (ii. 20), or Hooke's design for Magdalene College, Cambridge (ii. 33) are known only through his diary entries. The diaries are also the only primary source for Hooke's involvement in many of the projects listed below; e.g. Turner's almshouses in Kirkleatham (ii. 15), houses for Edgcumbe (ii. 22), Reading (ii. 23), de Vere (ii. 27), and Gould (ii. 45), and alterations and additions to properties owned by different members of the Boyle family (ii. 28 to ii. 31).

As noted in Chapter I, the diaries are not continuous, thus any project built during the lacunae would need other evidence to support an attribution to Hooke. For instance, he is credited with the Somerset House Stables (ii. 4), built before the diaries began, because of an extant drawing among his papers (**Figure III-128 or IV-16**). Yet some of the attributions lack any primary material supporting them. In such cases, certain criteria are first sought to assess their plausibility, e.g. whether Hooke had any associations with the client or whether there is evidence connecting the project to someone else. In the absence of any apparent connection to Hooke and bearing in mind the aphorism 'absence of evidence is not evidence of absence', these attributions are marked 'speculative' and await uncovering of further archival documentation to be verified or dismissed with any degree of certainty.

It should be noted that there are still some architectural drawings extant among Hooke's papers (e.g. **Figures III-18, 47, 74, 90, 125 to 127, 129, 130, 133, 156, 164, 181, 339-346**) that have not yet been connected to any specific project. As explained in the annotations for these drawings (see Chapter III, ii), some of them might be earlier designs for his known projects while others might be drawings that he collected. Considering the presence of drawings dated after Hooke's death among his papers (e.g. **Figures III-16, 91, 122**) it cannot be ruled out that some were added later by collectors or curators. The possibility remains that at least some of them might be connected to projects he worked on during the gaps in the diaries.

Chapter IV – Building

An in-depth analysis of Hooke's work for the City of London is outside of the scope of this dissertation as it has already been the subject of relatively-recent articles and a book-length study by Michael Cooper, who has conducted extensive research in the City archives. However, some of the particular projects Hooke was engaged in as part of his City Surveyorship are briefly analysed; these include the proposal he submitted for the City's rebuilding (ii. 1), his work for the City Churches (ii. 5), Monument to the Great Fire (ii. 6), Fleet Canal (ii. 7), and Thames Embankment (ii. 9). While the issues of authorship are particularly complex for such civic projects, where other surveyors, consultants, and committees would have been involved in any final decision-making, they illustrate the diversity of practical expertise Hooke accumulated through this work—expertise that he would use for future projects such as the sluices he helped design for the Southwells in Kings Weston (ii. 49) and even the possible consultancy he provided to Lowther for Whitehaven in Cumbria (ii. 34).

The following list is arranged chronologically. If a project is mentioned in the diaries, the date would be when Hooke was first engaged, e.g. had an initial discussion with the client, or first began working for a particular institution like Westminster Abbey (ii. 24). For others, it would be the known date of the beginning of construction.

While the list may appear long, the scope of work undertaken by Hooke himself varied greatly between liasioning between a craftsman and a client (e.g. Canterbury Cathedral Choir, ii. 25), directing renovations to existing buildings (e.g. the Lutton Chuch, ii. 50), preparing designs that may or may not have been realised later on (e.g. the Navy Office, ii. 20), and much more involved work such as the design and construction supervision of larger works such as Montagu House or the Royal College of Physicians.

ii. 1. PROPOSAL FOR THE RECONSTRUCTION OF LONDON AFTER THE GREAT FIRE

Attributions or discussions: Aubrey, *Brief Lives*, p. 98; Batten, p. 86; Colvin, *BDBA* (1954) and subsequent editions; Michael Cooper, *Robert Hooke and the Rebuilding of London* (Phoenix Mill, UK: Sutton Publishing, 2005) and 'Robert Hooke's Work as Surveyor for the City of London in the Aftermath of the Great Fire. Part One: Robert Hooke's First Surveys for the City of London', *Notes and Records of the Royal Society of London* 51 (1997), pp. 161-174; 'Espinasse, pp. 84-85; Sydney Perks, 'London Town-Planning Schemes in 1666', *Journal of the Royal Institute of British Architects* XXVII (1919), pp. 69-82; T. F. Reddaway, *The Rebuilding of London After the Great Fire* (London: Jonathan Cape, 1940); Robinson, pp. 48-49; Waller, p. xiii.

Brief description: After the Great Fire of London in 1666, there were several proposals for the City's reconstruction. Hooke's plan has not survived, and while none of the schemes were adopted in the end, his proposal earned him the position of City Surveyor.

A detailed analysis of Hooke's work as a City Surveyor is outside of the scope of this dissertation. For some of the subsequent work he undertook in that capacity, see ii. 5 (City Churches), ii. 6 (Monument to the Great Fire of London), ii. 7 (Fleet Canal), and ii. 9 (Thames Embankment) in this chapter. See also Appendix ii and iii.

Primary sources:

– Birch, vol. 2, p. 115 (19 Sep. 1666):

> "Mr. Hooke shewed his model for rebuilding the city to the society, who were well pleased with it; and Sir John Laurence, late lord mayor of London, having addressed himself to the society, and expressed the present lord mayor's [Sir Thomas Bludworth] and aldermen's approbation of the said model, and their desire, that it might be shewn to the King, they preferring it very much to that, which was drawn up by the surveyor of the city; the president answered, that the society would be very glad, if they or any of their members could do any service for the good of the city; and that Mr. Hooke should wait on them with his model to the King, if they thought fit to present it: which was accepted with expressions of thanks to the society."

– Waller, p. xiii:

> "What this Model was, I cannot so well determine, but I have heard, that it was design'd in it to have all the chief Streets as from Leaden-hall corner to Newgate, and the like, to lie in an exact strait Line, and all the other cross Streets turning out of them at right Angles; all the Churches,

> publick Buildings, Market-places, and the like, in proper and convenient places, which, no doubt, would have added much to the Beauty and Symmetry of the whole. How this came not to be accepted of I know not, but it is probable this might contribute not a little to his being taken notice of by the Magistrates of the City, and soon after made Surveyor."

Description:

On 2 September 1666, a fire broke out in a small bakery in Pudding Lane in central London. The conditions were ideal for its rapid spread; following an unusually dry summer and fanned by high winds, within four days the 'Great Fire of London' consumed 80% of the City: 13,200 houses, St. Paul's Cathedral and 86 parish churches, 44 company halls, the Royal Exchange, the Guildhall, the Custom House, and many other City buildings were destroyed.[305] Before the fire, there were already plans to reconstruct parts of London, to bring some order to what had largely remained a medieval city composed of timber buildings, a disordered mesh of streets, and severe air pollution.[306] As devastating as the fire was, many saw an opportunity to put these plans into action. Within days of the fire, Wren rushed a proposal for the City's rebuilding and was the first to present a plan to the King on 11 September. Two days later, Evelyn followed with a design of his own which was discussed at length and well received by the King and the Duke of York.[307]

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[305] Reddaway, *The Rebuilding of London After the Great Fire*, p. 26. While other works have since been published on the Great Fire, Reddaway's book remains a reliable source.

[306] Samuel Sorbière (1615–1670), a French *virtuoso* who became one of the first foreign members of the Royal Society, was not too impressed with London when he visited in 1663–1664. He published his sharp cricisims (which extended beyond London) in *Relation d'un voyage en Angleterre, où sont touchées plusieurs choses, qui regardent l'estat des sciences, et de la religion, & autres matieres curieuses* (Paris: Chez Louis Billaine . . . , 1664), causing an international incident. On Sorbière, see also Lisa T. Sarasohn, 'Who Was Then the Gentleman?: Samuel Sorbière, Thomas Hobbes, and the Royal Society', *History of Science* xlii (2004), pp. 211-232.

John Evelyn had addressed some of the problems with the city, especially the air pollution, in his *Fumifugium, or, the inconveniencie of the aer and smoak of London dissipated. Together with some remedies humbly proposed* (London: Printed by W. Godbid . . . , 1661).

[307] There were further plans by Peter Mills, Richard Newcourt (*bap. c.* 1610, *d.* 1679), and Captain Valentine Knight. On the various proposals for rebuilding the City, see P. Abercrombie, 'Wren's Plan for London after the Great Fire', *The Town Planning Review* 10 (1923), pp. 71-78; Julienne Hanson, 'Order and Structure in Urban Design: The Plans for the Rebuilding of London after the Great Fire of 1666', *Ekistics* 56 (1989), pp. 22-42; Elbert Peets, 'Famous Town Planners: IV. The Plans for Rebuilding London in 1666', *The Town Planning Review* 14 (1930), pp. 13-30; Sydney Perks, 'London Town-Planning Schemes in 1666', *Journal of the Royal Institute of British Architects* XXVII (1919), pp. 69-82; Pierce, 'Drawing for a Thames Embankment'.

On 19 September, Hooke presented his own scheme at a Council meeting of the Royal Society. John Lawrence (*d.* 1692), the former mayor of London, addressed the Society and informed them that Hooke had already shown his 'model' to the current mayor and aldermen of the City, who approved of it and indeed preferred it over the one that had been prepared by the City Surveyor, Peter Mills (1598–1670). They requested that Hooke's plan be presented to the King, although it remains unclear whether that was ever implemented.[308]

Hooke's proposed plan has been lost, or has otherwise been unavailable, presumably since his lifetime as even Waller had not seen it in person. "I have heard," he wrote "that it was design'd in it to have all the chief Streets as from Leaden-hall corner to Newgate, and the like, to lie in an exact strait Line, and all the other cross Streets turning out of them at right Angles." With all the public spaces and buildings "in proper and convenient places," Waller thought "it would have added much to the Beauty and Symmetry of the whole."[309]

The engraved orthogonal plan often reproduced as Hooke's scheme was first attributed to him by Sydney Perks in a 1919 paper on post-fire proposals for London. During his research, Perks had come across a Dutch map of the areas destroyed by the fire of London. Published by Marcus Willemsz Doornick of Vygendam in 1666, it included a plan titled "Nieuw modell om de afgebrande stadt London te herbouwen" (**Figure IV-1**), which Perks thought matched Waller's description of Hooke's proposed scheme.[310] Further maps from the period, such as Frederik de Wit's 'Platte grondt der stadt London met de aenwysinghe hoe die afgebrandt is' (Amsterdam, 1666) (**Figure IV-3**), or Matthaeus Merian's 'Grundtriss der Statt London wie solche vor und nach dem Brand anzusehen, sampt dem Newen Model, wie selbige widrum Auffgebauwet werden solle' (1670) (**Figure IV-2**) feature a similar plan. However, there is no evidence of a connection between these and Hooke's lost plan, and the glaring omission of St. Paul's Cathedral has been brought up as an argument against the attribution.[311] It is difficult to speculate Hooke's source of inspiration for the grid plan.[312] However, it

[308] Birch, vol. 2, p. 115.

[309] Waller, p. xiii.

[310] Perks, 'London Town-Planning Schemes in 1666', p. 76.

[311] Peets, who favours the attribution, dismisses the omission as an error; Peets, 'Famous Town Planners', pp. 22-23. Cooper, on the other hand, sees it as evidence that, if there is any relationship between the drawings at all, the Dutch plans could not be "anything more than stylised representations of Hooke's original plan;" Cooper, *Robert Hooke and the Rebuilding of London*, p. 113.

[312] On the early modern use of the grid in ideal cities and in urban planning in general, see Wim Nijenhuis, 'Stevin's Grid City and the Maurice Conspiracy', in *Early Modern Urbanism and the Grid: Town Planning in the Low*

has been suggested that he may recommended it to John Lowther (*bap.* 1642, *d.* 1706) for use in the planning of Whitehaven.[313]

None of the proposed plans were implemented in the end, but having impressed the City aldermen, on 4 October, alongside Edward Jerman (*c.* 1605–1668) and Peter Mills, Hooke was appointed 'City Surveyor for Rebuilding London'—according to Aubrey, a position "by which he hath gott a great Estate."[314]

ii. 2. COLLEGES FOR THE ROYAL SOCIETY IN LONDON AND CHELSEA

Attributions or discussions: Jim Bennett, 'Wren's Last Building?', *Notes and Records of the Royal Society of London* 27 (1972), pp. 107-118, at pp. 107-108; Michael Hunter, 'A "College" for the Royal Society: The Abortive Plan of 1667-8', in *Establishing the New Science: The Experience of the Early Royal Society*, 156-84 (New Hampshire, CT, 1989), pp. 156-184, at pp. 173-175.

Brief description: In addition to their endeavour to secure and convert the old Chelsea College for their use, in 1667–1668, the Royal Society embarked on a project to build a dedicated college in London; Hooke produced unrealised designs for both.

Countries in International Context Exchanges in Theory and Practice, 1550-1800, ed. Piet Lombaerde and Charles van den Heuvel (Turnhout, Belgium: Brepolis, 2011), pp. 45-62, 217-218. Samuel Hartlib had proposed a grid-layout for dividing and setting up farmland; see his *A discoverie for division or setting out of land, as to the best form* (London: Printed for Richard Wodenothe . . . , 1653).

313 See ii. 34 in this chapter on the church and port in Whitehaven, and Figures IV-218 and IV-219.

314 Aubrey, *Brief Lives*, p. 98. The City Surveyors were to work with Wren, Hugh May (1621–1684), and Roger Pratt (1620–1685), who had in turn been appointed 'King's Commissioners for Rebuilding the City of London'.

For the most recent study of Hooke's work as the City Surveyor, see Michael Cooper, 'Robert Hooke's Work as Surveyor for the City of London in the Aftermath of the Great Fire. Part One: Robert Hooke's First Surveys for the City of London', *Notes and Records of the Royal Society of London* 51 (1997), pp. 161-174; Michael Cooper, 'Robert Hooke's Work as Surveyor for the City of London in the Aftermath of the Great Fire. Part Two: Certification of Areas of Ground Taken Away for Streets and Other New Works', *Notes and Records of the Royal Society of London* 52 (1998), pp. 25-38; Michael Cooper, 'Robert Hooke's Work as Surveyor for the City-of-London in the Aftermath of the Great Fire. Part Three: Settlement of Disputes and Complaints Arising from Rebuilding', *Notes and Records of the Royal Society of London* 52 (1998), pp. 205-220; Cooper, *Robert Hooke and the Rebuilding of London*.

Although he was not involved in its design, Hooke's work in the laying out of the foundations for the Royal Observatory at Greenwich was likely due to his experience as a City Surveyor. Regarding the lack of evidence for Hooke's further involvement in the project, see Walker, 'Architectus Ingenio', pp. 155-160.

Primary sources:[315]

– Hooke's entries in *Diary i*:

- 24 Nov. 1672 (p. 14): "Lord Brounkers, told him of Lord Chesters[316] Legacy."
- 20 Apr. 1673 (p. 40): "Lord Chesters book and legacy."
- 25 July 1673 (p. 52): "went to Chelsey College with Mr. Colwall and Mr. Hill."
- 28 July 1673 (p. 53): "At Little chelsey with Mr. Hill by water."
- 3 May 1674 (pp. 100-101): "Dind with Sir Ch: Wren at Lord Brounker. Discoursd . . . about building with Lord Chesters money, &c."
- 20 June 1674 (p. 108): "to Mr. Hoskins with whom much discourse about the R. S. module."
- 23 Sep. 1674 (p. 122): "With Sir J. More to Chelsey colledge by water."
- 23 June 1675 (p. 166): "Appointed Peirce[317] to Chelsey Monday, 2."
- 6 Nov. 1677 (p. 326): "at Jonathans, 8d., Sir J. Hoskins, Mr. Hill, Mr. Lodowick, Mayor Holmes. about Chelsey Colledg, peppercorne 5 years £5, 5 years £10, and 10 years at £15 for the Remainder. I suppose for a glassehouse."
- 13 Nov. 1677 (p. 327): "Read a letter from Mr. Boyle about Chelsey Colledge being carryd away by poor people."[318]
- 10 May 1678 (p. 357): "with Hill and Hunt to Chelsey colledge by coach."
- 12 May 1678 (p. 358): "I discoursd with Lord Sarum[319] about my contrivance for Chelsey Colledge which he approved and promised £100."
- 14 May 1678 (p. 358): "at Sir Ch. Wrens, spake with Sir J. Williamson about Chelsey Colledge. met there Sir P. Wych and Mr. Mart he was well pleasd with Chelsey project . . . acquainted Sir Ch. Wren he liked it not."
- 23 May 1678 (p. 359): "noe meeting but a discourse about Chelsey Colledge."

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315 There is further primary evidence on this project, e.g. in the correspondence of Oldenburg or John Evelyn's diaries, however as Hooke is the focus here and in the interest of brevity, only those most closely related to him are included.

316 John Wilkins. Note that, in anticipation of Felicity Henderson's upcoming edition of Hooke's diaries, only some of the more obscure names are identified here.

317 Edward Pierce or Pearce, the mason, whom Hooke sometimes hired as a draughtsman; see the annotations for Figures III-164, III-192, III-164, III-216, III-334, and III-335. There is no subsequent mention in the diary on whether the appointment was kept.

318 This letter does not appear to be extant.

319 Seth Ward, also referred to as the Bishop of Salisbury.

- 27 May 1678 (p. 360): "at Mr. Hills about Chelsey Colledge . . . Mr. Henshaw here about Chelsey Colledge fallen."
- 1 June 1678 (p. 361): "with Mr. Hill to Sir J. Hoskins. debated about Chelsey."
- 6 June 1678 (p. 361): "at a Councill orderd about Chelsey Colledge."
- 14 June 1678 (p. 362): "Bates proferrd £20 per annum for Chelsey Colledge."[320]
- 23 July 1678 (p. 368): "Irishman about Chelsey Colledge."
- 5 Sep. 1678 (p. 375): "Mr. Henshaw to Sir Jos. Williamsons. Dined there with Sir J. Louther, Henshaw, Wren, Hill, Grew, Croon – about Arundell Library and Chelsey Colledge."
- 25 Sep. 1679 (p. 425): "Bates here with estimate of Chelsey Colledge."[321]
- 21 Oct. 1679 (p. 428): "At Bruins coffee house with Sir Chr. Wren . . . about Chelsey College."[322]
- 23 Oct. 1679 (p. 428): "To Jonathans, Sir Ch. Wren, Sir J. Hoskins, Mr. Hill, Bates, module of Chelsey Colledge."
- 11 Nov. 1679 (p. 430): "Councell at Gresham Colledge about arrears and Chelsey colledge."
- 21 Jan. 1680 (p. 436): "at Sir J. Williamsons about Chelsey, a councell."
- 8 Nov. 1680 (p. 457): "To Sir Ch. Wren met Henshaw, Hill, at Mans, order about Chelsey."[323]

– Hooke's entries in *Memoranda*:

- 30 July 1681 (p. 149): "from 10 to 8 at nigh[t] joint about chelsey coledg Sir C[hristopher] W[ren]."
- 5 Oct. 1681 (p. 151): "A Councell. About Sir S[tephen] Fox chelsey Coll[ege]."[324]

– Sprat (1667), p. 434:

> "The places of their Residence they have appointed to be two: One a College, which they design to build in London, to serve for their Meetings, their Laboratories, their Repository, their Library, and the Lodgings for their Curators: The other the College at Chelsey, which the King has bestow'd on them; where they have a large Inclosure, to serve for all Experiments of Gardning

[320] Bates was a carpenter; presumably he was interested in leasing the property for his operations.

[321] This and the subsequent entry on 23 Oct. suggest the estimate was for a model of Chelsea College.

[322] On 10 Oct. 1679, the Society Council considered a proposal by Solomon Foubert to rent Chelsea College for his academy; see below for the relevant extracts from the Royal Society records. On Foubert, see note 327.

[323] On 25 Nov. 1680, the Society gave Henshaw power of attorney to rent the 'arable ground' of Chelsea College to Thomas Franklin; Harry Hunt was requested to provide a survey; Birch, vol. 4, p. 56.

[324] See the extract from the 11 Jan. 1682 Royal Society meeting below.

and Agriculture: and by the neighbourhood of the River they have excellent opportunity of making all Trials that belong to the Water."

– Waller (1705), p. xxvii:

"I indeed, as well as others, have heard him declare sometimes that he had a great Project in his Head as to the disposal of the most part of his Estate for the advancement of Natural Knowledge, and to promote the Ends and Designs for which the Royal Society was instituted: To build an handsome Fabrick for the Societies use, with a Library, Respositary, Laboratory, and other Conveniencies for making Experiments, and to found and endow a perpetual Physico-Mechanick Lecture of the Nature of what himself read. But tho' he was often solicited by his Friends to put his Designs down in Writing, and make his Will as to the disposal of his Estate to his own liking in the time of his Health; and after when himself, and all thought, his End drew near, yet he could never be prevail'd with to perfect it, still procrastinating it, till at last this great Design prov'd an airy Phantom and vanish'd into nothing. Thus he dy'd last without any Will and Testament that could be found. It is indeed but a melancholy Reflexion, that while so many rich and great Men leave considerable Sums for founding Hospitals, and the like pious Uses, few since Sir Thomas Gresham should do any thing of this kind for the promoting of Learning, which no doubt would be as much for the Good of the Nation, and Glory of God, as the other of releiving the Poor."

– Birch:[325]

- 12 Dec. 1660 (vol. 1, p. 5): "it having been suggested at the committee appointed at the preceding meeting, that the college of physicians would afford convenient accommodation for the assemblies of the society, upon supposition, that it were granted and accepted of, it was thought reasonable, that any of the fellows of the said college, if they should desire it, be admitted likewise as supernumeraries, upon condition of submitting to the laws of the society, both as to the payment on their admission and the weekly allowance, and the particular works or tasks, that shou'd be allotted to them."
- 19 Dec. 1660 (vol. 1, p. 7): "The resolutions of this day were:

  That the next meeting should be at Gresham College, and the future ones continued there weekly, till a farther resolution mould be taken."

[325] Considering the large number of references to Chelsey College in the Royal Society records, only those most relevant to the topic at hand are included.

- 9 Mar. 1664 (vol. 1, p. 391): "Sir Robert Moray moved, that the council would make it their business to get an interest in Chelsea College, and to procure the reversion thereof. Whereupon it was ordered, that the archbishop of Canterbury should be spoken to by the bishop of Exeter, Dr. Wilkins, and Dr. Pell, to give his consent to have the said college applied to the use of the society."
- 16 Mar. 1664 (vol. 1, p. 394): "The president, Sir Paul Neile, and Sir Robert Moray were desired to be vigorous in prosecuting the business of Chelsea-college, and in putting a stop to his majesty's grant to Mr. Sutcliffe for pulling down the house; and to procure from Mr. Cole and Mr. Sutcliffe an information of the state of the whole matter concerning the foundation."
- 30 Sep. 1667 (vol. 2, p. 194): "Mr. Oldenburg acquainted the council, that in the name of the society possession had been taken of Chelsea-college on the 27th of that month of September, by Mr. Charles Howard, Mr. Balle, Mr. Hooke, and himself.

  . . . Dr. Wilkins moved, that a committee both of the society and council might be considered of, for raising contributions among the members of the society, in order to build a college.

  It was ordered hereupon, that Dr. Wilkins should be desired to present to the council at their next meeting a list of such persons, as he should think proper for that purpose."
- 5 Nov. 1667 (vol. 2, p. 205): "The business of voluntary subscriptions for contributing towards the carrying on of the ends of the institution of the Royal Society being considered of, it was after debate and mature deliberation unanimously agreed upon,

  That it was now a seasonable time for such subscriptions; and that they were to be made first by such of the council and of the society, as were both willing and able, and afterwards by such other well disposed persons not of the society, as should come in by the solicitation of a committee to be nominated by the council out of their own number, and out of the fellows of the society; which contributions should be employed in promoting the ends of the society, and particularly to the building of a college, as the most probable way of the society's establishment."
- 2 Jan. 1668 (vol. 2, p. 234): "The business of voluntary contributions for building a college being moved again, it was upon debate thought good,

  That those, who had a mind to contribute, should not be obliged to subscribe their respective sums till the total of the subscriptions amounted to one thousand pounds."

- 11 Jan. 1668 (vol. 2, p. 238): "Mr. Hooke was desired to bring in at the next meeting of the council a draught for the building of the society's college."
- 25 Jan. 1668 (vol. 2, p. 242): "The letter formerly ordered to be drawn up by Mr. Oldenburg for Sir Robert Moray about soliciting contributions in Scotland, was read; and it was thought fit, that something should be added, expressing Mr. Howard's bounty in giving the ground to build the college upon."
- 30 Jan. 1668 (vol. 2, pp. 243-245): "That Sir Anthony Morgan be desired by the secretary to attend Mr. Howard, to consider with him of the best way of securing to the society his conveyance of the ground in Arundel-house for building a college upon, so as to make it valid in law by collateral security, or otherwise, if need be.

  The form for subscribing contributions to build a college for the society was agreed upon, as follows:

  > I _____ give unto the president, council, and fellows of the Royal Society of London for improving natural knowledge, towards the building of an house or college for them upon the ground near Arundel-house, given for that use by the honourable Henry Howard of Norfolk, the sum of _____ and do hereby engage myself to pay the said within one year from the date hereof, upon the usual feasts of Lady-day, Midsummer, Michaelmas, and Christmas, by even and equal portions. In witness whereof I have here-unto set my hand and seal this _____ day of _____."

  . . . The letter [to solicit subscriptions from Scotland] intended to be written . . . was read again, with the addition ordered at the last meeting of the council . . .

  > Sir,
  >
  > The council of the Royal Society having lately taken into serious consideration, what might be the most probable means to establish the society and its design of improving useful knowledge to perpetuity; and having found upon mature deliberation, that one of the ways most likely to effect the same may be the erecting of a college fit to meet, and to make their observations and experiments in; they have accordingly resolved to endeavour to engage as many of the members of the Royal Society, and of others also not of their body, as are willing and able to promote so noble and useful a work: In pursuance of which, they have already begun to solicit divers of the society, and found

> no ill success in this undertaking; in which they are more especially encouraged by the signal nobleness and bounty of the honourable Henry Howard of Norfolk, most generously bestowing on the society a piece of ground in Arundel-house sufficient to build such a college on; the raising of which they intend . . . to begin with this approaching spring; and if the design be seconded by chearful contributions, hope to finish by Michaelmas next . . .
>
> Brounker, R. S. P."

- 24 Feb. 1668 (vol. 2, p. 252): "The lord bishop of Salisbury subscribed one hundred pounds towards the building of the college."[326]
- 4 May 1668 (vol. 2, p. 275): "The president moved, that the building of the society's college might be begun forthwith, there being already above one thousand pounds subscribed. In order to which Sir Anthony Morgan was desired, that the deed of the conveyance of the ground might be expedited: which Sir Anthony promised should be done, as soon as the ground should be surveyed, to know the bounds allotted for the said building."
- 11 May 1668 (vol. 2, p. 282): "Mr. Hooke was desired to bring in his draught for the building of the college, and an estimate of the charges thereof, on the Monday following.

  Sir Paul Neile was desired, that in case he should see Dr. Wren between that time and the Monday following, he would endeavour to engage him to at tend the council at their next meeting, and to bring with him his draught for the said building."
- 18 May 1668 (vol. 2, p. 284): "Mr. Hoskyns was desired to speak to Sir Anthony Morgan to make a draught of the conveyance of Mr. Howard's ground for building a college against the next meeting of the next council . . .

  The dimensions for the great meeting room of the college were proposed to be twenty eight feet broad, forty two feet long, and twenty five feet high."
- 30 May 1668 (vol. 2, p. 289): "The president gave notice, that Mr. Henry Howard had set out the ground for building the society's college upon, viz. an hundred feet one way, and forty feet the other . . .

[326] There were other subscriptions prior to this and afterwards; this particular extract is included to compare with Hooke's 12 May 1678 diary entry noted above.

It was ordered, that Mr. Oldenburg write a letter to Dr. Wren, to desire him to attend Mr. Henry Howard at Oxford about the draught of the society's building.

To this letter Dr. Wren returned the following answer from Oxford June 7, 1668 [followed by the text of the letter]."

- 19 June 1668 (vol. 2, p. 299): "Mr. Hooke promised to bring in a complete draught for the building of the college on the Monday following."
- 22 June 1668 (vol. 2, p. 300): "The draught of the building being examined and agreed upon, Mr. Hooke was ordered to get a model of it made with one door, and to consider of the buying of the materials, and of contracting with workmen, to be paid by measure for so much a rod and square: as also to find out a person to be constantly present; and to see the workmen do their duty."
- 29 June 1668 (vol. 2, p. 302): "Mr. Hooke was ordered to bring in at the next meeting of the council an estimate of the charge both of the materials and workmanship of the building.

  Dr. Wilkins and Mr. Hooke were desired to speak with Mr. Nelthorp about timber."
- 6 July 1668 (vol. 2, p. 304): "It was ordered, that Mr. Hooke make a draught for the building of the college, representing the front thereof to the Thames, and to draw it with the windows, Mr. Howard having declared, that it was indifferent to him, which way it stood, so it might be contrived for the conveniency of the society.

  Mr. Hooke was again ordered to prepare the workmen, and to look after materials; as also to make an estimate of the charges, according to this last position of the building."
- 13 July 1668 (vol. 2, p. 305): "There were examined two draughts for the building of the college, both fronting to the water, one of Mr. Henry Howard, the other of Mr. Hooke. The determination, which of them should be followed, was referred to the next meeting of the council, at which Mr. Howard was desired to bring in his design of ordering the whole plot of his ground."
- 10 Aug. 1668 (vol. 2i, p. 313): "It was resolved, that the building of the college should be deferred till spring, and in the mean time good materials be provided."
- 10 June 1669 (vol. 2, pp. 377-378): "Mr. Hoskyns made a report of what was done by the committee appointed May 20, 1669, for improving Chelsea-college, as follows:

  > At a committee of the Royal Society for improving Chelsea-college, &c. . . . resolved to

> Query the charter, and what is by this last granted to the society of the rights and possessions of the late college; and how far grantable?
>
> Item, Query, the map of the scite of the said college, and its lands; which map is in the hands of Sir Anthony Morgan's executors, or Mr. Cole, or Mr. Cheney . . .
>
> Item, Query, the patent for making collection for voluntary contributions throughout the nation, for advancing the said college; and what was collected, and in whose hands the same is?"

- 13 May 1669 (vol. 2, pp. 363): "The new patent from his Majesty, dated April 8, 1669, granting Chelsea-college to the society together with some additional privileges and powers, was read." [The text of the patent is reproduced on pp. 363-371.]
- 10 Apr. 1672 (vol. 3, p. 42): "There was made a proposal from Mr. Evelyn by Mr. Oldenburg, for letting out Chelsea college to be a prison-house during the war; together with an intimation, that Mr. Evelyn hoped to procure a rent of one hundred pounds a year for it, besides some necessary repairs of the house . . .

  It was propos'd by the lord Howard, that care might be taken to let out the the five acres of land lying about Chelsea-college, to some person or other, who would hedge it about, for any rent."

  18 Dec. 1672 (vol. 3, p. 70): "Sir Paul Neile representing to the council the strange neglect of Chelsea-college, and the reproaches thence falling on the Society . . .

  It was ordered likewise, that Mr. Hoskyns should be desired to satisfy the council about the nature of the land belonging to Chelsea-college, viz. whether it be Lammas-ground or not?"

- 9 Oct. 1673 (vol. 3, pp. 93-4): "Chelsea college being spoken of, and something mentioned of pulling down the house, and selling the materials, it was thought fit by the council, that Mr. Hoskyns or some other lawyer should be consulted with, whether . . . the said house might be pulled down, and the materials sold."
- 7 Oct. 1674 (vol. 3, p. 137): "Mention was made . . . of thinking of a way to put Chelsea College and the land to some use."
- 19 Oct. 1674 (vol. 3, p. 139): "Mr. Hooke acquainted the council, that Sir Jonas Moore had been with him at Chelsea College, and made an overture of engaging a gardiner, a sufficient man, to take a lease of the house and land about it . . . ; allowing withal to the Society a power to make hortulan experiments there; as also to build an astronomical observatory; which latter Sir Jonas

Moore himself would undertake to do at his own charges, to the value of an hundred and fifty or two hundred pounds."

- 17 Dec. 1674 (vol. 3, pp. 161-162): "The president [Brouncker], Sir Robert Southwell, and Mr. Pepys, were desired to make application to his highness prince Rupert, concerning the mischief, which his glass-house does to Chelsea-college; and to suggest to the prince, that his highness may perhaps put it and the land to some good uses, if he pleases to take it to himself, and to consider the Society for it.

  It was resolved, that Sir Jonas Moore be desired to write a letter to the prince, and to acquaint him, that the house and land of Chelsea might have been well disposed of for the benefit of the Society, if it had not been for the annoyance of the neighbouring glass-house."

- 6 Mar. 1676 (vol. 3, p. 310): "A proposal concerning Chelsea College was made by Mr. Oldenburg from a person, who would not yet be named, desiring a lease of the house and land then in possession for thirty-one years . . . Some of the council moved . . . that the proposer might be obliged not to put the house to any other use than had been now named by Mr. Oldenburg, which was to practise chemical operations, to make a physic-garden, and a repository for natural curiosities, without obtaining leave from the council."
- 4 May 1678 (vol. 3, p. 406): "It was ordered . . . That Mr. Hooke treat with Mr. Lem concerning Chelsea-College, and give an account of his proceedings at the next meeting of the council . . . That Mr. Henshaw, Mr. Hill, and Mr. Hooke, be desired to go to Chelsea College, and to get a survey of it sometime before the Thursday sev'nnight following."
- 13 June 1678 (vol. 3, p. 414): "It was ordered . . . That the tiles and timber of Chelsea-College be taken down, and secured in some place near the same; and that Mr. Henshaw be desired to direct some person to go about the pulling it down forthwith."
- 29 Sep. 1679 (vol. 3, p. 505): "It was ordered, that Sir Christopher Wren be desired to make the following proposals to Mons. Foubert[327] concerning Chelsea-College, and to give an account

[327] Solomon Foubert (*d.* 1696), a Parisian Huguenot, had moved to London earlier in the year, after Protestant academies were forced to close down in France. In May 1679, he proposed to establish an academy for military exercises, teaching aristocratic youth riding, fencing, bearing arms, and other military arts they normally had to travel to the continent to learn. Presumably through Royal Society fellows such as Robert Southwell and Evelyn, Chelsea College became a possible site for the academy, although nothing concrete appears to have come out of Foubert's proposal; Richard Ansell, 'Foubert's Academy: British and Irish Elite Formation in Seventeenth- and Eighteenth-Century Paris and London', in *Beyond the Grand Tour: Northern Metropolises and Early Modern Travel Behaviour*, ed. Sarah Goldsmith, Rosemary Sweet, and Gerrit Verhoeven (New

thereof to the next meeting of the council, viz. . . . That the lease shall be made for twenty-one years . . . That the College and six acres belonging to it shall be valued at forty pounds per annum . . . That the tenant shall pay ten pounds per cent, for the charge of fitting it."

- 10 Oct. 1679 (vol. 3, p. 506): "Upon debating the proposals made by Mr. Faubert concerning Chelsea-College, it was thought fit and ordered, that the house and the five acres . . . shall be let by lease for forty-one years to such persons, as shall be ready and engage to deposite the sum of money required, at the annual rent of thirty pounds . . . Mr. Faubert . . . acquainted with these proposals . . . concurred with them."
- 11 Nov. 1679 (vol. 3, p. 506): "Mr. Hooke was desired . . . To get a paper fairly drawn of Mr. Faubert's design."
- 14 Jan. 1680 (vol. 4, p. 2): "Mr. Povey was yet in hopes, that Mons. Faubert would go on with his design . . .

  Sir Christopher Wren, Dr. Croune, Mr. Hill, Dr. Gale, Mr. Hooke, or any three of them, were impowered to treat with Mr. Rossington concerning Chelsea College. And, if he should accept of the same conditions, that were proposed by Mons. Faubert, to agree with him."

- 25 Nov. 1680 (vol. 4, p. 56): "It was ordered, that Mr. Henshaw should . . . treat and agree with Mr. Thomas Franklin for the arable ground belonging to Chelsea-College, at the rate of 32 s. an acre per annum, for a term of 21 years; and, in order to ascertain the quantity thereof, Mr. Hunt was desired forthwith to make an admeasurement thereof."
- 23 Mar. 1681 (vol. 4, p. 75): "Mr. Hooke and Mr. Aston were desired to go to Mr. Lane, and give him a fee to peruse all the Society's writings, and to make an orderly abstract, especially of those relating to the title to Chelsea-college and land."
- 18 May 1681 (vol. 4, p. 86): "Mr. Hunt brought in the map of the land belonging to Chelsea-college."
- 29 June 1681 (vol. 4, p. 91): "The president [Wren] gave an account of his discourse with Mr. Rossington concerning Chelsea-college, whom he found unwilling to comply with the propositions made him by the Society . . . Whereupon it was resolved not to treat farther with him about it, but to think of some other way of disposing of it to some better advantage for the Society."

York: Routledge, 2017), pp. 46-63, pp. 50-51; E. S. de Beer, ed., *The Diary of John Evelyn*, 6 vols. (New York: Oxford University Press, 1955), vol. 4, pp. 257-258, 290, 399.

- 11 January 1682 (vol. 4, p. 117): "The president [Wren] having been impowered by former orders to dispose by sale of Chelsea-college with the appurtenances, reported, that he had sold it with the lands belonging to it to Sir Stephen Fox for his majesty's use, in case the Council should ratify the said sale, for 1300 *l.* ready money."

Description:

When the Royal Society was founded in 1660, as a yet semi-formal institution precariously funded by its fellows, it lacked its own dedicated premises. On 12 December 1660, there was an initial proposal to hold the meetings at the College of Physicians, of which several fellows were also members, but this was silently dropped when a week later they resolved to meet at Gresham College "till a farther resolution should be taken."[328] They probably did not expect to wait fifty years for this 'farther resolution' but the Society ended up remaining mostly at Gresham until 1710 when they finally moved to their first building at Crane Court.[329] Gresham College had been founded in 1597 through an endowment made by the wealthy merchant Thomas Gresham (*c.* 1518–1579) to provide free public lectures in the seven sciences, namely, astronomy, divinity, geometry, law, music, medicine, and rhetoric; Wren had been appointed Professor of Astronomy there in 1657, and Hooke would be Professor of Geometry from 1665 until his death.[330] Save for a six-year period after the Great Fire when they temporarily moved to Arundel House, the College generously accommodated the Royal Society in its early years. This was not by design but circumstance, however.

As Thomas Sprat reported in 1667, the Society had intentions to have two colleges: one in London for their meetings, laboratories, repository, library, and lodging for their curators, and the other in Chelsea where they would have the space to conduct botanical and agricultural experiments, as well as those involving water due to the close proximity of the river.[331] The latter, as a building anyway, already existed (**Figure IV-4**). Chelsea College had been founded in 1609 by James I, with a significant endowment from Matthew Sutcliffe (1549/50–1629), dean of Exeter and an anti-Roman

[328] Birch, vol. 1, pp. 5, 7.

[329] On the different locations occupied by the Royal Society prior to its current building at Pall Mall, see D. C. Martin, 'Former Homes of the Royal Society', *Notes and Records of the Royal Society of London* 22 (1967), pp. 12-19. On the building at Crane Court, see Bennett, 'Wren's Last Building?'.

[330] Gresham was also a member of the Mercers' Company, and had previously founded the Royal Exchange; see 'Gresham, Sir Thomas (*c.* 1518–1579)', *ODNB*; John Ward, *The lives of the professors of Gresham College* (London: Printed . . . for the author, 1740). The College and its professorships remain in existence.

[331] Sprat (1667), p. 434; see above for the relevant extract.

polemicist. It was a theological college with a single mission: training clergyman to rigorously defend the Church of England against Catholicism. It failed to thrive after Sutcliffe's death, however. Lack of further funds and the divisive rhetoric it generated falling out of favour, the endeavour completely failed and the college was finally dissolved in 1655. The building was used as a prison during the Commonwealth, and after the Restoration, to house prisoners of war. By 1664, the College had fallen into disrepair; only a part of it had been built and was slated to be demolished. Its large gardens, placement by the Thames, and proximity to London made it an ideal location for the Royal Society which decided to petition the king for the building and its grounds.[332]

Between Robert Moray's first suggestion on 9 March 1664 to procure the property and the letters patent dated 8 April 1669 officially granting it to the Royal Society, there are numerous entries in the Society's records illustrating an arduous process of numerous petitions and legal challenges.[333] After all that effort, however, the building turned out to be less useful, and in need of costlier repairs and upkeep than previously imagined. By 1672, the Society faced criticism for its "strange neglect of Chelsea-college;" it even considered letting out the building to be used as a prison once again and mused over whether the grounds could serve as a llama park.[334] While searching for more suitable tenants, the Society remained hopeful of its future for "hortulan experiments" or as the site of the astronomical observatory, which would later be built in Greenwich. Finding someone who would rent and repair the property continued to be a problem, especially with the unspecified annoyances caused by the neighbouring glass-house owned by Prince Rupert who was encouraged to rent the college.[335] Attractive proposals were made; in 1676, someone "who would not yet be named" wanted "to practise chemical operations, to make a physic-garden, and a repository for natural curiosities" there, and in 1679, the Parisian Huguenot, Solomon Foubert (*d.* 1696), was considering it as the site of the academy he was establishing to teach the military arts to aristocratic youth.[336] Nothing appears to have come

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[332] On Chelsea College, see John Darley, *The glory of Chelsey Colledge revived* (London: Printed for J. Bourn . . . , 1662), as 'King James's College' in Thomas Faulkner, *An Historical and Topographical Description of Chelsea, and Its Environs* (Chelsea: Printed for T. Faulkner, 1829), pp. 218-232; 'The Royal Hospital: King James's Theological College', in *Survey of London: Volume 11, Chelsea, Part IV: the Royal Hospital*, ed. Walter H. Godfrey (London: London County Council, 1927), pp. 1-4. The college premises had been conceived as a large complex composed of two quadrangles (Figure IV-4), but only one side of the larger court appears to have been ever built.

[333] The text of the letters patent can be found in Birch, vol. 2, pp. 363-371.

[334] Ibid., vol. 3, pp. 42, 70.

[335] Ibid., vol. 3, pp. 139, 161-162.

[336] Ibid., vol. 3, pp. 310, 505, 506; vol. 4, p. 2. On Foubert, see footnote 327.

out of these or further proposals made by individuals, and there was serious consideration to demolish the house and sell its materials.[337]

The Royal Society records illustrate that Hooke was an integral part of the discussions and considerations for Chelsea College; and while they illuminate some of the diary entries, they shed no light on the more tantalising ones. We are left to wonder who the prospective renter was in November 1677, interested in building a glass-house.[338] Was the "module of Chelsey Colledge" produced by Bates, the carpenter, in October 1679 related to Foubert's proposal? Had Hooke perhaps prepared a design for his academy, and would thus be asked a few weeks later "To get a paper fairly drawn of Mr. Faubert's design?"[339] These will likely remain unanswered until further documents or correspondence surface. In any case, all affairs related to Chelsea College came to a close in January 1682 when the Royal Society finally sold the building and its grounds for £1300 back to Charles II who would establish the Royal hospital there (**Figure IV-5**).[340]

As for the plans for a college in London "to serve for their Meetings, their Laboratories, their Repository, their Library, and the Lodgings for their Curators," they were not carried very far.[341] During the first six years of its existence, the Society was somewhat content to meet at Gresham College, but the Great Fire's devastating destruction of London in 1666 complicated this. The College had mostly escaped the conflagration but now had to temporarily accommodate the City officials whose offices had been destroyed; soon the Society found itself crowded out of the rooms that had to be allocated to more immediate needs. Merely weeks after the fire, Henry Howard (1628–1684), younger brother of the duke Norfolk, stepped in with an offer to host them at Arundel House (**Figures IV-6 to IV-9**).[342] After some initial hesitation, when Wilkins suggested renting a house somewhere in Westminster instead, Howard was elected fellow, his offer accepted, and an order issued at the 4 January 1667 council meeting to print notices that the Society would henceforth be meeting

337 E.g. ibid., vol. 3, pp. 93-94, 414.

338 *Diary i*, p. 326. This may have been Prince Rupert, but his name is not mentioned.

339 Ibid., p. 428; Birch, vol. 3, p. 506.

340 Birch, vol. 4, p. 117. The hospital would be designed by Wren.

341 Sprat (1667), p. 434. For extended discussions of the London college project, see Charles Richard Weld, *A History of the Royal Society with Memoirs of the Presidents*, 2 vols. (London: John W. Parker, 1848), vol. 2, pp. 205-214; Hunter, 'A "College" for the Royal Society'.

342 Howard's older brother Thomas, who had inherited the title upon their father's death in 1652, had been incarcerated in Padua as a lunatic since 1645 and would remain there until his death in 1677. Henry was effectively the head of the family, and would be declared duke of Norfolk after Thomas's death; 'Howard, Henry, sixth duke of Norfolk (1628–1684)', *ODNB*.

at Arundel House.[343] That the Society was lacking a dedicated building for its use was thrown into great relief with this episode.[344] Daniel Colwall (*d.* 1690) and Christopher Merret (1614–1695) revived the idea of sharing a space with the College of Physicians, whose building had been destroyed in the Fire, and proposed that a new facility be jointly-built. This was a sensible idea considering the number of individuals who were fellows of both institutions, the 'physicians of the society' as they were often referred to in the meeting minutes. But institutional rivalries intervened, the idea was rejected, and Hooke would later design the new Royal College of Physicians.[345]

As for building a college for the Royal Society, the first obstacle to overcome was financial, and the project began in the earnest with Wilkins's proposal on 30 September 1667 to form a committee to raise the funds. It was soon decided that contributions would be solicited not only from the fellows of the Society but also from "well disposed persons" including politicians, bishops, and aristocrats—even Margaret Cavendish, Duchess of Newcastle, who was critical of the Society, would be asked to contribute.[346] A text for subscriptions was drafted, with Brouncker and James Hayes making the first contributions; thereafter money started trickling in with subscriptions ranging between £10 and £100.[347] It was decided that contributors would not be legally obligated to pay until a minimum of £1000 was raised; by 4 May 1668, the subscriptions had surpassed that amount and the President moved "that the building of the society's college might be begun forthwith." This necessitated that "the ground should be surveyed, to know the bounds allotted for the said

[343] Birch, vol. 2, pp. 128, 138.

[344] Hunter suggests this was compounded by the insecurity caused by the apparent lack of sufficient space at Arundel House; Hunter, 'A "College" for the Royal Society', p. 160. Bennett suggests it may have been instigated by Charles II's bequest of Chelsea College; Bennett, 'Wren's Last Building?', p. 116n11.

[345] Birch, vol. 1, pp. 5, 7; and Hunter, 'A "College" for the Royal Society', pp. 160-161. On the rivalry between the two institutions, see Harold John Cook, 'Physicians and the New Philosophy: Henry Stubbe and the Virtuosi-Physicians', in *The Medical Revolution of the Seventeenth Century*, ed. Roger French and Andrew Wear (New York: Cambridge University Press, 1989), pp. 246-271; *The Decline of the Old Medical Regime in Stuart London* (Ithaca: Cornell University Press, 1986), pp. 162-182; and Matthew Walker, 'Architecture, Anatomy and the New Science in Early Modern London: Robert Hooke's College of Physicians', *Journal of the Society of Architectural Historians* 72 (2013), pp. 475-502, pp. 481-482. On Hooke's design for the new Royal College of Physicians, see ii. 10 in this chapter.

[346] Birch, vol. 2, pp. 194, 250. Unsurprisingly perhaps, she did not contribute; Hunter, 'A "College" for the Royal Society', p. 171.

[347] Birch, vol. 2, pp. 238, 242, 243-244. Hunter has discussed the financing efforts in terms of the tensions they expose between the aspirations of the Society and its tenuous dependence on voluntary funding; ibid., p. 156.

building."[348] The site was vaguely described as facing the Strand next to Arundel House, and was donated by Howard sometime before 25 January 1668 when he was thanked for his bounty. By then he had become a most generous benefactor to the Society; in addition to hosting them at Arundel House, he had also bequeathed to them the famed 'Bibliotheca Norfolciana' collected by his grandfather Thomas (1585–1646), fourteenth earl of Arundel. He would also later donate the Arundel Marbles to the University of Oxford which many Society fellows were affiliated with.[349]

On 11 January 1668, Hooke was asked "to bring in at the next meeting of the council a draught for the building of the society's college," but this was presumably before Howard's offer of the lot, so Hooke may have been asked to produce an initial design for the sole purpose of soliciting subscriptions. Once the minimum funds were raised, things began to move forward, and on 11 May, Hooke was once again asked to bring his draught, this time with a cost estimate.[350] But he had competition: Paul Neile was asked to encourage Wren to attend the next meeting, bringing his own draught for the building. The meeting minutes do not specify any discussions about these designs except that on 18 May the "dimensions for the great meeting room of the college were proposed to be twenty eight feet broad, forty two feet long, and twenty five feet high."[351] On 30 May, the precise dimensions of the Arundel lot were given as 100' by 40', as staked out by Howard, who apparently had his own ideas for the design. Wren was requested to meet with him in Oxford to discuss the draught.[352] He reported back with an often-reproduced letter dated 7 June 1668, which included a description of Wren's vision for the building—a veritable Solomon's House with an 'elaboratory', workshops for metalwork, and generous spaces for experiments; a cupola for observations, or if connected down to the cellar, for experiments requiring height, or else for use as an anatomy theatre; a leaded platform on the roof for telescopic observations; separate meeting rooms for the council and the society, the latter a double-height space with a length of 40' designed to expand to 55' when needed; a library and repository which could be combined by "placing the bookes after the moderne way in glasse presses" or by dividing the room with pillars; and service spaces such as a cellar, kitchen, parlour

[348] Birch, vol. 2, p. 275.

[349] Ibid., vol. 2, p. 136. Howard's grandfather Thomas had travelled in Italy with Inigo Jones in 1613 when he may have acquired Leonardo da Vinci's notebook which is now BL, Arundel MS 263. On 'Bibliotheca Norfolciana', see also Chapter II. For a contemporary catalogue of the Arundel Marbles, see John Selden, *Marmora Arundelliana* (London: Apud Ioannem Billium . . . , 1629).

[350] Birch, vol. 2, pp. 275, 282.

[351] Ibid., vol. 2, p. 284.

[352] Hall and Hall, *Oldenburg Correspondence*, vol. 4, p. 437; Birch, vol. 2, p. 289.

for the housekeeper, etc. The drawing he attached has not survived but the dimensions he gave were 100' by 30', and his further suggestion that "a fair building may easier be carried on by contributions with time, then a sordid one," hint at an elaborate edifice. Indeed, his cost estimate was £2000 for constructing the foundations and half of the building with the most necessary rooms, deferring the rest of the construction.[353]

Not knowing whether Wren was familiar with Hooke's design at that point, it is not possible to speculate whether the latter was the target of the 'sordid building' jab. But if it was, Wren must not have been too happy for it to have been ultimately preferred over his design. On 19 June, Hooke was asked to bring in "a complete draught for the building of the college," and three days later, it having been approved, "was ordered to get a model of it made with one door, and to consider of the buying of the materials, and of contracting with workmen." The following week he was requested to bring in estimates for material and workmanship, and to start making inquiries about timber.[354]

Around this time, there must have been some discussion about the siting and orientation of the building as Hooke was subsequently asked to draw its elevation—with the windows—facing the Thames. This is one of the causes of the confusion regarding the exact location of the lot previously described as facing the Strand which is north of Arundel House. The Thames, of course, is to its south. The available plans and views of the Arundel property (**Figures IV-6 to IV-9**) are not too helpful in determining a possible lot with unobstructed views towards both the Strand and the Thames—unless 'the Strand' was in fact 'Strand Bridge Lane' at the western boundary.[355] Another possibility is that if the site was far enough on the northern end of the western gardens, elevated above the Thames by a series of steps, and if some of the houses along the Strand had been demolished, the building could have had views towards both. In any case, the lot presumably had not changed, so the orientation probably had more to do with the location of the main entrance. The re-orientation of the building was cleared with Howard who seemed to give his approval, but he must not have been too happy with Hooke's design, as a week later he brought along his own draught, perhaps the same one he had shown to Wren a month before. Thus, on 13 July, the Royal Society council "examined two

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353 Wren's letter, the original of which is at the Royal Society Archives, has been transcribed in Birch, vol. 2, pp. 290-291, as well as ibid., vol. 4, pp. 454-455. A drawing among Hooke's papers, BL, Add. MS 5238, no. 66 (Figure III-90), was previously associated with Wren's design for the Royal Society but its dimensions do not match the description in the letter; see the annotations for the drawing in Chapter III.

354 Birch, vol. 2, pp. 299, 300, 302.

355 Hunter, 'A "College" for the Royal Society', pp. 164-166, 174.

draughts for the building of the college, both fronting to the water, one of Mr. Henry Howard, the other of Mr. Hooke." The delicate task of choosing between them was postponed to the next council meeting to which Howard was asked "to bring in his design of ordering the whole plot of his ground." It took almost another month for the council to meet again, and when they did, they resolved to defer the building of the college until next spring and in the meantime to acquire materials for building.[356]

That was the last mention of the college in the Society records. There has been some speculation about this abrupt abandonment of the project. One of the proposed reasons is the uncertainty surrounding the future ownership of the site at that time. The 1627 Parliamentary Act granting the property to the Earl of Arundel had stipulated limitations to its succession, so the lot was not exactly Howard's to give, at least until he petitioned the parliament for permission to lease it to the Society, which he does not appear to have done.[357] But whether this was because the project was already abandoned or vice versa remains unclear. Another possibility, also suggested by Hunter, is the difficult position the Royal Society was forced into when Howard brought his own draught.[358] In his letter, Wren noted Howard's delight in showing him his designs, so it indeed may not have been easy to reject such an enthusiastic and generous benefactor if his proposal was less than desirable. Just as he had seemingly given his approval of Hooke's design before showing up with his own, Howard had also given Wren the impression that he had been convinced by the latter's more expensive scheme, but in both cases, he was perhaps being polite and it is not a coincidence that we do not hear of Wren's or Hooke's proposals again, after Howard's interventions. This is conjecture, of course, and the reality is probably a combination of factors including the difficulty in collecting sufficient funds to erect a building worthy of the Society—and Hunter does report a slow-down in the number of subscriptions—and securing an appropriate site.[359]

Although this is not reflected in the Society's records, Hooke, however, remained hopeful. Wilkins died at the end of 1672, leaving the Royal Society £400; money which could be used towards building the college, Hooke suggested to Brouncker in 1674. He shared his idea with others such as

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356 Birch, vol. 2, pp. 304, 305, 313.

357 Hunter, 'A "College" for the Royal Society', pp. 175-176. That Howard was a Catholic may have weakened his position in negotiating with the parliament for a new act; *ODNB*.

358 Ibid., p. 175.

359 Hunter calculates the total funds raised at £1,285; ibid., p. 177. As he notes as well, the College of Physicians had similar difficulties in financing their building; see ii. 10 in this chapter on the Royal College of Physicians.

Hoskins with whom he had "much discourse about the R. S. module." The idea was revived four years later, when Hooke told Seth Ward about his "contrivance for Chelsey Colledge which he approved and promised £100," the same amount Ward had pledged for the London college. Two days later, on 14 May 1678, he discussed the project with Williamson and others but it failed to get Wren's approval, Hooke noting "he liked it not."[360] Nothing appears to have come out of the subsequent discussions and the Society was once again looking for a suitable tenant for Chelsea College. A year later, in October 1679, there were further discussions which involved a "module of Chelsey Colledge," but as already suggested, that may have been related to Foubert's proposal.

Richard Waller, in his biographical note on Hooke, wrote of the latter's intentions to leave most of his estate for the building of a "handsome Fabrick" for the Society, with a library, repository, laboratory, and other spaces to conduct experiments, and to endow a "perpetual Physico-Mechanick Lecture of the Nature of what himself read."[361] However, Hooke's procrastination, or bitterness, prevented him from producing an official will and he died intestate, though ironically his death precipitated the Society's move into their own building. Merely weeks after his death, Gresham College, keen on undertaking some rebuilding of their own, urged the Society to vacate their premises.[362]

ii. 3. HOUSE FOR THOMAS COVENTRY AT SNITTERFIELD, WARWICKSHIRE [SPECULATIVE]

Attribution: Colvin, *BDBA* (2008) [as 'attributed']; John Shelby, *An Eighteenth Century Warwickshire Village: Snitterfield* ([Warwickshire], 1986), p. 12; Worsley, pp. 17-18.

Brief description: Hooke has been suggested to have designed Snitterfield House in Warwickshire, built for Thomas Coventry sometime between 1668 and 1675.

Primary sources: None to suggest any connection to Hooke, but the house may have been built before 1672 when the extant diaries begin.

[360] *Diary i*, pp. 100-101, 108, 358; Birch, vol. 2, p. 252.
[361] Waller, p. xxvii.
[362] Bennett, 'Wren's Last Building?', p. 108.

Assessment:

In 1668, Thomas Coventry (*c.* 1630–1699), the younger son of second Baron Coventry of Aylesborough, bought the Snitterfield estate from the Hales family.[363] The existing structure was soon replaced by an Anglo-Dutch-style house, square in plan, with five bays, hipped roof, dormer windows, cupola, and elevations reminiscent of the end pavilions of Bethlem Hospital.[364] It was demolished in 1830.[365]

There is very little information about the construction of this house. It is thought to have been built sometime between 1668 and around 1675. The architect is unknown but it has been attributed to Hooke purely on stylistic grounds. The first attribution is from 1986 when John Shelby wrote "It has been suggested, . . . on the basis of comparison with the design of buildings elsewhere, notably the Bethlehem Hospital in London, that [the architect] was Robert Hooke."[366] The reference he gave for this suggestion, John Harris's *The Artist and the Country House* (Totowa, NJ, 1979), does not contain any mentions of Hooke, but Harris does connect the Coventry family's patronage of the Dutch artist Jan Wyck (*c.* 1645–1700) with the style of the house, noting that the "Netherlandish style linked with the family's patronage of Dutch artists is perhaps significant."[367] Giles Worsley revived the attribution in his 2004 article, emphasising that the similarity to Bethlem Hospital "is unlikely to be coincidence as Snitterfield's overtly Dutch sensibility is highly unusual among post-Restoration English country

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[363] Sources on Snitterfield house include John Harris, *The Artist and the Country House: A History of the Country House and Garden View Painting in Britain, 1540-1870* (Totowa, NJ: Sotheby Parke Bernet Publications, 1979), pp. 222, 227; John Shelby, *An Eighteenth Century Warwickshire Village: Snitterfield* ([Warwickshire]: Warwickshire Local History Society, 1986), pp. 10-15; Geoffrey Tyack, *Warwickshire Country Houses* (Sussex, UK: Phillimore & Co. Ltd., 1994), pp. 264-265; Worsley, p. 17-18. Harris notes the previous owner as "Sir James Hales" and Worsley as "John Hales," but primary sources point to Elizabeth Hales, widow of Sir Stephen Hales, who had died in 1668 without issue; see Harris, *Artist and the Country House*, p. 227; Worsley, p. 17; 'Parishes: Snitterfield', in *A History of the County of Warwick: Volume 3, Barlichway Hundred*, ed. Philip Styles (London: Victoria County History, 1945), pp. 167-172; Shelby, *Snitterfield*, p. 12. Thomas Coventry, who was created earl of Coventry in 1697, is not on *ODNB*; for his biography, see M. W. Helms and Edward Rowlands, 'Coventry, Hon. Thomas (c. 1630–99), Croome D'Abitot, Worcs. and Snitterfield, Warws.', in *The History of Parliament: the House of Commons 1660–1690*, ed. B. D. Henning (London: Published for the History of Parliament Trust by Secker & Warburg, 1983).

[364] Worsley, p. 18; Shelby, *Snitterfield*, p. 12. For a description, see also 'Parishes: Snitterfield', . Tyack, *Warwickshire Country Houses*; Harris, *Artist and the Country House*, no. 240.

[365] Shelby, *Snitterfield*, p. 10.

[366] Ibid., p. 12.

[367] On Wyck, see 'Wyck, Jan (*c.* 1645–1700)', *ODNB*; Harris, *Artist and the Country House*, pp. 43-44. On the Coventry family's patronage of Wyck, see ibid., p. 222.

houses. Hooke must be considered a serious candidate for what is obviously a sophisticated and unusual country house."[368]

There is one issue that is not addressed by Worsley when attributing this building to Hooke: the few available images of Snitterfield give significantly different impressions of the design. Central to the attribution is the depiction of the house in a *c.* 1700 painting attributed to John Wootton (1681/2–1764) (**Figure IV-10**). Indeed, it does bear some similarities to the end pavilions at Bethlem Hospital (**Figure IV-11**).[369] However, how accurate was Wootton's painting? Could he have embellished the house for effect or through inspiration from the Dutch art he encountered at the Coventry household? After all, as Harris notes, it was there that Wootton met Wyck who would exert great influence on the development of the young painter.[370] Accuracy in such paintings, or even in architectural engravings during this period, was not a requirement; they often depicted an idealised or projected version of the structure rather than as it was built.[371]

Other drawings of the house, from late eighteenth or early nineteenth centuries, show a much differently-proportioned or embellished building. Two of these are in a manuscript by Thomas Ward (1770-1850) entitled 'Collections for the continuation of the history and antiquities of Warwickshire by Sir William Dugdale Knight and Dr. Thomas [Ward] to the present year 1830," currently at the British Library (**Figures IV-12 and IV-13**).[372] They show a house much less cubical in form, and the facade looks almost a bay wider than the one depicted by Wootton. There are no pediments or a cupola, although those could have been removed during a roof renovation. Another drawing from the same period shows the building without the pilasters and Ionic columns or the embellished entrances, though these may have been only featured on the front facade to begin with (**Figure IV-15**). Interestingly, another drawing from late eighteenth century, i.e. predating Ward's two drawings, shows

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[368] Worsley, p. 18.

[369] Harris, *Artist and the Country House*, no. 240 on p. 227.

[370] Ibid., p. 227.

[371] Shelby has made a similar point, suggesting even that Wootten may have added the Dutch features to impress his patrons, the Coventry family; Shelby, *Snitterfield*, p. 12.

[372] BL, Add. MS 29165, fols. 87 and 89; the reference is from Geoffrey Tyack, 'Thomas Ward and the Warwickshire Country House', *Architectural History* 27 (1984), pp. 534-543, at pp. 534 and 541n15. One of these drawings is reproduced in Shelby, *Snitterfield*, p. 11, and the other in Tyack, *Warwickshire Country Houses*, p. 265, however neither of them give manuscript references for their reproductions, therefore the manuscript reference here should be considered tentative.

a relatively austere facade (**Figure IV-14**) comparable to the nineteenth century drawing, which makes it difficult to determine when exactly the pilasters were removed.

One last point is that, if Snitterfield was designed by Hooke, it would have had to have been before 1672 when the extant diaries begin since they contain no references to Coventry or Snitterfield.[373] The building would also pre-date Bethlem Hospital, and Hooke's November 1674 acquisition of 'Vingboon', i.e. the second edition of Philips Vingboon's *Gronden en afbeeldsels der voornaamste gebouwen* (Amsterdam, 1665) which is listed in the *c.* 1675 manuscript catalogue of his library, as well as the auction catalogue.[374] Unless new evidence is found linking Hooke to this building, it is highly unlikely he had anything to do with its design.

ii. 4. STABLES FOR SOMERSET HOUSE, LONDON

Attribution: Colvin, *BDBA* (1978) and subsequent editions.

Brief description: Hooke is thought to have designed the stables, built in 1669 or 1670 for Queen Catherine of Braganza, at Somerset House in London.

Primary Sources:

- British Library, Add MS 5238, no. 89: An undated drawing, presumably in Hooke's hand, of the elevation and plan of the stables (**Figure IV-16 or Figure III-128**).[375]
- Johannes Kip and Leonard Knyff, *Britannia illustrata or views of several of the Queen's palaces also of the principal seats of the nobility and gentry of Great Britain* (London, 1707): Drawn by Knyff and engraved

[373] The few mentions of 'Mr. Coventry' do not appear to refer to Thomas Coventry. Interestingly, there is a reference to Wootton on 12 Nov. 1678, though it is difficult to ascertain whether it is referring to the painter or 'Sir H. Wooton' mentioned a few months before, on 11 Aug.; *Diary i*, pp. 306, 384.

[374] *Diary i*, p. 129; Geraghty, 'Robert Hooke's Collection', at p. 115. Geraghty noted that while the purchase was of the second edition of the first volume of Vingboon's book, "Hooke undoubtedly knew both volumes, for his preliminary designs for Bedlam Hospital, drawn up within days of this purchase, were derived from Vingboons' design for a gentlemen's house contained in volume two;" ibid., p. 115. See Chapter II on Hooke's library.

[375] The two different figure numbers refer to the fact that the drawing has been reproduced twice in this dissertation. In several cases where a drawing is extant among Hooke's archives but is also related to a specific building, for the sake of convenience, it is included among the illustrations for both chapters. For any annotations on the drawing, the reader can consult Chapter III with the appropriate 'Figure III-x' number.

To prevent confusion, the two corresponding figure numbers are only included under the 'primary sources' section; in-text references are only to the figures reproduced for this chapter.

by Kip, the bird's eye view of Somerset House is considered to be one of the more accurate depictions of the buildings in the complex. Hooke's stables are clearly visible in the upper left corner (**Figures IV-17 and IV-18**).

Description:

Among Hooke's papers at the British Library is an undated drawing, in his hand, of what appears to be a stately home (**Figure IV-16**). It in fact depicts the elevation and plan of the stables at the Somerset House, built for Queen Catherine of Braganza (1638–1705), Charles II's wife.

After the Restoration, Somerset House returned to its function as the queen's 'dower-house'. Charles II's mother Henrietta Maria (1609–1669) lived there from 1660 until 1665 when she returned to France, and upon her death in 1669, Catherine formally took possession of the house, although she would not live there until she was widowed in 1685.[376] Records for the stables have been lost, thus the precise date of construction remains unknown, but considering Hooke's extant diaries, which begin in 1672, do not contain any references to the building, Colvin suggests 1669 or 1670 as viable options. He further speculates that Hooke may have received the commission via John Hervey (1616–1680), the queen's treasurer at the time, and Richard Gammon, the clerk of her works, both of whom later receive mentions in Hooke's diaries.[377] Another possibility is that Hooke may have been asked to build the stables by the queen's master of the horse, who was none other than Ralph Montagu (*bap.* 1638, *d.* 1709). The two had met at Westminster School under Richard Busby's care and presumably had kept in touch—Montagu later hired Hooke to build his famed house in Bloomsbury.[378]

As Catherine would not reside in the house until 1685, it has been seen as excessive to have built such a generous structure, or as Thurley has put it, such an "architecturally pretentious building" with stalls for 56 horses in an otherwise unoccupied house (**Figures IV-18 and IV-19**). Indeed, one is reminded of other buildings by Hooke that have missed the mark, at least in the eyes of his critics,

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[376] Sources on the old Somerset House during this period include L. M. Bates, *Somerset House: Four Hundred Years of History* (London: Frederick Muller Ltd., 1967), pp. 57-75; H. M. Colvin et al., *The History of the King's Works* (London: Her Majesty's Stationary Office, 1976), pp. 254-263; Simon Thurley, Patricia Croot, and Claire Gapper, *Somerset House: The Palace of England's Queens 1551–1692* (London: London Topographical Society, 2009).

[377] Colvin et al., *History of the King's Works*, vol. 5, pp. 254, 258.

[378] See ii. 19 in this chapter on the Montagu House. On Montagu, see 'Montagu, Ralph, first duke of Montagu (*bap.* 1638, *d.* 1709)', *ODNB*. It should be noted that in 1669 Montagu was appointed 'ambassador-extraordinary' to France where he would move by April of that year.

such as the Bethlem Hospital, a most palatial mental asylum, and Aske's almshouses that used up more than half of the bequest on construction.[379] The possible explanations Thurley offers are more charitable. He suggests that the building may have been constructed before it was known how the Queen would use it, and that it had become fashionable in London at the time to build such structures to resemble small country houses.[380]

That Hooke's drawing (**Figure IV-16**) bears such a close resemblance to the building depicted in the engraving by Kip (**Figures IV-17**) has been interpreted to mean that this was a presentation drawing for approval.[381] After Catherine, Somerset House was mostly used to accommodate foreign embassies, and having fallen into disrepair, it was demolished after 1776.[382]

ii. 5. CITY CHURCHES, LONDON

Attribution: Batten, pp. 85, 88; Colvin, *BDBA* (1954) and subsequent editions; Anthony Geraghty, *The Architectural Drawings of Sir Christopher Wren at All Souls College, Oxford: A Complete Catalogue* (Burlington, VT, 2007), pp. 85-86, 93-95, 99-100; Paul Jeffery, *The City Churches of Sir Christopher Wren* (London, 1996), *passim.*

Brief description: In 1670, Hooke was appointed by the Commissioners for Rebuilding Churches to assist Wren with the reconstruction of fifty-one Parish churches that had been destroyed in the Great Fire.

Primary sources:

A detailed analysis of Hooke's part in the reconstruction of the Parish churches is outside of the scope of this dissertation, but a selection of relevant sources is listed below:

- Hooke's diaries: numerous references to the City churches he worked on.
- Drawings attributed to Hooke or found in his archives: Figures III-78, III-91, III-184 to III-191, III-215 to III-223, III-330, III-334, III-335.
- Hooke, 'Rates allowed for masons' work for churches', 14 Oct. 1674; see Appendix, ii. 3 for a transcription.

[379] See ii. 16 and ii. 47 in this chapter for Hooke's work on the Bethlem Hospital and Aske's Almshouses.
[380] Thurley, Croot, and Gapper, *Somerset House*, p. 71.
[381] Ibid., Catalogue 13 on p. 105, Hooke's drawing is reproduced on p. 107.
[382] Colvin et al., *History of the King's Works*, vol. 5, p. 258.

- Parliamentary Acts for the Rebuilding of London, 1667 and 1670.
- Guildhall Library, London, MS 25540: Minutes of the Commission for Rebuilding Churches.
- See Appendix iii for extracts from Aubrey's *Monumenta Britannica* (Bodl., MS Top. Gen. c. 24), and selections from the unpublished meeting minutes of the Royal Society (RS, JBO/9).

Description:

Eighty-six parish churches were destroyed during the Great Fire. The Rebuilding Act of 1667 stipulated that only thirty-nine of these would be rebuilt, financed via the sale of the remaining sites, but this was met with resistance from those uncomfortable with the sale of church property as well as the parishes that were unwilling to be absorbed into others. The second Rebuilding Act passed in 1670 took on the challenge of consolidating the parishes and ensuring the availability of funds. Noting that the number of parish churches could not "conveniently by union or otherwise, be reduced to a less number than fifty-one," a detailed list of all of those to be rebuilt was provided, and a portion of the coal tax, which was increased and its collection extended until 1700, was reserved exclusively for the use of the Churches.[383]

The newly-appointed Commissioners for Rebuilding Churches had their first meeting on 13 June 1670 and clarified how the rebuilding work was to be undertaken:

> Dr Christopher Wren, Surveyor General of his Majesty's Works, Mr Robert Hooke and Mr Edward Woodroofe are hereby required to repair forthwith the aforesaid churches and take an account of the extent of the parishes, the sites of the churches, the state and conditions of the ruins and accordingly prepare fit models and draughts to be presented for his Majesty's approbation and also estimates proper to inform us what share and proportion of the money out of the imposition upon coals may be requisite to allow for the fabric of each church, and where any contracts have been already made by the churchwarden, the said Dr Christopher Wren and his assistants, are hereby authorised and required to call for the said contracts, and

[383] Jeffery, *City Churches of Wren*, pp. 24-30; for lists of the churches that survived the Fire and those that were destroyed but not rebuilt, see ibid., pp. 358-360. Other sources on the City Churches include Summerson, *Architecture in Britain 1530 to 1830*, pp. 187-202; and most recently, with lavish illustrations, Hornak, *After the Fire*.

> to examine what hath been already expended upon any of the said churches that thereupon we may the better judge what is further expedient to allow for the finishing of any such churches.[384]

The wording of the order clearly specifies Hooke and Woodroffe (*d.* 1675) as Wren's assistants as far as the new churches were concerned.[385] There does not appear to be any additional orders of this nature specifying the exact tasks to be assumed by the assistants, but it is helpful to note that for their work over a fifteen-year period, Wren was paid almost £1,600, with Hooke and Woodroffe each getting half that amount.[386] The salaries are more likely indicative of their responsibilities than the amount of work they actually carried out, however.

The nature or extent of Hooke's involvement, or Wren's for that matter, with the City Churches has been a matter of debate. The diary entries noting Hooke's visits to the church sites are remarkably numerous; Paul Jeffery, in his monograph on the City Churches, counts references to over thirty of the church sites and notes that those that are not mentioned were built during the periods not covered by the diaries, leaving little doubt that he was engaged in their construction.[387] Hooke's role was not limited to site supervision, however, and drawings of some of the churches have been attributed to him. They vary in style and purpose; some are presentation drawings, others are preliminary designs, and there is at least one rough design sketch.[388] Jeffery also found numerous mentions of Hooke's name in the parish records, concluding that the evidence for Hooke's involvement was "overwhelming."[389] While acknowledging the difficulties of attribution, he interpreted the evidence as "each of the three men [being] given the task and responsibilities of an

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384 Guildhall Library, MS 25540, fol. 3 in Jeffery, *City Churches of Wren*, p. 31.

385 Woodroffe, whose origins remain relatively obscure, is thought to have been a mason. In 1662, he was appointed Surveyor to the Dean and Chapter of Westminster, and in 1668, began working with Wren; Geraghty, 'Edward Woodroofe: Sir Christopher Wren's First Draughtsman'. Two drawings, in his hand, of alternative finial designs for the Monument are among Hooke's papers at the British Library; see Figures III-111 and III-112. a.

386 Jeffery, *City Churches of Wren*, p. 32.

387 Jeffery notes that the churches that were not mentioned were built during the periods not covered by the diaries; ibid., p. 35.

388 The related drawings are listed above under 'Primary sources' and reproduced in Volume 3 of this dissertation.

389 Jeffery, *City Churches of Wren*, p. 93.

architect in producing designs for the parish churches" and concluded that Hooke was also probably responsible for the design of some of the churches.[390]

In his *Architecture in Britain*, Summerson came to a similar, though more limited, conclusion. Attributing a drawing in Wren's archive at All Souls College, Oxford, to Hooke, he asserted that "Hooke's draughtsmanship gives a clue which can be picked up among the City church drawings and which suggests, for instance, that the street front of St Edmund, Lombard Street, was entirely his own work."[391] The drawing in question (**Figure III-216**) has since been attributed to Edward Pearce by Anthony Geraghty, who has downplayed Hooke's role in the reconstruction of the City churches, arguing that his "responsibilities were principally administrative, and the evidence of the drawings in no way supports the hypothesis that he was responsible for numerous church designs."[392] Given it was Geraghty himself who attributed some of the other drawings to Hooke, this is an intriguing statement which would have benefited from further elaboration.[393] Perhaps it is a matter of clarifying the meaning of 'administrative' which does not ordinarily connote the production of drawings, especially a design sketch such as the partial plan of St. Mary-le-Bow church among Hooke's archives (**Figure III-78**). Additionally, Hooke's supervision of the construction sites may not be 'design' in the strict sense but he was likely making on-the-spot detail decisions or else discussing any on-site problems encountered by the builders, which exceeds the 'administrative'.[394] The issues of attribution, in this particular case at least, appear to be related not to a lack of documentary evidence, but to the interpretation of the role of an architect.

Construction began on fifteen of the churches in 1670; by 1677, thirty of them were under construction, and by 1686, save for a few steeples, rebuilding was deemed completed.[395]

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[390] Ibid., pp. 32, 93-108.

[391] It is worth noting that Summerson was not exactly a fan of Hooke's work which he found "somewhat mechanical and insensitive;" Summerson, *Architecture in Britain 1530 to 1830*, pp. 237-238. Worsley used Summerson's attribution of the drawing to make stylistic attributions of other buildings to Hooke; see Worsley, pp. 20-21.

[392] Geraghty, *Architectural Drawings of Wren*, pp. 85, 86. See also Anthony Geraghty, 'Review of The City Churches of Christopher Wren. By Paul Jeffery', *The Burlington Magazine* 139 (1997), pp. 336-337.

[393] For his attributions of some of the drawings to Hooke, see Geraghty, *Architectural Drawings of Wren*, pp. 86, 93-95, 99-100.

[394] See part i of this chapter on issues of attribution.

[395] Summerson, *Architecture in Britain 1530 to 1830*, p. 192. Yearly payments allocated from the coal tax to the account of the parish churches are listed in Appendix B in Reddaway, *The Rebuilding of London After the Great Fire*, p. 313. For an analysis of the contracts made with bricklayers for the City churches, see James W. P.

ii. 6. MONUMENT TO THE GREAT FIRE OF LONDON

Attribution: Aubrey, *Brief lives*, p. 98; Batten, *passim*; 'Espinasse, pp. 96-97; *NHLE*, list entry no. 1002065.

Brief description: Hooke was responsible for the design and construction of the Monument to the Great Fire of London, built between 1671 and 1679.

Primary sources:

– Hooke's entries in *Diary i*:
- 10 Sep. 1672 (p. 7): "Piller."
- 22 Oct. 1672 (p. 11): "Fish street Piller."
- 8 Aug. 1673 (p. 54): "at the Piller."
- 11 Sep. 1673 (p. 59): "Spoke with Sir Th. Player about Pillar. Sir Thomas about money."
- 16 Sep. 1673 (p. 60): "Mr. Aubery here and at the piller."
- 2 Oct. 1673 (p. 63): "to Guildhall. order of the court of Aldermen for seeing Councell and for the piller."
- 19 Oct. 1673 (p. 66): "perfected module of Piller."
- 28 Mar. 1674 (p. 93): "At Mans coffee house — Met with Cap. Hamden, Story, &c., discoursing about Arch and theater and Fish Street Column."
- 1 June 1674 (p. 106): "At the pillar at Fish Street Hill. It was above ground 210 steps."
- 7 Aug. 1674 (p. 116): "At the Pillar in height 250 steps."
- 6 Nov. 1674 (p. 129): "Lord Mayors about Balcony pillars."
- 16 Dec. 1674 (p. 136): "At Lord Mayors and with Mr. Cibber. At Piller. Gave Sir J. Robinson Report. All but Player promised fair Oliver and Th. 3 doggs."
- 23 Mar. 1675 (p. 154): "At Tompions with Sir Chr. Wren at Pillar St. Magnus."
- 27 July 1675 (p. 171): "With Sir Ch. Wren about Report of Monument."
- 28 July 1675 (p. 171): "Home to Guildhall Committee. Received orders about the Ball and Railes about the Column . . . I took Draught of Piller Ball and Statue."

Campbell, 'Seventeenth-Century Bricklayers' Contracts: Wren's City Churches', *British Brick Society Information* 87 (2002), pp. 10-21. In 1671, Edward Pearce was contracted to do the stone and brickwork of the tower at St Lawrence Jewry; it may be that he first met Hooke in this context; ibid., p. 13.

- 3 Aug. 1675 (p. 172): "Walkd with Sir Christopher in Privy Garden and Discoursd of the Ball for the Columb."
- 4 Aug. 1675 (p. 173): "At Fishstreet Hill with Holder, 10sh."
- 27 Aug. 1675 (p. 177): "Lord Mayor who gave me directions to agree with brasiers for Ball and balcony."
- 8 Sep. 1675 (p. 179): "To Lever Smith about Rail and Balisters of Columb."
- 11 Sep. 1675 (p. 180): "To Sir Chr. Wrens. Received Draught of Urne. Cast up Smiths bill . . . At K. Brasier . . . Spoke with Sir Will. Turner about Urn who approvd well of it if the King liked it."
- 21 Sep. 1675 (pp. 181-2): "At Fish Street Hill on the top of the Column . . . Agreed with Cole Brasier for Urne after the Rate of 18d. per pound for plaine, and 28h. 6d. for chaced work. He to set it up and fix it."
- 24 Sep. 1675 (p. 182): "To Coles, Brasier drew out urne. With Sir Christopher to Physicians Colledge view 1sh."
- 28 Sep. 1675 (p. 183): "To Birds with Davys . . . Agreed with Bird for Urn at 19d. per pound for plain work."[396]
- 11 Oct. 1675 (p. 186): "I paid Bullock for Module for Urne 8s. 6d. and Lignum Vitæ."
- 20 Nov. 1675 (p. 195): "To Birds the urn bungled."
- 16 Dec. 1676 (p. 201): "At Birds, Saw half the urne made."
- 25 Jan. 1676 (p. 214): "Mr. Marshall here. With him to Birds, Bath Lane, he had finishd urne."
- 27 Jan. 1676 (p. 214): "To Garaways — urne to Fish Street Hill weight 1452."
- 2 Feb. 1676 (p. 215): "At Lord Mayors with Bird and Hoskins. Lord incouraged me to finish urne."
- 16 Mar. 1676 (p. 220): "To Little Brittain, Scots. Saw Dutch Columna Trajana."
- 21 Mar. 1676 (p. 221): "to Lord Mayors Disputed about the Piller and portico."
- 4 Apr. 1676 (p. 224): "With Oliver and Hodgkins and at Starr alehouse about Urn."
- 5 Apr. 1676 (p. 224): "Piller at Fish Street Hill. At the top of it saw Balcony, directed about setting the urne . . . at Committee of City Lands about urn."
- 7 Apr. 1676 (p. 225): "From [Garaways] to the Committee at John in Cornwall about urn . . . Gave a draught and report of iron frame for urn."
- 11 Apr. 1676 (p. 225): "to the top of the Piller."
- 24 Apr. 1676 (p. 228): "A Pick pocket broke his neck from Fish Street Hill piller."

[396] Robert Bird, brazier; Iliffe, 'Material Doubts', at p. 302.

- 4 May 1676 (p. 230): "Scarborough and I at Fish Street piller."
- 26 May 1676 (p. 234): "With Grace at Column to see the great fire in Southrick which burnd 8 or 900 houses. It stayd about 8 p.p."
- 27 May 1676 (p. 234): "At Fish Street piller."
- 11 July 1676 (p. 241): "At St. Magnus and at the piller."
- 14 July 1676 (p. 242): "Attended committee at Guildhall till 8 . . . Order to raise the urne to morrow."
- 15 July 1676 (p. 242): "At Fish Street column."
- 26 July 1676 (p. 244): "Bird here about air pump and urn ornaments."
- 7 Oct. 1676 (p. 252): "At Fish Street Hill Piller."
- 8-14 Oct. 1676 (p. 253): "Scaffolds at Fish Street piller almost all struck."
- 17 Nov. 1676 (p. 257): "Fish Street piller . . . Hill and I Discoursd . . . of the Inscription for the Piller."
- 6 Dec. 1676 (p. 261): "post prandium at Guildhall with Committee examind Olivers and Leybourns Survey. Questiond about the ground at the Column at Fish Street Hill."
- 8 Dec. 1676 (p. 261): "To Guildhall about accounts, noe Committee. Lord Mayor and Aldermen to the King about Lee River and choosing Common Councilmen, to Fish Street column . . . Rider promised to Lend Trajans Column at the Horse in Lumber Street."
- 31 Dec. 1676 (p. 265): "Due from Sir Th. Player for a warrant from Citty lands Committee for the Column and for the last yeare £50."
- 18 Feb. 1677 (p. 274): "At Hills, Colonna Trajana."
- 13 Apr. 1677 (p. 285): "set Tom to coppy Trajans Column."
- 21 May 1677 (p. 291): "Sent home Columna Trajana to Mr. Soutons in Broad street."
- 1 Sep. 1676 (p. 310): "To measure the ground at Fish street pillers."
- 2 Oct. 1677 (p. 316): "Observd that the column, cole abby steeple, and St. Brides steeple, were exactly in a line."
- 5 Oct. 1677 (p. 318): "Sir Chr. Wren, Dr. Gale, and Mr. Lane, about monument inscription."
- 8 Oct. 1677 (p. 318): "At Fish street piller. The Bakers ground distant the Length of the Piller."
- 9 Oct. 1677 (p. 319): "Fish street hill church warden for signing measure of Piller ground, 5sh. To view exchange with him."
- 17 Oct. 1677 (p. 321): "At Lord Mayors about the fleet and Dr. Gales inscription, he commanded me to meet with Dr. Gale, Sir Ch. Wren and Controuler, about inscription."

- 18 Oct. 1677 (p. 321): "To Dr. Gales about Inscription."
- 20 Oct. 1677 (p. 322): "discoursed with Sir Chr. Wren at Mans about Inscription."
- 22 Oct. 1677 (p. 322): "Calld on Marshall about Inscription."
- 23 Oct. 1677 (pp. 322-3): "To Lord Mayors about Inscription, to Guildhall with Jarmin, to piller about Scaffold. Calld at Mayors . . . With Tho. Davy at Column. At Dr. Gale. He resolvd the placing as I proposd."
- 24 Oct. 1677 (p. 323): "At Fish street column — Lord Mayor, who approved Inscription."
- 26 Oct. 1677 (p. 323): "At Fish street piller. Directed corners."
- 15 Dec. 1677 (p. 334): "The committee unwilling to Receive Satisfaction about the value of Hodgkins bills of the trees Round raile at Column."
- 5 Jan. 1678 (p. 339): "I resolvd to perfect telescopes by refraction and Reflection, to make some cœlestiall observations of Parallax, to finish my measure of the earth, to make observations at the column of tho [Mercury symbol] standard."
- 16 May 1678 (p. 358): "at Fish street piller tryd [mercury] experiment it descended at the top about $\frac{1}{3}$ of an inch . . . sat not, discoursd about Experiment at Fish. Street Column."
- 23 May 1678 (p. 359): "directed experiment at Column. Lent Mr. Hunt a cylinder to doe it."
- 30 May 1678 (p. 360): "Experiment for Column."
- 3 June 1678 (p. 361): "View at the Column."
- 17 June 1678 (p. 363): "to Sir J. Hoskins, then to Dr. Gale, saw Monument Inscription finisht."
- 29 July 1678 (p. 369): "calld on Dr. Gale for Inscription of Column."
- 30 July 1678 (p. 369): "call on Dr. Gale."
- 31 July 1678 (p. 369): "calld on Dr. Gale for Inscription againe."
- 1 Aug. 1678 (p. 369): "Received from Dr. Gale the Descriptions of the column."
- 6 Nov. 1678 (p. 383): "Viewd inscription on the Piller."
- 19 Nov. 1678 (p. 385): "smoked with Sir C. Wren. Spoke about inscription."
- 30 Nov. 1678 (p. 386): "at the Piller with Sir Ch. Wren and Dr. Gale, Gale voted against me."
- 16 Dec. 1678 (p. 388): "Piller . . . Barret, measurd the column."
- 17 Dec. 1678 (p. 389): "with Leybourne &c, at Jonathans casting up piller."
- 11 Jan. 1679 (p. 393): "with Mr. Bates to Sir Ch. Wrens, I spake to him of Lords Commissioners orders for churches, about Bow and Column and Mrs. Marshalls accounts."
- 18 Feb. 1679 (p. 400): "Dr. Witty, Column verses."

- 10 Apr. 1679 (p. 406): "At Fish Street Piller. Knight cut wrong R for P."
- 14 Apr. 1680 (p. 443): "At Toothes. About piller."

– Bodl., MS Rawlinson B363: Hooke, 'An account of the quantity and value of the work done at the Column on Fishstreet Hill', endorsed on 10 July 1679. An facsimile of this document has been reproduced in R. T. Gunther, *Early Science in Oxford*, vol. vii: *The Life and Work of Robert Hooke (Part II)* (Oxford: Printed for the author, 1930), p. 527; see Appendix, ii. 4 of this dissertation for a transcription.

– Drawings attributed to Hooke:
  - 'Elevation of the preliminary design of the Monument', 1671. ASC, AS II.71. (**Figure IV-20 or Figure III-215**)[397]
  - 'Partial elevation of the base of the Monument', *c.* 1671. BL, Add. MS 5238, no. 72. (**Figure IV-21 or Figure III-104**)
  - 'Elevation of the Monument up to the finial', 1675. BL, Add. MS 5238, no. 78. (**Figure IV-26. b or Figure III-112. b**)
  - 'Urn design for the Monument', 1675. RS, MS/131/54. (**Figure IV-27 or Figure III-314**)
  - Copies of the section/elevation and plans of Trajan's Column from Pietro Santo Bartoli, *Colonna Traiana* (Rome, *c.* 1673), after 1673. BL, Add. MS 5238, nos. 75, 76, 80. (**Figures III-107, III-109, III-115**)

– Drawings attributed to Woodroofe:[398]
  - 'Partial elevation of the top portion of the Monument', 1675; details. BL, Add. MS 5238, no. 77. (**Figure IV-25 or Figure III-111**)
  - 'Elevation of the Monument with an alternative design of the top portion pasted', 1675. BL, Add. MS 5238, no. 78. (**Figure IV-26. a or Figure III-112. a**)

– Drawings attributed to Wren:
  - 'Partial elevation of the top portion of the Monument with a statue of Augusta', 1675. BL, Add. MS 5238, no. 70. (**Figure IV-22 or Figure III-102**)

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[397] Regarding the citing of two different figure numbers, see footnote 375.

[398] The attribution of these drawings to Woodroofe is from Downes, *The Architecture of Wren*, pp. 66, 124n142, and their dating from Geraghty, 'Edward Woodroofe: Sir Christopher Wren's First Draughtsman', pp. 478-479. On Woodroofe, see also Downes, 'Sir Christopher Wren, Edward Woodroffe, J. H. Mansart, and Architectural History'.

- 'Partial elevation of the top portion of the Monument with an urn', 1675. BL, Add. MS 5238, no. 71. (**Figure IV-23 or Figure III-103**)
- 'Design for the finial of the Monument', *c.* 1675; detail. BM, 1881,0611.205, AN290174001. (**Figure IV-24 or Figure III-166**)

– Other primary sources related to the Monument:

- Various extracts, City Lands Committee meeting minutes, transcriptions of reports, letters, and inscriptions are available in:
  - Wren, *Parentalia* (London, 1750), pp. 321-324.
  - Charles Welch, *History of the Monument with Some Account of the Great Fire of London*, sixth ed. (London: Eden Fisher & Co., Ltd., 1921)
  - Wren Society, vol. 5, pp. 45-51.
  - Various engravings, reproduced and cited in **Figures IV-28 to IV-35**.

Description:

After the devastation of the Great Fire of London, an Act of Parliament was passed in 1667 for the rebuilding of the City of London. One of its stipulations was

> to preserve the memory of this dreadful Visitation . . . That a Columne or Pillar of Brase or Stone be erected on or as neere unto the place where the said Fire soe unhappily began as conveniently may be, in perpetuall Remembrance thereof, with such Inscription thereon, as hereafter by the Maior and Court of Aldermen in that behalfe be directed.[399]

It would take a few years for the project to start in the earnest.[400] In 1669, the City Lands Committee, which had been tasked with overseeing the project, received the order to proceed and

[399] Quoted in Charles Welch, *History of the Monument with Some Account of the Great Fire of London, which it Commemorates. Prepared and Printed under the Direction of the City Lands Committee of the Corporation of London*, Sixth ed. (London: Eden Fisher & Co., Ltd., 1921), pp. 4-5.

[400] Secondary sources on the Monument include Cooper, *Robert Hooke and the Rebuilding of London*, pp. 198-205; Lisa Jardine, 'Monuments and Microscopes: Scientific Thinking on a Grand Scale in the Early RoyalSociety', *Notes and Records of the Royal Society of London* 55 (2001), pp. 289-308; Lisa Jardine, 'For a Short Time an Endless Monument: The Shifting History of a Familiar London Landmark', *Historian* (2006), pp. 30-37; Moore, 'The Monument, or, Christopher Wren's Roman Accent'; Reddaway, *The Rebuilding of London After the Great Fire*, *passim*; Christine Stevenson, 'Robert Hooke, Monuments and Memory', *Art History* 28 (2005), pp. 43-73; Christine Stevenson, 'Vantage Points in the Seventeenth-century City', *The London Journal* 33 (2008), pp.

find a suitable lot for the column and piazza. 26 January 1671, they reviewed "a draught now produced by Mr Hooke one of the Surveyors of new buildings of the Pillar to be erected in memory of the Late dismall Fire the same was well Liked and approved. And it is referred to the said Surveyors to estimate and certifye unto this Court the charge of the said Pillar."[401]

The cost was approved, the land was acquired, and construction would soon begin, however there was first the challenge of ensuring that the lot could support the weight of the column. Hooke came up with a solution, which he later shared with the Royal Society at their 24 July 1689 meeting

> Mr Hook affirmed, that the Monument on Fishstreet-Hill is founded on a bed of Gravell not above 6 foot thick: under which there is a great bed of Clay not capable to bear the weight. So that that bed of gravell alone suffices to support so vast a Fabrick.[402]

Once the structural issue was resolved, and Hooke construction began, and we see from the diaries that Hooke "perfected module of Piller" on 19 October 1673, construction began. On 1 June 1674, it was already up 250 steps. Discussions began on how to terminate the structure at the top; there was going to be a balcony and rails for sure, but would the finial be a ball, a statue, or an urn as Hooke had originally conceived it in 1671? In July 1675, Wren prepared a report to the Committee, presenting several alternatives but noting that the King had approved the design with the gilded ball, on account of its easy visibility from a distance.[403]

The finial drawings, attributed to Wren, his draughtsman Edward Woodroofe, and Hooke,

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217-232; Walker, 'Limits of Collaboration'; Welch, *History of the Monument with Some Account of the Great Fire of London, which it Commemorates. Prepared and Printed under the Direction of the City Lands Committee of the Corporation of London*. For a conservation report on its recent restoration, including an analysis of the structure and materials, see Judy Allen, 'The Monument in the City of London: Repair and Discoveries', *Transactions of the Ancient Monuments Society* 56 (2012), pp. 68-89.

401 Cited in Cooper, *Robert Hooke and the Rebuilding of London*, p. 200.

402 RS, JBO/8/p. 271. A week earlier, Hooke had mentioned a similar problem that had been encountered at the Berkeley House in Piccadilly, where the builder, not trusting the support capabilities of a bed of gravel, had built his foundations on stiff clay only to see the chimneys sink; ibid., p. 270. It is unclear whether Hooke had any connection to the building of Berkeley House; he may have heard this story from a builder or perhaps even its architect, Hugh May.

403 Walker, 'Limits of Collaboration', p. 130.

have survived, mostly among the latter's papers at the British Library.[404] Among the options presented were a statue of Augusta, a flaming urn bearing the arms of the City, a phoenix emerging from the flames, and two different versions of a ball. Hooke pushed for his own urn design, now at the Royal Society archives, accommodating a hollow core for a zenith telescope.[405]

In 1677, Hooke enlisted the help of Thomas Gale, his schoolmate from Westminster, for the inscription at the base of the column. Gale, an antiquary and by this time high-master at St. Paul's School, would also be elected fellow of the Royal Society shortly after. The inscription was finalised in 1679, and within a few months Hooke prepared his survey, 'An account of the quantity and value of the work done at the Column on Fishstreet Hill', endorsed on 10 July. The final structure, of which no 'as-built' drawing has survived, is a 202-foot high column, reportedly of Doric, but, Stevenson points out, actually of Tuscan order.[406] Financed via the coal tax, it cost (in material and labour) £13,450-11-9.[407]

While his friend Aubrey unequivocally attributed 'the pillar on fishstreete-hill' to Hooke, Wren junior in his *Parentalia* (London, 1750), with equal confidence, credited his father with the design.[408] Based on the latter, until the publication of Hooke's diaries, the Monument was attributed to Wren, but it is now generally accepted that Hooke was mainly responsible for it. Using a social constructivist approach, a recent study of the Monument's design process has used it to qualify the relationship between Wren and Hooke, suggesting that the type of scientific collaboration encouraged in the Royal Society did not necessarily extend into architectural design. While a welcome corrective to the excessively-positive view of the friendship between Wren and Hooke, conversely it downplays the inherently collaborative nature of architecture. Often times it is legal responsibility, then and now, that determines attribution to a single person.[409]

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[404] These and other related drawings have been examined in ibid. They are listed under 'primary sources' above.

[405] Ibid., pp. 135-136. See the diary extracts above for 5 Jan., 16, 23 and 30 May 1678.

[406] Stevenson, 'Robert Hooke, Monuments and Memory', p. 68n5.

[407] Reddaway, *The Rebuilding of London After the Great Fire*, p. 193.

[408] Aubrey, *Brief Lives*, p. 98; Wren, *Parentalia: or, memoirs of the family of the Wrens*, pp. 321-324.

[409] For Walker's criticism of assumed collaborative practices in architecture, see his 'Limits of Collaboration'. Crucially, Walker seems to accept Steve Shapin's theory of Hooke's social inferiority, which I do not.

ii. 7. FLEET CANAL, LONDON

Attribution: Batten, p. 86; Cooper, *Robert Hooke and the Rebuilding of London*, pp. 164-173; Reddaway, 'Fleet Canal and Thames Quay' in *The Rebuilding of London After the Great Fire*, pp. 200-243.

Brief description: As one of the City Surveyors for the rebuilding of London, in collaboration with Wren, Hooke worked on the design and construction of Fleet Canal, which was built between 1671 and 1674.

Primary sources:

– Hooke's entries in *Memoranda*:
  - 4 Apr. 1672 (p. 137): "fitz at *th*e Ditch."
  - 27 Apr. 1672 (p. 138): "fleet Ditch holburne bridg."
  - 13 May 1672 (p. 139): "Haux. fleet Ditch Dep[uty] Jeofferys."

– Hooke's entries in *Diary i*:[410]
  - 21 Aug. 1672 (p. 5): "At Fleet Ditch."
  - 25 Sep. 1672 (p. 8): "At Fleet ditch and Bridewell about Youngs water line."
  - 12 Oct. 1672 (p. 10): "At Bridewell and Fleet ditch about Fitz."
  - 12 Nov. 1672 (p. 13): "Estimated Fitch his work at Sewers and Fleet ditch."
  - 17 Feb. 1673 (p. 29): "Pargiter at fleet ditch 10sh."
  - 27 Mar. 1673 (p. 36): "View at fleet ditch set out Oliver and Anis."
  - 28 May 1673 (p. 45): "At fleet Ditch with Sir Th. Player &c. Dind with Mr. Fitch at Dog, Ludgate hill."
  - 14 July 1673 (p. 51): "Measurd at fleet Ditch with Shortgrave and Leybourn."
  - 15 July 1673 (p. 51): "Met at fleet ditch about 11. dind at the Goat with Leybourn, Shortgrave, Bigs, Turner."
  - 16 July 1673 (p. 51): "From 8 till 12 at fleet ditch."
  - 15 Sep. 1673 (p. 60): "At fleet Ditch with the Armorers. at Guildhall with the controulor he told me of Olivers treachery."

[410] There are numerous brief references to the Fleet Canal project in Hooke's diaries. Some of them merely note 'At Fleet Ditch' without providing any further information; from these I have included here only the entries that seemed most relevant or that offered clarification to other primary sources.

- 1 Oct. 1673 (p. 63): "with Th. Fitch to Dr. Wren agreed upon report about tarris[411] work of Fleet Ditch."
- 2 Nov. 1673 (p. 68): "at Fleet Ditch to see the cradell."
- 25 Nov. 1673 (p. 71): "about measurement of fleet channell . . . Signed bills of measurement on the north of fleet bridge at Garways."
- 20 Feb. 1674 (p. 87): "At Lord Mayors. Gave him a report of the State of the key. Sent for Mr. Oliver to view the bridge."
- 23 Mar. 1674 (p. 93): "At Fleet Bridge and Holburne Bridge."
- 18 Apr. 1674 (p. 98): "View and report of Fleet Ditch filld up with soyle 3 foot at 2sh. per yard."
- 16 June 1674 (p. 108): "Delivered Report about Fleet Street irregularity."
- 18 Sep. 1674 (p. 121): "To Fleet Ditch. Measurd it."
- 21 Sep. 1674 (p. 122): "Measurd at Fleet Ditch."
- 25 Sep. 1674 (p. 122): "Fleet Ditch with Sir R. Ford."
- 2 Oct. 1674 (p. 124): "At Fleet Ditch."
- 7 Oct. 1674 (p. 125): "At Russells with Mr. Fitch. At Fleet Ditch, Hancock, 10sh. At Committee of City Lands."
- 12 Oct. 1674 (p. 126): "Mr. Fitch his view at Fleet Ditch. His account audited and agreed."
- 20 Nov. 1674 (p. 131): "Due to me . . . from Fleet Ditch £100."
- 16 Dec. 1674 (p. 136): "At Comtee voted an order £100 in full for Fleet Ditch and Salary without conscience or reason. Oliver a dog."
- 19 Dec. 1674 (pp. 136-7): "Gott order from Controuler. He told me of Sir W. Turner a good friend. The order is thus worded. Sir You are forthwith to pay to Mr. R. Hooke Surveyor of New building out of the moneys arising up by the Impositions Layd upon Coles the sum of one hundred pounds in full satisfaction for his frequent Directions and attendances at and in Relation to Fleet Channell and the publique works of this City for the space of three years and upwards till the finishing thereof — and this shall be your warrant Dated the 16 day of December 1674. Robt Vyner. Major J. Robinson. Will Savage. Joseph Sibley, John Du Bois. Tho: Heatly. To Sir Thomas Player. Kt. Chamberlaine of London."

[411] Tarras was a type of cement that hardened in water, making it particularly useful in wet applications. Three weeks later, Hooke certified its use at Bridewell Hospital, which was just west of the Fleet Ditch. Bridewell had been heavily damaged during the Great Fire, and Hooke was directing the repairs there; see ii. 11 in this chapter on Hooke's work at Bridewell Hospital.

- 23 Dec. 1674 (p. 138): "With Sir Th. Player at Fleet Ditch. Gave him guilt Animadversions. Promisd money tomorrow."
- 21 May 1675 (p. 161): "There is owing me from chamber . . . £100 for Fleet Ditch by order of Committee."
- 9 July 1675 (p. 168): "Receivd from the Chamber £100 for Fleet Ditch."
- 23 May 1676 (p. 234): "fleet ditch, Lost ground 12 deep by 14 feet broad. wherof 5ft. 7 inches was formerly street."
- 2 May 1677 (p. 288): "at fleet vaults and Salters."
- 21 Aug. 1677 (p. 308): "With Armorers at Fleet ditch, 10sh."
- 16 Oct. 1677 (p. 320): "Attended upon the Court of Aldermen about fleet channel."
- 17 Oct. 1677 (p. 321): "At Lord Mayors about the fleet."
- 13 Nov. 1677 (p. 327): "at Court of Aldermen with Fleet draught. Attended this morning and all the afternoon yesterday about Daintrys committee and committee about fleet Libertys."
- 2 Dec. 1678 (pp. 386-387): "A view at Bridewell and fleet Ditch, Sir J. Shorter, Sir J. Sheldon, Sir T. Player, &c."
- 13 Dec. 1678 (p. 388): "Viewd and Reported fleet Ditch amendments."
- 14 Dec. 1678 (p. 388): "at Bridewell view of fleet Ditch till 12."
- 30 July 1679 (p. 419): "At Committee. Sir J. Laurence there about Fleet Ditch."
- 1 Aug. 1679 (p. 419): "Notes from Sir J. Laurence about Fleet Ditch."
- 19 Jan. 1680 (p. 426): "to Sir J. Frederick. Proby at fleet Ditch. from Sir J. Frederick 6s. 8d."
- 12 Feb. 1680 (p. 438): "Proby, Fleet ditch."
- 1 Mar. 1680 (p. 440): "2 men about Bradway of Fleet ditch, &c."

– Records of the Corporation of London, City Lands Committee, Orders i; Papers MSS 57 & 97; and Meeting Minutes: These have been cited and quoted, with manuscript numbers, by Reddaway and Cooper. The latter has reproduced a report which recommended that the work on the Canal continue despite the costs.[412]

– The Pierpont Morgan Library, New York, MA 8602: 'The Surveyors Certificat for Rates to Masons at Fleet ditch', 9 October 1674; in Hooke's hand with Wren's autograph approval below it, the

[412] These primary documents, which I have not consulted, are cited with manuscript numbers in T. F. Reddaway, 'Fleet Canal and Thames Quay', in *The Rebuilding of London after the Great Fire* (London: Jonathan Cape, 1940), pp. 200-243; and Cooper, *Robert Hooke and the Rebuilding of London*, pp. 164-173, and fig. 52 on p. 169. See also Perks, *The Water Line*.

report specifies the approved rates for masons' work for the railings and stairs at Fleet Ditch. Transcribed in Appendix ii. 2.

Description:

Fleet River is one of the tributaries of the Thames. Now subterranean, it springs from Hampstead Heath, flows through Camden Town, King's Cross, Clerkenwell, and Farringdon, before joining the Thames at Blackfriars Bridge (**Figure IV-36**). For centuries, it provided essential means of transportation; by 1307, up to a dozen ships carrying merchandise were travelling up the river, sometimes going as far north as Holborn Bridge. But it also soon began to be used as a sewer, developing the offensive stench it became famous for – a stench strong enough by 1290 to overpower the incense used for mass at the Carmelite monastery in Whitefriars.[413] As the area became developed, adding to the natural accumulation of silt was the refuse from abattoirs, tanneries, and other industries, causing the river bed to gradually fill up. It was occasionally cleaned up but by the Great Fire in 1666, Fleet River had become Fleet Ditch, clogged up with mud and garbage, and prone to overflowing and flooding nearby premises.

One of the improvements planned for the post-fire reconstruction of London was turning the Fleet Ditch into a canal navigable up to Holborn Bridge at high tide (**Figures IV-37 and IV-38**).[414] The project was clarified in the second Rebuilding Act of 1670 and preparations began in November of that year. Hooke's diaries do not cover the initial period of the project, and some of the later entries are too brief to be helpful, but there are other primary sources, e.g. the orders and meeting minutes of the City Lands Committee, detailing and corroborating the work.[415]

A preliminary design for the canal was presented to the City Alderman on 10 March 1670. Once it was passed into law with the second Rebuilding Act, a ground plan was prepared, the wharves staked out, and within days the scheme was approved by the King.[416] Hooke, as one of the City Surveyors, was ordered by the City Lands Committee to meet with Wren, the latter in his capacity as one of the King's Commissioners for New Buildings, to prepare a report on the work to be done.

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[413] Walter Thornbury, 'The Fleet River and Fleet Ditch', in *Old and New London: Volume 2* (London: Cassell, Petter & Galpin, 1878), pp. 416-426, pp. 416, 418.

[414] Literature on the Fleet Canal project include ibid.; Perks, *The Water Line*; Reddaway, 'Fleet Canal and Thames Quay'; and Cooper, *Robert Hooke and the Rebuilding of London*, pp. 164-173.

[415] See note 412.

[416] Reddaway, 'Fleet Canal and Thames Quay', p. 203.

Despite this auspicious start, construction work was delayed due to financing and other legal issues. The project was being funded by a coal tax and it would take some time for enough money to accumulate to be able to pay the workers. There was also the issue of acquiring the land needed to construct the wharves; while there was no legal obligation to compensate the owners, after months of consideration, the City decided to purchase the lands.

During this lull, Hooke and Wren were slowly working on their report. One of the issues to resolve was whether to use timber, brick, or stone in constructing the wharves. In the report Hooke and Wren presented to the Committee on 22 March 1671, they recommended building them in timber, specifying all the dimensions and necessary parts. Considering the complexity of the work, they suggested a prototype wharf, 100' in length, be built under their supervision at £6 per square foot. They recommended that a 2" : 1' scale module could also be prepared to use as a reference when negotiating with the contractors. To clear the canal of all the debris and mud, they recommended that flat-bottomed barges be filled at ebb and then carried off during the tide. The stones of the previous wharves were to be removed but the piles longer than 3' were to be preserved. Where needed, "Ingenious Carpenters" would construct pumps for the water supply and sewer conduits.[417] They specified as much of the possible costs as possible though conceding that some of them would be estimated when needed. Their recommendations were accepted. Hooke was instructed to make the model, and four different carpenters were commissioned to build 100' sections of the wharf. After evaluating the prototypes, the City awarded Thomas Fitch (1637–1688) and John Ball with the initial contracts for the project. The work, however, did not go smoothly thereafter. Hooke and Wren had greatly underestimated the increased flow of the river after heavy rains and the lateral pressures on the timber walls. Making matters worse, illicit dumping of refuse had not stopped, and with every flooding, the amount of silt flowing down the river was increased, slowing down, if not impeding, the work of clearing the canal. Changes had to be made to the initial scheme; the piles and walls were redesigned using a trial-and-error method, and in areas of increased water pressure, brick facing was used. By this time, only Fitch was retained as the contractor. Sometimes referred to as 'Fitz' in the diaries, he was a competent builder who worked with Hooke on many projects including the Royal College of Physicians, the Bethlem Hospital, and the Montagu House, and went onto to design a few buildings

[417] Ibid., pp. 206-207; Cooper, *Robert Hooke and the Rebuilding of London*, pp. 165-166.

by himself.[418] Directing two hundred workers on the site, he was credited with much of the eventual success of the Fleet Canal, and would later be knighted for his work.

The project, which cost more than £51,000, was deemed finished in October 1674, and indeed the diaries show Hooke taking measurements, likely quantity surveys, a month before then, finally auditing and agreeing Fitch's account on 12 October. Hooke was paid a commission of £100, though it took nearly a year for him to actually receive it. In comparison, for the Fleet Canal, Thames Embankment, and other public works, Wren was presented with three 100-guinea gifts during this period.[419] This should not be interpreted as Wren having done most of the work, however. He was indeed closely involved in the preparation of the initial design and report, and since it was stipulated that the King's consent was required for the Canal project, as his proxy, his approval was sought for every major report. It also may have been more appropriate for him to be granted a greater sum as the King's representative, or since Hooke was already being paid as a City Surveyor, the latter's work may have been taken for granted. But the meeting minutes and orders of the City Lands Committee, as well as the diary entries, show that the project demanded quite a bit of Hooke's time and attention, indeed even after it was deemed 'finished'.

The engineering challenges posed by the Fleet Canal and the trial-and-error solutions Hooke devised would prove to be useful in future projects, such as the 1676 proposal he would prepare for the completion of the Tangier Mole. They would be especially valuable in 1692, when Hooke would help Robert Southwell with the construction of sluices at the latter's Kings Weston property, making use of his "paper about the Strength of Wall, how to estimate it," experimenting with mortar, and calculating the amount of timber needed.[420] The Fleet Ditch would once again be on Hooke's mind in March 1695 when the Royal Society would attempt to find the "Ingredients of the Cement for the old

[418] On Thomas Fitch and his brother John, both of who worked with Hooke on many projects, see Colvin, *BDBA* (2008), pp. 377-379. On Thomas's knighthood, see Reddaway, 'Fleet Canal and Thames Quay', p. 216; and Colvin, *BDBA* (2008), p. 378. In secondary literature, Thomas Fitch is sometimes referred to as a bricklayer but it has been pointed out that he was instead a member of the Carpenters' Company; ibid., p. 211n4.

[419] Ibid., p. 218.

[420] See sections ii. 26 and ii. 49 in this chapter.

Roman earthen Water-pipes found in Fleet ditch," which turned out to be "Pitch and Rosin, and . . . Brickdust."[421]

ii. 8. DORSET GARDEN [DUKE'S] THEATRE, LONDON [SPECULATIVE]

Attribution: Diana de Marly, 'The Architect of Dorset Garden Theatre', *Theatre Notebook* 29 (1975), pp. 119-124.

Brief description: It has been speculated that Hooke may have been the architect of Dorset Garden Theatre, built in 1671 in London, for the Duke's Company.

Primary Sources: There are no primary sources to corroborate this attribution; the theatre was built before Hooke's extant diaries begin, and the primary evidence used to support the attribution is problematic.

Assessment:

In 1975, Diana de Marly suggested Hooke as the possible architect of the Dorset Garden Theatre built in 1671, and since then, the attribution has found its way into the secondary literature on theatre history.[422]

It is very tempting to attribute this building to Hooke given its description as "the most magnificent public theatre ever constructed in England before 1671."[423] That the architect who would give London its most palatial building as a hospital for the lunatics could also give the country its most ornate theatre does not seem too implausible. The prototypical nature of this building as the first purpose-built theatre of the Restoration, with its reportedly significant improvements in acoustics and the elaborate machinery used to produce lavish performances including early English operas further encourage an attribution, considering Hooke's mechanical talents.[424] It was at this playhouse that

[421] Minutes for the 6 Mar. 1695 meeting; RS, JBO/9/p. 182; see also Appendix iii. 3. In 1676, further Roman artifacts were recovered while clearing the debris in the Ditch, including silver, copper, and brass coins; see Thornbury, 'The Fleet River and Fleet Ditch', vol. 2, p. 417.

[422] Most recently in Dawn Lewcock, *Sir William Davenant, the Court Masque, and the English Seventeenth-Century Scenic Stage, c. 1605-c. 1700* (Amherst, NY: Cambria Press, 2008), p. 205.

[423] Leslie Hotson, *The Commonwealth and Restoration Stage* (Cambridge, MA: Harvard University Press, 1928), p. 233.

[424] A contemporary account of the interior is given by a French visitor to the city, François Brunet, who attended a comedy by the Duke of York's Company ("la Comedie de la troupe de Mr Le Duc Dyorcq"). The

adaptations of Francis Godwin's *The man in the moone* (published posthumously in 1638) were performed, and also where, on 2 June 1676, Hooke saw a production of Thomas Shadwell's *The virtuoso* (pub. 1676), a satire on experimental philosophy with a protagonist based on Hooke, giving rise to one of the more memorable entries in Hooke's diary: "Damned Doggs. *Vindica me Deus*. People almost pointed."[425] Alas, there is no extant primary evidence linking its design to Hooke, or to Wren who had been traditionally credited with it.[426]

De Marly's conjecture of possible Hooke authorship was partly based on stylistic similarities and partly on misinterpreted primary evidence. First was her contention that there was "a very slight similarity in architectural vocabulary between the facade of Dorset Garden Theatre, and the central pavilion of Hooke's Bethlehem Hospital." She did qualify this by arguing that Hooke's design for the Bethlem is far more sophisticated and that

> The fenestration [of the theatre facade], particularly in the centre, is unlike anything designed by even an artisan-architect, and the placing

relevant excerpt from Brunet's unpublished 'Voyage d'Angleterre' (1676), currently British Library MS Add 35177, is reproduced in ibid., pp. 234-236.

[425] Francis Godwin, *The man in the moone, or, a discourse of a voyage thither* . . . (London: Printed for Joshua Kirton . . . , 1657). The two adaptations of Godwin's text performed at Dorset Garden Theatre were Aphra Behn, *The emperor of the moon: a farce* (1687) and Elkanah Settle, *The world in the moon an opera as it is perform'd at the Theatre in Dorset-Garden by His Majesty's servants* (London: Printed for Abel Roper . . . , 1697); on these and other theatrical adaptations of Godwin's text, see William Poole's Introduction in Francis Godwin, *The Man in the Moone*, ed. William Poole (Buffalo, NY: Broadview Press, 2009), p. 52, and Al Coppola, 'Retraining the Virtuoso's Gaze: Behn's "Emperor of the Moon," the Royal Society, and the Spectacles of Science and Politics', *Eighteenth-Century Studies* 41 (2008), pp. 481-506. Hooke owned copies of various (and related) science fiction texts on the moon; in addition to Godwin, *The man in the moone*, the 1703 auction catalogue of Hooke's library listed copies of John Wilkins, *The discovery of a vvorld in the moone. Or, A discourse tending to prove, that 'tis probable there may be another habitable world in that planet* (London: Printed by E[dward] G[riffin] for Michael Sparke and Edward Forrest, 1638), Hercule-Savinien de Cyrano de Bergerac, *Selenarhia, or, The government of the world in the moon a comical history* (London: Printed by J. Cottrel . . . , 1659) and *The comical history of the states and empires of the worlds of the moon and sun* (London: Printed for Henry Rhodes, 1687), and Bernard Le Bovier de Fontenelle, *A discovery of new worlds*, trans. Aphra Behn (London: Printed for Will. Canning, 1688). Thomas Shadwell, *The virtuoso. A comedy, acted at the Duke's Theatre . . . Licensed, May 31. 1676. Roger L'Estrange* (London: Printed by T. N. for Henry Herringman . . . , 1676); *Diary i*, p. 235.

[426] One of the reasons for the attribution to Wren is an order he received to inspect a defective wall a few weeks after the theatre had opened; The National Archives, Kew, PRO, LC 5/14, p. 73. This, however, does not mean he was the architect of the building. Wren had been appointed King's Surveyor of Works in 1669 and was receiving this order from the King's Lord Chamberlain in his official capacity.

> of two pairs of windows between the columns is most unusual. The broken pediment above the tower window is very strange.

Referring to the six engravings by Walter Dolle (*fl.* 1662–1674), one of the facade and five of the scenes from the play, published in Elkanah Settle's *The empress of Morocco* (pub. 1673), she decided that the "final result as shown in the engraving . . . is clearly not the work of an architect" or that it illustrated the incompetence of the engraver who had failed "to understand the details of a rough sketch made on the spot." After these unflattering descriptions, she concluded the "most the busy Hooke might have done would have been to suggest the use of an arcade, of columns, of a curved pediment" (**Figure IV-39**).[427]

Stylistic attributions being hardly reliable, de Marly offered some primary evidence. First, two diary entries, from 3 October 1672 and 4 August 1674, when Hooke respectively "Walked to Dr. Wrens . . . discoursed of theater" and "Discoursed with Sir Chr. Wren about theater." She speculated that the 'theatre' in these contexts may be referring to the Dorset Garden, although she considered the possibility they may instead be referring to the Theatre Royal (attributed to Wren) or Wren's work on other theatres. Given the telegraphic nature of Hooke's diaries, it is impossible to be absolutely certain, but these particular diary entries more likely referred to two theatres of the non-dramatic variety Hooke was working on.[428] First was the Barber-Surgeons' anatomy theatre, originally built by Inigo Jones but damaged in the Great Fire—Hooke was overseeing its repair in his capacity as a City Surveyor.[429] He noted visiting "Chirurgeons Theater" on 17 September 1672 and 23 January 1673, returning on 8 March with Charles Scarburgh (1615–1694), from whom he later received "40sh. for theater, making in all £20" on 24 January 1674.[430] Most of the other references to 'theatre' during this period were to the celebrated anatomy theatre Hooke designed for the Royal College of Physicians. On 2 December 1672, two months after hearing the news that John Cutler (1607/8–1693) would pay for the construction, Hooke produced a cost estimate for Daniel Whistler (1618/19–1684). When he met with the latter on 7 April 1673, he must have received approbation as within a week, Hooke was

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[427] Diana de Marly, 'The Architect of Dorset Garden Theatre', *Theatre Notebook* 29 (1975), pp. 119-124, pp. 120, 121, 124, Elkanah Settle, *The empress of Morocco, a tragedy. With sculptures. As it is acted at the Duke's Theatre* (London: Printed for William Cademan . . . , 1673).

[428] It is equally possible that they were discussing the Sheldonian Theatre Wren had built in Oxford.

[429] Walker, 'Architecture, Anatomy and the New Science', p. 479. 'Espinasse, p. 95.

[430] *Diary i*, pp. 7, 23, 33, 82. Scarburgh, physician and natural philosopher, read his anatomical lectures at the Barber-Surgeons' theatre.

drawing the "front of two lower storys of Theater." A year later, Hooke was still working on the design and finally had the construction order signed on 24 September 1674.[431]

As her second evidence, de Marly offered a quote from Aubrey's entry on Hooke in *Brief lives*: "He built Bedlam, the Physitian's College, Montague-House, the Piller on Fish-street-hill, and Theatre there." This indeed gives the impression that Hooke built a theatre near Fish Street, and de Marly went to some lengths trying to connect it to Dorset Garden, but it is actually the result of an unfortunate transcription error. *Brief lives*, composed roughly between 1679 and 1692, remained in manuscript until Andrew Clark's edition in 1898, and both that first edition and the 1972 printing of Oliver Lawson Dick's edition that de Marly quoted have transcribed the passage in the same way. In Aubrey's original manuscript, currently Bodleian Library, MS Aubrey 6, on fol. 16v we find:

[margin]	. . . He
The Piller	built Bedlam. Montag[2]ue-house. The [1]Physitians College
on Fish street-	and Theatre there. and he is much made use of in Designing
hill	Buildings . . .

The superscript numbers were added by Aubrey for the editor to rearrange the order, i.e. to list the Physicians' College and anatomy theatre before the Montagu House. What Clark and Dick had not realized was that 'theatre' in this context was referring to the anatomy theatre of the College of Physicians, so both listed it after 'The Piller on Fish Street-hill', i.e. the Monument to the Great Fire. Instead, it should have read: "He built Bedlam. The Physitians Colledge and Theatre there. Montague-house. The Pillar on Fishstreete-hill. and he is much made use of in Designing Buildings."[432]

Since Hooke's diaries before 10 March 1672 are not extant and there is no other documentation directly linking him to the design of this theatre, it is impossible to prove or disprove this attribution. But if Hooke was involved at all, it may have been via Roger Jerman (or Jarman, fl. 1657?–1670; *d.* 1678), who held a long lease on the lot that the theatre was built on.[433] Jerman, who receives numerous mentions in Hooke's diaries, was the City Carpenter 1662–1678 and a younger brother of Edward Jerman (*c.* 1605–1668), one of the three City Surveyors. It is not inconceivable that the theatre was built by a craftsman like Roger Jerman, who may have designed the facade as a dizzying

[431] *Diary i*, pp. 9, 15, 38, 39, 122. On the building of the anatomy theatre, see Walker, 'Architecture, Anatomy and the New Science', pp. 487-496.

[432] This error has been corrected in the most recent edition; see Aubrey, *Brief lives*, p. 98.

[433] Hotson, *Commonwealth and Restoration Stage*, p. 229.

collage of his brother Edward's designs for Mercers' Hall or the Royal Exchange.[434] If Jerman was involved at all, he may have sought Hooke's opinion, perhaps on the acoustics or theatrical machinery.

ii. 9. THAMES EMBANKMENT, LONDON

Attribution: Batten, p. 86; Sydney Perks, 'The Scheme for a Thames Embankment after the Great Fire of London', *Journal of the Royal Institute of British Architects* 31 (24 May 1924), pp. 445-461; S. Rowland Pierce, 'A Drawing for a Thames Embankment After the Great Fire, 1666, by Robert Hooke', *Antiquaries Journal* 44 (1964), pp. 233-241.

Brief description: As part of his work as the City Surveyor, Hooke prepared drawings for the clearing and improvement of the Thames embankment. Several of his survey and presentation drawings from *c.* 1671–1673 are extant.

Primary sources:

– Hooke's entries in *Diary i*:
  - 23 Sep. 1672 (p. 8): "Buttolph Wharf. Guildhall. Dr. Wren here, Committee about water line . . . Committee about Buttolph wharf." [two other visits to Buttolph are recorded on 21 and 24 Sep.]
  - 25 Sep. 1672 (p. 8): "At Fleet ditch and Bridewell about Youngs water line."
  - 9 Nov. 1672 (p. 12): "Guildhall about water line with Dr. Wren."
  - 7 Jan. 1673 (p. 20): "after the morn at Bridwell measuring wharf."
  - 19 Apr. 1673 (p. 40): "at Mr. Coxes old key Tham street."
  - 15 May 1673 (p. 43): "served with order for opening the Key."
  - 21 May 1673 (p. 44): "at Lord Chancellors and Dr Wrens with Samuell viewed the key."
  - 26 May 1673 (p. 45): "at Lord Mayors and Lord Chancellors. Lord Chancellor commanded a mapp of the key from London Bridge to Dougate to be made."
  - 31 May 1673 (p. 45): "measurd wharfs with Harry at water side."
  - 1 June 1673 (p. 45): "Drew map for Lord Chancellor."
  - 8 June 1673 (p. 46): "at Lord Mayors. at stilyard about water line."

[434] On the Jerman family of carpenters, the identification of Roger as Edward's younger brother, and his involvement in the construction of the Royal Exchange, see Colvin, *BDBA* (2008), pp. 574, 575; Helen Collins, *Edward Jerman, 1605–1668: The Metamorphosis of a Master-Craftsman* (Cambridge, UK: The Lutterworth Press, 2004). It should be noted that neither of these sources attribute Dorset Garden Theatre to Jerman.

- 14 June 1673 (p. 47): "Guildhall. Queenhith to be restored againe suddenly. Mr. John Fitch by."
- 29 Aug. 1673 (p. 58): "Chancellor gave order about key and for attendance on the councell."
- 3 Sep. 1673 (p. 58): "at Lord Mayors. warnd the wharfingers to take downe."
- 4 Sep. 1673 (p. 59): "Wharfingers about keys summond in. some bound over to pull downe."
- 10 Sep. 1673 (p. 59): "at the Keys with Oliver directed Warner. at the councell Spoke with Lord Chancellor."
- 17 Sep. 1673 (p. 60): "At Warners and the key."
- 24 Sep. 1673 (p. 61): "viewd the keys and calld upon them to pave."
- 30 Sep. 1673 (p. 62): "went with Harry to Pargiters and Hors fleet wharf."
- 8 Oct. 1673 (p. 64): "with Harry measurd Locks and fishmongers wharf."
- 10 Oct. 1673 (p. 64): "increasd my cold much by measuring wharfes."
- 9 Feb. 1674 (p. 86): "Viewd Lamets Wharf. With Lem and A baker. At Renish cole harbour."
- 10 Feb. 1674 (p. 86): "to Holbourne bridge. To Black fryer stairs."
- 20 Feb. 1674 (p. 87): "At Lord Mayors. Gave him a report of the State of the key. Sent for Mr. Oliver to view the bridge."
- 8 Apr. 1674 (p. 95): "Controuler fals at the Councell with Lord Mayor. 2sh. about key."
- 13 May 1674 (p. 102): "At Guildhall with Sir Th. Player, gave him Dimensions of the Key."
- 18 July 1674 (p. 113): "At Sir Ch: Wrens. He returnd. Spoke to him about key."
- 21 Nov. 1674 (p. 132): "Received from Clark for Cole Harbor certificat 18sh."
- 21 July 1675 (p. 170): "View at Guildhall and broken wharf."
- 23 Aug. 1675 (p. 176): "To Paules wharf."
- 4 Dec. 1675 (p. 198): "A view at Queen Street, 3 cranes and broken wharfe."
- 17 July 1676 (p. 243): "Puddle dock. None came . . . Paules wharf about stairs."
- 2 Jan. 1677 (p. 266): "Walkd with Hill to Thames and Fitches at Blackfryers. The Ice has removed Blackfryers bridge eastward before Mr. Youngs wharf."
- 29 Mar. 1677 (p. 282): "With Committee of Parliament to Pauls wharf with Oliver."
- 9 Oct. 1678 (p. 380): "At Sir J. Laurence about Water Line."
- 10 Oct. 1678 (p. 380): "At Court of Aldermen about water line."
- 11 Feb. 1679 (p. 399): "at the town clarks about Water Line."
- 14 Feb. 1679 (p. 399): "Guildhall Subpoenas. Water Line. I tended on them all day 10 aa 5."
- 25 Apr. 1679 (p. 408): "At Guildhall. Saw Act of Common Councell for Salary, and Water Line."

– Records of the Corporation of London:
  - City Lands Committee: Relevant extracts from the meeting minutes are reproduced in Sydney Perks, 'The Scheme for a Thames Embankment after the Great Fire of London', *Journal of the Royal Institute of British Architects* 31.14 (24 May 1924), pp. 449-452.
  - Office of the Comptroller: 4 Dec. 1671 "Letters Patent confirming the Design for making an open Wharf forty feet wide on the North side of the River Thames between London Bridge and the Temple and directing that no building should be erected within that distance from the River." The letters patent is transcribed in Perks in *The Water Line of the City of London After the Great Fire* (London: Taylor & Francis, 1935), pp. 35-38; its first page is reproduced as the frontispiece, and the attached drawing as Figs. 2-6 (**Figure IV-40**). These are also reproduced in Perks, 'The Scheme for a Thames Embankment after the Great Fire of London', pp. 453, 454.
  - Reports dated 22 Dec. 1671 by Wren and Hooke on the construction of new public landing stairs at The Three Cranes and at Blackfriars, reproduced in Reddaway, *The Rebuilding of London after the Great Fire*, facing p. 240.
– The National Archives, Kew, State Papers Domestic, Charles II:
  - 29/171, No. 95: *His Majesty's declaration to his city of London upon occasion of the late calamity by the lamentable fire* (London: Printed by John Bill and Christopher Barker Printers to the King's most Excellent Majesty, 1666).
  - 29/293, No. 38: "Petition of the Mayor and citizens of London to the King, for an approval under the great seal of the line of the quay or wharf between the Temple and London Bridge, prepared by them, as ordered by the Additional Act for rebuilding the city, and approved by his Majesty, and for a grant of such of the soil of the river as is needful for it." [?] Sep. 1671.
  - 29/293, No. 39: "The King to the Attorney-General. Warrant to prepare a bill for his signature, approving of the annexed draft or model of the quay or wharf designed between the Temple and London Bridge . . . " 24 Sep. 1671.
  - 29/293, No. 40: "Declaration of the King's approval of the water line of the Thames, between London Bridge and the Temple . . . " [?] Sep. 1671.
  - 29/293, No. 40: "Extract from a grant to the Lord Mayor, &c, of London, of all the ground that may be taken in from the Thames, to make the line between London Bridge and the Temple regular, except the portion between St. Paul's wharf and Baynard's Castle, which is granted to the Dean and Chapter of St, Paul's." [?] Sep. 1671.

– British Library:
  - Add. MS 5238, nos. 82 & 83: Two plans in Hooke's hand from *c.* 1672, one in ink and ink-wash (no. 82) and one in ink (no. 83), of the north embankment of river Thames, from the Tower dock to Whitefryers Lane (**Figures IV-42 and IV-43; or Figures III-119 and III-120**).[435]
  - Vol. ii, 43, Brit. Top.: A manuscript note on the verso of Add. MS 5238, no. 83 reads "A third copy of this Plan/ is in vol. ii. 43. of British Topography/ deposited in the Print Room./ [signature] June 1860." This drawing appears to have been misplaced but was reproduced in R. T. Gunther, *Early Science in Oxford, vol. 10: The Life and Work of Robert Hooke (Part iv)* (Oxford, 1935), pp. 62-63. It is almost identical to Add. MS 5238, nos. 82 & 83 but additionally shows the public landing stairs along the embankment (**Figure IV-44 or Figure III-121**).

– Society of Antiquaries, Drawings, vol. 2, p. 20: 'An Actual Survey Plann or Draught of a Key to be left open from London Bridge to the Temple', *c.* 1673 (**Figure IV-41 or Figure III-331**).

Description:

On 4 October 1666, about a month after the Great Fire, Hooke was appointed one of the City Surveyors for the rebuilding of London. The tasks of the official surveyors included viewing and measuring existing property lines, delineating street layouts, and inspecting new construction—the 'Key' or the northern embankment of the River Thames was one of their responsibilities.[436]

The embankment was of crucial importance from the very beginning. Right after the fire, in the declaration issued by the King on 13 September, it was ordered that no houses were to be rebuilt near the river; instead there would be "a fair Key or Wharf on the River side" clear of any buildings or hindrances. The objective was fire safety. Previously, there had been no easy access to the small, cramped, timber dwellings built at the edge of the river; a wide clear quay would allow land access for timely extinguishing of fires.[437] The plans proposed by Wren and Evelyn also featured wide quays; although most of the rebuilding plans were ultimately rejected, this shared idea of a wide clear

[435] Regarding the citing of two different figure numbers, see footnote 375.

[436] Note that embankment, key, quay, and wharf were used interchangeably during the period, a practice replicated here. On the Thames embankment after the Fire, see Perks, 'Scheme for a Thames Embankment', and *The Water Line*; Pierce, 'Drawing for a Thames Embankment'; Reddaway, 'Fleet Canal and Thames Quay'. On Hooke's work as the City Surveyor, Michael Cooper's is the most recent scholarship; see footnote 314 for a list of relevant works.

[437] *His Majesty's declaration to his city of London upon occasion of the late calamity by the lamentable fire*, (London: Printed by John Bill and Christopher Barker . . . , 1666), pp. 6-7; Perks, *The Water Line*, pp. 4-5.

embankment was adopted. It was the 'middle way' Oldenburg reported to Boyle in his 2 October 1666 letter: "Some are for a quite new model, according to Dr. Wren's draught; some for the old, yet to build with bricks; others for a middle way, by building a key, and enlarging some streets, but keeping the old foundations and vaults."[438]

On 24 October 1666, the Rebuilding Committees decided on a quay width of forty feet, which was also specified in the two rebuilding acts of 1667 and 1670. But with so much clearing and rebuilding to do within the city, and with limited funds to compensate the owners for their land, the quay remained a low priority. Work progressed slowly and in small measures; in 1668, a survey was made of the Billingsgate Dock by the City surveyors, in 1669, public landings were built at Billingsgate and Puddle Dock, and two years later, stairs were installed at Queenhithe, Trigg lane, and Old Swan. On 22 December 1671, Hooke and Wren reported an estimate for two more sets of stairs, at Three Cranes Wharf and Blackfriars, which were subsequently built in 1672.[439]

In September 1671, the embankment project received new attention with a petition to Charles II by the lord mayor and City council. On 4 December 1671 "Letters Patent confirming the Design for making an open Wharf forty feet wide on the North side of the River Thames between London Bridge and the Temple and directing that no building should be erected within that distance from the River" was issued.[440] Attached to it was a 50' : 1" scale plan of the proposed water line drawn by the City Surveyors; on 4 May 1671, a version of it had been submitted to Wren in his capacity as the King's Surveyor, and in July an order was issued for the design to be "described on a vellum draught" and presented to the King by Wren and Hooke. At the time Hooke was the most active City Surveyor, and that he is specifically asked to present the 'draught' to the King likely means both of the drawings were in his hand.[441] Indeed, the handwriting in the version attached to the letters patent is certainly similar to his (**Figure IV-40**).[442]

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[438] Oldenburg's letter is quoted in Cooper, *Robert Hooke and the Rebuilding of London*, p. 115.

[439] Pierce, 'Drawing for a Thames Embankment', pp. 234-236. Extracts from the two rebuilding acts relevant to the embankment have been reproduced in Perks, 'Scheme for a Thames Embankment', pp. 446-447, and Wren and Hooke's report, in Reddaway, 'Fleet Canal and Thames Quay', facing p. 240.

[440] Pierce, 'Drawing for a Thames Embankment', p. 235. A transcription of the letters patent is available in Perks, *The Water Line*, pp. 35-38.

[441] Perks, *The Water Line*, pp. 24-25.

[442] See also Chapter III for annotations on this and the following figures.

Another presentation drawing of the embankment, also at 50' : 1" scale and attributed to Hooke, is extant at the Society of Antiquaries (**Figure IV-41**). Less idealised and more based on actual site surveys and conditions, it has been dated to *c.* 1673 based on Hooke's diary entries when he recorded taking numerous surveys of the wharfs. Of the three other drawings of the embankment; two are among Hooke's papers at the British Library as Add. MS 5238 nos. 82 and 83 (**Figures IV-42 and IV-43**). A third drawing, bearing former shelfmark 'Vol. ii, 43, Brit. Top.', appears to be misplaced, but was luckily reproduced by Gunther in *Early Science in Oxford*, Vol. X (**Figure IV-44**).[443] Less detailed than the presentation drawing at the Society of Antiquaries, these three drawings locate all the keys and alleys from the Tower dock to Whitefryers. All of them in Hooke's hand, they appear to be almost identical, except that a gray ink wash has been added to Add. MS 5238 nos. 82, and 'Vol. ii, 43, Brit. Top.' has not only the public landing stairs added but also the straightened lines of the quay to be built in certain locations of the water line.[444] They seem to predate the drawing at the Society of Antiquaries and are tentatively dated here to *c.* 1672.

Ultimately, despite all the planning, the embankment project did not materialise. This was most likely due to lack of funds to compensate the landowners along the river and to cover the costs of building the projected wharfs. Even the forty-foot clearance could not always be enforced once the example was set by the Fishmongers' Hall, completed in 1671, which significantly encroached into the boundary. The clearance was also seen as detrimental to trade, making it less cost effective to have to transport goods inland for forty feet than to directly move them into a warehouse at the edge of the river. Indeed, it appears landowners continued to build at the edge of the river despite the building acts of 1667 and 1670, parts of which were finally repealed in 1821.[445]

ii. 10. ROYAL COLLEGE OF PHYSICIANS

Attributions or discussions: Aubrey, *Brief lives*, p. 98; Batten, pp. 89-90; Colvin (1954) and subsequent editions; 'Espinasse, pp. 88-91; Matthew Walker, 'Architecture, Anatomy and the New

[443] When the British Library was founded in 1972, the book collection of the British Museum was transferred there. Some items, selected in a seemingly random fashion, were left behind at the Museum, making it possible that 'Vol. ii, 43, Brit. Top.' is at either one of the institutions.

[444] The handwriting is much more consistent here.

[445] Perks, *The Water Line*, pp. 29-33; Reddaway, *The Rebuilding of London After the Great Fire*, pp. 240-243.

Science in Early Modern London: Robert Hooke's College of Physicians', *Journal of the Society of Architectural Historians* 72 (2013), pp. 475-502.

Brief description: In 1671–1678, Hooke built the Royal College of Physicians. Its censors' room has been installed in the new building.

Primary sources:

– Hooke's entries in *Memoranda*:
  - 6 Apr. 1672 (p. 137): "Mr Jenkins letter to S[ir] G[eorge] Ent for £100 for Lem."[446]
  - 18 Apr. 1672 (p. 138): "Physitia*n*s colledg."
  - 18 May 1672 (p. 140): "Angell court Physitions Colledge."
  - 24 May 1672 (p. 140): "measurd at Physitions Colledge. Sir G[eorge] Ents."
  - 2 July 1672 (p. 142): "Mr Jenkins paid 20."
– Hooke's entries in *Diary i*:
  - 7 Aug. 1672 (p. 4): "Colledge Physitians."
  - 24 Aug. 1672 (p. 5): "Physitians colledge. Fitz."
  - 1 Sep. 1672 (p. 7): "Physicians colledg."
  - 30 Sep. 1672 (p. 8): "All the afternoon at Sir G. Ent with the Colledge of Physicians."
  - 3 Oct. 1672 (p. 9): "With Kayus Sibber[447] at Sir George Ents, first heard Sir J. Cutler would build the theater."
  - 2 Dec. 1672 (p. 15): "Gave Dr. Whistler estimate of physitians theater."
  - 23 Jan. 1673 (p. 23): "View at Chirurgeons theater. Crane ill used."[448]

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[446] Jenkins may have been the treasurer of the College as his name is often mentioned in connection with payments to contractors or to Hooke. For biographical details on Ent, see 'Ent, Sir George (1604–1689)', *ODNB*. Joseph Lem was a bricklayer; other craftsmen mentioned in the diaries as being involved in the College construction were John Fitch ('Fitz', bricklayer and general contractor); Samuels (bricklayer); Abraham Storey, William Hammond, and Mr. Smith (masons); Hayward, Avis, and Whiting (carpenters); Roger Davys or Davies (joiner); Talbot (plumber); Robert Bird (brazier or smith); Grove (plasterer); Edward Pearce or Pierce (carver or sculptor); and the Dutch painter Abraham Danielszoon Hondius. Gate, Hewk, Coffin, and Parsons remain unidentified; see Batten, p. 90, and Walker, 'Architecture, Anatomy and the New Science', pp. 500n56, 501n95. Batten includes 'Griffith' among the unidentified craftsmen but it is also likely that he was a physician; cf. 'Griffith, Richard (1635?–1691)', *ODNB*.

[447] 'Cibber, Caius Gabriel (1630–1700)', *ODNB*.

[448] This diary entry is included only to note that Hooke was also overseeing the repairs to the barber-surgeons' anatomy theatre.

- 18 Mar. 1673 (p. 34): "at Physitians Colledge with Dr. Collins."[449]
- 13 Apr. 1673 (p. 39): "Drew front of two lower storys of Theater."
- 14 Apr. 1673 (p. 39): "At home with Coffin, all day almost. Coffin began Theater."
- 15 Aug. 1673 (p. 55): "at Physitians colledge about the dreine, turret."
- 11 Oct. 1673 (p. 64): "view at physitians college with Alderman Ward."
- 5 Dec. 1673 (p. 73): "with Mr. Story measuring at the Physitians College the Stonework."
- 30 Mar. 1674 (p. 94): "Dined at Dr. Whistlers with Lady Homes. Told him of Sir J. Cutlers Letter. He told me of Designe of Reading my Lecture in the theater."
- 24 Apr. 1674 (p. 99): "At the Physitians colledge with Davys, Parsons, Hewk, Talbut, &c."
- 1 May 1674 (p. 100): "Drew Designe for the Theater."
- 4 May 1674 (p. 101): "At the Colledge of Physitians. With Harry and Dr. Whistler. Gave him a scetch of Theater."
- 13 May 1674 (p. 102): "At Sir G. Ents with Physitians."
- 15 May 1674 (p. 103): "To Dr. Whistlers. To Sir G. Ents. To Sir Ch: Wrens and Sir J. Cutlers. Dind there. With Sir Christopher to Colledge by water."
- 26 May 1674 (p. 105): "To Physitians Colledge. They resolved Theater backwards."
- 30 May 1674 (p. 105): "At the Colledge of Physitians."
- 16 June 1674 (p. 108): "At Sir J. Cutlers. Spoke to him. He resolved Theater before."
- 19 June 1674 (p. 108): "To Sir J. Cutlers, Cornhill . . . Sir J. Cutler desired a painter. Measured at the colledge Sir G. Ents house. At Sir G. Ents. He would not Resolve till Dr. Whistler returnd."
- 29 June 1674 (p. 109): "At Colledge and Griffithes. Cast up Sir G. Ents with Mr. Shortgrave at Jose . . . At Hondius's. With Hondius to the colledge."
- 6 July 1674 (p. 111): "Dr. Collins here about Colledge . . . With Harry at Hondius's."
- 20 July 1674 (p. 113): "Set out Theater at Colledge. Agreed with Lem for £5 5 sh. p. Rod . . . Tom Hewk staind marble."
- 24 July 1674 (p. 114): "At Coxes. Sir Ch. Wren. Sir G. Ent. Theaters place confirmd from Dr. Cox. Home with Dr. Whistler."
- 30 July 1674 (p. 115): "At Physicians Colledge and Tom Hewks. He shewd me staining glasse. Not good."

[449] Two fellows shared the same name at the time; see 'Collins, Samuel (1617–1685)' and 'Collins, Samuel (*bap*. 1618, *d*. 1710)', *ODNB*.

- 31 July 1674 (p. 115): "With Lem at the Colledge. Orderd digger money."
- 7 Aug. 1674 (p. 116): "At Sir G. Ent . . . Propounded open theater. Agreed to. Sir Ch. Scarborough pleasd."
- 24 Aug. 1674 (p. 118): "To Sir Chr. Wren. With Mr. Fitch. Discoursd about the Theater of Physicians."
- 5 Sep. 1674 (p. 120): "Past Smiths bill at the colledge."
- 14 Sep. 1674 (p. 121): "At Sir G. Ents. At the Colledge about the painter. Sir G. Ent gave me order to agree with Hondius as cheap as I could for picture. Spoke with Hondius."
- 19 Sep. 1674 (p. 122): "At Colledge. Lem doing things contrary to order. Orderd glasing stopping, Whiting, hanging doors, putting on locks, &c."
- 5 Oct. 1674 (p. 125): "At Physicians College, Meeting about Theater, Hondius, Griffith, Gate, Hewk, &c."
- 20 Nov. 1674 (p. 131): "At Colledg Sir G. Ent Received from Jenkins by his Appointment £20."
- 4 Dec. 1674 (p. 133): "To Colledge past glasiers bill."
- 21 Dec. 1674 (p. 137): "Gave draught to Hammond of Colledge Gate."
- 23 Dec. 1674 (pp. 137-138): "Mrs. Hondius Demands money for Pictures. £20 account for Chimny Dining [room] and £50 for the other chimny-unreasonable."
- 12 Jan. 1675 (p. 141): "Agreeing with Story and Hammond for £210 for Colledge gate . . . At Dr. Glissons, Shewd Dr. Paget, Micklethwait, Whistler, Sir G. Ent, designe and they approved (and bid me continue)."
- 5 Feb. 1675 (p. 145): "By water with Pierce. Spoke about Statue of Cutler."[450]
- 12 Feb. 1675 (p. 147): "With Oliver at Physicians Colledge with Hayward, Fitch, and Samuells, bricklayer. At the Colledge Sir G. Ent, Dr. Glisson, Whistler, Cox, Collins. Orderd carrying up the whole front story and Hammond out."
- 19 Feb. 1675 (p. 148): "Gave Hammond the draft of Colledge gate to coppy . . . To Physitians Colledge. I had order from Sir G. Ent, Sir Ch. Scarborough, Dr. Whistler, and Allein, to bespeak Dr. Hameys head of Peirce, as also about the Kings statue, and Sir J. Cutler spoke about Painter. Past J. Lems bill about labourers which Mr. Jenkins affirmed to be just and true to his knowledge."
- 29 Mar. 1675 (p. 155): "Gave Hammonds man ground plat and upright of Theater."

[450] Pearce carved statues of Charles II, Cutler, and a head or bust of Baldwin Hamey; on the latter, see the 19 Feb. 1675 diary entry, and 'Baldwin Hamey, Baldwin, the younger (1600–1676)', *ODNB*.

- 3 Apr. 1675 (p. 157): "At Mr. Dubois's gave him an account of Mrs. Smith's Bills. He promised to speak to Sir Th. Player about £100. back to Tompions and Physicians Colledge. Met Hammond. Disliked carvings."
- 9 Apr. 1675 (p. 158): "With Blackburn at the Colledge of Physicians.
- 22 Sep. 1675 (p. 182): "Order for a View at Physitians colledge."
- 24 Sep. 1675 (p. 182): "With Sir Christopher to Physicians Colledge view 1sh."
- 13 Oct. 1675 (p. 187): "Received from the Colledge by Mr. Jenkins in a bag sealed up £20 as he affirmes. Gave Scarborough direction of one floor."
- 6 Jan. 1676 (p. 209): "Drew designe of Theater."
- 15 Jan. 1676 (p. 211): "Met Hammond drunk. he denyd to meddle with theater."
- 16 Jan. 1676 (p. 211): "At home all the morn wrote about Sound."
- 17 Jan. 1676 (p. 212): "Hammond faild . . . Agreed with Haywards for circular Roof and turret. With 16 Bracketting for £130 for oak Cornish 3f. 8sh. per foot."
- 21 Jan. 1676 (p. 213): "At Wings & Hayes at the Colledge of Physitians. Order for cleering yard, making ovens, &c."
- 11 Mar. 1676 (p. 219): "At Physicians colledge too thin ashlers."
- 14 Apr. 1676 (p. 226): "agreed with John Hayward for £140 for Roof of the Theater and sent him to Sir J. Cutler."
- 15 Apr. 1676 (p. 226): "whey to brighten iron. this is an excellent covering for Lanthorn and I Designe to cover that at the Colledg of Physitians in the same Manner."[451]
- 5 May 1676 (p. 230): "To Colledg of Physitians. Deliverd Lems and Glasiers bill to Dr. Cox."
- 22 Sep. 1676 (pp. 250-251): "Dined with Sir G. Ent . . . Left me to shape Lanthorne. At Theatre, Directed seates."
- 7 Oct. 1676 (p. 253): "Bespoke at Birds a ball for the theatre 3ft. diameter."
- 6 Nov. 1676 (p. 255): "At Physitians colledg auditing Groves and Talbots bills."
- 28 Nov. 1676 (p. 259): "1 Guiny to Clark to Colledge of Physitians. Line about paving with clinkers to have 3s. 6d. per yard. His bricks costing 18sh. per 1000. Sand 3d. per yard, paving 6d."
- 13 Jan. 1677 (p. 268): "Bird told me Sir J. Cutler had paid him for Ball."
- 27 Feb. 1677 (p. 276): "At Childs saw colledg ball up."

[451] Cf. 'Espinasse, p. 89.

- 13 Apr. 1677 (p. 285): "To Physitians Colledge with Oliver there, President, Collins, Whistler, Cash, Franklin, then Cox and Sir J. Ent. Colledge order made for finishing the building on each side the Theater."
- 9 June 1677 (p. 294): "Grove signed contract for plaistering the theater."
- 11 June 1677 (p. 295): "set out chimney at Physitians colledge."
- 8 Aug. 1677 (p. 305): "To Physitians Colledge. Directed Talbot about pipes and gutters."
- 22 Feb. 1678 (p. 346): "To Physicians colledge with Davys met Sir J. Cutler who promisd £800 when theater accounts done."
- 4 Dec. 1678 (p. 387): "met Slayer at Smithfield, cost with him about Physitians Colledge."
- 9 Dec. 1678 (p. 388): "directed Hayward about Theater Spire windows."
- 19 Dec. 1678 (p. 389): "to Physicians Colledge, past Davys bill for colledge."
- 8 Mar. 1679 (p. 402): "Heard Dr. Charltons Lecture at Physicians Colledge."[452]
- 13 June 1679 (p. 415): "At Physitians Colledge about Bills."
- 20 June 1679 (p. 415): "Missed Bill at Physicians Colledge, past bills."
- 25 June 1679 (p. 415): "all matters ended at Colledge of Physitians about Masons, Plumber, Smith, Paynter."

– Royal College of Physicians Archives:

- ENV269/J22: 'An account of the number of windows in the College of Physitians', n.d.
- ENV273/1 [X22]: 'Description of ground purchased in Warwick Lane, 1670'; a survey of the lot with dimensions. Although it is dated 1670, the date of the purchase of the lot, the handwriting might be from a later period, making it possible this is a copy of an older original.
- ENV273/2 [V22]: 'Plan of the College garden', n.d; survey with dimensions.
- ENV273/3 [W22]: 'Plan of the College garden', n.d.; survey with dimensions.
- ENVSR10A/WARWICK/BOX4/G1: 'Counterpart of Lease by the President & Fellows of the College to Dr. Daniel Whistler of the messuage or dwelling house lately erected and new built by Mr. Robert Hooke situate & being on the North side of the yard with liberty to make use of the College house, rooms and gardens for a term of 50 years at the annual rent of £54', 12 Sep. 1676.
- ENVSR10A/WARWICK/BOX4/K1: 'Indenture of Lease by Robert Hooke to the President and Fellows of the aforesaid messuage or dwelling house erected by him on the toft or parcel of ground

[452] Charleton had given his first anatomical lecture in the new theatre on 21 Jan. 1679; George Clark, *A History of the Royal College of Physicians of London* (New York: Oxford University Press, 1964–1966), p. 331.

aforesaid for the term of three score years, eleven calendar months and one and twenty days at the annual rent of £54', 1 Oct. 1673.

- ENVSR10A/WARWICK/BOX4/L1: 'Counterpart of Lease by Sir Geo. Ent. President, Baldwin Hamey, Francis Glisson & others to Robert Hooke, of a toft piece or parcel of ground situate lying and being on the North side of the [court] yard of the College for a term of 61 years for the yearly rent of one pepper corn', 1 Apr. 1673.
- ENVSR10A/WARWICK/BOX4/M1: 'Indenture whereby the aforesaid Robert Hooke doth covenant to erect, build and fully finish upon the toft or parcel of ground aforesaid one substantial, strong and sufficient messuage or dwelling house of such height as those buildings on the South side of the College Court Yard', 15 Apr. 1673.
- MS 735, p. 158: An engraving of the courtyard facade of the college, presented on 3 April 1913.
- MS 1097/1-11, 25-27: Contractors' bills for maintenance work, proposals and orders for minor alterations; dated between 1680 and 1817.
- MS 1097/29: William Pilkington, 'Observations on the state & condition of the College of Physicians in Warwick Lane, according to a survey made the 28th January 1820', signed 17 Feb. 1820.
- MS 1097/30: Letter dated 30 Apr. 1821 from Charles Day to Henry Halford, regarding his survey of the College, valuing the latter at £10,620.
- MS 1097/51 & 56: William Miller, 'Report respecting the roof of the theatre, Warwick Lane', 29 Oct. 1815. The attached plan is no. 56.
- MS 1097/53: 'The College case as to the subscriptions due from the fellowes, honoraryes, candidates & licentiates of the same, with Mr. Holt's opinion', May 1682.
- MS 2077: 'Copy of the Treasurer's Book During the Time that Dr. Hamey, Dr. Micklethwait, Dr. Coxe & Dr. Whistler were Treasurers, 1664–1684'.[453]
- MS 2245: 'An album containing images and maps, plans, engravings, photographs and drawings to illustrate Dr. Farre's History of the College', 1883.
- MS 2338/40: Newspaper clipping; 'The Profit and Loss of the Over 60's Adds up to a Lot of Brass. Tales from the Brass-Foundry Story: the Men, the Firms and their Ideas' in *The N. B. A.*

[453] Reference information regarding this manuscript, which I have not consulted, is from Walker, 'Architecture, Anatomy and the New Science', p. 499n48. Gunther gives several extracts from this manuscript as well as the *Annals of the Royal College of Physicians* (MS 4145) in Robert T. Gunther, *Early Science in Oxford, Vol. VII: The Life and Work of Robert Hooke (Part II)* (Oxford: [Printed for the editor], 1930), pp. vii-viii.

Diamond Jubilee Supplement, The Hardware Trade Journal, 4 October 1957. Includes an engraving of the entrance the Warwick Lane entrance to the former building of the Royal College of Physicians, by then used by the company 'Tylors'.

- MS 4145: *Annals of the Royal College of Physicians*, vol. 4 (1647–1682).[454]

– British Library, Add. MS 5238, no. 57: an undated partial elevation in Hooke's hand, most likely a preliminary design from *c.* 1671, of the main building of the Royal College of Physicians (**Figure IV-45 or Figure III-77**).[455] It correlates to the elevation/section of the same design, now Warwickshire C.R.O., CR2017/B1/4 (**Figure IV-46 or Figure III-337**), listed below.

– Warwickshire C.R.O.:

- CR2017/B1/4: an undated partial elevation/section in Hooke's hand, most likely a preliminary design from *c.* 1671 of the main building of the College. On its verso is the note 'Colledg [sic] front' (**Figure IV-46 or Figure III-337**). It correlates to the front elevation of the same design, now British Library, Add. MS 5238, no. 57 (**Figure IV-45 or Figure III-77**), listed above.
- CR2017/B1/5: an undated section through the anatomy theatre of the College, most likely dating to January 1676 when Hooke noted designing the theatre and subsequently agreeing with the carpenter for the bracing and cornice work (**Figure IV-47 or Figure III-338**). The accompanying plan (Figure IV-48 or Figure III-351) details the timberwork more clearly.
- CR2017/B3: an undated plan of the anatomy theatre of the College, likely dating to 1676 (**Figure IV-48 or Figure III-351**), accompanying the section (**Figure IV-45 or Figure III-77**) noted above.

– Note that there are multiple illustrations of this building used in books on London and by the Royal College of Physicians itself as frontispieces in its publications. A selection of these images is reproduced and cited among **Figures IV-51 to IV-93**; since illustrations were copied numerous times with slight variations, not every iteration is included for purposes of brevity.

Description:

The College of Physicians was founded during the reign of Henry VIII as an institution to regulate medical practice, first in London, and with an Act of Parliament in 1523, the whole of England. From

[454] Reference information regarding this manuscript, which I have not consulted at the Royal College of Physicians, is from Walker, 'Architecture, Anatomy and the New Science', p. 498n14. Note that this manuscript is available on microfilm at McGill University Library as Osler Library, Micro fiche 195 pts. 1 – 3.

[455] Regarding the citing of two different figure numbers, see footnote 375.

its inception, it sought to establish itself as an academic body rather than a trade guild like the London livery companies, a model used by the apothecaries and barber-surgeons. Full fellowships at the College required a degree from Oxford or Cambridge, the only two universities in England at the time, and was granted after rigorous examination. Medicine providing one of the few career trajectories available for gentlemen at the time, the others being the church and the legal profession, the Royal College of Physicians became home to many natural philosophers and even mathematicians.[456] Among its fellows were William Gilbert (1544?–1603), the author of *de Magnete* (London, 1600), an early and influential work of experimental philosophy, William Harvey (1578–1657), the discoverer of the circulation of the blood, Charles Scarburgh (1615–1694), an anatomical lecturer as well as a translator of Euclid's *Elements*, Henry Pierrepont (1607–1680), the marquess of Dorchester and mathematician, as well as founding members of the Royal Society such as Francis Glisson (1599?–1677), George Ent (1604–1689), Christopher Merret (1614–1695), and Daniel Whistler (1618/19–1684), the latter had also served as a Gresham professor of geometry.[457]

The building of the Royal College of Physicians was one of the many completely destroyed in the Great Fire in 1666.[458] After the initial shock, the fellows soon organised to raise funds for a new building, but before endeavouring to undertake such an investment, they sought a more permanent

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[456] Sources on the establishment and early activities of the Royal College of Physicians include Cook, *The Decline of the Old Medical Regime in Stuart London*; Margaret Pelling and Frances White, *Medical Conflicts in Early Modern London: Patronage, Physicians, and Irregular Practitioners, 1550–1640* (New York: Oxford University Press, 2003); Charles Webster, 'The College of Physicians: "Solomon's House" in Commonwealth England', *Bulletin of the History of Medicine* 41 (1967), pp. 393-412. On the professionalization of medical practice, see also Margaret Pelling, 'Trade or Profession? Medical Practice in Early Modern England', in *The Common Lot: Sickness, Medical Occupations and the Urban Poor in Early Modern England* (New York: Longman, 1998), pp. 230-258.

[457] For biographical details, see 'Harvey, William (1578–1657)', 'Scarburgh, Sir Charles (1615–1694)', 'Pierrepont, Henry, marquess of Dorchester (1607–1680)', 'Glisson, Francis (1599?–1677)', 'Ent, Sir George (1604–1689)', 'Merret , Christopher (1614–1695)', and 'Whistler, Daniel (1618/19–1684)', *ODNB*. See also Robert G. Frank, *Harvey and the Oxford Physiologists: A Study of Scientific Ideas* (Los Angeles: University of California Press, 1980).

[458] Most of the College library was also destroyed in the fire but the collection would be greatly replenished in 1680 with donation of almost 3,200 volumes from the collection of Henry Pierrepont, Marquis of Dorchester (1606–1680); see C. E. Newman, 'The First Library of the Royal College of Physicians: The FitzPatrick Lecture', *Journal of the Royal College of Physicians of London* 3 (1969), pp. 299-307, and L. M. Payne and C. E. Newman, 'The History of the College Library: The Dorchester Library', *Journal of the Royal College of Physicians of London* 4 (1970), pp. 234-246.

site than the lot they had been leasing from the dean and chapter of St. Paul's.[459] Having secured a suitable site, purchased for £1,200 in April 1669, a rebuilding committee was appointed. It included figures from the Royal Society, notably Scarburgh who sought advice from Wren, but ultimately, in December 1670, Hooke was officially commissioned to build it and a payment of 20 guineas for his "care and pains" was approved.[460]

By the time Hooke's diaries begin in March 1672, construction had already advanced; the foundations were dug up as early as January 1671, and later that year work was started on the main college building as well as the houses for the chemist and beadle located in the south wing. Two drawings in Hooke's hand, thought to be preliminary designs of the main building, likely date to this pre-1672 period. The elevation, now British Library Add. MS 5238, no. 57 **(Figure IV-45)** shows a two-story building, approximately 70' wide, with Ionic columns on the lower floor. When the partial section/elevation, now Warwickshire C.R.O., CR2017/B1/4 **(Figure IV-46)**, is taken into consideration, it is possible to discern a projecting porch over the entrance and perhaps corner pavilions.[461] Hooke must have soon realised, however, that the site was not wide enough to accommodate all of these, and indeed, according to a survey drawing from 1826 **(Figure IV-50)**, the width of the final facade of the main building was little over 60'. Though difficult to see, pencil sketches on the elevation **(Figure IV-45)** illustrate changes that were later adopted in the final design, such as columns and swags on the upper floor and a pointed pediment replacing the segmental one with the reclining figures on either side.

Although money was raised through subscriptions from the fellows, with those who failed to contribute threatened with exclusion from the College's publication *Pharmacopoeia*, there were difficulties financing such an undertaking and investors were sought to pay for the auxiliary buildings.[462] Hooke himself took on the role of financier, building the houses on the north side, for

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[459] For a survey of the lot, see Royal College of Physicians Archives, ENV273/1 [X22]. On the rebuilding of the College, see Clark, *A History of the Royal College*, vol. 1, pp. 328-345, and for a detailed account of Hooke's involvement, Walker, 'Architecture, Anatomy and the New Science'.

[460] Walker, 'Architecture, Anatomy and the New Science', p. 483. Further regular payments of £20 continued to be made up through 13 Oct. 1675; see Gunther, *Early Science in Oxford, Vol. VII: The Life and Work of Robert Hooke (Part II)*, p. viii.

[461] Walker, 'Architecture, Anatomy and the New Science', p. 483.

[462] Clark, *A History of the Royal College*, vol. 1, p. 331.

which the college paid him £54 per year in rent.[463] John Cutler (1607/8–1693), "the admired philanthropist and reputed miser," who had sponsored (though was not actually inclined to pay for) Hooke's lectures at Gresham College, stepped in with an offer to pay for the anatomy theatre.[464] On 15 May 1674, as the funds became available its construction, a meeting was convened to decide on the best location to site it. Hooke and Wren suggested the garden in the rear of the lot, in line the continental tradition of placing anatomy theatres near botanical gardens, but Cutler demanded that it be on the street, presumably for purposes of better visibility.[465]

Hooke obliged, placing the theatre at the centre of the street front of the site, leaving the ground floor as a loggia to serve as a gateway into the college courtyard. He prepared designs for the 'college gate' in late 1674 and construction started in early 1675. Two of Hooke's drawings for the theatre, a section **(Figure IV-47)** and plan **(Figure IV-48)** survive at Warwickshire C. R. O. and likely date to January 1676, when on the 6th Hooke recorded drawing the "designe of Theatre" and on 17th agreeing with Hayward, the carpenter, "for circular roof and turret" with 16 brackets and an oak cornice. Hogarth's view of the interior of the theatre **(Figure IV-90)** does show a cornice but the drawing is more illustrative than accurate; however, an idea can be had from the sections printed in the nineteenth century **(Figures IV-52 and IV-53)**. The 3-foot diameter brass ball, polished according to a recipe Hooke had heard about on 15 April 1676, was installed on 27 February 1677, but work continued until the end of 1678 when the spire windows were installed **(Figures IV-66 to IV-73)**. Hooke appears to have missed the first anatomical lecture in the new theatre by Walter Charleton (1620–1707) on 21 January 1679, but noted attending the one on 8 March.

Like Hooke's Bethlem Hospital, the College and its anatomy theatre became tourist attractions, where visitors were advised to pay 6d to their guide.[466] Illustrations of the building

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463 For the relevant leases, see above under primary sources, Royal College of Physicians Archives, ENVSR10A/WARWICK/BOX4/G1, K1, L1, and M1. Ent was also an investor, paying for the largest one of the residential houses.

464 Regarding Hooke's Cutlerian lecturership, see also Chapter I, and the annotations for Figures III-273 and III-291 in Chapter III.

465 Clark, *A History of the Royal College*, vol. 1, p. 330; Walker, 'Architecture, Anatomy and the New Science', p. 489. If Cutler was seeking visibility, he must have been unaware that this would be severely limited due to the narrowness of the lane (Figures IV-61 to IV-65).

466 Clark, *A History of the Royal College*, vol. 1, p. 333. "Allez voir le College des Phisiciens où il y a un fort bel amphiteatre pour L'anatomie & une perspective d'ou lo'n peut aisement voir toute la Ville de Londres; Donnez au sortir de ce lieu lá chacun Six sous au moins à celuy qui vouz aura fait voir la Maison;" F[rançois] Colsoni, *Le Guide de Londres pour les estrangers* ([London]: n.p., 1693), p. 7.

proliferated, with the anatomy theatre finding a place in the frontispiece of various publications.[467] In 1823, James Elmes, who attributed the building to Wren, praised the anatomy theatre as being

> a perfect study of acoustical and optical architecture: the roof and form of the section being so well adapted for the distribution of sound, and the elevation and arrangement of the seats, with the president's chair in the centre, and the separate stairs for the fellows and members, so well designed. This admirable structure being shortly to be pulled down, it is worth the inspection of the scientific architect, before it is destroyed.
>
> The effect of the lantern on the inside is every thing that can be desired; affording light and ventilation, and excluding rain in a very efficient manner. Its external appearance however is by no means graceful.[468]

But by then the Royal College of Physicians had outgrown Hooke's building and in 1825, moved to a building designed by Robert Smirke at Trafalgar Square. The buildings in Warwick Lane were used commercially until 1866 when the theatre was demolished and 1879 when the rest of the building succumbed to fire (**Figure IV-80**). Parts of the original censors' room (**Figure IV-91**), presumably with wood panelling by Davys, were installed in the building by Smirke (**Figure IV-92**) before being moved to the current building of the college in Regent's Park (**Figure IV-93**).[469]

ii. 11. BRIDEWELL HOSPITAL, LONDON

Attribution: Colvin (1995) and subsequent editions; 'Espinasse, pp. 92, 175.

Brief description: In 1672–1678, Hooke helped with the post-fire reconstruction of Bridewell Hospital.

[467] Given the multiple copies of the some of the same illustrations printed in different publications, only those sufficiently different were included among the attached figures.

[468] James Elmes, *Memoirs of the Life and Works of Sir Christopher Wren* (London: Priestley and Weale, 1823), pp. 451-52. See also Walker, 'Architecture, Anatomy and the New Science', p. 496. Interestingly, during this period when he was designing the roof of the anatomy theatre, Hooke was working on his theories of sound and light.

[469] Ro Spankie, 'Drawing Out the Censors' Room', *Idea Journal* (2012), pp. 72-87.

Chapter IV – Building

Primary sources:

– Hooke's entries in *Diary i*:[470]

- 28 Nov. 1672 (p. 14): "Received from Sir W. Turner for Bridewell £5."[471]
- 18 Mar. 1673 (p. 34): "With Fitch at Bridewell."[472]
- 22 Oct. 1673 (p. 66): "at Bridewell — directed severall alterations. measurd and certifyd tempests losse 10sh. certifyd for Fitch his tarras work."[473]
- 3 Feb. 1674 (p. 85): "At Bridewell view."
- 25 June 1674 (p. 109): "Showd Sir W. Turner Designe of Bridewell."[474]
- 2 Oct. 1674 (p. 124): "Order at Bridewell about building Bridewell."[475]
- 13 Nov. 1674 (p. 130): "Ricrofts at Bridewell."
- 29 Apr. 1675 (p. 159): "I spoke to Sir W. Turner about Bridewell and about £100."
- 7 May 1675 (p. 160): "At Bridewell Committee at the treasurers."
- 2 July 1675 (p. 167): "At Sir W. Turners. At Bridewell. £50 voted me for Green yards."[476]
- 12 July 1675 (p. 169): "Receivd from the Treasurer £50 for Bridewell."
- 27 Aug. 1675 (p. 177): "At Bridewell for Scarborough."[477]

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[470] The joint court of governors administrating Bridewell and Bethlem Hospitals met at Bridewell, making it difficult to interpret some of Hooke's diary entries. In some cases, these can be checked against the court minutes; where this was possible and the entry mentioned Bridewell but was found to be referring to Bethlem Hospital instead, the entries are marked with an asterisk (*) with further explanations provided in the footnotes.

[471] William Turner was the president of Bridewell between 1669 and 1687; see Edward Geoffrey O'Donoghue, *Bridewell Hospital: Palace, Prison, Schools from the Death of Elizabeth to Modern Times* (London: John Lane the Bodley Head Limited, 1929), p. 272. For the approval of the £5 payment, see the extract from the 22 Nov. 1672 minutes of the Court of Governors below.

[472] John Fitch, the bricklayer Hooke often collaborated with, would later be fired for neglecting his duties at Bridewell; see footnote 484.

[473] Tarras, a type of mortar that hardened in water, was utilised in wet applications. In this case, it may have been for work close to the Fleet river or in areas with drainage problems. See footnote 411, and ii. 7 in this chapter for Hooke's work on the Fleet Canal.

[474] At this meeting, discussions regarding building work were centered around the building of 'houses of easement', i.e. lavatories, in the new cellar of the 'Greene Yard' that was at the time being dug up; see Bcb-13, pp. 21-22; https://goo.gl/rVEHe4.

[475] While it remains unclear whether it is related to Hooke's diary entry, at this meeting, an order was issued to implement the divisions and ordering of the rooms on the south side of the green yard according to a (now presumably lost) 29 July report; https://goo.gl/qBmqek.

[476] See below for the relevant extract from the 2 July 1675 meeting.

[477] Scarborough was a surveyor Hooke (and Wren) frequently worked with.

- *1 Nov. 1675 (p. 191): "From Bridewell. Cartwright against expansions."[478]
- *12 Jan. 1676 (p. 210): "to Sir W. Turner who denyd me till workmen were paid . . . To Bridewell."[479]
- *10 Mar. 1676 (p. 219): "At Bridewell about Turret."[480]
- 27 Apr. 1676 (p. 228): "To Bridewell by water with Fitch. Directed dreine through cellers."
- *24 Jan. 1677 (pp. 269-70): "Court at Bridewell . . . The court orderd me £200. My freinds were Chase, Fitch, Crisp, Whistler, Russell, Pilkington, Hill, Knowles."[481]
- 23 Mar. 1677 (p. 280): "With Mr. Hill to Bridewell. Spake to treasurer for money. Putt off."
- *1 June 1677 (p. 293): "To Mr. Ducanes, Bridewells treasurer, and gave him receipt for £50 which I Receivd 20sh. of it in grates, 1 Guinney, the rest in money, gave his man 2s. 6d., being part of £200 orderd by Hospitall."[482]
- 24 Oct. 1677 (p. 323): "To Bridewell, Directed vaulting warehouse. Treasurer, Hublon, Hill, Crisp, &c."[483]
- 5 Dec. 1677 (p. 332): "View of Dorset drain for Governors of Bridewell and reported the want of it a nuisance. For view 6s. 8d."
- 9 Jan. 1678 (p. 339): "With Chase and Knowles at Bridewell about chappell. Drew Designe for chappell."[484]

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[478] At the 22 Oct. 1675 court meeting, Thomas Cartwright, the mason, was asked to prepare an estimate for Bethlem Hospital without the pavement and ornamental work for the rear of the building; Bcb-13, p. 186; https://goo.gl/pP1SkR.

[479] The court minutes indicate that Hooke's payment "about the New building," presumably Bethlem Hospital, would be taken into consideration when the building was completed; Bcb-13, p. 210; https://goo.gl/m7zYSP.

[480] This entry is referring to the turret or cupola of the central block of Bethlem Hospital; see Bcb-13, p. 230, https://goo.gl/qqgSjV.

[481] This entry and the £200 payment are in regard to Bethlem Hospital; the following entries may also be referring to Bethlem; Bcb-13, p. 326; https://goo.gl/FmK8To.

[482] Benjamin Ducane served as the hospital's treasurer between 1673 and 1683; see O'Donoghue, *Bridewell Hospital*, vol. II, p. 275. Considering the mention of the £200 fee Hooke was promised for Bethlem Hospital, this entry is likely related to that project rather than Bridewell.

[483] At the 17 Oct. 1677 meeting, the new building for the 'hempdressers' was discussed; presumably this is the warehouse Hooke would be directing the vaulting for a week later; see Bcb-13, p. 427; https://goo.gl/T7pXcL.

[484] Fitch was fired for neglecting and not valuing his work at Bridewell, as well as for badmouthing the treasurer even though care had been taken "from time to tyme to pay him for what worke hee hath done for this hospitall and for the hospitall of Bethlem;' Bcb-14, p. 35; https://goo.gl/3MDWxV.

- 9 Jan. 1679 (p. 392): "at Bridewell with Monox about Chace chappell. Spake with Witcherly."[485]

– Bethlem Museum of the Mind, Series BCB – Minutes of the Court of Governors of Bridewell and Bethlem Hospitals:[486]
  - 22 Nov. 1672 (Bcb-12, p. 460; https://goo.gl/5qGRxy): "Alsoe It is ordered by this Courte that five pounds be given and paid Mr. Hooke for & towards his paines of Surveyeing & makeing plotts for this [Bridewell] Hospitall & the New building and be charged uppon the Accompt for New building."
  - 2 July 1675 (Bcb-13, p. 144; https://goo.gl/LRri6q): "Alsoe this Courte takeing into consider*at*ion that Mr Robert Hooke hath spent many dayes and taken much paynes in Surveying and giveing his Advice about the Building of the Greene yard in the Hospitall of Bridewell It is ordered by this Courte that Mr. Tre*asure*r doe forthw*i*th give and pay unto him fifty pounds for the same to be allowed Mr. Tre*asure*r uppon his Accompt."

– Extract from Wilkinson, *Londina illustrata* (London, 1825):[487] "This chapel being destroyed by the fire, in 1666, it was re-edified, and finished in 1668,[488] in the manner hereafter described. It had a square roof, and two galleries, at the north and west sides, supported by columns of the Tuscan order; at the west side were places for the hospital boys, and others for the prisoners.[489] The walls brick; the wainscot and finishing very neat. The altar-piece consisted of two pilasters, with their

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485 At the 10 Jan. 1679 meeting, there was a discussion regarding the placement of the communion table in the chapel, with John Chase, Esq., identified as one of the governors of the hospital, delivering a "draft of the manner how hee conceived it;" https://goo.gl/KABup5.

486 I am grateful to Colin S. Gale, archivist of Bethlem Royal Hospital, for drawing my attention to the digitised 'Minutes of the Court of Governors of Bridewell and Bethlem Hospitals' available online at http://archives.museumofthemind.org.uk/BCB.htm. For a list of archival records extant from the period, see Colin Gale, 'Provenance: BRI - Bridewell and Bethlem Hospitals', *Bethlem Museum of the Mind*, 2014, http://archives.museumofthemind.org.uk/BRI.htm.

Extracts are provided here of only the entries specifically mentioning Hooke. Other possibly-related minutes were referenced in footnotes 474, 475, 483, and 485 above.

487 Robert Wilkinson, *Londina Illustrata. Graphic and Historical Memorials of Monasteries, Churches, Chapels, Schools, Charitable Foundations, Palaces, Halls, Courts, Processions, Places of Early Amusement, and Modern Present Theatres, in the Cities and Suburbs of London and Westminster* (London: Robert Wilkinson, 1825); available via Tufts Digital Library, https://goo.gl/62NPpi. This extract is partly quoted in William G. Hinkle, *A History of Bridewell Prison, 1553–1700* (Queenston, ON: The Edwin Mellen Press, 2006), p. 57.

488 According to Hooke's diary entry, his first design for the chapel dates to 9 Jan. 1678, however it may have been for interior alterations rather than a full reconstruction.

489 Hinkle notes that 'the hospital boys' refer to apprentices, and 'others' to the north side; see Hinkle, *A History of Bridewell Prison, 1553–1700*, p. 57.

> entablature and circular pediment of the Corinthian order; between which were the Commandments done in gold on black, and the Lord's Prayer and Creed in gold on blue, in gilt frames; and further enriched with gilt cherubim, leaves, fruit, &c. carved in relievo. The chancel was paved with black and white marble at the first building, but now the whole floor of the chapel was paved in the same manner. The last part, with a handsome pair of iron gates, were the gift of Sir William Withers . . .
>
> The Court Room has a chair for the president, and convenient seats for the governors. It is adorned with columns of the Composite order, a gallery, &c. but the most valuable embellishments are the several handsome tables, on which the names of the benefactors are depencilled in gold letters.
>
> Over the door, at the entrance, is this inscription: 'This Chapel, Court Room, and Parlour, were repaired and beautified in the year 1706. Sir Thomas Rawlinson, lord mayor, then president; Thomas Gardiner, Esq. treasurer'.
>
> And over the gates going into the chapel: 'These Iron Gates, and the Marble Pavement, were the gift of the Right Worshipful Sir William Withers, Knt. and alderman, president of this hospital Anno Dom. 1713'."

Description:

Bridewell Hospital "for the correction of 'the idle and vagabonds'," was one of the three royal charities established in 1552 by Edward VI, the other two being St. Thomas's Hospital for the care of the sick, and Christ's Hospital "for the maintenance and education of poor orphans."[490]

The building had been originally constructed between 1515 and 1523 as a palace for Henry VIII, who only used it as his residence for six years, before being assigned as a workhouse.[491] Although it was luckier than some of the neighbouring structures that were entirely destroyed, parts of Bridewell suffered considerable damage during the Great Fire. Of the original three quadrangles, in the southern one "hardly one stone was left upon another" while some parts of the two northern quadrangles

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[490] G. A. T. Allan and J. E. Morpurgo (revised by), *Christ's Hospital* (London: Town County Books, 1984), p. 11; John Illffe Wilson, *Brief History of Christ's Hospital, from the Foundation by King Edward the Sixth, to the Present Time, with a List of the Governors* (London: Nichols and Son, 1820), p. 1.

[491] Hinkle, *A History of Bridewell Prison, 1553–1700*, pp. 49-51. For a detailed description of the original sixteenth-century building, see Derek Gadd and Tony Dyson, 'Bridewell Palace Excavations at 9-11 Bridewell Place and 1-3 Tudor Street, City of London, 1978', *Post-Medieval Archaeology* 15 (1981), pp. 1-79.

remained fairly intact, as did the chapel court although the chapel itself was gutted and its roof destroyed.[492] By August 1670, however, there was already a "new-built house" for the prisoners.

Secondary literature from 'Espinasse or Colvin does not contain much detail about Hooke's work at Bridewell but this is very much in line with the paucity of primary source material supporting it. The first entry regarding work on Bridewell Hospital in Hooke's extant diaries is in 1672 when he was hired by William Turner and paid £5. Turner was the president of Bridewell and Bethlem Hospitals, and would commission Hooke the following year to build almshouses in Kirkleatham, and in 1674, the new Bethlem hospital.[493] The minutes of the joint court of governors for Bridewell and Bethlem Hospitals corroborate the £5 payment for 'surveying and making plots'.[494] At the time Hooke was already undertaking surveying work for the Thames embankment and Fleet ditch, so his work for Bridewell may have simply been an extension of his duties as the City Surveyor (**Figure IV-94** shows the proximity of Bridewell to both the embankment and Fleet Canal). The diaries suggest he was tasked with more involved work, in 1674 showing Turner a 'Designe of Bridewell', in 1675 being paid £50 for his work on the 'green yards', and later in 1678 drawing a 'Designe for chappell', but the court minutes are not too helpful in interpreting these entries. Hooke's name appears sporadically and only to approve payments, and the projects around these periods, if mentioned at all, involve the not-so-glamorous work of installing 'houses of easement', or toilets, building of warehouses, or minor tasks such as changing the placement of the communion table in the chapel.[495] None of these necessarily mean Hooke only started working on Bridewell in 1672, when his extant diaries begin, or that he was only tasked with relatively minor projects. The court minutes often contain references to recommendations by specific committees, as well as to drawings, invoices, and reports, which have not survived from this period.[496] Hooke may have been presenting his work privately to Turner or directly to these building committees without leaving many traces. Nonetheless a thorough study of the court minutes prior to the start of his diaries may yield further clues about Hooke's involvement,

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[492] O'Donoghue, *Bridewell Hospital*, vol. II, pp. 147-148. Figure IV-94 shows the building after its reconstruction; the original site extended south down to Thames River.

[493] See ii. 15 and ii. 16 in this chapter on Hooke's work for Turner's almshouses in Kirkleatham and the Bethlem Hospital in London.

[494] The money was ordered to be paid from the account of the 'new building' which may have been the western part of the so-called northern quadrangle, finished by the middle of 1673; see O'Donoghue, *Bridewell Hospital*, vol. II, p. 157.

[495] See footnotes 474, 475, 483, and 485.

[496] For a list of extant records from the period, see Gale, 'Provenance: BRI - Bridewell and Bethlem Hospitals'.

if any, in the rebuilding of Bridewell prior to 1672, such as the restoration of the chapel in 1669 (**Figure IV-97**), when it was topped with a cupola fitted with a bell and clock, the 1671 paving of the chancel in black and white marble, or the repairs to the sixteenth-century hall with a new roof in 1670.[497]

While it may never be possible to know which parts of the post-fire building (**Figures IV-94 to IV-98**) can be confidently attributed to Hooke, the amount allocated from coal dues for rebuilding Bridewell was £12,260-5-0, comparable to the £13,450-11-9 paid for the Monument.[498] The building was demolished in 1862.

ii. 12. WILLIAM HOOKER'S GAZEBO, GREENWICH [SPECULATIVE]

Attribution: Beryl Platts, 'The Oldest Road in London? Crooms Hill, Greenwich-1', *Country Life* 140 (17 Nov. 1966), pp. 1262-1264; Beryl Platts, *A History of Greenwich* (Newton Abbot, Devon: David & Charles, 1973), p. 181; Cherry and Pevsner, pp. 48 and 267; *NHLE*, list entry no. 1079008.

Brief description: A gazebo built in 1672 in William Hooker's garden at his house in Greenwich, the Grange on Crooms Hill, has been attributed to Hooke.

Primary sources: None suggesting a connection to Hooke.

Assessment:

There are multiple references to William Hooker (1612–1697) in Hooke's diaries. Hooker, a member of the Grocers' Company, was the Lord Mayor of London in 1673–1674 and was consequently involved in all matters related to the City, especially the building of the Monument to the Great Fire, which Hooke was chiefly in charge of.[499] Hooke was also helping Hooker with renovations to the latter's house at Crown Court on Fish Street Hill.[500]

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[497] O'Donoghue, *Bridewell Hospital*, vol. II, pp. 155-157. For descriptions of the building see also Hinkle, *A History of Bridewell Prison, 1553–1700*, pp. 49-65; for its post-fire rebuilding, see O'Donoghue, *Bridewell Hospital*, vol. II, pp. 149-158.

[498] Reddaway, *The Rebuilding of London After the Great Fire*, p. 193n2.

[499] On the building of the Monument, see ii. 6 in this chapter. Hooker was almost certainly a relation of Hooke's as they shared the same coat of arms.

[500] See ii. 14 in this chapter on Hooker's house in London.

Hooker owned a second residence in Greenwich, 'the Grange' on Crooms Hill. It has been assumed that he purchased the property in 1665 when he escaped to Greenwich during the plague, however he had already been a tenant in the building since 1662 and did not buy the freehold until 1673.[501] The building, dating back to at least the twelfth century, has gone under many alterations; its current exterior and interior features have been attributed to Robert Taylor (1714–1788) and obscure previous restorations (**Figure IV-99**).[502]

Facing the main house is a brick gazebo perched on the garden wall and overlooking Greenwich Park. It was built in 1672, this according to the date inscribed in the architrave of the window facing the street. It has been attributed to Hooke since 1966 when Beryl Platts wrote "This beautiful little building can almost certainly be attributed to Robert Hooke, who was designing Sir William's London house in that year."[503] Since then the attribution, usually qualified with a 'probably by', has been repeated in multiple sources and in the NHLE, but there appears to be no extant documentary evidence of Hooke's authorship.[504]

The gazebo (**Figures IV-100 to IV-102**) is certainly an interesting building with its gently trapezoidal plan following the border of the lot and the angle of the street; a labour-intensive decision when the option to build from a rectangular plan placed at an angle would have been equally viable. Like the Grange, the gazebo has undergone multiple alterations. The so-called 'serliana' doorcase that can be seen in the *c.* 1940 photograph (**Figure IV-100**) has been attributed to Taylor and thought to have been fitted in *c.* 1760.[505] According to a commemorative plaque that has since been removed, the building was repaired in 1955, and then with a grant from the 'Historic Buildings Council', restored

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[501] Platts suggested that Hooker purchased the property in 1665 from the Lanier family or Sir Launcelot Lake; see 'The Oldest Road in London? Crooms Hill, Greenwich-1', *Country Life* 140 (1966), pp. 1262-1264, p. 1264; *A History of Greenwich* (Newton Abbot, Devon: David & Charles, 1973), p. 181. More recently, based on the rate books for the parish of East Greenwich at the Greenwich Heritage Centre, Richard Garnier was able to narrow down the dates to 1662 and 1673; see 'The Grange and May's Buildings, Croom's Hill, Greenwich', *The Georgian Group Journal* 14 (2004), pp. 261-286, pp. 262 and 281n8.

[502] Garnier, 'Grange and May's Buildings'. For a description of the building, see *NHLE*, list entry no. 1079007.

[503] Platts, 'The Oldest Road in London? Crooms Hill, Greenwich-1', p. 1264; repeated in Platts, *A History of Greenwich*, p. 181.

[504] Attributions to Hooke, presumably based on Platts, can be found in Bridget Cherry and Nikolaus Pevsner, *London 2: South* (New Haven, CT: Yale University Press, 2002), pp. 48, 267; Clive Aslet, *The Story of Greenwich* (London: Fourth Estate Ltd., 1999), p. 190; and *NHLE*, list entry no. 1079008.

[505] Garnier, 'Grange and May's Buildings', pp. 272, 274, 283n49.

by the owners in 1972—Hooker's coat of arms (**Figure IV-102**), which was not an original feature, may have been added then.[506] Finally in 1992, according to a previous owner of the Grange, the serliana was "replaced by the original Hooke design;" it remains unclear whether this means the owner had access to original drawings by Hooke to undertake such a restoration.[507]

Indeed, until such drawings surface, or correspondence and further diaries are located to corroborate Hooke's authorship of this building, it is difficult to accept this attribution. The extant diaries which begin on 10 March 1672, bear no mentions of this building, and it should be kept in mind that Greenwich being relatively far, Hooke recorded his visits there on other occasions. It is of course plausible that the construction was finished within the first few months of 1672, never to be mentioned again, but it would be prudent not to make any further stylistic attributions based on this building alone.[508]

ii. 13. WREST PARK, BEDFORDSHIRE [SPECULATIVE]

Attribution: Worsley, pp. 19-21.

Brief description: It has been suggested that in 1672 Hooke may have designed the north front of Wrest Park, Bedfordshire, for Anthony Grey (1645–1702), eleventh earl of Kent.

Primary sources: Despite the period of construction coinciding with some of Hooke's extant diaries, they contain no mentions of Wrest Park and only one passing reference to 'Lord Kent'. There also appear to be no primary documents corroborating this attribution.

Assessment:

In his 2004 article 'Taking Hooke Seriously', Giles Worsley attributed a number of buildings to Hooke based mostly on style. There was often no evidence for these attributions; they are included here in case further documents are found in the future.

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[506] The plaque can be seen in the *c.* 1975 photograph, now Greenwich Heritage Centre, ref. Crooms Hill 125; the earliest photograph of the building, from *c.* 1870, ref. Crooms Hill 14, does not feature Hooker's coat of arms. Historic Buildings Council is now Historic England.

[507] The previous owner, identified as Mr. Nicholas Elliott, is quoted in Garnier, 'Grange and May's Buildings', p. 283n49.

[508] Hooke's authorship of Boone's Chapel has been suggested due to a stylistic similarity to this gazebo; see Madeleine Adams, Charlie MacKeith, and Ian Mills, *Boone's Chapel: History in the Making* (London: Boone's Chapel Ltd, 2010), pp. 30, 66. See also ii. 38 in this chapter.

Based on its "metropolitan quality," Worsley included Wrest Park in Bedfordshire, in particular its north front (**Figures IV-104 and IV-105**), in his list of buildings possibly designed by Hooke.[509] He supported the attribution with the stylistic similarities to some of Hooke's verified works, as well as to other buildings hypothetically attributed to Hooke by Worsley himself. Taken as a whole, the resemblances listed by Worsley are almost convincing: "the octagonal cupola with round-headed openings, scrolled buttresses and ogee-shaped dome topped by a ball" was also used in the end pavilions at Bethlem Hospital, the swags above the upper windows were similar to the ones used in the Royal College of Physicians and other Hooke buildings, the arched entrance flanked by two niches was comparable to the one featured in an unidentified drawing among Hooke's papers at the British Library (**Figure III-90**), and so forth.[510]

The site of Wrest Park had been owned by the Grey family since 1086 and records of a house there date back to 1308.[511] The medieval house survived into the 1660s, having gone through numerous, piecemeal alterations.[512] When Henry Grey (bap. 1594, d. 1651), tenth earl of Kent, died in 1651, the estate and title were inherited by his only surviving son Anthony Grey (1645–1702). There is little biographical information on the eleventh earl, but archivist and author James Collett-White, who noted his "magnificent collection of books" which included titles on architecture, thought it was likely he had made the Grand Tour sometime in the 1650s and 1660s.[513] This must have been before 1658 when he matriculated at Trinity College, Cambridge, from where he graduated M.A. in 1661 at the notably young age of sixteen.[514] Two years later, in 1663, he married Mary (*d.* 1702), daughter and

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[509] Worsley, p. 19.

[510] Ibid., pp. 20-21.

[511] Sources on Wrest Park include James Collett-White, 'The Old House at Wrest - I', *Bedfordshire Magazine* 22 (1991), pp. 322-327; James Collett-White, ed., *Inventories of Bedfordshire Country Houses 1714–1830*, vol. 74 (Bedfordshire Historical Record Society, 1995), pp. 243-246, 272-273; and on the gardens, Tim Richardson, 'Wrest Park: Bedfordshire', *Country Life* 191 (1997), pp. 38-43; Linda Cabe Halpern, 'Wrest Park 1686–1730s: Exploring Dutch Influence', *Garden History* 30 (2002), pp. 131-152.

[512] Collett-White, 'The Old House at Wrest - I', at pp. 322-325. The 1667 inventory of the house listed 'Mr Selden's Chamber', referring to the famed lawyer and scholar John Selden (1584–1654), who was the steward to the ninth earl and likely married the latter's widow; see ibid., p. 324. For Selden's biographical details, see 'Selden, John (1584–1654)', *ODNB*.

[513] Ibid., p. 325. The eleventh earl is briefly mentioned in the ODNB entry for his father; see 'Grey, Henry, tenth earl of Kent (bap. 1594, d. 1651)', *ODNB*. Additional biographical details noted in the secondary literature can be traced to George Edward Cokayne, ed., *Complete Peerage of England, Scotland, Ireland, Great Britain and the United Kingdom*, 1st ed. (London: George Bell & sons, 1887–1898), vol. 4, pp. 356-357.

[514] John Venn, *Alumni Cantabrigienses; A Biographical List of All Known Students, Graduates and Holders of Office at the University of Cambridge* (Cambridge: The University Press, 1922), part 1, vol. 2, p. 250.

sole heir of John Lucas (1606–1671), first baron Lucas of Shenfield. In July 1671, Mary inherited her father's substantial estates and in September gave birth to their first son, two events which are considered to have provided the impetus to rebuild Wrest Park.

Some of the work, such as alterations to the chapel chamber and the rebuilding of the apartments, all supervised by the earl's steward Thomas Hooper, began in 1672 and cost £510. The more substantial work of building the 212-foot long north front, to which Worsley found parallels in Hooke's work, cost £3,227, financed by Mary and the earl's mother Amabella (1607–1698).[515] Worsley, to explain the lack of any references to the building in Hooke's diaries, noted that the design work would have taken place prior to the beginning of Hooke's diary on 1 August that year.[516] It should be noted that, since Worsley's article, further fragments from Hooke's diaries have been published, and among these, covering the relevant period between 10 March and 31 July 1672, there are also no references to Wrest Park.[517]

As Worsley noted, Hooke knew Anthony Grey, though there is only one overt reference to him in the diaries where on 13 June 1677 Hooke noted meeting "Dr. Falwood and Lord Kent" at the workshop of the watchmaker Thomas Tompion (*bap.* 1639, *d.* 1713).[518] It is unclear whether the few previous mentions of 'Kent' refer to the earl or someone else with the name, but they reveal a strained relationship, eliciting an invective from Hooke ("Dog Kent") who later purposefully "Avoyded Kent" at a tavern.[519] Even if they knew each other socially, there is no obvious reason why Grey would commission Hooke. In 1671 the latter was busy with surveying work for the City and had just started designing the Royal College of Physicians; the Montagu House and Bethlem Hospital were still three years away. Mary, who was paying half of the bills, might not have heard the greatest praise for Hooke

515 Collett-White, 'The Old House at Wrest - I', p. 325. See also Collett-White, *Inventories of Bedfordshire Country Houses 1714–1830*, vol. 74, pp. 244-245. Amabella's mother was the daughter of John Evelyn of Godstone, related to the author of architectural works; see John Evelyn, 'De vita propria pars prima', in *The Diary of John Evelyn*, ed. E. S. de Beer (New York: Oxford University Press, 1955), p. 3 and n3.

516 Worsley, p. 20.

517 See *Memoranda* for these additional diary entries.

518 Worsley, p. 21; *Diary i*, p. 295.

519 See the entries for 1 June and 9 Nov. 1676 in *Diary i*, pp. 235, 255. Hooke may have met Grey via the latter's father-in-law, Lucas, who had been made fellow of the Royal Society in 1663 but was expelled in 1666 due to inactiveness; see 'Lucas, John, first Baron Lucas of Shenfield (1606–1671)', *ODNB*.

from her aunt Margaret Cavendish (1623?–1673), and Amabella, who was paying the other half, would presumably have had access to Evelyn, a cousin from her mother's side, for architectural advice.[520]

Noting that it was the earl's steward who had prepared the estimates and supervised the construction of the north front, Collett-White remarked that "it is possible that Anthony and Thomas Hooper designed it themselves, using the practical guides to country house building that were now appearing, such as Hugh May's translation of Freart's *Parallel of Architecture* (1665) and Sir Roger Pratt's *Notes on the Buildings of Country Houses*."[521] Although it is unclear how they would have had access to Pratt's writings which remained in manuscript until 1928, they may have been able to view the mansions built by Pratt, and indeed the earl's library did include several architectural texts that Collett-White noted in a 1740 inventory.[522] It is possible that the stylistic similarities discerned by Worsley between Wrest Park and Hooke's works can equally be traced to such influences, textual or otherwise.

The circumstantial evidence not adding up, barring the discovery of documentary evidence of Hooke's direct involvement, it is unlikely he had a hand in the design of Wrest Park.

ii. 14. HOUSE FOR WILLIAM HOOKER, FISH STREET HILL, LONDON

Attribution: Colvin (2008).

Brief description: In 1673, Hooke designed or helped with the restoration and alterations to William Hooker's house at Crown Court on Grace Church Street (extension of Fish Street Hill), London.

Primary sources:

– Hooke's entries in *Diary i*:
  - 6 Nov. 1672 (p. 12): "Sir W. Hookers house, Fish Street hill."
  - 11 Feb. 1673 (p. 27): "With Sir W. Hooker, fish street hill."

[520] Lucas's younger sister, Margaret Cavendish (1623?–1673), duchess of Newcastle upon Tyne, was a natural philosopher in her own right. She was no friend of Hooke's, however; she attacked his work in her publications and made a memorable visit to the Royal Society on 23 May 1667; see Emma Wilkins, 'Margaret Cavendish and the Royal Society', *Notes and Records of the Royal Society* 68 (2014), pp. 245-260.

[521] Collett-White, 'The Old House at Wrest - I', p. 326.

[522] Ibid., p. 325. For Pratt's architectural writings, see Robert T. Gunther, ed., *The Architecture of Sir Roger Pratt, Charles II's Commissioner for the Rebuilding of London after the Great Fire: Now Printed for the First Time from his Note-books* (New York: Oxford University Press, 1928). On the phenomenon of architectural tourism, see Adrian Tinniswood, *The Polite Tourist: Four Centuries of Country House Visiting* (London: The National Trust, 1998).

- 13 Feb. 1673 (p. 28): "at Sir W. Hookers, fishstreet hill."
- 14 Feb. 1673 (p. 28): "Contrived Sir W. Hookers house with Mr. Fits."
- 24 May 1673 (p. 44): "Sir W. Hooker. Lem here agreed with him."
- 26 Sep. 1673 (p. 62): "at Sir W. Hookers house Fish Street Hill."

Description:

William Hooker (1612–1697), a member of the Grocers' Company and Lord Mayor of London in 1673–1674, receives numerous mentions in the diaries. This is to be expected as he was also an alderman and would have been involved in matters related to the City, especially the building of the Monument to the Great Fire, built on Fish street hill.[523]

Hooke recorded meeting with Hooker at the latter's residence at Fish Street Hill. Some of the entries are ambiguous as they can also be interpreted as Hooke visiting the Monument on the same street, but indeed in 1677, Hooker was listed in the directory as "Sir Wil. Hooker Crown Court Grace-Churchstreet."[524] Grace Church Street was an extension of Fish Street Hill, with Crown Court further up the street past Magdalen Court (**Figure IV-106**). 'Mr. Fitz', i.e. John Fitch, and Lem were bricklayers Hooke often worked with and it is likely that the work only involved renovations or alterations of an existing building in Crown Court rather than a new construction. A more extensive project would have necessitated further diary entries, and involvement from more contractors. In 1673 Hooker married his second wife Susan, daughter of Sir Thomas Bendish from Essex, and may have wanted to renovate his residence at Crown Court, perhaps a new purchase, engaging Hooke in the project.[525] There appear to be no extant documentary traces of these renovations, nor any illustrations of Crown Court before or after 1673 to allow for a comparison.

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[523] Hooker was almost certainly a relation of Hooke's as they shared the same coat of arms; see Chapter I. See also ii. 6 (the Monument to the Great Fire), and ii. 12 (a gazebo attributed to Hooke due to his work on Hooker's London residence) in this chapter.

[524] *A collection of the names of the merchants living in and about the City of London* (London: Printed for Sam. Lee . . . , 1677), sig. E3r.

[525] For Hooker's biographical details, see J. R. Woodhead, *The Rulers of London 1660–1689. A Biographical Record of the Aldermen and Common Councilment of the City of London* (London, 1966).

Hooke owned a second residence in Greenwich, but there is no evidence of Hooke's involvement with that.[526] There is also a June 1668 reference that he also owned a property next to the St. Clement Danes church.[527]

ii. 15. WILLIAM TURNER'S HOSPITAL, KIRKLEATHAM, YORKSHIRE

Attribution: *Memoranda*, pp. 169-170 n109 (Felicity Henderson's note); *NHLE*, list entry no. 1139641, which erroneously attributes the 'Free School' building to Hooke.

Brief description: In 1673, Hooke designed a school and almshouses in Kirkleatham, Yorkshire for William Turner.

Primary Sources:

- Hooke's entries in *Memoranda*:
  - 7 July 1672 (p. 143): "finisht Sir W[illiam] Turners fountain."[528]
- Hooke's entries in *Diary i*:
  - 11 Jan. 1673 (p. 21): "At Sir W. Turner he desired modell for School Scoolhouse and 20 almshouses."
  - 27 Feb. 1673 (p. 31): "made Sir W. Turners draught of Hospitall."
  - 24 July 1673 (p. 52): "designd upright of Sir W. Turner."[529]
  - 29 July 1673 (p. 53): "finisht Sir W. Turners draught."
  - 30 July 1673 (p. 53): "Finisht the draught and carryd it to Sir W. Turner, I refused £5 he gave Harry 20sh. I tooke 5sh."

[526] On Hooker's Greenwich residence, see ii. 12 in this chapter.

[527] Walker, 'Architectus Ingenio', p. 105n7. Walker interprets the paucity of references to the house as it being the sort of small London houses of merchants; on the latter, see Mireille Galinou, 'Merchants' Houses', in *City Merchants and the Arts, 1670–1720*, ed. Mireille Galinou (Wetherby, UK: Oblong Creative Ltd for the Corporation of London, 2004), pp. 25-42. He further posits that the house may have been at any one of the properties owned by Hooker.

[528] Henderson suggests that the fountain may have been for the school and almshouses; *Memoranda*, pp. 169-170 n109. However, as these were not built until 1676, it instead may have been for Turner's London residence. On the latter, see Ann Saunders, 'A Day in the Life of a Merchant Taylor: Sir William Turner 1615–1693', in *City Merchants and the Arts, 1670–1720*, ed. Mireille Galinou (Wetherby, UK: Oblong Creative Ltd for the Corporation of London, 2004), pp. 161-178, figure 119 on p. 162.

[529] By 'upright', Hooke is referring to the facade.

– Guildhall Library, MS 5105, fol. 62v: Record of a 30 July 1673 payment of £1-5s "giuen Mr Hookes man for drawing the plot of the schoole house and Almes houses."[530]
– Knyff and Kip, *Britannia illustrata or views of several of the Queen's palaces also of the principal seats of the nobility and gentry of Great Britain* (London: Sold by David Mortier . . . , 1720): Drawn by Knyff and engraved by Kip, the bird's eye view of 'Charles Turner's seat at Kirkleatham, Cleveland' shows the school and almshouses prior to their extensive remodelling in 1742 (**Figure IV-107**).

Description:

William Turner (1615–1693) was born in Kirkleatham, Yorkshire, as the youngest son of a gentleman. Expected to learn a trade, he was sent to London in the early 1630s to apprentice with a woollen merchant, eventually becoming a freeman of the Merchant Taylors' Company and making a fortune as a woollen-draper. After the Restoration, he also became actively involved in the City affairs, serving as alderman from the early 1660s, Sheriff in 1663, and Lord Mayor in 1669. His work on the post-fire reconstruction of the City as well as his lengthy presidency of Bethlehem and Bridewell Hospitals kept him in constant contact with Hooke, of whom he soon became an important patron.[531]

Turner, who never married, set up charities to distribute his wealth which would accumulate to the enormous sum of £54,000 by the time of his death. In 1673, he asked Hooke to design a school and twenty almshouses to be built in Kirkleatham. Hooke promptly produced a set of drawings, possibly with the help of his assistant Harry Hunt, who received the bulk of the modest payment of £1-5s. These drawings unfortunately have not survived, making it impossible to know how much of Hooke's design was kept when it was built in 1676 presumably by local craftsmen. The building was entirely remodelled in 1742, leaving a Knyff drawing engraved by Kip in *Britannica illustrata* as the only record of the original design (**Figure IV-107**). Assuming Knyff's drawing is accurate, the design of the facades and central turret are not typical of Hooke's other works, strengthening the possibility that

[530] Information regarding this manuscript is from Felicity Henderson, 'Unpublished Material from the Memorandum Book of Robert Hooke, Guildhall Library MS 1758', *Notes and Records of the Royal Society* 61 (2007), pp. 129-175, at pp. 169-170, n109.

[531] See also ii. 11 and ii. 16 in this chapter. On Turner, who is not on *ODNB*, see Perry Gauci, 'Turner, Sir William (1615–93), of St. Paul's Churchyard, London', in *The History of Parliament: the House of Commons 1690–1715*, ed. D. Hayton, E. Cruickshanks, and S. Handley (New York: Cambridge University Press for the History of Parliament Trust, 2002); John Cornforth, 'Kirkleatham, Cleveland - II', *Country Life* CLXI (1977), pp. 134-137, p. 134.

a local builder may have added his own flair to Hooke's plans, but until more documentation can be found, this is just speculation.[532]

Another Kirkleatham charity built by the Turner family, the 'Free School', is curiously attributed to Hooke by Historic England, but in fact it has little to do with him.[533] To encourage his younger nephew Cholmley to follow in his footsteps, Turner left him a considerable sum of money he could access only if he took on and successfully fulfilled an apprenticeship. When his older brother died, Cholmley became heir to his family's estate, which obviated the need for an apprenticeship, so he opted to use the otherwise-inaccessible funds to build a Free School instead. Now referred to as the 'Old Hall Museum', this school was not originally intended by Turner and was indeed constructed much later in 1708, i.e. five years after Hooke's death.[534]

ii. 16. BETHLEM HOSPITAL, LONDON

Attributions and discussions: Aubrey, *Brief Lives*, p. 98; Batten, pp. 91-93; Colvin (1954) and subsequent editions; 'Espinasse, pp. 90-92; Jacques Heyman, 'Hooke and Bedlam', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate Publishing Company, 2006), pp. 153-164; Robinson, pp. 52-53; Christine Stevenson, 'The Architecture of Bethlem at Moorfields', in *The History of Bethlem*, ed. Jonathan Andrews, Asa Briggs, Roy Porter, Penny Tucker, and Keir Waddington (New York: Routledge, 1997), pp. 230-259; Christine Stevenson, 'Robert Hooke's Bethlem', *Journal of the Society of Architectural Historians* 55, no. 3 (1996), pp. 254-275.

Brief description: In 1674–1676, Hooke built a palatial new Bethlem Hospital at Moorfields in London.

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[532] Kirkleatham being so far north, it is unlikely Hooke would have travelled there to direct the construction. For descriptions of the remodeled building, see Cornforth, 'Kirkleatham, Cleveland - II'; 'Parishes: Kirkleatham', in *A History of the County of York North Riding: Volume 2*, ed. William Page (London: Victoria County History, 1923), pp. 371-383. See also *NHLE*, list entry no. 1310786.

[533] It should be mentioned that the attribution is qualified with a 'probably by Robert Hooke'; see *NHLE*, list entry no. 1139641. No references are given for the attribution, making it impossible to track down its source. None of the other sources already cited here attribute the 1708 school to Hooke, and Pevsner explicitly states that "Nothing at all is known of the architect of the school, nor for that matter of the hospital;" Nikolaus Pevsner, *Yorkshire: The North Riding* (Baltimore, MD: Penguin Books, 1966), p. 221.

[534] John Cornforth, 'Kirkleatham, Cleveland - I', *Country Life* CLXI (1977), pp. 18-21, p. 19. The construction date inscribed on the foundation stone; see ibid.

Chapter IV – Building

Primary Sources:

– Hooke's entries in *Diary i*:[535]

- 14 Apr. 1674 (p. 96): "With Dr. Allen at Bedlam. Viewd Morefields for new Bedlam. Drew up report for him. At Sir W. Turner. Undertook new Designe of it."
- 2 June 1674 (p. 106): "View in moor feilds with Committee at hospitall."
- 21 June 1674 (p. 108): "Walkd in Morefields."
- 3 July 1674 (p. 110): "At Bridewell about Bedlam."
- 10 July 1674 (p. 112): "At Davys about Bedlam module."[536]
- 11 July 1674 (p. 112): "At Bridewell agreed the module for Bedlam."
- 28 Sep. 1674 (p. 123): "Set out Morefield for Bethlehem with Sir W. Turner, Sir Th: Player, &c. — 30 and 350 west and 390 East."
- 29 Oct. 1674 (p. 127): "With Mr. Fitch at Morefields. At Mr. Shortgraves. Set out Bethlem wall."
- 13 Nov. 1674 (p. 130): "Designd module of Bedlam, Governors stark mad of the Dr."
- 20 Nov. 1674 (p. 131): "At Morefeilds wall."
- 30 Nov. 1674 (p. 133): "At Morefeilds with Bedlam Committee about Fitz view."
- 15 Dec. 1674 (p. 135): "Saw wall and grates in Morefields."
- 6 Jan. 1675 (p. 140): "With Sir Th. Player and the Treasurer about morefields walk and semicircle. Sir T. Player orderd me to agree about Levelling the walk and Re-mounting the trees."
- 5 Feb. 1675 (p. 145): "Set out Bedlam in Morefields."
- 15 Feb. 1675 (p. 147): "Finishd estimate of Bedlam. Deliverd it to Treasurer. Proposd new way of building."
- 17 Feb. 1675 (p. 148): "At Committee about Bedlam carpenters."

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[535] Hooke often took walks in Moorfields, spoke with friends and browsed the booksellers' stalls. Consequently, diary entries low on details, e.g. simply "At Morefields," are not included here but he may very well have been on site to monitor the construction on those days.

As there was one joint court of governors administrating Bridewell and Bethlem Hospitals, and their meetings were held at Bridewell, it can be difficult to interpret Hooke's diary entries. In some cases, these can be checked against the court minutes; where this was possible and the entry was found to be referring to Bethlem Hospital even though it only referred to Bridewell, the entries are marked with an asterisk (*) with further explanations provided in the footnotes.

[536] Davys was a joiner Hooke often worked with; here he is making the model Hooke would present to the governors the next day.

- 24 Feb. 1675 (p. 149): "Att Bedlam Committee for carpenters at Mr. Ducanes. The Rates are annexed, Jarmin, Bates and Audley lowest."
- 2 Mar. 1675 (p. 150): "With the Governors at morefields. Fitch began the planking etc. — of the foundation."
- 1 Apr. 1675 (p. 156): "At Bedlam. Cartwright a Devill. Committee mad. Rustom at Bedlam."
- 9 Apr. 1675 (p. 158): "At the Bedlam Committee who after some bickering left the matter of the stairs to me. Promised me Gratuity."
- 10 Apr. 1675 (p. 158): "At . . . Sir W. Turners about the steps without Bedlam Wall in Morefields, he liked them not."
- 9 June 1675 (p. 164): "At Bedlam, agreed about the sewer, the window under gallery, oak door cases, etc."
- 1 July 1675 (p. 167): "At Bethlem with Committee, we agreed about slating."
- 12 July 1675 (p. 169): "Bedlam Committee agreed with Ain and Gee for Slating Bedlam with Slates of Plinmouth Nayled on Lathes with 4d nayles 2 in every slat bigger than 5 inches and to 3 double that is 2 coverd at 26sh. 6d. per square."
- 19 July 1675 (p. 170): "Committee at Bedlam orderd all stone front. A great Huff with treasurer, and Chase."
- 4 Aug. 1675 (p. 173): "At Bedlam. Agreed whole Roof."
- 7 Sep. 1675 (p. 179): "At Treasurer Ducanes Comtee. They agreed Lucarnes 12 Carved Cantilevers, Lanthornes & flats."
- 22 Sep. 1675 (p. 182: "With Ducane to Bethlem and to old Bedlam. Scarborough made survey. At the treasurers a committee. Deliverd in Draught of turret."
- 24 Sep. 1675 (p. 182): "Drew turret for Bethlem. Treated with Bates and Audley for 3 turrets for £90."
- 28 Sep. 1675 (p. 183): "To Cartwright saw his Statues, for Bedlam Gates."
- 14 Oct. 1675 (p. 187): "Agreed at Bedlam for Sheilds and Inscriptions in the freize and for Sir W. Turner over Balcony door."
- 19 Oct. 1675 (p. 188): "To new Bedlam chimney all awray."
- 20 Oct. 1675 (p. 189): "to Bedlam Committee agreed with glasiers for small quarrys at 4d. 3 farthings per foot, for Squares, $5\frac{1}{2}$d. the Lead to be of 12 inches to an ounce and the glass every thick."

- *1 Nov. 1675 (p. 191): "From Bridewell. Cartwright against expansions."[537]
- 16 Nov. 1675 (p. 194): "Attended on the committee at Bedlam about chimneys turrets, boording galerys, &c."
- 20 Nov. 1675 (p. 195): "To Bedlam, Rectified chimneys."
- 30 Nov. 1675 (p. 196): "At Sir W. Turners shewd turrets. He desired draught of Bothe[bath?]."
- 1 Dec. 1675 (p. 197): "Viewd casemont at Bethlem. Met Sir W. Turner, he spoke about Raile and ballister on roof and of chimney piece."
- 9 Dec. 1675 (p. 199): "At Bedlam committee about lights, plaistering, &c."
- 16 Dec. 1675 (p. 201): "At Bedlam with Sir R. Piggot, Sibley, Pilkington, Boys, Ducane . . . Shewd Battes about Bedlam shutters and Hayward about Roof."
- 18 Dec. 1675 (p. 201): "At Sir Wm. Turners about Bedlam court ground."
- 27 Dec. 1675 (p. 204): "To Morefields. Dislikd chimneys."
- *12 Jan. 1676 (p. 210): "to Sir W. Turner who denyd me till workmen were paid . . . To Bridewell."[538]
- 14 Jan. 1676 (p. 211): "To Committee at Bedlam. Chimneys agreed and turrets."
- *10 Mar. 1676 (p. 219): "At Bridewell about Turret."[539]
- 11 Mar. 1676 (p. 219): "At Bedlam with Cartwright and Audley."
- 21 Mar. 1676 (p. 221): "To Bedlam, thence to Cartwrights, and saw straw chimneys, &c. Piketts designed Ascew. To treasurer Ducanes."
- 23 Mar. 1676 (pp. 221-222): "To Bedlam committee. Carryed for Gateway, for turret, for passage at stair foot, &c. . . . Sir W. Warren, Crisp, Allen, Gones, here to see picture of Bedlam."
- 1 Apr. 1676 (p. 223): "To Bedlam with Lever and Scarborough. Directed Miller, Cartwright, Hays and Lever."
- 3 Apr. 1676 (p. 224): "Describd turret at Bedlam."
- 12 Apr. 1676 (p. 225): "Agreed with John Hayward for £440 for Roof, Lanthorn, bracketting &c."

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[537] At the 22 Oct. 1675 court meeting, Thomas Cartwright, the mason, was asked to prepare an estimate for Bethlem Hospital without the pavement and ornamental work for the rear of the building; Bcb-13, p. 186; https://goo.gl/pP1SkR.

[538] The court minutes indicate that Hooke's payment "about the New building," presumably Bethlem Hospital, would be taken into consideration when the building was completed; Bcb-13, p. 210; https://goo.gl/m7zYSP.

[539] This entry is referring to the turret or cupola of the central block of Bethlem Hospital; see Bcb-13, p. 230, https://goo.gl/qqgSjV.

- 14 Apr. 1676 (p. 226): "To Bedlam and agreed turret once more and strawhouses and chimneys and grates."
- 26 Apr. 1676 (p. 228): "At Bedlam committee, turret lanthorn put up concluded".
- 28 Apr. 1676 (p. 228): "With Lem and Harry to Sir W. Turner. Spoke to him about Bedlam picture gallery, gratos, straw houses, &c."
- 2 May 1676 (p. 229): "to Bedlam committee. Agreed again Strawhouses &c. Vane, Washhouse."

  12 May 1676 (p. 231): "To Bedlam. Bespoke of Bird 18 inch copper Barrell. Brought him to Leace about Bedlam balls."

- 6 June 1676 (p. 236): "Committee at Bedlam about gates &c."
- 12 June 1676 (p. 237): "at Bedlam committee. Order about balls, about stair screen."
- 16 June 1676 (p. 237): "Bird here about air kettle. Tryd ball at Bedlam. Directed palisadoes."
- 1 July 1676 (p. 239): "With Sir Ch. Wren at Bedlam. Advised the widening the wall, to the middle of Morefields."
- 11 July 1676 (p. 242): "At comittee for Bedlam. I directed Hayward plank stairs at his request"
- 28 Aug. (p. 247): "I forgot to write this and the following weeks till September 9th . . . King at Bedlam on Tuesday 29th. of August. Committee at Bedlam the day before."
- 2 Oct. 1676 (p. 252): "Lookd over masons bills of Bedlam. To Treasurer and Hublon at Bedlam."
- 6 Oct. 1676 (p. 252): "At Bedlam with the Treasurer valuing carpenters bills."
- 8 Oct. 1676 (p. 253): "Two meetings at Bedlam. With Treasurer about bills."
- 17 Oct. 1676 (p. 253): "At Bedlam committee about bills."
- 24-28 Oct. 1676 (p. 254): "Severall committees at Bedlam about auditing bills where things went according to my prices."
- 23 Nov. 1676 (p. 258): "Fitch ended contract at Bedlam."
- 31 Dec. 1676 (p. 165): "Due from Hospital for Bedlam building and Surveying £200."
- 5 Jan. 1677 (p. 266): "To Bedlam Committee. They promised to take my plan into consideration next court."
- 11 Jan. 1677 (p. 267): "To Bedlam, Mr. Chase, Whistler, Pilkington, Crisp, Spires, Goald, Stanly, Chadwick and Ducane, 2 presbiterian dogs, Botteler, (Haines absent), Mr. Fitch. Upon arguing my busnesse. They voted I should have either £300 or £250 and soe Reported it."
- 18 Jan. 1677 (p. 268): "To Sir Wm. Turner about Spittle and Bedlam. He spake fair. I promisd Stevenson should paint Bedlam and Loggan Grave it."

- 24 Jan. 1677 (pp. 269-70): "Court at Bridewell . . . The court orderd me £200. My freinds were Chase, Fitch, Crisp, Whistler, Russell, Pilkington, Hill, Knowles."[540]
- 23 Feb. 1677 (p. 275): "Receivd by Scarborough order for £200 for Bedlam."
- 29 Mar. 1677 (p. 281): "At Mr. Mores about Bedlam draught."
- 6 Apr. 1677 (p. 284): "To Bridewell about the Draught of Bedlam, while there they left the managery of it wholy to me."
- 1 June 1677 (p. 293): "To Mr. Ducanes, Bridewells treasurer, and gave him receipt for £50 which I Receivd 20sh. of it in grates, 1 Guinney, the rest in money, gave his man 2s. 6d., being part of £200 orderd by Hospitall."[541]
- 10 June 1677 (p. 295): "Observd the Sun to set in the middle between the middle and westernmost turret of Bedlam."
- 10 July 1677 (p. 300): "At Whites about Bedlam."
- 3 Aug. 1677 (p. 305): "At Ducane. Received £50 upon Bedlam warrant, whioh with the former £50 made £100, remaining due £100."
- 16 Aug. 1677 (p. 307): "To founders in Bedlam for 2 ballances."
- 8 Oct. 1677 (p. 319): "Received from Monox 1 map of Bedlam."
- 8 Jan. 1678 (p. 339): "Received letter from Chase about Bedlam chappell."
- 9 Jan. 1678 (p. 339): "With Chase and Knowles at Bridewell about chappell. Drew Designe for chappell."
- 7 Apr. 1678 (p. 406): "Viewd Sewer at Bedlam with Oliver."

– Manuscript drawings:

- Bodleian Library, Gough Maps 44, no. 119 on fol. 61: Hooke's undated partial elevation of Bethlem Hospital (**Figure IV-108 or Figure III-225**).[542]
- British Library, Add MS 5238, no. 55: Hooke's undated partial elevation of Bethlem Hospital (**Figure IV-109 or Figure III-75**).

[540] The Court of Governors of Bridewell and Bethlem Hospitals met at Bridewell, otherwise this entry is in regard to Hooke's work for Bethlem Hospital. See below for the minutes of the 24 Jan. 1677 meeting.

[541] Benjamin Ducane served as the hospital's treasurer between 1673 and 1683; see O'Donoghue, *Bridewell Hospital*, vol. II, p. 275. Regarding the £200 fee, see Hooke's diary entry for 24 Jan. 1677 above, and the extract from the 24 Jan. 1677 meeting minutes of the Court below.

[542] Regarding the citing of two different figure numbers, see footnote 375.

– Bethlem Museum of the Mind, Series BCB – Minutes of the Court of Governors of Bridewell and Bethlem Hospitals:[543]

- 23 Jan. 1674 (Bcb-12, p. 609; https://goo.gl/aVk3xa): "The Courte takeing into Consideration that the Hospital House of Bethlem is very old weake & ruinous and to small & streight for keeping the great number of Lunatickes as are therein att p*re*sent and more are often needfull to be sent thither Itt is ordered that all the Governo*r*s be sum*m*oned as A Committee to consid*e*r thereof and whether the same House may sufficiently be repaired and inlarged or must be newbuilt & inlarged and how & where the same may most conveniently be newbuilt & enlarged And reporte their opinions thereof att the next Courte."
- 6 Mar. 1674 (Bcb-12, p. 623; https://goo.gl/2iFepq): "uppon readeing the Reporte of the one & Twentyeth of February last this Courte is of opinion that a new Hospitall [to be?] built be placed & built in some p*ar*te of Moorefields according to the last Reporte thereof."
- 8 May 1674 (Bcb-12, pp. 637-638; https://goo.gl/Zx9TjT: "Alsoe Att this Courte Sr William Turner Kn*igh*t & Alde*rm*an and President of this Hospitall And Sr Thomas Davies Kn*igh*t & Alde*rm*an are desired to acquaint the Lord Maior & Courte of Aldermen with the great necessity of the New building & removing of the Hospitall of Bethlem And to desire the direction & Assistance of his Lord*shi*p and that Courte for their application to his Majestie for his Leave & approbation therein And alsoe for their Concurrance in all or any other matter or thing concerning the Hospitall . . .

  Consider of view & appoint some fitt place grauntable[?] by the Citty whereon to build the said Hospitall house for health and Aire."

- 3 July 1674 (Bcb-13, p. 9; https://goo.gl/RMYre7): "Alsoe at this Courte Mr Hooke brought Twoe Plottes concerning of the New House for Lunatikes intended to be erected betweene Mooregate and the Posterne next London wall where there wilbe ground enough for One Hundred and Twenty Roomes for the Lunatikes & Officers being about Fower Hundred &

[543] I am grateful to Colin S. Gale, archivist of Bethlem Royal Hospital, for drawing my attention to the digitised 'Minutes of the Court of Governors of Bridewell and Bethlem Hospitals' available online at http://archives.museumofthemind.org.uk/BCB.htm. The relevant period between 1674 and 1678 are covered by volumes 12-14; in the interest of brevity, only some of the most relevant extracts are included here. Further references are included in Christine Stevenson, 'The Architecture of Bethlem at Moorfields', in *The History of Bethlem*, ed. Jonathan Andrews, et al. (New York: Routledge, 1997), pp. 230-259. For a list of archival records extant from the period, see Gale, 'Provenance: BRI - Bridewell and Bethlem Hospitals'.

Twenty foote long thereuppon hee was instructed to make a Modell thereof in pasboard and to bring the same with his Estimate of the Charge of the same building to the Courte to be there holden this day Seavenight and that further Considerations and directions therein may be hand and given."

- 11 July 1674 (Bcb-13, p. 15; https://goo.gl/HnfrNz): "Alsoe att this Courte Mr Hooke bringing a Modell of a new House for keeping the Lunatikes ⌜of Bethlem⌝ and the same being here viewed and deliberately advised and considered by this Courte that the same be single building not double."
- 3 Dec. 1675 (Bcb-13, p. 200; https://goo.gl/vwW1HQ): "Also attending to the reporte of the said Committee for the Hospitall of Bethlem It is ordered by this Courte that Three Cubilos[544] be made to the Three Platformes of the New building for the said Hospitall attending to the Designe given in by Mr Hooke the Surveyor. And that the Toppe of the same Cubiloes be covered w*i*th Lead And that there be noe Rayles and Banisters made about the said Cubiloes till this Courte shall further order therein."
- 24 Jan. 1677 (Bcb-13, p. 326; https://goo.gl/n6C42e): "Alsoe uppon Reading a Reporte of the Com*m*ittee of the Hospitall of Bethlem London of the Eleaventh of January last concerning Mr. Robert Hooke the Surveyor who hath given his constant Attendance and Assistance in the said Com*m*ittee in carrying on the Rebuilding for the Hospitall of Bethlem And that he tooke greate paynes in designeing the whole Building and contriving A Moddell thereof. And that hee did att all tymes assist the said Com*m*ittee in makeing their several Bargaines w*i*th their several Workemen and in drawing the Scantlings for the said Building and in viewing the severall particular workes not agreed for and valueing the same And that at all tymes hee was ready to goe to the said Building to direct the severall Workemen to carry on their serverall workes when anything dubious therein did happen to arrise And that hee hath not received anything of Recompence or Reward for his Care paynes & Service therein itt is ordered by this Courte that Mr. Tre*asure*r doe pay to Mr Robert Hooke the Sum*m*e of Twoe Hundred pounds for his Service about the said new Building to be allowed Mr. Tre*asure*r uppon his Accompt."

– John Strype, *A survey of the cities of London and Westminster: containing the original, antiquity, increase, modern estate and government of those cities. Written at first in the year MDXCVIII by John Stow, citizen and native of London. Since reprinted and augmented by the author; and afterwards by A. M. H. D. and others* . . . (London:

[544] Cupola.

Printed for A. Churchill, J. Knapton, R. Knaplock . . . 1720), book 1, chapter 26, pp. 192-197: a detailed description of the hospital from *c.* 1720.

Description:

Bethlem Hospital is one of Hooke's most famous and most documented buildings, therefore there is less of a need to assess the attribution.[545] Instead a general outline will be given.

Since 1377, Bethlem Hospital had been the only institution in London, in fact in all of England, dedicated to the care of the insane.[546] Although its original building in Bishopsgate had survived the Great Fire of London, it could no longer serve the needs of its patients. At the beginning of 1674, the

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[545] 'Bethlem' is a contraction of Bethlehem, the original name of the hospital; it is also nicknamed Bedlam.

Most recent and most extensive work on the architectural history of Bethlem Hospital during this period is by Christine Stevenson; see her 'Robert Hooke's Bethlem', *Journal of the Society of Architectural Historians* 55 (1996), pp. 254-275; 'Architecture of Bethlem'; *Medicine and Magnificence: British Hospital and Asylum Architecture, 1660-1815* (New Haven, CT: Published for the Paul Mellon Centre for Studies in British Art by Yale University Press, 2000); 'Robert Hooke, Monuments and Memory'; *The City and the King: Architecture and Politics in Restoration London* (New Haven, CT: Yale University Press, 2013). On Hooke's work on the hospital, see also Jacques Heyman, 'Hooke and Bedlam', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 153-164. Other histories of the building include Patricia Allderidge, *Bethlem Hospital, 1247–1997: A Pictorial Record* (Chichester, West Sussex: Phillimore & Co. Ltd., 1997), pp. 19-42; Edward Geoffrey O'Donoghue, *The Story of Bethlehem Hospital from its Foundation in 1247* (New York: E. P. Dutton & Company, 1915).

There is extensive literature on Bethlem Hospital in the history of medicine; a useful starting point remains Jonathan Andrews et al., *The History of Bethlem* (New York: Routledge, 1997); see also Patricia Allderidge, 'Bedlam: Fact or Fantasy?', in *The Anatomy of Madness: Essays in the History of Psychiatry. Volume II: Institutions and Society*, ed. W. F. Bynum, Roy Porter, and Michael Shepherd (New York: Tavistock Publications, 1985), pp. 17-33. On the general history of the definition and treatment of lunacy in the seventeenth century, useful sources include Katharine Hodgkin, *Madness in Seventeenth-Century Autobiography* (New York: Palgrave Macmillan, 2007); Michael MacDonald, *Mystical Bedlam: Madness, Anxiety, and Healing in Seventeenth-century England* (New York: Cambridge University Press, 1981); Roy Porter, *Mind-Forg'd Manacles: A History of Madness in England from the Restoration to the Regency* (Cambridge, MA: Harvard University Press, 1987); George Rosen, 'Irrationality and Madness in Seventeenth and Eighteenth Century Europe', in *Madness in Society: Chapters in the Historical Sociology of Mental Illness* (Chicago: University of Chicago Press, 1980), pp. 151-171. On the general history of asylum architecture, albeit mostly from later periods, see Leslie Topp, James E. Moran, and Jonathan Andrews, eds., *Madness, Architecture and the Built Environment* (New York: Routledge, 2007).

[546] Definitions of lunacy and diseases of the mind have remained controversial but they were even more open to interpretation during this period. For a useful compilation of extracts from primary texts, see Richard Hunter and Ida Macalpine, *Three Hundred Years of Psychiatry, 1535–1860: A History Presented in Selected English Texts* (New York: Oxford University Press, 1963); Hooke's own idea of using 'gangue' or marijuana to treat lunacy is reproduced on pp. 219-220.

governors of the hospital declared its current building to be "very old weake & ruinous and to*o* small & streight for keeping the great number of Lunatickes as are therein," and after briefly considering expanding the existing structure, they decided to build a new hospital big enough to accommodate 120 patients. It was to be sited in the expansive Moorfields "for health and Aire.[547]

With the instigation of William Turner (1615–1693), the president of both Bethlem and Bridewell Hospitals, Hooke, a City Surveyor since 1666, was commissioned with the design of the new building.[548] Hooke was already working on the repairs to Bridewell Hospital, and the previous year Turner had commissioned him with the design of his almshouses in Kirkleatham, so he must have seemed an obvious choice.[549] Two of Hooke's presentation drawings are extant (**Figures IV-108 and IV-109**), though none of the models mentioned in the diaries or the meeting minutes have survived.

Moorfields (**Figure IV-110**) was a city-owned open area just north of the London wall. It had been drained in the sixteenth century and was used by all Londoners for walking, grazing animals, and even drying laundry.[550] Its selection as the site of the new hospital suggests that Evelyn's idea of purifying air with green spaces planted with 'odiferous and refreshing' flowers and trees had gained some acceptance by then, and combined with the traditional idea of the relationship between health and air, Moorfields seems to have provided the ideal location.[551]

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[547] Minutes of the Court of Governors of Bridewell and Bethlem Hospital, 23 Jan., 6 Mar., and 8 May 1674, vol. 12, pp. 609, 623, 638; see above for longer extracts. See also Stevenson, *City and the King*, p. 243.

[548] Cf. 14 Apr. 1674 diary entry above. William Turner served as the president of the hospitals between 1669 and 1687; for biographical details, see Gauci, 'Turner, Sir William (1615–93), of St. Paul's Churchyard, London'; Cornforth, 'Kirkleatham, Cleveland - II', p. 134.

[549] See ii. 11 and ii. 15 in this chapter on Hooke's work at Bridewell Hospital in London, and Turner's almshouses in Kirkleatham.

[550] Laura Williams, '"To Create and Refresh Their Dulled Spirites in the Sweet and Wholesome Ayre:" Green Space and the Growth of the City', in *Imagining Early Modern London: Perceptions and Portrayals of the City from Stow to Strype, 1598–1720*, ed. J. F. Merritt (New York: Cambridge University Press, 2001), pp. 185-213, at p. 191.

[551] At the time, London was suffering from severe air pollution due to the use of low-quality sulphur-rich coal as a cheap alternative to firewood of which there was a severe shortage. In 1661, Evelyn produced a pamphlet addressed to the newly-restored king with suggestions such as moving the pollution-producing industries to outside of the city, and planting shrubs, fragrant flowers and trees on square fields of 20 to 40 acres surrounding the city; Evelyn, *Fumifugium*, p. 14. See also Peter Brimblecombe, 'Interest in Air Pollution among Early Fellows of the Royal Society', *Notes and Records of the Royal Society of London* 32 (1978), pp. 123-129.

Two years later, in 1676, Hooke delivered a remarkably palatial building (**Figures IV-108 to IV-134**), one that would prompt Thomas Brown (1663–1704) to wonder "Whether the Persons that ordered the Building of it, or those that inhabit it, were the maddest?"[552] Indeed, its grandeur would often be remarked upon and contrasted to the modesty of royal palaces.[553]

The building was situated so that its main ornate facade facing North opened onto Moorfields (**Figures IV-112 to IV-128**), and the South facade faced the surviving section of the London Wall (**Figure IV-129**) and was punctured by the unglazed windows of the patients' rooms (**Figure IV-130**). It was built with a 'single-pile' plan, i.e. with a long gallery corridor servicing patients' rooms on one side only—a configuration with a central corridor with rooms on both sides would have been much more economical, cutting the length of the building by half. But a conscious decision was made, perhaps at the 11 July 1674 meeting when Hooke was able to convince the court that the new Bethlem "be single building not double."[554] This was presumably to facilitate the movement of healthy, clean air from Moorfields into the building.[555] Evelyn seems to have approved of the result; on 18 April 1678, he wrote in his diary "I went to see New Bedlam Hospital, magnificently built, & most sweetly placed in Morefields."[556]

According to John Strype, the resulting "stately and magnificent Structure," built of brick and stone, was 540 feet in width and 40 feet in breadth, with gardens in the front enclosed by a wall with grated openings allowing views of the facade. At the two ends of the building, enclosed within high walls, were two grass yards where the patients could "air themselves" during the summer (**Figure IV-114 detail**). The galleries were 193 yards long, 16 feet wide, and 13 feet high, and the patients' rooms were 12 feet deep (**Figures IV-131 and IV-132**).[557] Strype also reported that only patients who were deemed curable, or if not, dangerous, poor, or otherwise incapable of self-care, were admitted. "Those that are only Melancholick, or Ideots, and judged not capable of Cure, these the Governors think the House ought not to be burthened with." Each patient had a private room, and if they were deemed fit, could walk in the long galleries at set times during the day. In the winter, the rooms were heated

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[552] Thomas Brown quoted in Stevenson, 'Architecture of Bethlem', p. 232.

[553] Ibid.

[554] See above for the extract from the minutes.

[555] Stevenson notes that the use of such a plan "would permit the great length of facade, the direct lighting of the galleries, and claims to be made for the building's openness to the healthful air of Moorfields;" Stevenson, 'Architecture of Bethlem', p. 235.

[556] de Beer, *The Diary of John Evelyn*, vol. 4, pp. 133-134.

[557] John Strype, *Survey of London (1720)* (Sheffield: hriOnline, 2007), book 1, chapter 26, pp. 192-193.

with stoves, and hot baths provided, and in the summer, cold baths were set up to cool and wash the patients, useful for "airing their Lunacy." The 'airing', whether through the building's orientation towards Moorfields, or through the patients' outdoor strolls and cold baths, appears to have worked—in 1703, the Hospital boasted of having cured two out of three patients in the past twenty years.[558]

Strype's account, as he himself noted, originated from Edward Tyson (1651–1708), Hooke's friend and collaborator in the 1680 dissection of a porpoise.[559] Tyson had been appointed physician to Bethlem and Bridewell Hospitals in 1684, thus his intimate knowledge of the hospital and its workings, but given his friendship with Hooke and their collaborations on anatomical experiments, it may be reasonable to assume that he was partly reflecting Hooke's ideas about the effects of respiration, and 'airing'.

By the beginning of the nineteenth century, the building was badly in need of repairs. A 1799 survey found structural problems related to some incompetence in the original construction, and it was decided, once again, to build a new Hospital.[560] Demolition of the Moorfields building was already under way in 1810, and the Hospital moved into its new building in St. George's Fields in 1815. The two life-size figures, 'Melancholy Madness' and 'Raving Madness', carved by the sculptor Caius Gabriel Cibber (1630–1700) for the main gate of the hospital (**Figures IV-111, IV-133 to IV-135**) are still extant, however. They are now on display at the Bethlem Museum of the Mind in Kent.[561]

ii. 17. MERCERS' HALL AND CHAPEL [SPECULATIVE]

Secondary source attribution: Batten, p. 111 (though with caution), based on several mentions of Mercers' Hall and Chapel in Hooke's diaries.

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[558] Ibid., book 1, chapter 26, p. 196. It is unclear what the standards were in measuring such an implausibly high rate of success. On Strype's references to open spaces, health, and clean air, see also Williams, "'To Create and Refresh Their Dulled Spirites in the Sweet and Wholesome Ayre:" Green Space and the Growth of the City', p. 198.

[559] See the annotations for Figures III-229 to III-232. cf in Chapter III. For biographical details, see 'Tyson, Edward (1651–1708)', *ODNB*, and Montagu, *Edward Tyson*.

[560] It is tempting to think that the state of disrepair may have been due to a lack of proper maintenance, but the surveyor's report noted several irregularities, e.g. the lack of ties between the facade walls, that could only have been caused by the original construction. On the report, see Stevenson, 'Architecture of Bethlem', p. 252.

[561] 'Cibber, Caius Gabriel (1630–1700)', *ODNB*.

Chapter IV – Building

Brief description: After they were completely destroyed in the Great Fire of 1666, the Hall and Chapel of the Mercers' Company were rebuilt by architects Jerman and Oliver, with plans beginning in 1667 and construction between 1672 and 1676. Hooke was a consultant in a legal dispute between John Frederick and the Company regarding the construction of the Hall.

Primary sources:

– Hooke's entries in *Diary i*:
- 1 Aug. 1674 (p. 115): "At Sir J. Fredericks about Mercers lights."
- 3 Oct. 1674 (p. 124): "At Sir J. Fredericks 20sh. At Mercers chappell with Lem and Griffith."
- 7 Oct. 1674 (p. 125): "Gave Sir J. Frederick account of Mercers hall."
- 8 Oct. 1675 (p. 185): "Mercers company orderd me £40 for Turret."

Assessment:

Batten found some of the references to the Mercers' Hall and Chapel in the diaries "very suggestive" but noted that the Company could not find Hooke's name in their books. She was writing this at a time when there was limited scholarship on the construction of these buildings, but since then, a study of the Hall heavily based on Company archives has yielded more information.

The Mercers' Hall and Chapel, along with their other properties such as the Royal Exchange and St. Paul's School, had been destroyed in the 1666 Fire of London. As soon as the first Rebuilding Act was passed in February 1667, architect Edward Jerman (*c.* 1605–1668) was appointed Company Surveyor and commissioned to rebuild the Hall, Chapel, and Schoolhouse.[562] Upon his death, he was replaced by John Oliver (*c.* 1616–1701). Hooke, as one of the four City Surveyors working alongside them, knew both Jerman and Oliver, and may very well have visited the construction site upon their requests. Another reason for the mentions of the Mercers in the diaries was Sir John Frederick (*bap.* 1601, *d.* 1685), a former mayor of London and president of Christ's Hospital 1662–1683, who owned the neighbouring property which had sustained some damage during the construction of the Hall and was disadvantaged by the height of the new building. Frederick lodged several complaints against the

[562] On Jerman's involvement in the reconstruction of the Mercers' buildings, including the Royal Exchange and St. Paul's School, see Ian Doolittle and Ann Saunders, *The Mercers' Company, 1579–1959* (London: Mercers' Company, 1994), pp. 72-83; for detailed information on the rebuilding of the Hall and Chapel, see Jean Imray, *The Mercers' Hall* (London: London Topographical Society [and] The Mercers' Company, 1991), pp. 23-48.

Company and Hooke was asked to give his opinion to find a middle ground. Eventually his recommendations were ignored.[563]

It would be amiss not to mention that Gresham College, where Hooke lived and the Royal Society met, was under the care of the Mercers' Company.[564] Any repairs to his lodgings or alterations of any part of the building would have required their approval, which may explain Hooke's 8 October 1675 note "Mercers company orderd me £40 for Turret."

ii. 18. MERCHANT TAYLORS' HALL AND SCHOOL

Attributions: Batten, p. 91; Colvin (1978) and subsequent editions.

Brief description: In 1674, Hooke designed an oak screen for the Merchant Taylors' Company Hall on Threadneedle Street, and in 1674–1675, a new building for its School on Suffolk Lane.

Primary Sources:

– Hooke's entries in *Diary i*:
- 1 Aug. 1673 (p. 53): "Sent for to Merchant taylors about Viewing the Hall by Sir W. Turner and Sir W. Pritchard and about Screen."
- 13 Aug. 1673 (p. 55): "at Merchant Taylors hall with Milner."
- 14 Aug. 1673 (p. 55): "made out taylors floor."
- 15 Aug. 1673 (p. 55): "at Merchant Taylors Hall. Designe of Screen and pavement accepted at Clipsams."
- 16 Sep. 1673 (p. 60): "at Merchant Taylors hall about raising the new pavement."
- 21 Sep. 1673 (p. 61): "Designed Merchant Taylors Garden."
- 22 Sep. 1673 (p. 61): "Sent for to Merchant taylors."
- 1 Oct. 1673 (p. 63): "Gave Milner the Draught of Merchant Taylors Garden."
- 15 Oct. 1673 (p. 65): "at Guildhall with Milner of Merchant taylors."
- 28 Jan. 1674 (p. 83): "At Merchant Taylors Scole. Ordered to draw up platt."

[563] See the diary entries above and Imray, *The Mercers' Hall*, pp. 36-37.

[564] Thomas Gresham (*c.* 1518–1579), who had been a member of the Mercers' Company, left his estate to the Company and the City of London to establish a College with seven professors to give public lectures on the seven liberal arts. In 1665, Hooke was elected Gresham Professor of Geometry, a position he held until his death; see Chapter I.

- 29 Jan. 1674 (p. 83): "Contrived with Lem Designe of Merchant Taylors School."
- 3 Feb. 1674 (p.85): Deliverd Sir W. Turner Merchant Taylors School draught"
- 11 Feb. 1674 (p.86): "At Merchant Taylors Schoole . . . in Merchant Taylors hall."
- 4 Mar. 1674 (p. 90): "Writ addresse to Merchant taylors."
- 25 June 1674 (p. 109): "With Merchant taylors view."
- 28 July 1674 (p. 114): "At . . . Merchant Taylors scoole."
- 23 Sep. 1675 (p. 182): "at Merchant taylers, Milner."
- 1 Oct. 1675 (p. 184): "Writ two certificates for merchant taylors only"
- 6 Oct. 1675 (p. 184): "Cald first at Merchant Taylors hall."
- 8 Oct. 1675 (p. 185): "To Marchantaylors view."
- 12 Oct. 1675 (p. 187): "At Merchant taylors hall."
- 4 Jan. 1676 (p. 208): "Sir Wm. Turner there prompt me with Merchant Taylors hall."
- 25 Apr. 1676 (p. 228): "Drew designe for Merchant Taylors. At Sir W. Turners."
- 26 Apr. 1676 (p. 228): "Ended Merchant Taylors draught. They sat not."
- 31 Dec. 1676 (p. 265): "Due from merchant taylors for busnesse done for them [blank]."
- 20 Oct. 1679 (p. 428): "Mr. Rowles at Merchant taylors hall 10sh."
- 21 Oct. 1679 (p. 428): "Dinner Merchant taylers hall."

Description:

The Great Fire of London in 1666 caused devastating damage to the Merchant Taylors' Company. Its Hall was gutted and its School were completely destroyed, as were many of the properties it rented out, resulting in a loss of £1,400 in annual revenue. The Company's ability to start a reconstruction campaign right away was thus severely limited and was further frustrated by the shortage of building materials and labour.[565] In 1668, Sir William Turner (1615–1693), a freeman of the Company, was elected Lord Mayor. After his mayoral tenure, he concentrated his energy on facilitating the completion of the Hall, raising funds from the Company members, and commissioning paintings, upholstery, and furnishings for its embellishment.

It was in this context that Turner hired Hooke to build an oak screen for the Hall (**Figure IV-136**). Hooke's design was approved on 15 August 1673, the joiner George Pawley was paid £3 to produce a measured drawing, and Mr. Whiting undertook the construction for £200, accepting the

[565] Matthew Davies and Ann Saunders, *The History of the Merchant Taylors' Company* (Leeds, UK: Maney Publishing, 2004), pp. 202-203.

commission in August and finishing it by the Autumn before Lord Mayor's Day. Hooke was also consulted on the paving and designed the gardens, though unfortunately none of the drawings mentioned in the diary are extant.[566] A 1680 drawing by John Oliver (1616–1701), who was a city surveyor with Hooke, shows the outlines of this garden though little else (**Figure IV-137**).[567] There appear to have been three separate gardens; the one presumably designed by Hooke south of the Hall, one used by the tenant Gabriel Glover (Glover's Garden), and a third one east of the kitchen and thus possibly a kitchen garden.[568]

On 28 January 1674, Hooke was additionally asked to produce a design for rebuilding the Merchant Taylors' School on Suffolk Lane (**Figures IV-140 to IV-142, IV-144 to IV-145**).[569] The next day he met with Joseph Lem, the bricklayer who had been overseeing the reconstruction of the Hall since 1671 (**Figures IV-138 and IV-139**), to collaborate on a design, and five days later delivered a draught to Turner. What was eventually built was a brick building of eight bays (**Figure IV-140)**, housing a chapel (**Figure IV-144**), library, school room (**Figure IV-145**), as well as rooms for the headmaster and three ushers, and a schoolyard in the rear with a cloister of either paired columns or pilasters (**Figure IV-140 to IV-142**).[570] The last payment for the construction was made on 26 November 1675; the building was demolished 200 years later in 1875.

An undated sketch among Hooke's papers at Trinity College, Cambridge (**Figure IV-143**), bears some resemblance to the courtyard facade of the School but it is too generic to be able to connect it to the project with any confidence.[571]

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[566] Catherine Davis, 'London Livery Company Gardens: The Merchant Taylors' and the Girdlers' Gardens (1666–2013)', *London Gardener* 17 (2012/2013), pp. 58-67, p. 60; Davies and Saunders, *The History of the Merchant Taylors' Company*, pp. 206-207. The screen remained in place until it was destroyed in 1940 during a bombing.

[567] The drawing was commissioned in May 1680 and may have been prepared with William Leybourne's assistance; Davies and Saunders, *The History of the Merchant Taylors' Company*, p. 206. It has been reproduced in ibid., pl. XVI; Davis, 'London Livery Company Gardens', p. 58.

[568] Davis, 'London Livery Company Gardens', pp. 59-60.

[569] For histories of the school, see H. B. Wilson, *The History of Merchant-Taylors School, from its Foundation to the Present Time*, 2 vols. (London: [Printed by Marchant and Galabin], 1812–1814); Francis R. Nixon, *The History of Merchant-Taylors' School, with Five Lithographic Views* (London: Taylor and Hessey, 1823); Frederick William Marsden Draper, *Four Centuries of Merchant Taylors' School, 1561–1961* (New York: Oxford University Press, 1962).

[570] Davies and Saunders, *The History of the Merchant Taylors' Company*, p. 208.

[571] It should also be noted that some of Hooke's notes in the same bundle have been dated to 1685, which is a decade after the School was built; see also the annotations for Figure III-181 in Chapter III.

Batten points out that while Hooke was clearly involved in the design of the school, his name only appears in the Company's books for the Hall. She speculates that Hooke may have been paid by Turner directly as a consultant to Lem who had been working with the Company since 1671.[572]

ii. 19. MONTAGU HOUSE, BLOOMSBURY, LONDON

Attribution: Aubrey, *Brief lives*, p. 98; Batten, pp. 93-96; Colvin (1954) and subsequent editions; 'Espinasse, pp. 97-99; Alison Stoesser, 'Robert Hooke's Montagu House: London Architecture with Continental Flair', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 165-179; Worsley, pp. 6-11 [for the second house].

Brief description: Beginning in 1674, Hooke built the Montagu House in Bloomsbury, London, for Ralph Montagu. The building later served as the first home of the British Museum.

Primary sources:

– Hooke's entries in *Diary i*:
- 31 July 1674 (p. 115): "To Flamstead . . . He spoke about R Montacues house and new quadrant."
- 28 Aug. 1674 (p. 119): "At Mr. Montacues with Vernon[573] 2sh. . . . At Whitehall with Mr. Montacue at Brooks Mordants . . . To waite on Mr. Montacue on wensday next at Northumberland[574] house."
- 2 Sep. 1674 (p. 119): "With Mr. Montacue to Southampton Feilds."
- 10 Sep. 1674 (p. 121): "Received a letter from Mr. Montacue."
- 12 Sep 1674: (p. 121): "At home all day about Mr. Montacue plat."
- 13 Sep 1674 (p. 121): "Mr. Peirce[575] here. Compleated Designe."
- 14 Sep. 1674 (p. 121): "At Mr. Peirces. Missd him."
- 18 Sep. 1674 (p. 121): "Mr. Peirce brought home draught."
- 21 Sep. 1674 (p. 122): "Missd Mr. Montague."

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[572] Batten, p. 91.

[573] Francis Vernon (*bap.* 1637, *d.* 1677), who had been elected fellow of the Royal Society in 1672. He almost certainly knew Hooke from Westminster School, which he attended 1649–1654, or Christ's Church, Oxford, where he matriculated in 1654. He had accompanied Ralph Montagu, another Westminster alumnus, on the latter's Paris mission, and had just returned to England in March; 'Vernon, Francis (*bap.* 1637, *d.* 1677)', *ODNB*.

[574] Montagu's wife Elizabeth was the widow of Joceline Percy (*d.* 1670), eleventh earl of Northumberland, and appears to have retained her title as Lady Northumberland even after marrying Montagu.

[575] Edward Pearce or Pierce (*c.* 1635–1695); see also footnote 317.

- 24 Sep. 1674 (p. 122): "At Mr. Mountacues. Left with him my designe."
- 12 Oct 1674 (p. 126): "At Mr. Mountacues with Mr. Fitch and agreed upon setting out ground &c. at the Ground and drank with Mullet and Fitch."
- 17 Oct. 1674 (p. 127): "At Mr. Montacues. With Povey, Samuell, Mullet, Fitch, agreed module."
- 5 Nov. 1674 (p. 128): "With Mr. Montacue about module. He orderd to lay out £20 on it."
- 3 Dec. 1674 (p. 133): "Mr. Montacue here."
- 9 Dec. 1674 (p. 134): "At home all Day about Montacues Module."
- 10 Dec. 1674 (p. 134): "To Mr. Montacues 1sh. Prevented his coming. He approvd great Rome and promisd Fitz."
- 13 Dec 1674 (p. 135: "Drew upright of Wings for Montacue."
- 15 Dec 1674 (p. 135): "With Mr. Mountacue. Mr. Sidley, Fitch, Davys here. Saw module approved. Orderd all hast to be made."
- 5 Feb. 1675 (p. 145): "Drew draught for Montacue."
- 5 Mar 1675 (p. 151): "Finisht estimate for Mr. Mountacue."
- 8 Mar. 1675 (p. 151): "Letter to Montacue."
- 12 Mar. 1675 (p. 152): "Finisht Mr. Montacues front Monday morn."
- 16 Mar. 1675 (p. 143): "At Mr. Montacues. Shewd him front of house which he liked."
- 17 Mar 1675 (p. 153): "Mr. Fitch here. Before he went to Mr. Montacue. Davys men brought in Module. Directed carpenter about the Ceeling of the stairs and partition and shoring plate of dining room."
- 3 Apr. 1675 (p. 157): "At Mr. Montacues, Povey. Montacue well pleased. Harry to coppy pictures for him."
- 10 May 1675 (p. 160): "Received from Davys about Montacues module £3."
- 13 May 1675 (p. 160): "At Mr. Montacues. At Blomesberry."
- 22 May 1675 (p. 162): "in Bloomsberry with mr. Mountacue, Mr. Russell, Leak, &c. Measurd out Ground to a square."
- 4 June 1675 (p. 163): "At Mr. Montacues. At Bloomsberry."
- 5 June 1675 (p. 163): "At Mr. Mountacues with Fitch. At Mr. Poveys with Harry. Harry carryed home piece to Montacue. Told Montacue of Pillers 20 foot high for £10."
- 17 June 1675 (p. 165): "At Mr. Montacues and at the ground with Mr. Russell and Montacue."
- 20 June 1675 (p. 165): "Finished Montacue Draughts."
- 21 June 1675 (p. 165): "To the King met Mr. Montacue in the Park."

- 22 June 1675 (p. 165): "All the morn at Mr. Montacue, Chace and T. Fitch. Lane and Fitch disappointed. J. Fitch cavilld."
- 29 June 1675 (pp. 166-167): "Set out Mr. Montacues front . . . With Scarborough. Davis with Mr. Montacue. Had a promise. Scarborough to have 10sh. per week. With Mr. Montacue at Somerset House. At Southampton House. At Mr. Wilds saw St. Peters &c."
- 6 July 1675 (p. 168): "Made ground plat of Wings for Fitch his contract. Scarborough here and cald at Montacues. Set out front foundation at 10 $\frac{1}{4}$. Mountacue on the ground, also Mullet and Sir Christopher — Mullet writ above me. a fool . . . Harry promisd Pictures from Mountacue."
- 19 July 1675 (p. 170): "At Bloomsbery with Mr. Montacue. He orderd stables bigger two foot, Mullet a Raskall."
- 24 July 1675 (p. 170): "To Bloomsberry. Fell out with Mr. Fits about the stock bricks in the front of the house."
- 27 Aug. 1675 (p. 177): "Told Mr. Montacue of Fitch."
- 1 Sep. 1675 (p. 177): "With Fitch to Bloomsberry. Saw the chimneys set out."
- 23 Sep. 1675 (p. 182): "Calld at Martins and Pits for Mr. Montacue. Spoke with him about Davys. &c. about Bricks. Povey there about marbling the side of the staircase."
- 30 Sep. 1675 (p. 183): "Spoke for Black marble, 12 inches. To Mr. Montacue with Harry and Davys. Cald at Mr. Godfreys. Saw both orders about balcony and turret . . . Walkd with Mr. Montacue."
- 8 Oct. 1675 (p. 185): "With Waters to Bloomsberry to Mr. Montacue. Found Millers Carless and neglectful."
- 13 Oct. 1675 (p. 187): "Went with Davys to Montacue. To Sir Chr. Wren. Discoursd with Cole the brasier, he showd me chased tobaccobox weighing only 2 ozs. for £3. I promisd to treat about chaced work. Bespoke a cock for £5. Montacue to agree in writing.
- 1 Nov. 1675 (p. 191): "To Mr. Montacue with Davys paper &c."
- 2 Nov. 1675 (p. 191): "With Mr. Montacue with Mr. Davys to Bloomsberry. Wilk denyd."
- 6 Nov. 1675 (p. 192): "At Mr. Montacues. Spoke about drain."
- 13 Nov. 1675 (p. 194): "Views; Mr. Montacue agreed with Davys. Italian painter Plaisterer and hanging maker."
- 1 Dec. 1675 (p. 197): "Mr. Montacues treated about drain."

- 18 Dec. 1675 (pp. 201-202): "With Davys at Mr. Montacues at Mr. Logans . . . Sent Davys to see for Mr. Montacue."
- 31 Dec. 1675 (p. 205): "With Davys and Scarborough to Mr. Montacue. Walkd into his upper apartment."
- 17 Jan 1676 (p. 212): "To Bloomsberry, thence to Mr. Montacue. Discoursed with him about levelling Court sinking garden. Drank tea. About Davys."
- 15 Apr. 1676 (p. 226): "Mr. Montacue at Bloomsbery. Told him my contrivance for semicircular higher tarris and fountaine with semicircular steps."[576]
- 28 Apr. 1676 (228): "to Mr. Mountacues. The west half of his Roof up. Resolved on the height of the wings, the rooms to be only 14 foot in the cleer."
- 2 May 1676 (p. 229): "With Mr. Fitch at Bloomsberry. Directed the placing the chimneys in the garretts."
- 10 May 1676 (p. 231): "To Bloomsberry met Mr. Montacue. Mr. Povey to board the upper part of the Roof."
- 24 May 1676 (p. 234): "At Mr. Mountacues. Saw his new bought picture some good. Much discourse with him about high roof. To Bloomsberry. Discoursd Hayward, he demanded £30 for higher roof, stair, stair head, chimneys, &c."
- 12 June 1676 (p. 237): "With Mr. Montacue from Garaways to Waters's chimney peices."
- 19 June 1676 (p. 238): "At Mr. Montacues with Mr. Povey . . . Mr. Montacue refused Hayes about hinges. Mr. Montacue going ambassador for France."
- 29 June 1676 (p. 239): "At Bloomsberry with Mr. Fitch. Saw glasse defective by Mr. Haywards ill framing."
- 1 July 1676 (p. 239): "With Mr. Montacue about covering chimneys . . . To Bloomsberry. At the top of the new flat. Directed covering and trussing chimneys. He orderd copper guilt balls and iron work for pavilion chimneys. I directed moulding at the bottom of the chimneys."
- 3 July 1676 (p. 240): "With Fitch to Mr. Mountacues. Directed the top of chimneys at Thomsons."
- 4 July 1676 (p. 240): "At Mr: Montacues, told him of chimneys. With Waters about chimney peices, Scarborough there."
- 5 July 1676 (p. 240): "Bespoke of Thomson Irons for chimneys."

[576] See Figures IV-147, IV-149, IV-151, and IV-156 for the garden and fountain.

- 8 July 1676 (p. 241): "To Thomsons and Bloomsberry. Irons for chimney done . . . Met Sir J. Hoskins at Childs. Resolved . . . to goe into France with Mr. Montacue."
- 13 July 1676 (p. 242): "To Bloomsberry top of chimney began."
- 14 July 1676 (p. 242): "At Bloomsberry about Haylofts, stables, stairs."
- 17 July 1676 (p. 243): "Missd Mr. Montacue . . . Top of Chimneys pulld down."
- 24 July 1676 (p. 244): "At Mr. Montacues he advised me for France and proferd me his favour. Discoursd about Portico and cupelos. Agreed about chimney pieces for Waters."
- 31 July to 10 Aug. 1676 [single entry] (p. 245): "Talkd long with Mr. Montacue. He promised and invited me to France."
- 14 Aug. 1676 (p. 246): "Stayd a long while with Mr. Montacue. He promised me £200 at Michaelmas and £50 at Xmas. Appointed Tasker for valuation."
- 17 Aug. 1676 (p. 246): "Spoke with Mr. Montacue in his chair at the mews gate about altering the chimneys on the pavillions."
- 11 Sep 1676 (p. 249): "Drew chimneys for Mr. Montacue."
- 12 Sep. 1676 (p. 249): "At Mr. Montacues. He allowed to leave out turret of wings. Directed chimney with Scarborough at Hercules pillers."
- 13 Sep. 1676 (p. 249): "to Mr. Montacue. With him to Bloomsberry. Took direction about some matters adjusted Mr. Fitch his bill of walling."
- 16 Sep. 1676 (p. 250): "Mr. Montacues, he promised me £200 after michaelmas. Promised to send me the module."
- 20 Sep. 1676 (p. 250): "To Mr. Montacue. Spoke with him about many things. He gave me Paper to Receive £200 at Michaelmas. Saw module of his Pictures Venus and Adonis . . . Mr. Povey propounded pillers before wings."
- 21 Sep. 1676 (p. 250): "To Mr. Montacues. With him to Bloomsberry. Pleasd with chimneys. Cupelos over gateways &c. He promised me French Academy bookes. Took his last leave alone. Discoursd with Thomson about gateway and Stepps. "
- 2 Oct. 1676 (p. 252): "Bid Hayward doe Mr. Montacue door as he saw fit soe he raisd not the price."
- 6 Nov. 1676 (p. 255): "Deliverd to Mr. Not a Letter for Ambassador Montacue."
- 31 Dec. 1676 (p. 265): "Due from Mr. Montacue upon promise for building his house £50, I hope £100."
- 16 Feb. 1677 (p. 274): "at Montacue house. Disliked the placing of the stairs."

- 2 Apr. 1677 (p. 283): "Davys here. To Bloomsberry, lookd over all particulars. Writ a note of Querys to Mrs. Montacue."
- 28 May 1677 (p. 292): "Cooper for money for Mr. Montacue sewer."
- 13 June 1677 (p. 295): "To Bloomsberry with Davys, set out garden."
- 19 June 1677 (p. 296): "Carryd letter for Mr. Montacue to Scowen seald."
- 23 July 1677 (p. 303): "To Mr. Scowens. Mr. Montacue desird his stairs to be on walls. To Mr. Povey and Mans coffe house with Scowen."
- 28 Aug. 1677 (p. 309): "At Bloomsberry, orderd Norris £40 on chimney peices . . . Spake to Scowen for my own money."
- 30 Aug. 1677 (p. 309): "Drew stair for Mr. Montacue. Borrowd pictures of Scowen for Harry Hunt."
- 6 Sep. 1677 (p. 311): "Sent a letter to Lord Ambassador Montacue."
- 9 Oct. 1677 (p. 319): "at Scowen. Mr. Montacue will be here a fortnight hence."
- 12 Oct. 1677 (p. 320): "directed Hayward about Montacue Cloysters and stair trusse, &c."
- 15 Oct. 1677 (p. 320): "Sherwood refused to proceed in plaistering Montacue cloyster . . . orderd Hayward timber Lintell for Montacue stairs."
- 19 Oct. 1677 (p. 321): "Wrote to Not to lend Norris £30 upon Mr. Montacues account to be repaid by him in a fortnight."
- 6 Nov. 1677 (p. 326): "Missd Mr. Montacue at Wardrobe and house, Talked with Scowen &c. Norris sly."
- 7 Nov. 1677 (p. 326): "I spake with Mr. Montacue for Stevenson &c."
- 17 Nov. 1677 (p. 328): "With Davys to Montacue house . . . To Bloomsberry missd Mr. Montacue."
- 18 Nov. 1677 (p. 329): "Lord Montacues draughts."
- 24 Nov. 1677 (p. 330): "Read over Articles with Scowen. Waited on Mr. Mountacue and Sidley, then read over Fitches demand of over work."
- 25 Nov 1677 (p. 330): "With Lord Embassador Montacue, $1\frac{1}{2}$ hours."
- 27 Nov. 1677 (p. 330): "Finisht Fitches contracts and Bills too late for Mr. Montacue."
- 28 Nov. 1677 (p. 330): "With Scarborough to Mr. Montacue, with him to his house and into his Garden. deliverd Fitches papers to Mr. Scowen."

- 4 Dec. 1677 (p. 332): "At Montacue house with Mr. Montacue and the two Fitches. Scowen Biassed."
- 5 Dec. 1677 (p. 332): "Discoursed with Mr. Montacue. He seemd well satisfyd in all things. Orderd Mr. Scowen to pay me £50 upon the old and £50 upon the new building . . . Desird me to send him the agreements, Designes and Estimates."
- 6 Dec. 1677 (p. 333): "Mr. Montacues account ended, wherein he is made Debtor to Mr. Fitch £800."
- 28 Dec. 1677 (p. 337): "Calld Mr. Davys with him to Scowen. Gold brought noe news. Resolvd about Sending to Mr. Montacue for books and account of the two additions."
- 30 Dec. 1677 (p. 337): "Wrote to Mr. Montacue for my two books Le Batemens de France and Le mesure de la terra. At Garways, met with Fitch, he promised to meet me tomorrow at Bloomsberry."
- 5 Jan. 1678 (p. 338): "Hayward here, to Bloomsberry. Directed Thomson about stairs with corbells &c."
- 4 Feb. 1678 (p. 343): "with Norris, bespake chimney pieces and agreed for 60 pounds."
- 18 Mar. 1678 (p. 349): "at Bloomsberry directed passages, stairs, wainscoting, staircase."
- 23 Mar. 1678 (p. 349): "at Bloomsberry, Scowen a note of chimney peices. Directed passages and stairs."
- 13 June 1678 (p. 362): "drew designe for Lord Emb. Montacue."
- 26 June 1678 (p. 364): "with Mr. Hammond to Bloomsberry. agreed with him. Spake with Scowen."
- 27 June 1678 (p. 365): "Agreed with Mr. Hammond for Bloomsberry stairs."
- 13 July 1678 (p. 366: "to Mr. Montacue with Mr. Davys, Talkd long with him."
- 18 July 1678 (p. 367): "To Olivers, Mr. Montacues, Directed to Agree with J. Fitch for coachhouses, washhouses, &c."
- 19 July 1678 (p. 367): "at Montacue House, to Mr. Montacue, set out walls."
- 23 July 1678 (p. 368): "With Slayer, Hutchins, Nicholson and German at Montacue house, directed stayres, wash house, vault, coach houses."
- 24 July 1678 (p. 368): "with Mr. Montacue about his stables in vault, Stairs out of Cloyster, sick horse stable."
- 26 July 1678 (p. 368): "to Montacue house met Mr. Mantacue, he agreed stable, staircase, &c."
- 3 Aug. 1678 (p. 370): "Also Mr. Montacues successor, Sir Thom. Armstrong."

- 7 Aug. 1678 (p. 370): "at Bloomsberry with Scowen, then to Lord Montacues, he desired to have staircase Railes done."
- 19 Aug. 1678 (p. 372): "at Bloomsberry, directed stairs, partitions in vault, Lock of the hall door, vaults in additionalls."
- 4 Sep. 1678 (p. 375): "At Montacue house, met Hammond, agreed staircase to consent."
- 5 Sep. 1678 (p. 375): "Scowen huffed. agreed with Slater for 28sh. per square. Directed carpenter, bricklayer, etc. Scarborough draught of chimney."
- 14 Sep. 1678 (p. 376): "At Mr. Montacues, Directed stairs, Carpenters, etc, met Scowen. Directed Lever about Iron Raile in front."
- 1 Oct. 1678 (p. 379): "To Montacue house disliked garden stairs. Spake about gates."
- 21 Oct. 1678 (p. 381): "At Mr. Montacues. Walkd with him an houre in the Garden. Spake about sashes, etc."
- 26 Nov. 1678 (p. 386): "to Mr. Davys, mist him. at Montacues with Tompion, viewd turrets, chimneys &c, walked long with him in the Garden."
- 21 Jan. 1679 (p. 394): "with Hayward to Colledge and Montacue house. Ballisters on top of house and raile on court stairs. Met Scowen."
- 22 Feb. 1679 (p. 400): "to Mr. Montacues. Spake with him. Mr. Fitch there. Viewd staircase and railes."
- 28 Feb. 1679 (p. 401): "at Mr. Montacues with Hammond about widening stairs."
- 11 Mar. 1679 (p. 402): "To Montacue house. Lever about Railes. at Mans, Bates."
- 15 Mar. 1679 (p. 403): "Walkd in Cloyster with Mr. Montacue. Saw his painting. Directed room passage, and iron rayles."
- 17 Mar. 1679 (p. 412): "At Mr. Montacues directed pillers, stairs, rails, arch, etc."
- 24 June 1679 (p. 415): "At Mr. Montacues about Baths, Lord Ranalaughs, Lord Conways Designe, visited Mr. Boyle."
- 11 July 1679 (p. 417): "With Italian to Mr. Montacue."
- 11 Sep. 1679 (p. 424): "At Mr. Montacues directed Baigne. Bill from Scowen for Journalls etc. 15s."
- 27 Sep. 1679 (p. 425): "Signd Birds bill to Mr. Montacue."
- 11 Oct. 1679 (p. 427): "At Mr. Montacues, walkd with him and talked of Parliament, viewd walls, drains, stairs, etc."
- 21 Oct. 1679 (p. 428): "Mr. Montacues, filld up celler."

- 22 Nov. 1679 (p. 431): "At Mr. Montacue, orderd Davys, Mason, £20."
- 2 Feb. 1680 (p. 437): "to Mr. Montacue. Looke with Scowan sash window blown down."[577]
- 1 Mar. 1680 (p. 440): "With Hammond to Montacue, past his Bill."
- 23 Mar. 1680 (p. 441): "At Mr. Montacues, Misses house, Bayne pulld up."
- 7 Apr. 1680 (p. 442): "At Montacue house about Baigne."
- 2 July 1680 (p. 447): "To Sir W, Jones, Mr. Montacues, etc. Bates had laggd and not followd Directions."
- 7 July 1680 (p. 448): "At Mr. Montacues, spake to him for money he promised me. Speedily viewd the cracks. None but that in the turret at the east of the Cloyster."
- 10 July 1680 (p. 448): "Spake to Mr. Montacue for £50 he promised."
- 3 Sep. 1680 (p. 453): "Directed Hayward at Montacue house."
- 22 Sep. 1680 (p. 455): "At Sir W. Jones and Mr. Montacues with R. Scowen."

– Hooke's entries in *Memoranda*:

- 10 Jan. 1681 (p. 145): "at Mr. Montacues, spake with Scowen."
- 21 Jan. 1681 (p. 145): "with Davys to Montacue. he promisd £50."
- 16 Feb. 1681 (p. 146): "with Dauys at whistlers & cast his bill then at Montacue house"
- 16 Mar. 1681 (p. 147): "at Mr Montacues he promisd money at his Returne from Oxford. Desired a Dyall."
- 2 Apr. 1681 (p. 147): "took Declination at Montacue house."
- 12 Aug. 1681 (p. 150): "at Mr. Montacues. in bath"
- 13 Aug. 1681 (p. 150): "at Mr Montacues in Bath."
- 16 Aug. 1681 (p. 150): "at Montacues swore & was mad."
- 5 Aug. 1682 (p. 154): "at Mr Montacues he told me he had orderd Mr Scowen to pay me £50 which has been due to me these two years."

[577] Batten notes that "This is a very early use of sash windows;" Batten, p. 94n3. On the invention and use of sash windows during this period, see A. P. Baggs, 'The Earliest Sash-Window in Britain?', *The Georgian Group Journal* 7 (1997), pp. 168-171; Hentie Louw, 'The Origin of the Sash-Window', *Architectural History* 26 (1983), pp. 49-72, 144-150, Hentie Louw and Robert Crayford, 'A Constructional History of the Sash-Window, c. 1670-c. 1725 (Part 1)', *Architectural History* 41 (1998), pp. 82-130.

– *The Diary of John Evelyn*, vol. 4: Kalendarium, 1673–1689:[578]

- 7 May 1676 (p. 90): "went to see Mr. Montagues new Palace neere Bloomesbery, built by Mr. Hooke of our Society, after the French manner."
- 5 Nov. 1679 (p. 184): "I was invited to dine at my Lord Tividales . . . we afterwards went to see Mr. Montagues new Palace neere Blomesbery, built by our Curator Mr. Hook, somewhat after the French; it was most nobly furnished, & a fine, but too much exposed Garden."
- 10 Oct. 1683 (pp. 344-345): "I went to Lond: with my Wife . . . Visited, the Dutchesse of Grafton . . . & Dining with my Lord Chamberlain (her Father) went with them to see Montague-house, a Palace lately built, by that Gent: who had married the most beautifull Countesse of Northumberland:[579] It is within a stately & ample Palace, Signor Virios[580] fresca Paintings, especialy the funeral Pile of Dido, one the Stayre Case & Labours of Hercules, fight with the Centaures, Effeminacy with Dejanira, & Apotheosis or reception amongst the Gods, on the walls & roofe of the Greate roome[581] above, I think exceedes any thing he has yet don, both for designe, Colouring, & exuberance of Invention, comparable certainely to the greatest of the old Masters, or what they so celebrate at Rome: There are in the rest of the Chambers some excellent paintings of Holbein & other Masters: The Garden is large, & in good aire, but the fronts of the house not answerable to the inside: The Court at Entrie, & Wings for Offices seeme to neere the streete, & that so very narrow, & meanely built, that the Corridore [is] unproportionable to the rest, to hide the Court from being overlook'd by neighbours, all which might have ben prevented, had they plac'd the house farther into the ground, of which there was enough to spare: But in summ,'tisèa fine Palace, built after the French pavilion way; by Mr. Hook, the Curator of our Society: There were with us my Lady Scroope, the greate Witt: & Monsieur Jardine the greate Traveller; & so we came late to Says Court."
- 19 January 1686 (p. 497): "This night was burnt to the Ground my Lord Montagues Palace in Bloom ⟨s⟩ bery; than which for Painting & furniture, there was nothing more glorious in England: This happen'd by the negligence of a servant, airing (as they call it) some of the goods

[578] de Beer, *The Diary of John Evelyn*.

[579] Elizabeth Wriothesley, one of the daughters of the fourth earl of Southampton, Thomas Wriothesley.

[580] Antonio Verrio (*c.* 1639–1707), who was later commissioned to paint the large group portrait depicting the foundation of the Royal Mathematical School at Christ's Hospital; 'Verrio, Antonio (*c.* 1639–1707)', *ODNB*.

[581] See below for Celia Fiennes's description of the room.

by the fire, in a moist season; for indeede so wett & mild a Winter had scarce ben ever seene in mans memory."[582]

– *The Ellis Correspondence* (London, 1829), vol. 1, pp. 25-26:
  - Unknown correspondent to John Ellis, 21 Jan. 1686: "On Wednesday, at one in the morning, a sad fire happened at Mountague House, in Bloomsbury, occasioned by the steward airing some hangings, &c. in expectation of my Lord Mountague's return home, and sending afterwards a woman to see that the fire-pans with charcoal were removed, which she told him she had done, though she never came there. The loss that my Lord Mountague has sustained by this accident is estimated at 40,000*l.*, besides 6,000*l.* in plate; and my Lord Devonshire's loss in pictures, hangings, and other furniture, is very considerable."[583]

– *Letters of Rachel Russell* (London, 1853):[584]
  - Elizabeth Montagu to Rachel Russell, 11 Feb. 1675 (vol. 1, p. 23):[585] "If our house went up as fast as we have models made, we should be in it before you get to yours, for we have no less than three that are big enough for Miss Ann to walk in. I long till the writings are done, that it may be begun; proposing the spending of many a pleasant hour in it."
  - Rachel Russell to John Fitzwilliam, 22 Jan. 1686 (vol. 1, pp. 179-180): "If you have heard of the dismal accident in this neighbourhood, you will easily believe Tuesday night was not a quiet one with us. About 1 o'clock in the night I heard a great noise in the square, so little ordinary, I called up a servant, and sent her down to learn the occasion. She brought up a very sad one, that Montague House was on fire; and it was so indeed: it burnt with so great violence, the whole house

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[582] Batten considers 'burnt to the ground' to be an exaggeration and thinks 'gutted' would have been more appropriate; Batten, p. 95.

[583] George Agar Ellis, ed., *The Ellis Correspondence: Letters Written During the Years 1686, 1687, 1688, and Addressed to John Ellis, Esq.* (London: Henry Colburn, 1829), vol. 1, pp. 25-26. See also Batten, p. 95n1.

[584] Rachel Russell, *Letters of Rachel Lady Russell*, Third ed., 2 vols. (London: Longman, Brown, Green and Longmans, 1853), pp. 84-85. Rachel Russell (*bap.* 1637, *d.* 1723) was one Thomas Wriothesley's daughters and half sister to Elizabeth, Montagu's first wife. When Wriothesley, fourth earl of Southampton, died without a male heir, his properties were divided among his daughters, and the Bloomsbury estate was inherited by Rachel. She later sold a portion of it to her brother-in-law Ralph Montagu for £2,610—it was on this seven-acre property that the Montagu house was built; see Marjorie Caygill and Christopher Date, *Building the British Museum* (British Museum Press, 1999), p. 8. On Russell, see 'Russell, Rachel, Lady Russell (*bap.* 1637, *d.* 1723)', *ODNB*.

[585] This letter is quoted but not fully referenced in Caygill and Date, *Building the British Museum*, p. 8, where the date is given as 11 Feb. 1676. The authors may have assumed the date was in the old style but I have not found any evidence suggesting that and therefore have kept the original date of 11 Feb. 1675 indicated in *Letters of Rachel Russell*, p. 21.

was consumed by 5 o'clock. The wind blew strong this way, so that we lay under fire a great part of the time, the sparks and flames continually covering the house, and filling the court."

– 'Memoirs of the late Duke of Montague', *Monthly miscellany, or, Memoirs for the curious* 3 (Mar. 1709), pp. 80-81:[586] "During the four last Years of King James II. he lived retir'd, enjoying a fine Family, and flowing Fortune; and this time he spent in Building two very magnificent Structures for his own Residence, which remain still as the Best Patterns of Building we have in England, and show the particular Genius of the Great Contriver, *viz.* his House at Boughton, in Northamptonshire, the antient Seat of his Family, an admirable Building, and contriv'd after the manner of Versailes, with extending Wings, excellent Avenues, Vista's and Prospects——For Rich Furniture, exquisite Gardens, Beauty of Building, and advantageous Situation, not to be equal'd in Britain.

The other was his House at Bloomsbury, commonly call'd Montagu House, and which is without Comparison, the finest Building in the whole City of London, or County of Middlesex, (Hampton-Court, only excepted.)

This Noble Structure, he had the Misfortune to build twice over, for having, upon his own Affairs calling him from home, let the house to the late Duke of Devonshire——In the time of fitting up the Lodgings, it had the Misfortune to be burnt down by the Negligence of the Servant; this occasion'd a Suit at Law between those two Noble Persons, which at last ended to the Disadvantage of my Lord Montagu, who was obliged to bear the loss, and Rebuild his House himself; in doing which, it was observable, that the first Model was so exquisitely Perfect; that no Alteration could be made to Advantage: But the House was exactly Built, in the Figure it had before; and this House is so much and so justly admir'd for its Beauty, that his Grace the Duke of Somerset has thought fit to make it very much the Pattern of his House, lately built at Pettworth in the County of Sussex."

– *The Journeys of Celia Fiennes* (London, 1949):[587]

- Through Worcester, Gloucester, Bristol to Wells and Taunton, 1698 (p. 235): "there is a large window just over the alter [of Gloucester Cathedral], but between it and the alter is a hollow walled in, on each side, which is a Whispering place; speake never so low just in the wall at one end the person at the other end shall heare it plaine, tho' those which stand by you shall not heare you

[586] 'Memoirs of the late Duke of Montague', *Monthly miscellany, or, Memoirs for the curious* 3 (1709), pp. 38-45, 77-82.

[587] Celia Fiennes, *The Journeys of Celia Fiennes*, ed. Christopher Morris (London: The Cresset Press, 1949).

speake, its the wall carrys the voyce-this seems not quite soe wonderfull as I have heard for the large roome in Mountague House (soe remarkable for fine painting) I have been in it and when the doores are shutt its so well suited in the walls you cannot tell where to find the doore if a stranger, and its a large roome every way; I saw a Lady stand at one corner and turn her self to the wall and whisper'd, the voice came very deer and plaine to the Company that stood at the crosse corner of the roome soe that it could not be carry'd by the side wall, it must be the arch overhead which was a great height."

- London, *c.* 1701–1703 (pp. 291-292): "Lord Mountagues house indeed has been new built and is very fine; one roome in the middle of the building is of a surpriseing height curiously painted and very large, yet soe contrived that speake very low to the wall or wanscoate in one corner and it should be heard with advantage in the very opposite corner across—this I heard Myself."

– British Library, Add MS 5238, no. 56: Hooke's presentation drawing of an unidentified building, possibly Montagu House, 1686[?]. (**Figure IV-146 or Figure III-76**).[588]

Description:

Ralph Montagu (*bap.* 1638, *d.* 1709), courtier, diplomat, and patron of the arts, was one of Hooke's more distinguished clients in terms of private commissions, and indeed, it was the Montagu House in Bloomsbury, deemed the finest building in London at the time, that launched Hooke's career as the designer of private mansions. Montagu was renowned for his wit, fondness for ostentatious wealth, and scandalous affairs—his rapid rise in Charles II's court was ascribed to "the favour of the ladies" which would eventually turn into a liability.[589] He held various court positions, including the post of 'master of the horse' to Queen Catherine between 1665 and 1678, and 'master of the great wardrobe' from 1671, but most notable was his appointment in 1669 as 'ambassador-extraordinary to France' where he would spend most of his time until the middle of 1672.[590]

Upon returning to England in 1673, Montagu married Elizabeth (*d.* 1690), daughter of Thomas Wriothesley (1608–1667), fourth earl of Southampton, who had died without a male heir and whose

[588] Regarding the citing of two different figure numbers, see footnote 375.

[589] All biographical details, unless otherwise noted, are from 'Montagu, Ralph, first duke of Montagu (bap. 1638, d. 1709)', *ODNB*. Montagu's quarrel with the King's former mistress and a subsequent affair with her daughter, compounded with other accusations, led to his complete dismissal from Charles II's court in 1678.

[590] Montagu's personal diary during his ambassadorship in Paris, is now Beinecke Rare Book & Manuscript Library, Yale University, MS Osborn fb121 (https://goo.gl/JNaqke).

considerable estate was divided among his daughters.[591] Elizabeth's sister Rachel Russell had inherited the Southampton House in Bloomsbury in the London parish of St. Giles's in the Fields. In 1675, she sold a seven-acre portion of the estate to Montagu. The receipt of payment is dated 19 June 1675 but the negotiations had clearly begun long before then—by Autumn 1674, Hooke was already designing a mansion on the lot.[592] With his more ambitious projects still ahead of him, in 1674 Hooke may not have been a natural choice for such a commission, but Montagu knew Hooke from Westminster School where they were pupils under Richard Busby's care.[593] As master of the horse to Queen Catherine, Montagu may even have commissioned Hooke to build her stables at Somerset House.[594]

Assisted by Edward Pearce or Pierce (*c.* 1635–1695), in September 1674 Hooke prepared a preliminary design of the main house, of which a model was made by the joiner Roger Davys at the considerable cost of £20. According to a February 1675 letter from Elizabeth to her sister, it was big enough for her toddler Anne to walk in.[595] In March, Hooke presented a design of the main facade of the house; a presentation drawing extant among his papers at the British Library might be a preliminary version of this (**Figure IV-146**). As it will be discussed below, the house was rebuilt after 1686 and most of the known illustrations of Montagu House depict the later design, but a few illustrations have survived in maps (**Figures IV-147 to IV-151**). The elevation in Morgan & Ogilby's 1682 map (**Figure**

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[591] Elizabeth was also the widow of the eleventh earl of Northumberland; see footnote 574.

[592] On Montagu's acquisition of the property, see footnote 584. A photograph of the receipt of payment is reproduced in Caygill and Date, *Building the British Museum*, p. 9.

Sources on Montagu House include Ian Dunlop, 'First Home of the British Museum', *Country Life* (14 Sep. 1951), pp. 812-814; Gervase Jackson-Stops, 'Daniel Marot and the 1st Duke of Montagu', *Netherlands Yearbook for History of Art* 31 (1980), pp. 244-262; Fritz-Eugen Keller, 'Christian Eltester's Drawings of Roger Pratt's Clarendon House and Robert Hooke's Montagu House', *The Burlington Magazine* 128 (1986), pp. 732-737; Caygill and Date, *Building the British Museum*; Stoesser-Johnston, 'Robert Hooke and Holland'; Alison Stoesser, 'Robert Hooke's Montagu House: London Architecture with Continental Flair', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Hunter (Burlington, VT: Ashgate, 2006), pp. 165-179; and Paul Boucher and Tessa Murdoch, 'Montagu House, Bloomsbury: A French household in London, 1673–1733', in *A History of the French in London: Liberty, Equality, Opportunity*, ed. Debra Kelly and Martyn Cornick (London: Institute of Historical Research, University of London, School of Advanced Study, 2013), pp. 43-68. On Montagu, see also Helen Jacobsen, *Luxury and Power: The Material World of the Stuart Diplomat, 1660–1714* (New York: Oxford University Press, 2012), pp. 138-159.

[593] Stoesser, 'Robert Hooke's Montagu House', p. 166. Stoesser notes that Montagu was at Westminster between 1646-7 and at least 1649, and that Hooke arrived there around 1650; ibid., p. 312n10. It is actually not known for certain when Hooke arrived at Westminster; see Chapter I in this dissertation.

[594] See ii. 4 in this chapter for the stables at Somerset House.

[595] In the diary, Hooke noted only one model while Elizabeth reported "no less than three;" it is possible there was one model made up of three parts.

IV-147), better visible in a later copy (**Figure IV-150**), shows a 13-bay house with a central pediment, in contrast with the 17-bay one in the extant drawing. As it can be seen in the plans (**Figures IV-152 and IV-153**), the estate was arranged around a square courtyard: to its north was the main house, 168' long, which was flanked on either side by offices, stables, and other service quarters (**Figures IV-154, IV-155, IV-163, and IV-164**). To the south, opposite the house, was the screen facing Great Russell Street with an arched entrance and large cupola (**Figures IV-159 to IV-163**).[596] North of the main house were the gardens, which included a semi-circular terrace and a fountain (**Figures IV-156 and IV-157**).[597]

As soon as the lot was officially purchased, construction began in the earnest. The foundations were set on 6 July; and while this detail is not mentioned in the diary, they were reportedly supported with inverted arches, a technique that had been recommended by Alberti to prevent differential settlement.[598] Designs of various parts continued to be produced, with Montagu closely reviewing and approving each detail. By May 1676, enough of the house had been finished for Evelyn to visit and see that it was built "after the French manner."[599] Later that year, Montagu was sent to France on another ambassadorial mission, leaving his steward Scowen to deal with the particulars in his absence. By December 1677, most of the work in the main house had been finished, with Fitch, the bricklayer, trying to settle his account. Work on the side wings, gardens, and detail work on the main house, such as the stairs, balusters on top of the roof, and sash windows, continued into 1680, although it would take another two years after then for Hooke to extract a payment for the rest of his fee.

Montagu did not get to enjoy this house for very long. His diplomatic mission had kept him away from London until mid-1678 when a scandal caused him to be cast out of the court. After a few

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[596] Caygill and Date, *Building the British Museum*, pp. 10-11

[597] Hooke would use the semi-circular terrace feature also for the gardens at Londesborough; see ii. 29 below.

[598] Joseph Moxon, *Mechanick exercises: or, the doctrine of handy-works. Applied to the art of bricklayers-works* (London: Printed for, and sold by J. Moxon . . . , 1700), p. 20.

This appears to have been a prudent decision. In 1754, after years of disuse and deterioration, a surveyor's report found the building to be a "well-built brick building, the foundation sound, and free from any material cracks or settlement;" Caygill and Date, *Building the British Museum*, p. 13. Wren also used the inverted arch system for the Trinity College Library and may have heard of it from Hooke. The later noted in his diary on 5 June 1675 "[Wren] was making up of my principle about arches and alterd his module by it;" this has often been interpreted to refer to the use of an approximation of the catenary curve at St. Paul's but the inverted arch system is a likelier candidate. See the annotations for Figure III-165. cf. in Chapter III.

[599] de Beer, *The Diary of John Evelyn*, vol. 4, p. 90. See above for the relevant extracts from primary sources.

years in England, further intrigues in 1683, caused him to leave for France. In his absence, he rented his house to the earl of Devonshire. In January 1686, reportedly due to a servant's negligence, the building suffered from a catastrophic fire, though the extent of the damages has been a source of speculation. Was the building completely "burnt to the ground," as reported by Evelyn, or was there a shell left?[600] Or were the damages perhaps limited only to the interiors? None of the contemporary sources provide an unequivocal answer to these questions, although the £46,000 estimate for the damages does suggest significant losses. More recently, however, it has been suggested that, due to the lack of any findings of charred remains in an archaeological investigation of the site, only the interiors may have been destroyed.[601]

Hooke's diaries not being extant from the period, there is much less information, and consequently a lot of speculation, about the rebuilding of the house. According to a memoir written right after Montagu's death, the house was "exactly Built, in the Figure it had before" since "it was observable, that the first Model was so exquisitely Perfect; that no Alteration could be made to Advantage."[602] But this account was later contradicted by several sources. In his *Vitruvius Britannicus* (London, 1715), Colen Campbell noted that the elevation facing the courtyard was 'inven. par M^{r} Pouget' (**Figure IV-154**). Writing in 1786, Horace Walpole also identified the architect as 'Monsieur Pouget', perhaps based on Campbell, but the fact that he was writing a century later and had gotten the construction date wrong at 1678 have cast some doubt on his account.[603]

'Pouget' may have been the Marseille-based sculptor and architect Pierre Puget (1620–1694), although his son François (1651–1707) and brother Gaspard have also been offered as possibilities.[604]

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[600] Ibid., vol. 4, p. 497.

[601] Caygill and Date, *Building the British Museum*, p. 10.

[602] 'Memoirs of the late Duke of Montague', p. 80.

[603] Worsley, p. 9.

[604] On 'Pouget', see Colvin, *BDBA* (2008), pp. 826-827, where François Puget, "a member of a family of sculptors and architects from Marseilles," is offered as the possible identity of the elusive architect. The first major study of Pierre Puget's work was Léon Lagrange, *Pierre Puget: Peintre, Sculpteur, Architecte, Décorateur de Vaisseaux* (Paris: Didier et Cie, 1868), see especially pp. 151-179 and 388-395 for his architectural work. With the 350th anniversary of Puget's birth in 1970, there were several publications on various aspects of his work; these include dedicated issues of the journals *Provence Historique* (vol. 22, no. 88; digitised and available online at https://goo.gl/ZL6uAq) and *Arts et Livres de Provence* (no. 78), and a monograph on his sculptural work, Klaus Herding, *Pierre Puget: Das Bildnerische Werk* (Berlin: Gebr. Mann Verlag, 1970). More recently, a collection of essays was published to accompany an exhibition of Puget's work in 1994-1995; see *Pierre Puget: Peintre, Sculpteur, Architecte, 1620–1694*. ([Marseille]: Musée de Marseille, [1994]).

That he had anything to do with the second Montagu House has been disputed by some scholars as there is no evidence that Puget ever visited England, however, this would not have excluded him as the 'architect' in seventeenth-century standards. After all, Hooke himself only visited Ragley Hall once. It is highly likely that Montagu, a connoisseur and patron of the arts with a particular appreciation of French art, knew Pierre Puget and may have sought his advice, or the latter may have even sent a drawing or two as models to be implemented by a local builder.[605] Two arguments against Puget's involvement due to stylistic reasons are not particularly robust: Worsley's assessment that "A French architect would surely have come up with something a little more imaginative" could be pointed to the lack of imagination by the local builder. And Stoesser's argument that Puget's "elaborate Baroque style" was too different from the second Montagu House ignores one crucial work of his.[606] In 1686–1687, Puget was working on a design for 'la Place Royale de Marseille' which indeed featured a rectangular dome similar to the one used in the second Montagu House (**Figure IV-248**).[607]

While it is impossible to rule out Puget as the architect of the second house, it is equally impossible to dismiss Hooke's involvement. Both Worsley and Stoesser noted that, like the second house, the British Library drawing (**Figure IV-146**) had 17 bays, and thus may have been a preliminary design.[608] If the second building can be attributed to Hooke, then mention must be made of Celia Fiennes's visits to the house in 1698 and *c.* 1701–1703. Comparing the 'great room' with the high ceiling to the 'whispering place' at Gloucester Cathedral, she noted how the lowest whisper spoken against the wall could be clearly heard in the opposite corner across the room.[609] This very phenomenon at Gloucester had been studied by Henry Powle (*bap.* 1630, *d.* 1692) in 1662 and reported to the Royal Society along with a drawing.[610] If the geometry of the ceiling was conceived intentionally

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[605] On Montagu's patronage of French artists and craftsmen, see Boucher and Murdoch, 'Montagu House, Bloomsbury'.

[606] Worsley, p. 9; Stoesser, 'Robert Hooke's Montagu House', p. 178.

[607] Puget's design for Marseille was never realised but survives in three drawings at the city's Musée des Beaux-Art; see Marie-Christine Gloton and Jean-Jacques Gloton, 'Puget Architecte', in *Pierre Puget: Peintre, Sculpteur, Architecte, 1620–1694* ([Marseille]: Musée de Marseille, [1994]), pp. 234-251, pp. 246-248; Renée Plouin, 'Les Projets de Place Royale à Marseille', *Provence Historique* 22 (1972), pp. 93-105; Félix-L. Tavernier, 'Projet de Place Royale', *Arts et Livres de Provence* 78 [Pierre Puget. Pour le trois-cent-cinquantième anniversaire de sa naissance à Marseille le 16 Octobre 1620] (1971), pp. 115-122.

[608] Worsley, p. 9; Stoesser, 'Robert Hooke's Montagu House', p. 178.

[609] Fiennes, *The Journeys of Celia Fiennes*, pp. 235, 291-292.

[610] Henry Powle, 'Account of *th*e whispering place at Gloucester', 29 Oct. 1662; RS, Cl.P/2/33. See also Robert Moray, 'Account of an echo', 3 Dec. 1662; RS, Cl.P/2/34.

to create the phenomenon, then, like his use of the sash window, it is another example of Hooke's willingness to make use of natural philosophical and mechanical explorations in his architectural work.

In 1754, Montagu House was offered for purchase to the British Museum for £10,000 and became its first building (**Figures IV-165 to IV-168**). The museum opened in 1759, but the house not meeting its needs, it was demolished between 1842 and 1850 (**Figure IV-162**).

ii. 20. NAVY OFFICE, SEETHING LANE, LONDON

Attribution: Batten, pp. 85-86, 88; Colvin (1954) and subsequent editions; 'Espinasse, pp. 93-94; Worsley, pp. 1-2.

Brief description: In 1673–1674, Hooke prepared preliminary designs for the Navy Office at Seething Lane. The construction was delayed until 1682, when it was built according to the drawings and estimate provided by Wren.

Primary sources:

– Hooke's entries in *Diary i*:
  - 29 Jan. 1673 (p. 25): "A great fire began at L. Williams closet that Burnt Navy Office and 30 other houses."[611]
  - 13 Feb. 1673 (p. 28): "At Seething Lane set out Cordon."[612]
  - 17 Apr. 1673 (p. 30): "With Lord Brounker all the morn about Navy Office."
  - 19 Apr. 1673 (p. 40): "to Dr. Wren at Paules about Navy Office module."
  - 20 Apr. 1673 (p. 40): "At the Lord Brounkers. discoursd about Navy Office."
  - 21 Apr. 1673 (p. 40): "at home about module."
  - 27 Apr. 1673 (p. 41): "at Lord Brounkers, signed bill for £4 19s. for Harry to Lady Day."

[611] The fire had started in William Brouncker's lodgings (i.e. L*ord* William's closet) within the Navy Office; T. F. Reddaway, 'Sir Christopher Wren's Navy Office', *Historical Research* 30 (1957), pp. 175-188, p. 175. William Brouncker, second Viscount Brouncker of Lyons (1620–1684), was a mathematician and the first president of the Royal Society. He had been appointed commissioner of the Admiralty in 1664, and during this period was also the comptroller to its treasurer; see 'Brouncker, William, second Viscount Brouncker of Lyons (1620–1684)', *ODNB*.

[612] The Navy Office that had burnt down was on Seething Lane.

- 8 May 1673 (p. 42): "measurd Sir R. Fords house. Navy office."[613]
- 11 May 1673 (p. 43): "with Lord Brounker at Navy office."
- 12 May 1673 (p. 43): "Diliverd Survey of Sir R. Fords house for 20sh."
- 21 Feb. 1674 (p. 87): "Mr. Satter about Navy office."[614]
- 23 Mar. 1674 (p. 92): "At the Victualling office and measurd it."
- 25 Mar. 1674 (p. 93): "Made Draught of Victualling office."[615]
- 27 Mar. 1674 (p. 93): "Sir Dionis Gauden here about Navy office."[616]
- 2 Apr. 1674 (p. 94): "Paid Harry 8sh. 6d. for Victualls."
- 3 Apr. 1674 (p. 94): "About navy office for Sir Dionis Gauden."
- 3 May 1674 (pp. 100-101): "Dind with Sir Ch: Wren at Lord Brounker. Discoursd about Navy office."
- 27 Nov. 1674 (p. 132): "Sir Christopher promisd Fitch Navy office. At Fitches."

– British Library, King's MS 43, pp. 147-149: Edmund Dummer, 'A survey and description of the principal harbours . . . & the Navy Office near Tower-hill', 1698. Dummer's survey includes a perspectival view of the complex with location maps (**Figure IV-171**), as well as plans and elevations of all the offices (**Figure IV-172**). Benjamin Cole's engraving (**Figure IV-169**) appears to be based on Dummer's view.

Assessment:

As it can be gleaned from the attributions, that Hooke had some involvement in the design of the Navy Office (**Figure IV-169**) has not been disputed. However, the ultimate design has traditionally been credited to Wren, who, as the Surveyor General, was in charge of its construction.

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[613] Richard Ford had been leasing one of the houses affected by the fire from Nicholas Salter; see footnote 614 below.

[614] 'Mr. Satter' is likely Nicholas Salter, who had petitioned the privy council a week earlier on 13 Feb. 1674 for payment for his lot. His refusal to accept the amounts offered as compensation would cause significant delays to the project; Reddaway, 'Wren's Navy Office', p. 179.

[615] 'Victualling Office' almost certainly refers to the Navy Office.

[616] 'Espinasse (p. 93) identifies Dionis Gauden as the victualler. I was unable to verify this but his father Denis Gauden (*d.* 1688), a sheriff of London and correspondent of Samuel Pepys, was the Surveyor of Marine Victuals between 1660 and 1679; J. C. Sainty, 'Surveyor of Marine Victuals 1550–c. 1679', https://goo.gl/XEiy9L.

In 1654, the Navy Board had moved from its previous location to a building at Seething Lane near the Tower of London (**Figure IV-170**).[617] A common practice at the time, chief Navy officials lived on the premises, and as Hooke noted in his diary on 29 January 1673, it was a fire that originated from the lodgings of comptroller William Brouncker (1620–1684) that caused the total destruction of the Office along with thirty houses.[618] Two weeks later, probably in his capacity as a City Surveyor, Hooke was on site to "set out Cordon," presumably marking the boundaries of the affected lots. Things appeared to proceed quickly at first. Two months after the fire, on 29 March, an act was passed tasking Wren with enlarging and rebuilding the Office.[619] Soon afterwards, Hooke became involved in the project, possibly at the instigation of Brouncker who was the first president of the Royal Society (1663–1677) and by 1673 the comptroller to the treasurer of the Admiralty. They met regularly in April, discussing Hooke's preliminary designs and the model built by the latter's assistant Harry Hunt.

The decision to expand the site of the new office by subsuming the adjacent lots would result in major delays, however. In May, Hooke surveyed such a lot that had been leased by Richard Ford from Nicholas Salter; both were now seeking compensation from the Navy, with Salter petitioning the privy council on 13 February 1674 for payment. Expecting the legal issues to be soon resolved, there was renewed activity in the spring of 1674 with Hooke surveying the site, probably on order from the Navy Board who had asked that a draught of the ground layout of the office be sent to the Surveyor General. There were further discussions with the victualler Dionis Gauden, Wren, and Brouncker, with the last relevant diary entry recording Wren's promise to give the contract to John Fitch (1642–1706), the bricklayer and general contractor they had worked with on many projects, a promise that would remain unfulfilled.[620] According to the Navy Board minutes, on 4 December Wren

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[617] Jonathan G. Coad, *The Royal Dockyards, 1690-1850: Architecture and Engineering Works of the Sailing Navy* (Vermont: Scolar Press, 1989), p. 44. The 'Navy Board', i.e. the officers and commissioners of the Navy, was tasked with building facilities, equipping and maintaining the ships, and day-to-day logistics, while the Admiralty was in charge of war tactics of the fleet; see ibid., p. 23. In 1786, the Navy Office moved from the premises at Seething Lane to Somerset House.

[618] On Brouncker, see footnote 611. The fire, which apparently started in the closet of Brouncker's mistress Abigail Williams, an actress, also caused the destruction of Brouncker's "pap*er*s, Modells, & other studyes, to *th*e generall regret of all *tha*t know, & hon*ou*r him. & to the no little preiudice of *th*e R Society;" this from an 8 Feb. 1673 letter by John Evelyn, quoted in an unsigned letter to Christopher Wase, dated 19 Feb. 1673, now CCC, Oxford, MS 332, no. 22. The fire also destroyed the lodgings of Samuel Pepys.

[619] Reddaway, 'Wren's Navy Office', p. 178.

[620] 'Espinasse identifies Dionis Gauden as the victualler; 'Espinasse, p. 93. I was unable to verify this but his father Denis Gauden (*d.* 1688), a sheriff of London and correspondent of Samuel Pepys, was the Surveyor of Marine Victuals between 1660 and 1679; see Sainty, 'Surveyor of Marine Victuals 1550–c. 1679'.

presented a draught of the design along with an estimate; £2,200 for the main building, £7,126 for lodgings for six officers, and £1,145 for necessaries.[621] This was too optimistic, however, as negotiations for acquiring the neighbouring lots would take several more years, finalising in January 1677. Other challenges surfaced by then, with the Navy diverting the funds to build thirty new ships, and the fallout from the political disturbance caused by the Popish Plot, the construction was postponed until finally on 25 April 1682 the Board was instructed to contact Joseph Lemm, the bricklayer. The tenders and necessary approvals having been received from the treasury and the admiralty, on 10 November 1682 the agreements were signed for the construction of 'The Office to be built according to the Dimensions in the Draught of it drawne by Sr. Christopher Wrenn'.[622] Batten has suggested that Wren may have simply presented Hooke's design; but either way, it is clear from the lack of further diary entries that Hooke was not involved with its construction.[623]

Attempting a more forceful attribution, in his 2004 article, Worsley proposed that "though ultimate responsibility rested with Wren as Surveyor-General," the Navy Office "should probably be attributed to Hooke."[624] His justification was stylistic: given the purported Dutch (particularly Philips Vingboons's) influence on the design of the Navy Office, and art historian Anthony Geraghty's remark that "Wren was only interested in Rome and France, not in the Netherlands," Worsley argued that the design of the Office as well as the Dutch-inspired City churches and the Custom House (**Figure IV-173**) were probably Hooke's. Given the lack of primary source documentation to support this, there is no way to prove or disprove it. While Worsley, aware of the problems of stylistic attributions, considered this speculation to be "rooted not just in stylistic analysis but in patterns of patronage, kinship and craftsmanship," the problem is that a lot of those patterns were equally valid for Wren. And once it is argued that Dutch-influenced buildings should be attributed to Hooke

[621] Reddaway, 'Wren's Navy Office', p. 180. In his 1698 survey of the Navy Office, Dummer calculated its value at £9,244-3-3; BL, King's MS 48, p. 150. See Figures IV-171 and IV-171 for Dummer's survey drawings of the complex.

[622] Ibid., p. 182. The contract was awarded to Joseph Ward, a carpenter; ibid., p. 183n1.

[623] Batten, p. 86. It has been noted that the construction of the office was delayed for various legal reasons, including the Popish Plot, and that it was built in 1682–1684 when the diaries are either not extant or have large gaps. Coad, *The Royal Dockyards*, p. 44.

[624] Worsley, p. 1.

because of the style, then how are we to approach other Wren buildings that share a lot of features with these?[625]

ii. 21. CHRIST'S HOSPITAL AND THE ROYAL MATHEMATICAL SCHOOL, LONDON

Attribution: Batten, p. 110; Colvin (1954) and subsequent editions; Tom Foxall, 'Schooled by Wren, or a School by Wren? The Conception and Design of Christ's Hospital Writing School, London', *Architectural History* 51 (2008), pp. 87-110, at p. 106; Wren Society, vol. 11 (1934), pp. 60, 63, 65-66, 70.

Brief description: Hooke was a governor of Christ's Hospital, and was involved its post-fire reconstruction, as well as the foundation of its Royal Mathematical School. In 1674, he created a design for the badges to be worn by the mathematics pupils, and *c.* 1691, submitted an unrealised design for the Writing School.

Primary Sources:

– Hooke's entries in *Diary i*:
  - 9 Nov. 1672 (p. 12): "Alderman Ward about Christ Church [Hospital] mathematick teacher."
  - 23 Nov. 1672 (p. 14): "Received from Sir J. Frederick[626] a green staff of governor of Christs hospitall."
  - 16 June 1673 (p. 47): "at Christchurch."
  - 6 Dec. 1673 (p. 73): "Ford[627] discoursd of bringing Leak and Hospital boyes to Geometry Lecture of reformations and I know not what."
  - 29 Dec. 1673 (p. 77): "Gave Mr. Oliver[628] a designe for Blewcoats badge."
  - 21 Jan. 1674 (p. 81): "At Christ Church hospitall. Delivered in design for badge. Which was two CC [second C mirrored] in compassing a prospect with a crown over and a Labell under in the CC was written Ambit et fovet in the Label a Carolo II data fuit in the prospect was a blewcoat

[625] On Worsley's justification of his stylistic attribution, see ibid., pp. 1-3. Geraghty's remark on Wren not being interested in the Netherlands appears to have been a verbal one.

[626] John Frederick (1601–1685) was a merchant and served as Lord Mayor of London in 1661–1662, and as president of Christ's Hospital in 1662–1683; M. W. Helms and John. P. Ferris, 'Frederick, John (1601–85), of Old Jewry, London.', in *The History of Parliament: the House of Commons 1660–1690*, ed. B. D. Henning (London: Published for the History of Parliament Trust by Secker & Warburg, 1983).

[627] Alderman Richard Ford had attended the 18 Nov. 1673 meeting of the committee when it was decided that the students would attend geometry and astronomy lectures at Gresham College.

[628] City Surveyor John Oliver was also a governor of the school.

boy attended by Geometry Arithmetic and Astronomy with hac via itur ad astra. At a distance the Herculean piller past through with a ship and trans . . . . . over and far off terra incognita."[629]

- 23 Jan. 1674 (p. 82): "My badge agreed upon and proposalls."[630]
- 1 May 1674 (p. 100): "At Ald. Wards about Leak and mathematical school."
- 9 May 1674 (p. 102): "At Christ Church hospitall, Alderman Ward . . . Setled Mr. Leak and an assistant . . . At the Tower. With Roler and Slingsby and Hoar about badge."[631]
- 27 May 1674 (p. 105): "at the hospitall about Leak &c."
- 20 Oct. 1675 (p. 189): "Deliverd Certificat for Christs hospitall."
- 11 July 1676 (p. 242): "With Mr. Pepys. Colwall. Leak at Hospitall about mathematicall boys."
- 28 Aug. &c. 1676 (p. 248): "I was twice with Mr. Pepys who was very civill and kind. I gave him module for Christchurch scoole and recommended Mercator for institution."
- 11 Sep. 1676 (p. 249): "With Sir J. More, Pepys, Wren, to Christchurch."
- 14 Sep. 1676 (p. 249): "At Christs hospitall with Sir J. More, Sir Ch. Wren, Mr. Wind, Sir Ch. Scarborough and some governors."
- 13 Nov. 1676 (p. 256): "Saw Shortgraves[632] things. Colwall spake of T. Shortgrave in Christ church."
- 28 Dec. 1676 (p. 264): "to Lord Brounckers about blew coat mathematicians. Moor a dog."
- 6 Feb. 1677 (p. 272): "At Christchurch hospitall about mathematical scole, Pepys, Brounker, Moor, Colwall. Wren. I spake of severall things."
- 13 Feb. 1677 (p. 273): "With Sir Ch. Wren to Guildhall, Christchurch, then to Physitians colledge."

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[629] The dotted section is replicated from the transcription of the diary.

[630] There were reportedly other proposals alongside Hooke's; see Clifford Jones, *The Sea and the Sky: The History of the Royal Mathematical School of Christ's Hospital* (Horsham, UK: Published privately . . . by Clifford Jones with the approval of Christ's Hospital, 2015), p. 26. However, the diary entry suggests his was selected.

[631] Hooke was visiting the Royal Mint which was located at the Tower of London. 'Roler' was probably John Roettier (*per. c.* 1620–1784) of the family of die-engravers and medallists originally from Antwerp. (I thank Felicity Henderson for verifying that it is indeed 'Roler' in the original manuscript of Hooke's diary and not a transcription error.) Henry Slingsby (1619/20–1690) had been the Master of the Mint since 1667 (he would later be disgraced) and James Hoare (*d.* 1696), its comptroller.

For biographical details, see 'Slingsby, Henry (1619/20–1690)', 'Roettier [Roettiers] family (*per. c.* 1620–1784)', *ODNB*; Leonard Forrer, *Biographical Dictionary of Medallists: Coin-, Gem-, and Seal-engravers, Mint-masters, &c. Ancient and Modern, with References to Their Works B.C. 500-A.D. 1900*, 8 vols. (London: Spink & Son Ltd., 1904–1930), vol. 5, pp. 150-191.

[632] Thomas Shortgrave. On 19 October, Hooke reported him being "very ill and Paralytick." He died shortly afterwards, in a poor financial state, and was buried on 29 October; *Diary i*, p. 254.

- 26 Apr. 1677 (p. 287): "to Sir Chr. Wrens. Cast up Christchurch masons work."
- 25 Mar. 1678 (p. 350): "at Mr. Boyles about Boys put in at Christ Church."
- 29 July 1678 (p. 369): "to Christs hospitall about viewing Firmans new designe, saw his spinning maides."[633]
- 25 Sep. 1678 (p. 378): "To the Hospitall to examine the Boyes. But I stayd not."
- 29 Sep. 1679 (p. 425): "Clayton[634] chosen Lord Mayor. With Sir J. Hoskins to see ship module at Christ Church."[635]
- 22 Oct. 1676 (p. 428): "Alarum of Blewcoat Boyes to hear Lecture."
- 25 Oct. 1679 (p. 428): "View at the Hospitall. Spoke to Parry."
- 12 Dec. 1680 (p. 459): "Perkins Died."
- 16 Dec. 1680 (p. 459): "Reported for Searle at the hospitall."
- 20 Dec. 1680 (p. 459): "Hospitall Committee, Spake for Dr. Wood. Street and Perkins stood, For Wood, Sir J. Frederick, Colwall, Lane, Wood, Torreano."[636]
- 31 Dec. 1680 (p. 460): "Prepared to goe to the King with the hospitall boyes."

– Hooke's entries in *Memoranda*:[637]

- 18 Jan. 1681 (p. 145): "at hospitall Dr Wood chosen mathematick master."
- 16 Aug. 1681 (p. 150): "Dr. Wood mathematick teacher."
- 17 May 1682 (p. 153): "att Hospitall mathematick petitions."
- 14 June 1682 (p. 154): "Paget chosen mathematick master."[638]

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633 Thomas Firmin (1632–1697), philanthropist, was a governor of Christ's Hospital and with Robert Clayton was responsible for facilitating improvements to its buildings; see 'Firmin, Thomas (1632–1697)', *ODNB*. A year earlier, he had established a workhouse in Little Britain, next to Christ's Hospital, to create employment for the poor. It was manufacturing linen and indeed his *Some proposals for the imployment of the poor, and for the prevention of idleness and the consequence thereof, begging . . . In a letter to a friend by T. F.* (London: Printed by J. Grover . . . , 1681) features an image of a woman spinning flax at a spindle.

634 Robert Clayton (1629–1707), banker and politician, was instrumental in the establishment of the Royal Mathematical School; 'Clayton, Sir Robert (1629–1707)', *ODNB*.

635 This ship model was hung in the Mathematical School until it was decided to repair and hang it "in some convenient place;" LMA, CLC/210/B/007/MS12873A, p. 252. According to Pepys's report, the model and its repair cost the considerable sum of £50-13-8; LMA, CLA/067/02/003.

636 Robert Wood, Thomas Streete, and Peter Perkins were candidates for the mathematical master position at the Royal Mathematical School; cf. LMA, CLC/210/B/005/MS12811/005, pp. 294-300. As Hooke noted on 18 Jan. 1681 (*Memoranda*, p. 145), eventually Wood was chosen for the position.

637 Numerous mentions of John Frederick with no further detail are not included.

638 Edward Paget replaced Wood as the mathematics master; see footnote 636.

– Hooke's entries in *Diary ii*:
  - 21 Nov. 1688 (p. 75): "At Jon. Sr Th. Meers query for me. Hospitall ticket left there."
  - 2 May 1689 (p. 118): "Noe auditors mane . . . between 2 & 3 Read $\frac{3}{4}$ hour Lecture, in the hall Paget & 2 other men and 40 children."
  - 18 May 1689 (p. 122): "to Ch. Ch. hospitall."
  - 6 June 1689 (p. 127): "cald at Pagits Scool."
  - 5 Oct. 1689 (p. 154): "At Dr Colwalls he desired tea. I urged him to cause his hosp[ital] children to write journalls."
  - 14 Nov. 1689 (p. 164): "Read a long lecture, Paget and 40 childr. and 4 others."
  - 21 Nov. 1689 (pp. 165-6): "Read a lecture 3 quarters of an howre [to] 40 childr, 6 others, Pagit, Mordan."
  - 20 Jan. 1690 (p. 181): "With Paget at school house."

  [gap in the diaries between 9 Mar. 1690 and 6 Dec. 1692]

  - 20 Dec. 1692 (p. 199): "saw foundation cleering at X church for school."[639]
  - 9 Feb. 1693 (pp. 212-213): "Noe auditory mane. I read a Lecture to a full auditory, with Paget and children. With Paget at Jon."
  - 11 May 1693 (p. 238): "I read Lect[ure] to 8 auditors and 40 children."
– London Metropolitan Archives:[640]
  - CLA/067/02/003: Pepys's report on the Mathematical School addressed to John Moore and the governors of the charity. Annexed to it is an audit of its accounts between 1673 and mid-1697, indicating the full cost of the badges, in which cutting the dye and other work on it cost £46, sixty badges another £30, costing 10s each. Money was also set aside for ten silver badges per year, with a total of £117-10-0 over 23.5 years.
  - CLA/067/02/004, no. 29v: An accounts' audit assessing the amounts registered in Pepys's report. It calculates the cost of the writing school at £5,300 and the mathematical school at £3,793-19-5. The amount for building the mathematical school with the two houses on each side, twenty houses

[639] Presumably for the Writing School at Christ's Hospital.

[640] I am grateful to Andrea Wellstead at Christ's Hospital School and David Luck at the LMA for facilitating my access to the archives of Christ's Hospital.

Only a select few extracts are provided here; for further extracts, see also Wren Society, vol. 11, pp. 60-80.

for the nurses, and a brick wall to include the whole grounds appear to have cost a total of £6,047-9-7.

- CLC/210/B/005/MS12811/005: Christ's Hospital, Committee meeting minutes, 1676–1687.
- CLC/210/B/006/MS12873/001: Christ's Hospital, Committee of the New Royal Foundation[641] meeting minutes and memoranda.
  - 8 Nov. 1673 (p. 14): "And when this Com*mit*tee is in some readiness Then six Aldermen with six Commoners Governors of Christs Hospitall shall be desired . . . to know of his Majesty what Badge or Cognizance Hee will be pleased to appoint the said Children to weare to distinguish them from others."
  - 18 Nov. 1673 (p. 17): "it was agreed that hee that shall be chosen Mathematicall Schoole Master [John Leake] shall in the Terme time goe with the Schollars to the Mathematicall Lectures of Geometry and Astronomy at Gresham College."
  - 9 Dec. 1673 (p. 25): In the draft of the address to the King, the committee wrote "It is humbly prayed that your Majestie will be pleased to direct the fforme of the said Badge or Cognizance."
  - 23 January 1674 (p. 27): "This Com*mitt*ee desired the Right Wor*shi*p*ful*l Sr. Richard Fford Kn*igh*t and Alderman and Sr. Robert Clayton Kn*igh*t and Alderman to speake with Mr. Slingsby Master of his Ma*jes*ties Mint about the Badge which the fforty poore Children are to weare . . . His Ma*jes*ty haveing left it to the Governors of the said Hospitall to put what Badge they please to distinguish the said Children from others and the Com*mit*te*e* haveing seene severall formes for a Badge they approve of that above and that it be of ffyne tinn and coloured or of any other Mettall as the said Sr. Richard Fford Sr. Robert Clayton and the said Mr Slingsby shall thinke fitt."
- CLC/210/B/007/MS12873A: Christ's Hospital, Schools Committee minute book, 1681–1688.
  - 16 May 1684 (p. 175): "This Com*mit*te went to veiw the houses in Little Brittaine late belonging to Mrs. Bridgett Ffryer now deceased, and ordered that a ground plott should be made of the whole, which relates to his Majesties gift forthwith And the Com*mit*te requested Mr. Hooke to give his assistance therein, the which he readily promised to doe."
  - 12 June 1684 (p. 178): "Mr. Oliver and Mr. Hooke are desired by this Com*mit*te to consider where a house of Easement may be fitly placed for the use of the Children of the said

[641] 'New Royal Foundation' would later be referred to as the Royal Mathematical School.

Mathematicall Schoole, and where a sink may be made, and how the water shall be laid in, and with all convenient speed to report to this Com*mit*te their opinion."

- 31 July 1684 (p. 191): "This Com*mit*te agreed on Wednesday morning next to view the Houses late Mrs. Bridgett Ffryers, and to set an estimation upon them Mr. Oliver, Mr. Hooke and Mr. Lemm are desired to assist this Com*mit*te therein and Mr. Leybourne if he can be ready to attend with the platt of the said Houses the same Com*mit*te at that time."

- CLC/210/F/015/MS12878/001: Record of the regulations for the management of the schools, [1671–1699?].
- CLC/210/G/A/019/MS22591: Hooke, 'Report of a survey of a wall built by John Searle adjoining the west passage into Christ's Hospital', 16 Dec. 1680; transcribed in Appendix ii. 5.

– Wren Society, vol. 11, pp. 60-80: Extracts and transcriptions of primary sources, though mostly limited to Wren's work at Christ's Hospital.

- Christ's Hospital Committee Minutes, 1669–1676; June 1673, p. 350:[642] "Erasmus Smith is willing to build Two Wards on a piece of Void ground that lyes before the Compting House, if the Hospital provides rough timber and bedd the Wards, and when these Wards are built and filled, the Hospital to proceed in further building Two Wards more to be bedded round, upon Part of ye Towne Ditch, adjacent to London Wall.

  The Committee agreed and thanked Erasmus Smith, and further agreed that Mr. Oliver & Mr. Hooke, Surveighors, should be desired to draw a platt of the building & an Estimate. The 1st floor to be 15ft. and the upper floor 12 ft. high."

  16 June 1673 estimate signed by Hooke and Oliver: "They have viewed the ground and certifie that 25 ft. 8 in. in width within ye walls is breadth enough for the Wards to be bedded on both sides.

  Second that ye 1st floor be 15 ft., 2nd 14 & no lucern windows in Roof. Front wall to be 2 $\frac{1}{2}$ Bricks to 2nd floor, & to top 2 Bricks." [followed by an estimate of £489-7-6.]

[642] This manuscript, which must be at the London Metropolitan Archives, has not been readily accessible for consultation; instead, a transcription from Wren Society, vol. 11, pp. 65-66 is used.

- BL, Add. MS 5238, nos. 50 and 51: Plan (**Figure IV-175 or Figure III-71**) and elevation (**Figure IV-176 or Figure III-72**) of an unrealised design for the Writing School, *c.* 1691, presumably in Hooke's hand.
- Hooke, 'An Instrument of use to take the draught, or picture of any thing. Communicated by Dr. Hook to the Royal Society, Dec. 19, 1694', in *Philosophical experiments and observations of the late eminent Dr. Robert Hooke* . . . , ed. W. Derham, (London, 1726), p. 296 (**Figure IV-180**): "upon the first Institution of the Royal Foundation of Christ-Church, I propounded it to the Governors there, for the Use of the Children: But Sir Jon. More undertaking to write an Institution [Jonas Moore, *A new systeme of the mathematicks* (London, 1681)], and having omitted it, it has not been there brought into Use."
- Edward Hatton, *A new view of London: or, an ample account of that city, in eight sections* (London, 1708), vol. 2, pp. 739-741: description of the buildings as they stood in 1708.

Description:

Christ's Hospital was one of the three royal charities established in 1552 by Edward VI: St. Thomas's Hospital was for the care of the sick, Bridewell's "for the correction of 'the idle and vagabonds'," and Christ's "for the maintenance and education of poor orphans."[643] The latter occupied the former site of the monastery of the Grey (or Mendicant) Friars, granted to the City of London in 1537 by Henry VIII after the dissolution of the monasteries. In 1673, Charles II founded a specialised school within the body of Hospital, with the purpose of educating poor orphans towards careers in the Royal Navy. Forty 'Blew Coat Boyes' competent in grammar and common arithmetic would be selected from the overall student population of the school, and receive further instruction in arithmetic and navigation at what would later be known as the Royal Mathematical School.[644]

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[643] Secondary literature on Christ's Hospital School include Allan and Morpurgo (revised by), *Christ's Hospital*, p. 11; E. H. Pearce, *Annals of Christ's Hospital* (London: Methuen & Co., 1901); William Trollope, *A History of the Royal Foundation of Christ's Hospital* (London: William Pickering, 1834); Wilson, *Brief History of Christ's Hospital, from the Foundation by King Edward the Sixth, to the Present Time, with a List of the Governors*, p. 1. On Hooke's work at Bridewell, see ii. 11 in this chapter.

[644] Sources on the Royal Mathematical School include Geoffrey Howson, *A History of Mathematics Education in England* (New York: Cambridge University Press, 1982), pp. 35-38; N. Plumley, 'The Royal Mathematical School within Christ's Hospital', *Vistas in Astronomy* 20 (1976), pp. 51-59; Albert C. Seward, 'Christ's Hospital and the Royal Society', *Notes and Records of the Royal Society of London* 3 (1940–1941), pp. 141-135; Frances Willmoth, *Sir Jonas Moore: Practical Mathematics and Restoration Science* (Rochester, NY: The Boydell Press, 1993), pp. 195-207.

Located just within the city walls at Newgate Street north of St. Paul's Cathedral (**Figure IV-174**), Christ's Hospital had sustained heavy damages during the Great Fire. As a City Surveyor, Hooke may have been involved in its immediate post-fire reconstruction, but it appears another City Surveyor, Peter Mills (1598–1670), was mostly in charge of the work during this earlier period.[645] According to the 5 August 1668 meeting minutes of the Court of Christ's Hospital, Mills "hath drawne the ground Plott of a Compting House, Court Roome and Schoole, with a house for the Treasurer, and houses for other Officers in this Hospitall."[646] By this time, however, Mills was already suffering from ill health, and had been replaced by John Oliver (*c.* 1616–1701), who had been sworn in as a City Surveyor in January of that year.

Oliver and Hooke subsequently became more closely involved with Christ's Hospital. By February 1672, Oliver had already been elected governor, and later in the year, on 23 November 1672, Hooke received his own governor's staff from the Hospital's president, John Frederick (1601–1685).[647] In June 1673, they were asked to prepare a design for two wards to be built near the Compting House, with funds donated by Erasmus Smith. The drawing has not survived, but the building was described as having a 25'-8" interior width to accommodate beds on both sides, a height of 15' on the first floor and 12' on the second, and was to have no dormer windows. It was to be built in brick at an estimated cost of £489-7-6. The location of the Compting House during that period being unclear, it is difficult

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The two most recent books on the subject are Nerida F. Ellerton and M. A. (Ken) Clements, *Samuel Pepys, Isaac Newton, James Hodgson, and the Beginnings of Secondary School Mathematics: A History of the Royal Mathematical School Within Christ's Hospital, London 1673-1868* (New York: Springer, 2017) and Jones, *Sea and the Sky*; neither of these contains footnotes or manuscript references, however, making it difficult to build on the research. This is particularly unfortunate given the difficulty in accessing the archives of Christ's Hospital. The latter are available for consultation at the London Metropolitan Archives but only as difficult-to-read microfilm reproductions, unless special permission is obtained to view the manuscript originals. The fact that the finding aid is not sufficiently detailed for the earlier years makes the task of finding the correct manuscript further arduous.

Wren Society (1934), vol. 11, pp. 60-80 contain useful extracts from relevant manuscripts; some of the reference numbers, though by now outdated, can also be found in Plumley, 'The Royal Mathematical School within Christ's Hospital'.

645 Wren Society, vol. 11, pp. 63-64.

646 Ibid., p. 64.

647 Ibid.; *Diary i*, p. 14.

identify the wards in the engraved view of the Hospital (**Figure IV-179**), but it is possible they are in the eastern wing of the quadrangle.[648]

Around this time, Hooke was also becoming invested in the subsequent establishment of the Royal Mathematical School. The School Committee had decided that the pupils were to attend the geometry and astronomy lectures at Gresham College, and indeed there are several references in Hooke's diaries noting their visits.[649] Hooke also suggested the use of his invention, 'an instrument to take the draught or picture of any thing', by the pupils of the school, and bitterly complained of Jonas Moore's omission of it from the school's textbook (**Figure IV-180**).[650] Another regulation of the School, stipulated in the 19 August 1673 letters patent, was that the pupils were to wear a badge to distinguish them from other Christ's Hospital students.[651] The King, when asked if he had any specific designs in mind, left the matter up to the governors. On 21 January 1674, Hooke recorded submitting a badge design featuring "a blewcoat boy attended by Geometry Arithmetic and Astronomy with hac via itur ad astra," and a ship in the distance passing the Herculean pillar, the latter perhaps a visual

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[648] Wren Society, vol. 11, pp. 65-66. Sorting out the locations and dates of buildings is particularly challenging in the case of Christ's Hospital—an issue raised in the secondary literature, including the nineteenth-century histories of the school. Most of the buildings were paid for directly by specific benefactors, and most of their accounts have not survived, making it impossible to know the specific craftsmen and architects who were contracted. Another caveat to heed is that over time offices and classrooms moved from one building to another, so the location of the 'mathematical school' or the 'counting house' are different according to the date of the reference.

A useful, though at times still confusing, description of the buildings as they stood in 1708 is provided in Edward Hatton, *A new view of London: or, an ample account of that city, in eight sections* (London: Printed for John Nicholson . . . , and Robert Knaplock . . . , 1708), vol. 2, p. 739-741.

[649] "First it was agreed that hee that shall be chosen Mathematicall Schoole Master shall in the Terme time goe with the Schollars to the Mathematicall Lectures of Geometry and Astronomy at Gresham College;" minutes of the 18 November 1673 committee meeting, LMA, CLC/210/F/015/MS12878/001, p. 17. See also the 'Record of the orders for the management of the mathematical school', [1671–1699?], LMA, CLC/210/F/015/MS12878/001, p. 78.

Regarding the pupils attending Hooke's lectures, see *Diary i*, pp. 73, 428; *Diary ii*, pp. 118, 164, 212-213, 238.

[650] Robert Hooke, 'An instrument of use to take the draught, or picture of any thing. Communicated by Dr. Hook to the Royal Society, Dec. 19, 1694', in *Philosophical experiments and observations of the late eminent Dr. Robert Hooke . . . and other eminent virtuoso's in his time*, ed. W[illiam] Derham (London: Printed by W. and J. Innys, Printers to the Royal Society . . . , 1726), pp. 292-296, at p. 296. See also Chapter III, i.

[651] Transcriptions of the letters patent are reproduced as Appendix VII in Trollope, *A History of the Royal Foundation of Christ's Hospital*, pp. lxxxii-lxxxvii, and as Appendix 5 in Jones, *Sea and the Sky*, pp. 321-323.

reference to the frontispiece of Francis Bacon's *Instauratio magna* (London, 1620).[652] Two days later, he noted that his design had been approved, though perhaps with some proposed changes.[653]

Three months later, to discuss the engraving of the die, he visited the Royal Mint at the Tower of London, meeting with Henry Slingsby (1619/20–1690), James Hoare (*d.* 1696), Master and Comptroller of the Mint respectively, and 'Roler', most likely John Roettier (1631–1703), the eldest of the three brothers from the Roettier family of die-engravers and medallists originally from Antwerp. John had been invited to England by Charles II himself in 1661 and worked with Pierre Blondeau who had invented a machine for striking coins.[654] In an audit of the school's accounts annexed to a report written by Samuel Pepys, it is recorded that the die cost £46, and the initial run of sixty silver badges another £30.[655] While it is unknown which of the Roettier brothers engraved the die, John is usually credited with it in the collections of the British Museum or the National Maritime Museum in Greenwich.[656] In addition to these badges (**Figure IV-181**), a version of Hooke's design was also used on the reverse of the medal struck to commemorate the 1673 foundation of the school (**Figure IV-182. a**).[657] In 1697, Evelyn included the medal in his *Numismata* with the following description (**Figure IV-182. b**):

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[652] Christ's Hospital students wore distinctive ankle-length blue coats, thus the 'blue coat boys' nickname that is used even on official documents such as the letters patent. Francis Bacon, *Franciscy de Verulamio, summi Angliae cancellarij, instauratio magna* (London: Apud Ioannem Billium typographum regium, 1620).

[653] That these diary entries are not corroborated by the committee meeting minutes for 23 January has complicated attributing the final badge design to Hooke.

[654] See footnote 631. On Blondeau, whose birth and death dates appear to be unknown, see Forrer, *Biographical Dictionary of Medallists*, vol. 1, pp. 94-95. On the new techniques of coinage brought by Blondeau and the Roettiers, as well as on Slingsby and Hoare, see C. E. Challis, 'Lord Hastings to the Great Silver Recoinage, 1464–1699', in *A New History of the Royal Mint*, ed. C. E. Challis (New York: Cambridge University Press, 1992), pp. 179-397, at pp. 331-358.

[655] LMA, CLA/067/02/003.

[656] Jones contests the attribution to John Roettier, indicating that only the names of the other two brothers, Joseph and Philip, were mentioned in the school's account books, but he cites no references to primary sources, making it difficult to verify this; see Jones, *Sea and the Sky*, pp. 27-28.

[657] The obverse side of the medal was adorned with an image of Charles II. The dies of the medal are extant at the British Museum; see the curator's comments in the British Museum collection, registration number M.7600, https://goo.gl/fpR41R.

The medal was already an expensive collector's item during its own time. In a letter dated 11 October 1687, Slingsby offered to sell Pepys his "generall collection of all the medalls made by Roettiers, of which I had an opportunity to chuse the best struck off; and I am sure soe full a collection noe man in England has besides myselfe, which you shall have at the same rate I paid for." In the attached list of medals, it is listed as the third most expensive item at £3-2-0; letter reproduced in Samuel Pepys, *Memoirs of Samuel Pepys, Esq. F.R.S. Secretary*

> A Blue-Coat Boy with his *Toaq* or Bonnet under his arm (by the Sea side in view of Ships impell'd by Winds) is represented as newly Examin'd by the *Arts Mathematical*; *Arithmetick* laying her Hand on the Childs Head; *Geometry*, *Astronomia* and *Mercurius*; *Angels* and *Horae* above in the Clouds, sounding Trumpets and pouring down Fruits out of the *Amalthean* Horn.[658]

It is unknown how much of Hooke's original design was changed by the time the dies were cast; neither of the texts used for the badge or the medal exactly match Hooke's proposal, and the Herculean pillar is not depicted on either. But "a blewcoat boy attended by Geometry Arithmetic and Astronomy" and the ships in the distance can certainly be seen on both designs. What Hooke may have meant by 'hac via itur ad astra' is also vague; it may have been the fourth figure only depicted on the medal, Mercurius holding a *caduceus* with his left hand, and pointing to the sky, i.e. *ad astra*, with the other.[659]

Hooke's architectural involvement in the Royal Mathematical School is also unclear. By May 1674, the school appears to have been already under construction but with no mention of a design. Indeed, rather than a free-standing structure, it has been suggested that 'the school', by which they likely meant the room where mathematics was taught, was built in the attic space on top of the new wards. This is certainly plausible considering one of the first mentions of it is on 27 May 1674 when the Hospital committee viewed the room and asked the carpenter to make haste in finishing it. It was indeed completed by September when the committee, including Oliver, approved "the Schoole prepared for the Mathematical Children, and gave order that forthwith every one of *th*e Children should have a drawer with a lock and key to secure their instruments and writings."[660] Whatever the arrangement was, it was soon found to be inconvenient, or at least unfitting for the prestige they had

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to the Admiralty in the Reigns of Charles II and James II. Comprising His Diary from 1659 to 1669, Deciphered by the Rev. John Smith, A.B. from the Original Short-hand MS. in the Pepysian Library, and a Selection from his Private Correspondence, ed. Richard Lord Braybrooke, Second ed., 5 vols. (London: Henry Colburn, 1828), vol. 5, pp. 131-132.

658 John Evelyn, *Numismata. A discourse of medals, antient and modern. Together with some account of heads and effigies of illustrious, and famous persons, in sculps, and taille-douce, of whom we have no medals extant; and of the use to be derived from them. To which is added a digression concerning physiognomy* (London: Printed for Benjamin Tooke . . . , 1697), p. 140.

659 Another variation of the classical Latin expression is *sic itur ad astra*. On the iconography of mathematical figures, especially in early modern frontispieces, see Remmert, *Picturing the Scientific Revolution*.

660 Wren Society, vol. 11, p. 67.

envisioned for the School. In June 1682, there were complaints that access to it was "straite, darke, and other wayes very incommodious, soe that very few or noe persons of quality are encouraged to visit," and a decision was made "to erect a better and more commodious Schoole" connected to the Great Hall. Hooke receives sporadic mentions in the meeting minutes of the Hospital committee, for instance in 1684 when he and Oliver were asked to advise Leybourne who was preparing a survey of the grounds adjacent to the school. Likewise, there are numerous entries in Hooke's diary regarding the Hospital, but since he was a governor of the school, the evidence is difficult to interpret. In August 1676, for instance, Hooke noted giving Pepys a "module for Christchurch scoole" but whether this was a model of the school, or a model made for display *at* the school is difficult to guess.[661]

Two drawings among Hooke's papers at the British Library (**Figures IV-175 and IV-176**) illustrate that he was somehow later involved in the design of the Writing School, but coinciding with a lacuna in the diaries, the circumstances in which they were produced are not recorded. As the meeting minutes are quiet regarding Hooke's involvement in the project, he may have been asked privately by John Moore, who had offered to pay for the building but requested to remain anonymous. It has been suggested that Hooke's drawings date to late 1691, before Hawksmoor from Wren's office began working on his proposal.[662] Eventually a version of Hawksmoor's design was built (**Figures IV-177 and IV-178**), and the opening oration of the school was read on 11 March 1695.

ii. 22. HOUSE FOR RICHARD EDGCUMBE

Attribution: Batten, pp. 110-11; 'Espinasse, p. 99.

Brief description: In 1675, Hooke prepared designs for a house for Richard Edgcumbe, though its location is unclear.

Primary sources:

– Hooke's entries in *Diary i*:
  - 27 July 1675 (p. 171): "Met Mr. Mountacue and Sir R. Edgecombe. Sir R. Edgecomb desired designe of house."

[661] See footnote 635.

[662] On the designs for the Writing School, see Tom Foxall, 'Schooled by Wren, or a School by Wren? The Conception and Design of Christ's Hospital Writing School, London', *Architectural History* 51 (2008), pp. 87-110; on Hooke's design, see pp. 104, 106.

- 30 July 1675 (p. 171): "Drew Sir R. Edgcomb's House shewd it him and his Lady. They liked it but to have it a little alterd."
- 2 Aug. 1675 (p. 172): "Draught for Sir Richard Edgecomb."
- 3 Aug. 1675 (p. 172): "Finisht Sir R. Edgecomb's draught. To Sir R. Edgecomes with Fitch."
- 1 Sep. 1675 (p. 177): "With Sir R. Edgcomb and Mr. Austen viewing house in Leicester feilds, and in Air Street."
- 28 Feb. 1676 (p. 218): "Sir R. Edgcumb into Society."

Description:

In 1675, Richard Edgcumbe (1640–1688) asked Hooke to prepare a design for a house.[663] The two may have known each other from Christ Church, Oxford, where Edgcumbe had matriculated in 1657, or were introduced via Ralph Montagu, for whom Hooke was designing the house in Bloomsbury. Montagu was related to Edgcumbe by marriage: four years earlier, the latter had married Anne, daughter of Edward Montagu I (1625–1672), first earl of Sandwich and cousin to Ralph Montagu.

Subsequent diary entries show Hooke presenting a draught to Edgcumbe and Lady Anne, making the alterations they request, and then visiting Edgcumbe with John Fitch (1642–1706), the bricklayer. A hint of the possible location of the house is given a month later when Hooke recorded being "With Sir R. Edgcomb and Mr. Austen viewing house in Leicester feilds, and in Air Street," but it is too vague to draw any firm conclusions. Austen's identity or the location of Air Street are unknown, and whether the houses were for him or for Edgcumbe is uncertain.[664] As an MP for

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[663] Batten, first to note the diary entries, identified Edgcumbe as "Sir Richard Edgecombe or Edgcumbe" as "mentioned in the *D.N.B.* as being one of the Knights of Cornwall;" Batten, p. 110n4. 'Espinasse noted him to be 'Sir Richard Edgcumbe of Mount Edgcumbe in Cornwall'; 'Espinasse, p. 99. While Edgcumbe's ancestor and his son are in *ODNB*, he is not; instead, biographical information can be found in Paula Watson, 'Edgcumbe, Richard (1640–88), of Cotehele, Calstock and Mount Edgcumbe, Maker, Cornw.', in *The History of Parliament: the House of Commons 1660–1690*, ed. B. D. Henning (London: Published for the History of Parliament Trust by Secker & Warburg, 1983), supplemented with the archival documents noted below. Incidentally, in his will, Edgcumbe described himself as a 'Knight of the Bath' rather than of Cornwall; see The National Archives, Kew, PROB 11/394/394, fol. 235v.

[664] The few other mentions of 'Austen' in the diaries give no further clues. Without a first name, it is impossible to narrow down his identity, but if he was a politician, one candidate is John Austen (*c.* 1640–1699), second baronet and MP for Rye, East Sussex, who lived in Bloomsbury; see Basil Duke Henning, 'Austen, Sir John, 2nd Bt. (c. 1640–99), of Hall Place, Bexley, Kent.; Stagenhoe, Herts. and Bloomsbury Square, Mdx.', in *The History of Parliament: the House of Commons 1660–1690*, ed. B. D. Henning (London: Published for the History of Parliament Trust by Secker & Warburg, 1983).

Laurenceston in Cornwall since 1661, Edgcumbe would occasionally spend time in London, but there is nothing in the available biographical information to suggest an exigent need to reside there for longer periods around 1675. If he were interested in investing in the London real estate market, however, Leicester Field was one of the squares under development at the time.[665] Named after Leicester House, which was by then mostly used to accommodate visiting ambassadors, the area was not yet the fashionable 'Leicester Square' it would later become but leases had started to be issued to speculators and developers in 1670.[666] However, Edgcumbe's will dated 1682 did not list any London properties, though that may simply mean he had sold it by then.[667]

The 'designe of house' is also ambiguous and may not have meant a new construction. Along with the long list of other properties in his marriage settlement with Anne Montague, in 1667 Edgcumbe had inherited his family seat Mount Edgcumbe in Cornwall, where ten years later Charles II and his whole Court were reported to have been "nobly treated."[668] He may have asked Hooke to make some alterations to that estate, or to another Cornwall property, the fifteenth-century mansion at Cotehele, Calstock, where he also resided.

ii. 23. HOUSE FOR ROBERT READING

Attribution: [This dissertation, via the diary entries.]

Brief description: In 1675, Hooke designed a house for Robert Reading, although its location or whether it was ever built remain uncertain.

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[665] Literature on Leicester Square include Edwin Beresford Chancellor, 'Leicester Square', in *A History of the Squares and Palaces of London in Two Volumes [Reprint of the 1907-1908 edition]* (London: I. B. Tauris & Co. Ltd., 2012); Tom Taylor, *Leicester Square: its Associations and its Worthies* (London: Bickers and Son, 1874); and more recently 'Leicester Square', in *Survey of London: Volumes 33 and 34, St. Anne Soho*, ed. F. H. W. Sheppard (London: London County Council, 1966), pp. 416-514; McKellar, *The Birth of Modern London: The Development and Design of the City 1660–1720*.

[666] On the property developers involved, see '[Leicester Square] Building Development', in *Survey of London: Volumes 33 and 34, St. Anne Soho*, ed. F. H. W. Sheppard (London: London County Council, 1966), pp. 416-440.

[667] 'Will of Sir Richard Edgcumbe', The National Archives, Kew, PROB 11/394/394.

[668] Watson, 'Edgcumbe, Richard (1640-88)'. A copy of the 1670 marriage settlement between Edgcumbe and Montagu, with a list of the properties in Edgcumbe's possession, is now Cornwall Record Office, CY/1649; a transcription is available online at https://goo.gl/UKcEsy.

Chapter IV – Building

Primary sources:

– Hooke's entries in *Diary i*:[669]

- 1 Oct. 1675 (p. 184): "Drew Urne contrived for Sir R. Redding."
- 2 Oct. 1675 (p. 184): "Contrived for Sir R. Reddings house . . . Finisht for Sir R. Redding."
- 7 Oct. 1675 (p. 185): "With Sir R. Redding at Dr. Locks lodging at Savoy."
- 13 Oct. 1675 (p. 187): "Drew Sir R. Redding designe."
- 15 Oct. 1675 (p. 188): "Received a message from Sir R. Redding."
- 30 Dec. 1675 (p. 205): "Sir R. Redding about house. Agreed with Davys for 6 frames and sasses for £24. Module for a Guinny. Treated about Irish Clapboord for 18d. per foot."[670]
- 15 Jan. 1676 (p. 211): "With Sir R. Redding to Davys."
- 24-28 Oct. 1676 (p. 254): "Dr. Wood with me about Sir R. Reddings potts and stonework."
- 22 Aug. 1678 (p. 373): "Sir R. Redding presented the Arundel Library for Duke of Norfolk wholly at their disposal to remove."
- 12 Feb. 1680 (p. 438): "at Garways with Dr. Holder, Sir Ch. Wren, Sir R. Redding, viewd his designe."

Description:

Biographical information on Robert Reading or Redding (*c.* 1640-?) is very limited. He was an Irish politician who was elected to the Royal Society on 2 November 1671, created first baronet of Reading in 1675, and admitted to the Dublin Society on 3 November 1684.[671] Hooke may have met him as early as the 1650s when they were both at Christ Church, Oxford, as was John Locke at whose lodgings they met on 7 October 1675.[672]

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669 Hooke met with Reading quite often, so only the more relevant diary entries are included here.

670 If 'sasses' is a transcription error and the reference is to 'frames and sashes', this may be referring to sash windows.

671 Birch, vol. 2, p. 485; Michael Hunter, 'The Social Basis and Changing Fortunes of an Early Scientific Institution: An Analysis of the Membership of the Royal Society, 1660–1685', *Notes and Records of the Royal Society of London* 31 (1976), pp. 9-114, p. 103; Robert T. Gunther, *Early Science in Oxford, Vol. XII: Dr. Plot and the Correspondence of the Philosophical Society of Oxford* (Oxford: [Printed for the editor], 1935), p. 154. Reading is not in *ODNB*.

672 Reading matriculated in Oxford in 1655 and received his BA in 1658; Joseph Foster, ed., *Alumni Oxonienses: The Members of the University of Oxford, 1500–1714*, vol. II (Oxford: James Parker & Co., 1891), vol. 3, p. 1242.

Diary references to Reading begin in August 1675 when he may have returned to London after a few years' absence. On 1 October, Hooke noted drawing an urn contrived for Reading.[673] The wording of the diary entry makes it difficult to tell whether the urn had been designed by someone else but the entry for the next day is clearer: "Contrived for Sir R. Reddings house." This is followed by several other references to the house but with few clues about its location; given the involvement of Roger Davys, a London joiner, the house may have been in London—although the mention of Irish clapboard does raise some doubts. The other entries are ambiguous and not detailed enough to be able to discern whether this was a new construction (necessitating a 'module' made by Davys) or a remodelling of an existing house (involving the installation of sash windows). Future discoveries of primary sources may shed further light on this house.[674]

ii. 24. WESTMINSTER ABBEY AND SCHOOL, LONDON

Attribution: Batten, pp. 112-113; Colvin (1954) and subsequent editions; Edward Smith, 'Hooke and Westminster' in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Cyril William Hunter (Burlington, VT: Ashgate, 2006), pp. 228-232.

Brief description: Between 1676 and 1693, Hooke supervised various works at Westminster Abbey (marble pavement in the quire) and School (portico into the school; library; headmaster's house) for Richard Busby.

Primary sources:

– Hooke's entries in *Diary i*:
  - 28 June 1676 (p. 239): "With R. Waters at Solomons portch for Dr. Busby."
  - 15 July 1676 (p. 242): "met Dr. Busby about quire pavement. Spoke to stone cutter."[675]
  - 21 Aug. 1676 (p. 246): "Westminster paving viewd."
  - 8 Oct. 1676 (p. 253): "I Received from Dr. Busby 3 guineys for the paving Westminster quire."
  - 4 Dec. 1678 (p. 387): "Scaffolds erecting in Westminster Hall."

[673] Besides his designs for the Monument to the Great Fire (see ii. 6 in this chapter), there is a drawing of an urn among Hooke's papers at the British Library; see Figure III-19.

[674] In early 1676, Hooke also collaborated with Redding on an ultimately-unsuccessful proposal for repairing and completing the Tangier Mole; see ii. 26 in this chapter.

[675] Hooke's black-and-white marble paving (Figure IV-183) is still extant.

- 13 Mar. 1679 (p. 403): "Agreed with Bates for Dr. Busby for 35sh. per Square for framing, raising rales, scaffold for roof; 15sh. per square for bricketting, finding all but boords — With mason for 10d superficial all without walls."[676]
- 1 July 1679 (p. 416): "Oliver at Mans with Dr. Busby, about Walker and Plummer. With Plucknet."[677]
- 30 Dec. 1679 (p. 434): "From Busby 5 Guinnys . . . Plucknet cunning, Walker, Tufnell, Horn, Pell there."
- 9 July 1680 (p. 448): "At Dr. Busbys by water, walkd with him and viewd his Garden and Prebends house."
- 28 Sep. 1680 (p. 455): "Dined at Dr. Busby 5 [gold] Guin. Directed about school."
- 5 Oct. 1680 (p. 456): "Agreed with Westminster Glasier for 9d."
- 6 Oct. 1680 (p. 456): "Dined with Dr. Busby, he signed to Glasier."

– Hooke's entries in *Memoranda*:

- 15 June 1682 (p. 154): "at D[r] Busby museam Roof."
- 16 June 1682 (p. 154): "agreed with Gregory for Dr Busby."[678]
- 27 June 1682 (p. 154): "from D[r] Busby 5 G[uineas] [gold]."
- 13 Jan. 1683 (p. 155): "at Dr Busby. Leuer 50sh Dauys font type. Gasses"
- 5 Mar. 1683 (p. 156): "agreed with for Dr Busbys ?busines at 6d. at Smiths Hayrig."

-Hooke's entries in *Diary ii*:

- 2 Nov. 1688 (p. 70): "Letter from J. Gee."
- 3 Nov. 1688 (p. 70): "Tufnell & Lake from Dr Busby about North window of Abb[ey]."[679]
- 12 Nov. 1688 (p. 72): "D. with Dr Busby merid.: viewd Windo abby $2\frac{1}{2}$."
- 17 Nov. 1688 (p. 73): "Anger viewd windows: drew it."[680]

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[676] This entry has been interpreted to refer to Busby's Library; *Diary i*, p. 403n*.

[677] Thomas Plucknett was the Clerk of Works at Westminster. Suspected of fraud, he was dismissed in January 1684; Edward Smith, 'Hooke and Westminster', in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Cyril William Hunter (Burlington, VT: Ashgate, 2006), pp. 219-232, 317-320, p. 320n52. Walker is identified as a smith in WAM XB/06/09/004/3; see below for a list of the primary sources.

[678] Gregory is identified as a carpenter in WAM 66886.

[679] John Tufnell was a mason and William Lake a glazier; see WAM XB/06/09/004/2 and 44608K.

[680] John Angier was a carpenter, but from his 'account of more work done' (BL, Sloane 1009, fols. 144-145) for an unspecified project, he appears to have also acted as a general builder, his bill including bricklaying, painting, glazing, and even preparing draughts.

- 4 Dec. 1688 (p. 79): "Dr Busby d[innerJ there . . . Saw window [at Westminster], directed batlemt of School."
- 7 Dec. 1688 (p. 80): "Anger about Dr Busby."
- 21 Dec. 1688 (p. 85): "Anger from Dr Busby."[681]
- 31 Dec. 1688 (p. 87): "Din'd with Dr Busby, viewd Greencoats Tuttle feild."[682]
- 14 Jan. 1689 (p. 90): "J Gee from Dr Busby, refusd payment."
- 22 Jan. 1689 (p. 92): "Angier compt through the Hall."
- 22 Feb. 1689 (p. 110): "D[ine] at Dr Busby: in Museum crack."
- 10 Apr. 1689 (p. 112): "to Dr Busby in the School Museum."
- 5 June 1689 (p. 126): "two messages from Dr Busby and J. Gee to meet J. Oliver tomorrow. 10."
- 6 June 1689 (p. 127): "Viewd Dr Busbys Cloyster house wth J. Oliver. D[ine] at Dr Busbys."
- 24 Oct. 1689 (p. 159): "Dr. Busby busy about grammer. Old Mar still at Wes[tminster] almes house draughts."
- 21 Dec. 1689 (p. 173): "D with Dr Busby, viewd fallen vault in Cloyster house and sunk gutters. He desird me to take care to have all made good. Recd. from him 4 G [gold] and one K. Jac. [gold]."
- 20 Feb. 1690 (p. 189): "At Dr Busby . . . viewd under Museum, also stair . . . wall 170 foot in Tuttle Feilds, altering his prebends house."
- 28 Feb. 1690 (p. 190): "With J. Oliver at Paules about Dr Busbys bills."
- 12 Dec. 1692 (p. 196): "I deliver smiths, plumbers and glaziers bills to Mr Needham[683]. D[inner] with Dr Busby Bulloc, Matier and Robinson: orderd plumber to mend Dr Busb[ys] spou[t]."
- 22 Dec. 1692 (p. 199): "Faltrop and Doogood[684] extravagant bill for Dr Busby. Tufnell mason about bill for W[estminster] Abby."
- 4 May 1693 (p. 237): "to Westm. met Needham. Lake o. At Vigars o. Dind with Dr Busby. Talk and recd papers about Lutton: about Tuttle Wall: and viewd Henry 7 chapel, Abby butteress, mend key, viewd chimny in little Cloyster, and Dr de Longlys; order Coll to mend them. From J. G. 18d."

[681] John Gee to Hooke, letter dated 19 Dec. 1688, Sloane MS 4062, fol. 230.
[682] Cf. WAM 66914.
[683] John Needham was one of Busby's representatives.
[684] Doogood was a plasterer.

- 25 May 1693 (p. 243): "At Dr Busbys, dind with him; spoke with Needham he told me of Chapter, and their resolve of Dr Birch his Noyse. View Cloyster house and direct sink etc. Set out Tuttle Wall, and agreed with Collins. Viewd Abby Window and considerd of its Repair."
- 29 May 1693 (pp. 244-245): "By water to Westminster: spake with Mr Needham, he told me Dr Birch had fully satisfyd the chapter this morning: tea with Dr Busby, he told me of a Mathemat. teacher: his sink in making. I orderd Lake to take down window Battlements, and lay them on lower leads. Collins askd 5sh. per yard for finish plaister of Plymouth lime."
- 10 June 1693 (pp. 248-249): "To Dr Birch at Johnsons Coffe house: he approved imploying Doogood for plaistering Abby Gable end. At Abby I direct Tufnell and smith for 4 cramps to hold North window and bear flower. I dind with Dr Busby and Matier, pp. 5 br. p. o. I viewd Cloyster house about joice in NE corn[er]. In Museum wth Dr and M, I contrivd sliders for small books."
- 22 June 1693 (p. 252): "To Sr C. Wren he viewd [Westminster] Abby North Gable, approvd bricking up."
- 27 June 1693 (p. 253): "I spake with Dr. Busby, B[ishop] of Rochester and the Chapter. They desird a note from Sr Christ. Wren, signd by us both, about the Abby north end. Anger to J. Gee much earnestnesse about Cloyster house."
- 11 July 1693 (p. 258): "at Dr Busbys . . . Directed Tufnell and Collins about window gable for cramps, 2 stone, 4 punchions, place brick etc. D[ine] with Dr Busby, Bulloc, Matier, Robinson: with Dr B. viewd and measurd wall Tuttle feild."
- 29 July 1693 (pp. 262-263): "Dobleday saw gable end brickd to 2nd cramp, scaffolding for the rest: South gable end worse: S. E. leads very bad: H 7 [Henry VII] Chappel leading. View Langleys turret. I Spake with Dr Busbys carpenter and Lake. Tufnel had D. with B[isho]p at Croydon Tuesday last."
- 1 Aug. 1693 (p. 263): "J. Gee from Dr Busby: he went off satisfyd."

– Westminster Abbey Muniment Room [WAM] [listed chronologically]:

- 66,915: 20 December 1677 receipt from Thomas Plukenett for 'laying black and White Marble in the Quire', for £10 which brought the full sum (including past bills) to £151-15-0.
- 66,887: Receipts dated 1 and 5 Dec. 1681 of payments for work done on the Portico of the School.
- XB/06/09/004/2: Receipt of payment, dated 28 Jan. 1682, for John Tufnell, the mason's work for the 'Portico of Westminster School'.

- 66,886: Carpenter 'Mr Gregory's bill for work done at Westminster, endorsed by Hooke in Oct. 1682. It includes a note indicating that it was measured by the surveyor Scarborough on 25 Sep. 1682.
- 66,914: An estimate of work to be done at Totehillfields, according to a design agreed on in May 1687[?].
- 44,099: Carpenter's bill for the work and materials of the south window of the Abbey, for £9-9-2, for work done on 20 Oct 1688 and 4 Nov 1688.
- 44,154: Glazier's bill, dated 24 Nov. 1689, for the rose window at the Abbey.
- 44,492A: Plumber's bill for work done at the Abbey, endorsed by Hooke on 13 Jan. 1693.
- 43,200: Glazier's bill for work at the school house, endorsed by Hooke on 8 Jan. 1694.
- 44,511A: Carpenter's bill for work done at the Abbey, endorsed by Hooke on 8 Jan. 1694.
- 44,690A: Plumber's bill, dated 9 Feb. 1694, for work done at the Abbey, with an undated note from Hooke disputing part of it.
- 44,608K: Glazier's bill, dated 13 Dec. 1694, for work done on the windows of the Abbey, especially the North Window, with an undated note by Hooke.
- 44,690B: Plumber's bill, dated 16 Mar. and 23 July 1695, for work done at the Abbey; Hooke's note, dated 16 Jan. 1696 disputes it in part.

– British Library:

- Sloane MS 1009, fols. 144-145: 'An account of more worke done that is not mentioned in the articles between Dr. Busby and John Angier./ nor in the Draught.' The exact project in question in unclear, but it bears a note at the end implying that Hooke had approved the charges, and that a true copy had been delivered to him. The document is undated but considering Gee's letter to Hooke regarding Angier (see below), it might be from *c.* 1688.
- Sloane MS 4062, fols. 229-230: 19 Dec. 1688 letter from John Gee to Hooke regarding John Angier.

– All Souls College, Oxford, AS IV.89: 'Elevation of an unidentified building, probably a design by Robert Hooke for the Busby Library, *c.* 1681', reproduced in Anthony Geraghty, *The Architectural Drawings of Sir Christopher Wren at All Souls College, Oxford: A Complete Catalogue* (Burlington, VT, 2007), p. 235 (no. 364). (**Figure IV-184 or Figure III-224**).

Description:

Richard Busby (1606–1695), the famed headmaster at Westminster School, took Hooke under his wing when the latter arrived in London after his father's death.[685] Busby remained a life-long friend; the diary entries show them regularly meeting and dining together. He also became an important patron, commissioning Hooke first to oversee relatively minor repairs and additions at Westminster Abbey and School, and then for his personal charitable works, to build a small parish church in Willen, and to 'beautify' the Church of St. Nicholas in Lutton, Busby's hometown.[686]

As far as the diaries are concerned, the first time Busby consulted Hooke for architectural help was in June 1676 for unspecified repairs at the Abbey's northern transept, the so-called 'Solomon's Porch'; it is unclear whether this work was related to the later re-glazing of its rose window.[687] Less than a month later, Busby commissioned him to repave the Choir in black and white marble (**Figure IV-183**); Hooke immediately contracted a stone mason and within six weeks the work was finished.[688] According to a receipt dated 20 December 1677, it cost a total of £151-15-0.[689]

There are further minor works Hooke supervised, though the diary entries, as usual, are low on detail. In the winter of 1678–1679, he directed repairs to the roof and stone walls, although rather than the Abbey, it is possible these were related to Busby's house. In 1670, Busby, who had been made Prebendary of Westminster after the Restoration, was allowed to move into the Prebendal House in the Little Cloister, connected to the College Garden with a staircase. Some initial repairs were made to the house, but later in the 1680s, Busby commissioned more substantial remodelling: a cellar and another floor were added to the house, and a library was built for his impressive collection of books.[690] A drawing among Wren's papers at All Souls College (**Figure IV-184**) has been attributed to Hooke for this library, although its proportions do not quite match what was eventually built (**Figure IV-185 and IV-186**). Towards the end of 1681, a new portico leading into the school was also constructed (**Figure IV-188**); receipts of payments to John Tufnell, the mason, for that work are dated December

685 See Chapter I for biographical notes on Hooke.

686 See ii. 35 and ii. 50 in this chapter, regarding Hooke's work for the churches in Willen and Lutton.

687 *Diary i*, p. 239. For the glazier's bill, see WAM 44,154.

688 This pavement is still extant. In 2005, one of its black marble tiles was inscribed commemorating Hooke's death.

689 WAM 66,915.

690 See Chapter II on Busby's library. Intriguingly, Hooke noted contriving "sliders for small books" for Busby; *Diary ii*, p. 249.

1681 and January 1682. The overall work in the School is considered to have been completed in 1687, the date inscribed in the plaster ceiling of the house.[691] Since not all of the bills in the Westminster Abbey Muniment Room related to these works are endorsed by Hooke, it would take further research to coordinate the diary entries and craftsmen's receipts to untangle which parts Hooke may have designed or at least supervised.

As one of his charitable works, Busby built a dormitory for the 'Hospital in Tothill Fields'. It is described as a two-storey building 58' in length and 15'-6" in width, estimated to cost £196-01-10, according to a design agreed on in May 1687.[692] While there is evidence Hooke was responsible for the wall enclosing the garden, it remains unknown whether he designed the main building. It was built by John Angier, the carpenter, who had tried his hand in the speculative real estate market in London by building no. 7 at St. James's Square, the house which Hooke had helped Richard Jones purchase. When the cost of the dormitory exceeded the estimate, Hooke was called in to survey; the dispute regarding the additional charges is documented in two manuscripts now at the BL.[693]

On January 1691, Hooke was appointed Surveyor to the Abbey with an annual salary of £20. Although he was discharged due to his 'age and infirmities' on 3 June 1693, he continued undertaking work for the Abbey and for Busby's charitable works; his note disputing part of a plumber's bill is dated as late as January 1696.[694]

The house and library Hooke built for Busby were destroyed in World War II. The house was not rebuilt but the library was later restored, replicating the plaster ceiling and bookcases (**Figure IV-187**). The portico has survived intact.

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[691] Smith, 'Hooke and Westminster', p. 228; Lawrence E. Tanner, *Westminster School: A History* (London: Country Life Ltd., 1934), p. 19. WAM 18,228 to 18,237.

[692] WAM, 66,914.

[693] See no. 28 in this chapter on Hooke's work for the houses at nos. 6 and 7, St. James Square. On Angier, see footnote 680, as well as the two manuscripts extant at the BL (Sloane MS 1009, fols. 144-145, and Sloane MS 4062, fols. 229-230, as noted above under the primary sources).

[694] On Hooke's withdrawal from the Westminster surveyorship, see Smith, 'Hooke and Westminster', p. 231. The plumber's bill endorsed by Hooke on 16 Jan. 1696 is WAM 44,690B.

ii. 25. CANTERBURY CATHEDRAL CHOIR, KENT

Attribution: Colvin, *BDBA* (1954) and subsequent editions.

Brief description: In 1676, Hooke liaisoned between John Tillotson, the Dean of Canterbury, and Roger Davys, joiner from London, for the installation of panelling and stalls for the choir at Canterbury Cathedral in Kent.

Primary sources:

– Hooke's entries in *Diary i*:
  - 21 June 1676 (p. 238): "Dean Tillotsons with Davys."
  - 8 July 1676 (p. 241): "Wrote to Deane of Canterbury."
  - 14 July 1676 (p. 242): "Received a letter from the Dean of Canterbury about Davys."
  - 22 July 1676 (p. 243): "Wrote to Dean of Canterbury."
  - 27 Dec. 1676 (p. 264): "Davys to Dean of Canterbury."
  - 21 June 1676 (p. 238): "Dean Tillotsons with Davys."
  - 13 Mar. 1677 (p. 279): "Met . . . Dean Tillotson about . . . Canterbury Church wainscote."
– Hooke's entries in *Memoranda*:
  - 6 Sep. 1681 (p. 150): "Dauys from Canterbury."
– Canterbury Cathedral Dean and Chapter Archives, Fabric 50/1-13:
  - Four drawings of different schemes, drafts and final agreements, bills and receipts.
  - Drawing signed by Roger Davys (or Davis), with a manuscript note in Hooke's hand that it was "Subscribed and agreed to/ in the Presence of Robert Hooke/ July 22. 1676." (**Figure IV-189**)
  - 2 Aug. 1672 agreements between Roger Davys and the Dean and Chapter of Canterbury Cathedral.[695]

[695] In the order they are listed, the archival documents are referenced from Margaret Sparks, 'The Refitting of the Quire of Canterbury Cathedral 1660–1716: Pictorial and Documentary Evidence', *Journal of the British Archaeological Association* 154 (2001), pp. 170-190, pp. 179, 189n33; C. Eveleigh Woodruff and William Danks, *Memorials of the Cathedral and Priory of Christ in Canterbury* (London: Chapman and Hall Ltd., 1912), p. 342; W. D. Caröe, 'Canterbury Cathedral Choir during the Commonwealth and After', *Archaeologia, or, Miscellaneous Tracts Relating to Antiquity* 62 (1911), pp. 353-366, p. 357.

Description:

John Tillotson (1630–1694) and his wife are mentioned frequently in Hooke's diaries. They were close friends, and though Hooke may have known Tillotson long before then, he would at least have met him at the Royal Society where the latter was elected fellow in January 1672.[696] As Hooke noted in his diary on 20 October 1672, Tillotson was appointed Dean of Canterbury, and was thereafter referred to by both names.[697]

In 1676, Tillotson approached Hooke for new panelling and stalls for the choir at Canterbury Cathedral. Although the design in the contract drawing (**Figure IV-189**) does bear some resemblance to the Censors' Room at the Royal College of Physicians (**Figures IV-91 to IV-93**), it is otherwise unclear whether Hooke was involved beyond simply putting Tillotson in touch with Roger Davys, the joiner whom he most often worked with. In either case, the inspiration was in fact the panelling Davys had built at Mercers' Hall for Edward Jerman or Jarman (*c.* 1605–1668) and John Oliver (*c.* 1616–1701) who were in charge of the Hall's reconstruction after the fire.[698] Indeed it was even written into the Canterbury contract that the work be "of as good materials & of such scantlings & thicknesses and in as good and workmanlike manner as is the wainscott now made and sett up in the Mercers' greate Hall in London."[699] The work cost £261-19-6; the fabric must have been pleased with the results as they would hire Davys again in 1682 for further work at the western end of the choir.[700]

Davys's work was replaced in 1830, but not before it was preserved in at least two engravings (**Figures IV-190 and IV-191**)[701].

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696 Birch, vol. 3, p. 4.

697 *Diary i*, p. 10.

698 Batten draws attention to the numerous mentions of Mercers' Hall and Chapel in the Diaries as suggestive of Hooke's involvement in their design, however at least some of those are related to the consultation work Hooke did on behalf of John Frederick, owner of a neighbouring building that had sustained some damage during the demolition of the damaged Chapel walls; see Imray, *The Mercers' Hall*, p. 36 and Batten, p. 111.

699 Caröe, 'Canterbury Cathedral Choir during the Commonwealth and After', p. 357.

700 Ibid. For the 1682 work, see Sparks, 'The Refitting of the Quire of Canterbury Cathedral 1660–1716: Pictorial and Documentary Evidence', p. 180. 6 Sep. 1681 diary entry suggests Davys was already engaged in work prior to 1682.

701 J. Dart, *The history and antiquities of the Cathedral Church of Canterbury* (London: Printed and sold by J. Cole, engraver . . . , 1726) reproduced as Fig. 10 in Sparks, 'The Refitting of the Quire of Canterbury Cathedral 1660–1716: Pictorial and Documentary Evidence' and as Plate XII in Caröe, 'Canterbury Cathedral Choir during the Commonwealth and After'.

ii. 26. TANGIER MOLE PROPOSAL

Attribution: Batten, p. 112; 'Espinasse, p. 88; Frances Willmoth, *Sir Jonas Moore: Practical Mathematics and Restoration Science* (Rochester, NY, 1993), p. 133.

Brief description: In 1676, in collaboration with Robert Redding, James Hayes, George Philips, and John Fitch, Hooke prepared a proposal for repairing and completing the Tangier Mole. It was unsuccessful.

Primary sources:

– Hooke's entries in *Diary i*:

- 11 Feb. 1676 (pp. 216-217): "Dind with Sir R. Redding and Coll Philips at Birchen Bear. about Tangier mole. We met againe at Redding's Lodging sat all day and I drew draughts. At Sir Chr. Wrens. With Mr. Henshaw, Sir J. Hoskins, Dr. Holder, Mr. Aubery and met againe Sun p*ost* p*randium*. We had severall meetings afterwards about it. I was 4 times at Lord Privy Seals. Dined there once. I made modules, discoursd with Sir Ar. Ingram and with Mr. Fitch about it, we had agreed it. There were 4 shares. Sir R. Redding, Sir J. Hayes, Coll Philips and I, Fitch to have my share. Sir R. Redding to furnish timber to ship for £30 per Load, and 2 inch plank at 35 per Load, to doe the mole of boxes the whole bredth and height. The proposall to be inscribed and a Description."
- 12-23 Feb. 1676 (p. 217): "attended on Committee of Tangier . . . Sir R. Redding and Coll Philips at Charing Crosse."
- 16 Mar. 1676 (p. 220): "Bates with me in the morning. I told him of Tangier and discoursd of trading."
- 24 Mar. 1676 (p. 222): "Met Collonel Philips at Herringmans. Gave me his book of Tangier. Desird me to write to him and to Tangier querys about mole."
- 25 Mar. 1676 (p. 222): "Met Collonel Philips at Mans coffe. Gave him enquirys for Tangier mole."
- 31 Mar. 1676 (p. 223): "Discoursd with Creed in Queen Street about Tangier mole."
- 3 Apr. 1676 (p. 224): "At Alsops, Mr. Martins, Sir W. Pettys. Discourse of chariot and Tangier."

Chapter IV – Building

Description:

In 1662, England acquired the port of Tangier in North Africa through Charles II's marriage to Catherine of Braganza.[702] Early expeditions revealed the port's vulnerabilities to stormy weather and to military attacks, and in 1663 Jonas Moore (1617–1679) was sent to assess the harbour for fortifications. His survey and proposed design for a mole was published by Hollar in 1664 to promote and finance the project. For the logistics of building the wall, Moore also consulted the Royal Society for help with instruments for sounding depths in water or for diving to facilitate the laying of foundations at the bottom of the sea (**Figures III-262, III-263. cf, III-269**).[703]

The contract for building the mole was signed in 1663, with the engineer Hugh Cholmley (1632–1689) put in charge of the work.[704] Severe storms during the winter of 1669–1670 and then in 1674–1675 caused significant damage to the wall, as well as to Cholmley's reputation, prompting an official inquiry. Proposals were sought for repairing and continuing the work; Cholmley's was rejected

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[702] Sources on the English presence in Tangier include E. M. G. Routh, *Tangier: England's Lost Atlantic Outpost, 1661–1684* (London: John Murray, 1912); Julian S. Corbett, *England in the Mediterranean: A Study of the Rise and Influence of British Power within the Straits, 1603–1713* (New York: Longmans, Green, and Co., 1917), vol. 2, pp. 335-419; W. B. T. Abbey, *Tangier under British Rule 1661–1684* (Channel Islands: J. T. Bigwood, 1940); and more recently Karim Bejjit, *English Colonial Texts on Tangier, 1661–1684: Imperialism and the Politics of Resistance* (Farnham, Surrey: Ashgate, 2015). See also Edwin Chappell, ed., *The Tangier Papers of Samuel Pepys* ([London]: Printed for the Navy Records Society, 1935); and Karim Bejjit, 'Tangier That Was: The Confessions of Samuel Pepys (1683)', in *Writing Tangier*, ed. Ralph M. Coury and R. Kevin Lacey (New York: Peter Lang Publishing, 2009), pp. 151-162 on Samuel Pepys's involvement with Tangier.

[703] Willmoth, *Sir Jonas Moore*, p. 135-136; Jardine, *Ingenious Pursuits: Building the Scientific Revolution*, pp. 213-217. See also the annotations for Figures III-262, III-263. cf, III-269 in Chapter III.

Cf. Royal Society meeting minutes from 10 June 1663 "Mr. Hoskyns desired some leads and balls for sounding without a line for one Mr. Jonas Moore going to Tangier: upon which the operator was ordered to provide four leads and two balls between that and the Monday following, and to deliver them to Mr. Hoskyns for Mr. Moore," or 11 Nov. 1663 "Mr. Povey mentioned, that Mr. Jonas Moore had an engine for staying two or three hours under water in; and likewise a method of blowing up great rocks; both practised by him at Tangier," or 13 Jan. 1664 "Mr. Jonas Moore acquainted the council with Sir John Lawson's desire, that they would appoint a committee to examine Mr. Greatrix's diving instrument, or to direct a good method of staying under water for a considerable time, to lay the foundation of the mole at Tangier, at the depth of four or five fathoms;" Birch, vol. 1, pp. 259, 330, 370.

[704] Routh, *Tangier*, p. 37. On Cholmley, see 'Cholmley, Sir Hugh (1632–1689)', in *A Biographical Dictionary of Civil Engineers in Great Britain and Ireland*, ed. A. W. Skempton, et al. (London: Thomas Telford Publishing on behalf of The Institution of Civil Engineers, 2002), pp. 133-134.

and he was subsequently succeeded by his assistant Henry Sheres (1645?–1710) whose proposal had cost £10,000 less.[705]

It must have been this call for proposals that Hooke and his collaborators were answering on 11 February 1676 when Hooke noted a meeting with "Sir R. Redding and Coll Philips . . . about Tangier mole." Robert Redding or Reading (*c.* 1640-?) was an Irish politician who had been elected fellow of the Royal Society in 1671 and created baronet in 1675. As an alumnus of Christ Church, Oxford, where he had matriculated in 1655, Reading may have already known Hooke before they met at the Royal Society.[706] 'Coll. Philips' has been identified as the military engineer Thomas Phillips (1635?–1693) by Frances Willmoth.[707] However he may also have been George Philips or Phillips (1629/30–1696?), secretary to William O'Brien, second earl of Inchiquin, who was the governor of Tangier between 1675 and 1680.[708] George Philips's 29 September 1675 letter to Michael Boyle (1609/10–1702), the Lord Chancellor of Ireland, was published in 1676 as a pamphlet titled *The Present State of Tangier in a Letter to his Grace, the Lord Chancellor of Ireland*, which is perhaps "his book of Tangier" that he gave to Hooke on 24 March 1676.[709] Others investing in the project were James Hayes (*d.* 1693), secretary to Prince Rupert, original fellow of the Royal Society, and a governor of Hudson's Bay Company, and John Finch, a master bricklayer and London builder, who was to have Hooke's share in the enterprise.

As he had just returned from Tangier, Philips would have been familiar with the structural problems of the mole, and the solutions that were being proposed by Cholmley and Sheres. After their first meeting, Hooke spent the day making draughts and modules, and discussing the project with

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[705] Routh, *Tangier*, pp. 353-354. On Sheres, see 'Sheres, Sir Henry, FRS (1645?–1710)', in *A Biographical Dictionary of Civil Engineers in Great Britain and Ireland*, ed. A. W. Skempton, et al. (London: Thomas Telford Publishing on behalf of The Institution of Civil Engineers, 2002), pp. 603-604.

[706] In 1675 Hooke designed a house for Reading; see ii. 23 in this chapter.

[707] Willmoth, *Sir Jonas Moore*, p. 133. Willmoth's references to Phillips's involvement in Tangier date to after 1683 when he was sent there to demolish the mole; his sketches of the town and harbour have been reproduced in Routh, *Tangier*.

[708] In the 8 Nov. 1675 entry in the Calendar of State Papers Domestic: Charles II, 1675-6, he is identified as "Lord Inchiquin's secretary, Col. George Phillips." On Philips, see 'Philips, George (1629/30–1696?)', *ODNB*.

[709] Philips's pamphlet is reproduced in Bejjit, *English Colonial Texts on Tangier, 1661–1684: Imperialism and the Politics of Resistance*, pp. 112-127. I concede that this does not entirely rule out Thomas Phillips who may have lent Hooke a book he owned rather than wrote himself. In 1683, he became involved in the destruction of the Tangier fortifications and mole, but this was seven years after Hooke was writing his proposal.

various colleagues. A cost estimate was made "to doe the mole of boxes," with Redding providing the timber.[710] This method, which had been used in building the foundation of the mole at Genoa where wooden boxes or chests filled with stones and cement were sunk and placed on a bed of rubble, was already well-known and advocated by Sheres but severely criticised by Cholmley who worried that the boxes would not be durable enough in the choppy waters of Tangier.[711] Perhaps similarly concerned, Hooke sought the opinion of Roger Bates, the London carpenter he had worked with on multiple architectural projects.

Even if eventually Hooke and his colleagues' proposal was cheaper, it is clear that the Commissioners decided to go with someone already well-acquainted with the project.[712] On 17 May 1676, the contract with Sheres was ordered to be entered into the treasury books—this is likely the reason Hooke's diary entries on the Tangier mole stop about a month before then.[713] Unfortunately, Hooke's drawings and models do not appear to have survived, but since this was an official submission necessitating four trips to the office of the Lord Privy Seal, further research among state papers might reveal a few more hints about the content of the proposal which may have technical significance.

ii. 27. HOUSE FOR AUBREY DE VERE, EARL OF OXFORD, WHITEHALL, LONDON

Attribution: Batten, pp. 106-07; Colvin, *BDBA* (1954) and subsequent editions; 'Espinasse, pp. 98-99.

Brief description: In 1676, Hooke designed a house for Aubrey de Vere, twentieth earl of Oxford, in the Privy Garden at Whitehall; possibly only the foundations were built.

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[710] Batten, who was the first to make this attribution, did not go into any details other than that "Hooke's scheme cannot have come to anything, for Mr. Shere, an engineer who had been working on the Mole, succeeded Cholmley in 1676," Batten, p. 112. 'Espinasse and Willmoth's accounts are equally brief; see 'Espinasse, p. 88; Willmoth, *Sir Jonas Moore*, p. 133.

[711] Cholmley defended his own method in the anonymously-published 1680 pamphlet *A short account of the progress of the mole at Tangier, from the first beginning of that work*, which is reproduced in Bejjit, *English Colonial Texts on Tangier, 1661–1684: Imperialism and the Politics of Resistance*, pp. 154-160. See also *An account of Tangier. By Sir Hugh Cholmley, bart. With some account of himself and his journey through France and Spain to that place, where he was engaged in building the mole in the time of King Charles the Second; and a journal of the work carrying on . . .* ([London]: [s.n.], 1787). On the debates regarding the laying of the foundations at Tangier, see Routh, *Tangier*, pp. 349-351.

[712] 'Cholmley, Sir Hugh (1632–1689)', p. 134.

[713] 'Minute Book: May 1676', in *Calendar of Treasury Books, Volume 5, 1676–1679* (London: His Majesty's Stationery Office, 1911), pp. 42-54.

Chapter IV – Building

Primary Sources:

– Hooke's entries in *Diary i*:

- 25 Mar. 1676 (p. 222): "Spoke for Davys at Mr. Mountacues. He promisd the Building for Lord of Oxford 50 guinnys."
- 26 Mar. 1676 (pp. 222-3): "At home till 4, then to Sir Chr. Wrens. Acquainted him about Lord of Oxfords building he seemd displeasd, and advised me against it."
- 27 Mar. 1676 (p. 223): "To Mans caffe house, then to Mrs. Kirks, where with Lord Oxon viewd ground . . . Lord Oxons."
- 28 Mar. 1676 (p. 223): "At Mr. Montacues. Spoke with him about Lord of Oxford. Sir Ch. Wren. He proposd £80 covering middle part with Lead. To Lord of Oxford. Saw his and his Ladys Roomes. Pleasd him."
- 29 Mar. 1676 (p. 223): "With Lord of Oxford and Mr. Montacue."
- 30 Mar. 1676 (p. 223): "At home all the morning . . . draughts for Lord Oxon."
- 31 Mar. 1676 (p. 223): "At Mr. Montacues. Spoke with him. Carryd draught to Lord Oxon. He, Lady and Mr. Kirk all pleasd. He agree that he would advance £500 to Fitch. and stand to the bargain made by me and Mr. Montacue."[714]
- 1 Apr. 1676 (p. 223): "With Mr. Montacue about Lord of Oxon. With him to Kirks. By the way he ingaged I should have £100 in all, £50 at first and twice £25 after and that he designed to pay me after the same rate."
- 4 Apr. 1676 (p. 224): "To . . . Mrs. Kirks."
- 6 Apr. 1676 (p. 224): "To Sir Ch: Wrens. Acquainted him with Lord Oxon. Displeasd."
- 8 Apr. 1676 (p. 225): "Scarborough here, wrote conditions for Madam Kirk."
- 12 Apr. 1676 (p. 225): "To Madam Kirk, gave her a paper of what was to be done."
- 13 Apr. 1676 (p. 226): "to Lady Oxford, Spoke to Mr. Montacue about Oxfords money."
- 15 Apr. 1676 (p. 226): "Lady Oxons."
- 17 Apr. 1676 (pp. 226-7): "At Mr. Mountacues, he wrote a Letter to Mrs. Kirk telling her I was to have £100 for building her house, £50 in hand and £25 at two other payments."
- 19 Apr. 1676 (p. 227): "At Lord Oxons."

[714] The £500 cost is confirmed in de Vere's 1688 petition; see below.

- 20 Apr. 1676 (p. 227): "At Lord Oxons. Madam Kirks . . . Walkt with Sir Chr. Wren round St. James Park and talkd with him about Lord Oxon . . . Directed Mr. Fitz his workmen about the house in the Privy garden."
- 21 Apr. 1676 (p. 227): "Missed Lord Oxford."
- 22 Apr. 1676 (p. 227): "at Lord Oxons . . . Seald contract with Lord Oxon and Fitch. Fitch had order for £50 for me."
- 24 Apr. 1676 (p. 227): "Mr. Fitch brought me £50 from Lord Oxon."
- 27 Apr. 1676 (p. 228): "At Lord Oxons building. Reproved Slabbs. Maddam Kirk not up."
- 1 May 1676 (p. 229): "Directed Scarborough about foundations of Lord Oxons . . . Went not to city view nor Lord Oxon."
- 3 May 1676 (p. 229): "To Madam Kirks. She very well pleasd about foundations and balcony. To Lord Oxon, he and my lady the same."
- 6 May 1676 (p. 229): "To . . . Oxons building."
- 5 June 1676 (p. 235): "Mr. Montacue out. Lord Oxon out . . . Walkd with Sir Chr. Wren to Lord Oxons building."
- 10 June 1676 (p. 236): "With Lord Oxon at Whitehall."
- 28 June 1676 (pp. 238-239): "By water to Mans and Lord Oxons."
- 1 July 1676 (p. 239): "spoke with Lord Oxon."
- 15 Aug. 1676 (p. 246): "At Mr. Mantacues, Mrs. Kirks she abed, Firth a Raskall."
- 19 Mar. 1677 (p. 280): "I spake to Lord Oxon about building in privy Garden."
- 8 Jan. 1678 (p. 339): "A message from Lord Oxford and Madam Kirk."
- 9 Jan. 1678 (p. 339): "At Lord Oxfords with Madam Kirk, and countess Oxon."
- 18 Jan. 1678 (p. 341): "With Fitch to Mrs. Kirks."
- 22 Jan. 1678 (p. 341): "At Mrs. Kirks."
- 28 Jan. 1678 (p. 341): "to Mrs. Kirks. Man not to be found."
- 29 Jan. 1678 (p. 341): "at Mrs. Kirks, missd Man againe."

– The National Archives, Kew, PRO:

- LC 5/141, p. 111: 22 January 1675 instructions to "cause a Dore to be made and opened out of *th*e House where Mr. Pelham Humfryes lately dwelt into that place which was lately *th*e Bowleing Greene at Whitehall, for *th*e perticular use of *th*e Right hono*ura*ble Earle of Oxford."[715]
- LC 5/140, p. 323: Instructions to Wren to "cause to bee erected for the Honoble William Paston Esqr., . . . a new building in the bowleing Greene next the Wall on the south side."[716]
- LR I, pp. 62, 73: 31-year lease dated 23 December 1676 of a neighbouring building, "lying … in a certain place or garden there called the Bowleing Greene . . . bounding west on the wall of a certain building or house now building by the Earl of Oxford, and extending west from the said wall of the building . . . 54 feet and in width in the middle of the said piece 54 feet and abutting upon the old wall of the palace or garden … towards the south."[717]
- Ind. 4619, p. 270: Petition dated 2 June 1688 by Aubrey, Earl of Oxford, who: "sheweth that his late Ma*jes*ty granted him a peice of Ground neare the Bowleing Green . . . during the lives of the Peti*tione*r and Diana his wife, and layd a foundacion for a house w*hi*ch cost him 500l. And being informed his Ma*jes*ty intends to turn that ground to other uses Submits his pretentions to his Ma*jes*ty and hopes his Ma*jes*ty will not let him loose his money layd out."[718]
- Calendar of Treasury Books, 1689–90, p. 423: "Nov. 3, 1690. Mr. Paston is called in about his pretensions to the part of the ground on which the Scotch Secretary's Office is built. He says the Earl of Yarmouth has a grant of part of that ground. He is desired to bring the patent to my Lords that it may be examined and he promises so to do."[719]

– Letter from Charles Bertie to Wren, dated 28 June 1676: "His Majesty having directed your setting out of fifty-four squares of ground, next my Lord of Oxford's building, in the bowling-green, Whitehall, for building of lodgings, for William Paston, Esq., my Lord Treasurer desires you will

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[715] Quoted in 'Houses in the Bowling Green', in *Survey of London: Volume 13, St Margaret, Westminster, Part II: Whitehall I*, ed. Montagu H. Cox and Philip Norman (London: London County Council, 1930), pp. 236-248. On the composer, see 'Humfrey, Pelham (1647/8–1674)', *ODNB*.

[716] Quoted in 'Houses in the Bowling Green'.

[717] Quoted in ibid.

[718] Quoted in ibid. With Charles II's death, de Vere had lost some of the royal favours he had enjoyed.

[719] Quoted in ibid. Note that by this time Charles II had died and his brother James II was overthrown by William III.

view the said ground, and make a skeame, or map, thereof, which his lordship desires you to transmit unto him, in order to the making of a lease thereof unto the said Mr. Paston."[720]

– 10 July 1676 report by Wren: "I humbly certify this map to represent the situation of a parcel of ground in his Majesty's bowling-green, in Whitehall, bounded southward with the old enclosure wall of the same; eastward, with the Earl of Oxford's new building; westward, with a line, about seven feet distant, from the timber building belonging to the under housekeeper of Whitehall; northward, with a line, ranging with the front of the said building of the Earl of Oxon."[721]

Description:

During the Commonwealth, his staunchly royalist views had landed Aubrey de Vere (1627–1703), twentieth earl of Oxford, in the Tower a few times, but after the Restoration he was rewarded for his loyalty with various offices to supplement his meagre fortune. His reputation for living "riotously" and the few scandals he was the subject of did not cause him to lose Charles II's favour. Indeed in 1670 he was named to the privy council, and his marriage in 1673 to Diana Kirke, the daughter of George Kirke (*c.* 1600–1675), groom of the bedchamber, seems to have elevated him further up the ranks.[722] Commissioning Hooke to build a house in the Privy Garden at Whitehall may have been part of this political rising.[723]

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[720] This letter, for which no manuscript reference is given, is transcribed in Elmes, *Memoirs of the Life and Works*, p. 360. Charles Bertie (1640/41–1711), who held various titles at that time, was writing as secretary to the Treasury; see 'Bertie, Charles (1640/41–1711)', *ODNB*. Why the 23-year old William Paston (1653/4–1732), second earl of Yarmouth from 1683, was installed in Whitehall is not immediately clear but may have had to do with his family connections. He was married to Charlotte Howard (*c.* 1650–1684), the king's illegitimate daughter, and his father had just been appointed lord lieutenant; see under 'Paston, Robert, first earl of Yarmouth (1631–1683)', *ODNB*.

[721] Wren's report, for which no manuscript reference is given, is transcribed in Elmes, *Memoirs of the Life and Works*, pp. 360-361.

[722] The Kirke family had accumulated a few scandals of their own so it was an apt match.

[723] 'Vere, Aubrey de, twentieth earl of Oxford (1627–1703)', and 'Kirke, George (*c.* 1600–1675)', *ODNB*. On Whitehall during this period, see Susan Foreman, 'Whitehall Palace: Sixteenth and Seventeenth Centuries', in *From Palace to Power: An Illustrated History of Whitehall* (Brighton, UK: The Alpha Press, in association with Sussex Academic Press, 1995), pp. 5-37; Simon Thurley, *The Lost Palace of Whitehall* (London: British Architectural Library, 1998); *Whitehall Palace: An Architectural History of the Royal Apartments, 1240–1698* (New Haven, CT: Yale University Press, 1999). For a detailed review of the 1670 survey of the palace, and a helpful gazetteer of all the courtiers residing there at that date, see Simon Thurley, *The Whitehall Palace Plan of 1670* (London: London Topographical Society, 1998), esp. pp. 31-55.

There are few direct primary sources on this house, and Hooke's diary entries are not particularly helpful, sometimes giving too little information for any meaningful interpretation, other times giving the impression that there is more than one project being undertaken. For instance, in addition to Lord and Lady Oxford, Hooke was discussing a building with Mr. and Mrs. Kirke, presumably Lady Oxford's brother (Percy) and mother (Mary). Indeed, on 17 April 1676, Hooke agreed with Mrs. Kirke to build 'her house' for the handsome fee of £100. Mary Kirke already had three properties at Whitehall. One of them was on the west side of Bowling Green, and had been granted specifically for the use of her servants; she later transferred that property to her son Percy, who in 1679 petitioned for extra land to properly repair it as the buildings were "now old and falling down;" thus this was not a property built three years before.[724] The other two properties were also already existing in 1670 when a thorough survey of Whitehall was conducted (**Figure IV-193**), but the next map available, from 1682 (**Figure IV-194**), shows that they went through some alterations in the intervening years. Indeed, if the 1682 map is to be trusted, the property by the Thames appears to have been demolished altogether and replaced by a large mansion, and the one just north of the horse guard yard appears to have been altered if not entirely rebuilt. Of course, these changes may have been made before or after 1676, when Hooke was hired, and the ambiguous diary entries could instead be interpreted as Mary Kirke paying for Oxford's house, perhaps as a dowry for her daughter. The discrepancy between the £50 fee Hooke had agreed to with Oxford and the £100 with Kirke could be that Montagu had intervened and helped increase his fee a few weeks earlier.[725]

As for the location of the house, while it appears it was the former dwelling place of the composer Pelham Humfrey (1647/8–1674), there is no information on that building to begin with.[726] Instead, some location information can be extracted from the documentation on a neighbouring plot. In June 1676, Wren, as surveyor-general, was asked to measure and draw an area that was to be leased to William Paston (1653/4–1732); it was described as a 54'x54' square lot next to "Lord of Oxford's building, in the bowling-green, Whitehall." Wren's survey and report gave further details of Paston's lot: to its south was the old enclosure wall of bowling green, to its east was "Earl of Oxford's new

[724] Percy Kirke's petition (The National Archives, Kew, PRO, C. 66/3233, 34 Chas. II.) is quoted in 'Houses in the Bowling Green', . Kirke gets several mentions in Hooke's later diaries as general Kirke, see 'Kirke, Percy (d. 1691)', *ODNB*.

[725] Montagu's connection to de Vere is unclear but he seems to have facilitated Hooke's getting the commission; cf. 25 Mar. 1676 diary entry.

[726] 'Houses in the Bowling Green', . On Humfrey, see 'Humfrey, Pelham (1647/8–1674)', *ODNB*.

building," to its west, seven feet from the boundary was a "timber building belonging to the under housekeeper of Whitehall [i.e. Mary Kirke; most likely the aforementioned servants' quarters]," and its northern boundary was aligned with de Vere's building.[727] It is clear from this description that the house was located somewhere along the southern end of bowling green.

Whitehall was always a rapidly changing area, partly due to the vagaries of the political landscape of the time. A courtier could easily lose the favour of the king and find himself evicted from the palace; additionally, the period between 1685 and 1689 saw the accession of James II and then William III via the Glorious Revolution, leaving alliances in constant flux. While de Vere seems to have navigated these changes well, not particularly getting along with James II, he did lose his position as the gentleman of the bedchamber and may even have been pushed out of Whitehall. In a 1689 survey of the rooms at the Palace, possibly commissioned by William III at his accession, there were 14 rooms registered for the earl of Oxford, with the notes that it contained "Rooms and offices below stairs," and that it was "built for the Sec*reta*ry of Scotland'.[728] Two years earlier, John Drummond (1649–1714), a loyal supporter of king James II, who created him earl of Melfort and appointed him one of the secretaries for Scotland, was allowed to overtake Paston and de Vere's lots and begin building a large house, prompting their protestations. In 1688 de Vere submitted a petition to James II, indicating that the late king had granted him the grounds for the duration of his and his wife's lives, and that he had "layd a foundacion for a house w*hi*ch cost him 500l." Having heard that the king intended "to turn that ground to other uses," he hoped his majesty would not let him lose his investment. De Vere's petition, which confirms the £500 he paid Fitch, raises the interesting possibility that only the foundation of the house may have been ever laid.[729] This would explain why Hooke's

[727] For the letter and Wren's report, see above under primary sources. On Mary Kirke as 'Housekeeper of Whitehall Palace', as well as on the Kirke family, see Thurley, *The Whitehall Palace Plan of 1670*, p. 44.

[728] 'The Lodgings and Apartments in the Palace of Whitehall with the Names of the Offices and Officers places where Lodged, from a Review begun & ended 1689. 1^{o} Will. Mary', Bodleian Library, Gough Maps 41g, no. 53. The next line lists 11 rooms for "Coll. Kirke [i.e. Percy] a new built house containing containing [written twice] Rooms as housekeepi*ng*," perhaps the house he had petitioned to build ten years earlier. Paston's name is not mentioned in the survey, perhaps because he had refused to swear allegiance to the new king.

[729] Whether there ever was any structure, foundation or otherwise, on Preston's lot remains uncertain. Wren had been instructed to have one built but when in 1690 Preston was "called in about his pretensions to the part of the ground on which the Scotch Secretary's Office is built," there was no mention of a previous house.

references to the actual construction did not progress beyond the foundations, and also how Drummond could so easily occupy and build on the lot.[730]

A year later, with the accession of William III, Drummond would flee, leaving the house unfinished but back in possession by de Vere.[731] In 1693, Wren was asked to provide an estimate for finishing the house, though this was most likely in his capacity as the surveyor general rather than an architect. Eventually it was occupied by the joint Secretaries of State for Scotland, the earls of Loudoun and Mar, who continued to build and expand it into a grand mansion, which appears in several views of Whitehall (**Figures IV-195 and IV-196**) as well as a map (**Figure IV-197**). These finally help us pin-point the location of de Vere's lot: estimating it to be the eastern half of Loudon and Mar's mansion, it appears to have been somewhere in the middle of the southern end of Whitehall's privy garden, which at that point had incorporated Bowling Green. Locating this on the 1682 map (**Figure IV-194**) interestingly corresponds to a lot and possibly a house. The house was eventually demolished in 1820.[732]

ii. 28. HOUSES AT NOS. 6 AND 7, ST. JAMES SQUARE, LONDON

Attribution: Batten, pp. 107-108; Colvin, *BDBA* (1954) and subsequent editions.

Brief description: In 1676–1680, Hooke supervised the completion of two buildings at St. James's Square, Westminster, for John Hervey and Richard Jones.

Primary Sources:

– Hooke's entries in *Diary i*:
  - 16 Jan. 1677 (p. 268): "Rose and went to Mr. Harveys. He was very civill and shewd me draughts about Storys house."[733]

730 The last diary reference to actual construction was on 3 May 1676 when Mary Kirke, de Vere and his wife were pleased with the foundations.

731 'Houses in the Bowling Green', . On Drummond, see 'Drummond, John, styled first earl of Melfort and Jacobite first duke of Melfort (1649–1714)', *ODNB*.

732 'Houses in the Bowling Green'.

733 Abraham Storey owned the leases of nos. 6 and 20 from 1675 and 1674 respectively; see Arthur Irwin Dasent, *The History of St. James's Square and the Foundation of the West End of London* (New York: Macmillan and Co., 1895), p. 20. Considering that two days later the house in question was described as "Storys new house in the Square," it must be no. 6.

- 17 Jan. 1677 (p. 268): "Cast up Storys house for Mr. Harvey."
- 18 Jan. 1677 (p. 268): "To Mr. Horners. With his Gentleman to Storys new house in the Square. Viewd it with Story."
- 20 Jan. 1677 (p. 269): "Wrote an account for Mr. Harvey of £436 . . . He commissiond me to treat about the house. I met with Story viewd Sir Allein, Apsleys, Friths,[734] Lord St. Albans, Storys, Barbons, houses."
- 22 Jan. 1677 (p. 269): "To Harveys Exchange gave him account of Storys abating £500. Harvey 0."
- 10 Feb. 1677 (p. 273): "to Mr. Harvey, with him to Storys house."
- 13 Feb. 1677 (pp. 273-74): "Mr. Harvys, with him to Lord [blank] house very good. He ordered me to agree with Story for £5000."
- 15 Feb. 1677 (p. 274): "Dind at Story. I proferrd him £5000, he accepted it not, but for £5500 proferd to doe all things."
- 19 Feb. 1677 (pp. 274-75): "With Mr. Harvey and his Lady about Storys house. I told them he proferd to doe £200 worth of work more for the former summe. He respited it for 3 or 4 days."
- 27 Feb. 1677 (p. 276): "To Mr. Harvey at 10 with him to Storys house and thence to Westminster hall. He told me he was to dine with the King at the Dutchesse of Portsmouths, that the King had said I was a very able and very honest man."
- 7 Mar. 1677 (p. 277): "Agreed with Story for £5000 for Mr. Harvey."
- 8 Mar. 1677 (p. 278): "Mr. Harveys. He desird me to respite agreeing with Story till Tuesday next . . . Told Story at Mans of Mr. Harveys refusall."
- 12 Mar. 1677 (p. 278): "To Mr. Harvey about his house, which was like to be fired. He orderd me to get it pulled downe, and to have it built etc. With him to view Angiers house."[735]
- 14 Mar. 1677 (p. 279): "To Mr. Harvey who orderd me to agree with Bates to pull down and rebuild 2 houses."
- 15 Mar. 1677 (p. 279): "To Bate with him viewd Mr. Harveys building . . . With Lady Harvey at Mr. Angiers house, then Storys. To Munmouths, to Bates, then to Bennets. Dined with Lady Harvey, who shewd me all her rare Entalios.[736] Most rare and curious . . . Mr. Harvey gave me full

[734] Richard Frith is noted to have owned the lease nos. 14 and 15 from 1673; see ibid..

[735] John Angier is noted to be the tenant of no. 7; see ibid.

[736] Intaglio prints.

power to agree for Storys house to the value of £5150 all things being done, as also to treat with Angier about his house to know his demands."

- 17 Mar. 1677 (pp. 279-80): "To Angiers house . . . Agreed with Story for £5000 for house completed. He would bring me a paper with a blank to fill. Met Mr. Harvey and told him. He liked it well."
- 19 Mar. 1677 (p. 280): "Mr. Story here with him to Mr. Harvy by coach. Story and he agreed, both referrd to Sir Jo: Cowell."
- 21 Mar. 1677 (p. 280): "At Mr. Harveys, with paper of things to be done. Met Sowerby and Scarborough."
- 22 Mar. 1677 (p. 280): "Bates, Salter, Story, here then at Garways. Thence to Mr. Harvey, then discoursed over Particulars with Story, thence to the square viewd house till 3. Dind with Lady Harvey. Booths proposalls . . . Booth gave me proposalls."
- 23 Mar. 1677 (pp. 280-81): "To Mr. Harvey. Booth there. New allarms about the failure of the house. Viewd the house all well."
- 26 Mar. 1677 (p. 281): "Drew up Mr. Harveys contract. Deliverd it to Mr. Dalton."
- 28 Mar. 1677 (p. 281): "read over Harveys contract."
- 29 Mar. 1677 (p. 282): "Harveys with contract. at Lord Ranalaughs shewd him draught."
- 31 Mar. 1677 (p. 283): "At Mr. Harveys with Booth. With him to Lord St. Albans house, and Story, Dind with him and his lady."
- 1 Apr. 1677 (p. 283): "Finish Harveys draught."
- 2 Apr. 1677 (p. 283): "Calld on Lord Ranalaugh, at Harveys."
- 3 Apr. 1677 (p. 283): "Gave Harvey draught."
- 15 Apr. 1677 (p. 285): "Read over Harvy and Booths contract."
- 17 Apr. 1677 (p. 285): "Harveys. missd Bennet at Storys new house."
- 26 Apr. (p. 287): "at Mr. Harveys, he seald with Booth. Booth ingaged to make Lucarnes as ornamentall. With Lady Harvey promisd to waite on her speedily to Pall Mall."
- 5 May 1677 (p. 288): "with Mr. Harvey at the Square and dind with him. Tooke an account of the things to be done."
- 16 May 1677 (p. 290): "Calld on Davys, then to Scowens, then Lord Ranalaughs . . . Dind with Lady Ranalaugh and Boyle at Storys."
- 17 May 1677 (p. 290): "With Mr. Harvey at his new house, directed about the stairs down into the celler."

- 26 May 1677 (p. 292): "to Mr. Harveys house (missd Lady Harvey) met him and Booth about stairs. He desird me to get locks."
- 28 May 1677 (p. 292): "speak with Lady Harvey about her house, new floor 1s. 8d."
- 7 June 1677 (p. 294): "To Mr. Harvey about Locks and fear of his well."
- 9 June 1677 (p. 294): "to Lady Harvey at Bloomsberry . . . Measurd garden, promised to call on Lady Harvey Thursday next."
- 16 June 1677 (p. 296): "to Mr. Harveys about Locks."
- 25 June 1677 (pp. 297-98): "to Harvey about his 9 inch wall."
- 26 June 1677 (p. 298): "Mr. Harvy paid Story for his house and the square"
- 19 July 1677 (p. 302): "To Mr. Harvey. At his new house he presented me with 50 Guinnys [gold]."
- 26 July 1677 (p. 303): "to Esqr. Harvey the iron for shutting the Shutters approved. Shewd Hicks the way for shutting a door closd."
- 11 Aug. 1677 (p. 306): "To Mr. Harvey about Storys laying in water."
- 25 Aug. 1677 (p. 308): "At Mr. Harveys about his Library."
- 18 Sep. 1677 (p. 313): "Made Mr. Harveys draught of 7 houses."
- 3 Oct. 1677 (p. 317): "Measurd at Mr. Harvys with Booth and Scarborough."
- 19 Oct. 1677 (p. 322): "Scarborough to examine Harveys building by consent."
- 20 Oct. 1677 (p. 322): "Met Lord Ranalaughs man . . . With Lord Ranalaugh, afterwards to Angiers house."
- 22 Oct. 1677 (p. 322): "At Angiers house and with Mr. Harvey. Proferd Angier £4500 after this manner of payment: £1000 down and £500 more every 6 monthes till £4500, without interest . . . With Lord Ranalaugh at Sun Taverne, Threedneedle."
- 23 Oct. 1677 (p. 322): "to Angier at Childs coffe house. He proferd for £4500 i.e. £1300 down and £500 for every six months for 7 payments. I proferd £1150."
- 26 Oct. 1677 (pp. 323-324): "Message from Lord Ranalaugh, with him at Nokes about Angiers house . . . Treated with Adams about Barbons house."
- 27 Oct. 1677 (p. 324): "Calld at Davys's, Adams's, Whistler, Dr. Barbons, Lord Ranalaugh, &c. Agreed with Angier for £4800."
- 31 Oct. 1677 (p. 324): "To Lord Ranalaugh, Mr. Boyles, then with Angiers to Mans 6d. Angier brake off and would dee noe more, but what he had given in his bill."
- 3 Nov. 1677 (p. 325): "At Lord Ranalaughs, much Discourse about his buildings. Agreed not with Angier."

- 5 Nov. 1677 (p. 326): "To Lord Ranalaugh agreed with Angier for his house for £1000 now, 1 £600 at 6 months, £600, 6 months, £600, 6 months, and £500 at 6 months, £500 at 6. £500 at 6. £500 at 6. With Lord Ranalaugh at the house."
- 1 Dec. 1677 (p. 331): "To Mr. Harvy saw his presses. Advised him about his houses in the Strand."
- 4 Dec. 1677 (p. 331): "At Mr. Boyles, Bennets, Lord Ranalaughs about stayres."
- 8 Apr. 1678 (p. 352): "Received order to designe Harvy 7 houses and agreement."
- 15 Apr. 1678 (p. 353): "made Harvys draughts."
- 17 Apr. 1678 (p. 354): "Gave Mr. Harvy his new designe in the morn."
- 23 Apr. 1678 (p. 355): "Lady Harvey noe directions."
- 18 May 1678 (p. 358): "Mr. Harvys concluded bills with Booth."
- 25 May 1678 (p. 360): "to Mr. Harvey with Booth gave him draught."
- 3 June 1678 (p. 361): "Lady Harvy about altering her house."
- 14 June 1678 (pp. 362-363): "to Mr. Harvy agreed the contract with Booth about his 5 houses."
- 19 June 1678 (p. 363): "drew Mr. Harvys five houses."
- 25 June 1678 (p. 364): "to Mr. Harvy, who seald covenants with Booth."
- 5 July 1678 (p. 365): "At Lady Ranalaughs and Mr. Boyles. She still finding fault."
- 3 Aug. 1678 (p. 370): "At Mr. Harveys about his vault. Not there."
- 7 Jan. 1679 (p. 392): "at Mr. Harvy who orderd me to proceed with his vault."
- 8 Feb. 1679 (p. 396): "Harvys, orderd digger £12."
- 21 May 1679 (p. 413): "Calld on Mr. Harvy, viewd his Strand houses."
- 6 June 1679 (p. 414): "Signed Booths and Labourers bill for Esq. Harvy."
- 10 July 1679 (p. 417): "At Mr. Harvys new houses."
- 19 July 1679 (p. 418): "Calld at Harvys building beginning to pave."
- 22 July 1679 (p. 418): "At Harvys houses."
- 16 Aug. 1679 (p. 421): "At Harvys Mr. Fouks had gone contrary to order."
- 1 Sep. 1679 (p. 423): "With Mr. Harvy, gave him Hornes bill."
- 8 Nov. 1679 (p. 430): "Harvys building, directed Booth about cornish . . . Mr. Harvy and Lady promised me Reward for houses."
- 22 Nov. 1679 (p. 431): "At Mr. Harvys 50. Guinnys [gold]."
- 21 Feb. 1680 (p. 439): "At Mr. Boyles, Mr. Harvys, left Booths contract."
- 19 July 1680 (p. 449): "Davys chinmy peices at Lady Jones."
- 13 Aug. 1680 (p. 450): "At Blooomsberry. With Lady Jones, desired her not to pay."

- 30 Aug. 1680 (p. 452): "At Jones new houses."
- 21 Oct. 1680 (p. 456): "Harvys view 10s."

Description:

During the Civil War, Henry Jermyn or Germain (bap. 1605, d. 1684) had amassed significant debts for the royalist cause. For his loyalty and service, Charles II created him earl of St. Albans in 1659, and after the Restoration, granted him leases to several estates, one of which was St. James's Fields in Westminster.[737] Then an open field, the development of the site into an urban square (**Figures IV-198 and IV-199**) commenced in 1667, when Jermyn began releasing lots to friends and prominent developers and builders such as Nicholas Barbon (1637/1640–1698/9), Richard Frith, and Abraham Storey (**Figure IV-200**).[738]

St. James's Square was conveniently located near Whitehall and other government offices, rendering it popular with courtiers and politicians. Two of these were John Hervey (1616–1680), treasurer to Queen Catherine of Braganza, and Richard Jones (1641–1712), later earl of Ranelagh. The latter was the only son of Katherine Jones [née Boyle] (1615–1691), whose Pall Mall residence Hooke was making alterations to in 1677 in order to accommodate Robert Boyle's laboratory.[739]

Hervey and Jones bought two neighbouring properties north-east of the square, now Nos. 6 and 7 (**Figures IV-200 to IV-202**), soliciting Hooke's help with the transactions and the completion

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[737] 'Jermyn, Henry, earl of St Albans (*bap.* 1605, *d.* 1684)', *ODNB*. Sources on St. James's Square include Dasent, *History of St. James's Square*; Chancellor, 'St. James's Square'; and *Survey of London: Volumes 29 and 30, St James Westminster, Part 1*, (London: London County Council, 1960), pp. 103-115. On the development of the 'square' in London, see also Elizabeth McKellar, 'Open Spaces in the City: from Fields to Squares and Gardens', in *The Birth of Modern London: The Development and Design of the City 1660–1720* (New York: Manchester University Press, 1999), pp. 188-217.

[738] For biographical details, see 'Barbon, Nicholas (1637/1640–1698/9)', *ODNB*, where Frith and Storey are excluded. See also Elizabeth McKellar, 'The Developers: Noble Landlords and Greedy Speculators', in *The Birth of Modern London: The Development and Design of the City 1660-1720* (New York: Manchester University Press, 1999), pp. 38-56.

[739] Hooke may have met Hervey through the Royal Society where the latter was elected fellow in 1664. He is thought to have had a hand in Hooke's receiving the commission for the Queen's stables at Somerset House; see ii. 4 in this chapter. For his biographical details, see 'Hervey, John (1616–1680)', *ODNB*.

Jones, who had been tutored by John Milton (1608–1674) in his youth, was also a fellow of the Royal Society (elected in 1663), and was created earl of Ranelagh in 1677; see 'Jones, Richard, earl of Ranelagh (1641–1712)', *ODNB*. Hooke would have known Jones from the time he resided with the Boyle family; on Hooke's work on the Pall Mall residence, see section ii. 30 in this chapter.

of the houses.[740] No. 6 had been leased by Storey, mason and builder, from Jermyn in 1673. Records indicate that by August 1676, he had finished enough of the construction to be able to mortgage the house for £1,200.[741] In January 1677, Hervey approached Hooke, asking for his help in purchasing the property. Hooke visited other houses in the square (**Figure IV-200**), presumably to better assess Storey's house, and a long process of bargaining began, both regarding the price and the amount of work needed to finish the construction. Hooke played the middle-man, bringing the price down to £5,000 including the remaining work to be done, and on 26 June 1677, Hervey finally purchased the house. A few weeks later, he presented Hooke with 50 gold guineas for his services. Hooke continued to put the finishing touches, finalising the stairs going into the basement, the shutters, and Hervey's library. During this period, making the interpretation of the diary entries rather difficult, Hooke was working on other projects for Hervey. On 18 September 1677, he prepared a "draught of 7 houses," receiving the order to go ahead with the project in April 1678. Whether these were Hervey's houses on the Strand, which Hooke was advising him about in December 1677 remains unclear. Nor is it obvious whether "Mr. Harvys five houses" was an additional set of properties.[742] What is clear is that construction on these houses began in early 1679 and ended by January 1680 when Hervey died. His widow lived at the St. James property for another year after then.

A few months after Hervey finalised his purchase of No. 6, Jones requested Hooke's help in acquiring the property just west of it, now No. 7. Jones, 'Lord Ranalaugh' in the diaries, had an interest in architecture himself and would later design his own house and gardens next to Chelsea Hospital, of which he would be appointed treasurer in 1686.[743] Hooke was ideally equipped for the task of bargaining with the builders. He was a family friend, despite the occasional friction, and had been advising his mother on alterations to her Pall Mall residence, and his uncle, Richard Boyle, on his estates in Chiswick and Londesborough.[744]

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[740] 'Espinasse, pp. 99-100; Inwood, *Man Who Knew Too Much*, p. 251.

[741] 'St. James's Square: No 6', in *Survey of London: Volumes 29 and 30, St James Westminster, Part 1*, ed. F. H. W. Sheppard (London: London County Council, 1960), pp. 103-109, p. 103.

[742] On Hooke's work on Hervey's other properties, see also Inwood, *Man Who Knew Too Much*, p. 251.

[743] Jones's connection to Hervey is unclear, in fact there might not be one other than the coincidence that they were both purchasing properties at the Square during the same year. On Jones's interest in architecture, see his 28 Aug. 1680 letter to Conway, transcribed in Appendix ii. 8.

[744] See ii. 29, ii. 30, and ii. 31 in this chapter. There is evidence of occasional friction between Hooke and Lady Ranelagh: upon being scolded by her on 20 June 1678, Hooke angrily noted "I will never goe neer her againe nor Boyle" and on 5 July 1678 complained about her "still finding fault;" see *Diary i*, pp. 364, 365.

In 1674, Jermyn had commissioned John Angier, the carpenter, to build a 'piatza house' on the lot of No. 7. Angier, in turn, subcontracted the masonry work to Storey who was of course already building on the lot next door. Two years later, Angier bought the property, and the following year sold it to Jones for the lengthily-negotiated price of £4,800.[745] In December 1677, Hooke made the finishing touches, and Jones occupied the house between 1678 and 1694, when he sold the property and moved to Chelsea.[746]

Nos. 6 and 7 have long since been rebuilt, and in any case, they had already been designed and built by the time Hooke became involved. There is an interesting drawing among Hooke's papers at the British Library (**Figure IV-203**), however.[747] It appears to be either an illustration of several design possibilities for a similar set of houses, perhaps Hervey's at the Strand, or a survey drawing of the St. James properties showing different options for the railing. The eighteenth-century illustrations of the square (**Figures IV-199 and IV-201**) show different facades from the seventeenth-century ones (**Figures IV-198 and IV-202**) which bear some resemblances to Hooke's drawing. But considering the seventeenth-century illustrations are details from maps, which favour accuracy of the plan rather than the elevations, it is difficult to be assertive on whether Hooke's drawing is related to this project.

ii. 29. ALTERATIONS TO RICHARD BOYLE'S ESTATE IN LONDESBOROUGH, YORKSHIRE

Attribution: Batten, pp. 104-105; Colvin, *BDBA* (1978) and subsequent editions; *NHLE*, list entry nos. 1000924 and 1310607.

Brief description: In 1676–1678, Hooke helped with the enlargement of the house, design of the gardens, and other works at Richard Boyle's seat at Londesborough, Yorkshire.

Primary Sources:

– Hooke's entries in *Diary i*:
- 28 Aug. 1676 (p. 247): "With the Lady and Lord Burlington to whom I gave Directions about Garden in Yorkshire."
- 8 Sep. 1676 (p. 248): "At Lady Burlingtons. With Boyle."

[745] 'St. James's Square: No 7', in *Survey of London: Volumes 29 and 30, St James Westminster, Part 1*, ed. F. H. W. Sheppard (London: London County Council, 1960), pp. 109-115.

[746] See Appendix A in Dasent, *History of St. James's Square*, pp. 228, 229.

[747] On this drawing, see also the annotations for Figure III-74 in Chapter III.

- 4 Oct. 1676 (p. 252): "At Lady Burlingtons."
- 5 Oct. 1676 (p. 252): "At Lady Burlingtons Garden, 5 Guineys."
- 24 to 28 Oct. 1676 (p. 254): "Severall times with Lady Burlington about Man of York."
- 21 Nov. 1676 (p. 258): "A letter from Lady Burlington."
- 22 Nov. 1676 (p. 258): "At Lady Burlingtons."
- 23 Nov. 1676 (p. 258): "At Lady Burlingtons."
- 25 Nov. 1676 (p. 259): "Lady Burlingtons plat . . . To Lady Burlingtons with Garden plat, met Mr. Moyser, Mr. Mans friend. Plat approved. From Lady Burlington 3 guinnys."
- 29 Nov. 1676 (p. 260): "Drew plat for Lady Burlington."
- 1 Dec. 1676 (p. 260): "With Tom to Lady Burlington she was much pleased with diagonall descents."
- 17 Dec. 1676 (p. 263): "Met Fitch at Garways who was to goe out of town next day for Yorkshire."
- 1 Jan. 1677 (p. 265): "to Boyles. Lord Burlington there."
- 6 Jan. 1677 (p. 266): "To Lady Burlington. Mett man and concluded Garden."
- 16 Jan. 1677 (p. 268): "Thence to Lady Burlington. Gave her an account of Lead pipes. Talbot demanded £2 $\frac{1}{2}$ per lb., but I suppose he will take 20sh. per lb. Met Man, with him to Boyles at Green dragon 6d."
- 20 Feb. 1677 (p. 275): "At Lady Burlingtons asked about £5000."
- 15 Mar. 1677 (p. 279): "Lady Burlington about the front of her house."
- 27 Mar. 1677 (p. 281): "With Lady Burlington."
- 31 Mar. 1677 (p. 283): "at Lady Ranalaughs, with Lord and Lady Burlington."
- 13 Mar. 1678 (p. 348): "At Lady Burlingtons about Porters ward. Dind there with Lord and Lady Burlington."
- 14 Mar. 1678 (p. 348): "made draugh for lady Burlington . . . at Lady Burlington, Lady Ranalaugh, Mr. Boyle"
- 23 Mar. 1678 (p. 350): "At Lady Burlingtons 2 Guinnys about Porters Lodge and peers."
- 25 Mar. 1678 (p. 350): "at Lady Burlingtons, 2 Guinnys."[748]

[748] The editors of *Diary i* interpret this and the following entries as indication that "Burlington House, of brick (later on cased in stone by the famous Earl on return from Italy in 1718), was built by Hooke;" *Diary i*, p. 350n*. There are several reasons to doubt this interpretation. Burlington had purchased his London residence, later styled 'Burlington House', from John Denham (1614/15–1669), Surveyor of the King's Works, in 1667. At time, the house was still under construction, with Hugh May (*bap.* 1621, *d.* 1684) directing the works, and

- 8 Apr. 1678 (p. 352): "missd Lady Burlington."
- 9 Apr. 1678 (p. 352): "Lady Burlingtons about her peers and Lodges."
- 22 Apr. 1678 (p. 354): "missd Lady Burlington."
- 25 Apr. 1678 (p. 355): "Burlington, &c., at Sir Chr: Wrens."
- 26 April 1678 (p. 355): "Lady Burlington abroad."
- 27 Apr. 1678 (p. 355): "at Lady Burlingtons she huffd . . . talkd with Dryden of Burlington."
- 29 Apr. 1678 (p. 356): "Drew Lady Burlingtons circular stairs and Deliverd them to Mr. Shepheard."
- 5 June 1678 (p. 361): "Dind at Lady Ranalaughs. Calld for draught at Burlington house."[749]
- 11 Jan. 1679 (p. 393): "to Mans from Lord Ranalaughs with Bates."

– Chatsworth, Bolton Abbey MSS 285: Londesborough estate account book covering the 1677–1681 period.[750]

Description:

After his early days assisting Robert Boyle (1627–1691), Hooke stayed close to the Boyle family.[751] In the early 1660s, before moving to Gresham College, he had resided with Katherine Jones [née Boyle] (1615–1691), viscountess Ranelagh, at her Pall Mall residence in London, often returning there to dine with various members of the family.

During the 1670s, the family provided Hooke with plenty of architectural work.[752] In 1676, he was approached by Boyle's eldest brother Richard Boyle (1612–1698), first earl of Burlington and second earl of Cork, for help with the Yorkshire estate of Londesborough. The property had been inherited by his wife Elizabeth (1613–1691) who was the sole heir of Henry Clifford (1592–1643),

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only after its completion did Burlington turn his attention to Londesborough. In addition, extant building records from Londesborough show that the porters' lodge and gate piers were indeed being constructed there around this time. See 'Denham, Sir John (1614/15–1669)', 'May, Hugh (*bap.* 1621, *d.* 1684)', *ODNB*; and 'Burlington House', in *Survey of London: Volumes 31 and 32, St James Westminster, Part 2*, ed. F. H. W. Sheppard (London: London County Council, 1963), pp. 390-429.

[749] While this may appear to contradict footnote 748 above, it may be that Hooke was being summoned to Burlington House regarding a drawing he or someone else had produced.

[750] I have not personally examined this manuscript and rely on the information provided in David Neave, 'Lord Burlington's Park and Gardens at Londesborough, Yorkshire', *Garden History* 8 (1980), pp. 69-90, at pp. 71-73.

[751] On Boyle's promotion of Hooke's architectural work, see Walker, 'Architectus Ingenio', pp. 118-119.

[752] See also ii. 28, ii. 30, ii. 31 in this chapter.

fifth earl of Cumberland.[753] The Burlingtons were planning to significantly expand the estate beyond the Hall built by Elizabeth's grandfather Francis in 1589, and it is clear from the diary entries that she was in charge of the project, most of the times meeting Hooke herself to review drawings, discuss details, and hand out payments.[754]

Hooke was first approached for advice on the gardens. The landscape was especially challenging, with a significant downward slope south-east of the Hall (**Figure IV-204**). After giving initial directions, he was requested to produce drawings, presumably so that they could be followed by the local architect, mentioned as 'Man' in the diaries and identified as Thomas Mann, who was to supervise the actual construction.[755] The drawings were approved in late November, Hooke was paid 8 guineas for his work, and by 6 January 1677, the garden was "concluded." Hooke's solution of providing a level ground by raising it with an arched terrace wall, perhaps to double as deer shelters, can be seen in Knyff and Kip's *c.* 1700 illustration just south of the fountain (visible in the upper-right quarter of **Figure IV-204**).[756] Hooke recorded London bricklayer John Fitch's travel to Yorkshire in mid-December, and it is possible he was being sent there to advise on this very wall. Hooke would later seek help from another London craftsman, Talbot, about the lead plumbing.

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[753] To avoid confusion with Robert Boyle, Richard will be referred to as Burlington. For his biographical details, see 'Boyle, Richard, first earl of Burlington and second earl of Cork (1612–1698)', *ODNB*. To note, he was great grandfather to Richard Boyle (1694–1753), third earl of Burlington and famed Palladian architect; see the notes on Chiswick House ii. 31 in this chapter.

[754] David Neave, *Londesborough: History of an East Yorkshire Estate Village* (Londesborough Silver Jubilee Committee, 1977), p. 11. Most of the details regarding the seventeenth-century additions made at Londesborough are from Neave's research on the estate; see also his 'Lost Houses No. 4: Londesborough Hall', *The Georgian Society for East Yorkshire* (1978), 'Lord Burlington's Park and Gardens at Londesborough, Yorkshire', and *Lost Houses of East Yorkshire* ([Kingston upon Hull]: Georgian Society for East Yorkshire, 1988). For a brief synopsis, see Nikolaus Pevsner et al., *Yorkshire: York and the East Riding* (New Haven, CT: Yale University Press, 2002), pp. 65, 74-75, 602-604. For the biographical context of Londesborough, see T. C. Barnard, 'Land and the Limits of Loyalty: The Second Earl of Cork and First Earl of Burlington (1612–98)', in *Lord Burlington: Art, Architecture and Life*, ed. Toby Barnard and Jane Clark (London: The Hambledon Press, 1995), pp. 167-200, pp. 194-195.

Elizabeth had also directed the repairs of their Irish estate, so her interests were not limited to the properties of her inheritance; see under see 'Boyle, Richard, first earl of Burlington and second earl of Cork (1612–1698)', *ODNB*.

[755] For the identification of 'Mr. Man' as Thomas Mann, see Pevsner et al., *Yorkshire: York and the East Riding*, p. 602. See also 'Architectus Ingenio', p. 114.

[756] Neave, 'Lord Burlington's Park and Gardens at Londesborough, Yorkshire', p. 71. This arched wall is still extant.

In 1677, substantial additions were made to the existing Hall, such as the two wings that were built to its north and south (**Figures IV-205 and IV-206**), with the south wing becoming the main facade of the house (**Figure IV-207**). Hooke's cost estimate for the work was about £5,000, though the diary entry gives no details about its scope. Further additions were made a year later: porters' lodges (for which Hooke produced a drawing and was paid 4 guineas), gate piers, and 'circular stairs' in an unidentified location. Documentary information about the construction of the gardens, stables, and almshouses are extant in an account book covering the 1677–1681 period, now Chatsworth, Bolton Abbey MSS 285.[757] While Hooke's name is not mentioned in these accounts, perhaps because he was paid directly by the Burlingtons, payments for the timber used at the porters' lodge in November 1678 and for the bricks in April 1679 have been recorded.

As Hooke did not always specify the content of the discussions, it has been suggested that he may have also been responsible for the stable blocks and almshouses that were built between 1677 and 1679.[758] An unsigned and undated drawing, bundled with some of Hooke's drawings at Warwickshire C.R.O. (**Figure IV-208**), does indeed bear some resemblance to the stable buildings illustrated by Kip and Knyff (upper left quarter of **Figure IV-205**), and further drawings in the bundle, of fences, gate piers, and garden walls, might also be related to Londesborough (**Figures III-342. d to 346**).

After 1700, the Londesborough estate remained largely unchanged, until its demolition in 1818. Some of the garden features, such as the arched terrace wall and gate piers, are reportedly still extant.

ii. 30. ALTERATIONS TO LADY RANELAGH'S HOUSE IN PALL MALL, LONDON

Attribution: *Survey of London* (1960), p. 367; Steven Shapin, 'The House of Experiment in Seventeenth-Century England', *Isis* 79 (1988), p. 380.

Brief description: In 1677, Hooke designed an extension and laboratory for the residence of Katherine Jones [née Boyle], in Pall Mall for the use of her brother, Robert Boyle.

Primary Sources:

[757] On this manuscript, which I have not examined, see ibid., pp. 71-73.

[758] Ibid., p. 71.

– Hooke's entries in *Diary i*:

- 12 Sep. 1676 (p. 250): "Dind with Mr. Boyle. His building put off till spring."
- 18 Nov. 1676 (p. 257): "[with] Boyle, borrowd of him Felibiens Architecture. Promisd to designe him a house."
- 17 Mar. 1677 (pp. 279-80): "to Mr. Boyle and Lady Ranalaugh about building the back part of her house."
- 19 Mar. 1677 (p. 280): "Dind with Mr. Boyle. Discoursd with Lady Ranalaugh about her back building."
- 21 Mar. 1677 (p. 280): "Did nothing by reason of wrong instructions to Mr. Boyle and dind with him."
- 27 Mar. 1677 (p. 281): "Lady Ranalaugh sent for me . . . Dind at Lady Ranalaugh, Lady Harriott there . . . With Lady Burlington, contrived Lady Ranalaughs house."
- 28 Mar. 1677 (p. 281): "Drew Designe of Lady Ranalaugh house."
- 29 Mar. 1677 (p. 282): "at Lord Ranalaughs shewd him draught. At Lady Ranalaughs."
- 30 Mar. 1677 (p. 282): "To Lady Ranalaugh with Bates."
- 31 Mar. 1677 (p. 283): "Calld . . . at Lady Ranalaughs, with Lord and Lady Burlington."
- 1 Apr. 1677 (p. 283): "Finish Harveys draught and Lady Ranalaughs."
- 2 Apr. 1677 (p. 283): "to Lady Ranalaughs to meet Lady Harriott, gave her a draught."
- 3 Apr. 1677 (p. 283): "With Bates to Lady Ranalaughs . . . agreed with Bates for £300."
- 10 Apr. 1677 (p. 284): "With Bates to Lady Ranalaugh. Set out ground. She agreed to signe, so did Bates."
- 20 Apr. 1677 (p. 286): "gave Bates the contract of Lady Ranalaugh to coppy."
- 28 Apr. 1677 (p. 288): "order from Lady Ranalaugh to agree about the vault with Bates."
- 5 May 1677 (p. 288): "At Lady Ranalaughs she signed Bates contract."
- 31 May 1677 (p. 293): "Dined with Mr. Boyle, spoke to Bates about window."
- 18 Aug. 1677 (p. 307): "Dined with Mr. Boyle contrivd his laboratory."
- 22 Sep. 1677 (p. 314): "At Lady Ranalaugh's building."
- 22 Oct. 1677 (p. 322): "Left with Lady Ranalaugh, Bates's contract."
- 23 Feb. 1678 (p. 346): "Directed Waux case for Boyle and the Lady Ranalaugh Closuts. Spake about Rigate chimneys."
- 1 Aug. 1678 (p. 369): "Lady Ranalaugh sent for me by Warr. I viewd the house and gave her a certificat of what I thought of her wall."

Description:

Since his early days assisting Robert Boyle (1627–1691), Hooke remained close to the Boyle family. Indeed, before he moved to Gresham College in 1664, he had been staying with Boyle's sister Katherine Jones (1615–1691), whose residence in Pall Mall, London, was reportedly "the meeting place for men of influence, in particular for the growing community of scientific virtuosi."[759] Katherine, who had married Arthur Jones (*d.* 1670), second viscount Ranelagh, and is thus referred to as 'Lady Ranalaugh' in the diaries, sought Hooke's help with several projects, one of which was alterations to her residence at Pall Mall, composed of two houses on the south side of the street, currently Nos. 83-84 (**Figures IV-209 and IV-210**). It had been assigned to Katherine around 1664 by her brother-in-law, Charles Rich (1616–1673), fourth earl of Warwick.[760]

Hooke's commission was to build an extension to the back of the house for Boyle who had been living with his sister since his move from Oxford in 1668. The project was first discussed in September 1676 but Boyle and Hooke decided to postpone it until next spring. In March 1676, Katherine approached Hooke about the project again; within two weeks he produced a design, visited the site with Roger Bates, the master carpenter, and had the draught approved. The work would cost £300 and the contract with Bates was signed on 5 May. Most of the construction must have finished by mid-August when Hooke recorded designing Boyle's laboratory. Presumably located in the newly-built extension, perhaps in the 'vault' or basement, it would soon become a popular attraction for foreign visitors.[761] Later that year, Hooke noted being at "Lady Ranalaugh's building" and a year later spoke with her "about her houses," but these further entries do not contain sufficient detail to determine which buildings Hooke was referring to.

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[759] 'Espinasse, p. 111; Lisa Jardine, *The Curious Life of Robert Hooke: The Man Who Measured London* (London: Harper Collins Publishers, 2003), p. 88. For biographical details, see 'Jones, Katherine, Viscountess Ranelagh (1615–1691)', *ODNB*.

[760] 'Nos. 83–84 Pall Mall: Lady Ranelagh's house: Christie's: Board of Ordnance', in *Survey of London: Volumes 29 and 30, St James Westminster, Part 1*, ed. F. H. W. Sheppard (London: London County Council, 1960), pp. 367-368, p. 367; Steven Shapin, 'The House of Experiment in Seventeenth-Century England', *Isis* 79 (1988), pp. 373-404, p. 380. There do not appear to be any illustrations of the houses from the period they were occupied by Katherine. After her death in 1691, the buildings were once again split into two houses and their facades may have been subsequently altered. In 1768, they were let to James Christie, the auctioneer, who made significant changes to the property; see 'Nos. 83–84 Pall Mall: Lady Ranelagh's house: Christie's: Board of Ordnance', p. 367.

[761] 'Boyle, Robert (1627–1691)', *ODNB*.

While the relationship between the Boyles and Hooke was not always smooth, the family entrusted him with numerous architectural commissions.[762] Another sibling, Richard Boyle (1612–1698), the first earl of Burlington and second earl of Cork, would seek Hooke's assistance with his estate in Londesborough, as well as his London residence, and Katherine's only son Richard Jones (1641–1712), 'Lord Ranalaugh' in the diaries, would solicit Hooke's help with his properties in Chiswick and St. James's Square.[763]

As for Lady Ranelagh's house at Pall Mall, upon her death, the house was repartitioned into two, and it has been suggested that the frontage, or indeed the houses themselves, may have been rebuilt in the eighteenth century. In 1768, the house to the east was leased to the auctioneer James Christie who spent £1,000 to alter the property and built a 'spacious and lofty' auction room in the rear, accessible via a passageway (**Figures IV-211 and IV-212**).[764] Whether this first Christie's auction room reused any part of Hooke's laboratory remains unknown.

ii. 31. ALTERATIONS TO LADY RANELAGH'S CHISWICK HOUSE, LONDON

Attribution: Batten, p. 104; 'Espinasse p. 100.

Brief description: In 1677, Hooke helped with the remodelling of Chiswick House for Richard and Katherine Jones [née Boyle].

Primary sources:

– Hooke's entries in *Diary i*:
  - 16 May 1677 (p. 290): "Dind with Lady Ranalaugh and Boyle at Storys.[765] To cheeswick, slept by the way. Directed about kitchen, Great Stairs, railes, Gates, floors, doors, &c. Returnd with Lord Ranalaugh in coach."
  - 4 July 1677 (p. 299): "with Bates to Cheeswick in $1\frac{1}{2}$ howr."
  - 17 May 1678 (p. 358): "with Lord Ranalaugh to Chiswick."

[762] 'Espinasse, p. 100; Jardine, *Curious Life of Hooke*, p. 91.

[763] See ii. 28, ii. 29, and ii. 31 in this chapter on Hooke's other works for the Boyle family.

[764] 'Nos. 83–84 Pall Mall: Lady Ranelagh's house: Christie's: Board of Ordnance', p. 367.

[765] Abraham Storey was a London mason and property developer. Earlier that year, Hooke was assisting John Hervey purchase a house from Storey at St. James's Square; see ii. 28 in this chapter.

- 14 June 1678 (pp. 362-63): "Spake with Lady Ranalaugh about her Houses. with Lord and Lady Ranalaugh to Chesweck in coach and 6 horses. Eat many strawberrys."
- 7 Sep. 1678 (p. 375): "I designd for Chesweek but heat prevented."
- 11 Jan. 1679 (p. 393): "to Mans from Lord Ranalaughs with Bates and Mounsir to cheeswick."

Description:

Chiswick, now in west London near Kew, was a village about five miles outside of the City. Chiswick House, thought to have been first built for Edward Wardour before 1612, was one of its many mansions, though there is but little information regarding its history prior to 1729, when the famed Palladian villa was built by architect Richard Boyle (1694–1753), third earl of Burlington.[766]

During the first half of the seventeenth century, the house appears to have changed a lot of hands. In 1669, it was sold to Charles Gerard (*c.* 1618–1694), first earl of Macclesfield, who then 'aliened' it to Richard Jones (1641–1712), then viscount Ranelagh. Jones was the only son of Robert Boyle's sister Katherine Jones (1615–1691).[767] When the latter decided to refurbish the property in 1677, the Boyle family enlisted Hooke's help, who was already busy assisting them with other projects.[768]

In his diary, Hooke recorded at least five trips to Chiswick. In May 1677, he visited the house, advising about the work to be done in the kitchen, great stairs, railings, gates, floors, doors, &c., returning there a month-and-a-half later with carpenter Bates. The two trips he made in 1678, a third one prevented by the heat, appear to have been social visits, but in January 1679 Hooke returned with Bates and 'Mounsir' presumably to direct some further work. Kip and Knyff's bird's eye view of Chiswick (**Figure IV-213**) was produced two decades after these renovations so it is impossible to know which of the features can be attributed to Hooke, and what other alterations may have been made during the intervening period.

It is unknown when the house was acquired by Edward Seymour (1633–1708), fourth baronet, but he sold it back to the Boyle family in 1682, specifically to Robert Boyle's eldest brother Richard Boyle (1612–1698), first earl of Burlington and second earl of Cork. Hooke had assisted Burlington with his Londesborough property in 1676–1679, so it is conceivable that he was commissioned with

[766] Daniel Lysons, 'Chiswick', in *The Environs of London: Volume 2, County of Middlesex* (London: T. Cadell and W. Davies, 1795), pp. 185-222, p. 193n43.

[767] Ibid., p. 194

[768] See ii. 28, ii. 29, and ii. 30 in this chapter on Hooke' other work for the Boyle family.

further work at Chiswick after 1682, but given the gaps in the diaries, it is impossible to be sure without the discovery of further documentary evidence. The house was eventually inherited by the third and last earl, who built the aforementioned Palladian villa in 1729, which descended to his daughter and sole heir Charlotte Elizabeth Boyle (1731–1754).[769]

ii. 32. HOUSE FOR WALTER YONGE IN DEVON[?]

Attribution: Batten, pp. 99, 109-110; Colvin, *BDBA* (1958) as 'House for Walter Young' in Colyton, Devonshire; Colvin, *BDBA* (1978) and (1995) as 'Escot House, Devonshire, designs for Sir Walter Yonge'; Oliver Hill and John Cornforth, *English Country Houses: Caroline, 1625–1685* (London: Country Life Limited, 1966), p. 228 as 'Colyton House, Devon'; *NHLE*, list entry no. 1098137 [noting Hooke was the designer of the former Escot house]. Colvin removed the building from Hooke's list of works in *BDBA* (2008).

Brief description: In 1677, Hooke made alterations to a house, possibly in Devon, for Walter Yonge.

Primary Sources:

– Hooke's entries in *Diary i*:
- 2 Feb. 1677 (p. 272): "To Pollextens. Sir Walter Youngs house to continue. Goring ball there."[770]
- 5 Feb. 1677 (p. 272): "At Garways spoke with Mr. Pollexten about Sir Walter Youngs draught . . . Drew the Draught fair."
- 6 Feb. 1677 (p. 272): "At home all the morning about Sir W. Youngs draught."
- 10 Feb. 1677 (p. 273): "to Sir Walter Youngs. Pollexten, Goring, Bell, and 2 others at the Vultur. Discoursed my draught with him."
- 14 Feb. 1677 (p. 274): "To Sir Walter Young. At Vultur, Discoursd of module . . . From Sir W. Young 5 Guinnys in Part."

[769] Sources on Chiswick House include Richard Hewlings, 'Chiswick House and Gardens: Appearance and Meaning', in *Lord Burlington: Art, Architecture and Life*, ed. Toby Barnard and Jane Clark (London: The Hambledon Press, 1995), pp. 1-150; John Harris, *The Palladian Revival: Lord Burlington, His Villa and Garden at Chiswick* (New Haven, CT: Yale University Press, 1994).

[770] 'Pollexten' is either Henry Pollexfen (*c.* 1632–1691) or his younger brother John (1636–1715). They were also from Devon, as was William Ball (*c.* 1631–1690), astronomer, barrister, and fellow of the Royal Society. Goring's identity has been more difficult to track down. Note that, perhaps not making the connection to the Pollexfen family, Batten identifies 'Pollexten' as a joiner; see Batten, p. 110.

- 16 Feb. 1677 (p. 274): "With Mr. Pollexten and Scarborough to Sir Wat Young at Readville."[771]
- 19 Mar. 1677 (p. 280): "A letter from Sir Walter Young about Scarborough."
- 3 June 1677 (p. 293): "Mr. Duke from Sir Walter Young, letter. He at Garways told me of his own improvement of corne growed by the slough of boggs, of fishing, cormorants, of Virtuoso Cole."[772]
- 18 June 1677 (p. 296): "Writ to Sir W. Young."
- 16 July 1677 (p. 302): "Wrote to Sir Walter Young."
- 21 Sep. 1677 (p. 314): "With Bates to Pollexten about Sir Walter Young."
- 23 Sep. 1677 (p. 315): "Discoursed with Bates and Davys about going to Sir W. Young on Wednesday next."
- 25 Sep. 1677 (p. 315): "Writt to Sir Walter Young . . . Bates and Davys towards Sir W. Young."
- 12 Oct. 1677 (p. 319): "Bates and Davys here from Sir Walter Young."
- 12 Nov. 1677 (p. 327): "Jonathans, Sir W. Young, Plumber, Talbot, &c."
- 20 Nov. 1677 (p. 329): "Wrote to Sir W. Young."
- 6 Mar. 1678 (p. 347): "Sir Walter Young at Crown with Pollexten."
- 15 Mar. 1678 (p. 348): "missd Sir Walter Young."
- 16 Mar. 1678 (p. 349): "At Lord Sarums, Sir Walter Youngs, and calld at Harrisons at Sir John Barnards in Hatton Garden."[773]
- 11 June 1678 (p. 362): "a letter from Mr. Young of Plimmouth."
- 26 Dec. 1679 (p. 390): "at Bristow, spoke with Crisp, Pullein, Younger, Sir W. Young, Sir J. Hayes, Sir R. Knight, Pope, Witty, &c."
- 11 July 1679 (p. 417): "At Garways, Knox, Sir Walter Young, etc."
- 9 Dec. 1679 (p. 433): "Garways, Sir Walter Young, Hill."
- 19 Jan. 1680 (p. 436): "at Jonathans, Drs. Wood, Bates, Sir W. Young."

Description:

When his father died in 1670, Walter Yonge (*bap.* 1653, *d.* 1731) at age seventeen inherited the baronetcy, the family seat of Honiton, and other estates in Devon. He would later become an active

[771] John Scarborough was a surveyor. It is unclear where 'Readville' was.

[772] Richard Duke, of Ashburton, Devon, was Yonge's brother-in-law.

[773] 'Lord Sarum' is the astronomer Seth Ward. In 1673, Ward purchased or built a mansion in Knightsbridge where Hooke often visited him, thus Hooke's itinerary is taking him from Knightsbridge to Bedford Row, then Hatton Garden in Holborn.

Whig politician, standing for parliament in 1678 and serving as MP between 1679 and 1708. His political ambitions growing, he would also acquire an estate in Escot and build a large mansion prominent enough to be featured in Campbell's *Vitruvius Britannicus* (London, 1715–1725), with a library furnished with the help of the philosopher John Locke (1632–1704).[774]

The exact circumstances in which Hooke met Yonge are unknown, but if we are to infer from the first diary entry with the latter's name, it may have been through a common acquaintance, 'Pollexten'. This was perhaps Henry Pollexfen (*c.* 1632–1691), a judge and politician, or more likely, his younger brother John (1636–1715), a wealthy merchant in London. Originally from Devon, where they probably knew Yonge from, the Pollexfens had a family mansion in central London, the 'Walbrook House' in the ward of the same name, which had been destroyed in the Great Fire. Its subsequent reconstruction had put them in touch with Hooke who surveyed their lot in February 1668 in his capacity as one of the surveyors in charge of rebuilding the City.[775]

Indeed, it was via one of the Pollexfens that Yonge approached Hooke in early 1677. The initial diary entry is abrupt: "Sir Walter Youngs house to continue," with no clues in the preceding entries about the location of the house or whether it was already under construction, but within a few days Hooke was preparing 'draughts'. Since Batten's attribution, it has been assumed that these draughts were for the Escot House in Devon. However, in a 1998 article, Bridget Clarke presented documentary evidence that connected the design and construction of the Escot house to surveyor William Taylor (*bap.* 1632). In any case, the chronology was problematic to begin with, as Yonge did not purchase the Escot estate until 1680, three years after he commissioned Hooke. Building contracts

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774 Yonge met Locke in 1686 during his travels in the Netherlands. On Locke's recommendations for Yonge's library at the Escot House, see E. S. de Beer, ed., *The Correspondence of John Locke*, 8 vols. (New York: Clarendon Press, 1980), esp. vol. 3, letters 893, 902, and 915.

775 On the Pollexfen family's ownership of the Walbrook House and its rebuilding after the Great Fire, see J. G. White, *History of the Ward of Walbrook in the City of London* (London: Bowles & Sons, Printers; Printed for Private Circulation, 1904), pp. 73-74; and Bridget Cherry, 'John Pollexfen's House in Walbrook', in *Englis Architecture Public and Private: Essays for Kerry Downes*, ed. John Bold and Edward Chaney (Rio Grande, OH: The Hambledon Press, 1993), pp. 89-105. John was the son-in-law of John Lawrence (*d.* 1692); the latter had served as Lord Mayor in 1664–1665, spoke favourably of Hooke's proposal for rebuilding London (see ii. 1 in this chapter), and receives numerous mentions in Hooke's diaries.

As parliamentary members, John Pollexfen was listed as 'of Walbrook House, London and Wembury, Devon' whereas Henry Pollexfen was 'of Woodbury, Devon and Lincoln's Inn Fields, London', indicating that the latter eventually moved out of the Walbrooke House. The last mention of Pollexfen prior to 2 Feb. 1677, when they discussed the Yonge house, was Hooke noting that he was "at Pollexsens view in Walbrook" on 25 Mar. 1675; see *Diary i*, pp. 154, 272.

signed with Taylor further show that construction did not begin until well into 1684.[776] For these very valid reasons, Colvin removed the Escot attribution from his entry on Hooke in the 2008 edition of *A Biographical Dictionary of British Architects, 1600-1840*.

If we were to speculate on what Hooke did for the partial payment of 5 guineas he noted receiving, there are several possibilities. In addition to the various estates he had inherited in Colydon and Honiton in Devon, Yonge owned a house on Bedford Row near Grays Inn in central London.[777] Two months after contacting Hooke, he would obtain a marriage license, so the commission may have been alterations to any one of these houses to accommodate his bride. But it is possible to interpret some of the diary entries in the fall of 1677 to point to a house in Devon, with Bates, a carpenter, and Davys, a joiner, travelling to Yonge's place and returning about ten days later. The work need not have been confined to interiors as they would have been able to instruct local labourers, such as masons and bricklayers, in any other work. But whatever it involved, Hooke's contribution may not have been extensive. 5 guineas even as a partial payment, when compared to Taylor's £200 fee for the Escot house, it is not a great sum.[778] It may therefore be safe to assume the work comprised of only minor repairs and alterations to one of Yonge's houses in Devon.

ii. 33. MAGDALENE COLLEGE, CAMBRIDGE

Attribution: Batten, pp. 105-106; Colvin, *BDBA* (1954) and subsequent editions.

Brief description: In March 1677, Hooke produced a drawing for Hezekiah Burton for Magdalene College, Cambridge.

[776] Bridget Clarke, 'William Taylor: New Discoveries', *The Georgian Group Journal* 8 (1998), pp. 1-11, pp. 5-7. See also Walker, 'Architectus Ingenio', p. 104.

[777] Andrew A. Hanham, 'Yonge, Sir Walter, 3rd Bt. (1653–1731), of Colyton and Escott, Devon, and Bedford Row, Westminster, Mdx.', in *The History of Parliament: the House of Commons 1690–1715*, ed. B. D. Henning (1983); it should be noted that it is unclear when Yonge acquired the house at Bedford Row. In addition to the 'Great House' in Colydon (described by Pevsner as having an "attractive but puzzling exterior" dating to early seventeenth century), and 'Batishorn' in Honiton, the Yonge family owned numerous other minor estates in Devon; see Tristram Risdon, *A Chorographical Description or Survey of the County of Devon* (London: Printed for Rees and Curtis, 1811), pp. 27, 368, 369. See also Bridget Cherry and Nikolaus Pevsner, *Lincolnshire* (New Haven, CT: Yale University Press, 1991), pp. 281, 495.

[778] Clarke, 'William Taylor: New Discoveries', p. 5.

Chapter IV – Building

Primary Sources:

– Hooke's entries in *Diary i*:
  - 13 Mar. 1677 (p. 278): "To Dr. Burton at Haynes about Magdalen Colledge."
  - 25 Mar. 1677 (p. 281): "Finisht draught of Maudlin Colledge for Dr. Burton."
  - 26 Mar. 1677 (p. 281): "Dr. Burton here about his draught."
– Letter from Hezekiah Burton to Samuel Pepys, 9 April 1677: "The foundation of that building in our college to which you are pleased to contribute is now laid and they begin to want moneys to go with it. I have said enough to tell you my business which is to desire you will send yours to Mr William Potts, an apothecary, who lives at the Elephant and Castle near St Antholin's church in Queen Street, London, who is appointed Receiver in the City."[779]

Description:

Magdalene College, Cambridge, had plans to expand into its Second Court since the 1640s when they began soliciting subscriptions for a new building (**Figure IV-214**). The project was stalled due to lack of funds, as well as the uncertainties of the Commonwealth era, but was picked up again under the leadership of James Duport (1606–1679) who was elected master in 1668. College fellow Hezekiah Burton (*bap.* 1632, *d.* 1681), stationed in London between 1668 and 1680 as the rector of St. George's parish in Southwark (across the Thames from the Monument to the Great Fire), was enlisted to help with the revival of the project.[780]

In March 1677, Burton approached Hooke for help, perhaps upon recommendation of a common acquaintance, John Tillotson who had hired him the year before to help renovate the Canterbury Cathedral choir.[781] Within two weeks, Hooke finished the "draught of Maudlin Colledge."[782] Although he offered no other clues about the building nor mentioned the project or 'Dr.

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[779] *The Letters of Samuel Pepys, 1656–1703* (Woodbridge: Boydell Press, 2006), letter no. 110, pp. 117-118.

[780] Peter Cunich et al., *A History of Magdalene College Cambridge 1428–1988* (Cambridge: Magdalene College Publications, Magdalene College, 1994); Robert Willis and John Willis Clark, *The Architectural History of the University of Cambridge and of the Colleges of Cambridge and Eton* (Cambridge: University Press, 1886), vol. 2, pp. 366-367. On the history of the project, see Royal Commission on Historical Monuments England, *An Inventory of the Historical Monuments in the City of Cambridge, Part II* (Her Majesty's Stationary Office, 1959), pp. 138-139. For biographical details, see 'Burton, Hezekiah (*bap.* 1632, *d.* 1681)', and 'Duport, James (1606–1679)', *ODNB*.

[781] On the Canterbury Cathedral Choir, see ii. 25 in this chapter.

[782] Magdalene is pronounced 'Maudlin'. The Cambridge college spells its name 'Magdalene' while the Oxford one uses 'Magdalen', but Hooke was not making this distinction in his diary entries. As orthography

Burton' in his diary thereafter, it has been accepted that Hooke was referring to the 'New Building' in the Second Court (**Figures IV-215 and IV-216**), now known as the 'Pepys Building' after Samuel Pepys (1633–1703), administrator of the Royal Navy, and an alumnus of the College.[783]

As no information on its architect nor any other drawings or documentation have survived for the Pepys Building, it is impossible to know whether Hooke's design was followed or even when exactly the construction took place. But there is one letter that offers a hint about the possible purpose of the drawing. Two weeks after Hooke handed his draught to Burton, the latter wrote to Pepys asking him to follow up on his promise, now that the "foundation of that building in our college to which you are pleased to contribute is . . . laid."[784] It is very likely that Burton had asked Hooke for a drawing he could use to solicit subscriptions that had been promised for the construction of the building.[785]

Burton's efforts seem to have paid off. Another letter to Pepys, this time from John Maulyverer of the College, suggests that by the end of 1679, the exterior work for the building had largely been completed and the concerns were now for financing the interiors.[786] Loggan's 1690 engraving of the college shows the building already standing in the Second Court (**Figure IV-214**). The interiors must have been in a fair shape by the time Pepys was writing his will in 1703 bequeathing his library and leaving instructions for placing *Bibliotheca Pepysiana* in the 'New Building' should it end up at Magdalene College.[787]

An elevation of an unrealised design for the Writing School at Christ's Hospital, extant among Hooke's papers (**Figure IV-217**), illustrate a similar use of the colonnade and roof-level balustrade so it is not entirely implausible that he contributed to the design.[788] But if the exterior work was indeed finished between 1677 and 1679, a period when his diaries are extant, there would have been more

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was still subjective and there was no 'Dr. Burton' at the Oxford college at the time, with the additional corroborating evidence, it is certain that Hooke was referring to the Cambridge college.

[783] Batten, p. 105; *An Inventory of the Historical Monuments in the City of Cambridge, Part II*, p. 139.

[784] *The Letters of Samuel Pepys, 1656–1703*, letter no. 110, pp. 117-118.

[785] On the fund-raising efforts for the New Building, see Cunich et al., *A History of Magdalene College Cambridge 1428–1988*, pp. 154-155. An alternative theory is that the building had already been conceived prior to the Civil War, and when it was revived in the 1670s, Hooke was consulted for some "cosmetic tinkering to improve old plans;" see ibid., p. 157.

[786] Willis and Clark, *Architectural History of Cambridge*, vol. 2, p. 367.

[787] Ibid., vol. 2, pp. 370-371. Per his instructions, after the death of his nephew, his library was placed in the Pepys Building in 1724.

[788] On this drawing, dated *c.* 1691, see also the annotations for Figure III-72 in Chapter III; and on the Christ's Hospital Writing School project, see ii. 21 in this chapter.

mentions of the building had Hooke been heavily involved in the project. The finished building is full of irregularities: in the front facade with its inconsistent spacing between the windows and the setting out of the wings, and in the plan with its oddly-placed south wing (**Figures IV-215 and IV-216**). It has been suggested that these were results of the design being "carried out by local workmen with very little or with no supervision from him."[789] This is possible although irregular financing hinted at in the cited correspondence may have been more of a contributing factor, with construction stopping for long stretches of time and resuming with a new set of workers.[790]

ii. 34. CHURCH AND PORT IN WHITEHAVEN, CUMBRIA

Attribution: Based on Hooke's diaries. Also suggested in Sylvia Collier and Sarah Pearson, *Whitehaven 1660–1800. A New Town of the Late Seventeenth Century: A Study of Its Buildings and Urban Development* (London: Her Majesty's Stationary Office, 1991).

Brief description: In 1679, Hooke provided Sir John Lowther (*bap.* 1642, *d.* 1706), second Baronet of Whitehaven, with a design and estimate for a church. Prior to that date and afterwards, he advised him on various projects including a quay, most likely for the port of Whitehaven on the coast of Cumbria. While the extent of Hooke's involvement in Lowther's projects is unclear, the church does not appear to have been built according to his design.

Primary Sources related to Hooke:[791]

- Hooke's entries in *Diary i*:
  - 14 June 1677 (p. 295): "advisd Sir J. Lowther about plat."
  - 30 Jan. 1679 (p. 395): "gave Sir J. Louther a Designe of church and estimate."
  - 7 July 1679 (p. 417): "Sir John Louthers designe at Jonathans."
- Hooke's entries in *Memoranda*:
  - 10 Jan. 1681 (p. 145): "with Sir J[ohn] Louther at Jonathans about Key."

[789] 'Espinasse, p. 94.

[790] The stark difference between the front facade constructed of stone and the manor-house-like rear facade built of brick is explained as a result of long gaps between building phases; see Cunich et al., *A History of Magdalene College Cambridge 1428–1988*, pp. 155-156.

[791] For an alternative interpretation of the same diary entries, see ii. 43 in this chapter on Lowther [St. Michael's] Church. Note that, of the numerous references to Lowther in the diaries, only the ones obviously related to building projects are included here.

- 27 Oct. 1681 (p. 151): "Sir J[ohn] Louther vewd ground."

Description:

Hooke's diaries are full of frequent references to 'Louther' and 'Lowther', sometimes qualified with the prefix 'Sir J.'. At least in connection to mentions of building projects, it has often been assumed that these referred to Sir John Lowther, first Viscount Lonsdale (1655–1700), however a likelier candidate is his cousin, Sir John Lowther (*bap.* 1642, *d.* 1706), second Baronet of Whitehaven and an active fellow of the Royal Society.[792]

Lowther of Whitehaven (the latter, a town on the coast of Cumbria in North West England) was also an early industrialist. His father Christopher (1611–1644), interested in mining and exporting the salt minerals on his estate, had built a pier in 1634 replacing the small quay in what was then a small fishing village. By 1645, two new streets parallel to the coast line were already laid out and would become the foundation of the grid form the town would later take.[793] Christopher died in 1644 when John was an infant, delaying further development of the site until the latter came of age in 1663. By then, however, he had moved to London and the city kept him busy: on 27 January 1664, proposed by physician Daniel Whistler (1618/19–1684), he was elected fellow of the Royal Society and soon afterwards became a member of the 'Mechanical' committee, "to consider and improve all mechanical inventions" alongside Hooke, Wren, Evelyn, and others. He also became an active member of the Society Council, and in the following year, he was elected Member of Parliament, a position he held for thirty-five years.[794]

Lowther remained committed to continuing his father's work at Whitehaven, however. Via correspondence with stewards acting on his behalf and occasional visits to Cumbria during the summertime, Lowther developed it into the first "post-medieval planned town in England."[795] In 1666,

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[792] On the Lowther family, see Hugh Owen, *The Lowther Family: Eight Hundred Years of 'A Family of Ancient Gentry and Worship'* (Chichester, Sussex: Phillimore & Co. Ltd., 1990); specifically, pp. 197-217 on Lowther of Lowther, and pp. 240-247 on Lowther of Whitehaven.

[793] Collier and Pearson, *Whitehaven 1660–1800*, p. 26.

[794] Birch, vol. 1, pp. 375, 376, 406, 498.

[795] Matthew Hyde and Nikolaus Pevsner, *Cumbria: Cumberland, Westmorland, and Furness* (New Haven, CT: Yale University Press, 2010), p. 672.

Part of Lowther's correspondence, which includes his exchanges with his steward in Whitehaven, is published in D. R. Hainsworth, ed., *The Correspondence of Sir John Lowther of Whitehaven 1693–1698: A Provincial Community in Wartime* (London: The British Academy, 1983). On new urban developments in England during the seventeenth and eighteenth centuries, see Christopher Chalklin, 'The Making of Some New Towns, c. 1600–

he began purchasing surrounding lands to expand his coal mines. Perhaps taking clues from the difficulties with post-fire reconstruction of London, he also began a land-purchasing campaign within Whitehaven to be able to have full planning control over the expansion of the town. At first his efforts were frustrated by legal issues, but once these were resolved, things picked up again in early 1680s.[796] No doubt influenced by the Acts of Rebuilding for post-fire London and discussions with Royal Society colleagues, he set up building regulations to facilitate an orderly development, establishing wide streets and standardising building heights. He provided the town with its public buildings, schools, a customs house, and market, and built facilities to further his own industrial ambitions, such as a shipyard, and new pier and breakwater. By 1688, when a survey of the existing structures was commissioned, the future grid plan of Whitehaven was already in place (**Figures IV-218 and IV-219**).

While Lowther provided some of the residential housing, he allowed others to build as well, enthralled by the idea of expansion by speculative building advocated by the likes of Nicholas Barbon (1637/1640–1698/9) in London.[797] Another London fashion he was enthusiastic about was open spaces, such as squares, gardens, and tree-lined palisades, but the town inhabitants disagreed on the value of an empty space without an obvious function and resisted the idea. But this was not the only idea they resisted. As the town grew, its inhabitants requested from Lowther an expansion to the existing chapel.[798] In his September 1678 response, he proposed that a new church be constructed instead, and a few months later, in January 1679, Hooke handed him a design and estimate. The project simmered for a while due to opposition from the inhabitants against the design, though rather than a judgement on Hooke's talents, the objections appear to have been against new ideas in general. In 1686, Lowther commissioned a model of it in London in an attempt to convince them, to no avail.

1720', in *Rural Change and Urban Growth, 1500-1800: Essays in English Regional History in Honour of W. G. Hoskins*, ed. C. W. Chalklin and M. A. Havinden (New York: Longman Inc., 1974), pp. 229-252; Roy Millward, 'The Cumbrian Town Between 1600 and 1800', in *Rural Change and Urban Growth, 1500-1800: Essays in English Regional History in Honour of W. G. Hoskins*, ed. C. W. Chalklin and M. A. Havinden (New York: Longman Inc., 1974), pp. 202-228. On Whitehaven specifically, see the extended study in Collier and Pearson, *Whitehaven 1660–1800*.

[796] Collier and Pearson, *Whitehaven 1660–1800*, p. 26.

[797] On Barbon, see also Appendix, ii. 6.

[798] Population of Whitehaven rose exponentially during this period, from 300 in the early 1670s to 2200 in 1693. By 1702 there were nearly 3000 inhabitants; see Owen, *The Lowther Family*, p. 243; Collier and Pearson, *Whitehaven 1660–1800*, p. 14.

The following year, another design, perhaps by Hooke again, was prepared and also rejected.[799] Finally, in 1693, St. Nicholas Church (**Figure IV-220**) was built though its architect remains a mystery.[800]

It is compelling to think that Hooke's work or influence on Whitehaven went beyond just a rejected church design. This is speculative without further documentary evidence but when he advised Lowther 'about plat' in June 1677 or 'vewd ground' with him in October 1681, it is plausible they were discussing the grid layout of Whitehaven, perhaps comparing it to the grid plan in Hooke's proposal for rebuilding London.[801] And the 'Key' they were conferring on in January 1681 was most like the quay Lowther had built for the port in 1680.[802]

As Collier and Pearson have pointed out, that Whitehaven predated similar planned towns by decades had everything to do with Lowther's unique position as a wealthy landowner with political connections; but even more adventageous was his close association with the Royal Society, which put him at the forefront of cutting edge knowledge but also in touch with the likes of Hooke, Wren, Evelyn, and others.[803]

ii. 35. CHURCH OF ST. MARY MAGDALENE IN WILLEN, BUCKINGHAMSHIRE

Attribution: Batten, pp. 96-97; Colvin, *BDBA* (1954) and subsequent editions; *NHLE*, list entry no. 1160998.

Brief description: In 1679–1682, Hooke built a small parish church for Richard Busby at his estate in Willen, Buckinghamshire.

Primary Sources:

– Hooke's entries in *Diary i*:

- 26 Sep. 1678 (p. 378): "Dr. Busby about Church."

[799] Unfortunately, no diaries are extant between 16 May 1683 and 31 Oct. 1688.

[800] On Lowther's travails with getting the church design approved, see Collier and Pearson, *Whitehaven 1660–1800*, pp. 34 and 39n67. St. Nicholas church was rebuilt in 1883 but most of it was burnt down in 1971; see Hyde and Pevsner, *Cumbria: Cumberland, Westmorland, and Furness*, p. 672.

[801] Hooke's plan for London is not extant; see ii. 1 in this chapter.

[802] While Lowther was one of the Commissioner of the Admiralty, a position that would expose him to many other quay projects, he was not appointed until 1689. A decade later, Hooke would be helping the Southwells with the design of a quay for their King's Weston estate in Dorset; see ii. 49 in this chapter.

[803] Collier and Pearson, *Whitehaven 1660–1800*, p. 35.

- 22 Nov. 1678 (p. 385): "all day about Dr. Busbys module of a church."
- 23 Nov. 1678 (p. 385): "Dind with Busby shewd draught. Plucknet[804] Alistrey &c. there."
- 10 Dec. 1678 (p. 388): "Drew ground plat for Dr. Busbys church."
- 11 Dec. 1678 (p. 388): "to Dr. Busbys, dind with him, gave him . . . another designe for Church."
- 1 Feb. 1679 (p. 395): "Dind with Dr. Busby and Smethwick. Discoursd about church."
- 25 Mar. 1679 (p. 404): "Dined with Dr. Busby, Dr. Pell, Smethwick, Horn, Bates, agreed about Country Church. Dr. Busby gave me 5 G[old]."[805]
- 28 Mar. 1679 (p. 405): "made draught of church for Dr. Busby."
- 29 Mar. 1679 (p. 405): "Dined with Dr. Busby, Dr. Pell, Bates, Horn, Tufnell, agreed about the new church."
- 1 Apr. 1679 (p. 405): "At Dr. Busbys agreed with Horn, Bates, Tufnell, Plucknett."
- 4 Apr. 1679 (p. 405): "Drew mouldings for Dr. Busby."
- 7 Apr. 1679 (p. 406): "Also Dr. Busbys Tufnell, gave him ground plot and mouldings."
- 15 Apr. 1679 (p. 407): "With Dr. Busby . . . he changed his mind to cover with lead."
- 21 Apr. 1679 (p. 407): "Drew designe for Dr Busbys church."
- 22 Apr. 1679 (p. 407): "called at Jonathans and spoke with Horn about Dr. Busby."
- 17 May 1679 (p. 412): "Spake to Dr. Busby and Mr. Smethwick about Church."
- 12 Sep. 1679 (p. 424): "Seald Presbys contract with Dr. Busby, With Plucknet."[806]
- 20 Sep. 1679 (p. 425): "At Dr. Busby with Horn, Bates, etc."
- 30 Dec. 1679 (p. 434): "At Busby, Bates quarelled. From Busby 5 Guinnys. Plucknet cunning, Walker, Tufnell, Horn, Pell there."
- 6 May 1680 (p. 445): "Dind with Dr. Busby, from him 5 Guinnys."
- 23 July 1680 (p. 449): "Doegood, plaisterer, would not agree . . . At Dr. Busbys, he desired me to agree with a plaisterer and he would stand to the agreement."
- 25 Aug. 1680 (p. 452): "Bates to Dr. Busbys."

– Hooke's entries in *Memoranda*:

- 25 Feb. 1681 (p. 146): "D[ined] with Dr Busby. Stated account with Plucknet."

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[804] Plucknett appears to have been in charge of the disbursements for this project as well; see WAM XB/06/09/004/3. On Plucknett, see also footnote 677 above.

[805] An accounts audit from 10 July 1682 names 'Mr. Hornes' as the bricklayer, 'Mr. Baites' as the carpenter, 'Mr. Tufnell' as the mason, and 'Mr. Walker' as the smith.

[806] William Presley is listed as the plumber in WAM XB/06/09/004/1.

- 5 Mar. 1681 (p. 147): "D[ined] with Dr Busby from him 5 Gu[ineas] [gold]."
- 19 May 1681 (p. 148): "Dr Busby. Saw churches."
- 23 July 1681 (p. 149): "paid Roger Davys £15 for Dr Busby left by 9 Gu[ineas]."
- 20 Aug. 1681 (p. 149): "Gauk Busby."
- 25 May 1682 (p. 153): "D[ined] Dr Busby passt Collins Tufnells & [ ] Bills."
- 17 Oct. 1682 (p. 155): "from Dr Busby. 5 G[uineas] [gold]."
- 5 Mar. 1683 (p. 156): "agreed with for Dr Busbys ?busines at 6d. at Smiths Hayrig."

– Hooke's entries in *Diary ii*:

- 14 Feb. 1689 (p. 188): "Gee and Chapman about Dr Busbys Almshouses."
- 20 Feb. 1689 (p. 189): "At Dr Busby . . . He left to me the full power to agree for Almes houses at Wellin."
- 5 June 1693 (p. 247): "Rog. Davis here about Dr Busbys church."
- 10 June 1693 (p. 249): "Dr desired me to goe to Welling with Mr Needham."
- 11 July 1693 (p. 258): "at Dr Busbys, agreed to goe with Mr Needham to Welling Thurs. 20."
- 15 July 1693 (p. 259): "Spake with Mr Needham of my not going on Thursday to Welling: sent word of it to Dr Busby by Mr Bullock."

– Westminster Abbey Muniment Room:

- XB/01/01/004: Letter dated 8 June 1682 from John Needham to an unnamed solicitor regarding a bill that was sent by the latter's client, presumably a contractor. Needham gives instructions to "bring the paper with him which you affirme to be signed by Mr Hooke & Mr Plucknett and bring either of them with him or Mr Hookes letter to attest the truth thereof the money shall then be paid to him without further trouble."
- XB/06/09/004/1: An audit of all the disbursements between May 1679 and 5 July 1682, with those up to 22 May 1684 added at the end. According to this audit, the church cost around £2,200.
- XB/06/09/004/2: Records of payments on 28 Jan. 1682 for bills from John Tufnell, the mason, for paving the floor, and from Roger Davis, the joiner, for the pews, screen, pulpit, and wainscoting.
- XB/06/09/004/3: An accounts audit dated 10 July 1682, naming 'Mr. Hornes' as the bricklayer, 'Mr. Baites' as the carpenter, 'Mr. Tufnell' as the mason, and 'Mr. Walker' as the smith. Acting on behalf of Richard Busby, Thomas Plucknett appears to have been in charge of the disbursements.

- XB/06/09/004/4 & 5: Lists of payments since the 10 July audit. Dated 16 and 20 July 1682, they give the names of each labourer and detailed accounts of all the work done, including the number of bricks used, millwork for the library, forging of the three church bells, etc.
- XB/06/09/004/6: 6 Dec. 1681 bill from Roger Davis, joiner, approved and signed by Hooke and Plucknett on 2 Jan. 1682. On the second folio is the contract between Roger Davis and Busby's three representatives, John Needham, Thomas Plukenett, and a third person whose signature is unfortunately illegible.
- XB/06/09/008: extract from *The Bucks Standard*, 4 Jan. 1958, on the history of the church.

– British Library, Add. MS 5238, no. 59: In Hooke's hand, an undated drawing of a plan and elevation of an alternative design for St. Mary Magdalene church (**Figure IV-221 or Figure III-79**).

– Warwickshire C.R.O., CR2017/B1/3: In Hooke's hand, an undated elevation drawing of an alternative design for St. Mary Magdalene church (**Figure IV-222 or Figure III-336**).

– Plate 2, 'The N. W. view of Willien Church, Bucks.' in *The Gentleman's Magazine: and Historical Chronicle*, Vol. 62, Part 2 (London, 1792), p. 1168 (**Figure IV-223**).

– The London architectural firm Shenstone & Partners[807]
- 'St Mary Magdalene Church, Willen: Conservation plan', 2001 (prepared by Purcell, Miller, and Tritton).
- Survey and construction drawings for restoration work, dated between June 2002 and November 2008.
- 'St. Mary Magdalene Church, Milton Road, Willen MK15 9AB Work to Repair and Recover the Nave Roof': a 2010 report and photographs of the roofing work completed in Nov. 2008 and the remedial work to the North Vestry in March 2009.

Description:

This parish church is one of the few buildings by Hooke to have survived in fairly intact form (**Figures IV-224 to IV-228**). His involvement in the project is heavily supported by surviving primary sources, such as diary entries, drawings, contractors' bills, and account audits.[808]

[807] I thank Michael Poteliakhoff of Shenstone & Partners for sharing their report, photographs, and drawings of the restoration work they have undertaken on the roof and the North Vestry of the church.

[808] I am grateful to Rev. Paul Smith for his hospitality and for granting me full access to the building as well as his archives.

Richard Busby (1606–1695), the famed schoolmaster of Westminster School, took Hooke under his wing when the latter arrived in London after his father's death. He remained a life-long friend and patron, hiring Hooke for several projects and facilitating his appointment as the Surveyor for Westminster.[809] The Manor of Willen, or Wyllyne, in Buckinghamshire had been sold to Busby in 1673 by the descendants of Robert Hammond (1620/21–1654), a Colonel in the Parliamentary Army infamous for detaining Charles I in the Isle of Wight for a year. When Hammond purchased the property, there was already a medieval church dedicated to St. Mary Magdalene but it was in desperate need of repair. Rather than restoring it, Busby had it demolished and commissioned Hooke to build a new one.[810]

Hooke produced some preliminary designs in 1678; the undated drawings currently among his papers at the British Library and Warwickshire C.R.O. are likely two of these early schemes (**Figures IV-221 and IV-222**). The plaster of the barrel vault bears the date 1680 but construction seems to have begun in 1679 with interior work continuing into 1682. Contractors' bills and audits of the accounts, currently among Busby's papers at the Westminster Abbey Muniment Room, list in great detail both the quantities of material used and the descriptions of the work done by each labourer.

It is a modestly-sized church, appropriate for a small parish which only had 97 inhabitants in 1841.[811] A nineteenth-century history of the church states that its construction cost the great sum of £5,000 and that "with good management, [it] might have been built for a third-part of the money."[812] A 1684 audit of all the disbursements, however, shows that it cost about £2,200.[813] The building went through some alterations in the nineteenth century but a *c.* 1792 drawing (**Figure IV-223**) illustrates what it may have looked like originally. It has a single nave with a barrel vault, and a rectangular chancel

[809] In addition to this church in Willen, in his later years Busby also hired Hooke to refurbish and 'beautify' the Church of St. Nicholas in Lutton, Lincolnshire; see ii. 50 in this chapter. For Hooke's work at Westminster Abbey and School, see ii. 24.

[810] Although Lipscomb gives Hammond's date of purchase as 1657, he was already dead by then, so it must have been sometime in the early 1650s; see George Lipscomb, *The History and Antiquities of the County of Buckingham* (London: J. & W. Robins, 1847), p. 408. Jardine interprets Busby's demolition of the previous church as an act of revenge, "obliterating all trace of Robert Hammond (whose family monument was presumably in the old church);" see Jardine, *Curious Life of Hooke*, p. 301.

[811] Lipscomb, *County of Buckingham*, IV, p. 408

[812] Ibid.

[813] WAM, XB/06/09/004/1.

which was replaced in 1861 or 1862 with the current apse by T. H. Lewis.[814] The tower had two chambers; the south one was the vestry, and the north one the library which housed 620 volumes donated by Busby and later by James Hume (*c.* 1676–1734), rector of Bradwell.[815] The lead cupola of the tower (visible in **Figure IV-223**) was removed in 1814 to pay for repairs.[816]

In 2001, a Conservation Plan for the church was prepared by Purcell, Miller, and Tritton. Subsequent restoration work was undertaken by the London architectural firm Shenstone & Partners who prepared measured survey drawings, and in 2010 summarised the roofing and other work they had directed in a report. Dr. Gerard Lynch, who has studied the brickwork in the church, has determined that the bricks used were wood-fired, as opposed to the coal-fired types used in London after the Great Fire. They were laid on a lime-rich mortar in a Flemish Bond pattern popular during the period.[817]

ii. 36. HOUSE FOR EDWARD CONWAY, RAGLEY HALL IN WARWICKSHIRE

Attributions: Batten, pp. 97-103; Colvin, *BDBA* (1954) and subsequent editions; *NHLE*, list entry no. 1001196. Conversely, the extent of Hooke's involvement has been challenged, first by Peter Leach in 'Ragley Hall Reconsidered', *The Archaeological Journal* 136 (1979), pp. 265-268.

Brief description: In 1679–1681, Hooke advised Edward Conway on the design of Ragley Hall in Warwickshire.

Primary Sources:

– Hooke's entries in *Diary i*:

- 12 Jan. 1678 (p. 340): "Lord Cowans desird me to look on his module January 30 next."

[814] Nikolaus Pevsner, Elizabeth Williamson, and Geoffrey K. Brandwood, *Buckinghamshire*, 2nd ed. (New Haven, CT: Yale University Press, 1994), p. 562; 'Willen', in *An Inventory of the Historical Monuments in Buckinghamshire, Volume 2, North* (London: His Majesty's Stationery Office, 1913), pp. 330-331. For a lengthier description of the building, see list entry no. 1160998 in Historic England, *The National Heritage List for England*, https://goo.gl/tE4quK.

[815] The books were removed to the vicarage sometime before 1895 and perished in a fire in 1946; see Michael Perkin and Neil Ker, *A Directory of the Parochial Libraries of the Church of England and the Church in Wales* (London: Bibliographical Society, 2004), p. 390.

[816] Sylvanus Urban, ed., *The Gentleman's Magazine: and Historical Chronicle* (London: Printed by John Nichols, 1792), p. 1168.

[817] Michael Poteliakhhoff of Shenstone & Partners, emails to the author, 2 and 6 Mar. 2012; Gerard Lynch, email to the author, 18 May 2015.

- 13 Feb. 1678 (p. 344): "Lord Conways Draught."
- 20 June 1679 (p. 415): "Lord Conways man about house."
- 24 June 1679 (p. 415): "Lord Conways Designe."
- 25 June 1679 (p. 415): "At Lord Conways, Mr. Holbert, etc."[818]
- 3 July 1679 (p. 416): "To Lord Conway."
- 5 July 1679 (p. 416): "Spake with Lord Conway, shewd Designe. He gave me 10 Gu. [gold]."
- 31 Oct. 1679 (p. 429): "Letter from Lord Conway by Mackginnys."[819]
- 20 Nov. 1679 (p. 431): "Sent letter to Lord Conway."[820]
- 21 Nov. 1679 (p. 431): "Drew ovall stairs."[821]
- 25 Nov. 1679 (p. 432): "Wrot to Lord Conway."
- 5 Mar. 1680 (p. 440): "Message from Lord Conway."[822]
- 31 Mar. 1680 (p. 442): "Lord Conway at my lodging."
- 14 June 1680 (p. 446): "Letter from Lord Conway."
- 19 June 1680 (p. 446): "Set out for Oxford with Mr. Davys at 5 in the morn. Mr. Pit overtook us at Acton. We dined at Wickham, baited at Petsworth, lay at the Angell in Oxford."[823]
- 20 June 1680 (p. 446): "Mr. Davys sick of his Ague. Dind with Pit. Visited Dr. Wallis, Mr. Barnard, Mr. Piggot, etc. Mr. Piggot at my lodging. Lay there Sunday night."[824]

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[818] 'Holbert' has been identified as William Hurlbutt (d. 1698?), a carpenter from Coventry; see Leach, 'Ragley Hall Reconsidered', p. 267. See also Colvin, *BDBA* (2008), pp. 548-549.

[819] C. Magenis (forename unknown) was Conway's assistant; cf. his note, now The National Archives, Kew, State Papers Domestic, Charles II, 29/413, fol. 70 [no. 38], an extract from which is referenced below and transcribed in Appendix i. 2.

[820] For Hooke's letter, see The National Archives, Kew, State Papers Domestic, Charles II, 29/412, fol. 87 [no. 67], noted below and transcribed in Appendix i. 1.

[821] It is unclear whether the stairs were for Ragley Hall as Hooke was working on multiple projects during this period.

[822] See footnote 819.

[823] Roger Davys (or Davies) was a joiner Hooke worked with on numerous projects; he also made architectural models which is probably why he was accompanying Hooke on this visit to Ragley. They appear to have stopped at Oxford along the way; 'Mr. Pit' is most likely Moses Pitt (*bap.* 1639, *d.* 1697), the bookseller and printer.

[824] At Oxford, Hooke also met with John Wallis (1616–1703) and Edward Bernard (1638–1697), Savilian professors of geometry and astronomy, respectively, and Thomas Pigot (1657–1686) who was on the same Royal Society committee on universal languages with Hooke.

- 21 June 1680 (p. 446): "Saw theater. Dined with Pigot. Visited by Wood. paid 10sh. Rode with Davys to Chipping Norton."[825]
- 22 June 1680 (p. 446): "Davys seasd with ague at Morton hin marsh. Tabor and pipe."
- 23 June 1680 (p. 447): "To Lord Conways. He was gon to Lord Brooks and Lord Digby. Roughly acosted by George Kempson."[826]
- 24 June 1680 (p. 447): "Viewd the country round. Holbert returnd."
- 25 June 1680 (p. 447): "Lord Conway returnd at night, I changd Lodging into the best Roome, Mr. Popham with him and Dr. Johnson from Warwick. Found in the house Mr. Kast the chaplain. Leonard an ingenious German mechanick servant to Van Helmont, the Butler who had lived 3 years in Constantinople. Holbert a Carpenter but a Pap. I viewd the remainder of H. Stubbs Library to be yet sold."[827]
- 26 June 1680 (p. 447): "Viewd module, shewd many faults, made a great many alterations, put the 2 great stairs into one and viewd the situation and ground round about. Dined and Supd with my Lord and Mrs. Popham. Davys sick of Ague."
- 27 June 1680 (p. 447): "With my Lord and Mrs. Popham and Mrs. Kemson to church. Mr. Wilson, the Parson, I doubt a Sycophant or worse. Dined with my Lord. Not at church in the afternoon."
- 28 June1680 (p. 447): "Spent most of my time in considering all matters."

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[825] Hooke is referring to Wren's Sheldonian Theatre; on its construction, see Anthony Geraghty, *The Sheldonian Theatre: Architecture and Learning in Seventeenth-Century Oxford* (New Haven, CT: Yale University Press for the Paul Mellon Centre for Studies in British Art, 2013). Anthony Wood (1632–1695) was an Oxford antiquary.

[826] For Hooke's note to Conway, see The National Archives, Kew, State Papers Domestic, Charles II, 29/413, fol. 310 [no. 163], noted below and transcribed in Appendix i. 4.

[827] Mr. and Mrs. Popham were probably cousins of Conway, as the latter's mother Frances was a daughter of Francis Popham (1572/3–1644). 'Dr. Johnson' might be Samuel Johnson (1649–1703), an anti-papist clergyman. 'Mr. Kast' remains unknown but Francis Mercury Van Helmont (1614–1698), son of the famous Flemish alchemist Jan Baptist (1580–1644), had been a member of the Conway household during the 1670s as physician to the philosopher Anne Conway (1631–1679), Edward's wife, who suffered from ill health much of her life. Anne's brother John Finch (1626–1682) lived in Constantinople between 1674 and 1681 as ambassador to the Ottoman court; the butler may have been from his household. Henry Stubbe (1632–1676), was an author and physician, the Conways being among his patients. He was also Hooke's schoolmate from Westminster, and a well-known critic of the Royal Society. His book collection, along with the collection of three others, was auctioned on 29 Nov. 1680; see *Catalogus variorum librorum in selectissimis bibliothecis doctorissimorum virorum; viz. D. Hen. Stubb nuperrime Londinensis [etc.] . . . quorum auctio habebitur Londini apud domum ex adverso areae Warwicensis . . . , 29 Nov. 1680* ([London]: n.p., 1680). A manuscript catalogue of his library is extant as BL, Sloane MS 35.

- 29 June 1680 (p. 447): "Stayd to see Sir J. Mordant and Mr. Parker who dined with my Lord and Dick Kemson. Prepard for Returne. Davys his Ague very gently. My Lord gave me 30 [gold] Guinnys."
- 30 June 1680 (p. 447): "Took leave of my Lord. Distributed 25sh. in the house. Took horse at 10 in the morning, baited at Morton hin masse. Lay very scurvily at Iselip."
- 1 July 1680 (p. 447): "Took horse at 4, arrived at Beckonsfeild by 10. Dined there and arrived at London and Gresham Colledge by 6. Davys seased with his Ague. I was not in the least weary."
- 3 July 1680 (p. 447): "Wrote letter to Lord Conway. Contrived his house."
- 5 July 1680 (p. 448): "Contrived house for Lord Conway."
- 7 July 1680 (p. 448): "Lord Conways man here. Michell returnd Draught of Portalls for Lord Conway."
- 8 July 1680 (p. 448): "Wrote letter and sent Draughts to Lord Conway."
- 9 July 1680 (p. 448): "Received Letter from Lord Conway . . . Sent Letter to Lord Conway."
- 16 July 1680 (p. 449): "Letter from Lord Conway."
- 20 July 1680 (p. 449): "Wrote and sent letter and Designe of 3 floors to Lord Conway."[828]
- 17 Aug. 1680 (p. 451): "Wrote to Lord Conway for Leonard."[829]
- 3 Nov. 1680 (p. 457): "At Lord Conways."

– Hooke's entries in *Memoranda*:

- 6 Jan. 1681 (p. 144): "at Lord conways with Dauys."
- 24 Feb. 1681 (p. 146): "to Lord Conway."
- 25 Feb. 1681 (p. 146): "at Mans. Lord Conways with module."
- 10 Mar. 1681 (p. 147): "Lord Conway . . . Lord Ranal[agh] modell."[830]

– The National Archives, Kew, State Papers Domestic, Charles II:[831]

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[828] Cf. Hooke's letter to Conway, 20 July 1680, noted below and transcribed in Appendix i. 5.

[829] Cf. Hooke's letter to Conway, 17 Aug. 1680, noted below and transcribed in Appendix i. 7. Leonard might be the "ingenious German mechanick servant to Van Helmont" he had met at Ragley when he visited Conway; see footnote 827.

[830] Hooke was most likely showing Richard Jones, earl of Ranelagh, Conway's model. Jones was Conway's cousin and there is at least one letter extant from their correspondence regarding the Conway house; see Appendix i. 8.

Jones was also Robert Boyle's nephew—Hooke had helped him with the purchase of a property at St. James Square, as well as other members of the Boyle family with repairs and alterations to various houses; see ii. 28, ii. 29, ii. 30, ii. 31 in this chapter.

[831] Transcriptions of these letters are provided in the Appendix as noted.

- 29/412, fol. 87 [no. 67]: Letter from Hooke to Conway, 15 Nov. 1679; Appendix i. 1.
- 29/413, fol. 70 [no. 38]: Letter from Magenis, to Conway, 6 Mar. 1680; Appendix i. 2.
- 29/413, fol. 141 [no. 84]: Letter from Harley to Conway, [? Apr.] 1680; Appendix i. 3.
- 29/413, fol. 310 [no. 163]: Letter from Hooke to Conway, 23 June 1680; Appendix i. 4.
- 29/414, fol. 57 [no. 31]: Letter from Hooke to Conway, 20 July 1680; Appendix i. 5.
- 29/414 fol. 132 [no. 67]: Letter from Hooke to Conway, 17 Aug. 1680; Appendix i. 7.
- 29/414, fol. 153a [no. 78]: Letter from Jones to Conway, 28 Aug. 1680; Appendix i. 8.

– *Fourteenth Report, Appendix, Part II. The Manuscripts of his Grace the Duke of Portland, Preserved at Welbeck Abbey*, vols. 3-4 (London, 1894):

- (p. 357) Letter from Conway to Harley, 22 Nov. 1677: "Heere you will finde me playing the foole in layout out mony upon building, having cheefely undertaken it because I finde my grandfather designed to build heere; yet I am not satisfied with my selfe. I have almost finisht one side of the out building and halfe the garden wall which I am planting with fruit trees. Next yeare I hope to finish the other part of the out-building and the rest of the garden wall. I have also the modell of the house designed."
- (pp. 374-375) Letter from Conway to Harley, 5 May 1683: "My cousin Seymour who has laid out more money in building than I have, has taken Mr. Halbert[832] with him to Bradley. I perceive he likes my model better than his own, and will alter as much of his design as it will bear. This is all the reward of a builder, to have his work approved, though I can challenge no more share of it than the present Master of the Horse to the Duke doth in the commendation which the King gives him, by saying that when the Duke has a Master of the Horse who understood it very well, he was the worst horsed of any man in England; but now he hath one that understands a horse no more than a cow, he is the best horsed of any man in the kingdom. This is exactly applicable to my skill. I wish it may be to my success in building."

– British Library:

- Add. MS 5238 no. 60: In Hooke's hand, drawing of an unrealised facade design for Ragley Hall, *c.* 1679 (**Figure IV-229 or Figure III-80**).[833]

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[832] On Hurlebutt; see footnote 818.

[833] Regarding the citing of two different figure numbers, see footnote 375.

This drawing has been suggested as an unrealised design for Ragley Hall in Oswald, 'Ragley Hall, Warwickshire -- I & II', p. 941; Leach, 'Ragley Hall Reconsidered', pl. LXVIII.A; Girouard, 'The Formal House: 1630–1720', p. 130; see the annotations for Figure III-80 in Chapter III.

- Add. MS 31323 W[3]: A survey drawing of the main floor, attributed to James Gibbs, *c.* 1750 (**Figure IV-232 or Figure III-237. cf**).

– RIBA, SD12/14a & SD12/14b: Two plan fragments of Ragley Hall, n.d.; attributed to Hooke but are more likely to be by Gibbs (**Figure IV-230 or Figure III-234 to III-236**).

– Kip and Knyff, 'Ragley in the County of Warwik the Seat of Popham Conway Esq.' in *Britannia illustrata or views of several of the queens palaces as also of the principal seats of the nobility and gentry of Great Britain* (London, 1707): *c.* 1698 engraving by Kip (**Figure IV-231**).

Description:

In June 1679, Edward Conway (*c.* 1623–1683), third Viscount and soon-to-be earl of Conway, hired Hooke to help design the stately mansion he intended as his seat at Ragley, Warwickshire.[834] Fulfilling his grandfather's desire to build on the site, presumably near the old Ragley Hall he resided in, Conway had already begun the project several years earlier and by November 1677, had built one of the annexes and had "also the modell of the house designed." By 'modell' he was most likely referring to a three-dimensional one, but it may also have been the 'draught' he showed Hooke in February 1678. It would take more than a year for the project to pick up again, perhaps because during the intervening period Conway was busy with administrative duties in Ireland, spending most of his time away from Ragley.[835]

In February 1679, his wife, the philosopher Anne Conway (1631–1679), died after a life-long illness, and soon Conway was looking for a new wife as well as eagerly pursuing higher social status, having paid (if the rumours are to be believed) £10,000 for the honour of being created first earl of Conway. It was probably to help hasten the construction of his new house, and to give it grandeur more reflective of the status of an earl, that he approached Hooke, who would have been a natural

[834] Walker suggests Boyle's involvement in Hooke's receiving this commission; Walker, 'Architectus Ingenio', p. 119.

[835] On the old Ragley Hall, see Geoffrey Tyack, 'Ragley Hall', in *Warwickshire Country Houses* (Sussex, UK: Phillimore & Co. Ltd., 1994), pp. 166-172, p. 166. For biographical details on Edward and Anne Conway, see 'Conway, Edward, earl of Conway (*c.* 1623–1683)' and 'Conway, Anne, Viscountess Conway and Killultagh (1631–1679)', *ODNB*. All the primary sources cited are listed above; the quote is from Conway's 22 Nov. 1677 letter to his cousin Edward Harley (1624–1700); on which see also Leach, 'Ragley Hall Reconsidered', p. 265.

Other secondary sources on Ragley Hall include H. Avray Tipping, 'Ragley Hall - I & II', *Country Life* (1924), pp. 438-445, 476-482; Oswald, 'Ragley Hall, Warwickshire -- I & II'; Leach, 'Ragley Hall Reconsidered'; Tyack, 'Ragley Hall', Giles Worsley, 'Ragley Hall, Warwickshire', *Country Life* 190 (1996), pp. 70-75; Walker, 'Architectus Ingenio', pp. 119-124; Smith, "Contriving Lord Conway's house': Who Really Designed Ragley Hall?'.

choice. By then the latter had already worked on high-profile residences, including the Montagu House in London, and the two knew each other via the Royal Society where Conway had been elected fellow in 1668.

Conway considered himself a bit of a 'gentleman architect'. Though he had received no formal university education during the turbulent times of the Civil War, in 1640 he had some training in Paris in the military arts, which certainly would have included some instruction in fortifications. In 1649, he took ownership of his father's famous library, an impressive collection of at least 8,000 volumes at their Irish estate alone, with further books at Ragley Hall. The extant catalogue contains many titles in architecture, as well as practical geometry and the art of drawing, and he may very well have been one of the gentleman autodidacts who received much of their 'training' from books.[836]

Diary entries and extant letters show that Hooke produced several schemes for Conway. One of these has survived among Hooke's papers at the British Library, probably because it was not adopted (**Figure IV-229**). It shows a more elaborate design than what was eventually constructed; the house has since gone through significant alterations, including the addition of a portico by James Wyatt in 1778, but the engraving by Kip in *Britannia illustrata* (London, 1707) shows what the facade looked like *c.* 1698 (**Figure IV-231**). It is reflective of some of their discussions captured in the extant correspondence, especially in regard to the entrance for which Hooke sought to emulate the "Great Stairs at Somerset house." We do not know if Hooke was referring to this particular drawing when he wrote in November 1679 "I conceive the Designe to be very magnificent (to say noe more of it) And that which will abundantly Answer your Lordship's Intentions in all particulars" but it was accompanied with a plea to avoid haste and "begin the foundations somewhat later in the spring when the fear of frost is perfectly off," when he could "be there to see every thing put into a good order for the beginning and compleating thereof."[837]

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[836] The Conway library catalogue, which has survived in manuscript form, lists at least 72 architectural titles under 'libri architectonici' in various formats; they include multiple editions of Vitruvius, as well as more contemporary books by Palladio, Scamozzi, le Muet, and others. Other architecture-related books are listed under the category of 'mathematica impura vel mixta'; in the folio section, for instance, the last acquisition is listed as "Niceron. La Perspective Curieuse. Par. 1638;" see Armagh Public Library, MS KH II 39, fols. 135v, 145r-149r. I thank Sarah Hutton for drawing my attention to this manuscript, and Thirza Mulder, archivist at Armagh Robinson Library, for providing a digital copy of the relevant section.

[837] Hooke to Conway, 15 Nov. 1679; transcribed in Appendix i. 1.

Perhaps it was partly because of Conway's cousin's criticisms that further design work was deemed necessary. Edward Harley (1624–1700), politician and fellow of the Royal Society in 1663–1685, had presumably been involved in the design of his own house in Brampton Bryan in the 1660s, and taken an interest in Ragley Hall.[838] In addition to foreseeing potential dampness problems in the foundations, he wrote "the Door apeared to mee too narrow for an Entrance becomming such a Structure."[839] Several months later, Hooke travelled to Ragley to discuss his scheme with Conway in person. It had clearly become too difficult to explain the designs via correspondence alone, by sending drawings and letters back-and-forth, so he went prepared, taking with him Roger Davys (or Davies), a master joiner he had worked with on numerous projects, to make alterations to the model on site. After a few days' journey, which included a stop-over at Oxford, on 26 June 1680, Hooke met with Conway, "Viewd module, shewd many faults, made a great many alterations, put the 2 great stairs into one and viewd the situation and ground round about." Upon returning to London, Hooke produced more drawings. Conway remained unsatisfied; and although the letters outlining his criticisms have not survived, Hooke's answer to them have. In a 20 July 1680 letter, with which Hooke sent three floorplans (now lost), he described in detail the layout of the building as he envisioned it. The letter is illuminating in multiple ways. It gives insight into the arrangement of a house fit for a gentleman with aspirations of further upward mobility, accommodating private apartments with separate circulation, as well as a library, a chapel, and a room "to lock up Instruments manuscripts Raritys &c." It also illustrates the complex relationship between 'client' and 'architect', or rather the inadequacy of these terms in situations where the architect is advising from over a hundred miles away, and the client is directly involved in the construction by providing, for example, the "Materialls of Brick & Stone" and "a good number of hands."[840]

There is also the matter of the local craftsman supervising the construction; in this particular case William Hurlbutt, the master carpenter who had built the stable block at Conway's Irish estate, as well as remodelled several houses for other aristocratic clients.[841] Indeed, in a 1979 article, Peter

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[838] On Harley, who was the son of Brilliana Harley [née Conway], see 'Harley, Sir Edward (1624–1700)', *ODNB*.

[839] Harley to Conway, [? Apr.] 1680; transcribed in Appendix i. 3.

[840] Hooke to Conway, 20 July 1680; transcribed in Appendix i. 5.

The plan arrangement Hooke proposed in this letter is discussed in Smith, "Contriving Lord Conway's house': Who Really Designed Ragley Hall?'. On the spatial arrangements and functions in formal houses during this period, see Girouard, 'The Formal House: 1630–1720', pp. 135-138 on Ragley Hall.

[841] On Hurlebutt, see footnote 818.

Leach argued that Hooke's involvement in the project had in fact been limited, and that Conway had preferred "the advice of the 'home-bred Architect', William Hurlbutt, to that of the 'ingenious gentleman', Robert Hooke."[842] Leach was implying a reversal of Roger Pratt's advice for building a country house, where he suggested that, if unable to contrive it themselves, the reader should hire "some ingenious gentleman," well-travelled and versed in the best authors on architecture to design it, rather than "a home-bred Architect" lacking such experience.[843] Leach's argument against Hooke's designation as the 'architect' of Ragley Hall was based on the differences between Hooke's suggested plan and the one that was eventually built, prompting him to look for "another hand in the design."[844] His explanation of the final scheme was that it was a combination of Hurlbutt's work, attributing the 1677 model to him, and "Italianate pattern-book design, derived primarily from Serlio and in part from Palladio."[845] Leach did not make any connections between Hurlbutt and the 'Italianate design', nor explained why Hooke could not have adopted such a plan at a later date. He also seems to have ignored one piece of evidence. From the extant correspondence, it was always clear that Hurlbutt was directing the work on site at Ragley. Hooke clearly acknowledged this. Writing to Conway on 17 August 1680, he offered to have the module brought to London and modified to the latest design so that "twill be very easy for Mr. Holbert or any els your Lordship shall imploy to proceed with the whole work without much if any further Direction."[846] Hurlbutt would have been expected to have the talent to improvise when needed but largely to follow the outlines of a design delineated by Conway and Hooke. And the model was indeed changed, though it would take some time for it to make it to London. According to the diary fragments, which had not yet been published when Leach wrote his article, Davys would make the necessary alterations, and the model would be a subject of discussion once again on 25 February 1681.

The more detailed diary entries ending in December 1680, and with too many gaps for the period up to mid-May 1683, we may never know whether Hooke was involved in any further changes to the design. There are the two plan fragments attributed to Hooke in the online catalogue of the RIBA collection (**Figure IV-230**). There is no further information about them in the printed catalogue nor are they mentioned in any other secondary literature. If they are indeed in Hooke's hand, and with

[842] Leach, 'Ragley Hall Reconsidered', p. 268.
[843] Ibid., p. 265.
[844] Ibid., p. 266.
[845] Ibid., p. 268.
[846] Hooke to Conway, 17 Aug. 1680; transcribed in Appendix i. 7.

no information on their provenance it is impossible to be certain, they would be proof that at least those parts of Hooke's scheme were eventually adopted. However, they closely resemble the *c.* 1750 survey plan James Gibbs (1682–1754) prepared prior to starting on interior work (**Figure IV-232**); this could equally be interpreted as these fragments being related to Gibbs's survey than Hooke but there are enough differences to suggest two different hands. In either case, it may be more prudent not to take them as hard evidence until further information about them is recovered.

The questioning of Hooke's role in the design of Ragley Hall throws into relief the larger issue of authorship during this period. 'Architect' was yet a foreign concept in England, recently imported from Italy and France by those exiled to the continent during the Interregnum. In the past, buildings were created collaboratively by groups of craftsmen; masons, bricklayers, carpenters, glaziers, joiners, plumbers, etc., with one acting as the master coordinating the work. Indeed, writing about the period involves intermittent pauses to decide how to qualify the designer; does one call master carpenter Edward Jarman (*c.* 1605–1668), the designer of no less a building than the Royal Exchange, the City Surveyor, 'an experienced man in buildings' as Roger Pratt put it, or an 'architect' in modern terms? The dichotomy between collaboration and authorship was not limited to architecture. It had obvious resonance in theatrical and printed works, but also increasingly in natural philosophy, where many experimental philosophers collaborated not only with other philosophers but also with mathematical practitioners and craftsmen in inventing new instruments. In an environment where the quality of the instrument had authority over the credibility of the experiment, the question remained: whose work was the instrument? The natural philosopher who conceived of it but lacked the tacit knowledge of materials and the skills needed to actually construct them? Or the instrument maker who invented a tool by interpreting a set of vague specifications?[847]

[847] Sources on architectural practice during this period include James Ayres, *Building the Georgian city* (New Haven: Published for the Paul Mellon Centre for Studies in British Art by Yale University Press, 1998); Howard Colvin, 'The Practice of Architecture, 1600–1840', in *A Biographical Dictionary of British Architects, 1600-1840* (New Haven, CT: Yale University Press, 2008), pp. 15-37; John Harris and Robert Headsky, *A Passion for Building: The Amateur Architect in England 1650–1850* (London: Sir John Soane's Museum, 2007); Frank Jenkins, *Architect and Patron: A Survey of Professional Relations and Practice in England from the Sixteenth Century to the Present Day* (New York: Oxford University Press, 1961), pp. 40-66; Barrington Kaye, *The Development of the Architectural Profession in Britain: A Sociological Study* (London: George Allen & Unwin Ltd., 1960), pp. 22-53; Douglas Knoop and Gwilym Peredur Jones, *The London Mason in the Seventeenth Century* (London: The Manchester University Press, 1935); John Wilton-Ely, 'The Rise of the Professional Architect in England', in *The Architect: Chapters in the History of the Profession*, ed. Spiro Kostof (New York, NY: Oxford University Press, 1977), pp. 180-208; Giles

In the case of Ragley Hall, Conway further complicated the issue of authorship with a letter dated 5 May 1683. Writing three months before his death, he explained to Harley that his cousin Seymour, presumably Edward Seymour (1633–1708) fourth baronet of Berry Pomeroy, had taken Hurlbutt with him to Maiden Bradley in Wiltshire. Having already spent more money than him on his new house, Conway wrote "I perceive he likes my model better than his own, and will alter as much of his design as it will bear. This is all the reward of a builder, to have his work approved."[848] With this, Conway attributed Ragley Hall to himself.

ii. 37. HOUSE FOR WILLIAM JONES, RAMSBURY MANOR IN WILTSHIRE

Attributions or discussions: Batten, p. 111 [Jones is identified but not the house]; Colvin, *BDBA* (1978) and subsequent editions; Colvin, 'Robert Hooke and Ramsbury Manor', *Country Life* (23 Jan. 1975), pp. 194-195; H. J. Louw, 'New Light on Ramsbury Manor', *Architectural History* 30 (1987), pp. 45-49; *NHLE*, list entry no. 1184029.

Brief description: In addition to helping with the renovations and alterations to his Bloomsbury house, in 1681–1683, Hooke built a house William Jones in Ramsbury, Wiltshire.

Primary Sources:

– Hooke's entries in *Diary i*:
  - 20 Sep. 1673 (p. 61): "to Sir W. Jones . . . about new house."
  - 24 Nov. 1673 (p. 71): "dind at Sir W. Jones. Saw his Survey of Country house. proferd him 3 guinnys for fee he refused upon the account I designed in house &c."[849]

Worsley, ed., *The Role of the Amateur Architect: Papers Given at the Georgian Group Symposium* (London: The Georgian Group, 1993); David Yeomans, *The Architect and the Carpenter* (London: RIBA Heinz Gallery, 1992).

On issues of authorship in literature or natural philosophy, see, for instance, Janet Clare, 'Shakespeare and Paradigms of Early Modern Authorship', *Journal of Early Modern Studies* 1 (2012), pp. 137-153; Domenico Bertoloni Meli, 'Authorship and Teamwork Around the Cimento Academy: Mathematics, Anatomy, Experimental Philosophy', *Early Science and Medicine* 6 (2001), pp. 65-95. Royal Society minutes contain numerous references to teams of fellows being assigned experiments to conduct together; see Birch, vols. 1-4, *passim*.

[848] Letter from Conway to Harley, 22 Nov. 1677 in *Fourteenth Report, Appendix, Part II. The Manuscripts of his Grace the Duke of Portland, Preserved at Welbeck Abbey. Vols. 3-4*, (London: Printed for her Majesty's Stationary Office . . . , 1894), p. 357.

[849] The country house in question may be the manor of Avington in Berkshire Jones had purchased that year; 'Jones, Sir William (bap. 1630, d. 1682)', *ODNB*. The designs Hooke was working on around this time

- 2 Dec. 1673 (p. 72): "At Sir W. Jones. Drew designs for Sir W. Jones. Shewd him designes he prepared. Mr. J. Fitch here."
- 6 Apr. 1674 (p. 95): "Dined at Sir W. Jones with Dr. Pope. Viewd his ground."
- 7 Apr. 1674 (p. 95): "Sent Davys to Sir W. Jones."
- 20 July 1675 (p. 170): "Dind at Sir Wm. Jones . . . Viewd Sir W. Jones his crack."
- 4 April 1678 (p. 351): "Saw Sir W. Jones Chimney set upright."
- 17 April 1680 (p. 443): "Sir W. Jones, viewd his house."
- 18 April 1680 (p. 443): "Sir W. Jones house."
- 6 May 1680 (p. 445): "At Sir W. Jones about house."
- 3 June 1680 (p. 445): "At Sir W. Jones in Bloomsbury, with Bate till 12."
- 2 July 1680 (p. 447): "To Sir W. Jones, Mr. Montacues, etc. Bates had laggd and not followd Directions."
- 7 July 1680 (p. 448): "Dined with Sir W. Jones, Viewd houses, etc."
- 14 July 1680 (p. 448): "At Sir W. Jones, Bates laggd."
- 28 July 1680 (p. 450): "At Sir W. Jones building."
- 3 Sep. 1680 (p. 453): "At Bloomsberry Sir W. Jones sashes."
- 20 Sep. 1680 (p. 454): "Scarborough on Sir W. Jones account."
- 24 Sep. 1680 (p. 455): "All afternoon at Sir W. Jones upon valuing [with] Bates."
- 30 Sep. 1680 (p. 455): "To Sir W. Jones, at his chamber, then at his house about windows."
- 4 Oct. 1680 (p. 455): "To Greys with Scarborough about Sir W. Jones. Delivered in to him the Bills."
- 10 Nov. 1680 (p. 457): "I dined at Sir W. Jones. About chimneys."

-Hooke's entries in *Memoranda*:

- 7 Aug. 1682 (p. 154): "with Heblethwait by coach & 4 horse D[ined] at Maidenhead. Lodgd at Redding. Saw Monastery & Drunken Justices."[850]

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may have been for a new house at Avington. Jones was also leasing a residence at the recently-built Southampton Square in Bloomsbury, London; in his will, he left this lease to his wife, so it is possible he had a long-term lease for a plot of land on which he had built a house for himself with Hooke's help.

[850] Hebblethwaite was William Jones's servant; see Howard Montagu Colvin, 'Robert Hooke and Ramsbury Manor', in *Essays in English Architectural History* (New Haven, CT: Yale University Press, 1999), pp. 191-194, p. 193. Jones had died on 2 May 1682, i.e. about three months before Hooke embarked on this journey; 'Jones, Sir William (bap. 1630, d. 1682)', *ODNB*.

- 8 Aug. 1682 (p. 154): "D[ined] at Spinham Lands. saw Donnington Castle. Mr Pelham. Lem Avis Davis all Suppd."[851]
- 9 Aug. 1682 (p. 154): "viewd Ramsbury & D[ined] at Swan. Lodgd at Spinham Lands. Gunter."
- 10 Aug. 1682 (p. 154): "Pelham gone. D[ined] at Redding. Lodgd at Maydenhead."
- 9 Aug. 1682 (p. 154): "at home by 11."
- 12 Jan. 1683 (p. 155): "R*eceiue*d from Mr Heblethwait £20 by order of Dr Tillotson Mr Pelham & Mr Gore."[852]

– National Archives, Kew, PROB 11/370/113: William Jones's 18 Oct. 1681 will, where he names his "sonne in law Thomas Pelham, Esq." and his "deare friends Doctor Tillotson, and William Gore Esquire" as the executors of his will. Attached to the will is a codicil dated 13 April 1682 stating "I also will that the building of my house at Ramsbury in the said County of Wilts shall proceed and the workman thereof shal bee paid out of my personall estate According to the agreement I have made with them."

– Townshend Archive at Raynham Hall, Norfolk:[853]
  - Although they do not amount to a complete set of building accounts, documents such as estimates, vouchers, and receipts for payment have survived on the construction of the house. The last payment, to Joseph Avis the carpenter, was registered on 15 June 1686.[854] In addition to these, two other documents are of interest:
  - 'Valluation of the Designe for the new house at Ramsbury', an undated quantity survey of the materials used, valuing them at £2,171-13-8.
  - Inventory dated 16 April 1728 listing 'Several Plans of a New House belonging to Sir Wm. Jones that either was built or to be built'; Louw notes that no other references to this set of drawings exist and that they are now considered lost.[855]

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[851] Speenhamland and Donnington Castle were near Newbury. Thomas Pelham (*c.* 1653–1712) was Jones's son-in-law and one of the executors of his will; Joseph Lem (bricklayer), Joseph Avis (carpenter), and Roger Davies (joiner) were London craftsmen Hooke most often worked with; see ibid..

[852] John Tillotson and William Gore, along with Pelham, were the executors of Jones's will, and it appears Hooke was paid £20 for the site visit in August and other help with the construction of Ramsbury.

[853] These documents have descended via Jones's granddaughter, Elizabeth, who married Charles Townshend (1674–1738), second viscount Townshend, in 1698. They are privately-held and unfortunately I was unable to secure permission to access to them; any information on their content comes from Hentie Louw's 1987 article on their discovery; see Louw, 'New Light on Ramsbury Manor'.

[854] For a detailed description of the craftsmen's bills, see ibid.

[855] Ibid., p. 49.

– Worcester College Archives, University of Oxford, Colvin 525: 'Design for a Country House with Ogee Dome, with Subsidiary Studies of the Dome and Entablature an elevation', an undated elevation attributed to Hooke (**Figure IV-238 or Figure III-228**). On the verso is the inscription 'Jones', in ink, possibly referring to William Jones.
– Emory University, Robert W. Woodruff Library Special Collections, call number QH271.H8 FOLIO (*RHBdb*, extra_BH_32): Hooke's presentation copy of *Micrographia*, with "Ex dono authoris" inscribed by William Jones.

Description:

William Jones (*bap.* 1630, *d.* 1682) was a talented lawyer who rapidly climbed up the ranks in Restoration England: in 1671 he was appointed king's attorney and received knighthood, two years later he became solicitor-general, and in 1675 attorney-general. His professional success also brought financial benefits, which he used towards social advancement; to join the landed gentry, in 1673, he began purchasing estates in Berkshire and Wiltshire, eventually acquiring Ramsbury from the earl of Pembroke in 1676.[856]

The numerous mentions Jones receives in the extant diaries, the first one approximately within a month of their inception, point to a convivial relationship between the two men.[857] They had likely met via the City Church Office, which at times sought Jones's council on legal matters, subsequently becoming friends, sometimes dining together and exchanging professional advice.[858] Hooke, for instance, would review the properties Jones was purchasing in the country as well as help with renovations to the London property he was leasing. Most notably, in September 1680, he would help

[856] Presumably this was the seventh earl, Philip Herbert (1653–1683), infamous for his scandalous behaviour which resulted in at least two murder convictions; see under 'Herbert, Philip, first earl of Montgomery and fourth earl of Pembroke (1584–1650)', *ODNB*. A month before his death, Jones purchased another estate from Herbert, the manor of Aldbourne in Wiltshire; see ibid., p. 45. On Jones, see 'Jones, Sir William (bap. 1630, d. 1682)', *ODNB*, and J. S. Crossette, 'Jones, Sir William (1630–82), of Southampton Square, Bloomsbury, Mdx. and Ramsbury, Wilts.', in *The History of Parliament: the House of Commons 1660–1690*, ed. B. D. Henning (London: Published for the History of Parliament Trust by Secker & Warburg, 1983).

[857] The very first mention of 'Sir W[illiam] Jones' in the extant diaries is recorded on 15 Apr. 1672 (*Memoranda*, p. 138); it gives no details other than his name.

[858] Walker has found evidence suggesting that the occasional payments Hooke made to Jones may have been from the City Church Office; 'Architectus Ingenio', p. 106n11.

fit sash windows, at the time a cutting-edge innovation, in Jones's Bloomsbury house in Southampton Square.[859]

When Jones bought the Ramsbury estate in 1676, it already contained a house built around 1560 by the earls of Pembroke.[860] After some attempts at renovating it, when he finally took possession of the estate in 1681 following a lengthy legal process, Jones decided to replace it with a new building, presumably commissioning Hooke with the design. The diaries do not offer much help in determining when Hooke may have worked on the schemes. Most of the post-1676 entries refer to the work done to Jones's Bloomsbury property mentioned above, and only fragments of the diary from the 1681–1683 period, when bulk of the exterior construction took place, have survived. Might Hooke and Jones have been discussing a suitable design for Ramsbury when the two 'viewed houses, etc.' after dinner on 7 July 1680? We may never know, but as far as the diaries are concerned, insight into Hooke's involvement with the Ramsbury estate comes only after Jones's premature death in May 1682.

In a 13 April 1682 codicil, Jones had made provisions in his will for the completion of the house, instructing his executors to honour the agreements he had made with the workmen.[861] Three months after Jones's death, Hooke travelled with the latter's servant Hebblethwaite to Ramsbury where he met Pelham, Jones's son-in-law and one of the executors of his will, as well as the London craftsmen Hooke often worked with, Lem, Avis, and Davys. The diary entries are low on detail but he likely reviewed the work in progress and perhaps gave further instructions regarding the completion of the house. In January 1683, for this visit and any other work he may have done during the intervening five months, Hooke was paid £20 by the executors of Jones's will. While most of the exterior construction seems to have finished by 1683 (the date inscribed on the rainwater heads), payments to craftsmen show that the rest of the work, including of the interior, lasted well into 1686. Due to the lengthy gaps in Hooke's diaries during this period, it remains unknown if and how much he remained involved in the construction process.

Colvin considers the diary entries regarding this visit as sufficient evidence for attributing Ramsbury manor to Hooke. Louw further states that the presence of Lem and Avis, "both former

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[859] See also note 849 on the Bloomsbury house; on the sash-windows see Louw, 'New Light on Ramsbury Manor', p. 48; Colvin, 'Hooke and Ramsbury', p. 192.

[860] For a 1562 survey drawing of the previous house, see Christopher Hussey, 'Ramsbury Manor, Wiltshire - II', *Country Life* (1961), pp. 1526-1529, p. 1528.

[861] National Archives, Kew, PROB 11/370/113; see also Louw, 'New Light on Ramsbury Manor', p. 45.

assistants of Robert Hooke, establishes the latter beyond all reasonable doubt as the designer of Ramsbury Manor."[862] Although one may be disinclined to call Lem (bricklayer) and Avis (carpenter) Hooke's assistants, it is true that he worked with them on numerous other projects. Whether this can be considered conclusive proof that Hooke designed the house is open to debate, however. One of the executors of Jones's will was Dean Tillotson, who six years earlier had hired his close friend Hooke to liaison between him and the joiner Davys for renovating the choir at Canterbury Cathedral.[863] Indeed on 30 March 1682, four and a half months before the Ramsbury visit, Davys had undertaken further work for him on the choir.[864] It is possible that Tillotson, to fulfill Jones's wishes that the contracts he signed with the craftsmen be honoured and the house be completed, asked Hooke and Davys to travel to Ramsbury to evaluate the work already done; indeed the undated 'Valluation of the Designe for the new house at Ramsbury' in the Townshend Archive was perhaps produced for this purpose. Lem and Avis may have been already working on the building by then or would become involved at a later date. These may explain why among Jones's papers at Raynham Hall "Robert Hooke's name appears once in the documentation, as one of the mourners in Sir William Jones's funeral procession."[865]

Further evidence given to corroborate Hooke's authorship of the design is somewhat more circumstantial. Considering the aforementioned diary entries regarding Hooke's visit to Ramsbury as sufficient evidence for attribution, Colvin has drawn attention to the considerable resemblance between the east and west facades of Ramsbury (**Figure IV-235**) and the pedimented blocks at Bethlehem Hospital (**Figure IV-236**).[866] However it should be noted that the design has as much, if not more, in common with Horseheath Hall in Cambridgeshire (**Figure 237**) built in 1663–1665 by Roger Pratt (1620–1685) who had indeed pioneered the so-called 'double pile' plan used at Ramsbury. An unsigned presentation drawing of a country house, now among the collections of Worcester College, Oxford (**Figure IV-238**), has been presented as additional evidence of Hooke's involvement.[867] The drawing is attributed to Hooke mostly based on stylistic grounds, as well as on its

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[862] Colvin, 'Hooke and Ramsbury', p. 193; Louw, 'New Light on Ramsbury Manor', p. 47.

[863] See section ii. 25 in this chapter.

[864] Sparks, 'The Refitting of the Quire of Canterbury Cathedral 1660–1716: Pictorial and Documentary Evidence', p. 180.

[865] Louw, 'New Light on Ramsbury Manor', p. 47.

[866] Colvin, 'Hooke and Ramsbury', p. 193.

[867] Walker, 'Architectus Ingenio', pp. 108-109. On the drawing attributed to Hooke (Figure IV-238), see also the annotations for Figure III-228 in Chapter III.

faint resemblance to Ramsbury manor. Indeed, it features the type of ogee dome favoured by Hooke, and bears the inscription 'Jones' on its verso, possibly referring to William Jones.[868]

Ramsbury manor has enjoyed a reputation as being one of the finest examples of the post-Restoration English country house, and for some, the evidence cited above is enough to credit Hooke with its design. Yet there are sufficient gaps to raise doubts and it may be more prudent, though admittedly unfashionable, to return to an earlier assessment made by Christopher Hussey, that the building might have been designed by a London builder, perhaps one who worked with Pratt, rather than an architect like John Webb or Hugh May or indeed Hooke.[869]

Ramsbury's last occupant, property developer Harry Hyams, died in 2015, reportedly leaving the house and his extensive art collection to the nation; it is expected that the house will be turned into a public museum.[870]

ii. 38. BOONE'S CHAPEL, LEWISHAM, LONDON [SPECULATIVE]

Attribution: Madeleine Adams, Charlie MacKeith, and Ian Mills, *Boone's Chapel: History in the Making* (London: Boone's Chapel Ltd, 2010), p. 30; Matthew Davies & Ann Saunders, *The History of the Merchant Taylors' Company* (Leeds, UK: Maney Publishing, 2004), p. 231 [as a possibility].

Brief description: A chapel, four almshouses, and a school built in 1682 in south London for Christopher Boone (1616–1686) have been attributed to Hooke.

Primary Sources: None suggesting a connection to Hooke.

Assessment:

In 1682, a chapel, along with four almshouses and a school, were built for Christopher Boone (1616–1686) in the parish of Lee in Kent, now the borough of Lewisham in south London. Boone was a commissioner of the East India Company and a member of the Merchant Taylors' Company, but

[868] Ironically, a pencil sketch of an alternative design for the lantern seems to replicate the one used in Horseheath Hall (Figure IV-237). The 'Jones' inscription is not in Hooke's hand, and it has been pointed out that it may equally be an erroneous attribution to Inigo Jones; see *Architecture and Illustrated Books*, p. 55.

[869] Christopher Hussey, 'Ramsbury Manor, Wiltshire - I', *Country Life* (1961), pp. 1376-1380, pp. 1379-1380; see also Hussey, 'Ramsbury Manor, Wiltshire - II'.

[870] Patrick Sawer and Sarah Limbrick, 'Centrepoint developer Harry Hyams leaves huge art collection to the nation in £487m will', *The Telegraph,* 13 Dec. 2015.

beyond these identifications, there is not a great deal of biographical information on him.[871] But thanks to John Evelyn (1620–1706), we at least know Boone was a man of expensive tastes. Recording in his diary three visits to Boone's estate, Lee Place, Evelyn noted its stylishness, the many curiosities from the East, carvings by Grinling Gibbons (1648–1721), and paintings by Robert Streeter (1621–1679).[872]

While there are no known records on the construction of the complex, according to one of Evelyn's diary entries, they were completed by July 1682. The almshouses provided for six elderly people as well as a schoolmistress who was tasked with teaching poor children how to read and write. The deed of the foundation is dated 22 June 1683 when, upon Boone's request, the Merchant Taylors' Company became trustees of the almshouses and school (**Figure IV-239**).[873] These were eventually demolished in 1877, but the chapel still stands and was restored as recently as 2008 (**Figure IV-240**).[874]

A small rectangular building of only 45 square meters, the chapel also housed the burial vault of Christopher and Mary Boone (1634–1722).[875] During the nineteenth century, the building was attributed to Wren, partly on account of his being an honorary freeman of the Merchant Taylors' Company where he would have met Boone. But, as it has been suggested, it may equally have been Evelyn's reference to Gibbons that encouraged local historians from that time to propose "the highest contemporary architectural pedigree for the chapel."[876] But considering the lack of any evidence connecting Wren to this building, Hooke has been suggested to be "at least as likely a candidate."[877] And in 2008, "the peculiar scroll key blocks to the elliptical windows and anecdotal evidence from

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[871] For the few details available on Boone's life, see Adams, MacKeith, and Mills, *Boone's Chapel*, p. 23.

[872] Davies and Saunders, *The History of the Merchant Taylors' Company*, p. 231; Adams, MacKeith, and Mills, *Boone's Chapel*, p. 26. On Boone, see ibid., p. 23.

[873] Davies and Saunders, *The History of the Merchant Taylors' Company*, p. 215.

[874] For general information on the Boone foundation, see 'Memorial CXX: Almshouses of Boones' Foundation (1686)', in *Memorials of the Guild of Merchant Taylors of the Fraternity of St. John the Baptist in the City of London*, ed. C. M. Clode (London: Harrison, 1875), pp. 377-389. For brief physical descriptions of the chapel and later almshouses, see Cherry and Pevsner, *London 2: South*, pp. 425-426; 'Lewisham', in *An Inventory of the Historical Monuments in London, Volume 5, East London* (London: His Majesty's Stationery Office, 1930), pp. 48-52, and list entry no. 1079981 in *The National Heritage List for England*. For a detailed description of the 2008 restoration, see Adams, MacKeith, and Mills, *Boone's Chapel*.

[875] The burial vault was rediscovered during the 2008 restoration; see Charlie MacKeith, 'Lewisham's Grade 1 Gem', *Cornerstone* 29 (2008), pp. 57-59, p. 59. The vault is also mentioned in James Elmes, *A Topographical Dictionary of London and Its Environs* (London: Whittaker, Treacher and Arnot, 1831), p. 72.

[876] Adams, MacKeith, and Mills, *Boone's Chapel*, p. 29.

[877] Davies and Saunders, *The History of the Merchant Taylors' Company*, p. 231.

diaries and other local buildings" were taken to "suggest that the chapel is the work of Robert Hooke."[878]

While all the authors repeat that their evidence is circumstantial and only 'suggest' an attribution to Hooke, it may be worth noting that the evidence is in fact less than circumstantial. One of the main reasons given for the attribution is the resemblance of some of the features of the building to those of the Greenwich gazebo attributed to Hooke by Beryl Platts (**Figures IV-100 to IV-102**).[879] There is no evidence that the gazebo is Hooke's work; this is especially noteworthy as some of the diaries have survived from this period and make no mention of the gazebo or indeed Boone's chapel. Another evidence offered is that the gazebo "was built for William Turner, son in law of Sir William Hooker and associate of Boone;" however, William Turner (1615–1693) died a bachelor, and there is no suggestion that anyone other than Hooker and his family lived at the Greenwich property.[880] Lastly, regarding the suggestion that a master builder would not have access to "the precise classical detailing of the modillions" because the architectural books these were illustrated in "were not widely available until the early eighteenth century," it should be noted that in fact book auctions taking place at London coffee-houses, not to mention the many booksellers around the city, enabled access to many architectural books printed locally or imported from abroad.[881]

Lack of evidence cannot be proof in itself, and indeed the diaries covering this period have some gaps, preventing a claim that the Boone's chapel is absolutely not by Hooke. But until other corroborating documents are found, it would be more prudent to avoid attributing this building to Hooke.

ii. 39. EASTON NESTON, NORTHAMPTONSHIRE [SPECULATIVE]

Attribution: Worsley, pp. 18-19.

Brief description: It has been suggested that Hooke may have designed the two wings at Easton Neston, Northamptonshire, for William Fermor in *c.* 1682–1686.

878 MacKeith, 'Lewisham's Grade 1 Gem', p. 57.

879 On the Greenwich gazebo, see ii. 12 in this chapter.

880 In any case, Hooke already knew Turner and would not have needed Hooker to connect.

881 Adams, MacKeith, and Mills, *Boone's Chapel*, p. 30. Literature on the book market in seventeenth-century London is quite extensive but a useful starting point, close to the topic and readily accessible, would be *RHBdb*.

Primary sources: Mostly coinciding with the gap in Hooke's extant diaries, there are no primary sources to corroborate this attribution.

Assessment:

In 1661, William Fermor (1648–1711) inherited Easton Neston from his father William Fermor (1621–1661), first baronet and royalist army officer. Perhaps, as suggested by Downes, it was the money brought in from his second marriage in 1682 that Fermor began rebuilding the house and gardens.[882] Construction seems to have progressed in several stages. The building of the wings (**Figure IV-241**) had begun in 1682 and by the middle of the 1680s, some work had also started on the house; the architect of these is unknown. Around 1686, upon advice from Wren, his wife's cousin, Fermor commissioned Hawksmoor to design the main house. Recalling his visit to Easton Neston, the latter wrote "The Body of the House has some virtues, but is not quite finished, the Wings are good for nothing." How much of the earlier design Hawksmoor retained is unknown but the house was largely completed in 1702, the date on the entablature.[883]

While there has been some suggestion that the earlier design of the house was Wren's, Hawksmoor's dismissal of the wings and his admiration for Wren, have been interpreted to mean they were not associated with the latter.[884] Pointing to a note regarding Easton Neston by John Grove, the carpenter who was involved in many of projects of the Office of Works, Worsley proposed "that the original design for rebuilding Easton Neston was made in the mid 1680s, with involvement from the Office of Works, but that for unclear reasons the scheme was abandoned after only the wings were built." Also finding stylistic similarities between the wings at Easton Weston and those at Montagu House and Ragley Hall, i.e. "single-storey wings with hipped roofs and dormers and single-bay pedimented centrepieces," Worsley concluded that "Hooke is the obvious candidate for the first scheme."[885]

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[882] 'Fermor, Sir William, first baronet (1621–1661)' and 'Fermor, William, Baron Leominster (1648–1711)' *ODNB*.

[883] The quote is from Hawkmoor's 1731 letter to Lord Carlisle, quoted in Kerry Downes, 'Hawksmoor's House at Easton Neston', *Architectural History* 30 (1987), pp. 50-76, p. 55. On Easton Weston, see Howard Colvin, 'Easton Neston Reconsidered', *Country Life* 148 (15 Oct. 1970), pp. 968-971; Downes, 'Hawksmoor's House at Easton Neston'. In 1691, Fermor purchased the famed Arundel Marbles to adorn his estate; they were eventually presented to the Ashmolean Museum in Oxford.

[884] Downes, 'Hawksmoor's House at Easton Neston', pp. 55-56; Worsley, p. 19. The south wing was demolished sometime before 1841.

[885] Worsley, p. 19. On the Montagu House and Ragley Hall, see ii. 19 and ii. 36 in this chapter.

If the wings were built *c.* 1682–1686, as implied in the secondary sources, only the first year-and-a-half of the project are covered by the extant diaries, and considering their extremely fragmented nature, they are not reliable as a source to corroborate or dismiss this claim. A drawing among Hooke's papers at Warwickshire C.R.O. (**Figure IV-242**), possibly in his hand, shows some similarities with the wings at Easton Neston, but it is obviously not connected to this project.[886] The attribution would need to be re-assessed with future discoveries of further primary sources.

ii. 40. ALMSHOUSES FOR SETH WARD, BUNTINGFORD, HERTFORDSHIRE [SPECULATIVE]

Attribution: Batten, p. 110; Colvin, *BDBA* (1978 and 1995); *NHLE*, list entry no. 1101350; all of these sources list the building as 'possibly' by Hooke.

Brief description: It has been speculated that Hooke may have been the architect of the almshouses built in 1684 for Seth Ward in Buntingford, Hertfordshire.

Primary Sources:

– Hooke's entries in *Diary i*:[887]
  - 22 Oct. 1673 (p. 66): "Designd Lord Sarums in the minorys 11s. 6d."
  - 15 Apr. 1674 (p. 96): "to Lord Sarum with carpenter."

– Hooke's entries in *Diary ii*:
  - 2 Apr. 1689 (p. 111): "H*arry* H*unt* returned and brought designe of Sarums almeshouses at Buntingford."[888]
  - 5 June 1689 (p. 126): "at Jon . . . Some of Seath Sarums mathemat. papers."

[886] This drawing is also reproduced as Figure III-339 for Chapter III.

[887] From the dozens of references to Ward in Hooke's diaries, only a few are included here. They regularly socialised, Hooke often dining at Ward's place, or they met within the context of the Royal Society, so often times only his name is mentioned without any further details. As Ward was the 'Lord bishop of Salisbury', the references vary between 'Lord Sarum', 'Lord Salisbury', 'Lord Bishop Sarum', 'Bishop Sarum', and sometimes just 'Sarum'. On Ward, see 'Ward, Seth (1617–1689)', *ODNB*.

[888] Ward had died a few months earlier on 6 January. During the last five years of his life, he suffered from senility.

Assessment:

Seth Ward (1617–1689), astronomer and bishop of Exeter and Salisbury (Sarum), supported multiple charitable causes.[889] In addition to establishing scholarships, in 1682 he founded the College of Matrons in Salisbury to house the widows of Orthodox clergymen, and in 1684 the almshouses in his hometown of Buntingford in Hertfordshire to provide for ten poor men (**Figure IV-243**).[890]

Hooke had known Ward since his Oxford years, when the latter was the Savilian Professor of Astronomy and a fellow of Wadham College. Their acquaintance continued in London via the Royal Society, and indeed Ward receives frequent mentions in the diaries. But while there are some indications Ward trusted Hooke's architectural abilities, there is no proof that he commissioned him for any of his charitable endeavours.[891] We can be fairly certain that Hooke was not involved in the College of Matrons as the project gets no mentions in the diaries during that period. But such certainty is more elusive in the case of the Buntingford almshouses as no diaries are extant between 16 May 1683 and 31 October 1688.

The only reason why the almshouses have been attributed to Hooke at all has been the 2 April 1689 Diary entry "H*arry* H*unt* returned and brought designe of Sarums almeshouses at Buntingford." But there may be another interpretation of it than Hunt bringing back Hooke's design drawing of the building. About two weeks before, on 18 March, Hooke had a meeting with the Haberdashers' Company which commissioned him to build Aske's almshouses (ii. 47 in this chapter) and Hooke may have known about Ward's building and wanted use it as an example. Hunt could have been visiting the region and produced a drawing of it on-site, or perhaps fetched the drawing from Ward's archives.

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889 On Ward's charities, see Walter Pope, *The life of the right reverend father in God Seth, Lord Bishop of Salisbury, and chancellor of the most noble order of the garter* (London: Printed for William Keblewhite . . . 1697), pp. 79-83.

890 For descriptions of the Buntingford almshouses, see Royal Commission on Historical Monuments (England), *An Inventory of the Historical Monuments of Hertfordshire* (London: His Majesty's Stationery Office, 1911), p. 140 and , *The Victoria History of the Counties of England, Hertfordshire* (London: Constable and Company Limited, 1914), vol. 4, p. 79. The date of the foundation is given in the commemorative inscription above the entrance door; a transcript of the text is available in Pope, *Life of the right reverend rather*, p. 82.

891 Ward did not escape getting on Hooke's ever irritable nerves; he was 'fals' (a favourite invective of Hooke's) on 3 Dec. 1675 (*Diary i*, p. 198) and "a Courtier" on 29 Dec. 1677 (*Diary i*, pp. 264-265). Nonetheless, Ward appears to have been ready to support Hooke's proposal for Chelsea College; on 12 May 1678 (p. 358) Hooke noted "I discoursd with Lord Sarum about my contrivance for Chelsey Colledge which he approved and promised £100;" see ii. 2 in this chapter.

Ward had died three months before and it is possible his papers were circulating, which may explain Hooke's entry a month later that he saw "Some of Seath Sarums mathemat. papers."[892]

Until Hooke's missing diaries are located or more drawings of his are recovered that directly connect him to the Buntingford almshouses, there is no evidence Hooke designed this building.

ii. 41. HOUSE FOR ROBERT SOUTHWELL, SPRING GARDENS, LONDON

Attribution: Colvin, *BDBA* (1978) and subsequent editions; Stephen Inwood, *The Man Who Knew Too Much: The Strange and Inventive Life of Robert Hooke, 1635–1703* (London: Pan Macmillan, 2003), p. 251, based on Colvin.

Brief description: In June 1684, Robert Southwell paid Hooke 5 guineas possibly for a house design in Spring Gardens, London.

Primary sources:

– British Library, Egerton MS 1633, diary of Philip Madox [entries listed in chronological order]:[893]
  - [fol. 69r] 22 Mar. & 30 Nov. 1679: "I received of Mr Bedford a quarter rent of the house in Spring Garden . . . £50-0-0."[894]
  - [fol. 88r] 4 Apr. 1684: "paid Mr. Muly, for his disbursments about the house with Mr. Frith £3-4-6."

[892] 5 June 1689, *Diary ii*, p. 126.

[893] Colvin noted his sources for the attribution as "a payment of 5 guineas to Hooke by Southwell on 17 June 1684, recorded in Thomas Thorpe's *Catalogue of Southwell MSS*., 1837, 296-7, [that] probably relates to this house, which was built by Richard Frith, B.L., Egerton MS. 1627, ff. 62v, 68;" Colvin, *BDBA* (2008), p. 536.

While his conclusions are discussed below, the couple of errors in his manuscript reference should be noted here. First, the manuscript number is in fact Egerton MS 1633; indeed, its description in the British Library online catalogue and the 'Eg. 1627' inscription on its front flyleaf, confusingly refer to MS 1627, but its current shelfmark, also noted on the spine of the binding, is MS 1633. The first folio number Colvin noted, i.e. 62v, is correct but the second one should be 86 instead of 68; the latter does not contain any information relevant to the house.

I was unable to locate a copy of Thorpe's catalogue of Southwell's manuscripts from 1837 to be able to double-check Colvin's other reference, nor was I able to find it in Thorpe's 1834 *Catalogus librorum manuscriptorum bibliothecae Southwellianae*, but the payment to Hooke is in fact noted in Egerton MS 1633, fol. 86. On Southwell's manuscripts, see William Poole, 'Robert Southwell's Manuscript Library' (unpub. work, 2007).

[894] Bedford is unidentified.

- [fol. 62v] 6 May 1684: "This night I sent Sr R Southwell the proposalls of Mr. Firth about his house in Spring Garden."
- [fol. 86r] 14 June 1684: "To 5 Guinnees p*aid* Mr Hooke — £05-8-4;" 15 Aug. 1684: "Sent [Southwell] Mr. Bedfords £50 by J. Sampson."
- [fol. 88v] 22 Oct. 1685: "Received of Sr W*illia*m Colt a quarter rent of the house in Spring Garden . . . £45-0-0"[895]

– *Calendar of Treasury Books: Preserved in the Public Record Office* (London: His Majesty's Stationery Office, 1904-1957):

- Vol. 4, 1672–1675, p. 111; entry for 15 April 1673:

> "Royal warrant to the Attorney or Solicitor General to prepare a grant of a lease to Sir Robert Southwell, for eleven years, of the house in Old Spring Garden, where he now lives as tenant to Sir William Morice, in reversion after the interest therein of said Sir William Morice and John and Nicholas his sons: all in view of said Southwell's expense in the ornament and conveniences of said habitation, and that his desire herein is principally that he may be near his duty in the King's service."

- Vol. 4, 1672–1675, pp. 662-663; entry for 27 Jan. 1675:

> "[Royal warrant to the Attorney or Solicitor General for a great seal] for a grant to Sir Robert Southwell of a lease of the house in Old Spring Garden . . . "

- Vol. 10, 1693–1696, p. 1243; entry for 21 Nov. 1695 (report from S. Travers, surveyor general):

> "it appears that by lease dated 1661, May 30, Charles II. granted to Secretary Sir William Morice (for 80 years terminable on the lives of John and William Morice) the messuage or mansion house with new buildings thereto lately added in the Old Spring Garden and the piece of land adjoining thereto. John and Nicholas Morice are both living and the lease has long since been assigned to Sir Robert Southwell, who by virtue thereof claims the waste ground behind Wallingford House, alleging it to be the same acre so granted in Morice's lease . . . "

[895] William Dutton Colt (*bap*. 1646, *d*. 1693), who was a member of the duke of Northumberland's court and was knighted on 26 Nov. 1684; see 'Colt, Sir William Dutton (bap. 1646, d. 1693)', *ODNB*. He made quarterly payments until February 1690 after when payments from a 'Mr Trussell' begin to be recorded.

Description:

In 1669, returning from a diplomatic mission to Portugal, Robert Southwell (1635–1702) rented a property in Spring Gardens. This area, just west of Charing Cross, had long ceased to be a garden, and being ideally located near Westminster, the Admiralty, and Whitehall palace, it was populated with politicians and officers (**Figures IV-244 and IV-245**). During the Parliamentary years, the house, lying on a lot to the east, had been in the possession of 'General Desborough' or John Disbrowe (*bap.* 1608, *d.* 1680), and there is a record of it undergoing £2,000-worth of renovations in 1656. With the Restoration, the property was granted to William Morice (1602–1676), who had been awarded for his loyalty to Charles II by being appointed secretary of state. Retiring to Devon in 1668, Morice rented the property to Southwell, though it appears with further diplomatic missions, the latter was not able to fully enjoy it until his return in 1672. A year later, he sought a 'reversion lease', to have the property assigned to him.[896]

According to Colvin, *c.* 1684 Southwell replaced the house with a new one built by Richard Frith, one of the speculative builders operating in London at the time. He further suggested that the 5-guinea payment Southwell made to Hooke on 17 June 1684 probably related to this house.[897] With no extant diaries from the period, it is difficult to corroborate this, but it is also difficult to reach Colvin's conclusions from the evidence. He based his attribution on two entries from the diary of Southwell's steward Philip Madox, now BL, Egerton MS 1633, which contains detailed information on Southwell's accounts.[898] On 6 May 1684, Madox recorded sending Southwell "the proposalls of Mr. Firth about his house in Spring Garden," and more than a month later, paid Hooke the said 5 guineas without specifying any further details. There is no corroborating evidence connecting these two pieces of information. Regarding Frith, a month before Madox sent the former's proposal to Southwell, money was paid to 'Mr. Muly', possibly an accountant or creditor, for disbursements he had made to Frith "about the house."[899] The amount may have been for preparing the proposal, perhaps a drawing or a model. It is noteworthy that a quick perusal of the rest of the manuscript did

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[896] 'Spring Gardens', in *Survey of London: Volume 20, St Martin-in-The-Fields, Pt III: Trafalgar Square and Neighbourhood*, ed. G. H. Gater and F. R. Hiorns (London: London County Council), pp. 58-65; *ODNB*; primary sources listed above.

[897] Colvin, *BDBA* (2008), p. 536. On Frith, see McKellar, *The Birth of Modern London: The Development and Design of the City 1660–1720*, *passim*.

[898] See note 893 regarding this manuscript reference.

[899] Madox noted other unrelated financial dealings with Muly.

not present any further entries regarding Frith or any construction work, although it is possible that the money was paid from another account. During this period, Madox was also recording incoming quarterly payments of £50 as rent for "the house in Spring Garden." This rental income is recorded throughout the diary, which spans *c.* 1679–1692, although the names of the tenants and the amount of payments change. Thus, obviously there were multiple houses on Southwell's Spring Gardens property, and some of them, according to a 1695 report by the surveyor general, had been "lately added:" Frith's work may have been for a house occupied and paid for by a tenant.[900]

Regarding the 5-guinea payment to Hooke, it may indeed have been for a drawing, though the project probably did not go any further than that considering Hooke was paid £100 for the earl of Oxford's house.[901] There a few references to Frith (or Firth) in Hooke's diaries, so he certainly knew him and may have simply liaisoned between him and Southwell. It is equally possible that Hooke was paid for some other consultancy work. From his later diaries and correspondence, we know that he helped Southwell with the flood defences at his Kings Weston property near Bristol; Southwell had acquired that property in 1679 and may have consulted Hooke on similar matters.[902]

ii. 42. BOUGHTON HOUSE, NORTHAMPTONSHIRE [SPECULATIVE]

Attribution: Worsley, pp. 13-14.

Brief description: It is speculated that in 1684–1689, Hooke may have designed the additions to Ralph Montagu's Boughton estate in Northamptonshire.

Primary sources: None to support this attribution, although part of the construction dates does coincide with one of the gaps in Hooke's extant diaries. The building accounts are not extant, although some evidence regarding the craftsmen who were hired can be extracted from the executors' accounts.[903]

Assessment:

As the eldest surviving son of Edward Montagu (1616–1684), second Baron Montagu of Boughton, in 1684, Ralph Montagu (*bap.* 1638, *d.* 1709) inherited the Boughton estate along with his father's title.

[900] For manuscript references, see above, under 'primary sources'.

[901] See ii. 27 in this chapter.

[902] See ii. 49 in this chapter.

[903] T. V. Murdoch, *Boughton House: The English Versailles* (London: Faber and Faber, 1992), p. 58.

He was in Paris at the time and would be detained there for another year due to political reasons, but once back in England, Montagu began remodelling his family seat in the 'style of Versailles'.[904]

He had commissioned Hooke to build the Montagu House at Bloomsbury in London. In 1686, a catastrophic fire had burnt it down, or at least caused great damage, and it was rebuilt although the architect of the second house has been a matter of debate.[905] Worsley, who attributed the second Montagu house, as well as Petworth House to Hooke, suggested that he may also have been the architect of the Boughton estate built around the same period. In addition to Hooke's connection to Montagu, he based this attribution to the French styling of the house and the craftsmen involved in the remodelling. Worsley drew parallels between the north wing of Boughton house and Louis le Vau's design for the garden facade of Versailles, which, Worsley noted, Montagu would have been familiar with from his ambassadorship to France. He also noted the presence of London craftsmen, such as the joiner Roger Davys and the plasterer Henry Doogood, with whom Hooke had worked in other projects.[906]

Worsley gave the construction dates of Boughton House as *c.* 1684–1689. Part of that period, from 1 November 1688, is in fact covered by the diaries which contain no references to Boughton or Montagu. Indeed, during this period there are only sporadic references to Roger Davys, and mentions of Henry Doogood begin only later in the diaries, on 19 December 1692.[907] If we are to heed James Lees-Milne's suggestion, quoted by Worsley, that "whoever rebuilt Montagu House after the fire was responsible" for Boughton House, we may need to briefly revisit the 'Pouget' issue.[908]

As already discussed above, with the second Montagu House, contemporary accounts credited the French architect 'Monsieur Pouget', who has remained an elusive figure to this day.[909] His identification as the sculptor and architect Pierre Puget (1620–1694) has been hastily rejected by

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[904] 'Montagu, Ralph, first duke of Montagu (*bap.* 1638, *d.* 1709)', *ODNB*. Most recent scholarly work on Boughton House is ibid.. See also John Cornforth, 'Boughton House, Northamptonshire I-III', *Country Life* 148 (1970), pp. 564-568, 624-628, 684-687; and 'Boughton House, Northamptonshire IV-V', *Country Life* 149 (1971), pp. 420-423, 476-480.

[905] See ii. 19 in this chapter.

[906] Worsley, p. 14.

[907] *Diary ii*, p. 198.

[908] Worsley, p. 13.

[909] See ii. 19 in this chapter.

several writers due to the latter's style being more ornate.[910] However, there are more similarities between Boughton House and Puget's unrealised design for 'la place Royale de Marseille' from 1686–1687 (**Figure IV-248**) than le Vau's design for Versailles; for instance, the four-cornered dome of the stable block at Boughton House (**Figure IV-249**) bears some resemblance to Puget's great arch of triumph (**Figure IV-248**).[911] This is not to suggest that Puget was in England directing the works at Boughton House—he may have provided drawings to be interpreted by local builders or sent an emissary to oversee the work.

But Puget's possible involvement aside, considering neither the building accounts nor Hooke's diaries from the period are extant, it is impossible to prove or disprove Hooke's involvement in Boughton House. Future discoveries of correspondence or other primary sources might one day shed light on this, but until then, there is no compelling reason to think Hooke had any involvement in the design of Boughton House.

ii. 43. LOWTHER [ST. MICHAEL'S] CHURCH, WESTMORLAND [SPECULATIVE]

Attribution: Batten, p. 105; Colvin, *BDBA* (1954) and subsequent editions.

Brief description: In 1679, Hooke provided a church design and estimate for 'Sir John Lowther'; this has been interpreted to be for the partial rebuilding of Lowther Church in Westmorland, for John Lowther, first Viscount Lonsdale.

Hooke's design is more likely to have been for a church in Whitehaven for John Lowther of Whitehaven.

Primary Sources:

– Hooke's entries in *Diary i*:[912]
  - 14 June 1677 (p. 295): "advisd Sir J. Lowther about plat"
  - 30 Jan. 1679 (p. 395): "gave Sir J. Louther a Designe of church and estimate."

[910] Murdoch, *Boughton House: The English Versailles*, p. 58; Stoesser, 'Robert Hooke's Montagu House', p. 178.

[911] Puget's design for Marseille was circular in plan, but the similarities can be discerned in the elevation drawing reproduced below. On Puget's architectural work, see Gloton and Gloton, 'Puget Architecte'.

[912] For a different interpretation of the same diary entries, see ii. 34 in this chapter on the church and port in Whitehaven, Cumbria.

- 7 July 1679 (p. 417): "Sir John Louthers designe at Jonathans."

– Hooke's entries in *Memoranda*:

- 10 Jan. 1681 (p. 145): "with Sir J[ohn] Louther at Jonathans about Key."
- 27 Oct. 1681 (p. 151): "Sir J[ohn] Louther vewd ground."

Assessment:

'Louther' and 'Lowther', sometimes bearing the prefix 'Sir J.', get frequent mentions in Hooke's diaries. It is unclear, however, whether the different spellings and configurations of the name are meant to differentiate between the two cousins sharing the same name: Sir John Lowther (*bap*. 1642, *d*. 1706), second Baronet of Whitehaven, and John Lowther, first Viscount Lonsdale (1655–1700), of Lowther.[913] John Lowther of Whitehaven, who spent most of his time in London and was an active fellow of the Royal Society since his election on 27 January 1664, was a proto-industrialist responsible for developing the first planned town in early modern England.[914] His cousin John Lowther of Lowther, who inherited the baronetcy and the family estates in 1675, was equally ambitious: he expanded his land holdings by purchasing further estates in Cumberland and Westmorland before starting an intensive building program in Lowther that included a new house, offices, gardens, and refurbishment of an existing Norman church. He, too, tried his hand in industry, building a textile manufacturing facility, which was later converted into a school when the endeavour failed. Lowther of Lowther was also elected to the Royal Society, but some thirty-five years after his cousin, at the end of 1699.

When interpreting mentions of Lowther's name in the diaries, at least in connection to the building projects, it has often been assumed that they referred to the younger cousin, Lowther of Lowther. This is most likely due to an understandable confusion between the two names. But if Hooke was using the name as referring to one person rather than differentiating between the two cousins, then it would be much more plausible for that person to be Lowther of Whitehaven.[915] Not only was

[913] On the Lowther family, see Owen, *The Lowther Family*; specifically, pp. 197-217 on Lowther of Lowther, and pp. 240-247 on Lowther of Whitehaven.

[914] On new urban developments in England during the seventeenth and eighteenth centuries, see Chalklin, 'The Making of Some New Towns, c. 1600–1720'; Millward, 'The Cumbrian Town Between 1600 and 1800'. On Whitehaven specifically, see the extended study in Collier and Pearson, *Whitehaven 1660–1800*.

[915] This possibility is briefly raised by Colvin in Colvin, Crook, and Friedman, *Architectural Drawings from Lowther Castle, Westmorland*, p. 9 however he quickly suggests Hooke may have designed churches for both family members. In their study of the town of Whitehaven, Collier and Pearson instead suggest, as I do here, that

Hooke in constant contact with him via the Royal Society, but the mention of a 'Key' in the 10 January 1681 diary entry further strengthens this possibility; in the early 1680s, a quay was indeed being built for the Whitehaven port.[916] Considering Whitehaven was being planned and built from scratch, and the fact that it utilised a grid plan which Hooke had based his proposal on for the post-fire reconstruction of London, it is also possible that on 14 June 1677, when Hooke was advising Lowther on a 'plat', he was looking at the town map.[917]

Until more primary sources are discovered, it will be impossible to know with acceptable certainty which 'Sir John Lowther' Hooke was referring to in the relevant diary entries. In case he was indeed advising Lowther of Lowther on St. Michael's Church, some general information about the building may be helpful for future research.

After a campaign of land purchases, Lowther had set out to build a new complex with a mansion, stables, offices, and gardens. Sometime before 1686, he also decided to refurbish the church that had been on the Lowther estate since at least 1280.[918] It is not too clear how extensive this refurbishment was; according to a 1777 description, Lowther "pulled down all or most of the church, and rebuilt it in a much better form," and in an 1813 reference, the building was said to have been "entirely rebuilt" and "finished with a dome and lanthern in the manner of St. Paul's, London."[919] A complete rebuilding seems almost implausible given it is said to have only cost £300 but the 1936 assessment of the building did determine that most of the exterior walls indeed dated to the seventeenth century (**Figure IV-251**).[920] While these made a "strange, baffling exterior" to art historian

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Hooke was more likely referring to Lowther of Whitehaven rather than Lowther of Lowther; see *Whitehaven 1660–1800*, pp. 34, 35, 39n67.

916 A decade later, Hooke would be helping the Southwells with the design of a quay for their King's Weston estate in Dorset; see correspondence no. 10 in Appendix II.

917 See ii. 1 in this chapter on Hooke's proposal for the reconstruction of London after the Great Fire.

918 John F. Curwen, 'Parishes (West Ward): St Michael, Lowther', in *The Later Records Relating To North Westmorland or the Barony of Appleby* (Kendal: Titus Wilson and Son, 1932), pp. 325-34, p. 325. Information in secondary sources is inconsistent but the reconstruction seems to have begun in 1682 and finished by 1686; see ibid.

919 Joseph Nicolson and Richard Burn, *The History and Antiquities of the Counties of Westmorland and Cumberland*, 2 vols. (London: Printed for W. Strahan, and T. Cadell, 1777), vol. 1, p. 440; Frederic Shoberl, 'Westmorland', in *The Beauties of England and Wales: or Original Delineations, Topographical, Historical, and Descriptive, of Each County* (London: Printed for J. Harris . . . , 1813), vol. 14, p. 127.

920 The £300 cost of the church was included in Lowther's 1697 estimate for the whole complex. For purposes of comparison, the main house cost around £6,460, the stables £1,500, the school £600, and the kitchen wing £300; see Howard Colvin, J. Mordaunt Crook, and Terry Friedman, 'Appendix A: The 1st

Nikolaus Pevsner's modern eyes, the building was positively assessed by the antiquary and Bishop of Carlisle, William Nicolson (1655–1727), who found but one deficiency: "not haveing yet a convenient place for the hanging up of a good large Bell." The cupola, it appears, was "too sleight a Building . . . hardly able to support its own Covering of Lead," let alone house a bell.[921] While there may have been attempts to strengthen it in the intervening time, the cupola was eventually removed a century later, probably in 1824 when the tower underwent extensive repairs and alterations.[922]

Views of the church with the dome and cupola "in the manner of St. Paul's" are preserved in Thomas Machell's drawing from shortly after 1686 **(Figure IV-250)**, and the 1819 series of sketches of the interior and exterior by the artist and architect John Buckler (1770–1851).[923] As Batten also notes, the drawing reproduced in *Diary i* as being somehow related to this church actually has nothing to do with it.[924] Currently among Hooke's papers at the British Library, that drawing (**Figure III-68**) is in fact an elevation of Peter Noorwits's New Church in The Hague.

If, as suggested, the refurbishment of St. Michael's Church took place between 1682 and 1686 (i.e. 3 to 7 years after Hooke presented his 'Designe of church and estimate' to Lowther, already presenting a timeline problem), it is reasonable to expect there to have been some mentions of the church in the diaries, which cover at least the period up to March 1683. However, closest is the October 1681 entry about Lowther viewing a ground, giving no further details. One of the reasons why this church was attributed to Hooke in spite of the timeline issues has no doubt been the existence of a drawing, previously thought to be in his hand, of an unrealised design for Lowther Hall (**Figure III-192**). That drawing has since been attributed to Edward Pearce (*c.* 1635–1695) instead, and there

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Viscount Londsdale's Expenses in Rebuilding Lowther Hall', in *Architectural Drawings from Lowther Castle, Westmorland* ([London]: Society of Architectural Historians of Great Britain, 1980), pp. 20-21.

'Lowther', in *An Inventory of the Historical Monuments in Westmorland* (London: His Majesty's Stationery Office, 1936), pp. 158-162; the accompanying plan indicating dates of construction is reproduced as Figure IV-251.

921 Hyde and Pevsner, *Cumbria: Cumberland, Westmorland, and Furness*, p. 272. In 1913, John Charles Cox was equally unimpressed with the new walls, commenting on how they "gave a stiff and somewhat repulsive appearance to the whole of the exterior church;" see 'Lowther (St. Michael)', in *County Churches: Cumberland and Westmorland* (London: George Allen & Company, Ltd., 1913), pp. 162-63, p. 162. Nicolson's favourable view is recorded in the 20 Aug. 1703 entry in *Miscellany Accounts of the Diocese of Carlile* . . . (London; Carlisle: George Bell & Sons; C. Thurnam & Sons, 1877), p. 69.

922 Samuel Lewis, *A Topographical Dictionary of England*, Second ed. (London: Samuel Lewis and Co., 1833), vol. 3, p. 182.

923 Buckler's sketches are now BL, Add. MS. 36390, fols. 145r-148v.

924 *Diary i*, pp. 395, 397; Batten, p. 105.

is no longer a compelling reason to consider Hooke's involvement.[925] The architectural drawings extant at Lowther Castle include designs for the house from William Talman (1650–1719).[926] Perhaps better known as the architect of Chatsworth House, Talman was the Comptroller of the Royal Works and intimately familiar with Wren's designs. It is plausible that Lowther, who nonetheless had some confidence in his own design capabilities, may have sought his, or indeed Pearce's, advice on the design of the Church roof and renovations.

ii. 44. PETWORTH HOUSE, SUSSEX [SPECULATIVE]

Attribution: Worsley, pp. 11-13.

Brief description: It has been suggested that Hooke may have been the architect of Petworth House in Sussex, built for the Duke and Duchess of Somerset in 1688–1691.

Primary sources: Despite the period of construction coinciding with some of Hooke's extant diaries, they contain no mentions of Petworth House or the Duke and Duchess of Somerset. Furthermore, there appear to be no other primary sources to corroborate this attribution.

Assessment:

In 2004, Giles Worsley proposed Hooke as the architect of Petworth House in Sussex.[927] Formerly the principal seat of the earls of Northumberland, the estate had been inherited by Ralph Montagu's step-daughter Elizabeth (1667–1722), the sole heir of Joceline Percy (1644–1670), eleventh earl of Northumberland.[928] The wealthiest and most sought-after heiresses in England, and twice-widowed from two short marriages, in 1682, she married Charles Seymour (1662–1748), the sixth Duke of Somerset.[929]

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[925] See the annotations for Figure III-192 in Chapter III. Considering the similarities in their draughting styles, other drawings previously attributed to Hooke are now considered to be in Pearce's hand; see Figures III-164, III-192, III-216, III-334, III-335.

[926] Colvin, Crook, and Friedman, *Architectural Drawings from Lowther Castle, Westmorland*.

[927] Worsley, pp. 11-13.

[928] The Percy family also had a London residence at Charing Cross, the Northumberland House, which Hooke noted visiting a few times in the mid-1670s.

[929] Both would become influential courtiers and politicians, and Seymour would also serve as chancellor of the University of Cambridge from 1689 until his death; see 'Seymour, Elizabeth, duchess of Somerset (1667–1722)', and 'Seymour, Charles, sixth duke of Somerset (1662–1748)', *ODNB*.

While they had commissioned some interior work in 1686, the Somersets began a more comprehensive project of rebuilding Petworth House sometime around 1688 when Elizabeth came of age and gained access to her inheritance. The earliest primary evidence for the west front appears to be a payment in the winter of 1689–1690 to Samuel Foulkes, the master mason supervising the work. The extant craftsmen's bills show that work continued into 1693 but most of the money was spent in 1689–1691.[930] Despite the plethora of documentary evidence of the construction, however, the designer of Petworth House has remained a mystery.[931]

Worsley gave several justifications for crediting Hooke with the design of the house. After building his case for attributing the second Montagu House, built after the 1686 fire, to Hooke, he suggested that when it came to rebuilding Petworth House, the Somersets would have naturally sought advice from Elizabeth's step-father, Montagu, "a man of sophistication and understanding of French culture, with the practical experience of building three large and fashionable houses," and that "it would have been logical for them to use the services of his architect [Hooke], who had immense practical experience and intimate relations with the country's leading craftsmen."[932] He pointed out that Foulkes, and other craftsmen who worked at Petworth were associated with Wren and Hooke, and indeed Edward Dee, the bricklayer, John Hunt, the glazier, Grinling Gibbons, the sculptor, and John Scarborough, the surveyor, have been found to be connected to the King's Office of Works in London. Scarborough's name in particular has appeared in several of Hooke's projects, including the Bethlem Hospital, the Montagu House, and de Vere's (Lord Oxford's) House.[933] Worsley also noted

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[930] Worsley, p. 12; Gervase Jackson-Stops, *The Country House in Perspective* (London: Pavilion Books Ltd., 1990), p. 72. Sources on Petworth House include Kerry Downes, *English Baroque Architecture* (London: A. Zwemmer Ltd., 1966), p. 59; James Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto: The Hamlyn Publishing Group Limited, 1970), pp. 47-59; Harris, *Artist and the Country House*, pp. 84-85; Geoffrey Beard, *Craftsmen and Interior Decoration in England, 1660–1820* (London: Bloomsbury Books, 1986), pp. 138-39; and Jackson-Stops, *The Country House in Perspective*, pp. 68-79.

[931] The account rolls of Petworth House between 1689 and 1695, inclusive, have survived and are among the Egremont Archives at West Sussex C. R. O.; see Beard, *Craftsmen and Interior Decoration*, p. 139n69.

[932] See section X on the Montagu House.

[933] Worsley, p. 12; Lees-Milne, *English Country Houses: Baroque, 1685–1715*, p. 49; Jackson-Stops, *The Country House in Perspective*, pp. 71-72. Worsley has also pointed out that Elizabeth had been brought up in Montagu's household but this does not appear to have been the case as according to the *ODNB*, when her mother married Montagu in 1673, Elizabeth was sent to Petworth to be brought up by her grandmother, dowager countess Elizabeth; see 'Seymour, Elizabeth, duchess of Somerset (1667–1722)', *ODNB*. Nonetheless, her wedding ceremony to Seymour is noted to have taken place at Montagu House; Lees-Milne, *English Country Houses: Baroque, 1685–1715*, p. 49.

the stylistic similarities between the western facade of Petworth *c.* 1695 (**Figure IV-252**) and the north elevation of the second Montagu House (**Figure IV-156**), drawing attention to the French influence, in particular to the four-sided domes over the centre and the balustraded mansard roofs.

Stylistic similarities are often unreliable for attributions, and in this particular case doubly so, as anecdotal evidence suggests that the similarity between the Petworth and Montagu Houses was very much intentional. In the 'Memoirs of the late Duke of Montague', published in 1709, it was noted that "[Montagu] House is so much and so justly admir'd for its Beauty, that his Grace the Duke of Somerset has thought fit to make it very much the Pattern of his House, lately built at Pettworth in the County of Sussex."[934] Thus it is possible the Duke of Somerset either literally used some of the drawings for Montagu House, or hired craftsmen with experience in the relevant building techniques. It has been pointed out that, a few years before Petworth House, Foulkes and Scarborough had worked on the construction of Winchester Palace (1683–1685) for which Wren had produced a drawing with a four-sided dome (**Figure IV–253**).[935] Indeed while the Montagu House may have been an early adaptation of the French style, it is possible that the source of this was Montagu rather than Hooke. Ambassador to Louis XIV, Montagu had a particular appreciation of French architecture, especially the Versailles, so while he may have indeed given architectural advice to his daughter-in-law, he might not have felt a need for Hooke's involvement.

Harris and Jackson-Stops suggest another candidate for the designer: Daniel Marot. Although Marot mainly lived in Holland, Harris proposed that, as was the case with Chéron at Chatsworth, Marot "may have left some painted design for the house," which would have been built under the supervision of a clerk of works or architect from the Office of Works in London.[936] Strengthening this possibility, Jackson-Stops has noted a £20 payment made to "Mr. Maro" in 1693 as well as proof of his visit to the house sometime in 1690 or 1693.[937]

This is another case where it is impossible to categorically rule out Hooke's involvement in a project. But considering the lack of any references to Petworth or the Somersets, or indeed Montagu in Hooke's later diaries, the lack of any references to Hooke in the Petworth accounts, and the fact

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[934] 'Memoirs of the late Duke of Montague', p. 81. I have not been able to trace the origin of the reference to the Duke of Somerset.

[935] Beard, *Craftsmen and Interior Decoration*, p. 139n71; Lees-Milne, *English Country Houses: Baroque, 1685–1715*, pp. 50-52.

[936] Harris, *Artist and the Country House*, p. 85.

[937] Jackson-Stops, *The Country House in Perspective*, p. 74.

that the Somersets pursued a design similar to the Montagu house, rather than it being brought by the architect, it is unlikely that Hooke was engaged in the project.

ii. 45. HOUSE FOR [EDWARD?] GOULD, HIGHGATE, LONDON

Attribution: Stephen Inwood, *The Man Who Knew Too Much: The Strange and Inventive Life of Robert Hooke, 1635–1703* (London: Pan Macmillan, 2003), p. 388.

Brief description: In 1689, Hooke designed a house for a 'Mr. Gould', perhaps Edward Gould, at Highgate in London.

Primary sources:

– Hooke's entries in *Diary ii*:
- 27 Mar. 1689 (p. 109): "one Mr Gold from Dr Sherlock[938] about his house at Highgate."
- 28 Mar. 1689 (p. 110): "Gould cal'd to goe with him to Highgate."
- 30 Mar. 1689 (p. 110): "With Gould to Highgate."
- 3 Apr. 1689 (p. 111): "At Jon. Gould & a french Writing master &c: noe news."
- 4 Apr. 1689 (p. 111): "Gold and Abram."
- 13 Apr. 1689 (p. 113): "Calcut939 with me about Golds building."
- 29 Apr. 1689 (p. 117): "Goulds frenchman."
- 30 Apr. 1689 (p. 117): "At Jon. Gould, Mr Hensh[aw] & Dr [blank] till $3\frac{1}{2}$h."
- 2 May 1689 (p. 118): "At Jon. Goulds frenchman."
- 6 May 1689 (p. 119): "With Gold to his wife in Gracech[urch] Street."
- 8 May 1689 (p. 119): "At Jon. Gould about his house."
- 13 May 1689 (p. 120): "Caltrop here about Gould."
- 16 May 1689 (pp. 121-122): "Made Draught for Gold, Highgate . . . Gold and Calcut at Jon."
- 17 May 1689 (p. 122): "Gold here to see his Draught . . . finisht house dra[ught] . . . Gold and Calcut appointed to call on Munday [blank]."
- 20 May 1689 (p. 122): "Gould neither came nor sent."
- 1 June 1689 (p. 125): "At Jon. Gold and his wife. about module."

[938] William Sherlock, as identified by Gunther in *Diary ii*, p. 184n3.

[939] On 5 June 1678 Hooke recorded that he "Gave to Robert Calcut our awards about Jenner and Tomplers" (*Diary i*, p. 361), but there is no further detail to illuminate his identity.

- 6 Sep. 1689 (p. 146): "Goulds French Spy."

Description:

In March 1689, Hooke was approached by a Mr. Gould (or Gold) for his house at Highgate in north London.[940] In the diary entries Hooke does not give a first name, making it difficult to properly identify him, but he was apparently sent by a shared acquaintance, William Sherlock (1639/40–1707), the Church of England clergyman, who was also the master of the Temple.[941] Sherlock would have known Henry Gould (1643/4–1710), a judge and member of the Middle Temple, who was made a bencher of his inn on 7 February 1689, shortly before Hooke was approached.[942] There was also the physician William Gould (1654–1714), a fellow of Wadham College, Oxford, but he had been elected fellow of the Royal Society in 1683, so Hooke would presumably have already known him without the need for Sherlock's introductions.[943] A third and perhaps strongest candidate is the London merchant Edward Gould (*d.* 1728), whose wife Elizabeth Gower (*d.* 1713) had inherited a Highgate property in December 1688. These houses, at nos. 17, 19, and 21 High Street, were rebuilt in 1733, and there is no information on the structures they replaced, nor sufficient detail on Edward's life to be able to connect him to Sherlock or Hooke.[944]

The initial meeting was followed by a site visit and several discussions, some of which were held at Jonathan's coffee house, with Gould sometimes accompanied by an unidentified French writing master. In May, Hooke prepared a draught, which he made adjustments to after a meeting with Gould, and a few weeks later met with him and his wife to discuss the model. There are no more entries regarding the project and Hooke records no payment for his efforts. Some bitterness on

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[940] Inwood did not identify Gould, only noting that he and his wife had approached Hooke to design a house at Highgate; *Man Who Knew Too Much*, p. 388.

[941] 'Sherlock, William (1639/40–1707)', *ODNB*.

[942] 'Gould, Sir Henry (1643/4–1710)', *ODNB*. "Jon." preceding Gould's name denotes their meeting place, i.e. Jonathan's coffee house, rather than his first name.

[943] In any case, he was probably still based in Oxford at this time as he was not admitted a candidate fellow of the Royal College of Physicians until 1691. On William Gould, who is not in *ODNB*, see Robert Barlow Gardiner, *The Registers of Wadham College, Oxford. (Part I.) From 1613 to 1719* (London: George Bell and Sons, 1889), p. 292; Hunter, 'The Social Basis and Changing Fortunes of an Early Scientific Institution: An Analysis of the Membership of the Royal Society, 1660–1685', p. 112; William Munk, *The Roll of the Royal College of Physicians of London* (London: The College, 1878), vol. 1, p. 495.

[944] 'Nos 17, 19 and 21 High Street (The Gould Charity Estate)', in *Survey of London: Volume 17, the Parish of St Pancras Part 1: the Village of Highgate*, ed. Percy Lovell and William McB. Marcham (London: London County Council, 1936), p. 20.

Hooke's part does come through in his mention of seeing 'Gould's French spy' a few months later, so it is likely the house was never built or if it was, not with Hooke's blessing.

ii. 46. HOUSE FOR RICHARD VAUGHAN AT SHENFIELD PLACE, BRENTWOOD, ESSEX

Attributions: Batten, p. 111; Colvin, *BDBA* (1954) and subsequent editions; James Bettley and Nikolaus Pevsner, Essex (New Haven, CT: Yale University Press, 2007), p. 684; *NHLE*, list entry no. 1297232.

Brief description: Hooke built a house at Shenfield in Brentwood, Essex, for Richard Vaughan in 1689.

Primary Sources:

– Hooke's entries in *Diary ii*:
- 1 June 1689 (p. 125): "Esqre Vaughan of Essex from Mr Green about his house."
- 2 June 1689 (p. 126): "Esqr. Vaughan here; to goe with him to morrow morn at 6."
- 3 June 1689 (p. 126): "H*enry* H*unt* and I with Vaughan in Coach and 4 horses to Burntwood,[945] thence to his Seat and Sr William Applebys[946] house . . . R[eceiv]d [1 Gold sovereign]; returnd at $4\frac{1}{2}$."
- 5 June 1689 (p. 126): "Vaughan here: d[eliver]d him a draught for a house 40 foot square."
- 15 June 1689 (p. 129): "Vaughans Goodwin here about the building."
- 17 June 1689 (p. 129): "At Tompions. Jon. Gof, Lod, Cur, Spencer; Vaughan about house."
- 27 June 1689 (p. 132): "At Jon. Vaughan Gave him a Schetz[947] of his front"
- 4 July 1689 (p. 133): "At Jon. Sr W. Apleby & Mr Vaughan. With Goodwin & his other carpenter and a joyner. Recd from him 20s."
- 7 July 1689 (p. 134): "At Jon. o. Vaughan his wife and sister."
- 1 Aug. 1689 (p. 139): "Drew Vaughans Vpright [Gunther: "Upright, probably a drawing of the elevation of Vaughan's house."]
- 2 Aug. 1689 (p. 140): "Gave young Appleton Vaughans Vpright"
- 17 Sep. 1689 (p. 149): "Vaughans carpenters."

[945] Brentwood.
[946] Sir William Appleton, Vaughan's father-in-law.
[947] Probably 'sketch'.

- 3 Oct. 1689 (p. 153): "At Jon. Mr Vaughan returnd out of Wales."
- 9 Oct. 1689 (p. 155): "Letter from Vaughan by Lingar."
- 23 Oct. 1689 (p. 159): "At Jona. Esqr Vaughan . . . Designd 2d floor for Vaugh."
- 24 Oct. 1689 (p. 159): "Stayd for Esqr Vaughan at Jon. till 9. Left his draughts with Lingar."
- 26 Oct. 1689 (p. 160): "Goodwin from Vaughan about little stairs: advised winders."
- 14 Nov. 1689 (p. 164): Linger alterd Vaughans house."
- 2 Jan. 1690 (p. 176): "At Jon . . . Mr Vaughan about his court."
- 1 Feb. 1690 (p. 184): "Letter from Vaughan for Measurer."
- 6 Feb. 1690 (p. 185): "At Jon. Jed. and Linger about Vaughan."
- 10 Feb. 1690 (p. 186): "At Jon. Pif, Lingar told of Esquire Vaughan robbd of 500[£]."

Description:

On 1 June 1689, the eldest son of Sir Edward Vaughan of Terracoyd [Torcoed, Wales], Richard Vaughan (*d.* 1728) approached Hooke to design a house for him. Vaughan had just recently married his second wife Elizabeth, daughter and co-heir of Sir William Appleton, Bart. of Shenfield, and presumably wanted to set up a new home at Shenfield in Brentwood, Essex.[948]

In remarkable speed, Hooke visited the site and delivered "a draught for a house 40 foot square" within four days. He continued to develop the design, meeting with Vaughan and his father-in-law, and at least in one occasion his wife and sister, at Jonathan's coffee house to discuss the building. In the coming months, he continued to produce draughts of the elevations and the second floor, meeting with the client as well as his agents, perhaps those in charge of the construction back at Shenfield. The last mention of Vaughan is on 10 February 1690, and with the gap in the diary between 10 March 1690 and 5 December 1692, there are no further details about the project.

Colvin has identified Vaughan's house as 'Old Shenfield Place', which still exists though in a radically altered form.[949] It is currently used as a care home (**Figure IV-254**).

[948] John Burke and John Bernard Burkey, *A Genealogical and Heraldic Dictionary of the Landed Gentry of Great Britain & Ireland.* (London: Henry Colburn, 1846), vol. 2, p. 1533.

[949] For descriptions of the current building, see *NHLE*, list entry no. 1297232; James Bettley and Nikolaus Pevsner, *Essex* (New Haven, CT: Yale University Press, 2007), p. 684.

ii. 47. ASKE'S ALMSHOUSES [OR HOSPITAL], HOXTON, LONDON

Attributions: Batten, pp. 103-104; Colvin, *BDBA* (1954) and subsequent editions; Waller, p. xxv.

Brief description: In 1691, Hooke was hired by the Haberdashers' Company to build almshouses in Hoxton with Robert Aske's bequest. The construction started at the end of 1691, and the first pensioners entered in 1695.

Primary Sources:

– Hooke's entries in *Diary ii*:
- 18 Mar. 1689 (p. 107): "Sr P. Daniel, Sr Th. Vernon, Dep. Smith &c to dine with the Haberdashers at Romer. I was with them at 4 till 6. Dr Tillots., Dr Sharp, Dr Scot, Sr J. Laurence, Sr P. Dan., Sr T. Vernon about new Hospitall."
- 18 Apr. 1689 (p. 114): "With Sr Tho. Vernon, Mr Bodington, Mr Bauden, Chancey, Cap. [blank] to Haggerston Kingsland Islington to view ground for Almeshouse."
- 28 May 1689 (p. 132): "With Haberdashers to view Haws [Hoxton] his ground."
- 7 Feb. 1690 (p. 185): "At Haberdashers hall 4 Wardens and Cap. Mould: I shewd my designe, desird Hogsden [Hoxton] ground."
- 20 Dec. 1692 (p. 198): "At Hoxton: Jones; both gable ends brickd up without order; also a flat about cupola, Lucern lights backward: Iron cramps etc without reason, salt mouldring stone: Plumber laying high gutters, bricklayers tiling front etc: all without my order. Spake with Sr R. Levet: he shamd me off."
- 24 Dec. 1692 (p. 200): "Michaell for module; I bid him send Housman."
- 2 Jan. 1693 (p. 202): "At Chancys [spake?] about slating, and desird me to be at Com[mit]tee Wensday at 3 p.p."
- 7 Jan. 1693 (p. 203): "At Jon. Sr R. Levet and Chancy order that all front be coverd with slate."
- 9 Jan. 1693 (p. 204): "Jones and Michal here, I bid them put the slates on the middle front at Hoxton."
- 10 Jan. 1693 (p. 204): "Then to Mr Chancy advised about bills, measures, estimates etc."
- 11 Jan. 1693 (p. 204): "Housman and Michael fetcht away Hospitall module."
- 19 Jan. 1693 (p. 207): "At Chancys, with Allen about carpenter and bricklayers bill: things more calm."
- 6 Feb. 1693 (p. 212): "I gave Mich. direction about Hoxton Vallys."

- 9 Feb. 1693 (p. 213): "One Vaughan complaining of injury done him by Hoxton sewer etc."
- 10 Feb. 1693 (p. 213): "to Chancy, Allen and Mould to coffe house in Freemans Yard: with them to Hoxton to view and measure."
- 22 Feb. 1693 (p. 216): "with Chancy, Allen and Mould to Hoxton."
- 24 Feb. 1693 (p. 217): "Chancy and Allen here, they went to Hoxton . . . Chancy, Pif calld to tell me nothing was done at Hoxton meeting."
- 25 Feb. 1693 (pp. 217-218): "At Jon. Michael, Cox plumber, I directed him 7 lb per foot pedaments, and sent him to Chancy for orders: Diton about Slate I sent him to Mou[l]d. J. Hayward about his bills: next week."
- 2 Mar. 1693 (p. 218): "Chancy calld, 20 Rod lesse then bills."
- 3 Mar. 1693 (p. 219): "Chancys at 10 about Bricklayer measures: excused my not coming pp. Chancy promisd to move for my mony . . . story about Ask etc."
- 6 Mar. 1693 (p. 219): "An order from Haberdashers committee for covering pedaments with lead."
- 27 Mar. 1693 (p. 225): "To Hoxton: Chancy, Allen, Watts viewd and valued Brickwork. Dined there. Mould, Staply, Web and Nicols: Mr Pitfeild here at 5: then met Chancy, Allen, Watts at Jon. with Nicols, where they cast up Bills, Nicoll asserted that the usuall prise for Rubbd and Gaged work was 8d per foot and that he would doe it soe. He sayd that 6[lb?] per Rod running was allowed for the sewer in Fenchurch Street, all works included; it is above 6 foot high."
- 28 Mar. 1693 (p. 225): "I left Hales Bill Contract and Michaels weights with M Chancy."
- 1 Apr. 1693 (p. 227): "Walk with Gof to Hoxton: Statue too small: direct for water pipes."
- 11 Apr. 1693 (p. 230): "With Pif to view house at Hoxton: Parker and another."
- 17 Apr. 1693 (p. 232): "Jones for Inscript. [for the statue]"
- 22 Apr. 1693 (p. 233): "At Jon. Chancy and Allen about inscrip[tion for statue of Aske]."
- 26 Apr. 1693 (p. 234): "At Haberdashers' Hall: Chancy, Sr T. Vernon, P. Daniell, R. Levet, Steel, Barron, Littleberry, Allen, Farindon etc. wranglings."
- 13 May 1693 (p. 239): "I gave Jones the inscript for Ask Stat[ue]."
- 15 May 1693 (p. 240): "With Chancy about Hab[erdashers] accounts: in lower cellar."
- 10 July 1693 (p. 257): "at Jonathans Gof, Spen, Cur, Pif: heard Mr Aske was broke [? his statue]."
- 17 July 1693 (p. 259): "With Gof and Cox plumber to Hoxton: directed pipes and covering the flatt."

– British Library, MS Sloane 1039, fol. 131: Letter from Hooke to Richard Levett, 20 June 1691 (transcribed in the Appendix, i. 9, in Volume 2).

– Guildhall Library, MSS 15845 and 15886: Archival collections of the Haberdashers' Company.

Description:

One of the twelve great livery companies in London, the Haberdashers' Company was first incorporated in 1447 during Henry VI's reign.[950] Originally called the 'Hurrers and Milliners', they were initially a branch of the Mercers' Company, dealing in merceries or small wares; but they eventually separated, and further parted ways with the Haberdashers of Hats (milliners), and dealt only in ribbons, laces, and other small wares.[951]

Robert Aske (1619–1689), a silk merchant who had been a freeman of the Company since 1643 and served as its master in 1684, bequeathed in his will the sizeable sum of £20,000 for the building of almshouses to accommodate twenty poor single freemen of the Haberdashers' Company, and to provide education for twenty boys, sons of freemen. When he died in January 1689, his executors immediately set out to realise his will. One of them was John Tillotson, by then the Archbishop of Canterbury, who knew Hooke quite well through the Royal Society and who had in fact sought Hooke's help with the installation of new panelling in the choir of Canterbury Cathedral more than a decade before.[952] Tillotson recommended Hooke, who was subsequently commissioned with the work.

As it can be discerned from the diary entries, Hooke was involved in the project from its very inception. For the site, he insisted on the open fields of Hoxton, north of London, and his orientation of the building to face a piazza is reminiscent of his design for Bethlem Hospital built at Moorfields (e.g. compare Figure IV-255 to Figure IV-112). Once the charity was established via a private Act of Parliament, the land was purchased for £2,000, and Hooke prepared his design which he presented on 7 February 1690 to the Haberdashers' committee.[953]

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[950] The 'Twelve Great Livery Companies of London' are (in order) Mercers, Grocers, Drapers, Fishmongers, Goldsmiths, Skinners, Merchant Taylors, Haberdashers, Salters, Ironmongers, Vintners, Clothworkers. The first 93 of the current list of companies are listed in 'Appendix I: Livery Companies in Order of Precedence' in I. G. Doolittle, *The City of London and Its Livery Companies* (Dorchester, Dorset: Gavin Press, 1982), pp. 171-172; the updated list now includes 110 companies and can be found at Livery Committee of the City of London, 'List of Livery Companies by Precedence', https://goo.gl/AWu2RU.

[951] William Herbert, *History of the Twelve Great Livery Companies of London* (London: Published by the Author; and to be Had of Him, at the Library, Guildhall, and of all the Principal Booksellers, 1836), p. 533.

[952] See ii. 25 in this chapter.

[953] Hooke's drawings are not extant. Writing in 1915, O'Donogue noted that "The Haberdashers' Company still preserve the pasteboard model which Hooke made for their almshouses," but it appears to have

With a nearly three-year gap in the diary between 10 March 1690 and 5 December 1692, many of the details are missing, but when it picks up again, there are plenty of entries giving clues about the progress of the project. A number of these reveal Hooke fighting the perennial battles between architects and contractors as we find him complaining about his orders not being followed, or closely examining bills and bargaining down prices. A letter extant among Hooke's papers gives further insight into his travails with contractors. Dated 20 June 1691 and addressed to the then master of the Haberdasher's Company, Richard Levett (*d.* 1711), who was overseeing the project, in his letter Hooke complained about Banks, one of the carpenters, who had refused to sign a contract, and worried that it was a strategy to increase the costs and use lower quality materials. In order to prevent any delays to the work, he suggested signing a contract, presumably a disingenuous one, with another carpenter to force Banks to comply. The letter is also significant as it illustrates how some design decisions were dictated not by visual concerns but by the availability of materials and scheduling issues. Explaining that the masons were unable to procure stones for forty columns in less than two months, Hooke suggested using pilasters and arches of 'rubbed and gaged brickwork' instead.[954] The building has since been demolished, replaced in 1825 by a new school designed by David Riddel Roper, and the available illustrations are not detailed enough to be able to differentiate between stones and bricks (**Figures**

since perished; O'Donoghue, *The Story of Bethlehem Hospital from its Foundation in 1247*, p. 400. For the selection and purchase of the Hoxton site, see Ian W. Archer, *The History of the Haberdashers' Company* (Chichester, Sussex: Phillimore & Co. Ltd., 1991), pp. 104, 106. On Bethlem Hospital, see ii. 16 in this chapter.

A contemporary account of the almshouses can be found in John Strype, *A survey of the cities of London and Westminster: containing the original, antiquity, increase, modern estate and government of those cities. Written at first in the year MDXCVIII by John Stow, citizen and native of London. Since reprinted and augmented by the author; and afterwards by A. M. H. D. and others* . . . (London: Printed for A. Churchill, J. Knapton, R. Knaplock . . . , 1720), vol. 1, pp. 212-213. For a detailed history, see J. R. Meredith, 'The Foundation and Early History of Aske's Hoxton Hospital, 1689–1755' (unpub. M.A. diss., University of Birmingham, 1964); a more readily-available source is 'Haberdashers' Aske's Schools', in *The Victoria History of the County of Middlesex*, ed. J. S. Cockburn, H. P. F. King, and K. G. T. McDonnell (London: Oxford University Press for the Institute of Historical Research, 1969), pp. 296-297.

954 'Rubbed and gaged brickwork' was a technique developed in the seventeenth century where sculptural elements were carved into the brick, especially in window heads; see James W. P. Campbell, *Brick: A World History* (New York: Thames & Hudson, 2003), p. 190. Hooke had been interested in the technique since the 1670s. Edward Helder, a master bricklayer who particularly excelled in gauged brick, received many mentions in Hooke's diaries. On 23 Sep. 1675, Hooke noted visiting Helder's house where he reportedly displayed his work, an example of which is among the collections of the Victoria and Albert Museum in London; see Gerard Lynch, *The History of Gauged Brickwork: Consevation, Repair and Modern Application* (Burlington, MA: Elsevier/Butterworth-Heinemann, 2007), pp. 148-149.

IV-255 to IV-260), but considering Hooke was discussing the price of rubbed and gaged bricks with the bricklayer Nicols in 1693, Levett must have accepted this compromise.[955]

The problems with the contractors seem to have eventually caused friction between the Haberdashers' Company and Hooke. While they seem to have had an overall good relationship at the beginning, four years into the project, at least one meeting would end in "wranglings."[956] It was perhaps around this time that Hooke began to be blamed for the project far exceeding his initial estimate. The justifications he gave to his friend and biographer, Richard Waller, would sound familiar to any architect today: additions and alterations to the first design, coupled by his "not procuring and agreeing with the Workmen himself" had caused the costs to increase, but had he been allowed to negotiate with the workers directly, "it should have come to little or no more than his first propos'd Sum."[957] Hooke may have been justified in his argument but the final cost of £11,787-6-7, more than half of the bequest, was a staggering sum for a charity building. The Company contested some of the bills, abandoned the cupola (**Figure IV-259**), and left the northern end of the building incomplete.[958] Despite all the complications and the sour relationship at the end, the building was held in high esteem by its contemporaries. In 1708, it was described as "a sumptuous Edifice built of Brick and Stone, with a Piazza in the Front . . . [and] an Ambulatory 340 Foot in le*ngth* constituted by . . . stone Columns of the Tuscan Order," with a middle section "adorned with Columns, Entablature and Pediment of the Ionick Order." In 1720, Strype found this "Model of a Stately Building . . . convenient for the Purpose," and noted its position with "Grass Plats before it, and Rows of Lime Trees."[959]

While none of Hooke's drawings of the building are known to have survived, a sketch showing a plan and elevation of a modular unit, or at least a very small house, is extant among his papers at the

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[955] In his description of the building, Strype wrote that it was "sustained with Stone Columns . . . the full Length of the Structure," but this does not preclude the use of brick for the pilasters protruding from the wall; Strype, *Survey of London*, vol. 1, p. 213.

[956] *Diary ii*, p. 243.

[957] Waller, p. xxv. It appears one of the major functions of the architect at the time was to control workers' bills, to ensure they did not exceed the estimates they had given and that the client was not being over-charged. For example, when the architect Edward Jerman died during the construction of the Royal Exchange, the costs soared without his oversight in place; see Doolittle and Saunders, *The Mercers' Company, 1579–1959*, pp. 79-80.

[958] Archer, *History of the Haberdashers' Company*, p. 107. Resulting in the charity having to turn away students for a period, the high cost of the building gained some notoriety.

[959] *A new view of London: or, an ample account of that city, in eight sections* . . . (London: Printed for John Nicholson . . . and Robert Knaplock . . . 1708), Vol. 2, p. 747; Strype, *Survey of London*, vol.1, p. 213.

British Library (**Figure IV-262**).[960] It is undated, and the oversized, floor-to-ceiling windows look rather too modern, but a comparison with the 1792 plan of Hoxton Hospital, prepared by the surveyor John Baker (**Figures IV-260 and IV-261**) shows that it may plausibly be related to an almshouse, if not Aske's.

Aske had bequested some of the money towards a school for twenty boys. Hooke's proposal "that there might be instituted in that place, a Mathematical-School for Boys to be instructed in the Principles of Astronomy and Navigation," no doubt influenced by the Royal Mathematical School at Christ's Hospital, was accepted and at least according to the commemorative plaque, partly implemented.[961]

ii. 48. ROYAL DOCKYARD IN HAMOAZE, PLYMOUTH [SPECULATIVE]

Attribution: Colvin, *BDBA* (1954) and subsequent editions.

Brief description: It has been suggested that Hooke may have designed the buildings at the Royal Dockyard in Hamoaze, Plymouth, built for the Navy in 1692–*c.* 1700.

Primary sources:

– -Hooke's entries in *Diary ii*:
- 27 Apr. 1693 (p. 235): "Received a letter from Sr R. Southwell wth Mr Dummers designes for flood-Gates."
- 28 Apr. 1693 (p. 235): "Wrot objections on Mr Dummers proposalls: Deliverd them to Sr R. Southwell at the Custom house."
- 8 June 1693 (p. 248): "I wrote a short state of my case and gave it to Sr R. Southwell."
- 10 June 1693 (p. 248): "I deliverd to HH[962] for Sr R. Southwell . . . Mr Dummers draught of Sluce gates."

[960] Also reproduced as Figure III-18; see the annotations in Chapter III. The partition in the room with the staircase is suggestive of stables but the door into that area appears to be too small.

[961] Waller, p. xxv.

[962] Harry Hunt, Hooke's assistant.

– The National Archives, Kew, PRO, SP 29/401, fol. 225: Letter dated 24 Feb. 1678 from Bernard de Gomme[963] in Portsmouth to Joseph Williamson[964] ". . . Concerning the fortifications at portsmouth . . . Wee are att present making one of the Sally portts of Stone of the Basse flanke, for to be a pattern on for all the rest, & one Basse flanke with all the Ambrasures is finished Compleat; and foure Gunns putt in, & place for one more; Soe *tha*t in my absence Mr. Hooke whoe has been Imployed by me in Severall places, in building of his Ma*jes*ties ffortifications of Tilbury & plymouth, and is now appointed by *th*e Office of *th*e Ordnance for this fortification, shall be able to finish *th*e Remainder . . ."

– British Library:

- Lansdowne MS 847: Edmund Dummer, 'An account of the generall progress and advancement of his ma[ties] new docks and yard at Plymouth . . . Presented to the R[t] Hono[ble] the principall officers and commissioners of his ma[ties] Navy', Dec. 1694. Drawings of the new dockyards at Plymouth (**Figures IV-264, IV-266, IV-847**).[965]
- King's MS 43: Edmund Dummer, 'A survey and description of the principal harbours with their accommodations & conveniences for erecting, moaring securing and refitting the Navy Royall of England', 1698. Folios 126-144 have Dummer's survey of Plymouth dockyards, including 'A plan of Plymouth Sound' (fol. 126), 'A view of his majesty's dock yard at Plymouth' (fol. 130), elevations and plan of the officers' dwellings (fol. 135), elevations and plan of the Great Storehouse (fol. 144), as well as drawings of the other buildings, general description of the dockyards, and estimated value of the complex. (**Figure IV-269**).
- Add. MS 9329: A compilation of printed addresses, reports, and instructions related to the Navy. Along with explanatory notes, it also contains a full set of engravings of Dummer's drawings of

[963] Bernard de Gomme (1620–1685) was a Dutch military engineer first brought to England by Prince Rupert in 1642. During the Civil War, he designed the fortifications in Oxford, and after the Restoration, was appointed chief engineer in charge of fortifications at the ordnance office. He was a close associate of Jonas Moore, who was surveyor general of the ordnance, and eventually replaced him in 1682. Sources on de Gomme include Anthony Kemp, 'The Fortification of Oxford during the Civil War', *Oxoniensa* 42 (1977), pp. 237-246; A. D. Saunders, *Fortress Builder: Bernard de Gomme, Charles II's Military Engineer* (University of Exeter Press, 2004); and 'Gomme, Sir Bernard de (1620–1685)', *ODNB*.

[964] Joseph Williamson (1633–1701) was the secretary of state at the time; see 'Williamson, Sir Joseph (1633–1701), *ODNB*. Williamson had also been a fellow of the Royal Society since 1663 and was elected as its second president in November 1677. He receives numerous mentions in Hooke's diaries.

[965] Lucia Nuti, "'To make the whole progress a lineall visible Demonstration:" the Journal of Edmund Dummer', *Word & Image* 15 (1999), p. 293.

the Plymouth dockyards, including copies of the three prints among Hooke's papers in Add. MS 5238 (listed below).

- Add. MS 5238 (Hooke's papers):
  - No. 79: Anon. (engraver), Edmund Dummer (draughtsman), 'Fourth draught: engraved elevation and plan of the officers' dwelling houses in Plymouth', 1694 (**Figure IV-263 or Figure III-113**). Engraved version of Lansdowne MS 847, fol. 46 (**Figure IV-264 or Figure III-114. cf**).[966]
  - No. 81: Anon. (engraver), Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694 (**Figure IV-265 or Figure III-117**). Engraved version of Lansdowne MS 847, fol. 50 (**Figure IV-266 or Figure III-118. cf**).
  - No. 92: Anon. (engraver), Dummer (draughtsman), 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694 (**Figure IV-267 or Figure III-131**). Engraved version of Lansdowne MS 847, fol. 50 (**Figure IV-268 or Figure III-132. cf**).

Assessment:

Among Hooke's papers at the British Library are several printed engravings of various buildings at the Royal Dockyard in Hamoaze, Plymouth (**Figures IV-263, IV-265, IV-267**). Colvin has interpreted their presence as possibly connecting Hooke to their designs, especially in light of the resemblance between one of the buildings and Bethlem Hospital, as well as his previous involvement in the design of the Navy Office.[967]

Hooke indeed had had previous dealings with the Navy: in the 1670s, he was involved in the establishment of the Royal Mathematical School, which was founded by Charles II to supply the Navy with apprentices, and prepared the preliminary designs for rebuilding the Navy Office which had burnt down in 1673.[968] In 1685, he provided Samuel Pepys, secretary for the Admiralty, with an 'Analysis of

[966] Regarding the citing of two different figure numbers, see footnote 375.

[967] Although I have not been able to trace its source, before Colvin's suggestion, there must have been a previous attribution of the Plymouth fortifications to Hooke. Writing well before him, Batten expressed her objection: "It is worth noting here that Robert Hooke was not connected with the fortifications at Plymouth and Portsmouth as has sometimes been suggested . . . That these fortifications were carried out by a Mr. Hooke is certain, but reference to the Calendar of State Papers shows that in February 1678 the Mr. Hooke concerned was on the spot whereas Robert Hooke, as his Diary shows, was in London and oblivious to fortifications;" Batten, p. 112. See above for the extract from the State Papers. On Hooke's work at Bethlem Hospital, and the Navy Office, see ii. 16 and ii. 20 in this chapter.

[968] See ii. 20 and ii. 21 in this chapter for Hooke's work on the Navy Office, and Christ's Hospital.

the whole Businesse of Navigation under the Title of Hydrographie', a detailed diagram organising all knowledge on the subject.[969] By the 1690s, perhaps due to his work on the Fleet Canal and Thames embankment, Hooke had also become an established expert in wharf construction, collaborating on a 1676 proposal for completing the Tangier mole, and advising the Southwells on constructing a sluice at their Kings Weston estate in Dorset in 1692–1693.[970] Thus Hooke would have had the social connections and the necessary technical expertise to design the dockyards.

Predated by Portsmouth and Chatham, Plymouth dockyards was established just as the Anglo-Dutch wars drew to a close.[971] Located towards the western end of the southern coast of England, it was to facilitate easier access to France and Spain, rivalries with which had recently been rekindled. It was to have a dry-dock along with support facilities such as officers' dwellings, storehouses, and workshops for various trades (**Figure IV-269**).

Hooke is not mentioned as the designer in any of the extant documents related to Plymouth dockyards, however. Colvin has pointed out that there was a 'Henry Hook', who may have been a relation, acting as the deputy-governor of Plymouth citadel, implying that he may have consulted Hooke regarding the designs. The citadel was a nearby but separate structure built in the late 1660s and there is no evidence of Henry Hook's involvement in the dockyards, but it cannot be satisfactorily ruled out. Henry may have been the same 'Mr. Hooke' mentioned as having carried out the Tilbury, Plymouth, and Portsmouth fortifications. The reference, first noted by Batten, is in a February 1678 letter from the renowned military engineer Bernard de Gomme (1620–1685) who was reporting to Secretary Williamson on the status of the fortifications at Portsmouth, stating that in his absence 'Mr. Hooke', who had previously been employed in the building of Tilbury and Plymouth fortifications, was appointed by the Ordnance Office to finish the ones in Portsmouth. As Batten has pointed out, in February 1678 Hooke was in London and nowhere near Portsmouth.[972]

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[969] There are two copies of this manuscript: Hooke, 'Hydrography', 24 Mar. 1685; RS, Cl.P/20/70, fols. 156-158; and 'Mr Hooke's Analysis of the whole Businesse of Navigation under the Title of Hydrographie', 23 Mar. 1686, Bodl. MS Rawlinson, A.171, fols. 245v-246r. For a discussion of Hooke's diagrams and proposals for organising knowledge, including the 'Hydrography' chart, see Yeo, *Notebooks, English Virtuosi, and Early Modern Science*, esp. pp. 243-252.

[970] See ii. 7 and ii. 49 in this chapter.

[971] Plymouth Dockyard was renamed Devonport in 1823. Since the relevant primary sources refer to the site as Plymouth, in order to avoid confusion, I will avoid referring to it as Devonport.

[972] See under 'Primary sources' for de Gomme's letter, footnote 963 on de Gomme, and footnote 967 on Batten's comment.

All extant documents, however, do point to Edmund Dummer (1651–1713) as the designer of the Plymouth dockyards.[973] Dummer had joined the Navy in 1668 as an apprentice shipwright, and on account of his considerable draughting skills, was placed under the tutelage of John Tippetts, then Surveyor of the Navy.[974] During his apprenticeship, he also picked up some pretensions towards the new learning; his 1679 short treatise 'about Improveing the Art of Building Ships', utilising a language that would have been familiar to the Royal Society, sought to perfect shipbuilding "by settling it on positive and unerring maxims deduced from reason and experiments."[975] After he served his apprenticeship at Portsmouth, he embarked on a trip to the Mediterranean between 1682 and 1684, when he produced a set of elaborate drawings of cities and naval arsenals, now BL, King's Library, MS 40, presumably to present to Charles II but the latter died by the time they were finished.[976] His talents and skills enamored him to Evelyn who supported his bids for further appointments, though Pepys was less enthusiastic, criticising Dummer for being "an ingenious young man, but said rarely to have handled a tool in his life, nor knows judiciously how to convert a piece of timber; has been much abroad indeed, but gained his present promotion . . . upon the credit only of his designing and making of draught."[977]

In 1689 Dummer was appointed Assistant Surveyor of the Navy before taking on the full title in 1692. When the Admiralty inquired about the possibility of building a dock at Plymouth in June 1689, it was Dummer who was tasked with producing a survey of the area. In November, he gave estimates for building in three possible locations, with separate prices for doing the work in timber or

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[973] On Dummer, see Nuti, 'Journal of Edmund Dummer'; J. Coad, 'Dummer, Edmund (fl. 1682–1712)', in *A Biographical Dictionary of Civil Engineers in Great Britain and Ireland*, ed. A. W. Skempton, et al. (London: Thomas Telford Publishing on behalf of The Institution of Civil Engineers, 2002), pp. 193-194; Paula Watson, 'Dummer, Edmund (1651–1713), of London', in *The History of Parliament: the House of Commons 1690–1715*, ed. D. Hayton, E. Cruickshanks, and S. Handley (New York: Cambridge University Press for the History of Parliament Trust, 2002); Celina Fox, 'The Ingenious Mr Dummer: Rationalizing the Royal Navy in Late Seventeenth-Century England', *eBLJ* Article 10 (2007), pp. 1-58; Colvin, *BDBA* (2008), p. 336; and 'Dummer, Edmund (*bap*. 1651, *d*. 1713)', *ODNB*.

[974] Where Dummer acquired his drawing skills prior to the Navy is unknown as he was too old to have been a student at the Royal Mathematical School where a drawing master was regularly employed to instruct the pupils. Fox suggests he may have picked them up from master shipwright Anthony Deane (1638-1721); see Fox, 'Ingenious Mr Dummer', p. 2.

[975] Ibid., pp. 7-8.

[976] On Dummer's journal of his travels in the Mediterranean, see Nuti, 'Journal of Edmund Dummer'.

[977] Qualifying Pepys's comments, Fox has pointed out that at this time he was supporting his friend Deane's bids for the same positions; 'Ingenious Mr Dummer', pp. 22-23.

in stone. Upon deliberations, in January 1690, an order was issued to build, in stone, a protective wet-dock as well as a dry-dock large enough for first rate ships in Hamoaze at the tidal mouth of River Tamar, in Plymouth.[978] It would take another year for the actual project to start; in March 1691, estimates were requested, and in November, Barnaby Swier was appointed master bricklayer. In July 1692, the project was expanded to include several other buildings such as accommodation for the officers, storehouses, workshops, and other such services, and a new estimate of costs was ordered. By the end of the month, a list of the buildings with their sizes and costs was prepared, and a budget of £23,406 was allocated to create 'a fully fledged dockyard' at Plymouth.[979] The expansion of the project would require the acquisition of adjacent land, however, resulting in some delays to the project, which was finally completed *c.* 1700.[980]

Some parts of the period of construction are covered by Hooke's diaries but they contain no reference to the dockyards. While this does not preclude a consultation with Hooke over the design of the officers' terrace (Figures IV-263, IV-264, IV-270) purported to resemble Bethlem Hospital, there is no external evidence for it.[981] There is a record that in May 1693, Wren sent two of his staff, Ephraim Beachem and Thomas Webb, to Plymouth to evaluate the quality of the works but this was done at the Navy Board's request and does not necessarily denote Wren's connection to the designs either.[982] On the other hand, Dummer's direct involvement in the design of the complex, including the officers' terrace, appears to be well documented. In May 1694, the Navy Board reported that "The first design and modell of the officers' houses to be built at their Majesty's new dockyard at Plymouth [had been] proposed by the Surveyor to be two storeys," noting the suggestion that a third floor be added.[983] In his December 1694 report 'An account of the generall progress and advancement of his

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[978] Ibid., p. 26; Coad, *The Royal Dockyards*, p. 9 and *Historic Architecture of H. M. Naval Base Devonport 1689–1850* (London: National Maritime Museum, 1983), p. 342.

[979] Coad, *Historic Architecture . . . of Devonport*, pp. 342, 344.

[980] Ibid., p. 347.

[981] Due to Colvin's attribution, it has generally been accepted that the design was influenced by Bethlem Hospital; see Fox, 'Ingenious Mr Dummer', p. 43n101; Coad, *Historic Architecture . . . of Devonport*, p. 347 and Coad, *The Royal Dockyards*, p. 194.

[982] Coad, *Historic Architecture . . . of Devonport*, p. 347.

[983] Ibid., pp. 348, 350.

In BL, Add MS 9329, *The humble address of the right honourable the lords spiritual & temporal and commons in Parliament assembled, presented to her majesty on thursday the one and twentieth of May, 1702. And her majesties most gracious answer thereunto* ([London], Printed by Charles Bill, and the Executrix of Thomas Newcomb . . . , 1702), p. 14, the officers' lodging illustrated in the fourth draught were noted to "appear to be very convenient, and sufficient

ma[ties] new docks and yard at Plymouth', Dummer credited the addition of a third floor to one of the resident commissioners, Captain Henry Greenhill, noting that he had meant to create a more humble structure considering the exposure of the building to the elements:

> The Structure now built differs nothing (or att least very little) from the Plann first proposed but the Superstructure is more beautifull than I designed it by the Addition of One Story, and the alteration of the Roofe on that occasion which was procured by the Solicitation of Captaine Greenhill. I had I confesse very great Regard to the Eminence of its scituation, and was unwilling to make too proud a Building where the severitie of a Season has such comand, as at this place it has, and I chose safety rather than beauty where both could not well appeare together.[984]

With the language Dummer uses, he unequivocally identifies himself as the designer while acknowledging the intervention from Greenhill. Had someone as eminent as Hooke given design advice for the building, it would not have been out of place for him to recognise it here.

Another Dutch-style building the design of which can be connected to Dummer is the 'Great Storehouse' (**Figures IV-267 and IV-268**). In his description of the building in the same report, Dummer noted how the "middle of each front will bee compleated with a handsome Compasse Pediment, and over the Two Gates, Two Turretts are to be erected, One for a Clock and the other for Sun Dialls, and the Eves to bee ended with a Cove Cornish."[985] Elsewhere Dummer displayed his familiarity with Vitruvian concepts by emphasizing the "Correspondence of Utilitie, Proportion, Strength and Ornament" in the officers' dwelling, or the "Uniformitie, Place, and Capacitie of [the Great Storehouse] both for Ornament and Utilitie."[986] These make it difficult to doubt Dummer's involvement as the designer of these buildings, and in any case there is no reason why he could not

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in Extent (being now inhabited) eminent in Situation (overlooking all the Yard) not disagreeable in the Figure of their Structure; but attended with suitable Qualities of Utility, Proportion, Strength and Ornament."

[984] BL, Lansdowne MS 847, p. 37. It was to this report that the eight draughts were appended, with a ninth one illustrating the pediments with the arms and trophies of the King, Admiralty, and Navy; Fox, 'Ingenious Mr Dummer', pp. 26-27.

[985] BL, Lansdowne MS 847, p. 42; Coad, *The Royal Dockyards*, p. 10.

[986] BL, Lansdowne MS 847, pp. 35 and 42.

have been influenced by the Bethlem Hospital, or Wren's Royal Chelsea Hospital which had just opened in 1692, or indeed directly by architectural books.

There is a potential connection to Hooke, however. In 1692–1693, Robert Southwell, then president of the Royal Society, was engaged in the design of his own sluices for his estate at Kings Weston with Hooke's help.[987] In April 1693, he solicited Hooke's opinion on "Mr Dummers designes for flood-Gates," but whether these were for Plymouth or for Southwell is unclear. Perhaps Southwell was considering Dummer's design for Plymouth as a model to follow or had directly asked him to produce a bespoke design for Kings Weston. In either case, Hooke must not have been too impressed as he recorded delivering his objections to Dummer's proposal the next day, but not his drawings which he kept for at least another month. Whether any of his objections resulted in alterations to the design of the Plymouth gates, or whether they even reached Dummer, is unknown.

There remains one last tangential connection to Hooke to consider. In 1698, Dummer's career was suddenly interrupted: he had accused the main contractor at Portsmouth dockyards of irregularities or 'indirect practices', and was countersued for bribery, which resulted in his suspension from the surveyorship.[988] He would later be exonerated but was never reinstated to the position. The contractor was none other than John Fitch (1642–1706), the carpenter and builder Hooke had been working with at least since the early 1670s, indeed including on the Bethlem Hospital. In 1682, Charles II granted Fitch a lifetime appointment as 'Workmaster to the Ordnance' in charge of building and repairing all the forts, and with his brother Thomas (1637–1688), he built the fortifications at Portsmouth and conducted the repair work at Hull.[989] He was also noted as the contractor for "the new Yard at Plymouth."[990] Both brothers were considered to be competent designers; Thomas was even knighted in 1679 for his work in the post-fire reconstruction of London. In fact, right before

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[987] See ii. 49 in this chapter on the sluices at Kings Weston.

[988] 'Dummer, Edmund (*bap.* 1651, *d.* 1713)', *ODNB*; Watson, 'Dummer, Edmund (1651–1713), of London'.

[989] For biographical details, see 'Fitch, John (1642–1706)' and 'Fitch, Sir Thomas (1637–1688)' in Colvin, *BDBA* (2008), pp. 377-379. John Fitch does come across as a bit of a troublemaker; he was fired for neglecting his duties at Bridewell Hospital, as well as for badmouthing its treasurer; see ii. 11 in this chapter. He is also noted to have played de Gomme and Martin Beckman, the engineer in charge, against one another, although they don't appear to have necessarily needed his help to fire invectives at each other; see Saunders, *Fortress Builder: Bernard de Gomme, Charles II's Military Engineer*, pp. 329-330. Fitch's character traits may have been the reason why Wren did not give him the St. Paul's contract despite Hooke's recommendation.

[990] Bernard Pool, *Navy Board Contracts, 1660–1832: Contract Administration under the Navy Board* (London: Longmans, Green and Co. Ltd., 1966), p. 49.

Plymouth, in 1688–1691, the Fitch brothers had built the Grand Storehouse (**Figure IV-271**) at the Tower of London.[991] While the surviving documentation on the building does not indicate an architect's name, and indeed it may have been designed internally by the staff of the ordnance office, it has been suggested that Thomas may have been the designer.[992] The 360-foot wide building, which featured 22 bays and an octagonal cupola, is considered to be the "most prestigious single building erected by the late Stuart Ordnance Office anywhere in the country."[993] It was destroyed in a catastrophic fire in 1841, with only its pediment, carved by the mason John Young, surviving (**Figure IV-272**).

Given the Fitch brothers' involvement in the construction of Bethlem Hospital and the Grand Storehouse at the Tower of London, both of which display features similar to the officers' terrace at Plymouth, it is not inconceivable that the surviving brother John may have contributed certain design details. He may have also sought Hooke's opinion, though it should be noted that Fitch receives no mentions in the later Diaries, perhaps because by this time he was an established general contractor undertaking large projects for the military, but it could also be due to a falling out between the two.

An elevation drawing of a military building, now RIBA, SA11/3 (**Figure IV-273**), has been attributed to Hooke by John Harris and Kerry Downes based on stylistic similarities to Bethlem Hospital, but Colvin's attribution of Plymouth dockyards, more precisely the officers' terrace there, must no doubt have influenced this.[994] Lack of provenance information on the drawing makes it difficult to be sure of an attribution, but should future discoveries connect it to Hooke more convincingly, his possible involvement in the design of Plymouth dockyards may need to be revisited.

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[991] H. M. Colvin et al., *The History of the King's Works* (London: Her Majesty's Stationary Office, 1976), p. 381; Geoffrey Parnell, 'The Building and Works of the Office of Ordnance at the Tower of London, 1660–1722' (unpub. D.Phil. diss., King's College, University of London, 1995), pp. 66-71.

[992] Colvin, *BDBA* (2008), pp. 378-379.

[993] Parnell, 'Building and Works', p. 70.

[994] Lever, *Catalogue of the Drawings Collection of the Royal Institute of British Architects*, p. 139. See also the annotations for Figure III-233 in Chapter III.

ii. 49. SLUICES FOR SOUTHWELL AT KINGS WESTON, BRISTOL

Attribution: Batten, p. 112; 'Espinasse, p. 99.

Brief description: In 1692–1693, Hooke helped with the design of sluices for Robert Southwell, presumably for the latter's estate at Kings Weston near Bristol.

Primary Sources:

– Hooke's entries in *Diary ii*:
- 6 Dec. 1692 (p. 194): "a box of limestones and sand etc from Sr R. Southwell and a letter from his son."
- 9 Dec. 1692 (p. 195): "Sr R. Southwell and his son explicating the key, the wharfing, the mole, and the sluces: query of mortar turns coled not etc."
- 10 Dec. 1692 (p. 196): "HH[995] tea. Mod[ule] for sluse."
- 13 Dec. 1692 (p. 196): "HH module of sluse."
- 14 Dec. 1692 (p. 197): "Sr R. Southwell till 12: tea: much pleased with water-mill crank and moduls."
- 15 Dec. 1692 (p. 197): "Letter from Sr R. Southwell."
- 17 Dec. 1692 (p. 197): "Sr R. Southwell. HH module of the double gate about Mill and [?] [small sketch]."[996]
- 21 Dec. 1692 (p. 199): "Sr R. Southwell gave me 5 G*uineas* [gold] in the Repository: desird a rule of Resistance of water."
- 23 Dec. 1692 (p. 200): "letter from Sr R. Southwell."
- 24 Dec. 1692 (p. 200): "Sr R. Southwell till 11, well satisfyd of his querys."
- 28 Dec. 1692 (p. 201): "Stone cariage module."
- 2 Jan. 1693 (p. 202): "Sr R. Southwell and his son here. HH carried away all modules: he had my paper about the Strength of Wall, how to estimate it. We tryd the strength of his mortar by weight 23 lb, with the mortar stood against 50 lb pressure, but without mortar yielded to half its own weight. Tea etc. he left 5 Guineas [gold], which makes 20 . . . desird paper about pressure."
- 3 Jan. 1693 (p. 202): "At Custom house paper from Sr R. Southwell."

[995] Harry Hunt, Hooke's assistant.

[996] BL, Sloane MS 4024, fol. 68r.

- 4 Jan. 1693 (p. 202): "Pressure papers etc of wall for Sr R. Southwell to whom I gave them at Pontacks."
- 10 Jan. 1693 (p. 204): "Sr R. Southwell and his son queried about walls with solid earth between. I diswaded from rake and captston, advised ditching and wall with buried trunks to carry off the water; explained to Mr Southwell all the papers of pressure, resistance of wall, centre of gravity. Contra perpetuall motion, series, areas etc."
- 18 Jan. 1693 (p. 207): "Marshalls boy brought Sr R. Southwells two lamps hither by his order. A letter from him for 3 pp."
- 25 Jan. 1693 (p. 208): "Wrote Rule of measuring velocity of ∇ at depths for Sr R. South, which I gave him at Pontacks."
- 30 Jan. 1693 (pp. 209-10): "With Mr Waller at Sr R. Southw[ell] . . . I gave him account of 6 foot Sluce . . . Discoursd abt my arrears, etc."
- 4 Feb. 1693 (p. 211): "Spake with Sr R. Southwell . . . about sluce, mill tides etc."
- 8 Feb. 1693 (p. 212): "Royal Society met: I gave Sr R. Southwell sluces of 6.5.4 foot square."
- 16 Feb. 1693 (p. 215): "Sr. R. Southwell calld to have the quantity of timber for Floodgates."
- 17 Feb. 1693 (p. 215): "The weight of Sr R. Southwell 3 stones."
- 18 Feb. 1693 (p. 215): "Wth Sr R. South[well] at Custom house: estimate of timber quanti. for Sluse, floodgates, Lundby, 33 load."
- 22 Apr. 1693 (p. 233): "Weygh sand, clay, alabaster, stone for Sr R. Southwell."
- 27 Apr. 1693 (p. 235): "Received a letter from Sr R. Southwell wth Mr Dummers designes for flood-Gates."
- 28 Apr. 1693 (p. 235): "Wrot objections on Mr Dummers proposalls: Deliverd them to Sr R. Southwell at the Custom house."
- 29 Apr. 1693 (p. 235): "I drew form for timber contract for Sr R. Southwell."
- 2 May 1693 (p. 236): "At Custom house gave Sr R. Southwell Designe of sluse and contract for timber."
- 3 May 1693 (p. 236): "Letter and draught of Dyck gates from Sr R. Southwell. Direct HH about module for Sluse."
- 11 May 1693 (p. 238): "HH module of sluce."
- 17 May 1693 (p. 240): "Sr R. Southwell his modul of Sluse."
- 8 June 1693 (p. 248): "I wrote a short state of my case and gave it to Sr R. Southwell."

- 10 June 1693 (p. 248): "I deliuerd to HH for Sr R. Southwell . . . Mr Dummers draught of Sluce gates."

– British Library, Sloane MS 1039, fol. 168: letter from Edward Southwell to Hooke, 25 Jan. 1693; see Appendix i. 10 for a transcription of the letter.

– Kings Weston: Batten noted the presence of several drawings of sluices for the river Stour in Dorset among a collection of architectural drawings at Kings Weston.

– 'A Contrivance which Sir Robert Southwell saw at Brandenberg, for speedy Conveyance of Earth, and to fill up, or raise Ground, &c. communicated to Dr. Hook, Sept. 9. 1692', in *Philosophical Experiments and Observations of the Late Eminent Dr. Robert Hooke* . . . , W. Derham, ed. (London, 1726), Plate III and pp. 275-276: a pulley system of baskets "to transport Earth, Sand, &c. 1, 2, 3, 4, or 500 Yards, whether ascending, or descending," enabling two workers to do the job of 6. A diagram is provided but Hooke notes that a "small Module would express all the Particulars, much plainer than any Draught."

Description:

In late 1692, Robert Southwell (1635–1702) and his son Edward (1671–1730) approached Hooke for advice on a solution against flooding at their Kings Weston estate near Bristol. As a fellow of the Royal Society since 1662 and its president between 1690 and 1695, Southwell knew Hooke well; he had previously entrusted him with the design of his London residence in Spring Gardens, and was aware of his expertise in mechanics and hydraulics. Hooke had worked on the Thames embankment and Fleet Ditch, collaborated on a proposal for completing the Tangier mole, and presented a carefully rendered sectional drawing of a waterwork under construction at Hockney.[997]

In his diary, Hooke noted numerous discussions with the Southwells on "the key, the wharfing, the mole, and the sluces." A precise location for the project is not indicated but it was probably the area now called Avonmouth, where river Avon meets the Severn estuary (**Figure IV-274**). Hooke's assistant Harry Hunt produced several models, including one for the sluicegates, and based on his now-lost "paper about the Strength of Wall," Hooke advised them on how to calculate water pressure

[997] See ii. 7, ii. 9, ii. 26, ii. 41 in this chapter. For the waterwork at Hockney, see Figure III-287, and Royal Society meeting minutes for 2 June 1686.

and the centre of gravity of the retaining walls.[998] On 2 January 1693, they all met at Hooke's quarters to experiment with mortar. A few weeks later, Edward wrote to request further calculations following adjustments made to the original design, especially of the height of the sluice walls; Hooke obliged, also calculating the amount of timber required to do the job and prepared the contract for Southwell.[999]

Several mentions were made of a water mill, another subject Hooke was comfortable with. Southwell was present at the 2 April 1690 Royal Society meeting when Evelyn gave "an account of a Sort of Mill now used at Deptford without either Cogg, or Wheel; made by the fall of water into a large tubb of about 6. or 7. foot Diameter." Evelyn thought that it had been contrived by a Welsh gentleman who had lived in Montpellier for some time, but Hooke quickly objected to this account, pointing out that the Deptford mill "was not a new thing, but to be found in [blank] Book of Engines." The title of the book was omitted from the meeting minutes, perhaps missed by the amanuensis, but it was Böckler's *Theatrum machinarum novum* (Cologne, 1662), and the mill in question was illustrated in plate 50. A week later Harry Hunt was ordered to go to Deptford, to take an account of the mill.[1000]

In April 1693, Southwell, who may have still had some concerns about the designs, sought Hooke's opinion on "Mr Dummers designes for flood-Gates." During this period, Edmund Dummer was designing and building the Plymouth dockyards, but whether the designs Southwell was inquiring about were for Plymouth or bespoke ones for Kings Weston is unclear.[1001] In either case, Hooke was not impressed and delivered his objections to them the next day, though he held onto the drawings for at least another month.

In 1712–1719, the Kings Weston House (**Figure IV-275**) was replaced with a design by John Vanbrugh (1664–1726). It is unclear whether any work was done on the sluices then but the development of Bristol harbour and the Industrial Revolution have caused there to be little trace left of them by now.

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[998] *Diary ii*, pp. 195, 196, 197, 204, 211. Hooke had no doubt gained valuable experience during the construction of the wharves at Fleet Canal where lateral forces on the retaining walls had created numerous problems; see ii. 7 in this chapter.

[999] Letter from Edward Southwell to Hooke, 25 Jan. 1693, BL, Sloane MS 1039, fol. 168; see Appendix i. 10 for a transcription.

[1000] RS, JBO/8, pp. 298-299.

[1001] On Plymouth dockyards, see ii. 48 in this chapter.

ii. 50. CHURCH OF ST. NICHOLAS, LUTTON, LINCOLNSHIRE

Attributions: Lisa Jardine, *The Curious Life of Robert Hooke: The Man Who Measured London* (London: HarperCollinsPublishers, 2003), pp. 301-304; Edward Smith, 'Hooke and Westminster' in *Robert Hooke: Tercentennial Studies*, ed. Michael Cooper and Michael Cyril William Hunter (Burlington, VT: Ashgate, 2006), pp. 229, 231.

Brief description: Hooke directed repairs and interior millwork at the Church of St. Nicholas, Lutton in Lincolnshire, for Richard Busby, in 1693–1703.

Primary sources:

– Hooke's entries in *Diary ii*:
  - 30 Mar. 1693 (p. 226): "made a valuation for Lutton Church in Lincolnshire wher Dr Busby was christened about Michaelmas 1606."
  - 4 May 1693 (p. 237): "Dind with Dr Busby. Talk and recd papers about Lutton."
  - 5 June 1693 (p. 247): "Rog. Davis here about Dr Busbys church."
  - 10 June 1693 (p. 249): "Discoursd with Dr Dove of Lutton church. I mention'd a Vault: Dr desired me to goe to Welling [Willen, Buckinghamshire] with Mr Needham."

– British Library:
  - Sloane MS 1039, fol. 123: Extract from the fifth codicil to Richard Busby's will, with instructions to his executors to complete the repairs to Lutton Chapel. The manuscript which, according to Lisa Jardine, is in Busby's Receiver General John Needham's hand, is undated but Busby's official will is dated April 1695:[1002]

> And whereas I have long intended to have repaired & beautified
> the Chappell at Lutton in the County of Lincoln the place of
> My Nativity & have already by the assistance of Dr Hooke
> begun the said work; Now My will is that if it should please
> God that I happen to dy before the same be finished,
> that then my Ex*ecu*ters with the advice & assistance of the s*ai*d

[1002] Busby's full will with its codicils are printed in G. F. Russell Barker, *Memoir of Richard Busby D.D. (1606–1695) with Some Account of Westminster School in the Seventeenth Century* (London: Lawrence and Bullen, 1895), pp. 131-147; for this particular codicil, see p. 146. Modernised transcriptions of this extract are also printed in Jardine, *Curious Life of Hooke*, p. 301 and Michael Cooper, *'A More Beautiful City': Robert Hooke and the Rebuilding of London After the Great Fire* (Stroud: Sutton Publishing, 2003), p. 16.

> Dr Hooke do finish & compleat the same in such manner
> as I have acquainted the s*ai*d Dr Hooke I intended to have
> p*er*formed.

- Lansdowne MS 655: Manuscript copy of Busby's will with all its codicils and the decree of the Court of Chancery.
– Busby Trustees Collection, Westminster Abbey Muniments, MS *In Libro Depositinn: fo: 99: usq fo: 109:* [produced for] *Sir Thomas Trevor Knight. His Maj^ies^ Attornie Generall,* Hooke's deposition for the Chancery case opened for the fifth codicil to Busby's will.

Description:

Richard Busby (1606–1695), the famed schoolmaster of Westminster School, took Hooke under his wing when the latter arrived in London after his father's death. Busby remained a life-long friend and patron, commissioning Hooke to build a church in Willen, and facilitating his appointment as the Surveyor for Westminster.[1003] In his later years, he also hired Hooke to refurbish and 'beautify' the Church of St. Nicholas in Lutton, Lincolnshire, where Busby had been christened.[1004]

The diary entries show that Hooke started working on an estimate in March 1693. The diary ends about five months after then, but as it can be gleaned from a manuscript among Hooke's papers at the British Library, the work was still unfinished two years later. Sloane MS 1039, fol. 123, is an extract, in John Needham's hand, from the fifth codicil to Busby's will.[1005] It is undated but was probably written around April 1695, the date of Busby's official will. It leaves instructions to his executors to ensure the completion of the repairs to Lutton Chapel and confirms Hooke had already been working on repairing and 'beautifying' it. Busby's will was finally proved on 19 February 1697 but a Chancery case had been opened in November 1696 for the fifth codicil which had not been

[1003] See ii. 24 and ii. 35 in this chapter.

[1004] The church was built in the sixteenth century but has undergone many alterations and restorations since, most recently in 1859; for a detailed description of the church, see *NHLE*, list entry no. 1359229. A shorter description is available in Nikolaus Pevsner, John Harris, and Nicholas Antram, *Lincolnshire* (New Haven, CT: Yale University Press, 1989), pp. 547-548, and photographs of the church exterior and interior in Andrew Bowell, 'Parish Church of St. Nicholas, Lutton, Lincolnshire', https://goo.gl/C7Sz4n.

[1005] Needham, with whom Hooke was in constant contact especially during his years as the Surveyor for Westminster, was Busby's Receiver General. For the identification of his hand, see Jardine, *Curious Life of Hooke*, p. 384n42.

properly signed.[1006] On 12 July 1697 Hooke was called in to give a deposition, the record of which yields further details about the work done at the church.[1007]

In his deposition, Hooke explained that he had sent someone to assess the building, "to take a view thereof & to see in what state & condition of repaires the same was in." It is unclear whether 'to take a view' in this context means to survey the building, but no such drawings have survived. The church, Hooke's agent reported, needed repairs to the walls and tiling, but Busby insisted that the parish take care of the exterior while he paid to "pave the floor & adorne & beautyfy [the church]." Hooke prepared several designs for a new pulpit, communion table, and railing, as well as a marble font and tiling for the floor. Wren chipped in and prepared an estimate: £400 including new wainscoting for the church. Hooke, perhaps because of his advancing age and poor health, refused to undertake the work himself, promising to assist instead. Noel Ansell, a carpenter in London, was contracted to do the work, and the floor paving not being ready, deposited the furniture at Busby's house in Westminster where Hooke inspected them. When Busby died, they were still at his house. The work was eventually completed in 1703, the date recorded on the pulpit.[1008]

ii. 51. KIVETON PARK, YORKSHIRE [SPECULATIVE]

Attribution: Worsley, pp. 14-17.

Brief description: It is speculated that in 1694 Hooke may have built Kiverton Park, Yorkshire, for Thomas Osborne.

Primary sources: Mostly coinciding with the gap in Hooke's diaries, and none of the extant drawings being in his hand, there are no primary sources to corroborate this attribution.

Assessment:

Thomas Osborne (1632–1712), earl of Danby from 1674, was an early supporter or William of Orange, with whom he nonetheless had a difficult rapport once the latter ascended to the throne. He

[1006] Barker, *Memoir of Busby*, pp. 36-37.

[1007] For quotations from the depositions, see Jardine, *Curious Life of Hooke*, pp. 302-303. Jardine does not give the manuscript reference, however the same document is also quoted in Smith, 'Hooke and Westminster', pp. 225-226, 319n38, where it is identified as "MS *In Libro Depositinn: fo: 99: usq fo: 109:* [produced for] *Sir Thomas Trevor Knight. His Majties Attornie Generall.* Busby Trustees Collection, Westminster Abbey Muniments."

[1008] Jardine, *Curious Life of Hooke*, pp. 302-304; Smith, 'Hooke and Westminster', pp. 229, 231.

was rewarded for his loyalty, though, by being created marquess of Carmarthen in 1689, and duke of Leeds in 1694. In that same year, he rebuilt his family seat at Kiveton Park, Yorkshire, which Worsley attributed to Hooke.[1009]

Worsley's attribution was based on three factors: the style of the house, that London craftsmen were hired to build it, and that Hooke knew Osborne. Stylistically, among other things, he deemed it to be "a simplified version of the second Montagu House . . . set back behind a forecourt, flanked by single-storey wings with a central, single-bay pedimented projection, hipped roofs and dormers," and emphasised the use of oval *oeil-de-boeuf* windows similar to the ones in the Somerset house stables (**Figure IV-277**).[1010] He also drew attention to the fact that Osborne had hired London craftsmen, including the carver Jonathan Maine, who had worked on the City Churches, and possibly also John Fitch, a close associate of Hooke's. While the set of extant drawings do not appear to be in Hooke's hand, Worsley contended that they were "clearly contract drawings and not proof of authorship."[1011] Lastly, as Worsley pointed out, Osborne did indeed receive a few mentions in *Diary ii* as 'Carmarthen' although none of these were related to Kiveton Park.

The unreliability of stylistic attributions aside, 1694 is relatively late in Hooke's life. In the year before, he was discharged from his surveyorship of Westminster Abbey due to his 'age and infirmities', and he does not appear to have been particularly close to Osborne to undertake the project as a favour. Considering the lack of any primary sources to corroborate this attribution, which Worsley himself admitted was 'more speculative', it is not likely Hooke was the architect of Kiveton Park.

ii. 52. BURLEY-ON-THE-HILL, RUTLAND [SPECULATIVE]

Attribution: Kerry Downes, *English Baroque Architecture* (London: A. Zwemmer Ltd., 1966), p. 64; James Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), p. 116.

Brief description: It is speculated that Hooke may have designed, or given advice for, Burley-on-the-Hill, Rutland, built in 1696–1700 for Daniel Finch (1647–1730), second earl of Nottingham.

[1009] Kerry Downes attributed 'Kiveton or Keiton, near Sheffield' to William Talman (1650–1719) and gave the dates of construction as 1694–1704 in *English Baroque Architecture*, p. 65.

[1010] Worsley, p. 17.

[1011] Ibid., p. 24n44.

Primary sources: Coinciding with Hooke's later years, for which no diaries are extant, there are no primary sources to corroborate this attribution.

Assessment:

In 1694, Daniel Finch (1647–1730), second earl of Nottingham, purchased the estate Burley-on-the-Hill from the executors of the will of George Villiers (1628–1687), second duke of Buckingham.[1012] He had been negotiating the terms of his purchase since 1693, but construction of the new house would not begin until 1696 and would finish before 1700.[1013]

Like Petworth House, despite the abundance of primary evidence regarding the construction of Burley House, no architect has been credited with the design. Detailed accounts of the construction, along with correspondence and sketches, survive in a 'scrapbook', which includes the names of all the craftsmen, most of whom appear to have been locals with a few brought in from London for detail and finish work.[1014] While no architect's name is mentioned among these records, Finch appears to have sought construction advice from Wren and Henry Sheres (1645?–1710), the Surveyor of the Ordnance, and had a model of the house built by Thomas Poulteney, the joiner who had earlier worked on the City Churches.[1015]

That Hooke may have been involved in the design of Burley House was first suggested by Kerry Downes in 1966. The two pieces of circumstantial evidence he offered were Hooke's social connections to Finch, and the stylistic similarities between Burley House and Hooke's previous works. It is indeed possible that Finch and Hooke knew one another, perhaps via Busby under whose care both had studied at Westminster School, albeit with a twelve-year difference. They may have met via Finch's uncle, Edward Conway (*c.* 1623–1683), for whom Hooke had designed Ragley Hall, but who had died more than a decade before Finch even purchased the Burley estate. They also had a common friend, John Lowther (1655–1700), first Viscount Lonsdale, for whom, it has been suggested, Hooke

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[1012] For biographical details, see 'Finch, Daniel, second earl of Nottingham and seventh earl of Winchilsea (1647–1730)' and 'Villiers, George, second duke of Buckingham (1628–1687)', *ODNB*.

[1013] Sources on Burley-on-the-Hill include Pearl Finch, *History of Burley-on-the-Hill, Rutland, with a Short Account of the Owners, and Extracts from their Correspondence, and Catalogue of the Contents of the House*, 2 vols. (London: John Bale, Sons & Danielsson, Ltd., 1901); Downes, *English Baroque Architecture*, pp. 63-65; Lees-Milne, *English Country Houses: Baroque, 1685–1715*, pp. 112-118; Beard, *Craftsmen and Interior Decoration*, pp. 145-146.

[1014] Lees-Milne, *English Country Houses: Baroque, 1685–1715*, p. 113.

[1015] It has also been suggested that Finch may have been his own architect; see Judith Hook, *The Baroque Age in England* (London: Thames and Hudson, 1976), p. 63. Sheres had been the Surveyor at Tangier Mole; see ii. 26 in this chapter.

may have designed Lowther Hall in Westmorland, a suggestion based on a drawing that has since been attributed to Edward Pearce instead.[1016] Indeed there is actually no particularly-strong social connection between Hooke and Finch, and the only diary reference to the latter occurred on 27 March 1693 when Hooke noted "Ld Notingham [appointed] chancellor."[1017] Stylistically-speaking, Downes suggested similarities between Burley House (**Figures IV-278 and IV-279**) and Hooke's designs for Bethlem Hospital, Ragley Hall, and the first Montagu House.[1018] To this, Lees-Milne also added a resemblance to Lowther Hall, but as already noted, it now appears Hooke was not involved in that latter project.[1019]

Even if we lay aside the fact that Hooke does not receive any mentions among the multitude of extant documentary evidence regarding the construction of the house, and that likewise Finch does not receive any references in Hooke's diaries except for the one mentioned above, there is one other consideration to be made. The 1696–1700 period when the construction took place, coincides with Hooke's later years. Three years earlier, in 1693, he was discharged from his surveyorship of Westminster Abbey due to his 'age and infirmities'. Considering the large scale of the project (**Figure IV-279**) and Hooke's increasing health problems during this period, it seems unlikely that he was involved in the design of Burley House in any meaningful capacity.

ii. 53. KNELLER HALL [WHITTON HOUSE], MIDDLESEX [SPECULATIVE]

Attribution: John Harris, 'Kneller Hall, Middlesex' in *The Country Seat: Studies in the History of the British Country House, Presented to Sir John Summerson*, ed. Howard Colvin and John Harris (London, 1970), pp. 81-84.

Brief description: It has been suggested that an elevation drawing attributed to Hooke may have been used as a preliminary design for Godfrey Kneller's Whitton House, the construction of which began in 1709.

Primary sources:

[1016] See ii. 43 in this chapter on Lowther Church, and the annotations for Figure III-192 in Chapter III.

[1017] *Diary ii*, p. 218.

[1018] Downes, *English Baroque Architecture*, p. 64. For Bethlem Hospital, Ragley Hall, and the Montagu House, see ii. 16, ii. 19, and ii. 36 in this chapter.

[1019] Lees-Milne, *English Country Houses: Baroque, 1685–1715*, p. 116.

– British Museum, Ee,2.119, AN1265760001: an undated drawing attributed to Hooke of a design for an unidentified country house (**Figure IV-282**).

Assessment:

Godfrey Kneller (1646–1723), a German-born history and portrait painter, moved to London in 1676 and became one of the leading painters of the time. Rising up the ranks, he was appointed principal painter to the king in 1688, knighted in 1692, received an honorary doctorate from the University of Oxford in 1695, and was created a baronet in 1715.[1020]

In 1709, Kneller purchased Whitton House and proceeded to build a new mansion. There seems to be some confusion regarding its architect. While the design was previously attributed to John Vanbrugh (1664–1726), this based on a 1703 letter he wrote using a dismissive tone about Kneller, architectural historian John Harris has suggested the involvement of Wren or the Office of Works instead.[1021]

While the overall design was common during the period, Harris has argued, what made "Kneller's house almost unique are the slightly projecting single-bay angles capped with concave domed cupolas" (**Figures IV-280 and IV-281**). He has suggested two examples with such cupolas as 'immediate antecedents' of the 1709 design: a "design for an unidentified house" attributed to William Talman (*bap.* 1650, *d.* 1719) and "a neatly-drawn elevation for an unidentified country house in the frenchified style associated with Hooke and Ragley Hall."[1022] The drawing Harris attributed to Talman has since been re-attributed to Wren, which only strengthens his point about a Wren connection.[1023] But if Harris is correct in his hypothesis that there is a relationship between the drawing attributed to Hooke (**Figure IV-282**) and Whitton House, two possibilities, as conjectural as Harris's suggestions, arise. Considering Hooke died in 1703, i.e. 6 years before Kneller even purchased Whitton House, and he was already not very active in his final years, a direct connection to Kneller is unlikely. So, the first possibility is that this drawing is simply not in Hooke's hand. It bears no identifying marks, and the only provenance information available on it is that it was acquired by the British Museum sometime between 1753 and 1833. A second possibility is that, if the drawing is indeed Hooke's, then

[1020] 'Kneller, Sir Godfrey, baronet (1646–1723)', *ODNB*.
[1021] Harris, 'Kneller Hall, Middlesex', at p. 81.
[1022] Ibid., p. 83
[1023] Geraghty, *Architectural Drawings of Wren*, no. 320 on p. 210.

Wren or the Office of Works had it in their archive and consulted it as a model for ideas when they were designing Kneller's house.

There is currently not enough information to prove or disprove a connection between the drawing attributed to Hooke and Kneller's Whitton House. But considering some of the stylistic similarities, instead, an open mind should be kept about the authorship of the drawing at the British Museum.

APPENDIX

Some available primary textual evidence of Hooke's architectural work

Appendix: Some available primary textual evidence of Hooke's architectural work

Introductory Note

Hooke's diaries are the most valuable primary documentation of his architectural activities. However, as discussed in Chapter I, they only start in 1672 and are not continuous, thus providing only a partial picture. Extant correspondence with clients outside of London provide some additional information, as do the reports Hooke prepared in his capacity as one of the City Surveyors for London. The architectural drawings among his papers at the British Library or those attributed to him in other repositories provide further insight.[1024]

Some of the correspondence, reports, and other texts related to Hooke's architectural practices are listed below, with transcriptions of relevant letters some of which have never been published (i. Correspondence). Most of the reports Hooke prepared for the City are among the collections of the London Metropolitan Archives and Guildhall Library, and have already been identified and studied but a few additional reports not already covered are listed and transcribed below (ii. Reports).[1025] Extracts from unpublished Royal Society meeting records, as well as manuscript notes from Hooke's friend John Aubrey are also provided (iii. Other).

[1024] An annotated list of the manuscript drawings and prints among Hooke's papers is provided in Chapter III, ii, and the images are reproduced in this volume.

[1025] Secondary sources on Hooke's work as a City Surveyor are provided in Chapter IV, ii. 1, ii. 5, ii. 7, and ii. 9.

Appendix

i. CORRESPONDENCE

1. Hooke to Edward Conway, 15 Nov. 1679.

Notes: In June 1679, Edward Conway (*c.* 1623–1683), third Viscount and later Earl of Conway, hired Hooke to help with the design Ragley Hall, his stately mansion in Warwickshire.[1026] In this letter, Hooke introduces a new design for the front stairs to the house, presumably following a request from Conway for a more 'magnificent' entrance. He has sent him some drawings, which he still finds unsatisfactory but hopes to discuss the changes in person when Conway is in London, before the foundation work can begin in the spring.

Source: National Archives, Kew, State Papers Domestic, Charles II, 29/412, fol. 87 [no. 67]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017. A transcription of the letter is available in M. I. Batten, pp. 99-100, although it is missing one line of text from the manuscript and has slightly different paleographical interpretations.

Transcription:

My Lord

I had sooner return*e*d my humble acknowledgments for the

Honour of yo*u*r Lo*rdshi*ps Letter had not an important occasion hindred

me from giving yo*u*r Lo*rdshi*p a positive Answer to yo*u*r hon*our*s kind Invita-

tion; which now necessitates my stay here. I had also sent yo*u*r Lo*rdshi*p

severall designes for the stairs before the Great House, but

that they doe none of them please me. The Ascent indeed is

too long and too high to be w*i*thout doores, which has caused

me to consider afresh the whole Designe, and to vary

the module itself: whereby (considering it is the first &

most considerable ornament of the whole front) I have

cast them to be under the court of the house it self,

[1026] See Chapter IV, ii. 36, for Hooke's work on Ragley Hall.

somew*ha*t of the nature of the Great Stairs at Somerset house,
next the Garden, though much otherwise contrived.
The Portico then in w*hi*ch they are lyes open to the Great Court,
into w*hi*ch the landing is immediate out of the Coach, and thereby
the stairs always lye dry and clean, and it serves as a Vesti-
bule where footmen and meaner attendants may walk w*i*thout In-
cumbring the great Hall. At the head of those Stairs of Stone
the passage opens into the Great Hall which I make fowr score
foot square which leads to the Great Parlor straight
forwards adjoyning to w*hi*ch the Apartments lye very conve
niently. I conceive the Designe to be very magnificent (to
say noe more of it) And that w*hi*ch will abundantly Answer y*ou*r
Lo*rdshi*p's Intentions in all particulars. Nor will the expence exceed
what your Lo*rdshi*p hath already Resolved upon.
I hope the Great affairs of the Approaching Par*liamen*t will necessitate
your Lo*rdshi*p Presence here in Town, before the foundations be
begun to be Layd, that so I may have the Hon*ou*r of Discoursing
this Designe with yo*u*r Lo*rdshi*p before finall Resolutions be made past
Recalling. This I mention not any ways to Lessen the Value of
that module your Lo*rdshi*p now hath, nor any ways to Hinder the
progress of the work it self as now designed. But that I conceive
it will be much better for the work, to begin the foundations
somewhat later in the spring when the fear of frost is perfectly
off. before which time I doubt not to be able (God willing) to be there to
see every thing put into a good order for the beginning and compleating

thereof. I was very much troubled that I heard not of your Lo*rdshi*p being in

town the last time, till the night before yo*u*r Lo*rdshi*p left it ⌜for⌝ that I lost the

[sideways]

Opportunity of Acquainting yo*u*r Lo*rdshi*p w*i*th it, But yet I hope there may be time enough for that affair after t*h*e 22th [sic]

of January, when yo*u*r Lo*rdshi*p designes to be in London. In the mean time some draughts Ready for yo*u*r Lo*rdshi*ps perusall shall be made by

my Lord

yo*u*r Lo*rdshi*ps most humble and most

November the 15th 1679 obedient servant Robert Hooke

2. C. Magenis to the Earl of Conway, 6 Mar. 1680.

Note: Conway's assistant C. Magenis (his forename is unclear), presumably reporting from London, is relaying Hooke's message that the latter will wait on Conway before the foundation of Ragley Hall is laid.

Source: The National Archives, Kew, State Papers Domestic, Charles II, 29/413, fol. 70 [no. 38]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017.

Transcription of the relevant extract:

. . . Mr Hoock sayes he will endeavour to waite
on yo*ur* Lord*shi*pp ⌜before⌝ the Foundation of the House is
layd . . .

3. Edward Harley to Conway, [? Apr.] 1680.

Notes: Conway's cousin Edward Harley (1624–1700), politician and fellow of the Royal Society 1663–1685, was presumably involved in the design of his own house in Brampton Bryan in the 1660s, and took an interest in Ragley Hall. In this letter, he critiques Hooke's design, a model of which he has seen at Ragley, finding the entrance door too small and thinking that a trench below the foundation level may be needed to prevent dampness in the house and the front court.

Appendix

Source: The National Archives, Kew, State Papers Domestic, Charles II, 29/413, fol. 141 [no. 84]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017.

Transcription of the relevant extract:

[recto]

. . . I am very glad Mr Hook attends y*ou*r Lo*rdshi*p to see
*th*e Laying of *th*e foundation of *th*e Hous, In *th*e model
I saw at Ragley, *th*e Door apeared to mee too
narrow for an Entrance becom*m*ing such a
Structure, I take liberty allso to doubt if
there be not a trench sunk deeper then the

[verso]

foundation Where *th*e Earth is left higher
then *th*e Cellers it may occasion *th*e inconvenience
of some dampish natyres either in *th*e building
or *th*e Court before *th*e Hous . . .

4. Hooke to Conway, 23 June 1680.

Notes: On 19 June 1680, accompanied by Roger Davys, the master joiner who had collaborated with him on many projects, Hooke set out on his journey to Ragley, stopping in Oxford along the way.[1027] In the second leg of their journey, Davys was seized with a fever, delaying their arrival and causing them to miss Conway, for which Hooke apologises with this letter. While waiting for Conway's return on the night of 25 June, Hooke used the opportunity to view the countryside, meet various people including "Leonard an ingenious German mechanick servant to Van Helmont, the Butler who had lived 3 years in Constantinople. Holbert a Carpenter but a Pap," and view the yet-unsold section of the library of Warwick physician Henry Stubbe (1632–1676). On 26 June, he recorded that he "Viewd module, shewd many faults, made a great many alterations, put the 2 great stairs into one and viewd the situation and ground round about."[1028]

[1027] *Diary i*, pp. 446-447.

[1028] It is likely Hooke took Davys with him for the latter to make the necessary alterations to the model. For details on Hooke's trip to Ragley, including the identification of the people he met there, see Chapter IV, ii. 36.

Appendix

Source: The National Archives, Kew, State Papers Domestic, Charles II, 29/413, fol. 310 [no. 163]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017.

Transcription:

My Lord.
It has been my great unhappinesse (which I am
much troubled at) to disappoint yo*u*r Lo*rdshi*ps expecta
tions, and even now when I verily[?] believe your
Lo*rdshi*p expected me not. I came forth on Saturday
w*i*th a Designe to waite on yo*u*r Lo*rdshi*p upon munday last
but some misfortune upon the way stay*e*d me late[?]
I could not Reach Ragly before yo*u*r Lo*rdshi*p was Remo
ved from thence. My Lord I will not venture[?]
in this scribble to make any further apology for
my self, but doe only beg your Lo*rdshi*p would please
soe soon as may be to send what further Com-
mands yo*u*r Lo*rdshi*p has for

My Lord
From yo*u*r Lo*rdshi*ps house at Ragly — Yo*u*r Lo*rdshi*ps most humble
June 23. 1680 — Serv*an*t Robert Hooke

5. Hooke to Conway, 20 July 1680.

Notes: Writing a month after his visit to Ragley, where he made alterations to the model and the design of the staircase, in this letter Hooke introduces further changes to the overall plan while addressing Conway's requests. The accompanying drawing is not extant, nor are any of Conway's letters outlining his criticism. This letter is illuminating in multiple ways. It shows the relationship between the client and the architect, especially in a case where the latter is over a hundred miles away, and the former not only has an interest in architecture himself but is directly involved in the construction by providing the materials and arranging workers.[1029] The letter also gives insight into the layout of a house fit for a gentleman with aspirations of further upward mobility;

[1029] Conway had also inherited his father's vast collection of books which included numerous architectural titles; see Chapter IV, ii. 36. See also Chapter II on reading practices.

accommodating private apartments as well as a library and a room to keep valuable items such as instruments, manuscripts, and rarities under lock and key.

Source: The National Archives, Kew, State Papers Domestic, Charles II, 29/414, fol. 57 [no. 31]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017. A transcription of the letter is available in Batten, pp. 100-102, though with a few different paleographical interpretations.

Transcription:

My Lord,

Since yo*u*r Lo*rdshi*p has hon*ou*rd me w*i*th the freedom of Declaring my thoughts I presume further to acquaint yo*u*r Lo*rdshi*p that as to yo*u*r Lo*rdshi*ps objections I was well aware of ⌜them⌝ and soe I hope I shall be the better inabled to answer them (though it may be somew*ha*t more Difficult at this Distance) first then I am assured there will not be £100 difference in the charges at most between the way of the module and this propounded by me though I con ceave the house will be £500 the better. The Hall in that way, yo*u*r Lo*rdshi*p is sensible will at best be Dark at the uper or best end thereof, It will be open to the passages of the Stairs Parlor &. It will be covered by a half pace, and It will have noe prospect save at the Lower end.
In this I send, the uper end is next the light, Lyes free from the trouble of passage, it may be as close or open as shall suit w*i*th the present use.
next the building in this is noe more then in the other contrivance, & yet in the second Story there are the same quantity of Roomes and more conveniently Disposed (which seems to be yo*u*r Lo*rdshi*ps principal objec tion) for there will be 8 great appartments all of convenient accesse w*i*thout interfearing. vi*delice*t 4 backwards towards the south west and as many forwards towards the North east, for as 5 & 6 are drawing roomes to the fowr

apartments backwards, soe 3 & 4 to as many as large and as good forwards.
next my Lord, because I perceive yo*u*r Lo*rdshi*p is not pleased to have a Vestibule for
footmen, I have only Layd the middle third part of it ⌜(I)⌝ for a staircase allowing
only what projects w*i*thout the sides for an open portico and half pace to the stairs
in the middle of the ascent (half the ascent being w*i*thout & half w*i*thin the house) this is
marked in the Draught of the first Story w*i*th, 2,2,2,. I have Layd one third of it 3, to
inlarge the chappell making the Gallery thereof which is even w*i*th the floor of the Hall.
4 is the chappell which is cleer from the ground to the top of the first story. the other third
part 5 I have joyned to the Stewards Room 6. And because yo*u*r Lo*rdshi*p likes a Vestibule
though not for footmen I have placed it in the very centre of the house. 7.
which is open to the top in an octagon, and serves to lead into all parts of the
house both in the first & second Storys, and will be of as great ornament &
convenience as any thing can be in the house. this at fowr of its sides
Receives light from the Roof, behind some of the other ⌜sides⌝ ascend the stairs into
the Cupelo at the top, which stands upright of the 8 columns of *th*e vestibule
and will be a very fair Room, the contrivance of w*hi*ch I hope I shall have time
enough to acquaint yo*u*r Lo*rdshi*p w*i*th hereafter. This Vestibule takes off that great
length yo*u*r Lo*rdshi*p objects against in the Hall soe that the Remaining part 8
is but 66 foot, which is somew*ha*t shorter than that Designed by yo*u*r Lo*rdshi*p. And
for the breadth which is 44 foot is tis $\frac{2}{3}$ ds of the Length and soe is of a good pro-
portion, yet because yo*u*r Lo*rdshi*p may think it too wide, because 4 foot more
then the former, by a row of Corinthian pillers of timber which serve to sup-
port the Gallerys .35.35.35. in the 2nd story. I can Reduce it to 33 foot in the cleer
which is half the length and a good proportion also, between w*hi*ch Pillers in the wall

Appendix

behind them I leave neeches which may serve to Receive Statues, Busts, vases or the like, according to the most noble way of the Antients and some of our better sort of modern buildings. In the east Pavilion is 9 the little parlor which is 20 foot wide and 30 foot Long, to which 10 is a w*i*thdrawing Room sufficiently Large w*i*th Prospect towards the front & towards London. this little parlor may be a with drawing Room to the Hall at other times. In the North Pavilion is 11. the Library of the same bignesse w*i*th the Little Parlor, & 12 a closet to study in & 13 a room to

[verso]

to lock up Instruments manuscripts Raritys etc. those last two roomes are to be only 12 foot high and soe over them will be two roomes convenient for a bedchamber & study for the Chaplaine or Library keeper. the like may be done over the dressing roomes of the Great Apartments backwards in this Story and over all the Dressing Roomes of the apartments in the 2nd story which will be very convenient for Roomes for servants. The whole back part of the house in this story I alter little Soe that y*ou*r Lo*rdshi*p will have besides a hall vestibule and staircase, a chappell and a Library too and convenient Roomes to it. And also a Stewards Room & Little Parlor w*i*th their conveniences & 10 Great apartments, every of w*hi*ch have free access to the great Staircase, hall Chappell Library Great parlor Little parlor entrance etc. w*i*thout at all intermingling or running through one another, and yet in the 2nd story you may goe round the house through each of them. Each of these apartments are compleat having w*i*thdrawing room bedcham ber, closet, Dressing room, Stool Room, servants Room, and back stairs. I hope this may suit w*i*th y*ou*r Lo*rdshi*ps Designe for I know not well where to leave out anything. however my Lord if y*ou*r Lo*rdshi*p shall yet think the hall or any other parts either too big or too little w*i*thout altering any thing of the Designe either forwards or backwards the middle

part may be made shorter & narrower or wider & longer as y*ou*r Lo*rdshi*p shall best like, for the Difference of charge is little more then for floor & Roof. for the contrivance of the Garrets I shall have time enough to acquaint y*ou*r Lo*rdshi*p. But the Draught of the celler story I have added. 8.9.10.11. are appropriated to *th*e staircases. 18 is the lower part of the chappell 19.20.21. are vaults about 4 foot Deeper then the present ground for. Ale, wine, & cider 13 is the great vault for small beer 90 foot long & 37 foot broad. 14 is the vaulted passage from end to end of the house. All the other Roomes may be assigned to w*ha*t use y*ou*r Lo*rdshi*p pleaseth & may be vaulted or not as there shall be occasion Y*ou*r Lo*rdshi*p I hope will by these Scetches understand the Designe of the whole in generall soe as thereby to see w*ha*t is consonant or not, w*i*th y*ou*r Lo*rdshi*p*s* Intentions. Door windows chimneys ornaments etc. are here omitted, being obvious enough, but when I shall have the Ho nour to know y*ou*r Lo*rdshi*ps further pleasure concerning these, either compleat Draughts of every part, or a small module of the whole shall be provided by

July t*h*e 20. 1680 My Lord

Gresham Colledge

y*ou*r Lo*rdshi*ps most humble & most obedient Serv*an*t Rob*ert* Hooke

If y*ou*r Lo*rdshi*p can provide Materialls of Brick & Stone Against the Spring and have a good number of hands for working the Stone fit for Setting It will be much better for the work to begin in March when the fear of the frost is pretty well over and soe the mortar will be thoroughly dry before ⌜next⌝ winter and the whole house may be coverd before Michaelmas. for if this should prove a hard winter there would be a necessity in the Spring to take down a great part of the walls that should now be built but especi

ally the Stone work, As I have found twice in the building of S^{t} Paules and in a Stair

case at Mountacue house & severall other places.

6. Hooke to Henri Justel, 10 Aug. 1680.

Notes: Henri Justel (1620–1693), scholar and librarian in the court of Louis XIV, was an active correspondent of the Royal Society. Within a few months after this letter, he would receive an invitation from Charles II to organise the royal manuscripts, and by the end of the next year he move to England and be elected fellow of the Royal Society. Responding to Justel's 13/23 June 1680 letter, Hooke is requesting information on a new method for removing earth used for Louis XIV's building, perhaps referring to additions to or landscaping at Château de Versailles. The minutes of the Royal Society meetings where Justel's previous and later letters are discussed do not mention any responses to Hooke's particular inquiry.[1030]

Source: BL, Sloane MS 1039, fol. 174.

Transcription of relevant extract:

. . . I should be very gladd
to understand from you the new way invented for Removing earth made use
of in the Kings building of w*hi*ch you were pleas*e*d formerly to promise me a Descrip
tion. . . .

7. Hooke to Conway, 17 Aug. 1680.

Notes: Providing further insight into seventeenth-century architectural practice, this letter illustrates how Hooke used drawings and models to communicate his designs long-distance, and directed some of the construction work via contractors at either end.

Source: The National Archives, Kew, State Papers Domestic, Charles II, 29/414 fol. 132 [no. 67]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017. Please note that in the Calendar of State Papers, this letter bears the wrong attribution in the header as "Capt. Philip Wilkinson to the Early of Conway." A transcription of the letter, using slightly different paleographical conventions, is also available in Batten, pp. 102-103.

[1030] Birch, vol. 4, pp. 27, 35, 44-45, 55, 60, 64.

Appendix

Transcription:

My Lord

I never designed those draughts for any other use then to explaine my meaning to yo*u*r Lo*rdshi*p which without them it would have been very difficult to have done intelligibly by words.

That soe yo*u*r Lo*rdshi*p understanding the severall Designes might pitch upon the best, which being done I always designed a farther explanation of all particulars by a module and necessary draughts. My ocassions will not permitt my absence hence at this time, But if they would I humbly conceive it will be much better for Dispatch to send Leonard up with the old module and in a fortnight or there about he may Returne w*i*th it back againe compleated & Rectifyed, when twill be very easy for M^{r}. Holbert or any els yo*u*r Lo*rdshi*p shall imploy to proceed w*i*th the whole work without much if any further Direction. Here I can be often w*i*th him and he may have what help is needfull for Expedition, Soe that he will rid more in a week here than in a month in the Country

In the meantime M^{r}. Holbert cannot well doe amiss if he proceeds in carrying up the front and Rear Walls and all the crosse walls for those apartments which are Little if at all altered but only in doorways. and leave the crosse walls that are to be under the Hall & Staircase till Leonard Returne to be then carried up, for as they will quickly be done, they having not much work, soe being best of

all sheltered by the out walls they will best indure to be
carryed up last of all. And in the mean time to hasten
w*i*th the front wall which will be most exposed to the
frost that if possible it may be Dry & well thatched before
the Cold weather come. My Lord when Leonard is come
up yo*u*r L*ordshi*p may be assured noe time shall be lost in the
Doing of it, at least he will want noe help nor materialls
M^r^. Davys having already upon my desire provided for
him a very good workman and convenient place, nor shall he
want any necessary Directions or overseeing that can
be given him by

My Lord

yo*u*r L*ordshi*ps most humble

Gresham Coll*ege* Aug. 17. 1680 & most obedient ser*va*nt R*obert* Hooke

8. Richard Jones to Conway, 28 Aug. 1680.

Notes: Richard Jones (1641–1712), the Earl of Ranelagh, was the only son of Arthur Jones (d. 1670) and Katherine Boyle (1615–1691), one of Robert Boyle's sisters. Before he moved to Gresham College, Hooke had been staying at Lady Ranelagh's house in London, where he met Conway, and which has been described as "the meeting place for men of influence, in particular for the growing community of scientific virtuosi (associated with the circle of Samuel Hartlib)."[1031] A few years before this letter, Hooke had helped Lady Ranelagh with an addition to her house in Pall Mall, some minor work in her house in Chiswick, and with the acquisition of a house in St. James's Square, though with occasional friction.[1032] Her son, Richard was interested in architecture

[1031] Jardine, *Curious Life of Hooke*, 88.

[1032] On Hooke's work for the Boyle family, see Chapter IV, ii. 29 to ii. 31. There is evidence of occasional friction between Hooke and Lady Ranelagh: upon being scolded by her on 20 June 1678, Hooke angrily noted "I will never goe neer her againe nor Boyle," and on 5 July 1678 complained about her "still finding fault;" see *Diary i*, pp. 364, 365.

and around 1690 would design his own house and gardens next to Chelsea Hospital, of which he was the Treasurer. He advised Conway on Ragley Hall, as well as his project at Newmarket in Suffolk. It is noteworthy that in the letter he is asking Conway to send him the drawings (presumably by Hooke) for his house so he can show them to and get an opinion from Hugh May (1621–1684), architect to Windsor Castle.

Source: The National Archives, Kew, State Papers Domestic, Charles II, SP 29/414, fol. 153a [no. 78]; accessed via *State Papers Online*, Gale, Cengage Learning, 2017.

Transcription:

London August [torn] 1680
My owne Dear lord
On sunday last I went to Windsor, where I was very well and
Kindly received by my master and his brother, and our great Mi-
nisters; I stayed amongst them till thursday night and
then returned to London, and sent the next morning for M^{r}
Hookes: but as yett he is not come to mee But I believe on
Munday morning I shall see him: If I doe, y*ou*r lord*sh*ip may
Expect to hear from me by Tuesdays post. In the meane
tyme pray lett M^{r} Hallbord send me up *th*e draughts of your
Hous, for I have discoursed of it to M^{r} May at Windsor:
but he will give mee noe opinion till he sees the draughts
By my next you shall know[?] all *th*e news I have heard[?, torn]
since my being here, w*hi*ch is not much
y*ou*r own most truly
Ranelagh

9. Hooke to Richard Levett, 20 June 1691.

Notes: Robert Aske (1619–1689), master of the Haberdasher's Company in 1685, had bequeathed money to build almshouses for the Company. A few months after his death in 1689, Hooke was appointed architect, and after the charity's approval by the Parliament in 1690, land was purchased in an open field in Hoxton, north of London. Then master of the Haberdasher's Company,

Richard Levett (*d.* 1711) oversaw the project which was eventually completed in 1692.[1033] In this letter, Hooke complains about the carpenter Mr Bankes who has refused to sign a contract and worries that he will increase the costs and use lower quality materials. In order to force Bankes to comply and prevent any delays to the work, Hooke suggests signing a contract, presumably a disingenuous one, with another carpenter. He also explains that the masons are unable to procure the stones for the forty smaller columns in less than two months, and suggests using pilasters and arches of 'rubbed and gaged brickwork', a technique developed in the seventeenth century where sculptural elements were carved into the brick, especially in window heads.[1034] It is noteworthy that Hooke is willing to change the design to hasten the construction in line with the availability of materials.

Source: BL, Sloane MS 1039, fol. 131; a part of this letter is published in a modernised transcription by Lisa Jardine.[1035]

Transcription:

Hon*our*ed S*i*r
Mr. Bankes does absolutely refuse to signe the contract which
you gave order to Cap*tai*n Mould to get ready for him. he says he will abide
by his first proposalls, but I perceive he will interpret them as to his per-
-formance, how he pleaseth, nor will he hear of making the timbers of his
floors, window frames, or door cases, square without wain or Sap, Soe that
as the work may be performed he may be much dearer than any of the
other proposers duely limited as they ought to be. In the mean time, I
have forborn to give him any Directions for the Hospitall, till he doe
comply w*i*th your Last orders to me concerning him. But S*i*r we shall
suddainly have occasion for a Carpenter, or be forced to Delay the work
if therefore you think fitt the other Proposer (I acquainted you with) will
be willing to Signe the same contract, either for the whole celler Story or for

[1033] Anthony Charles Hotson, 'Late-Stuart Moneyed Men and Their Patronage of Sculpture and Architecture, circa 1660 to 1720' (unpub. PhD diss., Courtauld Institute of Art, 2006), p. 176.

[1034] On gauged brick, see Campbell, *Brick: A World History*, 190; Lynch, *The History of Gauged Brickwork: Consevation, Repair and Modern Application*.

[1035] Jardine, *Curious Life of Hooke*, 246

half of it as you shall direct. and possibly that may make Mr. B. comply
The Masons that are pitched upon to be treated with, being not
able to procure stone for the 40 smaller Columns in lesse then two–
months time would have made us loose a great part of this Summer.
I have therefore thoughts to supply that Defect by an other form of Pil-
lasters & arches and to make them of rubbed & gaged Brickwork if you
approve of it. I will therefore stay from giving any directions concer
ning these particulars till I receive your Orders. But in the mean
time the Bricklayers ⌜doe⌝ proceed with all the hast can be made to finish
the walls of the Celler story. for the whole building, which I hope will
be neer compleated by the end of next week. I doe therefore earnestly
intreat you to send, with what speed you can, concerning these particu
-lars, your Directions and Com*m*ands to

Hon*our*ed S*ir*

Gresham Coll: June 20. 1691. Your most faithfull humble

Serv*an*t Rob*ert* Hooke

10. Edward Southwell to Hooke, 25 Jan. 1693.

Notes: In late 1692, Robert Southwell (1635–1702) and his son Edward (1671–1730) approached Hooke for advice on a solution against flooding at their Kings Weston estate near Bristol.[1036] In his diary, Hooke noted discussions on "the key, the wharfing, the mole, and the sluces," several models made by Harry Hunt, and his advice regarding calculation of water pressure and retaining walls.[1037] In this letter, Edward is requesting further calculations following adjustments made to the original design. The project took a few more months to finalise, with Hooke still reviewing models and Edmund Dummer's draughts for the gates in June 1693.[1038]

[1036] On Hooke's work for the Southwells, see Chapter IV, ii. 41 and ii. 49.

[1037] *Diary ii*, pp. 195, 196, 197, 204, 211.

[1038] Hooke had already built an expertise in hydrostatics by this time. As part of his City Surveyorship, he had worked on the Fleet Canal and Thames Embankment projects (Chapter IV, ii. 7 and ii. 9), and at the 2 June 1686 meeting of the Royal Society, he had presented a carefully rendered sectional drawing of a waterwork then under construction at Hockney (Figure III-287). See also Chapter IV, ii. 48 for Dummer's work at Plymouth Dockyards.

Appendix

Source: BL, Sloane MS 1039, fol. 168.

Transcription:

[recto]

London. 25. Jan*ua*ry 1692/3

S*ir*

We sent last night into the Country to know what labourers will demand to remove a yard Square of our Mudd. and we mentioned the rates in London of 4.^{l} 5.^{s} 6^{d}. for Dry Earth.

But this is chiefly concerning the side of our intended sluce. We already call this sluce the very Lungs of the whole worke: for by some dexterity in venting out water and letting in the Tide, we may have the better government of our Gates. So as to open them or keep them shut as we think fitt.

Now the size of the sluce must be adjusted to the Dimentions and Capacity within of holding Water. And as to this we find the length of the Dock above the Wall, will be 600. Yards. The Breadth appears now by the Mudd in *th*e Woodden Modell to be very different, but in generall we may reckon it. at 60. Yards broad to the topp of the Mudd, where the Tide commonly flowes.

[verso]

But then this Mudd lying down in great banks from the North to the South . takes up much of this room; and I leave you to make some Estimate thereof by this account. That the Mill Stream close under the South rock is about .2. foot deep. But from thence the

Mudd rises gradually towards the North
bank. So as it is .7. foot deep at .40. foot
distance from the rock. And then .10. foot
deep at .70. foot from the rock, and afterwards
much more steep, and indeed so thick and
hard below, as that they could not drive
down the Spitt[?] above .16. foot, w*hi*ch however
was not the true bottom of *th*e Rock.

Alsoe we are still uncertain how high the
wall shall be built, whether at .30. foot or
36. So that if you can conform any Estimate
of the Sluce to these calculations, it will be
a very good worke, and you will continue
to oblige

S*ir* Your most hum*b*le Servant

Edward Southwell

11. Hooke to Robert or Edward Southwell, 11 Dec. 1701.

Notes: In 1701, the Southwells once again turned to Hooke for advice, this time on a water supply design for the estate of their neighbour, Thomas Chester (1668–1705). Joseph Gillmore, a mathematics teacher from Bristol, had been contracted to design an engine to transport water from a nearby pond to Chester's estate at Knole in Almondsbury, and Robert Southwell presumably wondered whether he was up to the task. The five letters and two sketches regarding this project have largely been ignored, or simply undiscovered, among Southwell's papers, RS, MS 248.[1039]

The first letter to have survived from the exchange is a 17 October 1701 note from Chester to Southwell (MS 248/16), giving a brief synopsis of the design. This may have been the

[1039] On Chester, see Waters, *Genealogical memoirs of the families of Chester of Bristol, Barton Regis, London, and Almondsbury, descended from Henry Chester, Sheriff of Bristol 1470* . . . , 37-38. Gillmore is an elusive figure; his identification as a mathematics teacher from Bristol is from his plan of the City of Bath printed in Robert Pierce's book on water therapy; see Pierce, *Bath memoirs: or, observations in three and forty years practice, at the Bath, what cures have been there wrought* . . ., facing p. 1.

information Hooke based his 11 December letter (MS 248/18; transcribed below) on, advising against Gillmore's design and claiming that it is based on a false principal of hydrostatics. It is possible he meant this to be a private note but Southwell appears to have shared it with Gillmore, who obviously took great offence and defended his design in a sharp language with a 2 January 1702 letter to Southwell (MS 248/17; transcribed below). Southwell forwarded Gillmore's letter to Hooke with a note dated four days later (BL, Sloane MS 1039, fol. 101r; transcribed below). In his 29 January response (MS 248/14; transcribed below), perhaps his final written opinion on the matter, Hooke defended his criticisms of Gillmore's design and to better explain how he thought the pressures in the cylinders would operate, enclosed two drawings. It is likely that the rough sketches on the back of Gillmore's letter (Figure III-315) are in Hooke's hand and that he then had these carefully drawn in ink wash by an unnamed assistant (Figures III-316); or, using his expression, "caused the adjoyning Schems to be Drawn."

The final outcome of the project is unclear. According to a letter he sent to Edward Southwell (RS, MS 248, no. 15), Chester sided with Gillmore and decided to go ahead with the latter's design but as his letter is dated a week before Hooke's last, it is not known whether his opinion may have been swayed later by Hooke's renewed objection and sketches.

Source: RS, MS 248/18.

[This letter may have been sent as an attachment to another correspondence as it is not signed or dated, although it is indeed in Hooke's handwriting. The date and corroboration of the author are from the secretarial note scribbled on the back of the letter.]

Transcription:

M^{r} Gillmore (if I doe rightly apprehen his meaning) says

That the perpendicular fall of his pond water is 32 foot, that

is the power he hath to move his work and to raise the water of

the fountain 217 foot perpendicular to the Cestern at the house

The 40000 cubic feet of water in the pond (w*hi*ch he says is 200 foot

Long. 50 foot Broad & 4 foot thick) would by an Angelicall Engine

(wherein there should be noe friction nor any Leakage or Losse of water

or any other impediment from the pipes, valves, cocks, or weight of

the parts of the engine to be moved) raise 5894 feet of water
out of the fountain and Deliver it into the Cisterne at the house
217 foot above the s*ai*d Fountain. But such an engine is hard
to find and not every where to be putt into practise. I fear not
in the present Designe. by some engines possibly there may not
be raised ½ this quantity and by some not a quarter or a sixth
and by others none before they be (by Dear bought Experience) Re-
formed. what M^{r} Gillmore's engine may doe I know not enough
of it to give any judgment concerning it. But if I may venture to
conjecture by his way of calculating the weight of the water in the
inch & half pipe I doe feare he proceeds upon a fals principle of
Hydrostaticks, which like a Will with a wisp has mislead many a
man into the maze or Labyrinth of a perpetuall motion whence tis
hard to find the way out without a claw or Guide. He must have ⌜as much⌝ force
to move his forcers as will more then counterpoise a Cylin
der of water of the same Diameter with his force barrells and 217.
foot high otherwise they will not work or move at all: and the
water will need lesse force to carry it from the fountaine
to *th*e cestern in pipes of 6 inches bore then in pipes of one inch
or one inch & half. I wish he had sent a more particular descriptio*n*
of the engine that now works at the house G. & to wh*at* perpendicular height
the water is there raisd to be put into the cestern at the House E. possibly
I might have prevented some needless Expenses about the new Designe.

Appendix

12. a. Robert Southwell to Hooke, 6 Jan. 1702.

Notes: *See the notes for correspondence no. 11.*

Source: BL, Sloane MS 1039, fol. 101r.

Transcription:

Spring Garden 6th Jan*ua*ry 1701/2

S*i*r
The inclosed Letter from Mr. Gilmore came last
night to my Son. You are well enough acquainted –
with the Temper of young Undertakers, not to wonder, that
they are displeas'd, if they are not admir'd or at least
approv'd.

I hope to have health enough to wayte on you tomorrow.
In the meane time, wishing you a very happy New Yeare, I
am very truely

S*i*r
Your most affect. friend
& Servant
Robert Southwell

12. b. [attachment] Joseph Gillmore to Edward Southwell, 3 Jan. 1702.

Notes: *See the notes for correspondence no. 11.*

Source: RS, MS 248/17.

Transcription:

Worthy Sir Bristoll January 3^{d} 1701/2
I admire D^{r} Hook should give his oppinion so sharp when in *th*e
mean time he acknowledgeth he doth not know enough of *th*e
Engine to give any judgement concerning it, neither am I
lead by Will with a Wisp into a Maze or Labyrinth nor grounds
upon a false principle, neither can D^{r} Hook or any man
in London calculate *th*e weight of water otherwayes then

Appendix

what I have for every common Surveyor knoweth how to
calculate a Cylinder of water as well as *th*e best Artist and
I do aver and justifie on a 217 foot Alt of pipe 1 In ½ bore
there is no more then 20 Gallons of water or 160 pounds
wine measure, our force barrils are 2 In diam*eter* and *th*e wheel
32 foot diam*eter th*e bottom of *th*e pond is equall with *th*e top of
*th*e wheel, Now *th*e question is wheather or no a pipe of 3 Inch
bore layne from *th*e bottom of *th*e pond to *th*e top of *th*e wheel will
not Work a Crank of 6 Inches, and *th*e force barrills 2 In. diam
when *th*e quantity of water in *th*e pond is allmost 1000 Tuns
and supplyed continually by a Spring in *th*e dryest Summer
2 In: diam*eter* Now D^{r} Hook mistakes for I never pretended to
Raise *tha*t vast body of water of 1000 Tuns into *th*e Cistern but
onely as a Stock to force *th*e wheel and if it be true as
he reports *tha*t if *th*e Diam*eter* of *th*e Cylinders or pipes *th*e 217
foot perpendicular had been 6 In diam*eter* (which is 2550 pounds
weight or 318:$\frac{79}{100}$ gull) would need as little force as a
pipe of 1 ½ then I have done.

The Engine at G *th*e Horse is fastened to a Crowne wheel
whose diam is 13 foot and on it 120 boggs each bogg 4 $\frac{1}{12}$ In
assunder this forcer a Lanthorn[?] of 8 Rungs[?] *th*e Spindle lyeth
Horizontall and *th*e Crank 6 In to play *th*e forcer to force
*th*e water 95 foot perpendicular in a pipe of 2 In diameter
which holds 15 Gall. $\frac{5}{10}$ or 124 pound weight which is but 36
pounds adds and we have 20 times the advantage I should
be glad to be convinced if I am in error

I am going to Survey Major Yeat's Estate your Worhship being my first
Imployer in this Country to Introduce me into this Imploy
I give you humble and hearty thanks for all favours
in Generall and am your Wo*rshi*ps

Obedient

Servant

Jos*eph* Gillmore

13. Hooke to Robert Southwell, 29 Jan. 1702.

Notes: *See the notes for correspondence no. 11.*

Source: RS, MS 248/14; see also Figures III-315 and III-316.

Transcription:

Most Hon*our*ed S*i*r

What I writ in the account I gave you of a designe of M[r] Gilmore about Raising water is every part of it true. And I assert it as demonstrative in Hydrostaticks as *tha*t 2 & 2 are 4 in Numbers. I never told him that he had not ⌜rightly⌝ calculated, the content of water in a pipe of

an inch & half bore, 217 foot high (I having not examined it as knowing it to be nothing to the purpose: for that the force necessary to make the forcers work must be more then the pressure of a Cylinder of Water of 217 foot hight and of the bignesse of the bore of the force barrells (which I then knew not, but now he asserts to be of 2 inches Diameter) And now I say that it must be soe though his pipe were but of ½ an inch Diameter. nor would it need to be more though it were of 6 inches Diameter which would contein a Cylinder of water of 144 times the quantity or weight that the half inch pipe conteins. Herein I conceived it was that he went upon a mistake as thinking it otherwise, and I am now by the Expressions in his Letter assured that he did soe. And that was the principle which I called <u>Will with a wisp</u> because I have known many Men mislead by it into an opinion that they have found a perpetuall motion. I am sorry he tooke my Expression soe hainous, as if I had designd it was an affront to him, which I had not the least thought

of, my intention being only to give Your Self, Most Hon*our*ed S*i*r, my reall thoughts of it, at Least Least soe far as I was then informd concerning it, which was too little to give a true Judment of the whole[?] undertaking. for I knew not that there was soe plentifull a supply of water nor doe I as yet know how He hath contrived his overshott wheel. But this I say in Generall that if his matters be contrived well the spending of the 1000 tun of water by a Descent of 32

foot may raise 140 tunns or better 217 foot high but the smallness of the pipe by w*hi*ch
it is to rise will be noe manner of help to promote it. Nor had I any thoughts of his raising
up the pond water but did rather suppose that he raised water for the use of the house from
some spring or fountain neer adjoyning to the wheel. the Dashing of *th*e water of the 3 inch pipe
against the vanes of *th*e 32 foot wheel will not be of Little effect, but all that water should[?] be
conveyd
as bucketts or boxes on the Rim of the wheel to be dischargd from them at the bottom & not
before
soe that the whole weight of the water of that 3 inch pipe may operate on the wheel the whole
32 foot of its Descent. which is [?] enough to be contrived, & will then be able to work the forc-
cers of a two inch Barrell nay of a greater if there were need. to conclude if there ⌜be⌝ a plentifull
supply of water at all times to work the wheel as it is now affirmed and that this water
hath 32 foot fall to descend by the wheel, there is noe Difficulty to Contrive an Engine to raise
a sufficient Stock of water to Supply the house tho[?] 600 yards Distant & 217 foot higher
then the Spring or fountain from which it is to be raised, But whether M*r* Gilmores Engine
be Soe contrived I cannot say because I know not the contrivance. nor did I sensure any thing
concerning it save only that the Dashing of *th*e water of the 3 inche pipe against the vanes of
the 32 foot wheel (which I was told was the only thing was depended on for Strength to move the
forcers & the smallnesse of the pipe for the conveyance I was assured were mistakes. and that
he may further satisfy himself about the pressur of the Cylinders of water I have
caused the adjoyning Schems to be Drawn.[1040] where ab. represents the Cylinder of
water of ½ an inch diameter and cd one of 6 inches which is 12 times the Diameter or
144 times the content, these communicate the pressure to each other by bc. now if the pres-
sure of *th*e 144 cylinder be greater then the pressur of ab the smaller Cylinder to resist
it the*n* surely the water would rise higher in the smaller then it doth in the great & then
there would be an easy way to make a perpetuall motion by conveying the water of the top
of the smaller into the greater which would be Lower. But Experience will convince that
the surface of the greater will be as high as the surface of the other. But I forget my
self, & I fear I have tired You with this tedious Subject I doe therefore must earnestly beg
your pardon, and Desire you will ascribe it to my zeale to Expresse my self as far as I am

[1040] Figures III-315 and III-316.

able. Most Hon*oure*d S*i*r

Your most Obliged & most faithfull
humble servant R*obert* Hooke

Gresham Colledge
Jan 29. 1701/2.

ii. REPORTS

1. Hooke and John Oliver to the Court of the Company of Carpenters, 29 Jan. 1671.

Notes: Hooke and John Oliver, as City Surveyors, give their opinion to the court of the Company of Carpenters regarding the formation of a separate company of sawyers. They explain that sawyers have already been part of incorporated companies such as the Carpenters, Shipwrights, and Joiners, and that their separation would mean loss of work for these companies and cause increases in labour costs, especially for the King's navy. They add that the use of a saw can be perfected by anyone of ordinary capacity.

Source: The transcript below is copied, with slight modifications (e.g. the contractions are expanded and 'v's converted into 'u's where appropriate), from Appendix G in Edward Basil Jupp, *An Historical Account of the Worshipful Company of Carpenters of the City of London, Compiled Chiefly from Records in Their Possession*, second edition with a supplement by William Willmer Pocock (London: Pickering & Chatto, 1887), pp. 308-309.

Transcription:

1st Feb*rua*ry 1671.
This day the Surveyo*u*rs of new buildings (in pursuance
of an Order of this Court of the 23th [sic] of March 1670)
brought unto this Court the draught of a Letter subscribed
by them to Mr Attorney Generall wherein they sett downe
their opinions conc*e*rning the inconveniency of Incorporating
certaine workemen in and about this Citty exercising the
trade of sawing The Tenor of which Letter is as followeth,
v*idelice*t:

S*i*r

Appendix

Wee have in pursuance of your desires informed ourselves of the nature and use of the Sawyers worke within the Citty of London And wee find it to bee a part of the buisnesse [sic] of the Carpenters, Shipwrights Joyners etc. (who are already incorporated into Companyes) and that it hath alwayes hitherto beene done by the said Artificers App*re*ntices or by persons hired as Labourers And wee are further informed that the Incorporating of the Sawyers will bee a manifest injury to the aforesaid trades by depriving them of a considerable part of their imployment and will be a greater to the publicke by raising and inhancing the price of Labourers and Labourers worke and a most insufferable prejudice to trade and naviga*ti*on and most especially to his Majestyes navall affaires It is therefore our humble opinion that the said imployment ought to bee and remaine in the same manner & way it is now used without any Limita*ti*on or restraint and that such trades as make use of the sawe may have Lib*er*ty to imploy such as they shall find ingenious and carefull in doing their worke And the rather because wee are certainly informed any ordinary capacity may attaine the perfec*ti*on of it in a few dayes Besides wee doe not conceive such a Company will bee of any Publiq*ue* good to the Corpora*ti*on of the Citty All which considera*ti*ons notwithstanding wee humbly submitt our opinions to your hono*ur*s most excellent Judgment and subscribe ourselves

Yo*ur* hono*ur*s humble serv*an*ts

Rob*er*t Hooke

John Oliver

Guildhall Januar*y* 29 1671

The which Letter being here read was Liked and approved of by this Court and ordered to be entred into the Repertory.

Appendix

2. Hooke, Oliver, and Christopher Wren, 'Rates to be paid to masons at Fleet Ditch', 9 Oct. 1674.

Notes: In Hooke's hand with Wren's autograph approval below it, this is a survey and approval of the masons' work and rates for the railings and stairs at Fleet Ditch. See Report 2 below for a similar one for London churches, written five days later.

Source: The Pierpont Morgan Library, New York, MA 8602. The Morgan Library collections catalogue indicates this document to be 'from Sussex Collection of Autographs, 222'.

Transcription:

[recto]

In pursuance of an order of this Com*mit*te*e* bearing date
1674. we have viewed the Railes and Staires
set up by Mr. Fitch at Fleet Ditch and to the best of
our judgement & information we value them as followeth

For every foot Running measure of Railing mentioned in *th*e
measurement extending on each side the said Ditch —
timber & workmanships included seaven shillings

For the sawing framing workmanship & setting up
of four pair of stairs leading down to the said
Ditch at bridewell Blackfryers Fleet bridge
and Flatlane bridge timber not included Eighty
pounds. Dated Oct. 9th 1674. Rob: Hooke
Jo: Oliver

Having considered the aforesayd worke & the rates allowed, I doe
heerin concurre with the Opinion of the Surveighers of the City.
Chr: Wren

[verso]

The Surveyors Cert*ifica*t for
Rates to Masons ? at Fleet
ditch.

dat*ed* oc*to*ber 9. 74.

Box [I?] No 337

3. Hooke, 'The Rates allowed for masons' work about the churches', 14 Oct. 1674.

Notes: This autograph report by Hooke on the authorised rates for masons' work on London churches follows another one dated five days earlier on rates for the Fleet Ditch; see Report 1 above.

Source: Current location of this report is unknown; it was sold as lot 263 in the Bonhams auction of 'the Enys Collection of Autograph Manuscripts' on 28 Sep. 2004, https://goo.gl/RFjGx2.

Transcription:

The Rates allowed for masons worke about the

churches are as followeth		s	d
For Portland Black p*er* foot	—	02	6
For Portland ashler wrought and set p*er* foot	—	02	10
For Purbeck paving wrought & set p*er* foot		00	09
For the superficiall work of all small mouldings ⌜wrough in Portland stone. .⌝ p*er* foot		01	06

October *th*e 14. 1674. certify[d] by me Robert Hooke.

4. Hooke's autograph survey of the Monument, 10 July 1679.

Notes: Until the publication of Hooke's diaries, the Monument to the Great Fire of London was attributed to Wren, whose papers these are noted to have originated from.[1041] None of the documents appear to be in Wren's hand but of the fifteen folios, the first is signed by Hooke and is indeed in his handwriting; this is transcribed below. The rest of the folios contain further surveys of quantities used and costs of materials and labour, written in several hands one of which might be Hooke's.

[1041] William Dunn Macray, *Catalogi codicum manuscriptorum Bibliothecae Bodleianae partis quintae fasciculus primus, viri munificentissimi Ricardi Rawlinson codicum classes duas priores . . .* (Oxford: University Press, 1862), 621-622.

Appendix

Source: Bodl., MS Rawlinson B363, fol. 1. An image of this document was reproduced in R. T. Gunther, *Early Science in Oxford*, vol. 7, p. 527.

Transcription:

An account of the quantity and value of the work done
at the Column on fishstreet Hill.

The solidity of the whole fabrick from the Bottom of the Lowest plinth to the Black marble under the urne, the cylinder of the Staircase only deducted, and the stone for the carving not allowed for, is - - - - -		37396
The Black marble that covers the capitall - -		287
Lanthern		64.

From this solidity Deduct.

For 8 great reeches -	281
For 3 doors & passages -	289
For 3 sides Reveyled -	486
For Rough Block -	1499
For Rubble work -	7185
in all	9740
The Remainder is	27656
To this add upon the account of the carving in the front, Dragons & festoons	540

For marble stepps.
For marble paving.
For marble Harth pace.

This is the true account of the measurements
taken by M[r]. Leybourne by my Direction and assistance

and the computation made thereupon by us both
all w*hi*ch was done together w*i*th the assistance and in
the Presence of M^rs^. Marshalls freinds & Servants
by us — witnesse my hand —
July the 10th. 1679 — Robert Hooke

There is demanded 39 foot of solid stone at the top of the Column more then what I could measure.

5. Hooke, 'Report of a survey of a wall built by John Searle adjoining the west passage into Christ's Hospital', 16 Dec. 1680.

Notes: As this is a report Hooke submitted to the Court of Alderman of the City, it is likely he is acting as a City Surveyor here. He is asked to determine the value of a party wall built by John Searle bordering Christ's Hospital.

Source: LMA, CLC/210/G/A/019/MS22591.

Transcription:

[fol. 1r]

To the Right Hon*our*able the Lord Major
and Court of Aldermen –

In pursuance of an order of this Hon*our*able Court bearing –
date December the 2*n*d 1680 I have viewed a Wall
built by John Searle adjoining to the west passage
into Christs Hospitall and have caused the same
to be measured and the quantity thereof adjusted
And thereby find that the moyety of the said
Wall accounted as a p*ar*ty wall from the Foundat*i*on
To the topp of the first Storey is two rodd three
quarters and 3 foote, the vallue of which con -
sidering the time when it was built and the materi -
alls wherewith it is built (which is in great part
of the old materialls of a wall which was –

standing in the same place. I have computed after
the rate of foure pounds and Ten shillings p*er*
12 : 8 : 6 Rodd to amount to Twelve pound Eight Shillings
6 : 13 : 0 and Six pence. For Interest for 9 yeares Six –
19 : 1 : 6 pounds Thirteen Shillings, which together
maketh Nineteen pounds, One Shilling Six –
pence which is the sum*m*e I conceive the –
Hospitall ought to pay for the same All
which nevertheless I humbly submitt to the
grave wisdome of this Court
Dated Dec i6 1680 Rob Hooke

[fol. 1v]

[smudged numbers]

[fol. 2r]

Decemb 14 1680 — The mesure of A fence wall built by Christ hospitall and maid use of by Mr Se*a*rle – –

The moyety of which wall is 1 Rod ½ at 5 - 5 p*er* Rod – – – – – – £ s d 07 - 17 – 06

Mesured p*er* me
William Beale

[fol. 2v]

Measure of a p*ar*ty wall next
the Church between Christ
Hospitall and John Searle

And Mr Hookes measure about a p*ar*ty wall
Next the Lodge to the Grayfryers.

6. 'Mr Hooke's Certificate', 16 May 1682.

Notes: Not in his hand nor bearing his signature, this is probably a draught report Hooke dictated to an amanuensis during his visit to Guildhall on 16 May 1682.[1042] On the verso, along with the identification 'Mr. Hooke's Certificate', is a pencil sketch of a pump (Figure III-157), likely a mechanical solution he proposed to the problem of heavy rain accumulation mentioned in the report. The implied culprit, 'Doctor Barbon' or Nicholas Barbon (1637/1640–1698/9), was a major figure in the rebuilding of London. Although he had studied medicine in Leiden and Utrecht, he abandoned his medical practice in pursuit of profit with speculative property development. He advocated free trade, propounded the economic benefits of consumption, pioneered fire insurance, and remained a contentious figure among the learned or genteel society.[1043]

Source: BL, Sloane MS 1048, fol. 62; Figure III-157.

Transcription:

[recto]

The partyes whoever they are att whose Charge
the passage is to bee repaired are the
trespassers and ought to make satisfac*t*ion for *th*e
trespasse done and forthwith to remove the
cause of any other tresspasse by Amending
the paveing but especially the sinkes or
dreines which are the principall cause of this
nuisance they being not bigg Enough upon any

[1042] On that day, Hooke noted meeting with John Lawrence (*d.* 1692) at Guildhall and receiving payments for work; *Memoranda*, p. 153. On Lawrence's support of Hooke's scheme for the rebuilding of London, see Chapter IV, ii. 1.

[1043] Barbon received a few undetailed mentions in the early diaries. On Barbon, see *ODNB*, and McKellar, *The Birth of Modern London: The Development and Design of the City 1660–1720*, *passim*. John Lowther (*bap.* 1642, *d.* 1706), F.R.S., found Barbon's speculative building practices inspirational for his own development of the port town of Whitehaven; see Chapter IV, ii. 34; Collier and Pearson, *Whitehaven 1660–1800*, p. 27.

suddain raine to receive the water that comes downe
the Court but that it must run over into the passage
and soe sinke through and Rott *th*e timbers
under; which will be very prejudiciall to *th*e
house To redresse which the best way is to
summon Doctor Barbon and such other as are
supposed to have Interest in the said passage before
the Lord Mayor or before the Com*issione*rs of Sewers
whoe meet every weeke att Guildhall for by this meanes
itt will bee determined whoe is to amend the same
and an order may be obtained for *th*e doeing of
itt within a time lymitted within which time if
it be not amended It will bee plaine whoe
may bee Indited att *th*e Sessions or Sued att
Common Lawe for *th*e Tresspasse Committed
May *th*e 16th 1682

[verso]
Mr Hookes Certificate
[pencil sketch of a pump; Figure III-157]

iii. OTHER

1. Selected extracts from his diaries on construction materials and techniques.

Notes: While diary extracts on specific projects are included in Chapter IV, a few general architecture-related notes are listed below.

Source: *Diary i.*

- 8 Jan. 1674 (p. 79): "Saw Dr. Wallis. His letter to Hevelius about his Machina Coelestis, and his calculating the Distance of the arches analytically."
- 28 Mar. 1674 (p. 93): "At Mans coffee house — Met with Cap. Hamden, Story, etc., discoursing about Arch and theater and Fish Street Column."
- 2 May 1674 (p. 100): "To Thomkin[1044] in Water Lane. Much Discourse with him about watches. Told him the way of making an engine for finishing wheels, and a way how to make a dividing plate; about the forme of an arch; about another way of Teeth work; about pocket watches and many other things."
- 7 July 1674 (p. 111): "Saw Mr. Story[1045] who returnd from Holland Saturday last. Told me of the new Lutheran church 70 foot Diameter. [a tiny plan of the church] and 70 foot over at Amsterdam. Of the Burghers hiordiage[1046]. Of the Jews new Synagogue 100 foot square."
- 10 July 1675 (p. 169): "The Arch of Pont de St. Esprit is 90 foot and 3 foot thick."
- 6 Sep. 1675 (p. 179): "With Sir Chr. Wren. Long Discourse with him about the module of the Temple at Jerusalem."
- 26 Sep. 1675 (p. 182): "Riddle of arch, of pendet continuum flexile, sic stabit grund Rigidum."[1047]

[1044] Thomas Tompion (*bap*. 1639, *d*. 1713), the horologist and scientific instrument maker Hooke collaborated with; see *ODNB*.

[1045] Abraham Storey was a London mason and property developer; see Chapter IV, ii. 10 (Royal College of Physicians) and ii. 28 (St. James Square).

[1046] 'Hiordiage' does not seem to be a proper word, and the handwriting in the original manuscript (which almost reads as 'bird cage') is difficult to interpret. The reference may be to the 'Burghers Hall' in the new Town Hall.

[1047] The catenary arch; see the annotations for Figure III-165. cf.

– 29 Jan. 1676 (pp. 214-215): "To Sir Ch: Wren with Mr. Hill and Aubery. Mr. Henshaw and Dr. Holder there. Discoursed about petrifactions of Bodys, about plaisters, about framing glasse, Form of arch light gold statues, Staining marble, Filligreen sodering with bran, about printing stuffs and guilding stuffs, about Dr. Moors notions, about ghosts and spirits."

2. Royal Society meeting minutes, 1666–1669; selected extracts on brick-making.

Notes: 1666 was a pivotal year for Hooke; after the Fire of London, he presented a plan for its rebuilding and was subsequently appointed one of the City Surveyors for the rebuilding of London, launching his architectural career.[1048] He also began thinking about building materials, developing a new way of making bricks. While this material is available in print form, some extracts are included here to make them more easily accessible.

Source: Birch, vol. 2.

– 24 Oct. 1666 (p. 117): "It was moved, that the materials for building, and the several sorts of earth for making brick and tile, might be now considered of by the society; who were desired to think upon it against the next meeting. It was mentioned, that there was good terrace[1049] in England, especially in Derbyshire."
– 31 Oct. 1666 (pp. 118-119): "Mention being again made of considering the several sorts of clay fit for making bricks, Sir Paul Neile affirmed, that there was a certain clay in England, which made as good founding bricks, as any of those call'd klinkers in Holland.
The earl of Kincairdin remarked, that the klinkers in Holland differed from the other bricks chiefly in the manner of burning; those, that lie near the fire, making the more lasting bricks; the remoter from it the softer.
Another member mentioned, that Mr. Wylde had a way, by mixing several sorts of earth together, to make hard and lasting bricks.
It was observed by another, that Sir George Downing had commended the bricks made in the isle of Ely, as being equal in goodness to any of the Dutch klinkers.
Mr Hooke took notice, that those earths, which will vitrify, make the more lasting bricks.
It was ordered, that Mr. Hooke should make trials of several earths by burning them in a wind-furnace, to see, which kind would yield the best brick."

[1048] See Chapter IV, i. 1.
[1049] Hooke had used tarras at Fleet Canal and Bridewell Hospital; see Chapter IV, ii. 7 and ii. 11.

Appendix

- 14 Mar. 1667 (pp. 156-157): "Mr. Williamson produced extracts of two letters, one written by Dr. Collins in Moscow, . . . the other written at Dantzick, February 19, 1666/7, mentioning, that the same mechanician had invented a mill, which would form bricks as fast as many hands could take away."
- 28 Mar. 1667 (p. 163): "Mr. Hooke proposed an expeditious way of making bricks, the consideration of which was referred to the next meeting."
- 4 Apr. 1667 (p. 164): "It was ordered, that Mr. Hooke produce his method of making bricks with; less charge and more speed than hath been hitherto used . . ."
- 11 Apr. 1667 (p. 167): "Mr. Hooke was put in mind to bring in a model for his expeditious way of making bricks . . ."
- 18 Apr. 1667 (p. 168): "Mr. Hooke produced his model for brick-making, and promised to produce another at the next meeting."
- 25 Apr. 1667 (p. 171): "The experiments appointed for the next meeting were
  1. Another method of Mr. Hooke for making bricks."
- 9 May 1667 (p. 172): "The brick-engine was produced again, and tried with some clay; but that being too stiff, the trial succeeded not.
  The members discoursing afterwards upon the whole, and considering, that this way would require vast spaces of ground to lay the bricks upon thus made, thought best to lay it aside."
- 26 June 1669 (p. 388): "as also a description of a burning concave of thirty four inches diameter, melting all sorts of metals, and vitrifying brick in less than a minute."

3. Royal Society meeting minutes, 1686–1696; selected extracts.

Notes: If Hooke wrote lengthy lectures on architectural theory or kept detailed records of his practice, these have not survived or else lie undiscovered. His lecture on the Tower of Babel along with his illustrations are lost, indeed the only trace of them are among the Royal Society meeting minutes where it is also possible to find hints about his architectural practice. Thomas Birch's four-volume edition of the meeting minutes of the Royal Society, published in 1756–1757, span the period between the Society's foundation in 1660 and the end of 1687; these are now available online. The minutes covering the rest of Hooke's lifespan, 1688–1703, remain in manuscript among the Archives of the Royal Society. Below are selected extracts relevant to Hooke's architectural activities.

Appendix

Sources: RS, JBO/8 and JBO/9.

Transcription of selected extracts:

[24 Oct. 1688, JBO/8/p. 225]

The second letter [by Henri Justel] gave a farther account of the ruines
of the ancient city between Tripoli and Alexandria, of
which formerly. That there had lately been brought from
thence 6 Columns, some of them 45 foot high, but of
what order of Architecture is not said.
This gave occasion to speak of the orders of pillars.

S^r^ John Hoskins observing that that which is commonly
called the Gothic, has been by some thought to have been
Arabek. The ⌜same⌝ said there was great difference among Archi
tects about the diminution of Columns, some holding that
the biggest diameter of the Shaft out to be in the Middle
of the length, others at one third from the bottom, others
that there is no swelling at all . . .

[31 Oct. 1688, JBO/8/p. 227]

The last days minutes mentioning the diminishing of
Columns, the Vice pres*id*e*n*t informed the Society, that
some Architects carry them equall till a third, and
then diminish; others diminishing from the bottom.

M^r^ Hook supposed the reason of this custome of di=
minishing Pillars was to make them show the higher . . .

[12 June 1689, JBO/8/p. 227]

. . . M^r^ Hook shewed his manner of Imitating Mocha-stones,[1050] by
rubbing a smooth glas*s* on a smooth stone on which ground Ivory-
black colour was laid, and then separating them without slip-
ping, in which case the colour being drove by the Air, as it first en-
ters the crack, will stick to the Glas*s* in such a manner as are the appea-

[1050] A variety of agate.

rances of the figures of Trees etc. in Mocha-Stones . . .

[17 July 1689, RBO/8/p. 270]

. . . A Discourse arising about the reason, why some Sands are so hard when under water, and others again so loose such as are there calld quick-sands. It was the generall Opinion, that the firmness proceeded from the bigness of the grains of Sand, whereas in quicksands the Atoms of Sand are generally very small. On this Occasion Mr Hook related that at Buckley house in Pickadilly the walls were placed on a bed of gravell which being not above 3 foot thick, the Builder was unwilling to trust the weighty stacks of Chimneys on that foundation. Wherefore digging through it they came to a stiff Clay on which the Chimneys were built; but contrary to their expectation, the whole stacks of Chimneys when built subsided many feet, so that there was a necessity to pull them down & built again upon piles . . .

[24 July 1689, JBO/8/p. 271]

. . . Mr Hook affirmed, that the Monument on Fishstreet-Hill is founded on a bed of Gravell not above 6 foot thick: under which there is a great bed of Clay not capable to bear the weight. So that that bed of gravell alone suffices to support so vast a Fabrick . . .

[4 Dec. 1689, JBO/8/p. 283]

. . . Mr. Hook read a discourse concerning the Antiquity of Naturall Philosophy, and shewing the great Advantages, that might accrue to the Nation, if People were incouraged to discover the Secrets of the severall Artifices used in India, and elsewhere, whereby the foreign Manufactures are made, that are brought to us.

Mr Hook presented to the View of the Society an Indian Book of Arithmetick written in the Brachman-Character. The same said that He had seen gold wire for the covering Silk for weaving, brought from India far suppassing in finenes*s* those made here.

The ⌜same⌝ described a sort of Cloath, which, He said, was made by the Indians in America about 500 Miles to the Northwest of Carolina, being a course sort made of a Substance, that is very strong, but neither flax, nor hemp, nor like any Materiall, he had hitherto seen in England. But he shewed the manner of the Texture thereof, which he imitated by bobbins, as they weave bone-lace.

[5 Nov. 1690, JBO/9/p. 9]

. . . Mr Hook related, that in digging for the foundation of St Magnus Church they found the Warfing or Campshead of *th*e bank of the Thames lower, than the very bottom of the River, as it is at present, whence he argued, that the very bed of the River has been raised many foot above its ancient Channell . . .

[26 Aug. 1691, JBO/9/p. 55]

. . . M^r^. Hook said, that Mortar made of Tile dust and Lime was as good, as tarras[1051], to hold water: And that it was an usuall thing in some Countries of England, to make floors by first laying on of Loam, and then Chalk stawed on it, which as the Loam dries, they beat into it; and that this will make a Floor hard enough to thresh upon. . .

It is ordered, that M^r^. Ozenam's Dictionaire Mathematique and M^r^. Perraults Architecture generale de Vitruve be procured for the Society's Library . . .

[28 Oct. 1691 JBO/9/pp. 59-60]

. . . On mention of the Instrument for preserving fire burning under water, there arose some discourse about smoaking Chimneys, and M^r^. Fatio gave a Description of two fashions of Chimneys to carry smoak, the one with one or more plates of tinn set Sloaping like a valve with a hole above it, in the Chimney to prevent the return of the smoak, when

[1051] See footnote 1049.

beat down by an eddy wind, which is most commonly the cause
of smoaking Chimneys; And the other was by covering the
top of the Chimney, and making two appendages to the sides there-
of open both at ⌜the upper and lower part of *th*e funnel⌝, whereat the smoak should have
passage, when the Eddy wind beats down ⌜the⌝ wind.

M^r^. Hook said, that a hoop all round the Chimney of a
good breadth open both above and below with the funnell close
at topp hath been used for this purpose with good success.

Halley gave an account of Sr Christopher Wrenn's
contriving of a Chimney for the gunners room at Whitehall
under the eddy of the Banqueting house, and long Gallery, viz
that it was encreasing the draught of the Chimney by having a
double funnell, one whereof fed the fire with Air, and came
[continued on p. 60]
under the hearth, whilest the other did carry the smoak, which
being prest by the Air, that descended by the other funnel went
away with so much force, as not to be bent down at any time
with the Eddy winds . . .

[18 May 1692, JBO/9/p. 85]

. . . D^r^. Hook read an account of the severall opinions concerning
the Tower of Babel, from Herodotus, Strabo, and others; thereby
shewing, that the immense hight thereof is fabulous, and that the
whole did not exceed the perpendicular hight of a Stadium, and
that the Egyptian Pyramids were near as great buildings . . .

[25 May 1692, JBO/9/p. 86]

. . . D^r^. Hook read a farther Discourse, concerning the Tower of Babell gi-
ving his own opinion of the magnitude, and structure thereof he also
gave a translation of a Letter of Pietro de la Valle, describing the Ruines
of the said Tower, he produced likewise a figure thereof according as he
conceived it to have been, shewing the proportion and Symmetrie thereof,

which was contrived to deceive the Eye, and make it appear vastly higher, than really it was.

[1 June 1692, JBO/9/p. 87]

. . . D[r]. Hook was desired to hasten his Apparatus for management of the long Telescope lately given the Society by M[r]. Hugens. And in the mean time Halley was ordered to view the Scaffolding of S[t]. Pauls Church to see if that might not conveniently serve for the present to erect *th*e Object' glass thereon for viewing such of *th*e Coelestiall Objects a; now present themselves.

[22 June 1692, JBO/9/p. 89]

. . . Dr Hooke read a Lecture, wherein he further discovered concerning the Forme, Magnitude, Materialls, Construction, and Use of the Tower of Babylon, or Beli[?], Explaining Divers of them by Draughts, and Delineations there shewn . . .

[13 July 1693, JBO/9/p. 133]

. . . D[r]. Hooke Read a Lecture about Earthquakes indeavouring to explaine some other Mythologys of Ovids Metamorphosis to this effect as Particularly that of the Gygantomachia, which he supposed had also an Allusion to ⌜in⌝ that Expression in Genesis, where it is sayd, And there were Gyants in the Earth in those days, or times and not to the attempt of the Nimrodians to build the Tower of Babel, and that because these Gyants were soe mentiond before the Flood of Noah. And soe Ovid hath placed in before the flood of Deucalion. Besides he thought it might be worth considering, whether the Hebrew word, which the Septuagint have Rendred by Gygantes, may not signify also Earthquakes, or Subterraneous Powers, especially in the 9[th]. verse of the 14[th]. of Isaiah.

[2 Jan. 1695, JBO/9/p. 176]

. . . D[r]. Hook produced his portable Camera obscura, but it being candle light, nothing could be seen but the candles. It was ordered to be shown at the next meeting before the Society sitt . . .

Appendix

[9 Jan. 1695, JBO/9/p. 177]

Dr Hook shewed the use of his portable Picture=box, by placing it against the Flame, which it represented very lively painted on the focus of the Glass: but it required that the Object be luminous or strongly illuminated, to make a perfect distinct figure . . .

[6 Mar. 1695, JBO/9/p. 182]

It was tried what were the Ingredients of the Cement for the old Roman earthen Water-pipes found in Fleet ditch[1052]. The Cement being put into the fire was found to smell strong of Pitch and Rosin, and it was supposed that a third Engredient was Brickdust . . .

[27 Mar. 1695, JBO/9/p. 184]

. . . Dr Hook said that he had found out a Method of describing a very great Circle, by a small pair of Compasses, but capable of doing it, with great exactness seen to a thousand foot Radius. This he promised to produce when he had drawn up a full account thereof.

[17 Apr. 1695, JBO/9/p. 186]

. . . Dr Hook produced an artificiall stone made into a Knife handle which seemed very weighty and took a pretty good polish. The specifick Gravity thereof was found by experiment to be to that[?] of Water as 12 to 5.

[30 Apr. 1695, JBO/9/p. 188]

Dr Hook said that he was told that the hardness of the artificiall stone he produced the last day was such, that Emery would not touch it, but that whilest it was soft, it would take any impression of a Seal or any Intaglia whatsoever very perfect . . .

[8 May 1695, JBO/9/p. 189]

[1052] On Hooke's work on Fleet Canal, see Chapter IV, ii. 7.

Appendix

D^r^ Hook observed that in Greenwich park the hill on which
the observatory stands is full of round Stones for figure
such as described the last day but differing in size.
. . .
D^r^ Hook read an account of an Invention of his for describing
a very great Circle by a method free from all the Objections
against Ubaldi's rulers or a very long beam, but at this
time he did only signifie that it was done by a small wheel
moving at right angles to the Center . . .

[17 May 1695, JBO/9/p. 190]

. . . Dr Hook shewed the manner of describing a very great Circle
wherof he read a discourse the last day: it was by help of a small
circle of wheel made to turn at right angles to a line affixt
to the centre, and he alleaged that this would certainly keep the
line under the same degree of tension. This entry is imperfect . . .

[22 Apr. 1696, JBO/9/p. 226]

. . . D^r^. Hook said that as to Lime, he had reason
to believe that no Substance whatever would
make so durable a Plaster as Oyster shells, and
that instead of Sand he thought nothing better
than ground Cinders, which two would together
make a much harder and more durable mortar
than any other whatever.

[8 July 1696, JBO/9/p. 241]

. . . D^r^. Hook presented the Society with a brick
found in mark lane at *th*e depth of 25 foot,
where there had long since been a Granary, and
where was found a great quantity of burnt
Corn which seem'd very Sound. On the Brick
which appeared as firm as the old Roman
bricks, there were tolerable well designed (es=

=pecially for the time when it was made) . . .

4. John Aubrey, *Naturall historie of Wiltshire*, 1656–1691; extracts.

Notes: John Aubrey (1626–1697), antiquary, biographer, and writer on many subjects, composed the two-volume *Naturall historie of Wiltshire* between 1656 and 1691. Only the first volume is extant, and remained in manuscript until it was published in a heavily abridged form in 1847.[1053] The two extracts below relate to Hooke's models.

Sources: Bodl., MSS Aubrey 1 and 2.

Transcriptions of relevant extracts:

[MS Aubrey 1, fol.]

. . . Desire of M^r^ Hook, R.S.S. a copie of the Modelle of his excellent Bee-
hive, March 1684/5, better than any yet known . . .

[MS Aubrey 2, fol. 66v]

[[M^r^ Rob*ert* Hook R.S.S. hath contrived a little
Wind-mill, (which stands on ⌜a⌝ stemme[?] no bigger than
a pick-stall) of great use for Dreyning of Grounds.
The Modell is in the Gallery [[Librarie]] of the Royall
Societie at Gresham-college./]] . . . [1054]

5. Aubrey, *Monumenta Britannica*, 1665–1693; extracts.

Notes: Written between 1665 and 1693, Aubrey's impressive antiquarian treatise *Monumenta Britannica* included notes from John Evelyn, Thomas Gale, and Aubrey's own notes on conversations with Wren, Hooke, and others. Not published in his lifetime, despite his efforts, the book is perhaps best known for Aubrey's survey of Stonehenge and 'Chronologia Architectonica', his innovative use of architectural fragments such as windows as tools to determine chronology.[1055]

[1053] Aubrey, *The Natural History of Wiltshire by John Aubrey, F.R.S. (Written between 1656 and 1691).*

[1054] Double brackets (e.g. [[ ]]) denote Aubrey's use of the bracket, in order to distinguish it from authorial notes.

[1055] For a 20th-century facsimile, see John Aubrey, *Monumenta Britannica*, 2 vols. (Sherborne, Dorset: Dorset Publishing Co., 1980–1982). A section of 'Chronologia Architectonica' was published in the 18th century as John Aubrey, *Fashion of windows, in civil and ecclesiastical buildings, before the conquest* ([London?]: s. n., [1766?]). Most recent scholarship on *Monumenta Britannica* include Kelsey Jackson Williams, *The Antiquary: John Aubrey's*

Appendix

The transcriptions below are limited to sections where Hooke's name is mentioned and are deemed relevant to the subject of this dissertation.

Source: Bodl., MSS Top. Gen. c. 24 and 25.

A facsimile of *Monumenta Britannica*, Parts one and two, was published in 1980–1982, with photographs of each page opposite annotations and transcriptions by the two modern editors. While it is a useful source, the transcriptions are at times not verbatim, so the decision was taken to transcribe these selections directly from the original manuscript.[1056]

Transcriptions of relevant extracts:

[MS Top. Gen. c. 24, fol. 240v]

. . . M^r^ Tho*mas* Blount shewed me a kind of white Trocke,
whereof about halfe a bushell, were found under the foun-
dation of Bowe-church-London. Quare Elias
Ashmole what they were? also M^r^ S^r^ Christopher Wren, & M^r^ Hook . . .

[MS Top. Gen. c. 24, fol. 241r]

London
Remarques taken, at the Rebuilding of the City of
London, from D^r^ Christopher Wren Survey*o*r of his Ma*jes*tie's
Buildings, and Survey*o*r of all the Churches in London and also
from M^r^ Robert Hooke R.S.S. Survey*o*r of the Citie of
London . . .
M^r^ Hooke. [in the left margin]
In Bush-lane about twenty foot deep was
found a pavement of opus Tessellatum,
w*hi*ch was bedded in playster, to lay on large square Bricks equilaterally square: and that
imbedded in a Chalke-mortar. / They find Roman Brick-batts in the walles of

Historical Scholarship (New York: Oxford University Press, 2016), especially chapter 2, and Poole, *John Aubrey and the Advancement of Learning*. On 'Chronologica Architectonica', see H. M. Colvin, 'Aubrey's Chronologia Architectonica', in *Concerning Architecture: Essays on Architectural Writers and Writing presented to Nikolaus Pevsner*, ed. John Summerson (London: Allen Lane, 1968), pp. 1-12; Olivia Horsfall Turner, "'The Windows of this Church are of several Fashions': Architectural Form and Historical Method in John Aubrey's 'Chronologia Architectonica"', *Architectural History* 54 (2011), pp. 171-193.

[1056] On the use of the double brackets, see footnote 1054.

old ruines of the Churches; which were built of the ruines
of Roman building. etc. —
Feb. 24. 1685/6 Roman bricks were found by
Algate, Seaventeen Inches Long, eleaven Inches broad, thick one
inch and a quarter. See more in the ⌜Philos*ophical*⌝ Transaction. M*emoran*d*u*m the Bricks
of S^{t} Albans have the same Dimensions. [[M^{r} Rich*ard* Waller R. S. S.]]

[MS Top. Gen. c. 24, fol. 241v]

M^{r} R*obert* Hooke [in the left margin]
In the time of the conflagration, there was a Cellar
vitrificated, by the Oyle. q*uare* where 'twas?

Eryolevis Neapolitana, Smooth Bank-cresses of
Naples: this Plant after the Fire, ⌜did⌝ spred over all the Ruines
in so great plenty, that they did thatch their Shedds,
and Cellars with it. before the Fire, 'twas very rarely to be
found, ⌜viz⌝ it was ⌜grew⌝ growing in the back of Old-street beyond –
Grayes-Inne toward Battle-bridge, but since the fire on
the top of the walles of S^{t} Pauls church in abundance it
never flourished so much as in the Ruines. This from
Tho*mas* Willisell, as also D^{r} Chr*istopher* Meret M. D. & M^{r} Hook.
See M^{r} J*ohn* Ray's Synopsis - pag.

[MS Top. Gen. c. 24, fol. 243r]

M^{r} Hook [in the left margin]
London-stone in Canon-street was a . . . . . .
The stone that stands there now [[opposite to St Swithens Church]]
is only a mock-stone; I have known one of two were[?] out
in my time with Carts etc. / v*ide* Camden . . .

In digging the foundation of St Paules church,
they found severall Welles. q*uare* M^{r} Hooke . . .

[MS Top. Gen. c. 24, fol. 243v]

. . . M^{r} Hooke affirms that the Whole City of London

is raysed since the time of the Romans here, neer twenty
foot. it has been ⌜[[now 1689]]⌝ raysed since the fire two foot ±
and that when the City was first built, the ground
was but a little above high-water-marke for the next
part, e.g. ⌜as at⌝ Southwark.

In digging for foundations, they found at S^{t}
Martin's le grand, in a little kind of Vault, in which
were all the bones of a Skeleton, and on the wall were
Staples [[or manacles]] for his hands and feet, where
he suffered death by immersing: from M^{r} Rob*ert* Hook.

[MS Top. Gen. c. 24, fol. 244r]

From M^{r} Rob*ert* Hooke, R.S.S.
In Bush-lane under the very street twenty foot
deepe was found at the re-building of the City of Londo*n*
* *Opus tesselatum* of little pieces of brickes, marble, flints etc. in this lane in the foundation is Roman mortar: and in digging they found many Roman bricks two foot square, as at Ariconium (i) Kenchester. From as you goe between the two Tower-hill, are to be from Roman brickes.

*there is some of this mosaique worke in the Repo--sitory of the Royall Society w*hi*ch vide.

M*emoran*d*u*m London-stone was not a Lapis milliaris, as
was supposed. It was rooted a matter of ten foot
deepe: the roote was broad [and want a great way
under the Howses] it was kind of Obelisque, and
stands about *th*e middle of London (i) between Ludgate
and Algate: it was ⌜so⌝ fast sett with Roman mortar
that M^{r} Hooke ⌜one of *th*e City surveyors⌝ was faine to get a Derbyshire
miner to breake it up, and he was 2 or 3 dayes
before he could fetch up a little core. This was
for the foundation of a Cellar; the stone remaynes
still, but now scarce peepes his head above

Appendix

ground: ⌜as⌝ I remember before the fire it was about
2 foote or a foote ½ high. Mr Hooke thinks it is
a kind of hard stone.

Q*uare* M^{r} Hooke how much they found ground to be
gained ⌜(i) N*orth* & S*outh* ⌝ from the Thames, by digging foundations
Q*uare* D^{r} Chr*istopher* Wren more particularly of the gain'd
ground from the River of Thames in *th*e Countrey
w*hi*ch he saies was a greater worke by far then any
drayning in Lincolnshire or &. and that it
was certaynly so ⌜a Rom*an* worke⌝ though no history make mentio*n*
of it his Reasons are. q*uare*

London-stone is now since the burning of London, even with the streete, whereas
before the Conflagratio*n* it was three q*uarter*s of a yard (or more) above ground. The
fire did calcine it, which is the cause of its aequation only the upper part of it about two
inches above the surface is to bee soon now [[1673]] it stands just over against
S. Swithins Church close by the signe of the black boy in Cannon street. The longe
st is two foot & about an inch: the breadth, about 6 inches. It was before the fire a kind of
broken cubicall figure. The Stone is now taken upp and buried and sett in the same place about
2 fo
high: planed 1 by 9 vide *th*e demensions *th*e app*er*es above ground.

[MS Top. Gen. c. 25, fol. 7v]

. . . De la Val. in his Travells speakes of the Tower of
Babel, and also of Ezechiels Tombe, and
also of Absolom's Pillar, which was cutt out of a Rock
which Sr Christopher Wren sayes 'twas a pretty thing. insert his
draught of it here, and also desire him to shew me his
⌜excellent⌝ draughts of Porsenna's Monument . . .

[MS Top. Gen. c. 25, fol. 8r]

. . . Robert Hook LL. D. R.S.S. hath read an
excellent Lecture concerning the Tower of Babel,
and drawne a Scheme of it . . .

Robert Hooke's *Praxes:* Reading, Drawing, Building

Yelda Nasifoglu

— VOLUME 3 —

ILLUSTRATIONS

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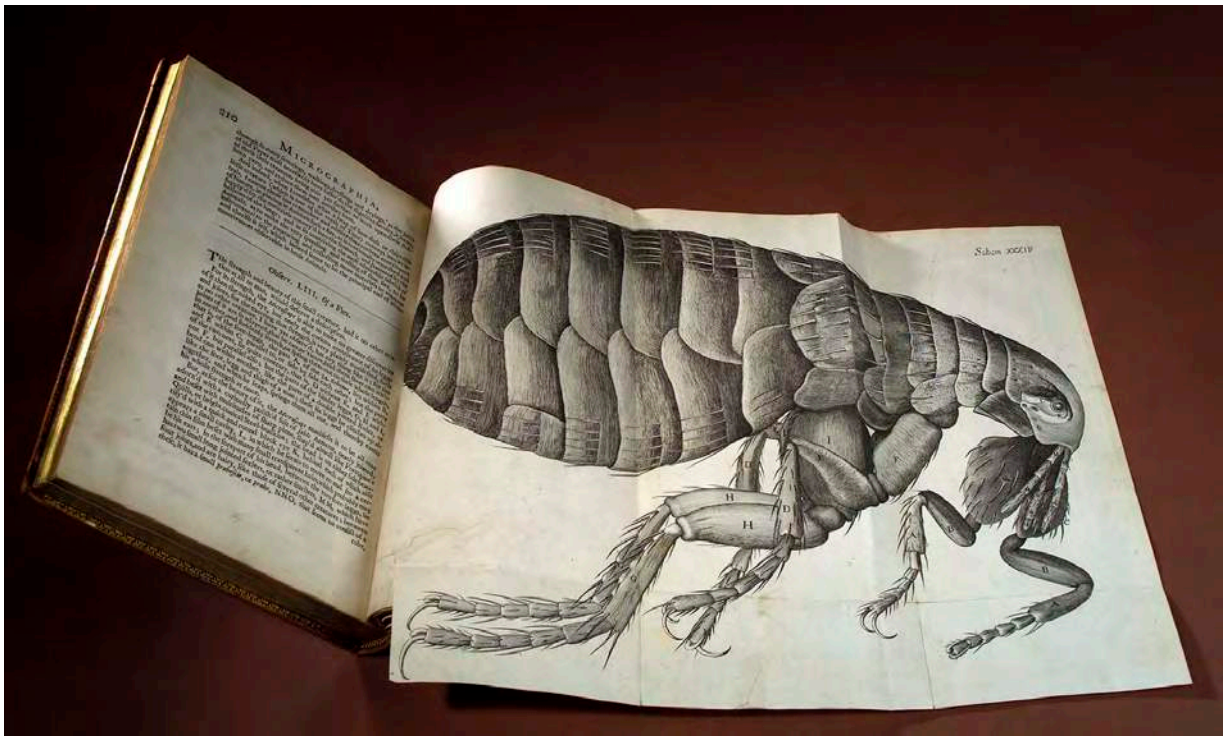


Figure I-1. Robert Hooke, *Micrographia* (London, 1665), Schem. XXXIV, engraving of a flea.
Source: Wellcome Collection.

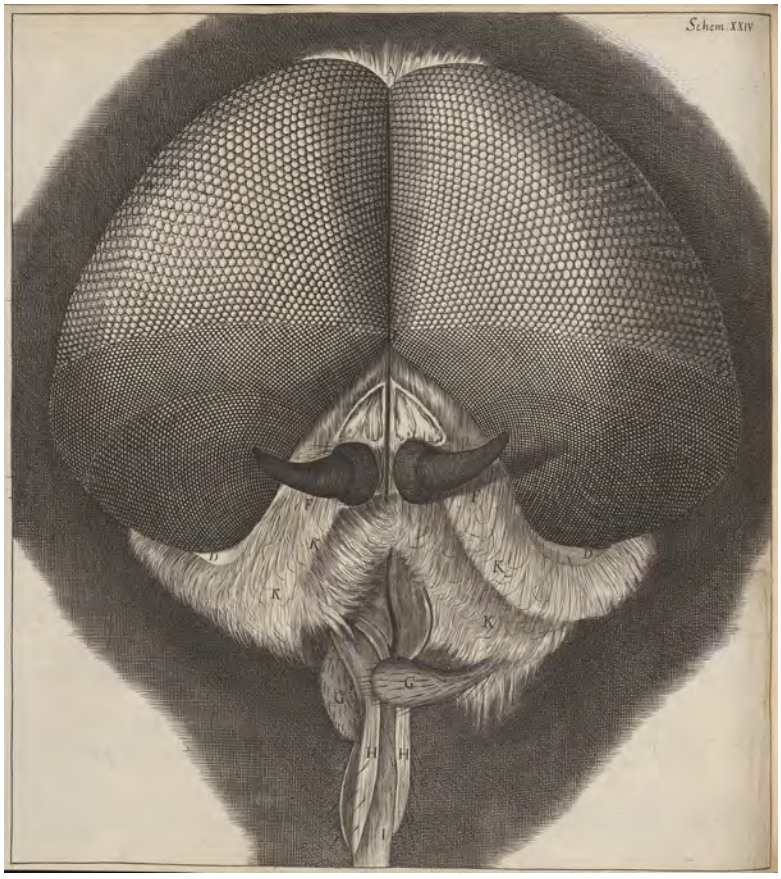


Figure I-2. Robert Hooke, *Micrographia* (London, 1665), Schem. XXIV, head of a grey drone fly.
Source: Wellcome Collection.

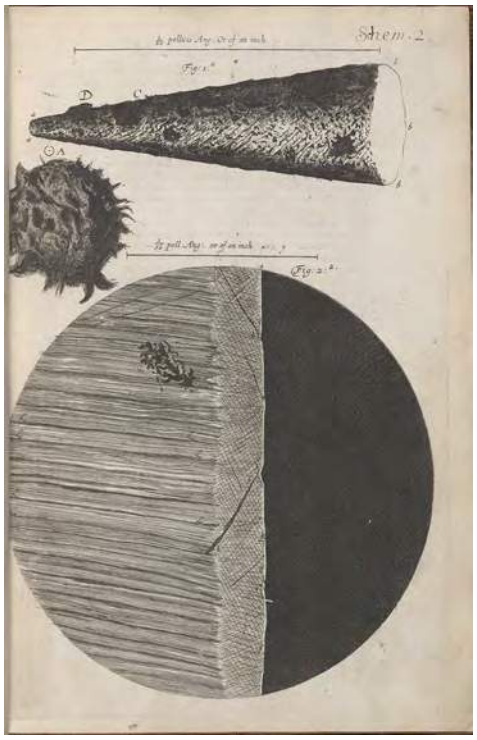


Figure I-3. Hooke, *Micrographia* (London, 1665), Schem. II, magnified view of a sharp needle, printed dot, and edge of a razor. Source: Wellcome Collection.

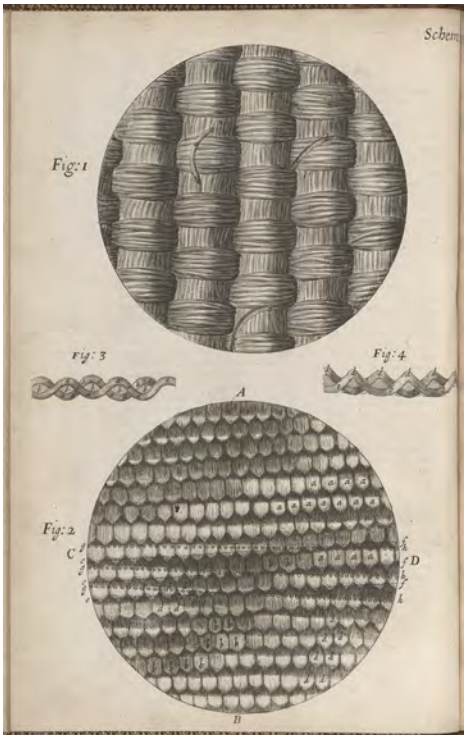


Figure I-4. Hooke, *Micrographia* (London, 1665), Schem. III, magnified view of a fine taffety ribbon and a piece of watered silk. Source: Wellcome Collection.

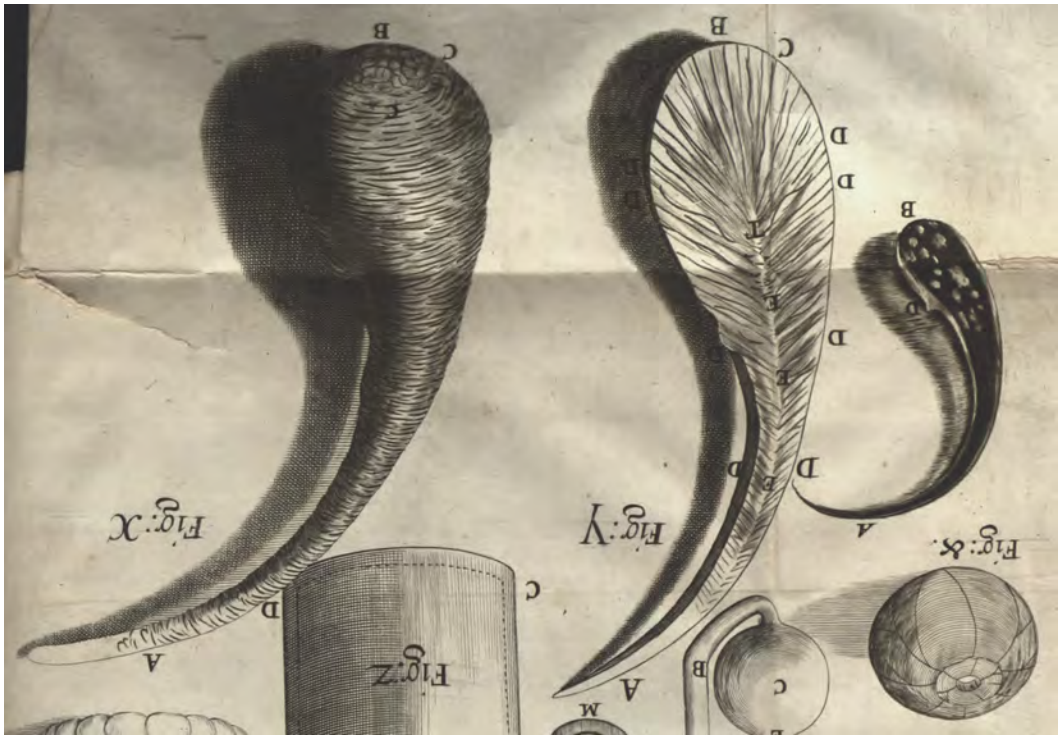


Figure I-5. Hooke, *Micrographia* (London, 1665), Schem. IV, detail showing views and section of a 'Rupert's drop'. Source: Wellcome Collection.

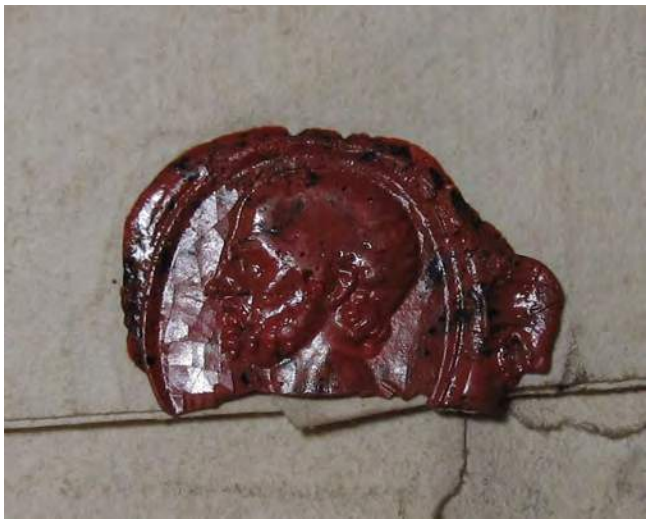


Figure I-6. Detail of Hooke's seal from his 8 April 1682 letter to Martin Lister. Source: Bodl., MS Lister 35, fol. 65v.

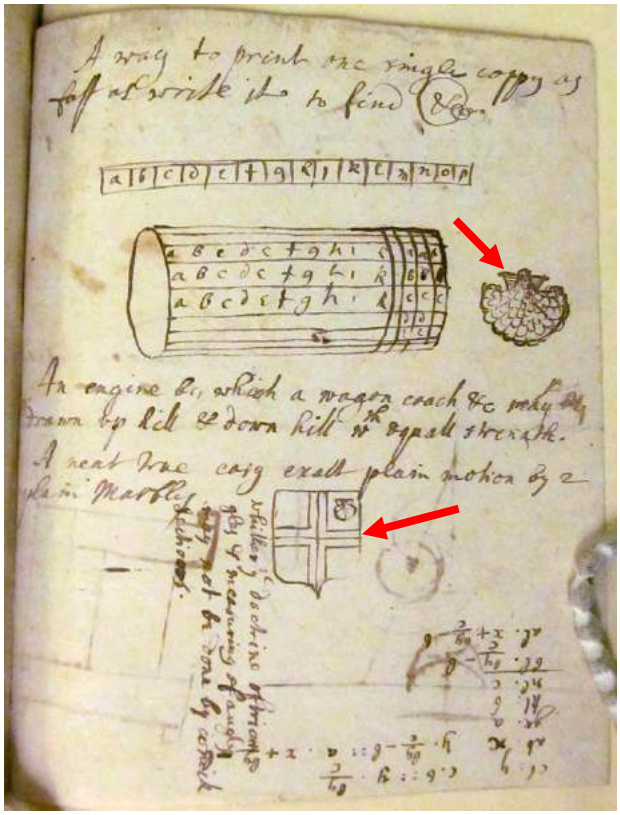


Figure I-7. Hooke's sketches of his coat of arms in a folio of notes bound in his copy of Pietro Accolti's *Lo inganno de gl' occhi* (Firenze, 1625), after 1678. The red arrows, added by the author, point to the relevant sketches. © The British Library Board, shelfmark 536.I.21.(6).

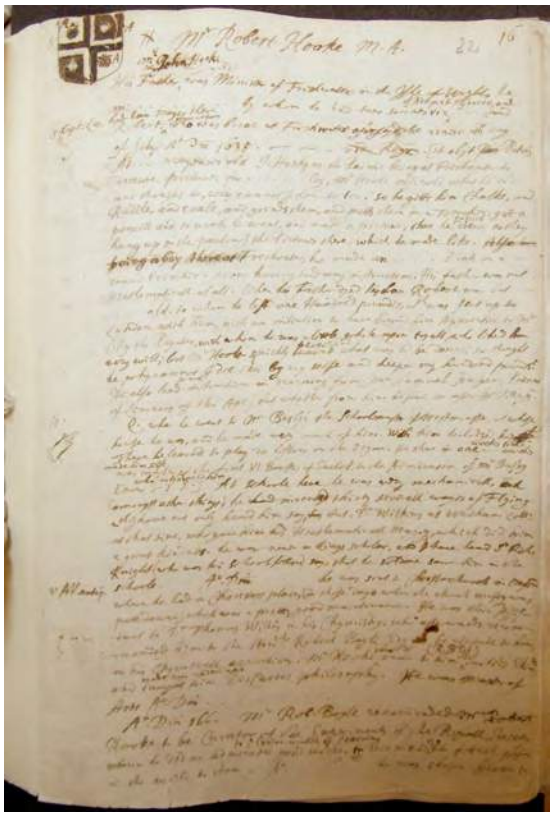
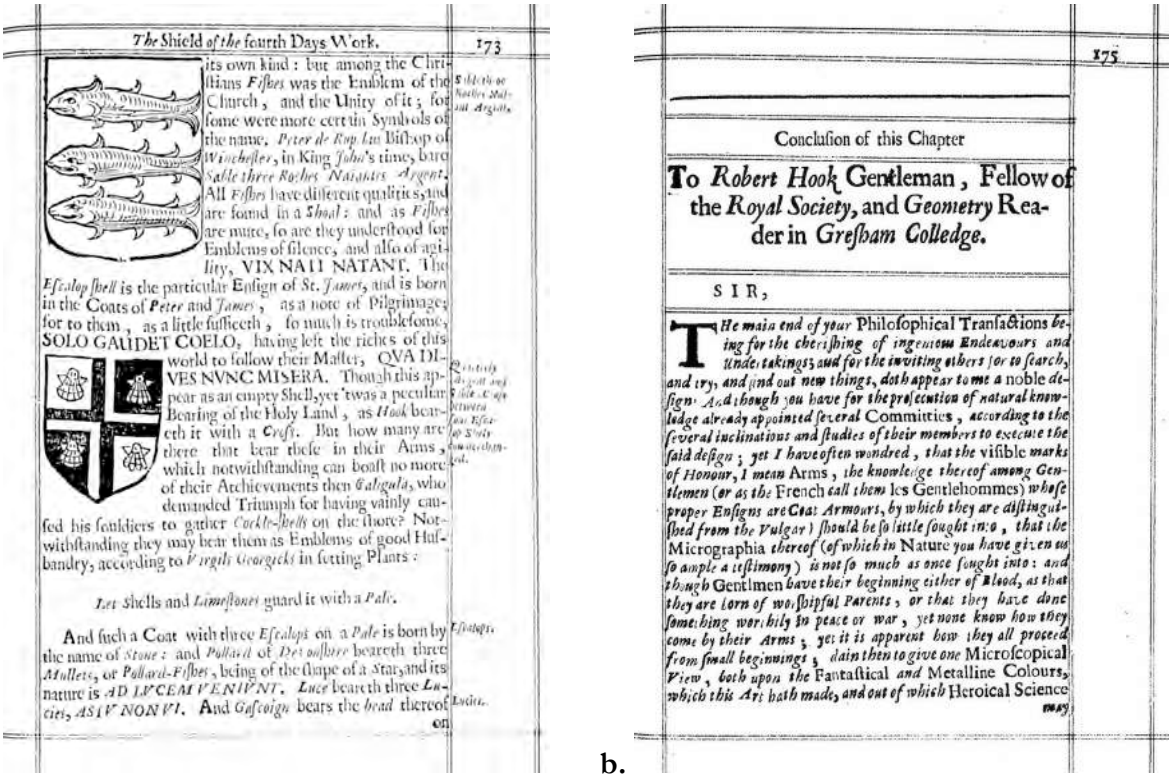


Figure I-8. John Aubrey, 'Mr Robert Hooke M.A.' in *Brief lives*, *c.* 1680. Source: Bodl., MS Aubrey 6, fol. 32r.



The Shield of the fourth Days Work. 173

its own kind: but among the Christians *Fishes* was the Emblem of the Church, and the Unity of it; for some were more certain Symbols of the name. *Peter de Rup Leo* Bishop of *Winchester*, in King *John*'s time, bare *Sable three Roches Naiantes Argent.* All *Fishes* have different qualities, and are found in a *Shoal*: and as *Fishes* are mute, so are they understood for Emblems of silence, and also of agility, VIX NATI NATANT. The *Escalop shell* is the particular Ensign of St. *James*, and is born in the Coats of *Peter* and *James*, as a note of Pilgrimage; for to them, as a little sufficeth, so much is troublesome, SOLO GAUDET COELO, having left the riches of this world to follow their Master, QVA DIVES NVNC MISERA. Though this appear as an empty Shell, yet 'twas a peculiar Bearing of the Holy Land, as *Hook* beareth it with a *Cross*. But how many are there that bear these in their Arms, which notwithstanding can boast no more of their Atchievements than *Caligula*, who demanded Triumph for having vainly caused his Souldiers to gather *Cockle-shells* on the shore? Notwithstanding they may bear them as Emblems of good Husbandry, according to *Virgils Georgicks* in setting Plants:

Let Shells and *Limestones* guard it with a *Pale*.

And such a Coat with three *Escalops* on a *Pale* is born by the name of *Stone*: and *Pollard* of *Devonshire* beareth three *Mullets*, or *Pollard-Fishes*, being of the shape of a Star, and its nature is *AD LVCEM VENIVNT*. *Luce* beareth three *Lucies*, *ASIV NON VI*. And *Gascoign* bears the *head* thereof on

a.

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Conclusion of this Chapter

To *Robert Hook* Gentleman, Fellow of the *Royal Society*, and *Geometry* Reader in *Gresham Colledge*.

SIR,

THe main end of your Philosophical Transactions being for the cherishing of ingenuous Endeavours and undertakings, and for the inviting others for to search, and try, and find out new things, doth appear to me a noble design. And though you have for the prosecution of natural knowledge already appointed several Committies, according to the several inclinations and studies of their members to execute the said design; yet I have often wondred, that the visible marks of Honour, I mean Arms, the knowledge thereof among Gentlemen (or as the French call them les Gentlehommes) whose proper Ensigns are Coat Armours, by which they are distinguished from the Vulgar) should be so little sought into, that the Micrographia thereof (of which in Nature you have given us so ample a testimony) is not so much as once sought into: and though Gentlmen have their beginning either of Blood, as that they are born of worshipful Parents, or that they have done something worthily in peace or war, yet none know how they come by their Arms; yet it is apparent how they all proceed from small beginnings, dain then to give one Microscopical View, both upon the Fantastical and Metalline Colours, which this Art hath made, and out of which Heroical Science may

b.

Figure I-9. a. Hooke's coat of arms (with the scallops) reproduced and explained by Sylvanus Morgan in *Armilogia, sive ars chromocritica* (London, 1666), p. 173. **b.** Morgan's epistolary address to Hooke in ibid., p. 175.

ILLUSTRATIONS FOR CHAPTER II

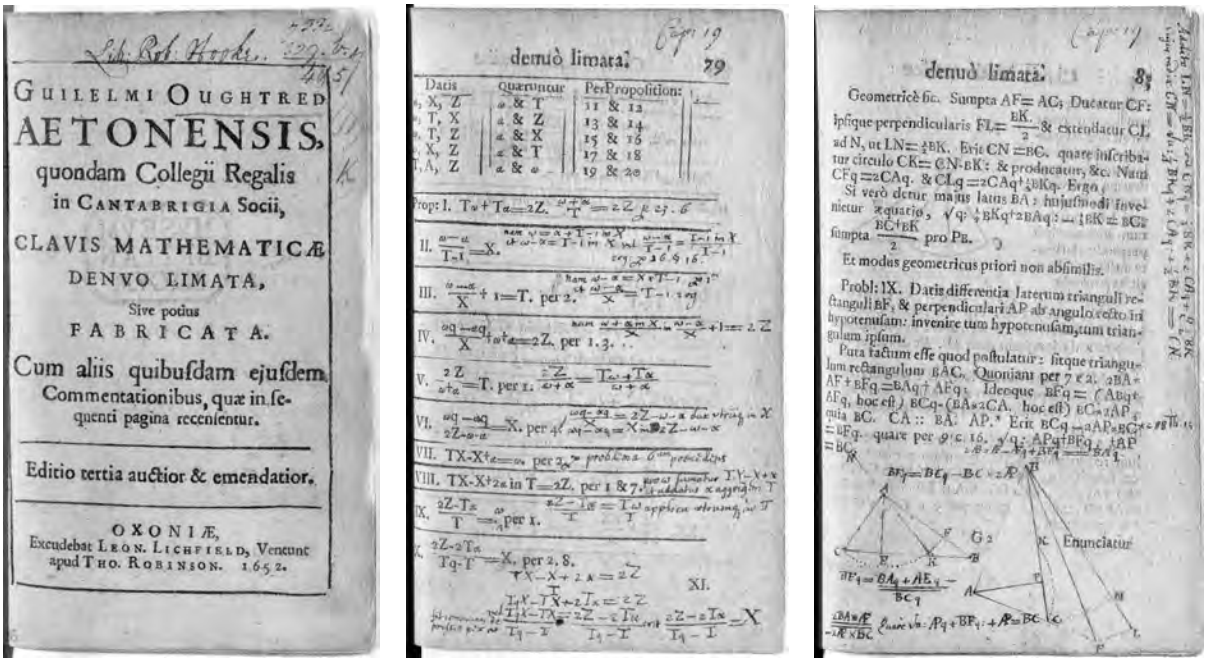


Figure II-1. Hooke's copy of William Oughtred, *Clavis mathematicae* (Oxford, 1652) with his ownership inscription, and annotations possibly in his hand. © The British Library Board, shelfmark 529.b.19.(4, 5.), title page, pp. 79, 83.

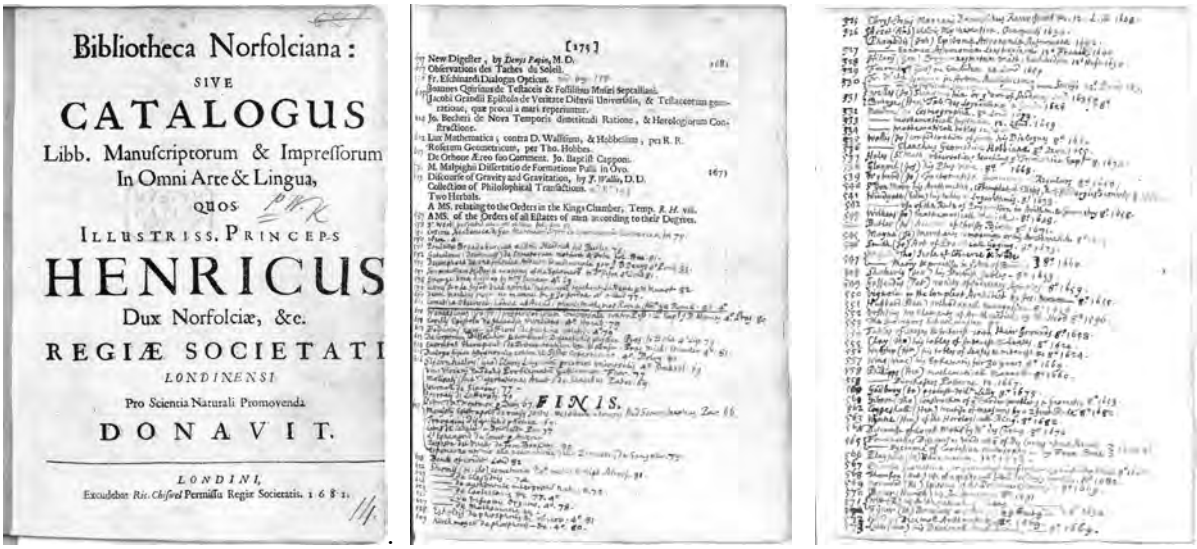


Figure II-2. a-c. Hooke's emendations to the library catalogue of the Royal Society. © The British Library Board, shelfmark 824.f.52, title page, pp. 175, [189].

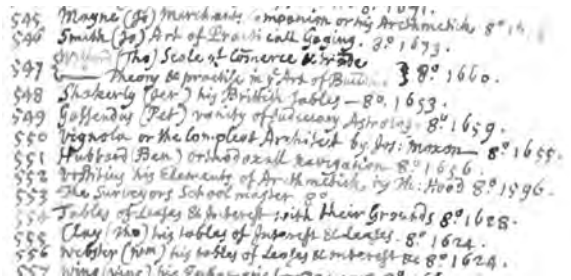


Figure II-3. Detail of Figure II-2. c. of Hooke's emendations. Note the copy of Moxon's *Vignola* at no. 550. © The British Library Board, shelfmark 824.f.52, p. [189].

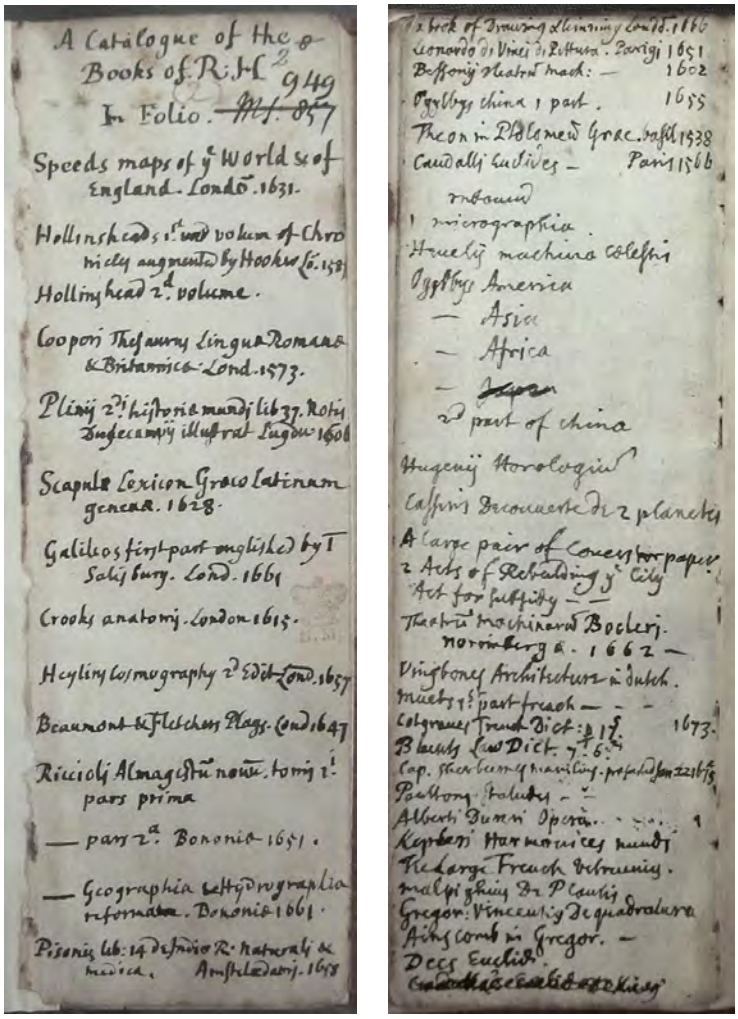


Figure II-4. a-b. Hooke, 'A Catalogue of the Books of R. H.', *c.* 1675. © The British Library Board, Sloane MS 949, fols. 2r [left] and 4v [right].



Figure II-5. Hooke, 'List of desiderata from the auction of Edward Wray's library on 20 June 1687'. © The British Library Board, Sloane MS 1039, fol. 149r.

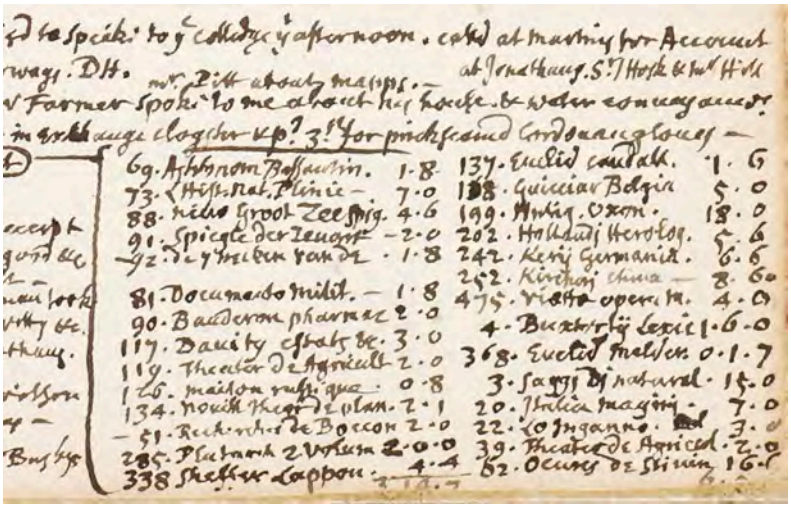


Figure II-6. Hooke, 'List of purchases from Moses Pitt's auction', diary entry for 24 Dec. 1678. Source: LMA, CLC/495/MS01758, p. 139; https://goo.gl/rqJt9z.



70 DELLA ARCHITETTVRA

a una certa particolare parte della città, dellaquale, tratteremo insieme con l'altre cose del suo genere, quando membro per membro tratteremo di simili opere publiche. Nel fondare sotto gli ordini delle colõne, nõ fa mestiere tirare a dilũgo una fossa tutta cõtinouata ripiena di muraglia, ma è cosa conueniente fortificare prima il luogo one tu uuoi porre le sedie, & il letto di esse colõne: & dal l'uno all'altro gittare poi archi uoltãdo il dorso di qual s'è l'uno uerso il piondo, di modo che'l ricinto, e lo spazzo del primo piano, serua p cõrda di detti archi.

Percioche stãdo cosi, sarãno mãco prõte a forare il Terreno in un luogo solo, postoui sopra, & di quà, & di là piu pesi, p i fortificamẽti de gli Archi che in questo modo se gli cõtraporrãno. Et quãto le colõne sien atte a forare il terreno, & quãto elleno sieno pericolose, & aggrauate da i pesi postiui sopra, lo dimostra la cãtonata del nobile Tẽpio di Vespasiano, ch'è uolta uerso l'occidẽte estiuo. Per cio che hauendo uoluto lasciare sotto uota la uia publica, da poterui passare, che ueniua occupata dalla cãtonata, intralasciãdo alquanto di spatio della piãta, & addattata alla muraglia una uolta, lasciarono essa cãtonata quasi che in modo d'un pilastro a lato alla uia, & l'afforzificarono con saldezza di opera, & con aiuto di un barbacane. Ma questa finalmente sforzata dalla grauezza di si grande edificio, & mancandoli sotto il Terreno, si però, & di questi sia detto a bastanza.

Che è si debbono lasciare sfiatatoi aperti nelle mura grosse, da basso, ad alto, & che differentia sia intra il muro, & il fondamẽto, et quali sieno le parti principali delle mura. de tre modi del murare, & della materia, et della forma del primo ricinto a piano. Cap. VI.

Gittati i fondamenti, ne segue dipoi il muro espedito, Nè quì uoglio lasciare in dietro quello che si appartiene si a riempiere i fondamenti, si a finire ancora tutte le mura. Percioche ne gli edificij grandi, doue la mole della muraglia ha da essere molto grossa, si hanno a lasciare nel mezo delle grossezze delle Mura, da fondamenti insino al disopra, sfogatoi aperti, & spiramenti non molto lontani l'un da l'altro, per i quali possino liberamẽte esalare senza alcun danno della Muraglia, i uapori che si fussero generati, & ragunati sotto il Terreno, se alcuno per sorte ue ne fusse. Gli antichi in certi luoghi simili, si per

Figure II-7. Leon Battista Alberti, *L'architettura* (Venice, 1565), p. 70. Hooke owned a copy of this edition and used this type of inverted arch system for the foundations of Montagu House.
Source: Bayerische StaatsBibliothek, Münchener DigitalisierungsZentrum Digitale Bibliothek, 4 A.civ. 2; https://goo.gl/QSMf6B.

ILLUSTRATIONS FOR CHAPTER III

ii. 1. BIBLIOTHÈQUE NATIONALE DE FRANCE, PARIS

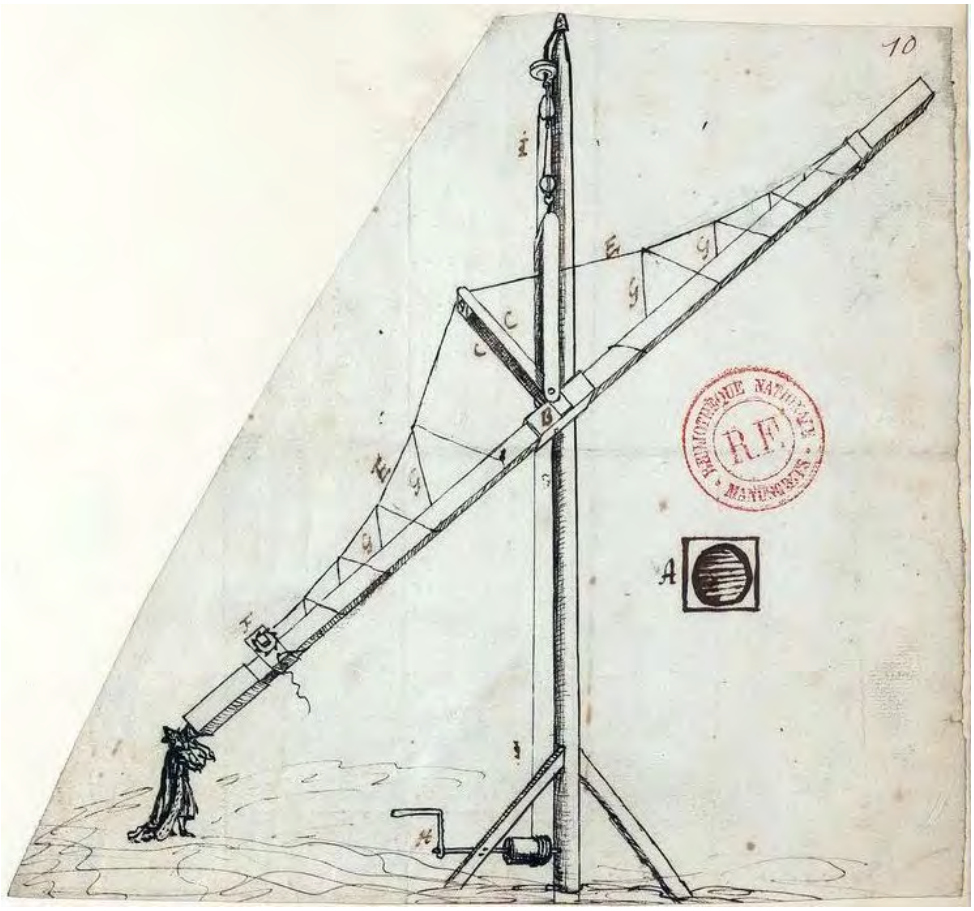


Figure III-1. Hooke, 'Sketch of the 60-foot telescope', attached to a letter dated 27 Feb. 1667 from Henry Oldenburg to Johannes Hevelius. © Bibliothèque Nationale de France, Département des manuscrits, NAL 1641, fol. 10r.

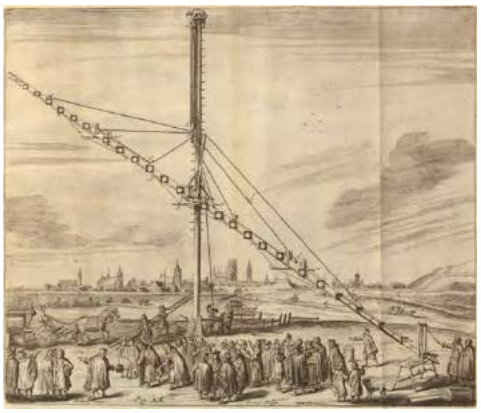


Figure III-2.cf. 150-foot telescope in Hevelius, *Machinae coelestis* (Gdańsk, 1673), Fig. AA. © Wikipedia Commons, https://goo.gl/YJWiu5.

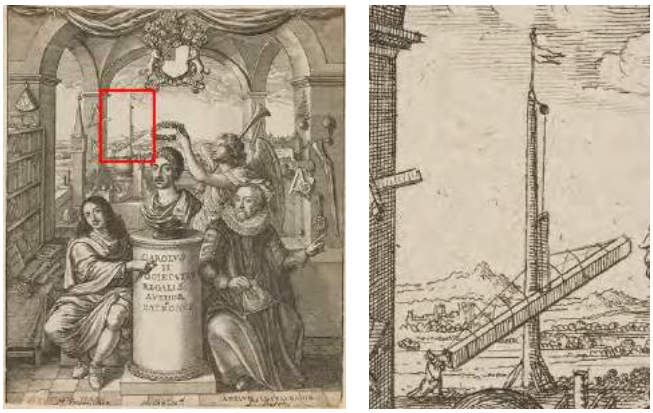


Figure III-3.cf. Wenceslaus Hollar (engraver), John Evelyn (designer), 'Frontispiece of Thomas Sprat's *The history of the Royal Society of London* (London, 1667)'; detail showing the telescope.
Source: Wellcome Library, London, L0076260.

ii. 2. BRITISH LIBRARY, LONDON

a. Inserts in Printed Books



Figure III-4. Hooke, 'Copy of the illustration and text of the missing title-page of the 'January Hebdomas prima' section', n.d.; detail. Folio inserted between pp. 126 and 127 in Hooke's copy of Joannes Ciermans, *Disciplinae mathematicae* (Louvain, 1640). © The British Library Board, shelfmark 531.n.16.



Figure III-5. cf. Original illustration in the title-page of 'January Hebdomas prima' in Ciermans, *Disciplinae mathematicae* (Louvain, 1640), fol. 31r. Source: Leuven University Library, PRECB0001.



Figure III-6. Anon., 'Colour drawing of a tulip in a terracotta jug', n.d.; pasted on the verso of the title-page of Heinrich Lautensack, *Des circkels unnd richtscheyts* (Frankfurt, 1564); detail. © The British Library Board, shelfmark 536.I.21.(5).



Figure III-7. cf. Georg Flegel, 'Watercolour drawing of two tulips', 1630. Source: Staatlichen Museen zu Berlin, KdZ 7578.

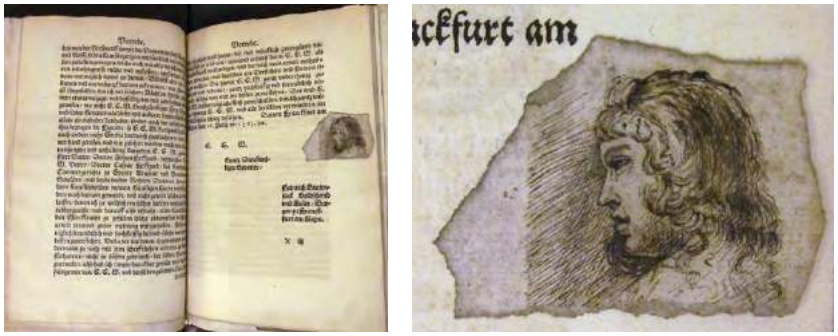


Figure III-8. Hooke (attrib.), 'Figural drawing' pasted on sig.)(iij in the copy of Lautensack, *Des circkels unnd richtscheyts* (Frankfurt, 1564); detail. © The British Library Board, shelfmark 536.I.21.(5).

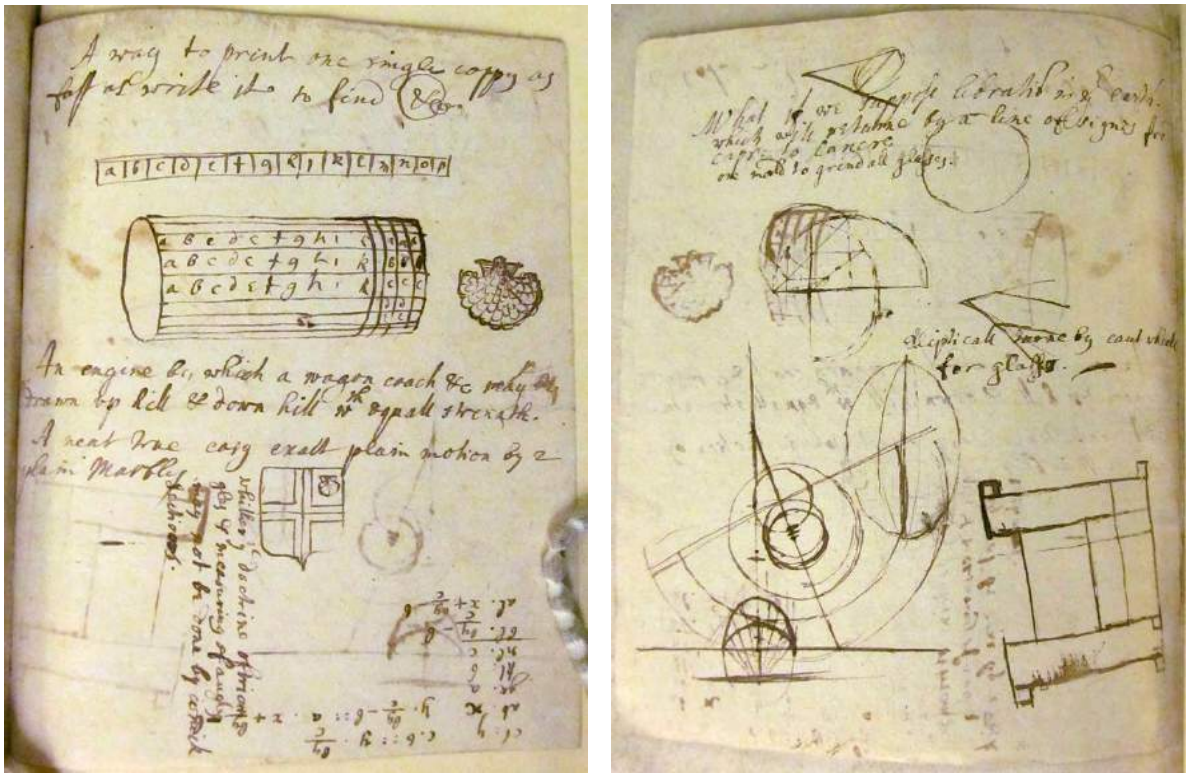


Figure III-9. Hooke, 'Various notes', recto and verso of the folio bound in his copy of Pietro Accolti's *Lo inganno de gl' occhi* (Firenze, 1625), after 1678. © The British Library Board, shelfmark 536.I.21.(6).

b. Add. MS 5238



Figure III-10. Anon., 'A painting of the fireworks display designed by Martin Beckman to celebrate the birth of Prince of Wales in 1688'. © The British Library Board, Add. MS 5238, no. 1.

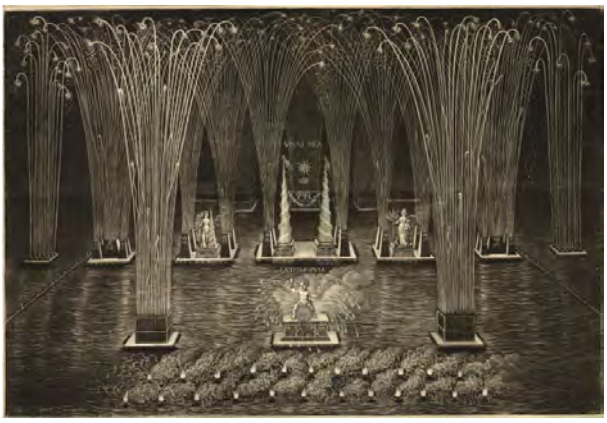


Figure III-11. cf. Bernard Lens II (engraver), Martin Beckman (publisher), 'A view of the fireworks on the Thames to celebrate the birth of the son of James II, on 10 June 1688'. © Trustees of the British Museum, 1880,1113.1354, AN589827001.



Figure III-12. Anon., 'Sketch of a female head in chalk', n.d. © The British Library Board, Add. MS 5238, no. 2r.

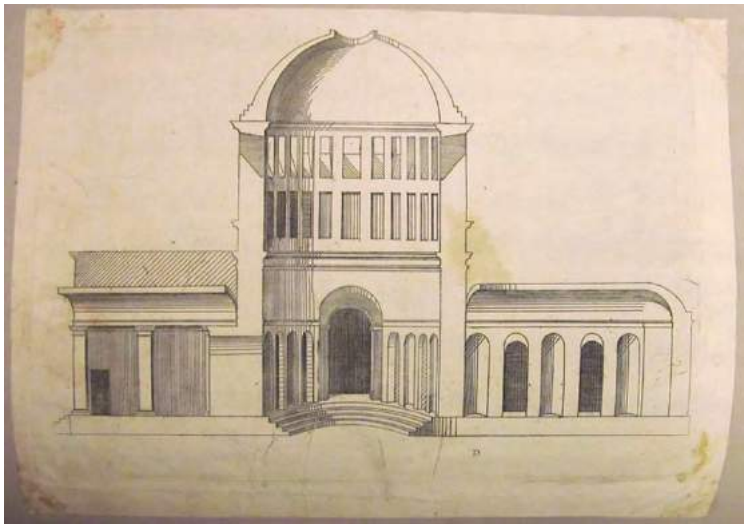


Figure III-13. Jacques Androuet du Cerceau (workshop of), 'Longitudinal section through a domed Roman structure', print from *Temples et habitations fortifiés* (*c.* 1545–1550). © The British Library Board, Add. MS 5238, no. 2v.

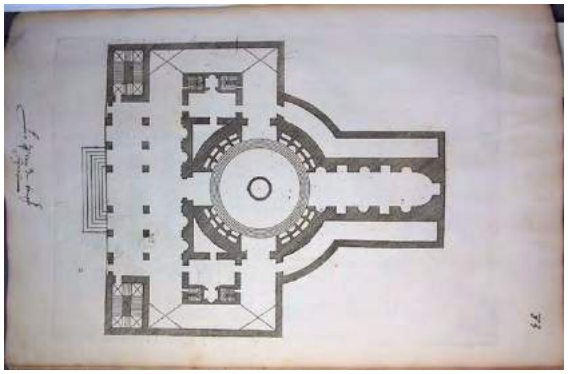


Figure III-14. cf. Du Cerceau (workshop of), 'Plan', from *Temples et habitations fortifiés* (*c.* 1545–1550). © Centre for Canadian Architecture, NA44.S485.A74 1547, fol. 83r.

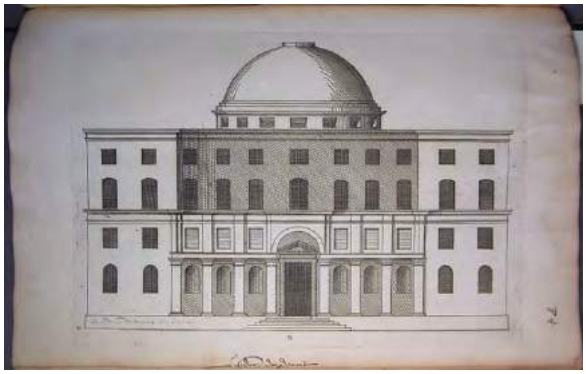


Figure III-15. cf. Du Cerceau (workshop of), 'Front elevation', print from *Temples et habitations fortifiés* (*c.* 1545–1550). © Centre for Canadian Architecture, NA44.S485.A74 1547, fol. 84r.



Figure III-16. Richar d Bradley, 'Partial drawing of a Roman pavement discovered in the churchyard of Woodchester in Gloucester', 1722. © The British Library Board, Add. MS 5238, no. 3.



Figure III-17. cf. Priscilla Combe, 'Part of a Roman pavement found in the church yard at Woodchester', 1756. © The British Library Board, King George III Topographical Collection, shelfmark K Top Vol. 13, no. 101c.

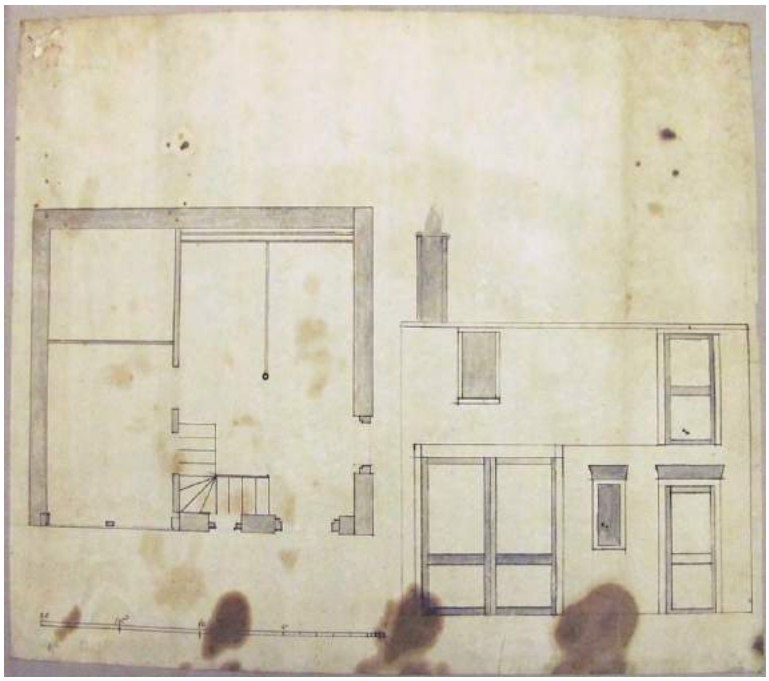


Figure III-18. Hooke, 'Plan and elevation of a small unidentified building', n.d. © The British Library Board, Add. MS 5238, no. 4.

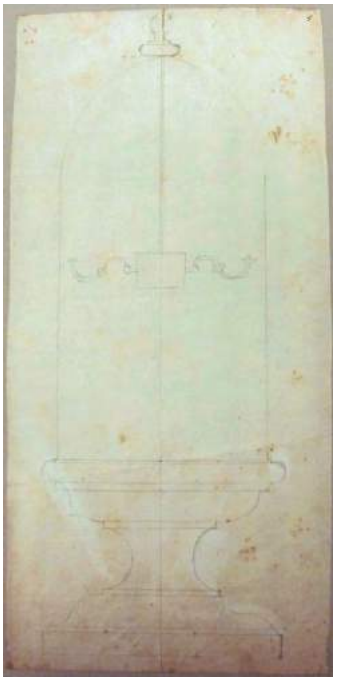


Figure III-19. Hooke, 'Elevation of a large urn on a base', n.d. © The British Library Board, Add. MS 5238, no. 5.

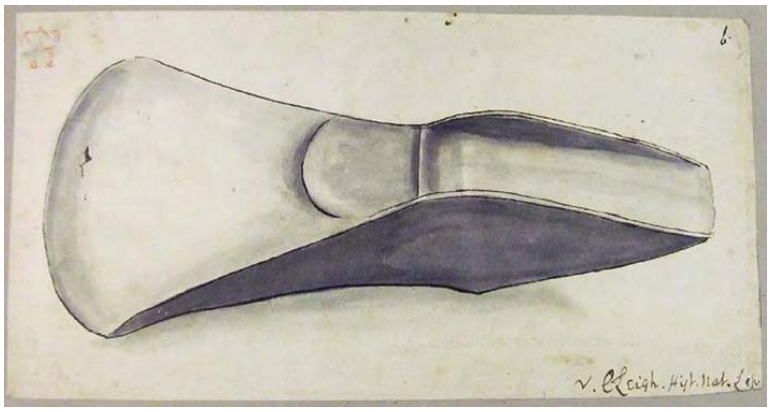


Figure III-20. Hooke, 'Ink wash drawing of an axe head', *c.* 1700. © The British Library Board, Add. MS 5238, no. 6.

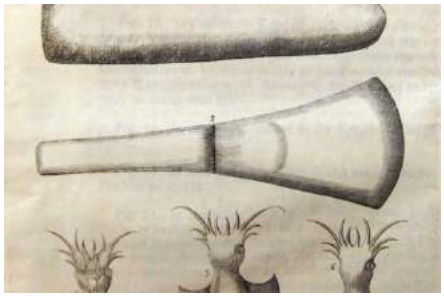


Figure III-21. cf. Charles Leigh, *The natural history of Lancashire, Cheshire, and the Peak in Derbyshire* (Oxford, 1700), detail from pl. 4, fig. 3.



Figure III-22. cf. Robert Plot, *The natural history of Stafford-shire* (Oxford, 1686), detail from pl. xxxiii (facing p. 404).



Figure III-23. Hooke, 'Pencil and ink drawing of a woman and child', n.d. © The British Library Board, Add. MS 5238, no. 7.



Figure III-24. Hooke or Harry Hunt[?], 'Pencil drawing of a young woman [Grace?]', *c.* 1672–1677. © The British Library Board, Add. MS 5238, no. 8r.



Figure III-25. Hooke[?], 'Pencil drawing of a boy', n.d. © The British Library Board, Add. MS 5238, no. 8v.



Figure III-26. Hooke or Hunt[?], 'Pencil drawing of a young woman [Grace?]', *c.* 1672–1677. © The British Library Board, Add. MS 5238, no. 9.



Figure III-27. cf. William Faithorne (etcher), 'Maria Ruten, wife of Antoni van Dyck', n.d. Source: William Sanderson, *Graphice* (London, 1658), facing p. 41.



Figure III-28. Hooke[?], 'Pencil and crayon sketch of a man [self-portrait?]', n.d. © The British Library Board, Add. MS 5238, no. 10.



Figure III-29. Hooke[?], 'Drawing of a man, possibly a Native American', n.d. © The British Library Board, Add. MS 5238, no. 11.



Figure III-30. Anon., 'Portrait, possibly an etching, of a woman in profile with a hand over her shoulder', n.d. © The British Library Board, Add. MS 5238, no. 12.



Figure III-31. Hooke[?], 'Portrait of a young man, in pencil and white chalk', n.d. © The British Library Board, Add. MS 5238, no. 13r.



Figure III-32. Hooke[?], 'Pencil sketch of a boy', n.d. © The British Library Board, Add. MS 5238, no. 13v.



Figure III-33. Hooke, 'Pencil sketches of part of an instrument', 1676[?]. © The British Library Board, Add. MS 5238, no. 14.

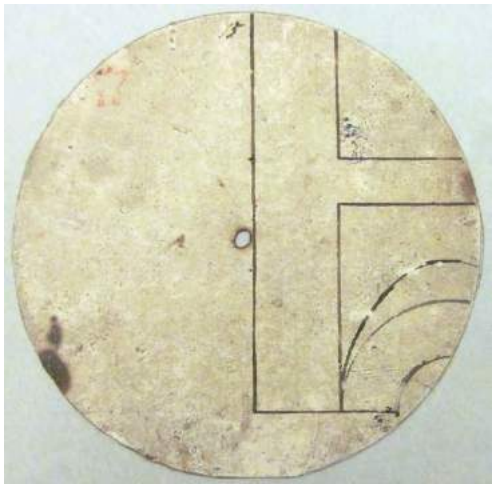


Figure III-34. Hooke, 'Fragment of an ink drawing, cut into the shape of a disk', n.d. © The British Library Board, Add. MS 5238, no. 15.



Figure III-35. Hooke[?], 'Pencil sketches of legs with some parts hatched in ink', n.d. © The British Library Board, Add. MS 5238, no. 16.



Figure III-36. cf. Abraham Bloemaert, *Prima pars, 't eerste deel van de teeken-konst* (Amsterdam, 1611), no. 126.



Figure III-37. Anon., 'Ink sketch of a man', n.d. © The British Library Board, Add. MS 5238, no. 17.



Figure III-38. Hooke[?], 'Pencil copy of an engraving or painting', n.d. © The British Library Board, Add. MS 5238, no. 18.



Figure III-39. Hooke, 'Ink and ink wash sketch of a young man in profile', n.d. © The British Library Board, Add. MS 5238, no. 19.



Figure III-40. cf. Faithorne (attrib.), 'Design for a book illustration', n.d., detail. Source: The Elisha Whittelsey Collection, The Metropolitan Museum of Art, 50.605.47.



Figure III-41. Hooke[?], 'Ink sketch of a peacock', n.d. © The British Library Board, Add. MS 5238, no. 20.



Figure III-42. Hooke or David Loggan[?], 'Ink sketch of a man, perhaps Richard Allestree', 1676[?]. © The British Library Board, Add. MS 5238, no. 21.



Figure III-43. Anon., 'Pencil portrait of a man, perhaps Thomas Hearne (1678–1735)', n.d. © The British Library Board, Add. MS 5238, no. 22.



Figure III-44. Hooke or Hunt[?], 'Pencil and ink portrait of a young woman [Grace?]', *c.* 1672–1677. © The British Library Board, Add. MS 5238, no. 23.



Figure III-45. Hooke, 'Small prints of a woodcut image of Hercules, illustrating heroic virtue', n.d. © The British Library Board, Add. MS 5238, nos. 24 to 28.

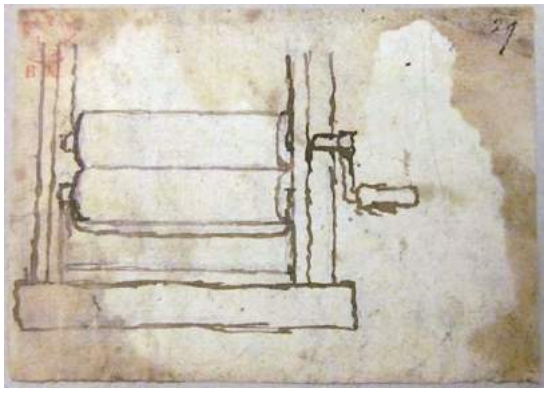


Figure III-46. Hooke, 'Ink sketch of a rolling press', 1679[?]. © The British Library Board, Add. MS 5238, no. 29.



Figure III-47. Hooke[?], 'Small elevation sketch of an unidentified building', n.d. © The British Library Board, Add. MS 5238, no. 30.

(a) **(b)**

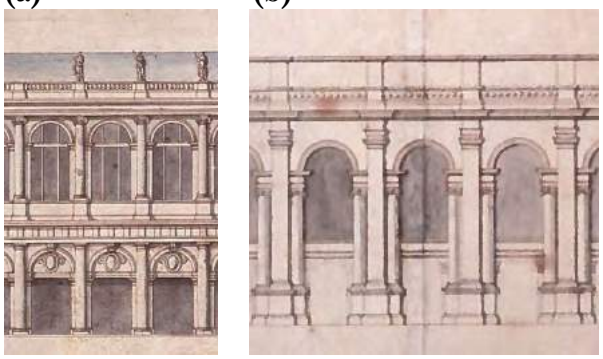


Figure III-48. cf. (**a)** Wren, 'Elevation of Trinity College Library, Cambridge', *c.* 1675, detail. **(b)** Hawksmoor, 'West elevation of an alternative design for Whitehall Palace', *c.* 1695, detail. ASC, AS I.46 and AS V.8, reproduced in Geraghty, *Architectural Drawings*, pp. 35, 184. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure III-49. Anon., 'Manuscript map of the southern tip of South America', 1678. © The British Library Board, Add. MS 5238, no. 31.



Figure III-50. Hooke[?], 'Pencil drawing of a woman next to an architectural profile', after 1675[?]. © The British Library Board, Add. MS 5238, no. 32.

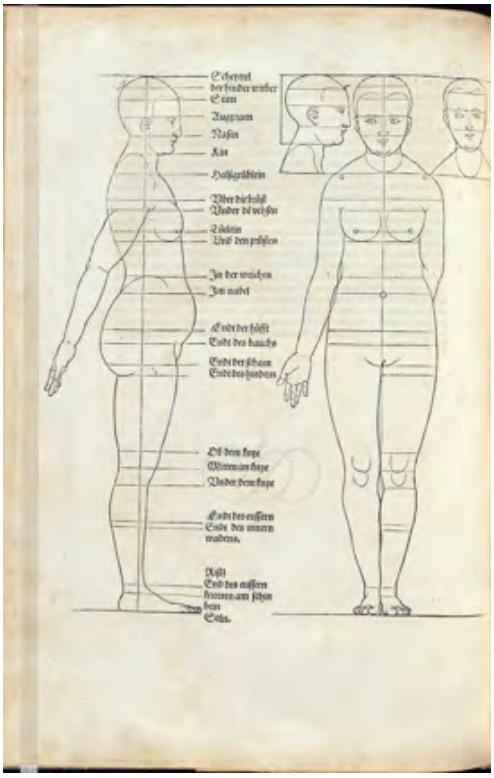


Figure III-51. cf. Albrecht Dürer, *Vier bücher von menschlicher proportion* ([Nuremberg], 1528), sig. R[i]v.



Figure III-52. cf. Gabriel Krammer, 'Thuscana II', *Architectvra* (Prague, 1600), pl. 3, detail.

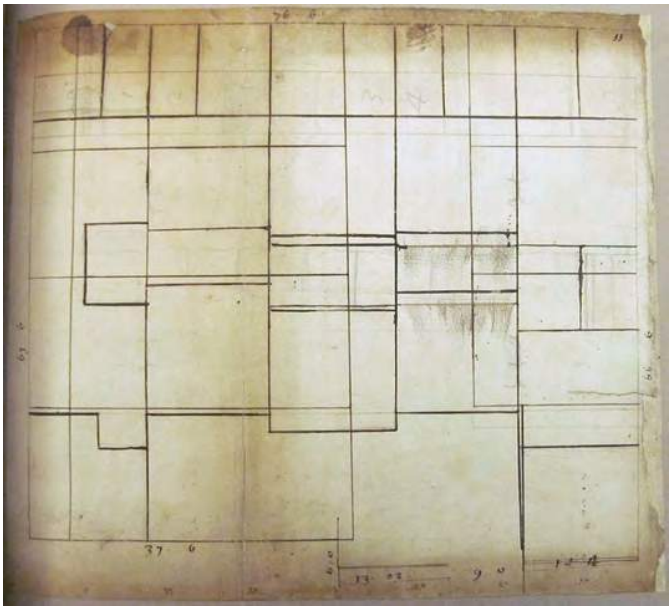


Figure III-53. Hooke, 'Survey of an unidentified lot', after 1666. © The British Library Board, Add. MS 5238, no. 33.

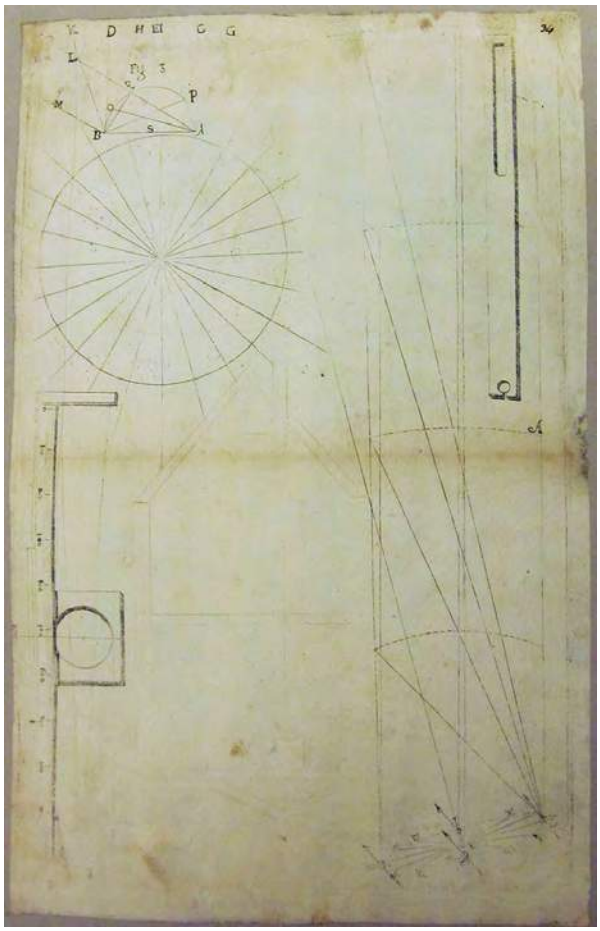


Figure III-54. Hooke, 'Preparatory drawing for *An attempt to prove the motion of the earth*', *c.* 1674. © The British Library Board, Add. MS 5238, no. 34.

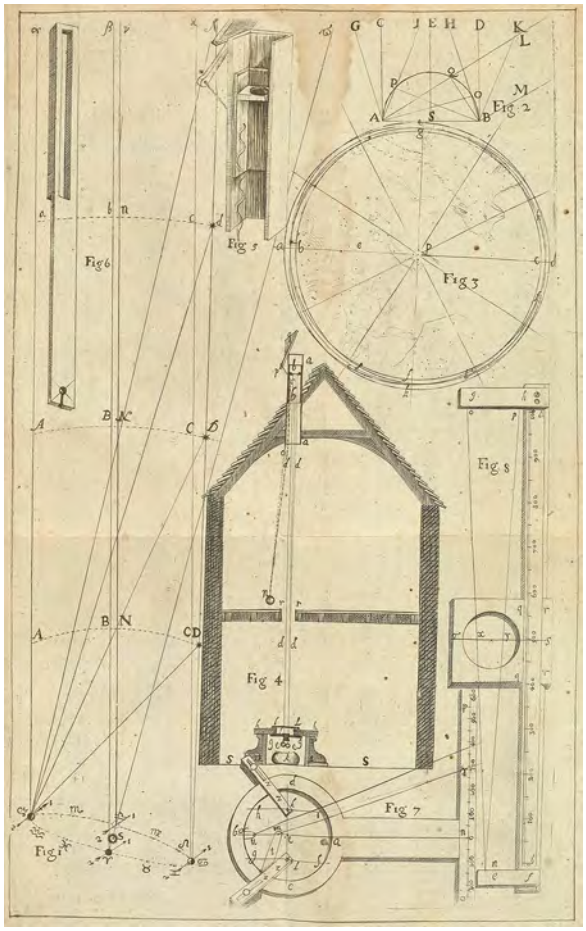


Figure III-55. cf. The engraved plate as printed in Hooke, *An attempt to prove the motion of the earth* (London, 1674).

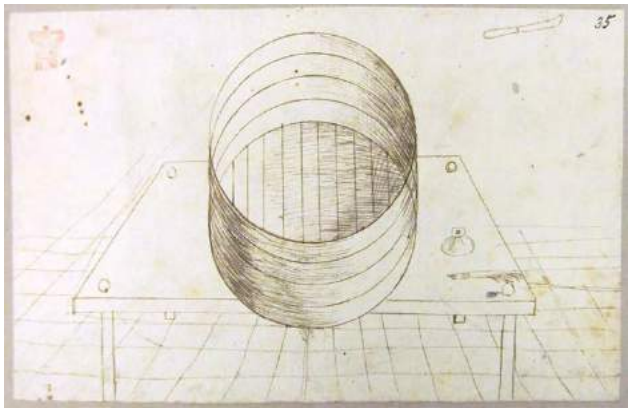


Figure III-56. Hooke, 'Sketch of a barrel', n.d. © The British Library Board, Add. MS 5238, no. 35.

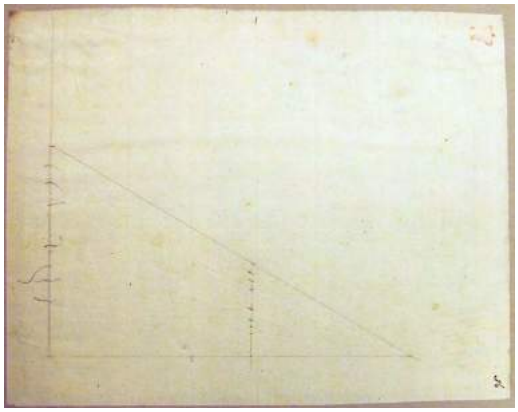


Figure III-57. Hooke, 'Drawing of a triangle', n.d. © The British Library Board, Add. MS 5238, no. 36.

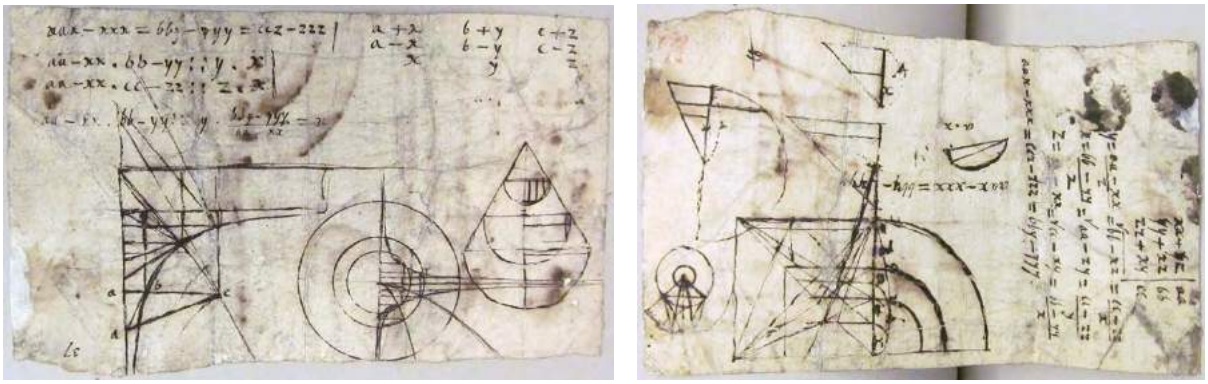


Figure III-58. Hooke, 'Geometric sketches and calculations', n.d. © The British Library Board, Add. MS 5238, no. 37r-v.

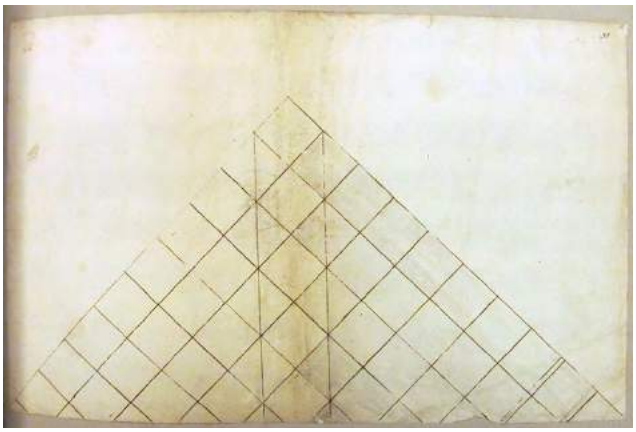


Figure III-59. Hooke, 'Drawing of a triangle divided into squares', n.d. © The British Library Board, Add. MS 5238, no. 38.



Figure III-60. Anon., 'Partial drawing of a young man's face', n.d. © The British Library Board, Add. MS 5238, no. 39.



Figure III-61. Hooke[?], 'Ink drawing of a group of four people', n.d. © The British Library Board, Add. MS 5238, no. 40.



Figure III-62. Anon., 'Ink drawing of an old man and saintly figure', n.d. © The British Library Board, Add. MS 5238, no. 41.



Figure III-63. Hooke[?], 'Pencil sketch of a bucolic setting', n.d. © The British Library Board, Add. MS 5238, no. 42.



Figure III-64. Anon., 'Ink drawing of a woman', n.d. © The British Library Board, Add. MS 5238, no. 43.



Figure III-65. Oliviero Gatti (engraver) after Guercino (artist), 'The bust of an old man, a boy, and a young woman', published in Guercino's book of drawings (Bologna, 1619). © The British Library Board, Add. MS 5238, no. 44.



Figure III-66. Anon., 'Ink wash drawing of a geometric object', n.d. © The British Library Board, Add. MS 5238, no. 45.



Figure III-67. Anon., 'Copy of a French print or painting', n.d. © The British Library Board, Add. MS 5238, no. 46.



Figure III-68. Hooke (attrib.), 'Elevation of Peter Noorwits's New Church in The Hague', n.d. © The British Library Board, Add. MS 5238, no. 47.

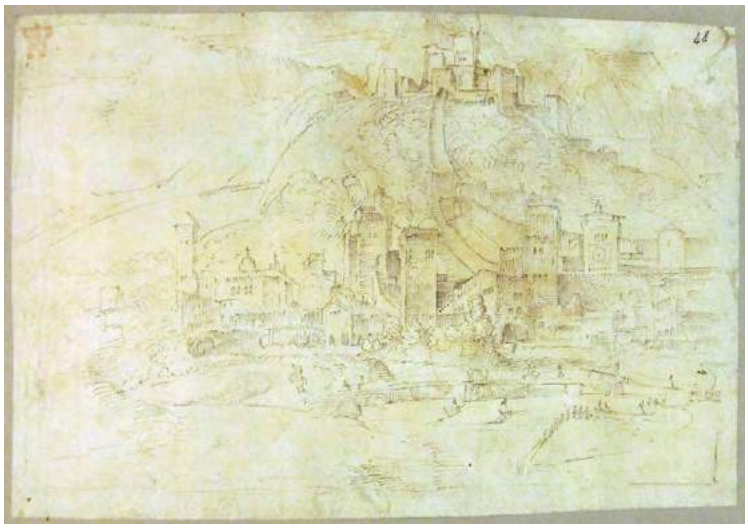


Figure III-69. Anon., 'Ink sketch of a town, possibly in northern Italy', n.d. © The British Library Board, Add. MS 5238, no. 48.

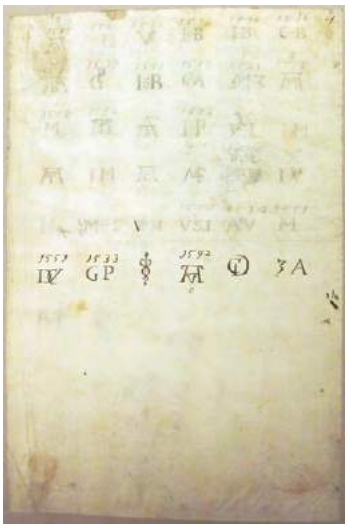


Figure III-70. Hooke[?], 'Artist monograms with dates', n.d. © The British Library Board, Add. MS 5238, no. 49.

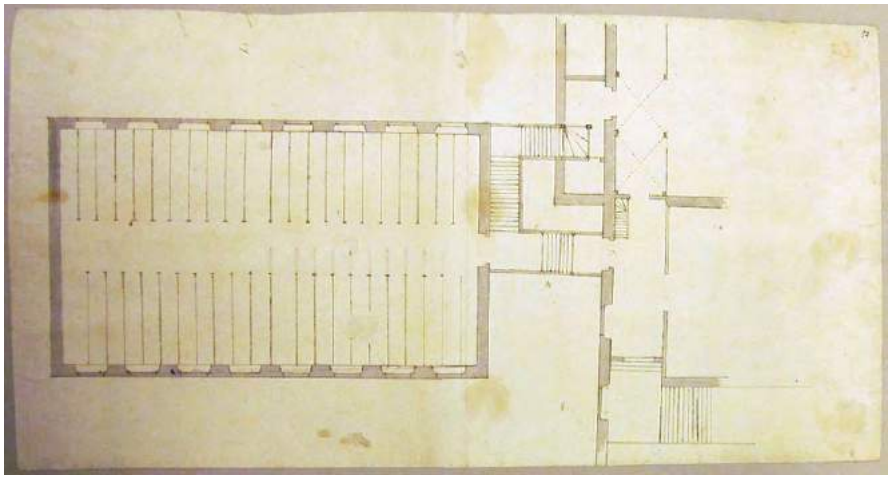


Figure III-71. Hooke, 'Plan of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. © The British Library Board, Add. MS 5238, no. 50.

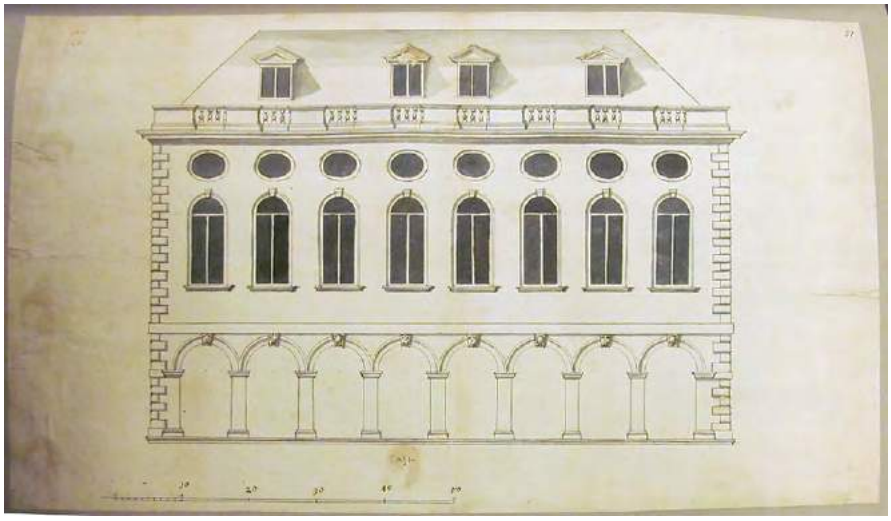


Figure III-72. Hooke, 'Elevation of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. © The British Library Board, Add. MS 5238, no. 51.

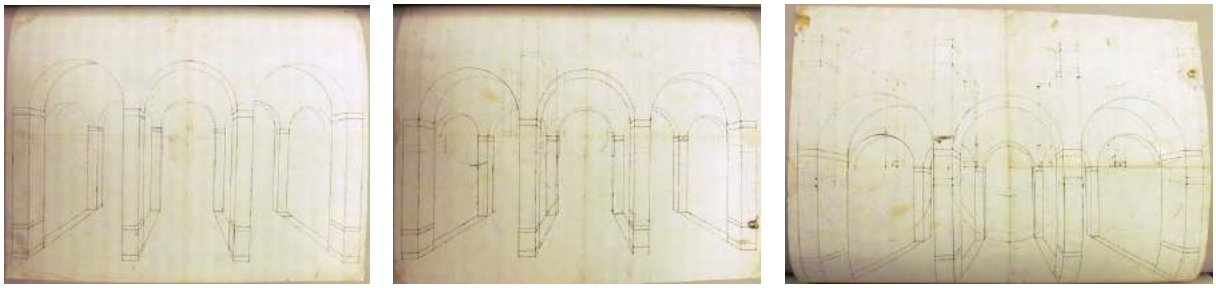


Figure III-73. Hooke, 'One-point perspective drawings in ink', n.d. © The British Library Board, Add. MS 5238, nos. 52, 53r-v.

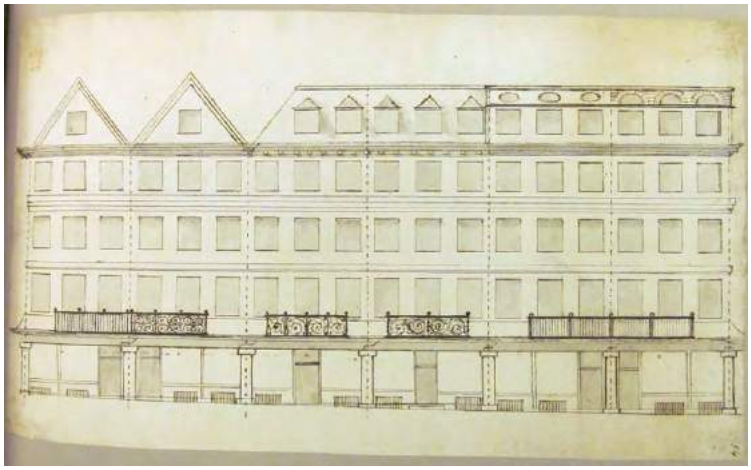


Figure III-74. Hooke, 'Elevation of a row of buildings, with alternative designs', *c.* 1677 © The British Library Board, Add. MS 5238, no. 54.



Figure III-75. Hooke, 'Presentation drawing for the Bethlem Hospital', *c.* 1674 © The British Library Board, Add. MS 5238, no. 55.



Figure III-76. Hooke, 'Presentation drawing of an unidentified building, possibly the Montagu House', 1686[?]. © The British Library Board, Add. MS 5238, no. 56.

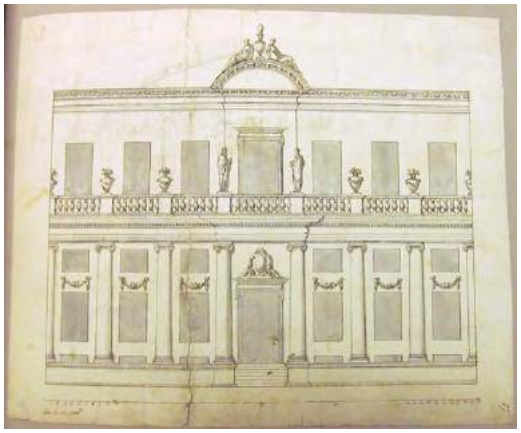


Figure III-77. Hooke, 'Preliminary design for the Royal College of Physicians', *c.* 1671. © The British Library Board, Add. MS 5238, no. 57.

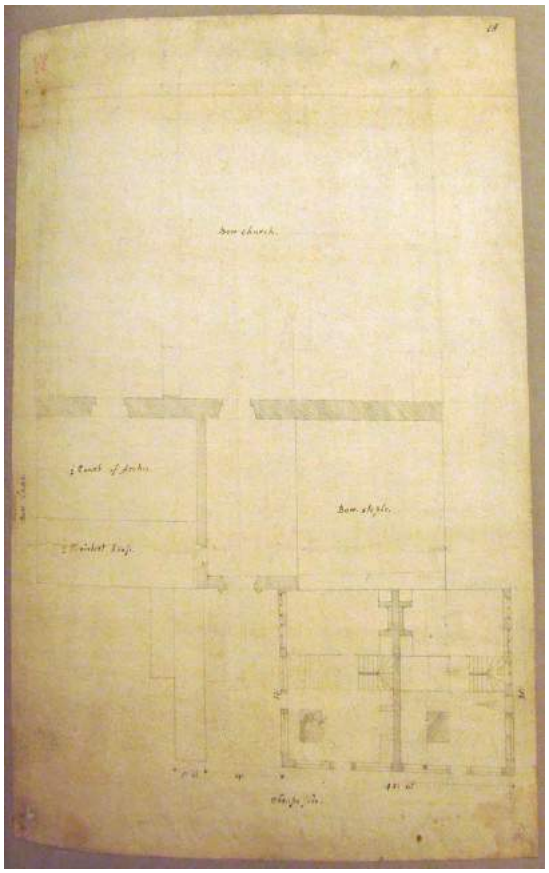


Figure III-78. Hooke, 'Partial plan of St. Mary-le-Bow church', *c.* 1670. © The British Library Board, Add. MS 5238, no. 58.

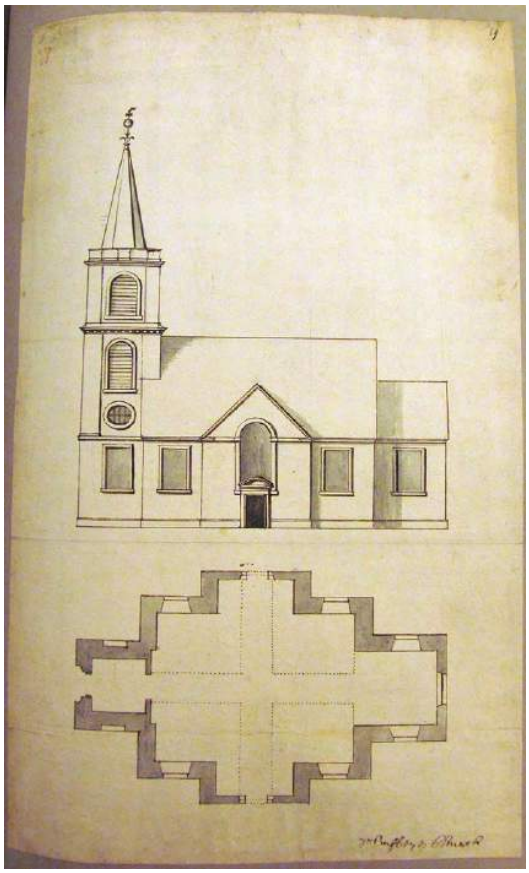


Figure III-79. Hooke, 'Elevation and plan of an alternative design for St. Mary Magdalene church in Willen', *c.* 1678. © The British Library Board, Add. MS 5238, no. 59.

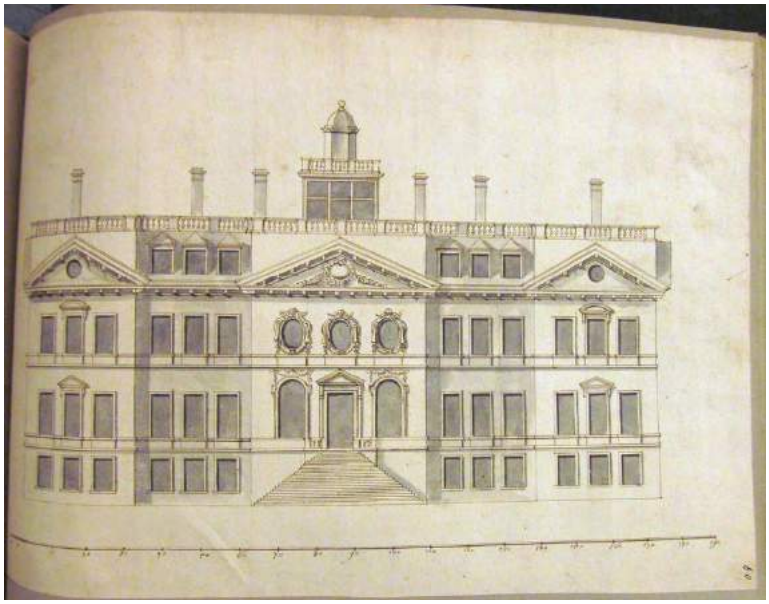


Figure III-80. Hooke, 'An early design for Ragley Hall', *c.* 1679; detail. © The British Library Board, Add. MS 5238, no. 60.



Figure III-81. Nicolaas Hogenberg (etcher), 'Entry of Pope Clement VII and Emperor Charles V into Bologna', *c.* 1530. © Trustees of the British Museum, SL,5238.61.



Figure III-82. Agostino Veneziano (engraver), 'The arch of Constantine in Rome', 1515–1550. © Trustees of the British Museum, SL,5238.62.



Figure III-83. Loggan[?], 'Partial portrait of Michiel Adriaenszoon de Ruyter', n.d. © The British Library Board, Add. MS 5238, no. 63.



Figure III-84. cf. Abraham Blooteling (engraver), 'Portrait of de Ruyter', *c.* 1655–1690. © Trustees of the British Museum, 1869,0710.2.



Figure III-85. cf. Loggan, 'Portrait of Thomas Barlow, Bishop of Lincoln', *c.* 1672. © Trustees of the British Museum, Gg,1.477.



Figure III-86. Anon., 'Charcoal and crayon copy of a portrait of Franciscus Sylvius', n.d. © The British Library Board, Add. MS 5238, no. 64.



Figure III-87. cf. Cornelis van Dalen, the younger (engraver), 'Portrait of Franciscus Sylvius', 1659. © Trustees of the British Museum, 1864,0714.17.

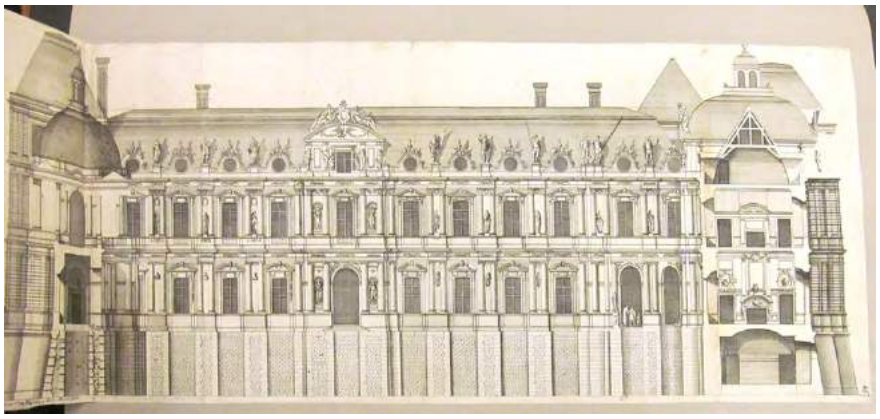


Figure III-88. Jean Marot (engraver) and Pierre Mariette, the younger (printer), 'Elevation/section of Château of Coulommiers-en-Brie by Salomon de Brosse', 1677. © The British Library Board, Add. MS 5238, no. 65.

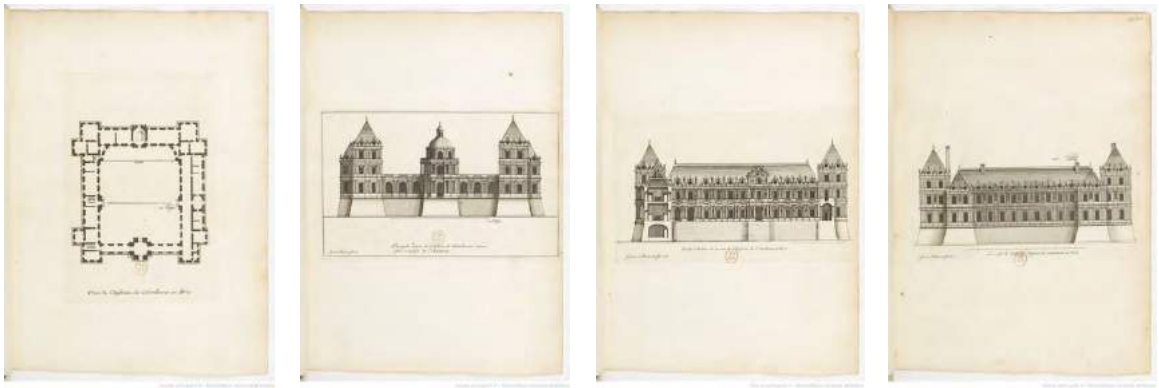


Figure III-89. cf. a-d. Jean Marot, 'Château de Colombières en Brie', n.d. Printed in *Recueil des plans, profils et élévations des [sic] plusieurs palais, chasteaux, églises, sépultures, grotes et hostels bâtis dans Paris et aux environs par les meilleurs architectes du royaume desseignez, mesurés et gravez par Jean Marot* ([n.pt.], [n.d.]), fols. 20, 21, 22, and 22 (last folio number is repeated).
Source: Bibliothèque nationale de France, département Estampes et photographie, 4-HA-7 (A).

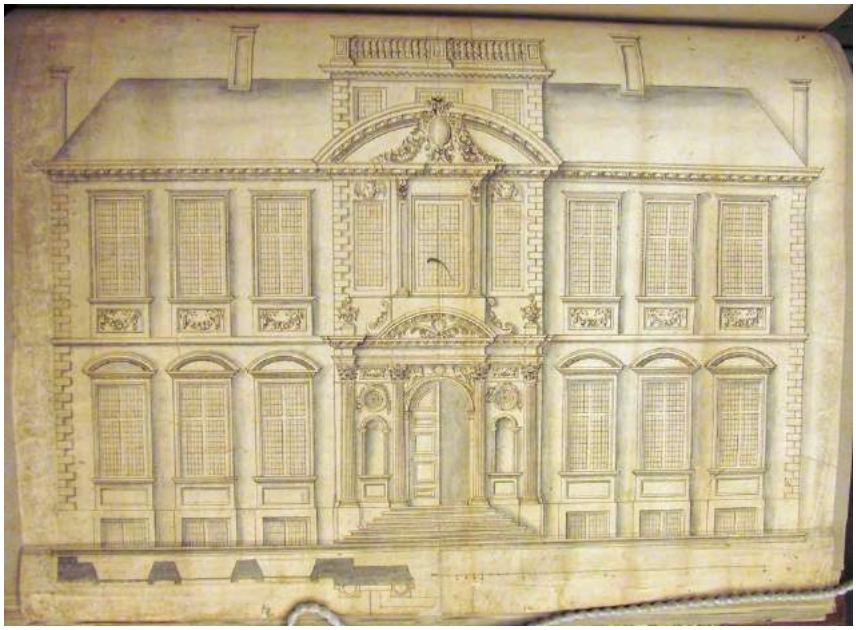


Figure III-90. Hooke[?], 'Presentation drawing with an elevation and partial plan of an unidentified building', after 1677[?]. © The British Library Board, Add. MS 5238, no. 66.



Figure III-91. Anon., 'Tower of St. Mary-le-Bow', n.d. © The British Library Board, Add. MS 5238, no. 67.

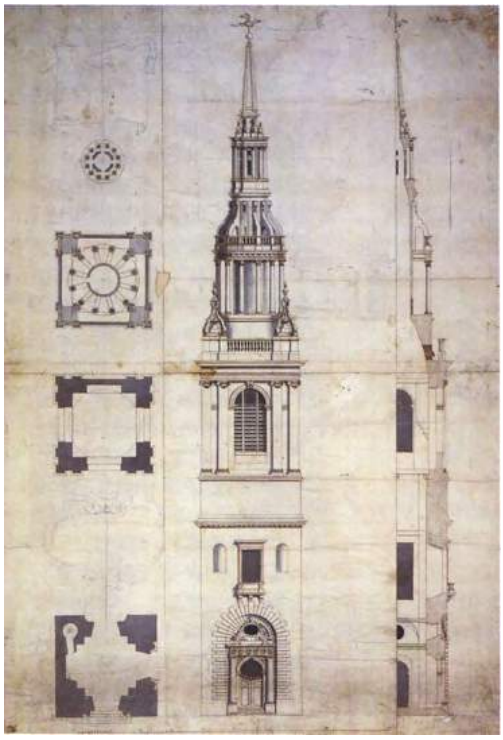


Figure III-92. cf. Hawksmoor (attrib.), 'Tower of St. Mary-le-Bow', *c.* 1726.
ASC, AS II.76, reproduced in Geraghty, *Architectural Drawings*, p. 89. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure III-93. cf. Anon., 'Tower of St. Mary-le-Bow', n.d. Source: Bodl., Rawlinson Prints a. 2, fol. 30.



Figure III-94. cf. Office of Christopher Wren (attrib.), 'Steeple of St. Mary-le-Bow', n.d. Source: Bodl., Gough Maps 44, no. 69.



Figure III-95. cf. Henry Hulsbergh (engraver), 'Plans, Elevation & Profile of Bow-Steeple: London', n.d. Source: Bodl., Gough Maps 20, no. 44c.



Figure III-96. cf. Anon., 'Tower of St. Mary-le-Bow', n.d. © The British Library Board, King George III Topographical Collection, K.Top23.27.b.



Figure III-97. cf. Colen Campbell, 'Preparatory drawing of Church of St Mary-le-Bow, Cheapside, City of London', *c.* 1717. RIBA pix, RIBA68780, VOS/50 folio 10.

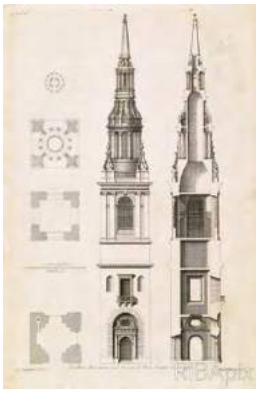


Figure III-98. cf. Campbell, 'Church of St Mary-le-Bow, Cheapside, City of London', *Vitruvius Britannicus* (London, 1717), vol. 2, pl. 26.

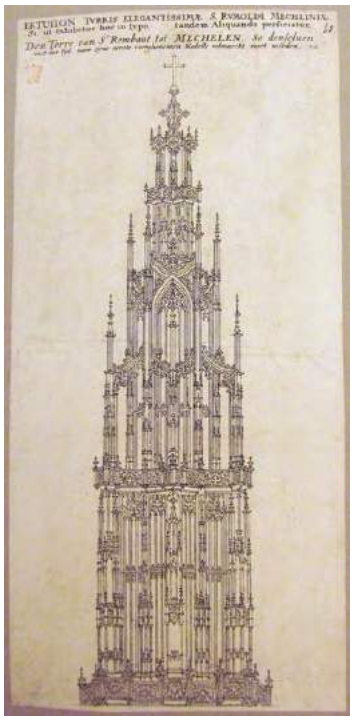


Figure III-99. Hollar, 'Partial print of an engraving of the tower of Saint Rumbold's Cathedral in Mechelen', 1649. © The British Library Board, Add. MS 5238, no. 68.

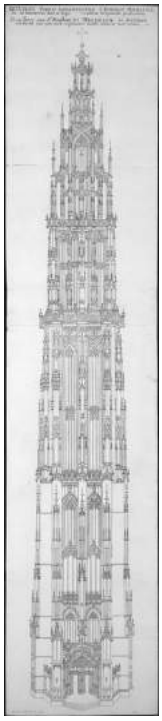


Figure III-100. cf. Hollar, 'Engraved print of the tower of Saint Rumbold's Cathedral in Mechelen', 1649. Source: University of Toronto, The Wenceslaus Hollar Digital Collection, Hollar_k_0866.

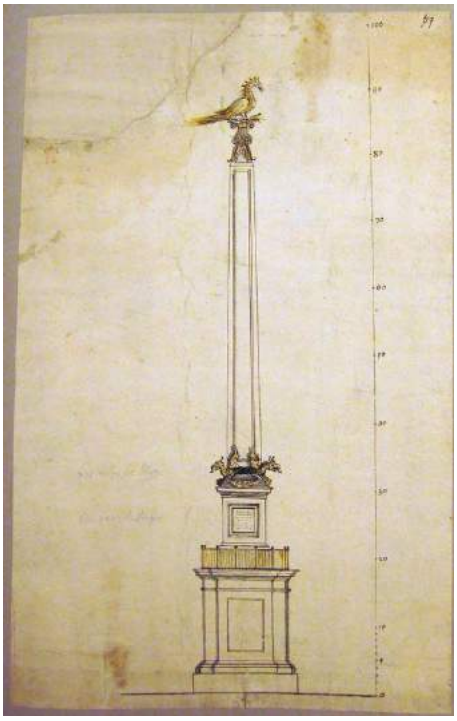


Figure III-101. Hooke, 'Elevation of the Cheapside Obelisk', 1680. © The British Library Board, Add. MS 5238, no. 69.



Figure III-102. Christopher Wren (attrib.), 'Partial elevation of the top portion of the Monument with a statue of Augusta', 1675. © The British Library Board, Add. MS 5238, no. 70.



Figure III-103. Wren (attrib.), 'Partial elevation of the top portion of the Monument with an urn', 1675. © The British Library Board, Add. MS 5238, no. 71.



Figure III-104. Hooke, 'Partial elevation of the base of the Monument', *c.* 1671. © The British Library Board, Add. MS 5238, no. 72.

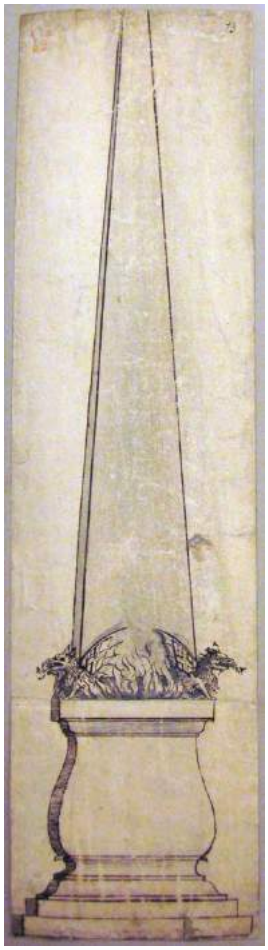


Figure III-105. Hooke, 'Partial elevation of the Cheapside Obelisk', 1680. © The British Library Board, Add. MS 5238, no. 73.

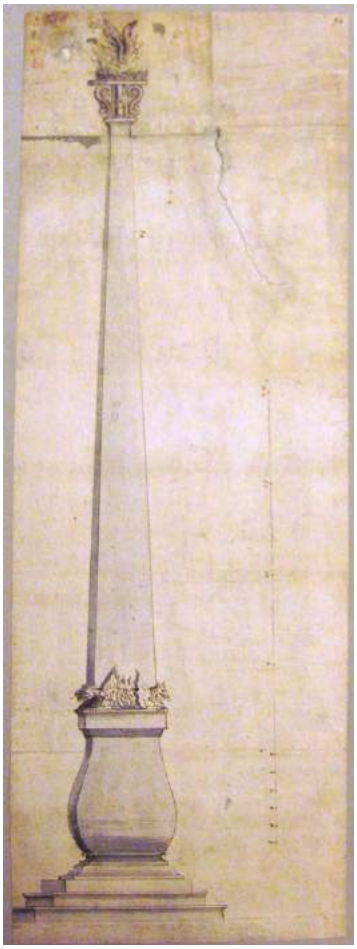


Figure III-106. Hooke, 'Elevation of the Cheapside Obelisk', 1680. © The British Library Board, Add. MS 5238, no. 74.

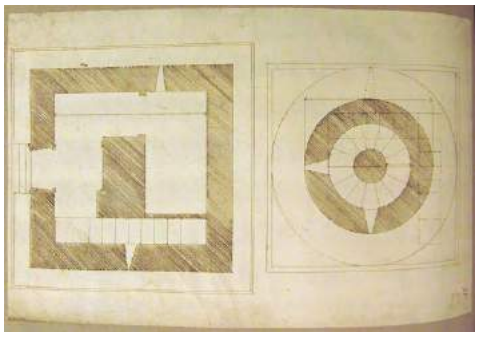


Figure III-107. Hooke[?], 'Copy of Pietro Santo Bartoli's plans of Trajan's Column', 1677[?].. © The British Library Board, Add. MS 5238, no. 75.

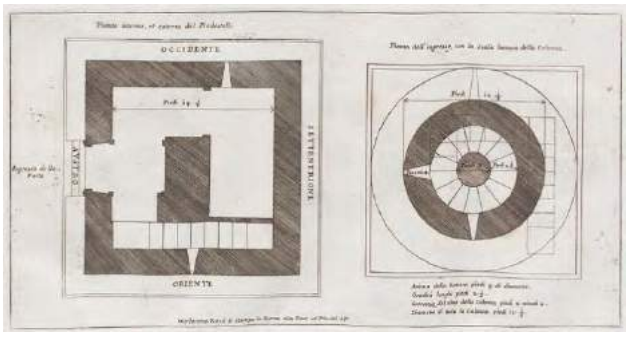


Figure III-108. cf. Pietro Santo Bartoli, 'Plans of Trajan's Column', *Colonna Traiana* (Rome, *c.* 1673), fol. 8.

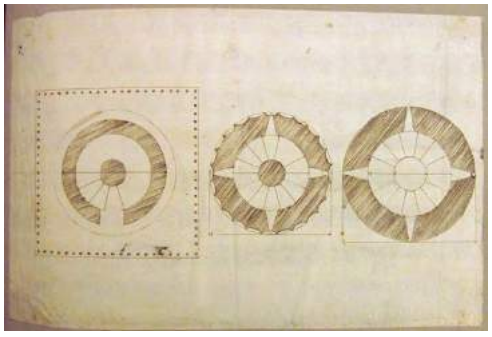


Figure III-109. Hooke[?], 'Copy of Bartoli's plans of Trajan's Column', 1677[?]. © The British Library Board, Add. MS 5238, no. 76.

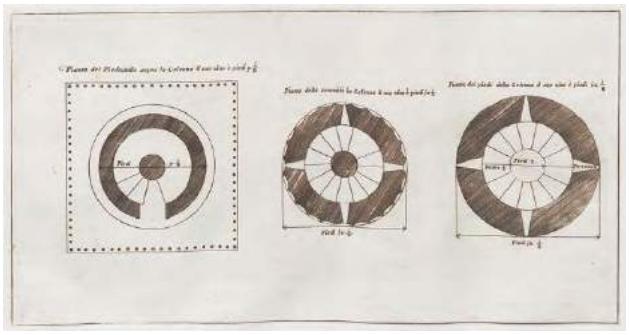


Figure III-110. cf. Bartoli, 'Plans of Trajan's Column', *Colonna Traiana*, fol. 9.



Figure III-111. Edward Woodroofe (attrib.), 'Partial elevation of the top portion of the Monument', 1675; details. © The British Library Board, Add. MS 5238, no. 77.



Figure III-112. a. Woodroofe (attrib.), 'Elevation of the Monument with an alternative design of the top portion pasted', 1675. © The British Library Board, Add. MS 5238, no. 78.

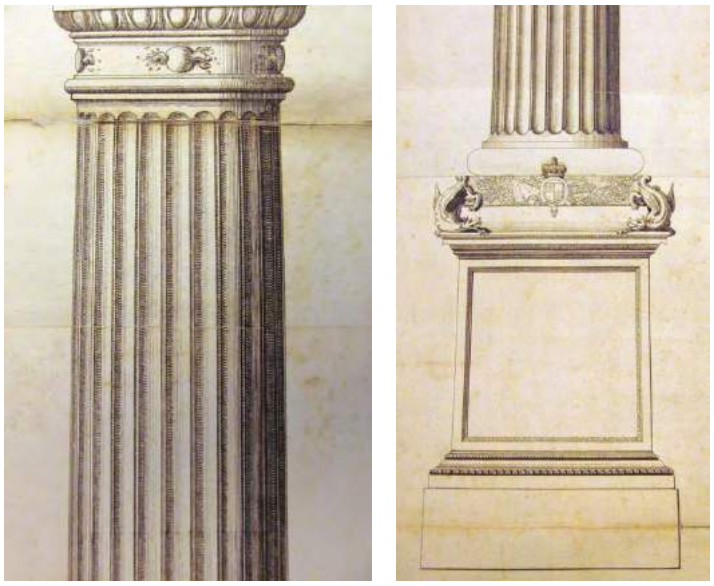


Figure III-112. b. Hooke[?], 'Elevation of the Monument up to the finial', 1675. © The British Library Board, Add. MS 5238, no. 78.

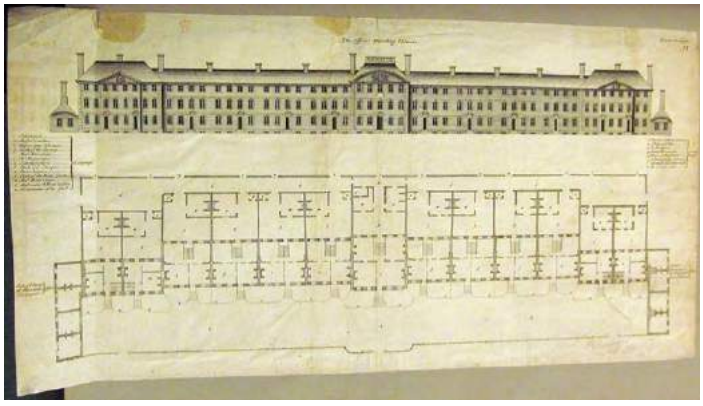


Figure III-113. Anon. (engraver), Edmund Dummer (draughtsman), 'Fourth draught: engraved elevation and plan of the officers dwelling houses in Plymouth', 1694. © The British Library Board, Add. MS 5238, no. 79.

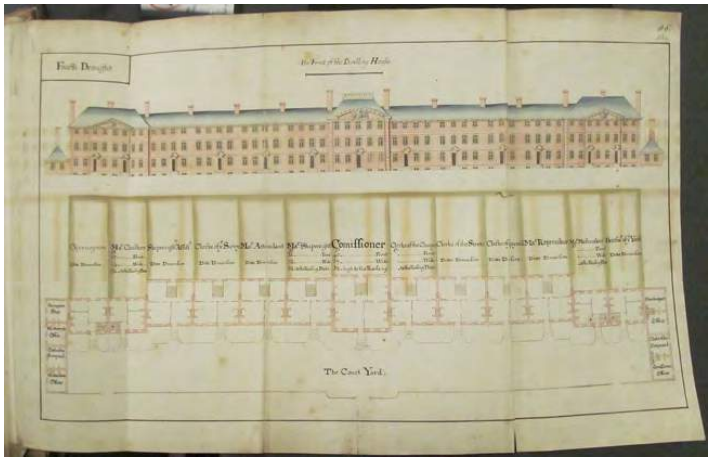


Figure III-114. cf. Dummer, 'Fourth draught: elevation and plan of the officers dwelling houses in Plymouth', 1694. © The British Library Board, Lansdowne MS 847, fol. 46.

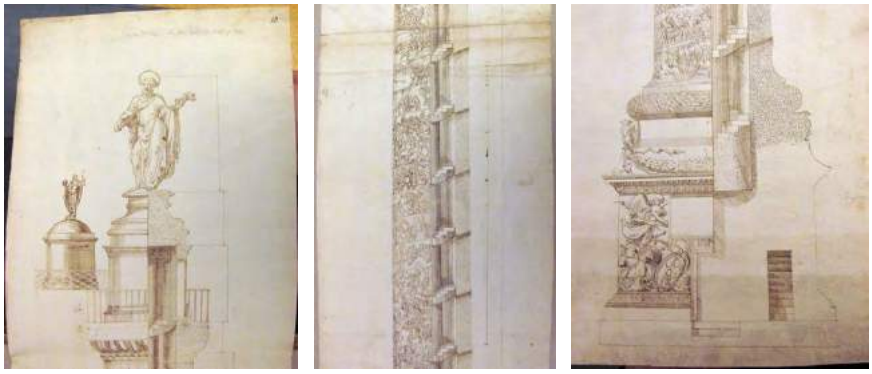


Figure III-115. Hooke[?], 'Copy of Bartoli's section / elevation of Trajan's Column', 1677[?]. © The British Library Board, Add. MS 5238, no. 80.



Figure III-116. cf. Bartoli, 'Section / elevation of Trajan's Column', *Colonna Traiana*, fols. 3-5 pasted together.

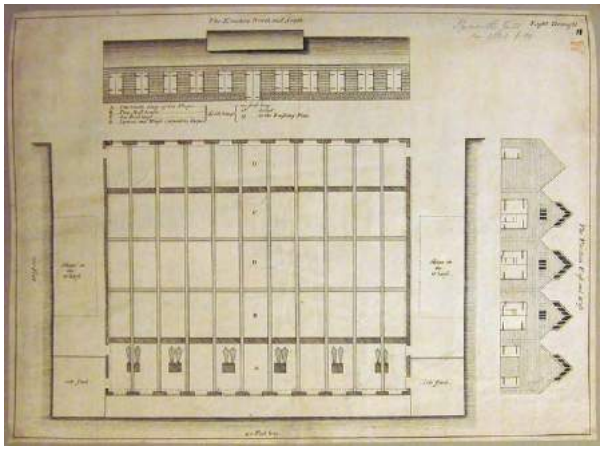


Figure III-117. Anon. (engraver), Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694. © The British Library Board, Add. MS 5238, no. 81.

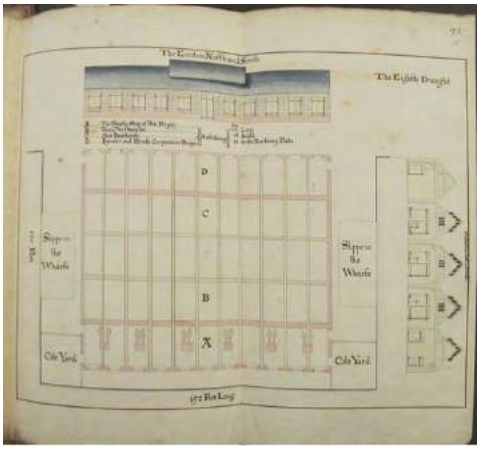


Figure III-118. cf. Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694. © The British Library Board, Lansdowne MS 847, fol. 50.

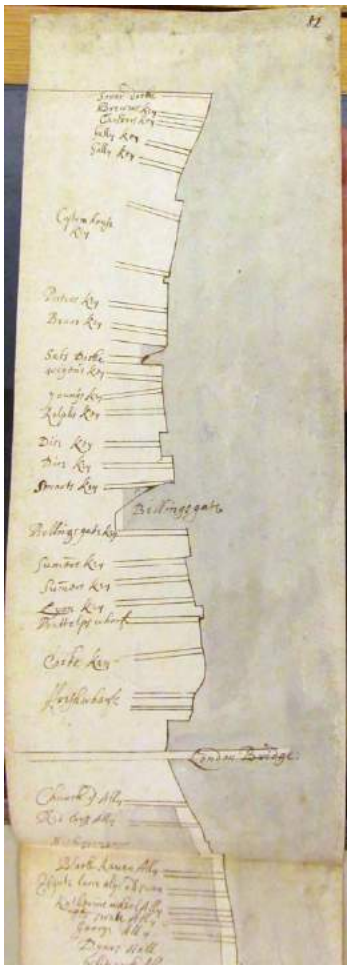


Figure III-119. Hooke, 'Plan in ink and ink-wash of the north embankment of river Thames, from the Tower dock to Whitefryers Lane', *c.* 1672. © The British Library Board, Add. MS 5238, no. 82, detail.

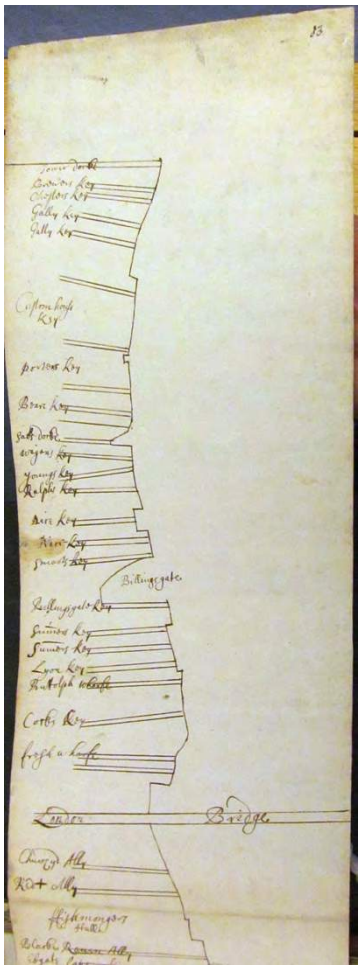


Figure III-120. Hooke, 'Plan in ink of the north embankment of river Thames, from the Tower dock to Whitefryers Lane', *c.* 1672. © The British Library Board, Add. MS 5238, no. 83, detail.

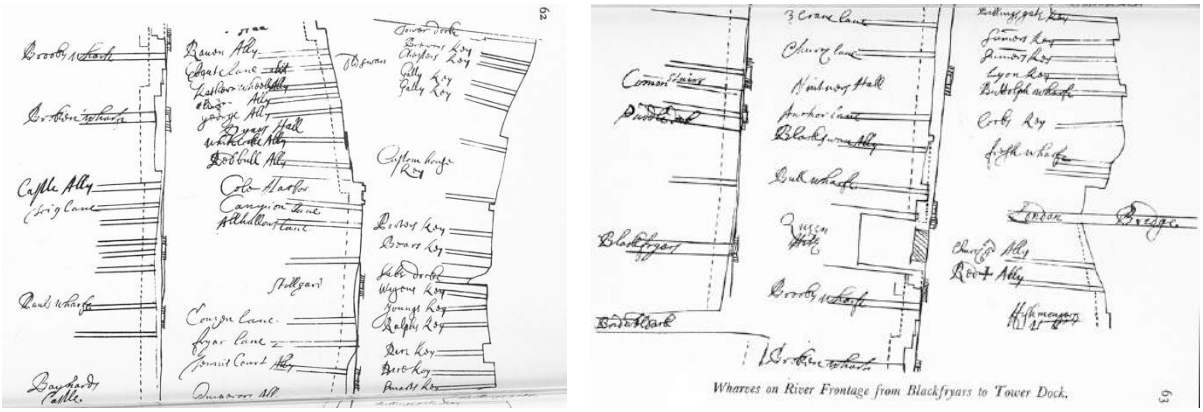


Figure III-121. Hooke, 'Survey of wharves along the River Thames from Blackfryers to Tower Dock, with locations of public landing stairs', *c.* 1672.
Source: Reproduced from Gunther, *Early Science in Oxford*, Vol. 10 (Oxford: 1935), pp. 62-63.

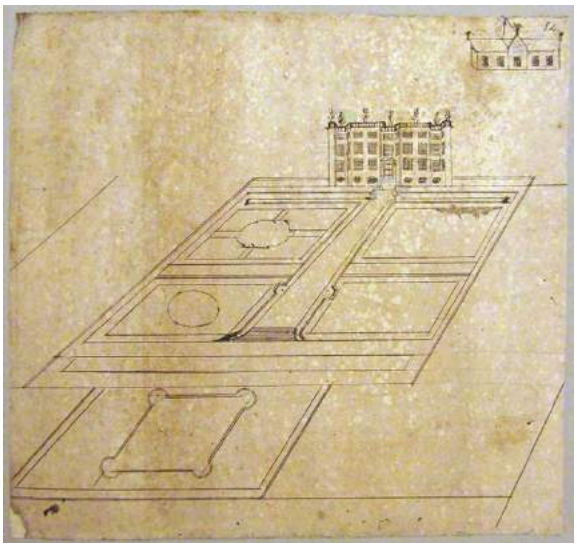


Figure III-122. Anon., 'Copy of Kip and Knyff's engraving of Haigh Hall, Lancaster', n.d. © The British Library Board, Add. MS 5238, no. 84.

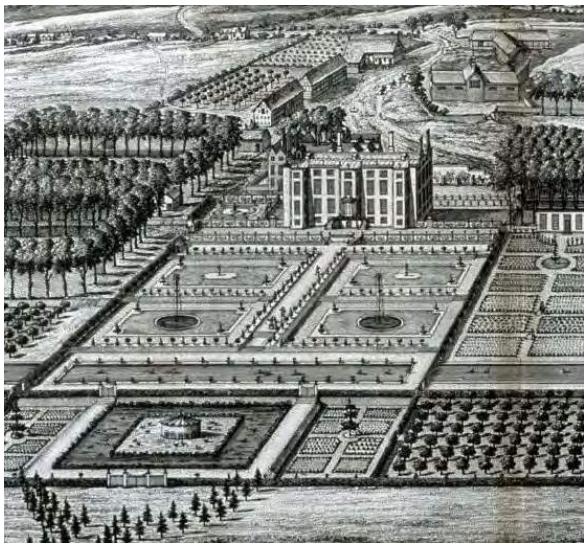


Figure III-123. cf. Kip and Knyff, 'Bird's eye view of Haigh Hall in Lancaster, seat of Sir Roger Bradshaigh Baronet', *Britannia illustrata* (1707), detail.
Source: Achenbach Foundation for Graphic Arts, accession no. 1963.30.26697, https://goo.gl/JZWckT.

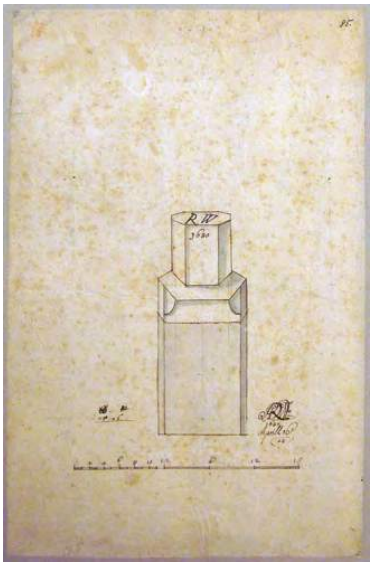


Figure III-124. Anon., 'Elevation, in ink and ink-wash, of part of a column bearing initials RW', 1680. © The British Library Board, Add. MS 5238, no. 85.

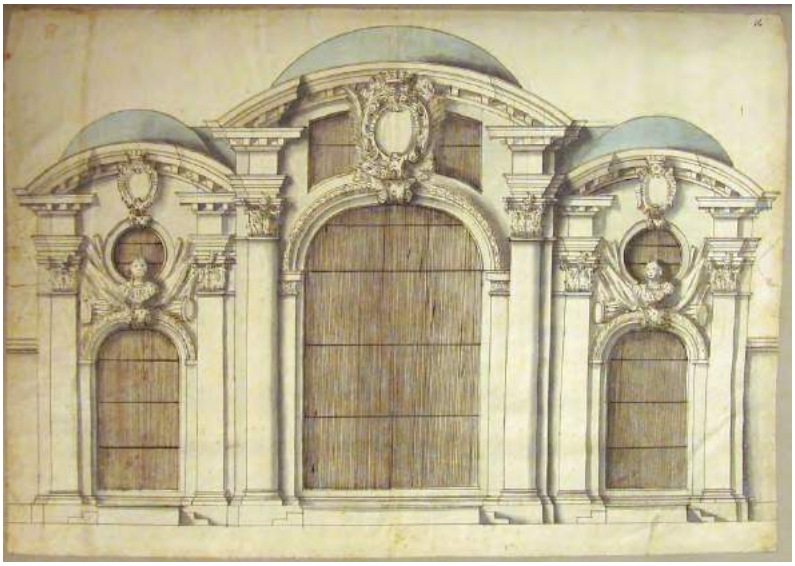


Figure III-125. Anon., 'Elevation, in ink and ink-wash, of a small building, perhaps a musical or theatrical pavilion', n.d. © The British Library Board, Add. MS 5238, no. 86.



Figure III-126. Hooke[?], 'Elevation of a window with a triangular pediment', n.d. © The British Library Board, Add. MS 5238, no. 87.

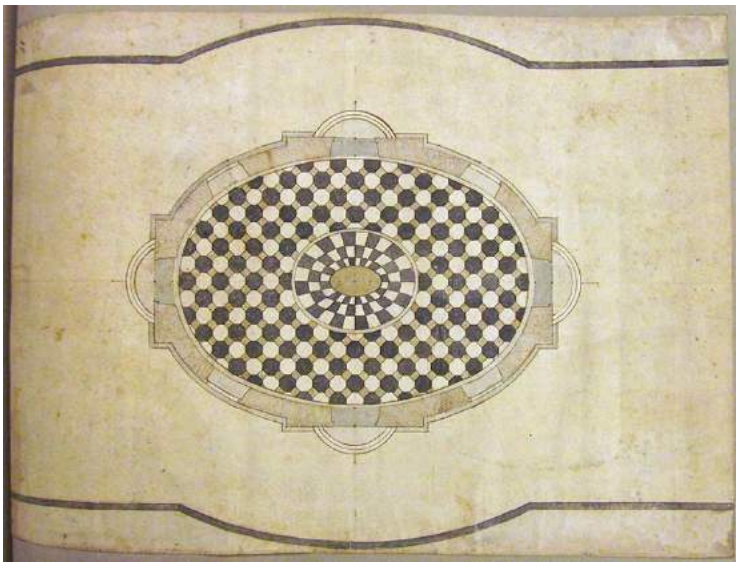


Figure III-127. Anon., 'Plan of a small oval building', n.d. © The British Library Board, Add. MS 5238, no. 88.

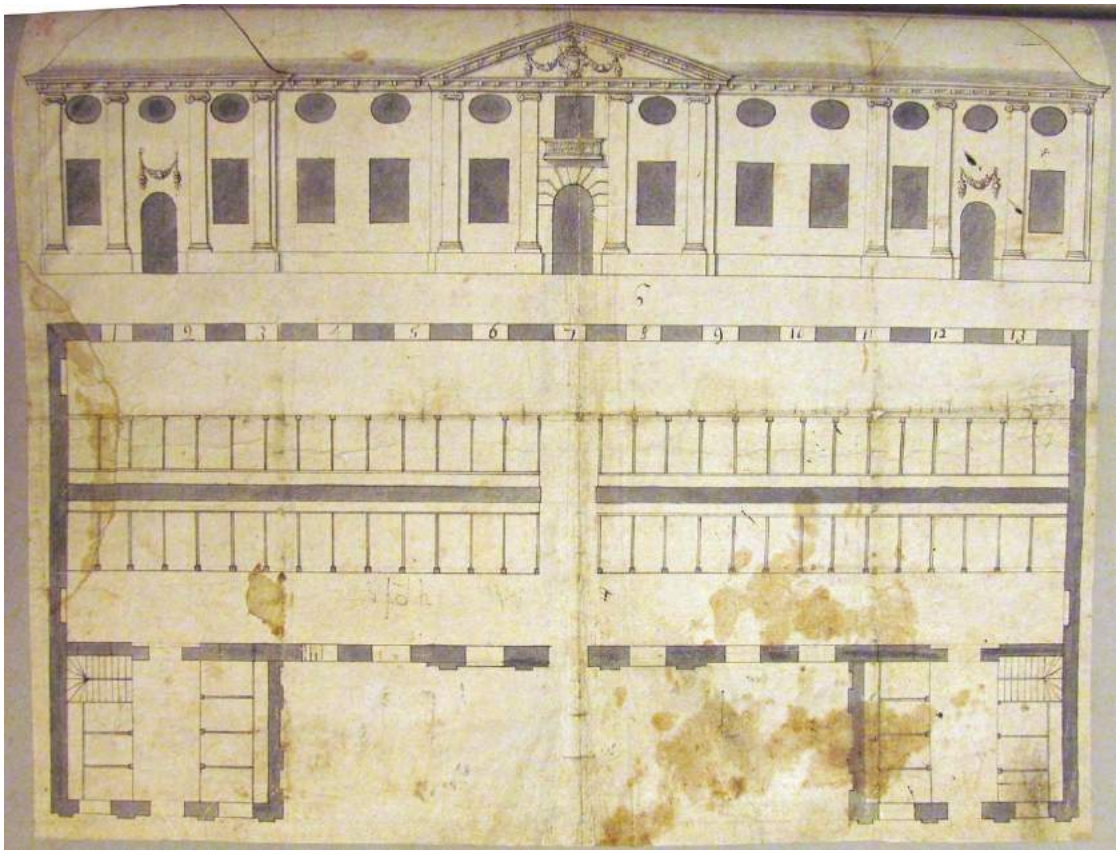


Figure III-128. Hooke, 'Elevation and plan, in ink and ink-wash, of the Somerset House stables built for Queen Catherine of Braganza', 1669 or 1670. © The British Library Board, Add. MS 5238, no. 89.



Figure III-129. Hooke[?], 'Ink and ink-wash elevation of a niche, perhaps in a chapel', n.d. © The British Library Board, Add. MS 5238, no. 90.



Figure III-130. Hooke[?], 'Ink and ink-wash elevation of a niche', n.d.; detail. © The British Library Board, Add. MS 5238, no. 91.

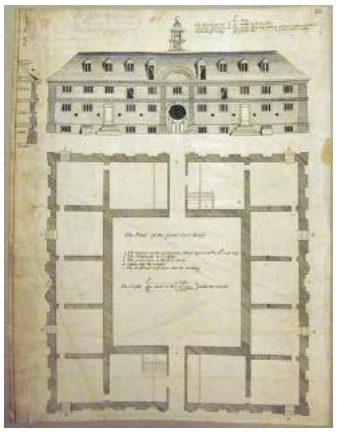


Figure III-131. Anon. (engraver), Dummer (draughtsman), 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Add. MS 5238, no. 92.

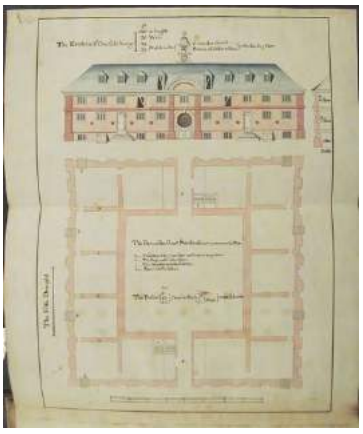


Figure III-132. cf. Dummer, 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Lansdowne MS 847, fol. 47.

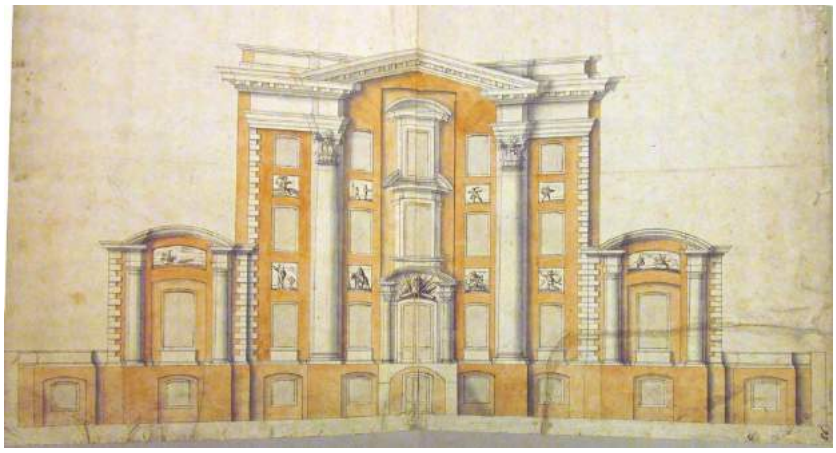


Figure III-133. Anon., 'Large drawing, in ink and colour ink-wash, of an elevation of an unidentified institutional building', n.d. © The British Library Board, Add. MS 5238, no. 93.

c. Add. MS 5262

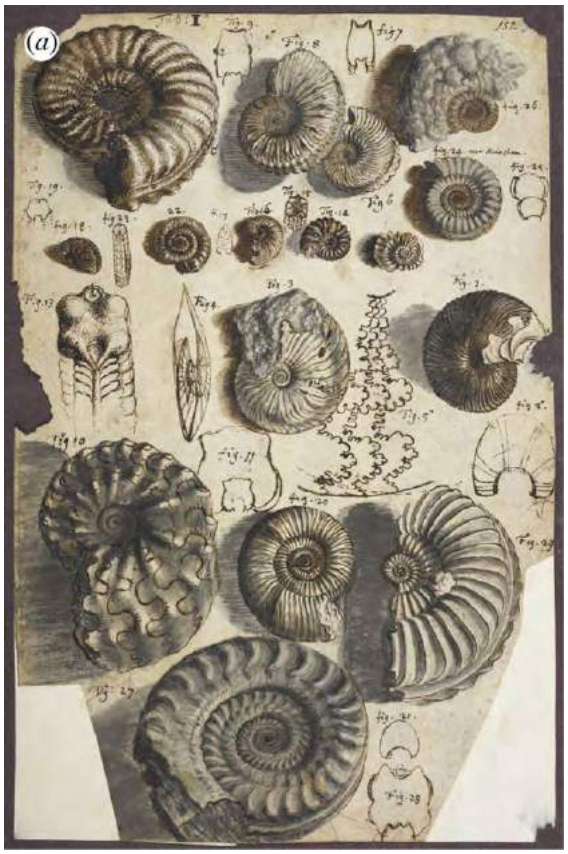


Figure III-134. Hooke, 'Snake-stones (ammonites)', n.d.; detail. © The British Library Board, Add. MS 5262, no. 152, reproduced in Sachiko Kusukawa, 'Drawings of Fossils by Hooke and Richard Waller', *Notes and Records of the Royal Society* 67 (2013), p. 124.



Figure III-135. Hooke, 'Nautilus shells', n.d. © The British Library Board, Add. MS 5262, no. 153, reproduced in ibid., p. 125.

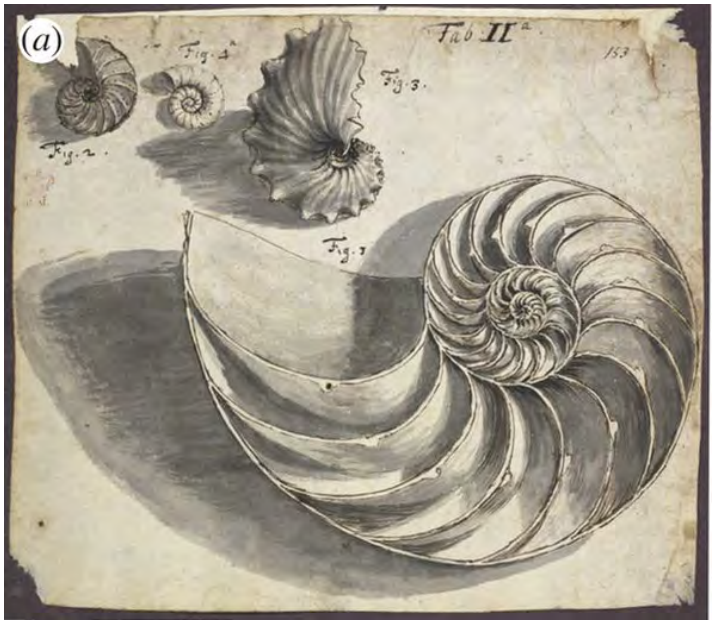


Figure III-136. Hooke, 'Helmet and button stones', n.d. © The British Library Board, Add. MS 5262, no. 154, reproduced in ibid.

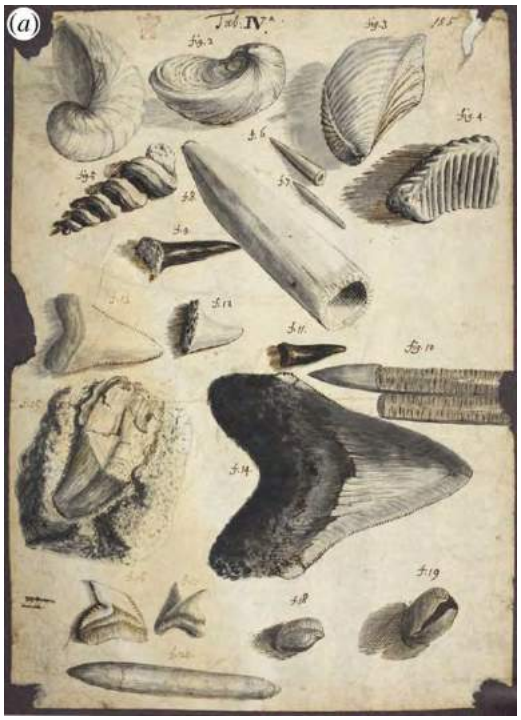


Figure III-137. Hooke, 'Various fossils', n.d. © The British Library Board, Add. MS 5262, no. 155, reproduced in ibid., p. 126.



Figure III-138. Hooke, 'Various fossils', n.d. © The British Library Board, Add. MS 5262, no. 156, reproduced in ibid., p. 127.



Figure III-139. cf. Richard Waller, 'Petrified nautilus shell', 1687[?]. © The British Library Board, Add. MS 5262, no. 158, reproduced in ibid., p. 129.

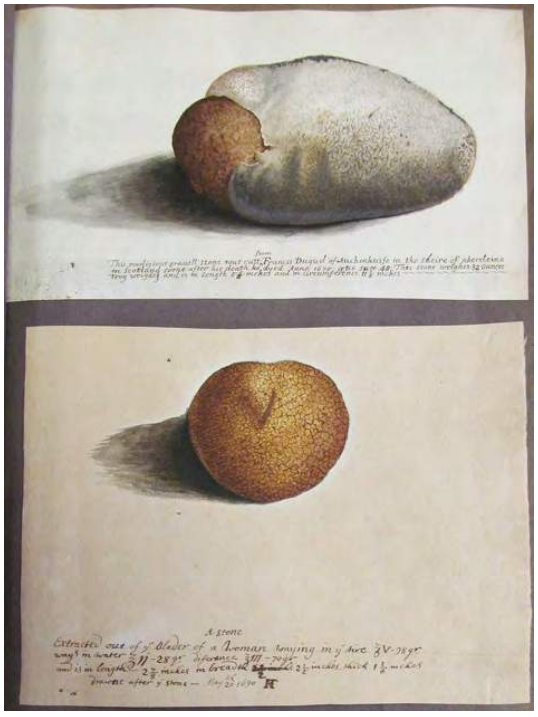


Figure III-140. cf. Hunt, 'Prodigious gravell stone cutt from Francis Dugud', 1675; 'A stone extracted of the blad*d*er of a woman', 1690. © Royal College of Physicians, MS 618, no. 37.

d. Add. MS 57495

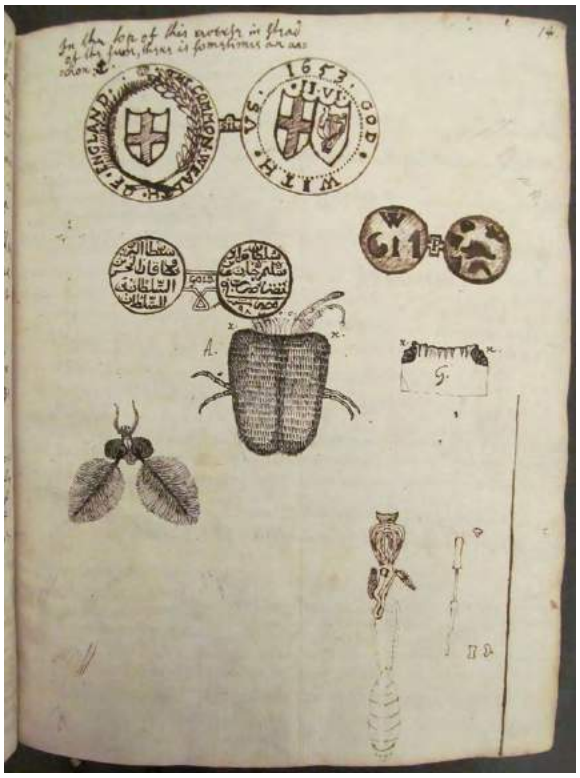


Figure III-141. John Covel (previously attributed to Hooke), 'Sketches of coins and insects', *c.* 1660–1661. © The British Library Board, Add. MS 57495, fol. 112v.

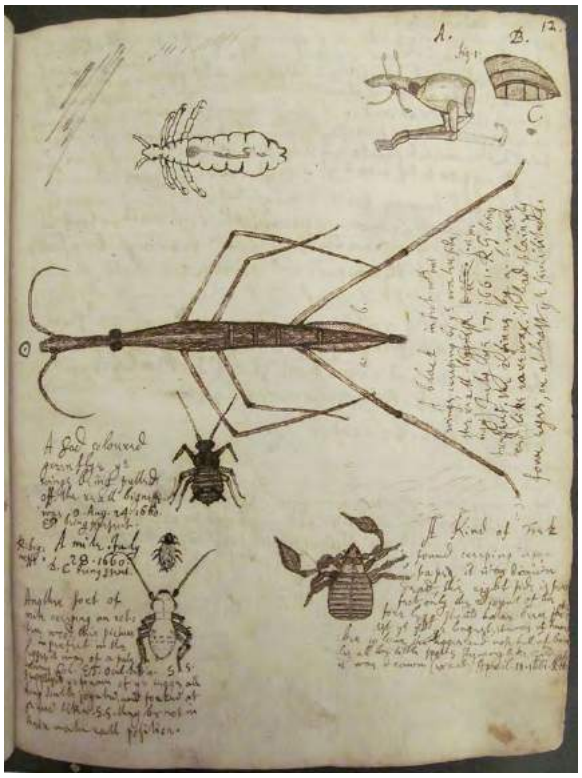


Figure III-142. Covel (previously attributed to Hooke), 'Sketches of insects', 1660–1661. © The British Library Board, Add. MS 57495, fol. 113v.



Figure III-143. Covel, 'Sketch of a tick', 1660–1661, detail. © The British Library Board, Add. MS 57495, fol. 113v.

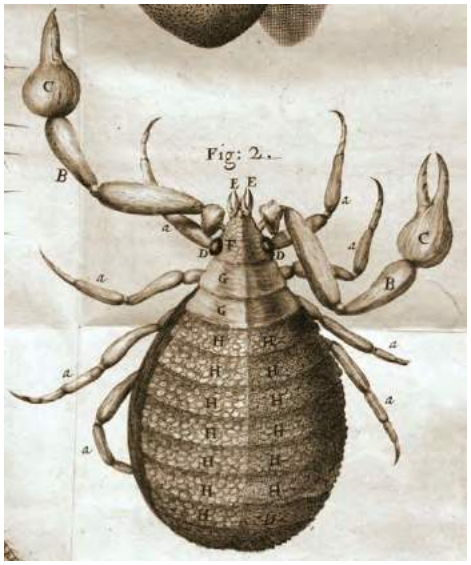


Figure III-144. cf. Hooke, *Micrographia* (London, 1665), Schema XXXIII, Fig. 2.



Figure III-145. Covel, 'Drawing of a *trombidium holosericeum* (red velvet mite) and a 1574 gold coin from the reign of Murad III', *c.* 1660–1661, detail. © The British Library Board, Add. MS 57495, fol. 112v.

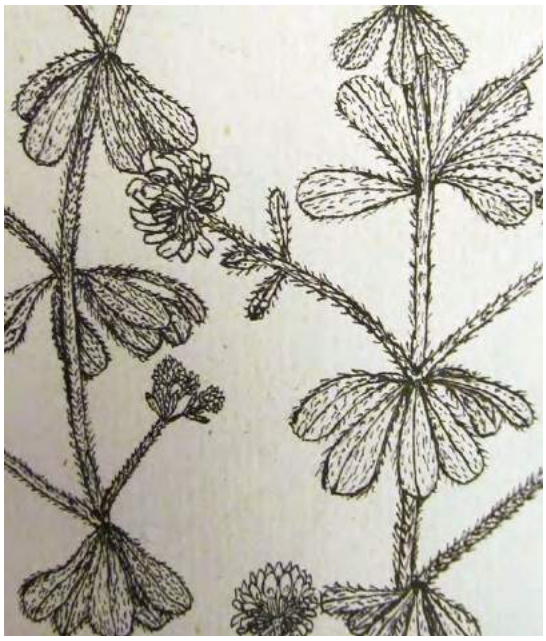


Figure III-146. cf. Covel, '*Lotus subbiflorus* [?]', detail. © The British Library Board, Add. MS 57495, fol. 53r.



Figure III-147. Covel, 'Sketches of insects', 1660–1661, detail. © The British Library Board, Add. MS 57495, fol. 113v.

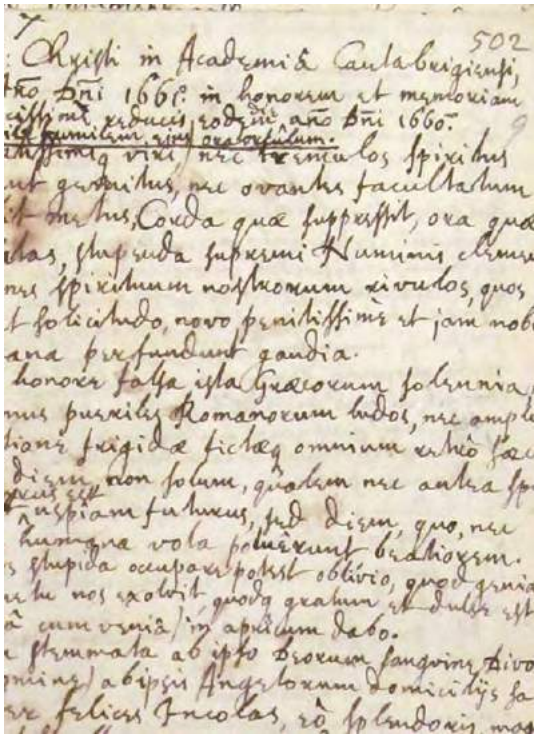


Figure III-148. cf. Covel, 'Oration in honour of Charles II's restoration', 1661. © The British Library Board, Add. MS 22910, fol. 9r.

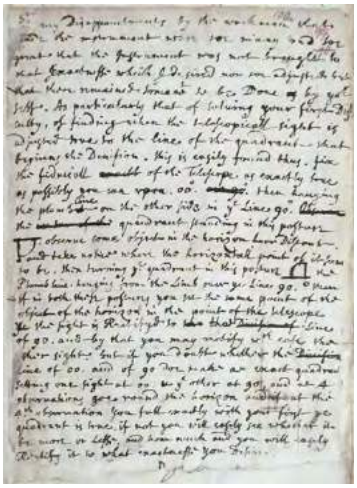


Figure III-149. cf. Covel, 'Ink wash drawing of a caterpillar', n.d. © The British Library Board, Add. MS 57495, fol. 117r.



Figure III-150. cf. Covel[?], 'Drawing of an unidentified bovine animal', n.d. © The British Library Board, Add. MS 22910, fol. 221r.

e. Sloane MS 1039



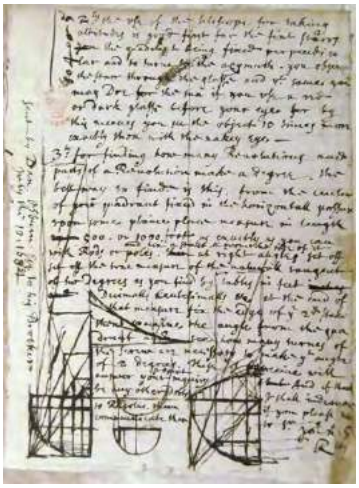


Figure III-151. Hooke's copy of his letter "Sent by Dan. Osburn Esq. to his Brother July the 10 1684," with sketches illustrating the use of a quadrant described in the letter. © The British Library Board, Sloane MS 1039, fol. 100r-v.

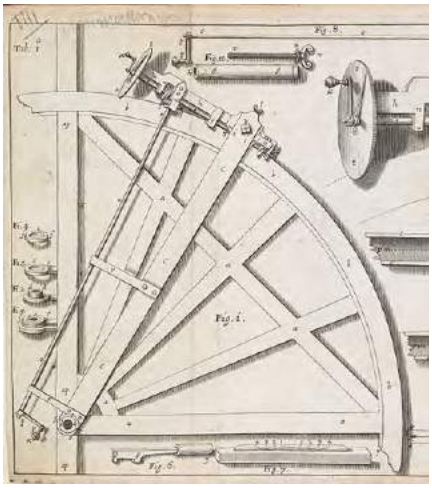


Figure III-152. cf. Hooke, *Animadversions on the first part of the* Machina coelestis *of . . . Johannes Hevelius* (London, 1674) in Hooke's *Lectiones Cutlerianae* (London, 1679), detail from table 1.

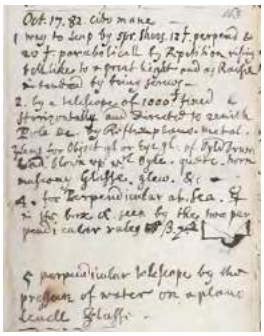


Figure III-153. Hooke, '*Memorandum* for 17 Oct. 1682'. © The British Library Board, Sloane MS 1039, fol. 153r, detail.

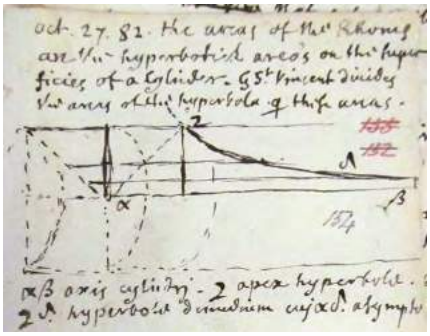


Figure III-154. Hooke, '*Memorandum* for 27 Oct. 1682'. © The British Library Board, Sloane MS 1039, fol. 154r, detail.

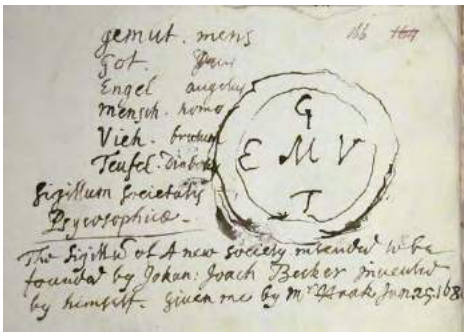


Figure III-155. Hooke, '*Memorandum* for 25 June 168[6?], with a sketch of the seal of Johann Joachim Becher's *societatis psychosophicae'*. © The British Library Board, Sloane MS 1039, fol. 166r, detail.

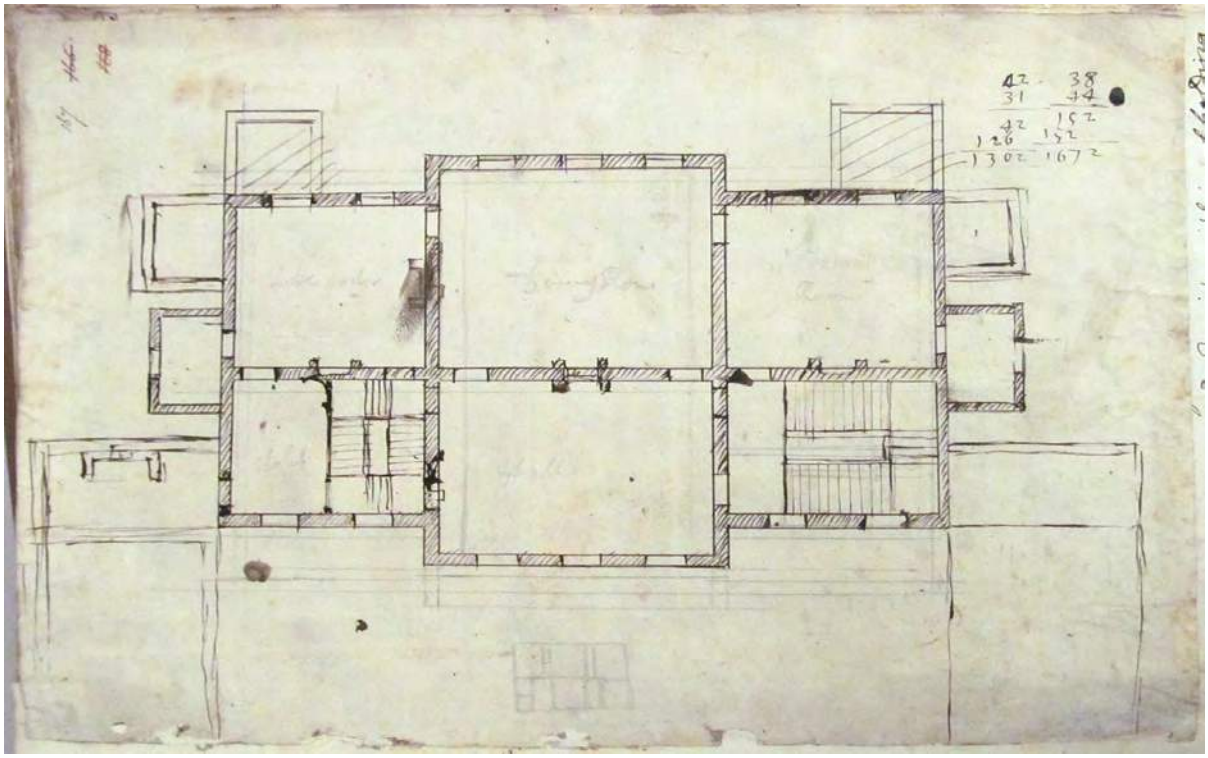


Figure III-156. Hooke, 'Plan of an unidentified building', n.d. © The British Library Board, Sloane MS 1039, fol. 167.

f. Sloane MS 1048

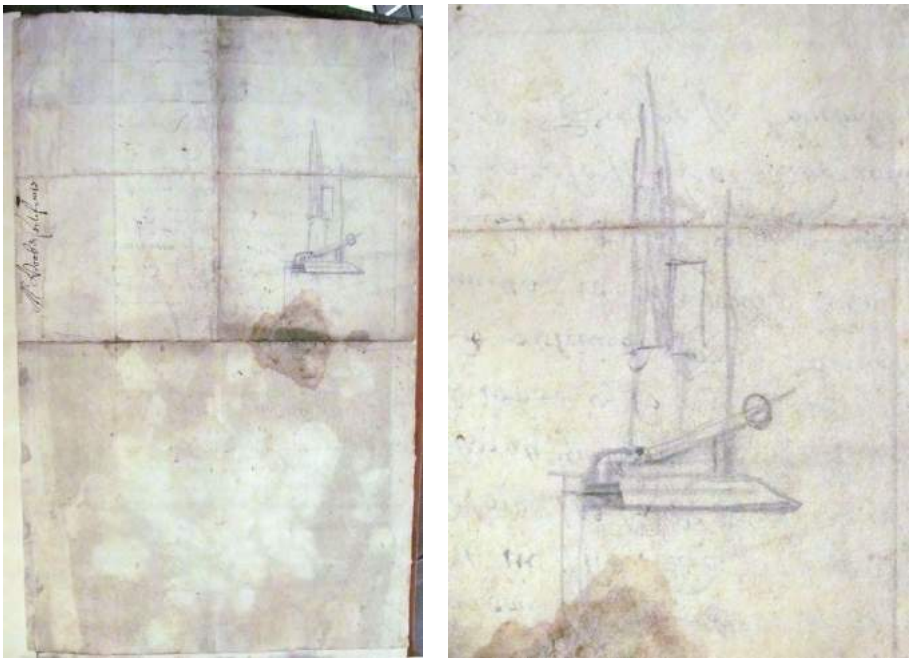


Figure III-157. Hooke[?], sketch on the verso of 'Mr. Hooke's certificate', 16 May 1682; detail. © The British Library Board, Sloane MS 1048, fol. 62v.

g. Sloane MS 4024



Figure III-158. Hooke, 'Microscopic view of a yellow sunflower dust' and 'Elliptic symbol', diary entries for 16 and 18 Aug. 1689. © The British Library Board, Sloane MS 4024, fol. 43r.

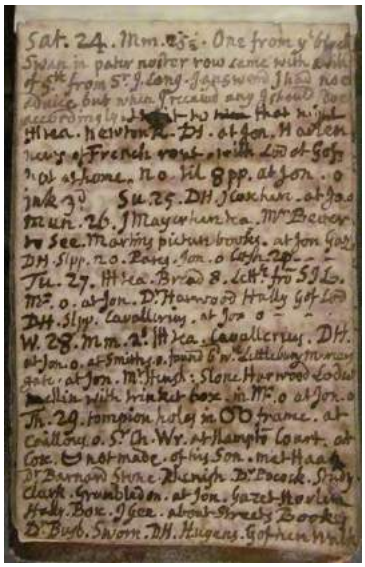
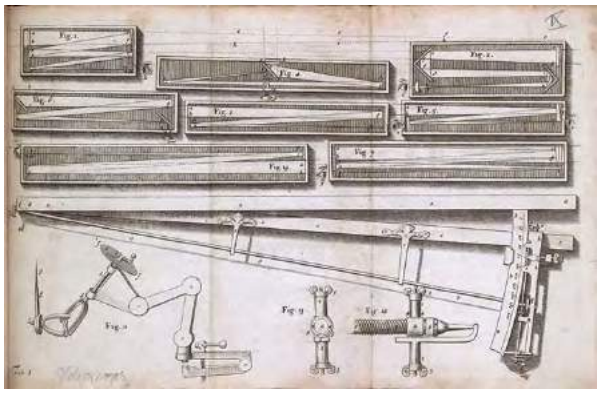


Figure III-159. Hooke, 'Symbol of spectacle frames', diary entry for 29 Aug. 1689. © The British Library Board, Sloane MS 4024, fol. 45r.



Figure III-160. Hooke, 'Symbol of a bowl', diary entry for 12 Sep. 1689. © The British Library Board, Sloane MS 4024, fol. 49r.

h. RP 9026



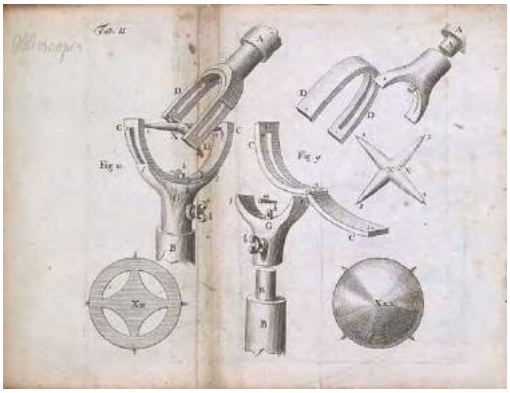
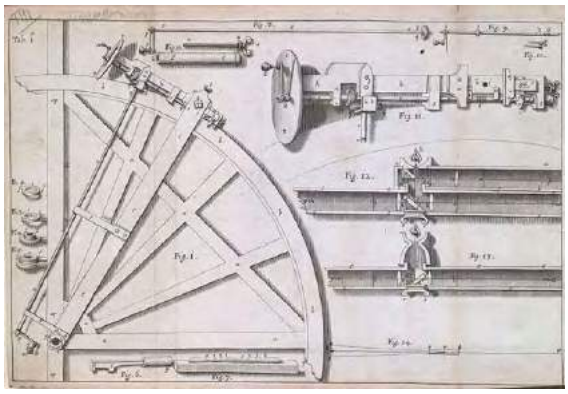


Figure III-161. cf. Tables 1 and II in *A Description of helioscopes, and some other instruments made by Robert Hooke* (London, 1676) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in British Library, RP 9026, nos. 1 & 2.



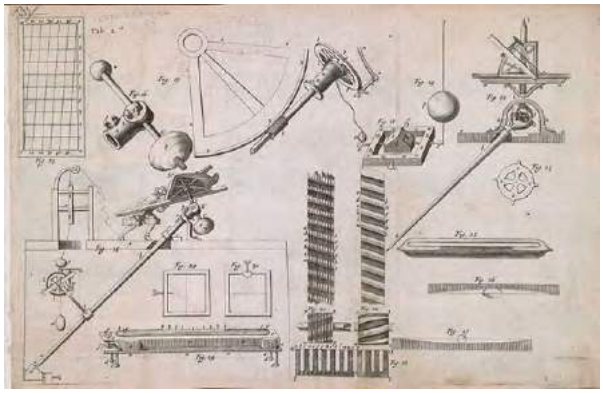


Figure III-162. cf. Tables I & 2 of *Animadversions on the first part of the* Machina coelestis *of . . . Johannes Hevelius* (London, 1674) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in British Library, RP 9026, nos. 3 & 4.



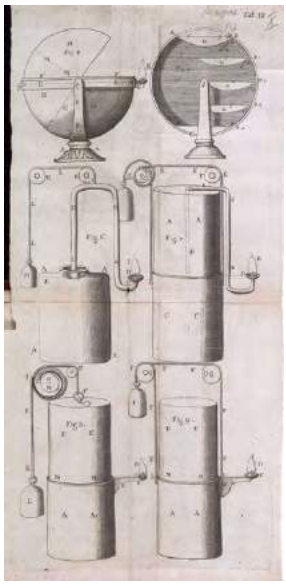


Figure III-163. cf. Tables I and III of *Lampas: or, descriptions of some mechanical improvements of lamps & waterpoises* (London, 1677) in Hooke's *Lectiones Cutlerianae* (London, 1679); printed versions of the plate proofs copied in British Library RP 9026, nos. 5 & 6.

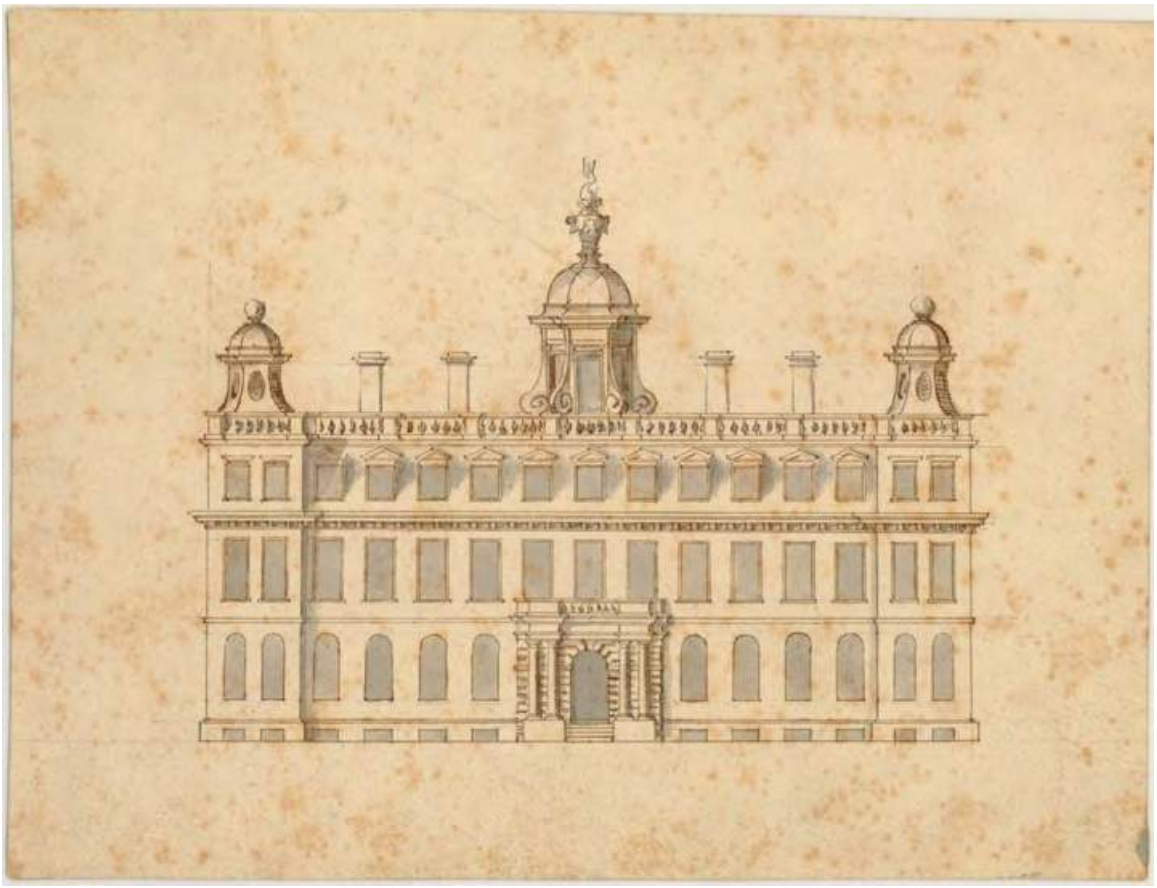


Figure III-164. Hooke (attrib.) or Pearce (attrib.), '[Elevation of a 17thC building with cupola Pen and brown ink, with grey wash, over graphite]', n.d. © Trustees of the British Museum, Ee,2.119, AN1265760001.

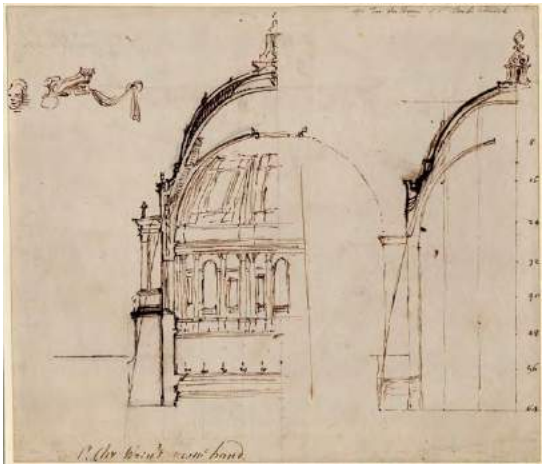


Figure III-165. cf. Wren, 'Study for the dome of St. Paul's Cathedral using a cubic parabola', *c.* 1690. © Trustees of the British Museum, 1881,0611.203, AN290173001.



Figure III-166. Wren, 'Design for the finial of the Monument', *c.* 1675. © Trustees of the British Museum 1881,0611.205, AN290174001.

ii. 4. CAMBRIDGE UNIVERSITY LIBRARY

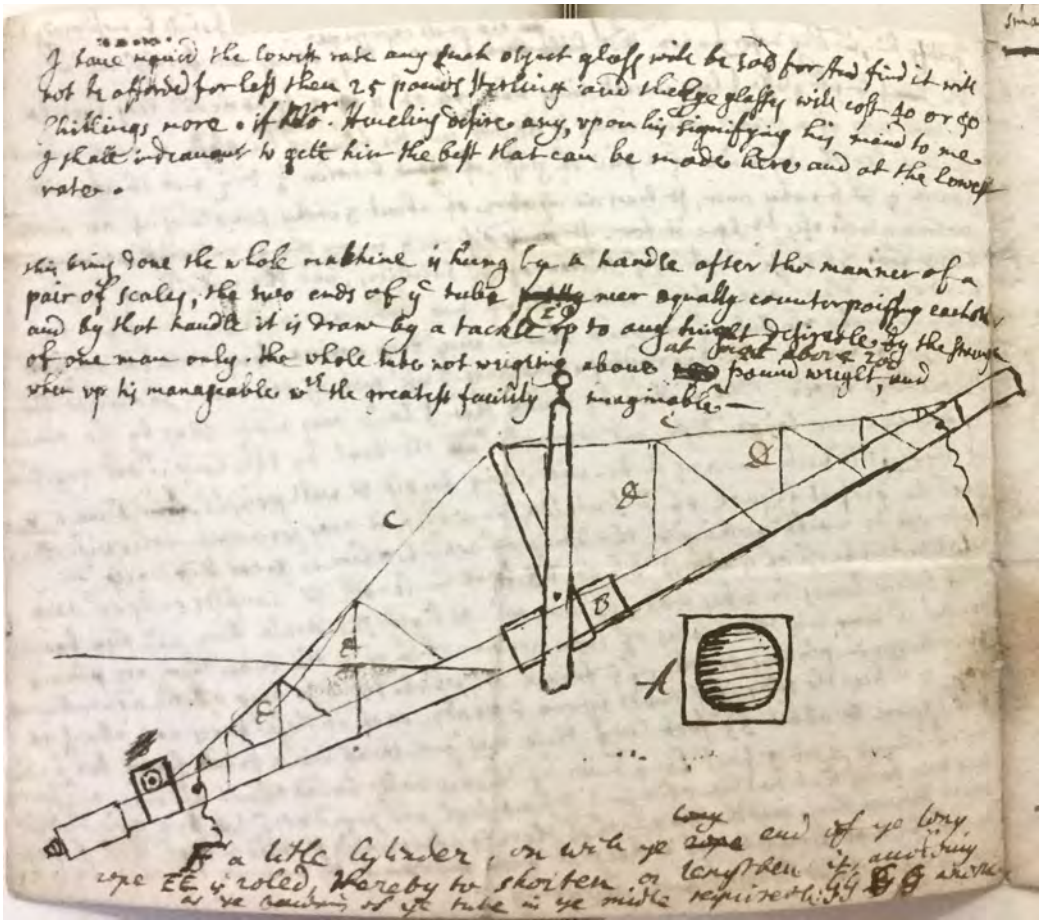


Figure III-167. a. Hooke's sketch of the 66-foot telescope in his letter to Hevelius, *c.* 20 Feb. 1667. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/117v.



Figure III-167. b. Hooke, 'Letter to Hevelius regarding telescopic sights', *c.* May 1668; detail. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/129v.

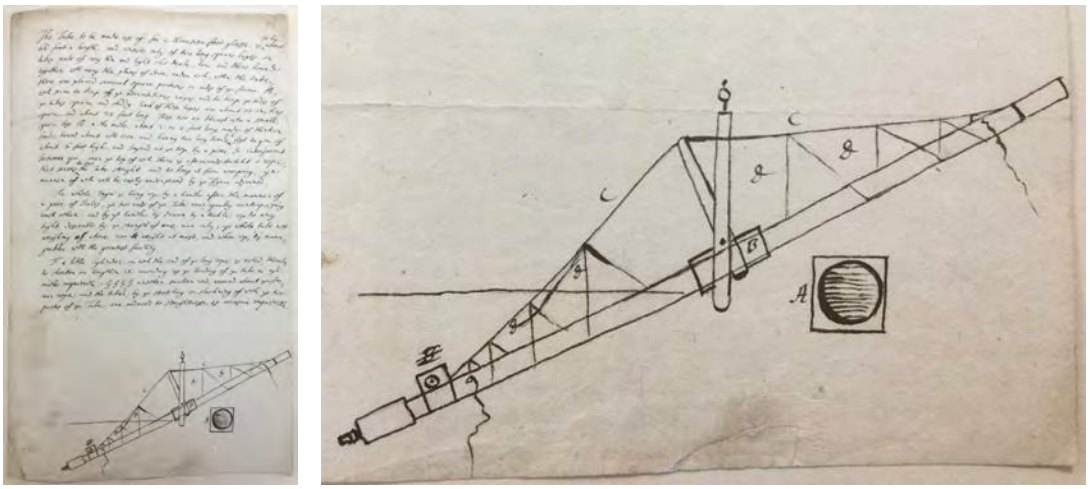


Figure III-168. cf. a. Oldenburg's notes on Hooke's letter to Hevelius, Feb. 1667; detail showing the sketch. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/116r.

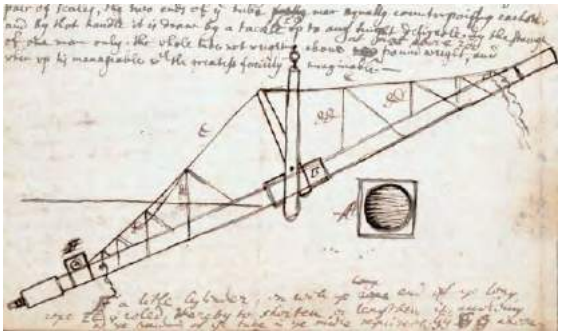


Figure III-168. cf. b. Author's collage of the two sketches (Figures III-167 a. and III-168. cf. a), showing their near-identical size and composition.

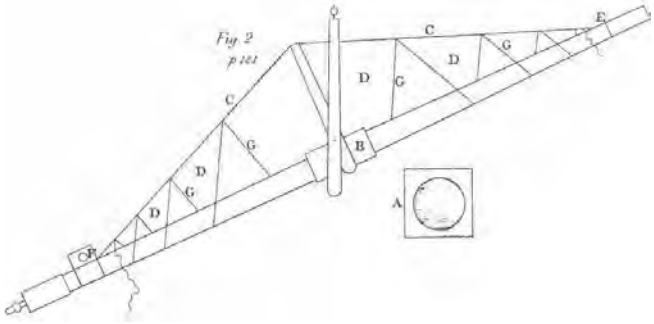


Figure III-168. cf. c. A diagram of Hooke's sketch, published in Stephen Jordan Rigaud, ed., *Correspondence of Scientific Men of the Seventeenth Century* (Oxford: University Press, 1841), vol. 1, pl. 2, fig. 2.
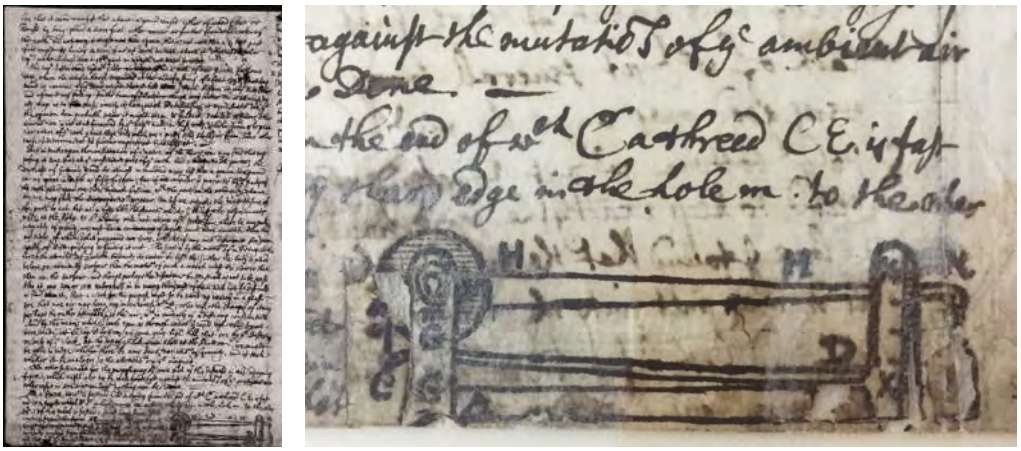


Figure III-169. Hooke, 'Instrument to measure gravitational differences', sketched in the attachment to his 21 March 1666 letter to Robert Boyle. Source: Cambridge University Library, MS Add.9597/13/5/118v.

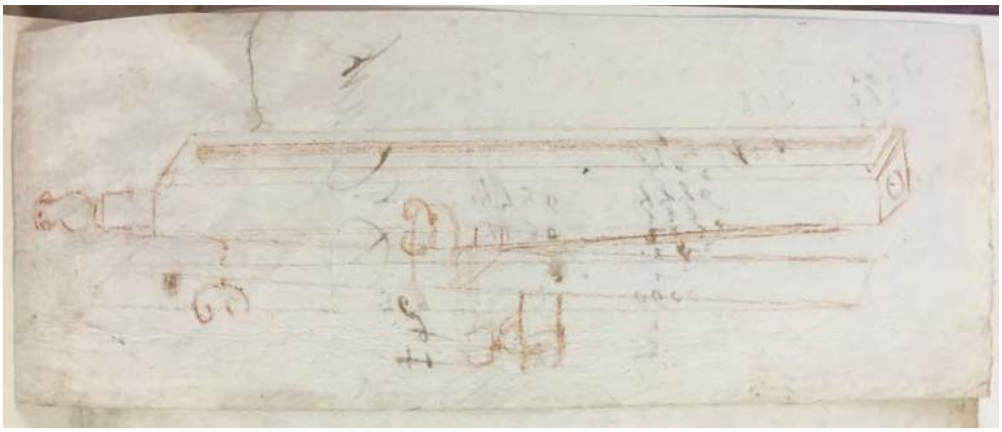


Figure III-170. Hooke, 'Diagram of a telescope', 1667[?]. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/122av.



Figure III-171. Hooke, 'Drawings related to experiments conducted on 11 July 1683, 9 and 16 Jan. 1684'. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/135r, 143v, 145r.

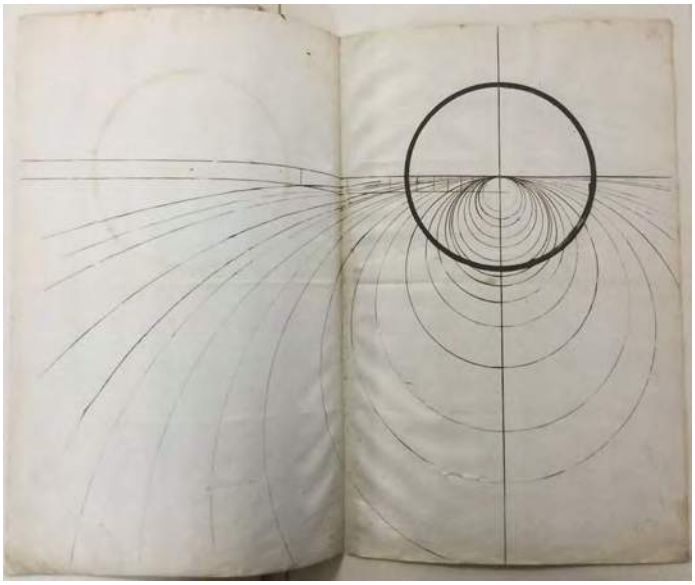


Figure III-172. Hooke, 'Magnetical orbs formed around a terrella', 26 Feb. 1674. Source: Cambridge University Library, Department of Manuscripts and University Archives, The Macclesfield Collection, MS Add.9597/13/5/155a.

ii. 5. [CAMBRIDGE] TRINITY COLLEGE, UNIVERSITY OF CAMBRIDGE
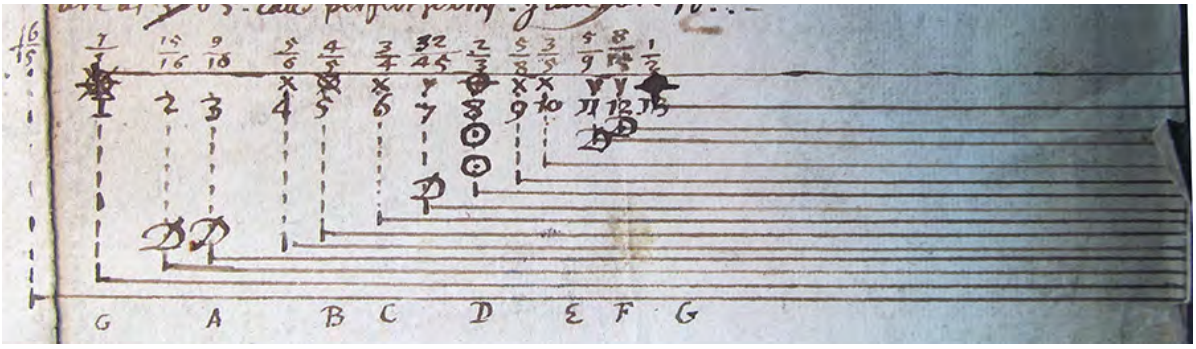


Figure III-173. Hooke, detail from 'Hook's musick scripts' [notes on music and an alphabetical musical notation], 1671–1676. Trinity College, Cambridge, MS O.11a.1[11a].



Figure III-174. Hooke, detail from 'A new sunopsis of musicke' [notes on music and an alphabetical musical notation], 1671–1676. Trinity College, Cambridge, MS O.11a.1[11b].

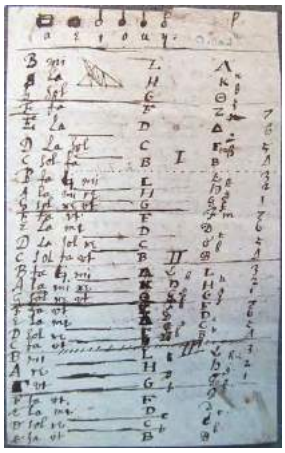


Figure III-175. Hooke, 'A new sunopsis of musicke', 1671–1676. Trinity College, Cambridge, MS O.11a.1[12].

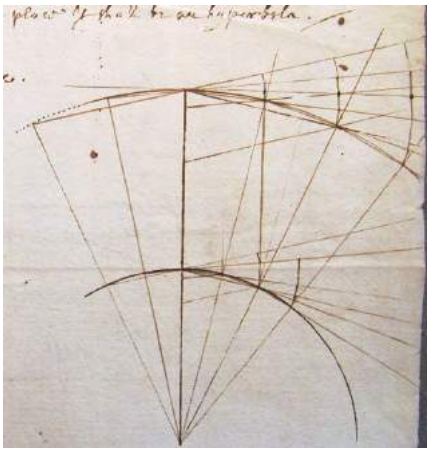


Figure III-176. Hooke, 'Laws of Circular motion', 1685, detail. Trinity College, Cambridge, MS O.11a.1[16b].

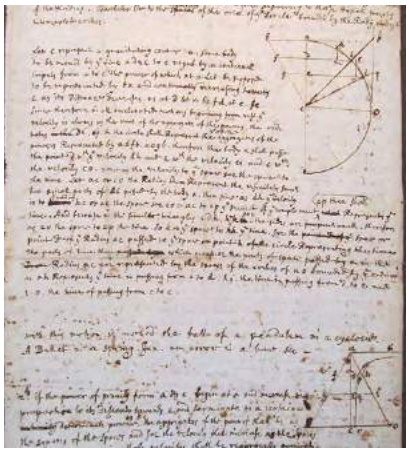


Figure III-177. Hooke, 'Laws of Circular motion', 1685. Trinity College, Cambridge, MS O.11a.1[16d].

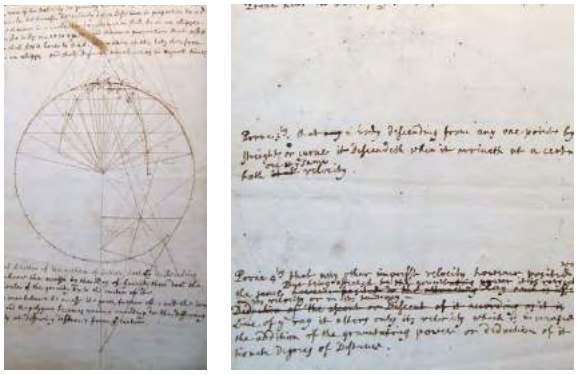


Figure III-178. Hooke, 'Laws of Circular motion', 1685, recto and detail from the verso. Trinity College, Cambridge, MS O.11a.1[16f].



Figure III-179. Hooke, 'Notes on velocity and motion', n.d. Trinity College, Cambridge, MS O.11a.1[19].

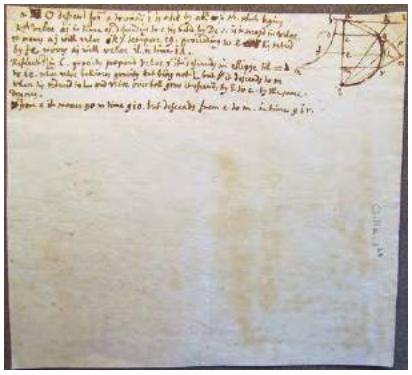


Figure III-180. Hooke, 'Notes on velocity and motion', n.d. Trinity College, Cambridge, MS O.11a.1[20(r)].

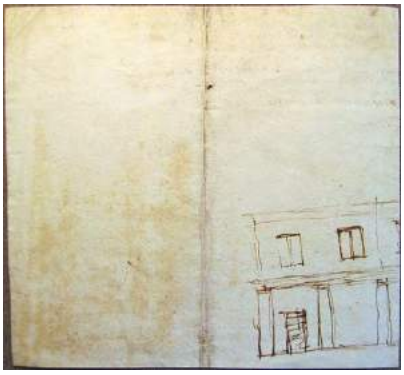


Figure III-181. Hooke, 'Sketch of an unknown building', n.d. Trinity College, Cambridge, MS O.11a.1[20(v)].

ii. 6. [CAMBRIDGE] WHIPPLE LIBRARY, UNIVERSITY OF CAMBRIDGE

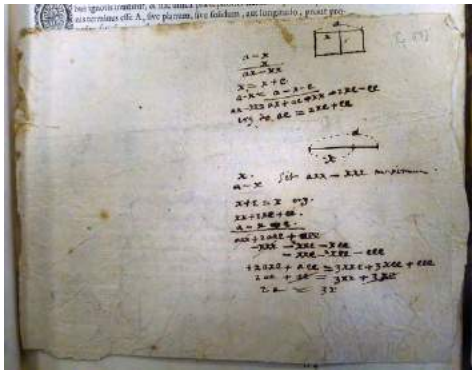


Figure III-182. Hooke, 'Notes on Pierre de Fermat's *Varia opera mathematica* (Toulouse, 1679)', after 1681. Source: Whipple Library, Cambridge, classmark STORE 57:20.

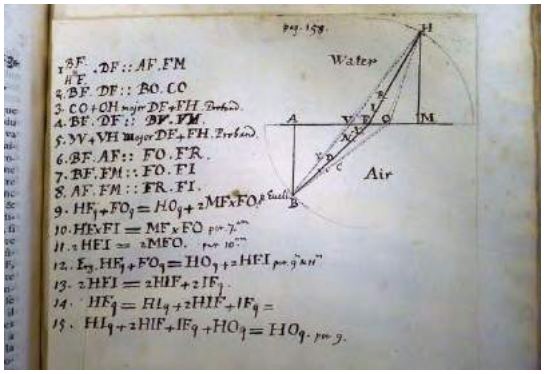


Figure III-183. Hooke, 'Notes on Fermat's theory of refraction', after 1681. Source: Whipple Library, classmark STORE 57:20.

ii. 7. CHEROKEE RANCH AND CASTLE FOUNDATION, COLORADO, USA [BUTE COLLECTION]

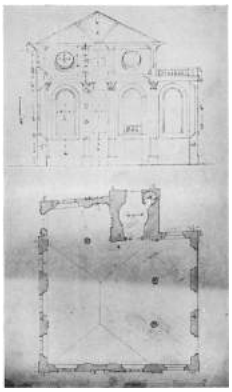


Figure III-184. Hooke (attrib.), 'Plan and section looking west of St. Benet, Thames Street: design A (with attic)', n.d.
Source: John Summerson, 'Drawings of London Churches in the Bute Collection: A Catalogue', *Architectural History* 13 (1970), fig. 10 (Bute no. 19).

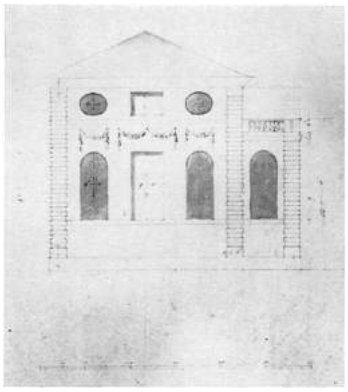


Figure III-185. Hooke (attrib.), 'East elevation of St. Benet, Thames Street: design A (with attic)', n.d.
Source: Summerson, 'Drawings of London Churches', fig. 11a (Bute no. 20).

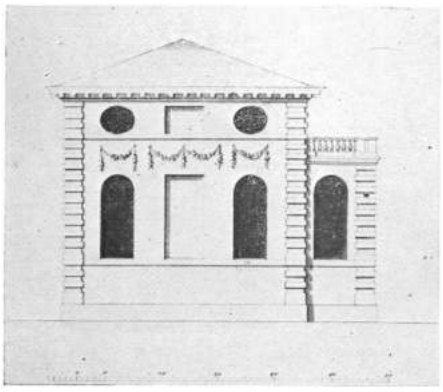


Figure III-186. Hooke (attrib.), 'Definitive version of the east elevation of St. Benet, Thames Street: design A (with attic)', n.d.
Source: Summerson, 'Drawings of London Churches', fig. 11b (Bute no. 21).

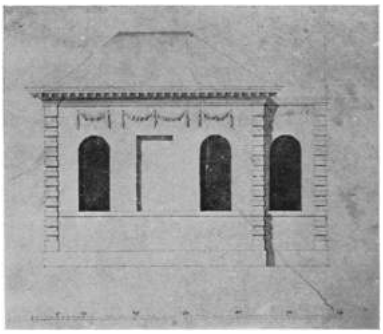


Figure III-187. Hooke (attrib.), 'East elevation of St. Benet, Thames Street: design B (without attic)', n.d.
Source: Summerson, 'Drawings of London Churches', fig. 11c (Bute no. 22).

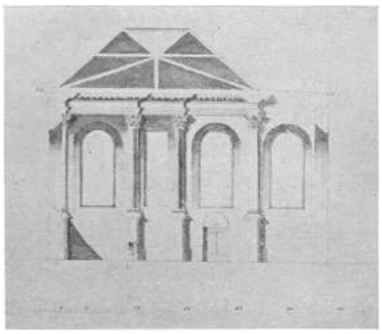


Figure III-188. Hooke (attrib.), 'Section looking west of St. Benet, Thames Street: design B (without attic)', n.d.
Source: Summerson, 'Drawings of London Churches', fig. 11d (Bute no. 23).

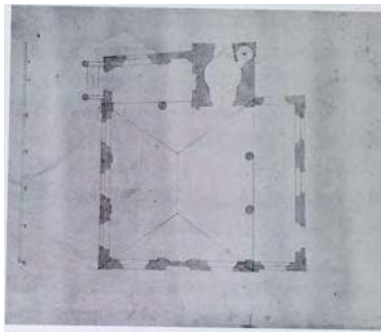


Figure III-189. Hooke (attrib.) [previously attrib. Wren], 'Plan suitable for both designs A and B, St. Benet, Thames Street', n.d.
Source: John Harris, *A Catalogue of British Drawings for Architecture, Decoration, Sculpture and Landscape Gardening 1550–1900 in American Collections* (Upper Saddle River, NJ, 1971), pl. 227 (Bute no. 24).

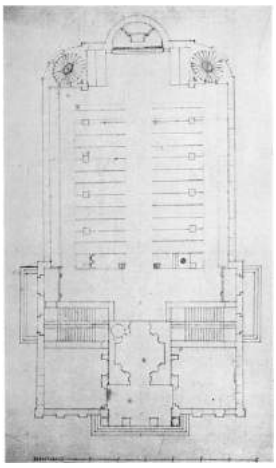


Figure III-190. Hooke (attrib.), 'Project for St. Clement Danes: plan', n.d.
Source: Summerson, 'Drawings of London Churches', fig. 12 (Bute no. 27).



Figure III-191. Hooke (attrib.), 'Project for St. Clement Danes: West elevation', n.d.
Source: Summerson, 'Drawings of London Churches', fig. 13 (Bute no. 28).

ii. 8. CUMBRIA ARCHIVE CENTRE, CARLISLE

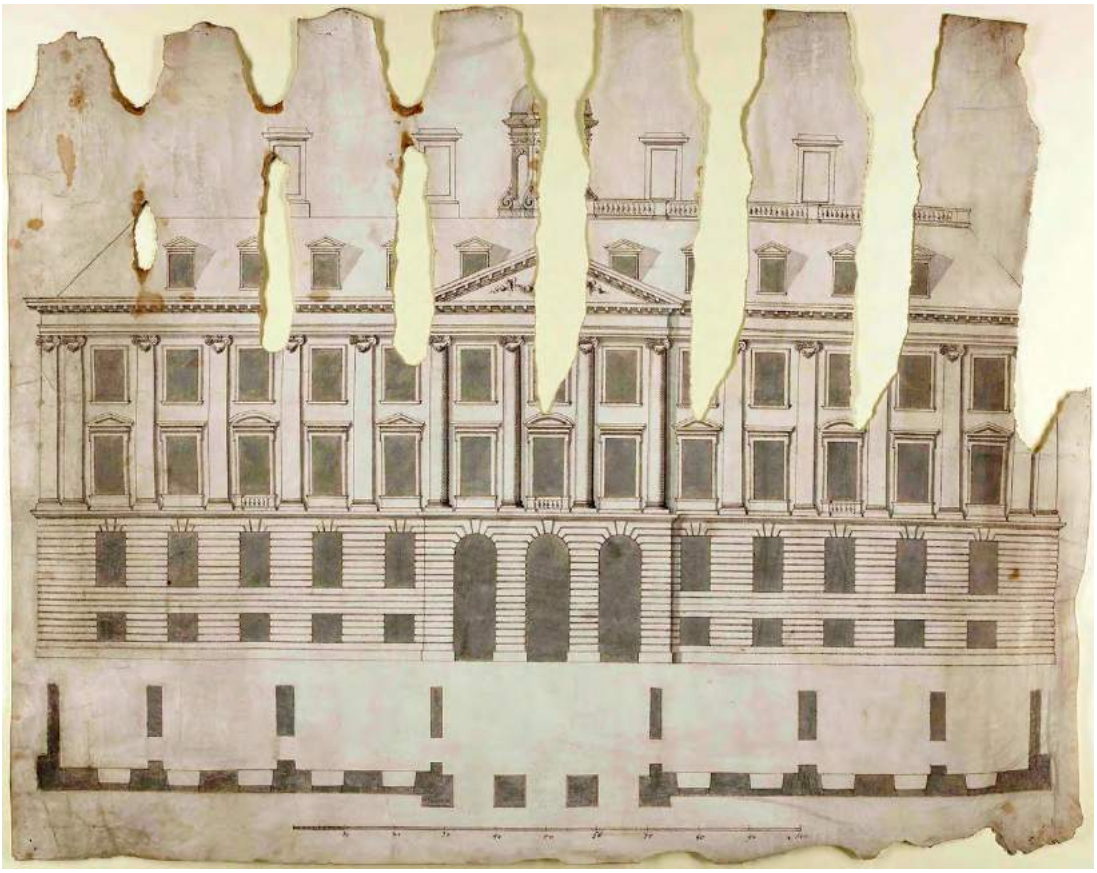


Figure III-192. Edward Pearce or Pierce (previously attrib. to Hooke), 'Elevation and partial plan of a design for a new mansion', *c.* 1680–1690. DLONS/L11/4/1, Cumbria Archive Service, Carlisle.

ii. 9. LINCOLNSHIRE ARCHIVES, LINCOLN

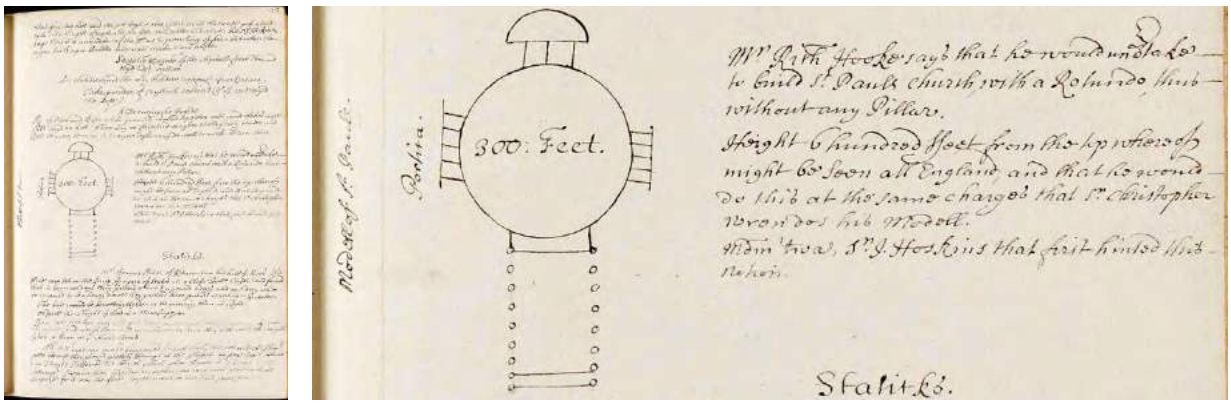


Figure III-193. Anon., 'Modell of St. Pauls', n.d. Source: Lincolnshire Archives, Lincoln, 1-Worsley/35, p. 33 © Lord Yarborough.

ii. 10. LONDON METROPOLITAN ARCHIVES

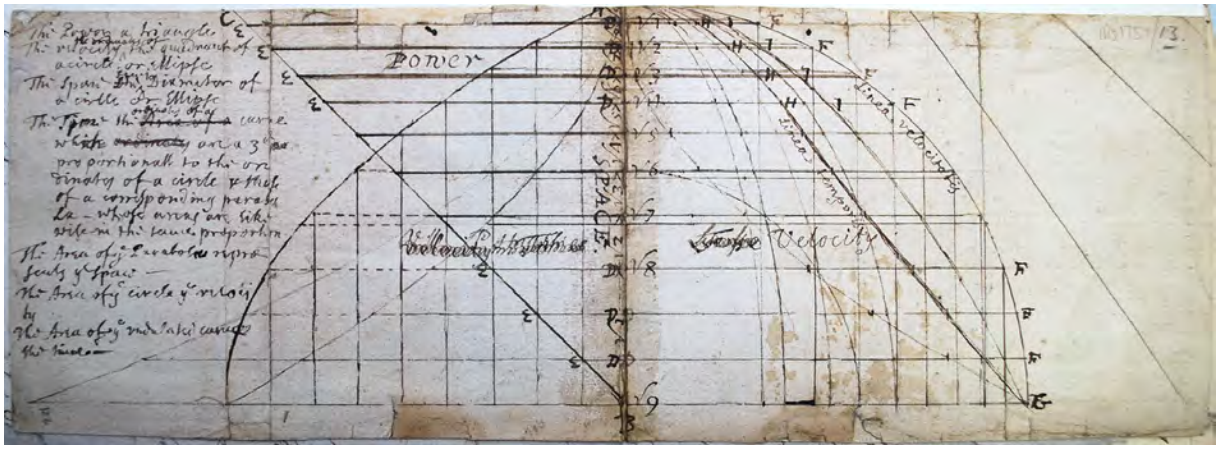


Figure III-194. Hooke, 'Scheme shewing the proportions of velocity, time, power and space', n.d. Source: LMA, CLC/495/MS01757 no. 13.

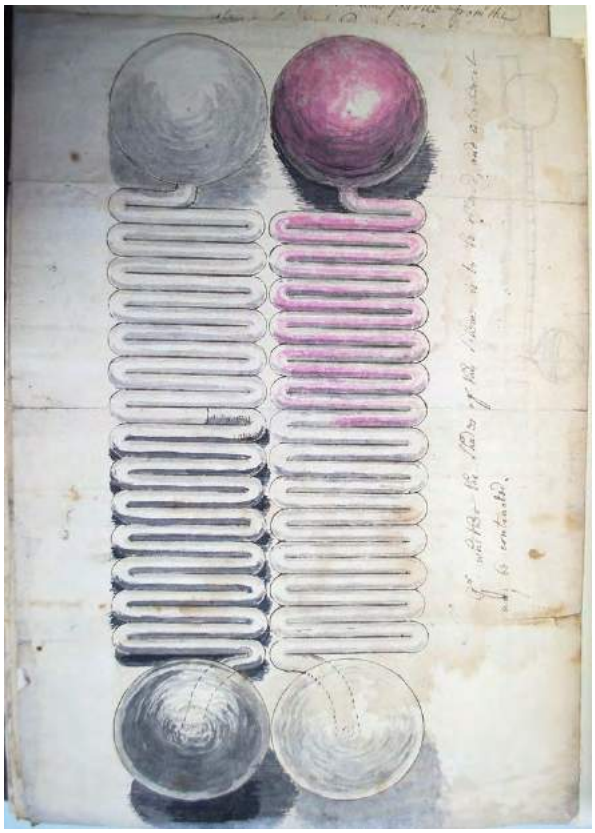


Figure III-195. Hooke[?], 'Proposed design for a thermometer', n.d.
Source: LMA, CLC/495/MS01757 no. 20.

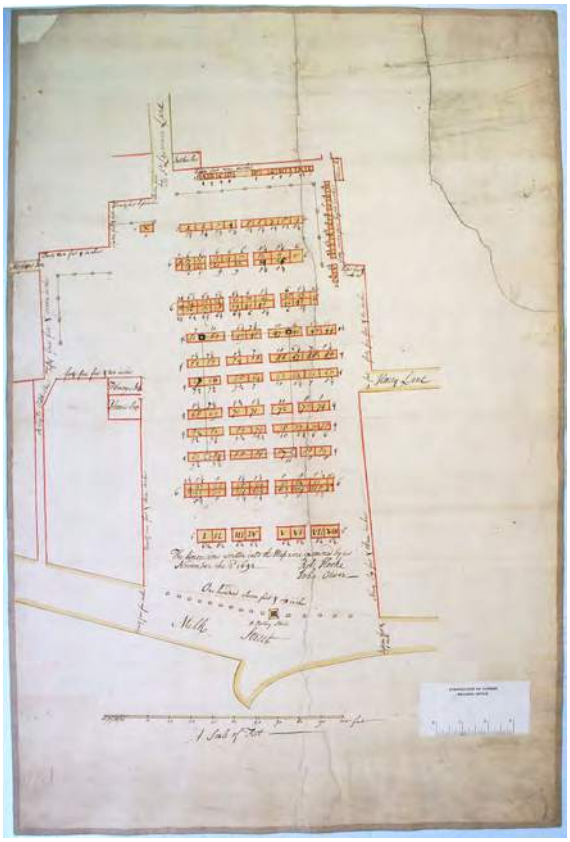


Figure III-196. Hooke and John Oliver (examined by), 'Plan of Honey Lane Market with dimensions of the roads, adjoining areas, and the stalls', 3 Nov. 1692.
Source: LMA, COL/PL/02/C/009/a.

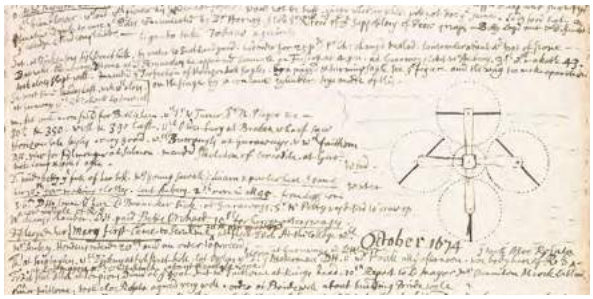


Figure III-197. Hooke, 'Invention horizontall sayles by a poysed and turning sayle', diary entry for 26 Sep. 1674.
Source: LMA, CLC/495/MS01758, p. 69; https://goo.gl/rqJt9z.



Figure III-198. Hooke, 'Saw new way of microscope. Very simple and pretty', diary entry for 3 Dec. 1674.
Source: LMA, CLC/495/MS01758, p. 71; https://goo.gl/rqJt9z.



Figure III-199. Hooke, 'Way of fixing double springs to the inside of the balance wheel', diary entry for 8 Mar. 1675.
Source: LMA, CLC/495/MS01758, p. 76; https://goo.gl/rqJt9z.

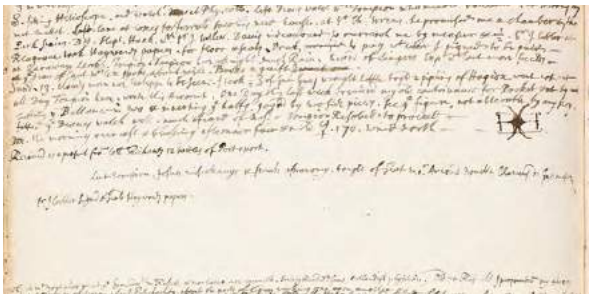


Figure III-200. Hooke, 'Pocket watch with balance cut into two', diary entry for 13 June 1675.
Source: LMA, CLC/495/MS01758, p. 80; https://goo.gl/rqJt9z.

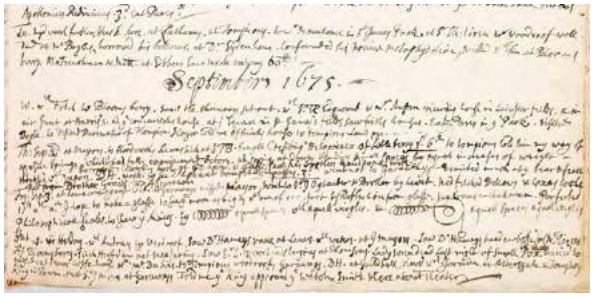


Figure III-201. Hooke, 'Philosophical scales', diary entry for 3 Sep. 1675.
Source: LMA, CLC/495/MS01758, p. 83; https://goo.gl/rqJt9z.



Figure III-202. Hooke, 'Invention for the best way for a circular fly', diary entry for 12 Oct. 1675.
Source: LMA, CLC/495/MS01758, p. 86; https://goo.gl/rqJt9z.



Figure III-203. Hooke, 'Wren's hypothesis of a light pulse and wave', and 'Spurs used in Holland to walk in frosty weather', diary entries for 1 Jan. 1676.
Source: LMA, CLC/495/MS01758, p. 91; https://goo.gl/rqJt9z.



Figure III-204. Hooke, 'Jonas Moore's explanation of a geometric problem using a parallelogram with one side ascew', diary entry for 7 Jan. 1676.
Source: LMA, CLC/495/MS01758, p. 92; https://goo.gl/rqJt9z.

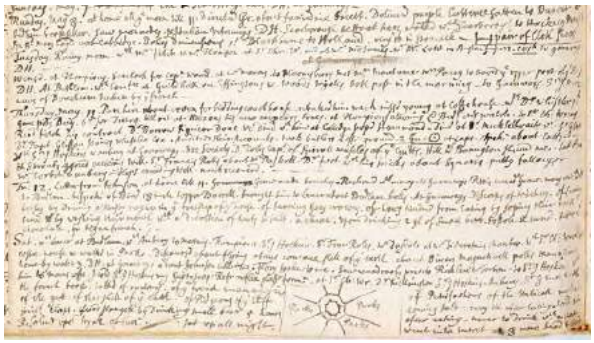


Figure III-205. Hooke, 'Plan of the menagerie at Versailles', diary entry for 13 May 1676.
Source: LMA, CLC/495/MS01758, p. 98; https://goo.gl/rqJt9z.



Figure III-206. Hooke, 'Ellipsical appearance of the sun at dawn', diary entry for 15 June 1676.
Source: LMA, CLC/495/MS01758, p. 100; https://goo.gl/rqJt9z.

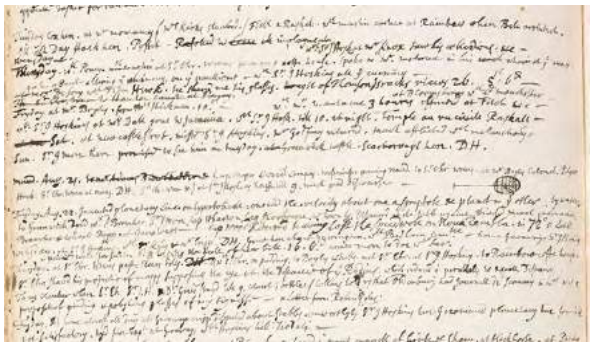


Figure III-207. Hooke, 'Invention of a planetary line on a hyperbolic conoid', diary entry for 22 Aug. 1676.
Source: LMA, CLC/495/MS01758, p. 102; https://goo.gl/rqJt9z.



Figure III-208. Hooke, 'Reine's contrivance for cementing glass plates in a furnace', diary entry for 30 Mar. 1677.
Source: LMA, CLC/495/MS01758, p. 112; https://goo.gl/rqJt9z.

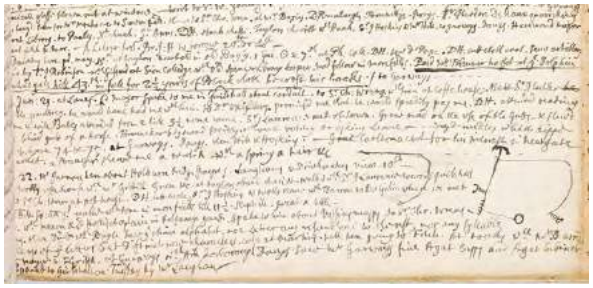


Figure III-209. Hooke, 'Watch with a spring[?]', diary entry for 21 June 1677.
Source: LMA, CLC/495/MS01758, p. 115; https://goo.gl/rqJt9z.

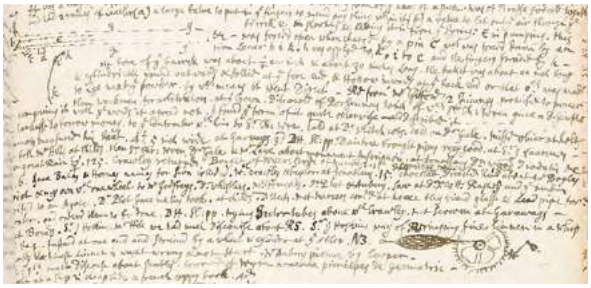


Figure III-210. Hooke, 'Papin's wind gun' and 'Hoskins's way of rinsing fine linen', diary entries for 4 and 6 Oct. 1677.
Source: LMA, CLC/495/MS01758, p. 121; https://goo.gl/rqJt9z.



Figure III-211. Hooke, 'Plan and elevation of Porcenna's tomb', diary entry for 17 Oct. 1677; detail. See also Figure III-227. cf. below.
Source: LMA, CLC/495/MS01758, p. 122; https://goo.gl/rqJt9z.



Figure III-212. Hooke, 'Plan of Hagia Sophia', diary entry for 14 Nov. 1677; detail.
Source: LMA, CLC/495/MS01758, p. 123; https://goo.gl/rqJt9z.



Figure III-213. Hooke, 'Hooke and Wren's philosophical spring scales', diary entry for 21 Aug. 1678.
Source: LMA, CLC/495/MS01758, p. 135; https://goo.gl/rqJt9z.

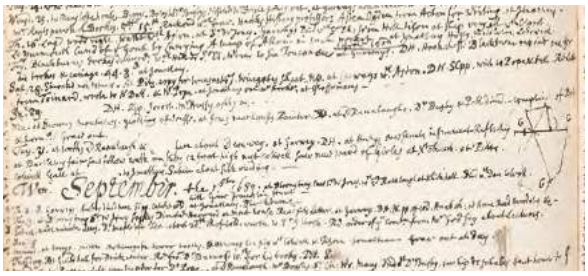


Figure III-214. Hooke, 'Streete's reflecting instrument[?]', diary entry for 31 Aug. 1680.
Source: LMA, CLC/495/MS01758, p. 153; https://goo.gl/rqJt9z.

ii. 11. [OXFORD] ALL SOULS COLLEGE, CODRINGTON LIBRARY, UNIVERSITY OF OXFORD

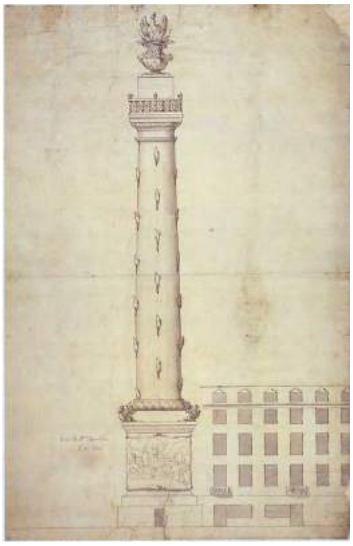


Figure III-215. Hooke (attrib.), 'Elevation of the preliminary design of the Monument', 1671. Source: ASC, AS II.71, reproduced in Geraghty, *Architectural Drawings*, p. 259. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure III-216. Edward Pearce (previously attrib. to Hooke), 'St. Edmund King and Martyr, elevation facing Lombard Street', *c.* 1670. Source: ASC, AS II.44, reproduced in ibid., p. 86. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure III-217. Hooke (attrib.), 'West elevation of St. James, Piccadilly', n.d. Source: ASC, AS II.45, reproduced in ibid., p. 95. By permission of the Warden and Fellows of All Souls College, Oxford.

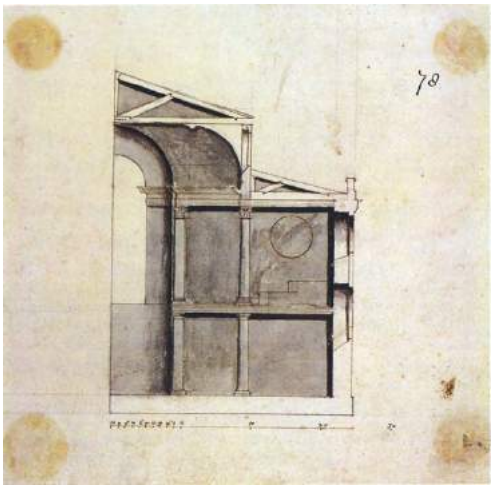


Figure III-218. Hooke (attrib.), 'Half cross section, looking east, for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS IV.78, reproduced in ibid., p. 93. By permission of the Warden and Fellows of All Souls College, Oxford.

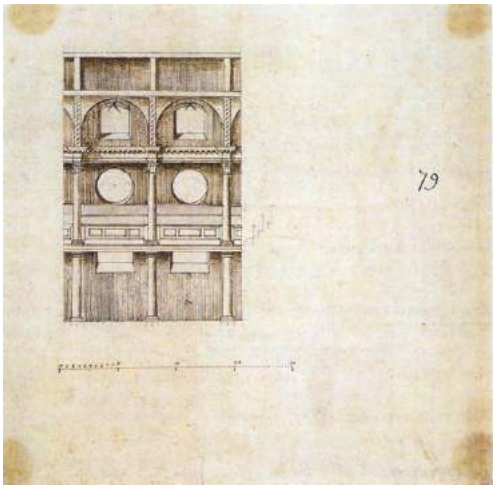


Figure III-219. Hooke (attrib.), 'Part long section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS IV.79, reproduced in ibid., p. 93. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure III-220. Hooke (attrib.), 'Revised half cross section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS I.74, reproduced ibid., p. 94. By permission of the Warden and Fellows of All Souls College, Oxford.

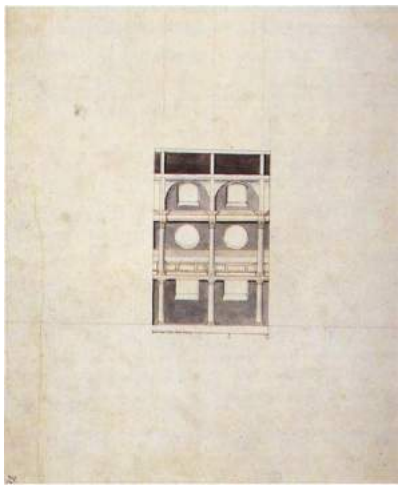


Figure III-221. Hooke (attrib.), 'Revised part long section for the preliminary design for St. James, Piccadilly', *c.* 1676. Source: ASC, AS I.73, reproduced in ibid., p. 94. By permission of the Warden and Fellows of All Souls College, Oxford.

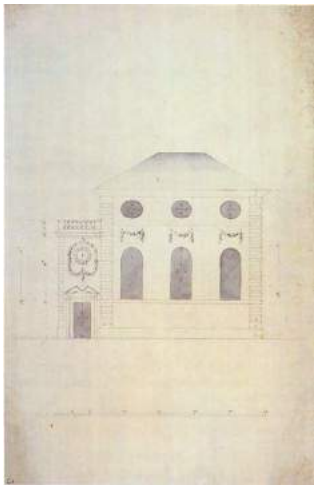


Figure III-222. Hooke (attrib.), 'South elevation of St. Benet, Thames Street (Paul's Wharf)', *c.* 1677. Source: ASC, AS I.63, reproduced in ibid., p. 99. By permission of the Warden and Fellows of All Souls College, Oxford.

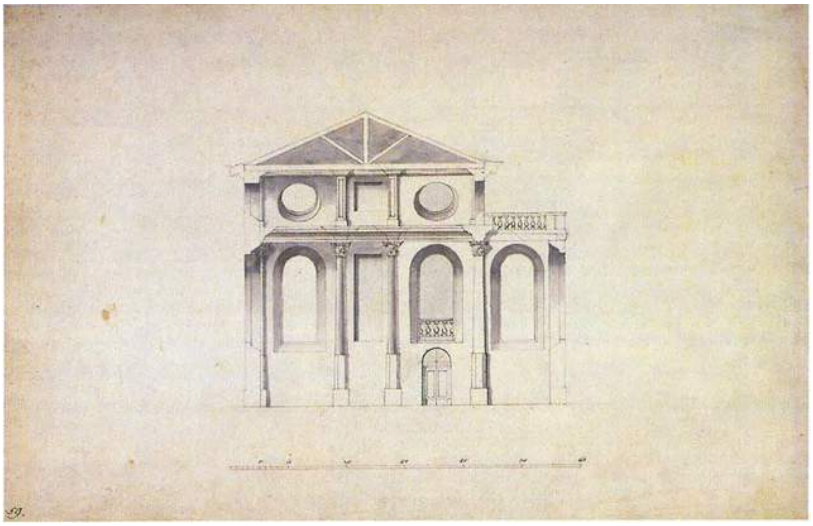


Figure III-223. Hooke (attrib.), 'Section looking west of St. Benet, Thames Street (Paul's Wharf)', *c.* 1677. Source: ASC, AS I.59, reproduced in ibid., p. 100. By permission of the Warden and Fellows of All Souls College, Oxford.

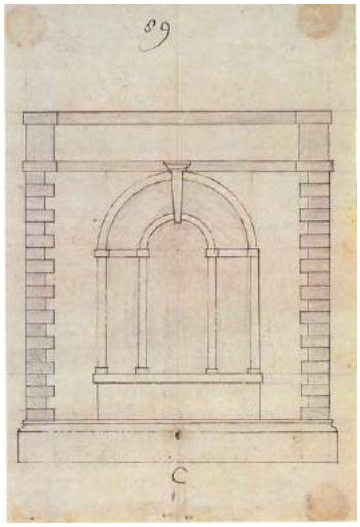


Figure III-224. Hooke (attrib.), 'Elevation of an unidentified building, probably the Busby Library at Westminster School', *c.* 1681. Source: ASC, AS IV.89, reproduced in ibid., p. 235. By permission of the Warden and Fellows of All Souls College, Oxford.

ii. 12. [OXFORD] BODLEIAN LIBRARY, UNIVERSITY OF OXFORD

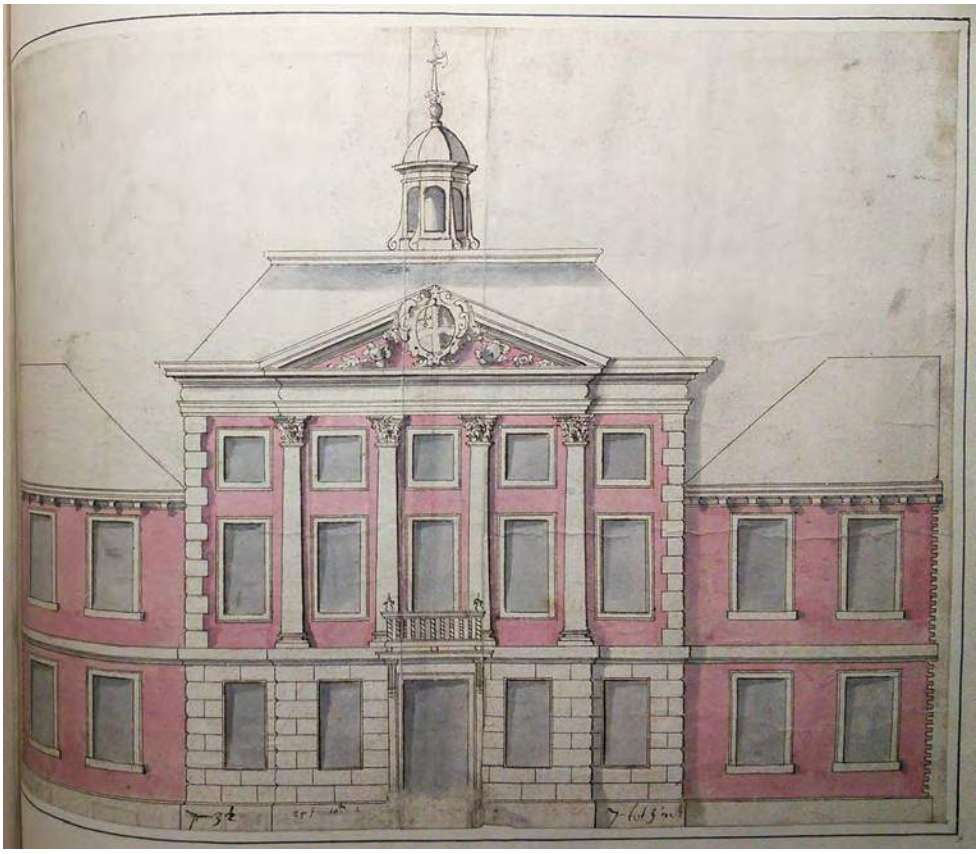


Figure III-225. Hooke, 'Partial elevation of Bethlem Hospital', n.d.
Source: Bodl., Gough Maps 44, no. 119 on fol. 61.



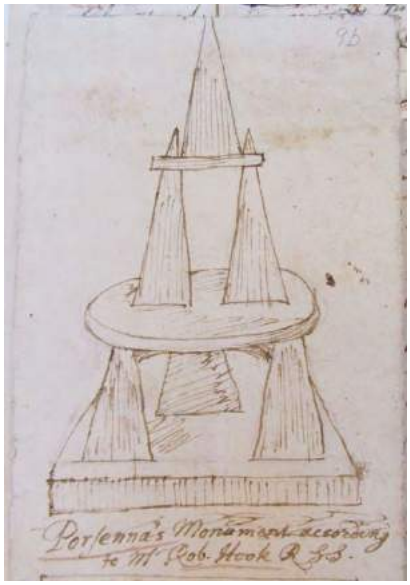


Figure III-226. John Aubrey, 'Porsenna's Monument according to Mr Rob. Hooke RSS', n.d.; detail. Source: Bodl., MS Top. Gen. c. 25, fol. 9b.

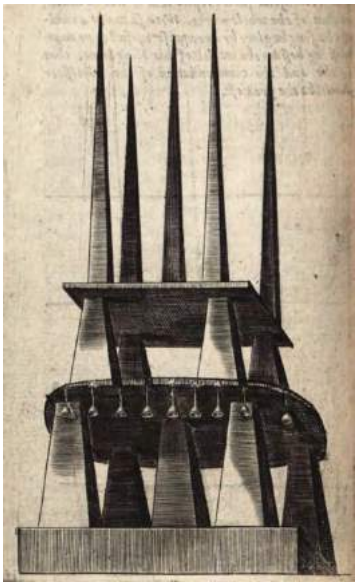


Figure III-227. cf. 'Porsena's Tombe' in John Greaves, *Pyramidographia* (London, 1646), pl. facing p. 67.

ii. 13. [OXFORD] WORCESTER COLLEGE, UNIVERSITY OF OXFORD

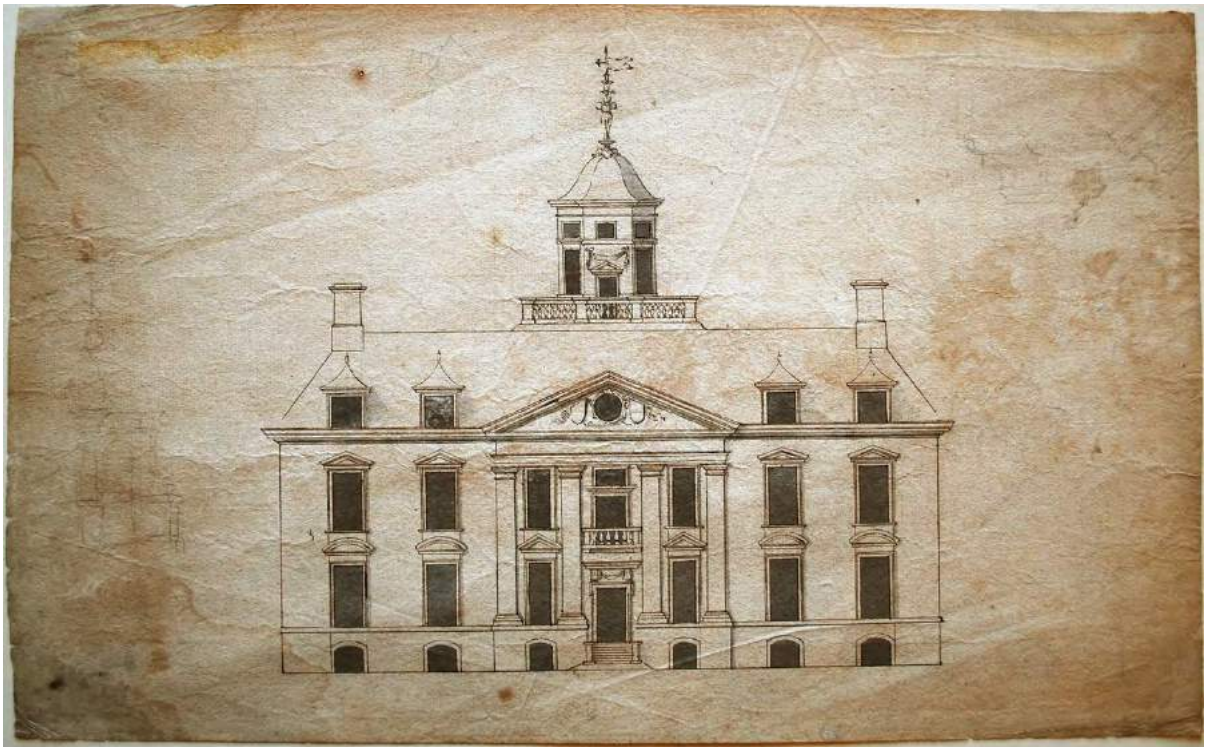


Figure III-228. Hooke (attrib.), 'Design for a Country House with Ogee Dome, with Subsidiary Studies of the Dome and Entablature', n.d. Source: Worcester College, Oxford, Colvin 525.

ii. 14. ROYAL COLLEGE OF PHYSICIANS, LONDON

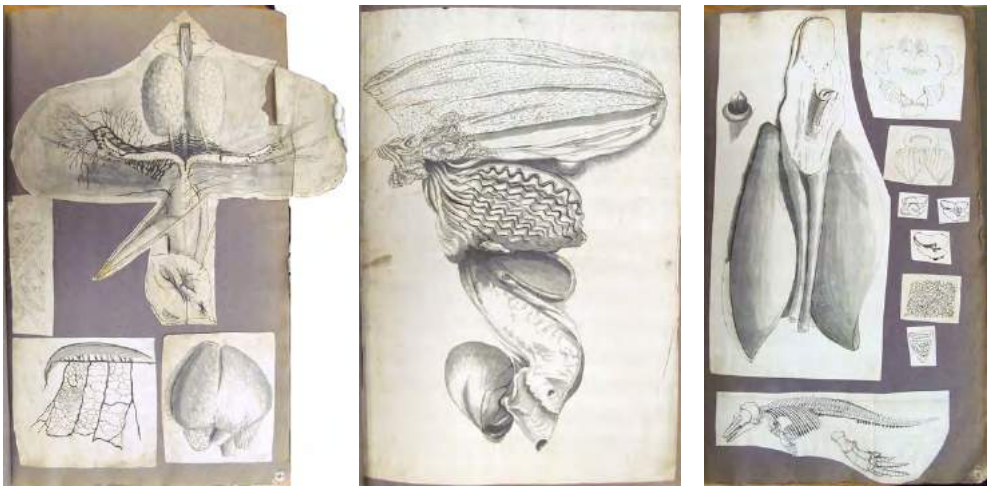


Figure III-229. Edward Tyson and Hooke [?], 'Drawings of a dissected porpoise', 1680. © Royal College of Physicians, MS 618, nos. 3, 4 & 5.

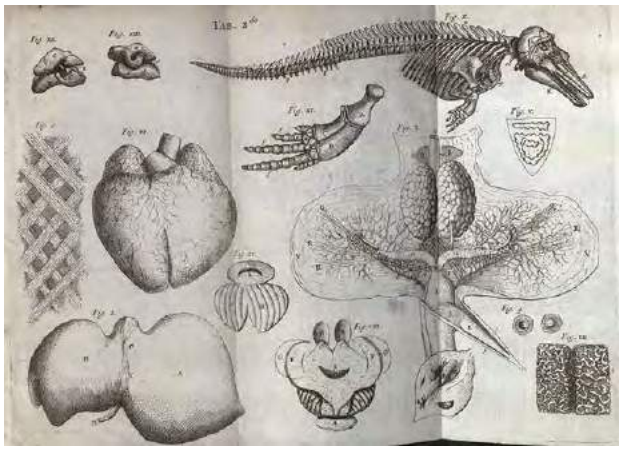


Figure III-230. Anon. (engraver), Tyson, *Phocaena, or the anatomy of a porpess* (London, 1680), pl. 2.

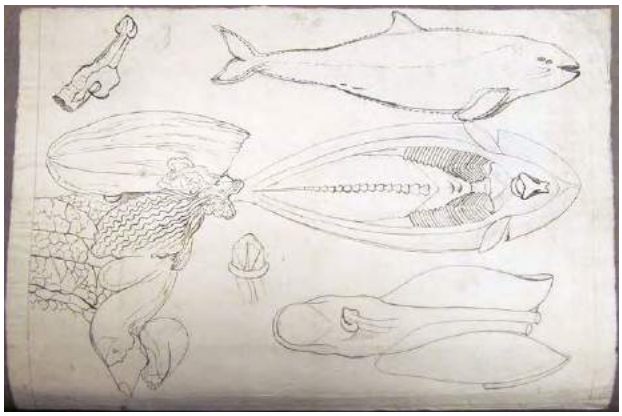


Figure III-231. Tyson and Hooke [?], preparatory drawing for engraving, 1680. © Royal College of Physicians, MS 618, no. 56.

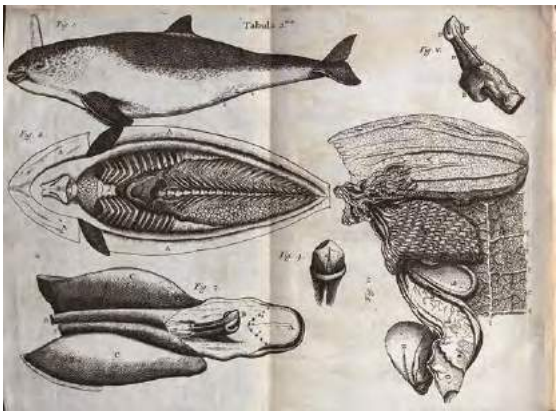


Figure III-232. cf. Anon. (engraver), Tyson, *Phocaena, or the anatomy of a porpess* (London, 1680), pl. 1.

ii. 15. ROYAL INSTITUTE OF BRITISH ARCHITECTS, LONDON



Figure III-233. Hooke (attrib.), 'Design for a military building', n.d. Source: RIBA, SA11/3.

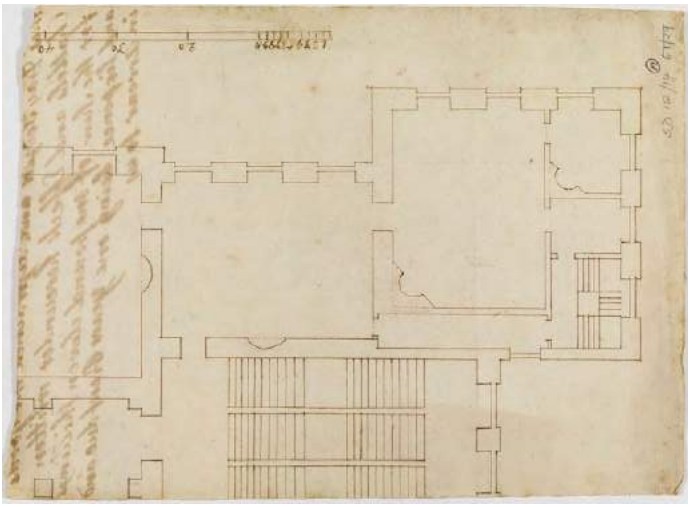


Figure III-234. James Gibbs[?], 'Plan fragment of Ragley Hall, Warwickshire', *c.* 1750[?].
Source: RIBA, SD12/14a.



Figure III-235. Gibbs[?], 'Plan fragment of Ragley Hall, Warwickshire', *c.* 1750[?].
Source: RIBA, SD12/14b.

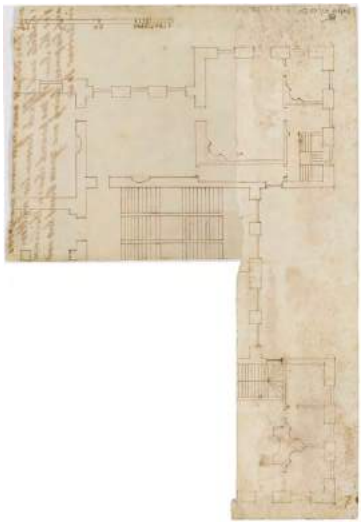


Figure III-236. cf. Gibbs[?], 'Plan fragments of Ragley Hall, Warwickshire', *c.* 1750[?]. Oriented to match Gibbs's survey drawing on the right. Author's collage of RIBA, SD12/14a and SD12/14b.

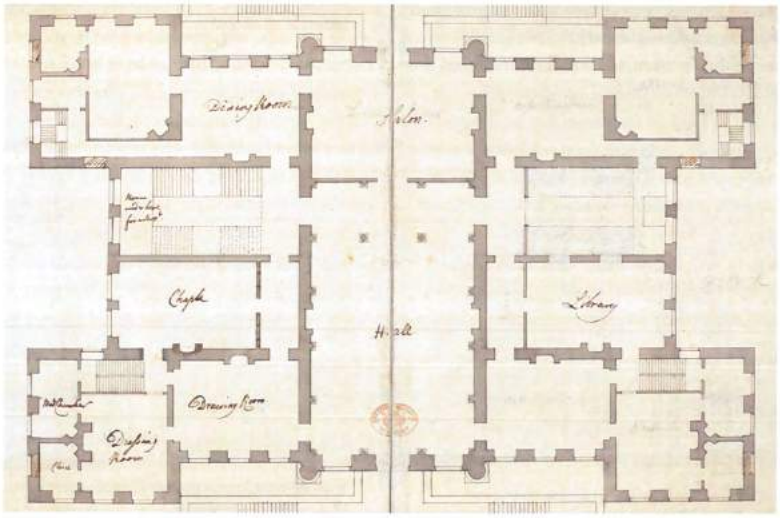


Figure III-237. cf. Gibbs, 'Ragley Hall, plan of the principal floor', *c.* 1750.
Source: British Library, Add. MS 31323 W[3]; reproduced from Patricia Smith, "Contriving Lord Conway's house': Who Really Designed Ragley Hall?', *Georgian Group Journal* 21 (2013), p. 3.

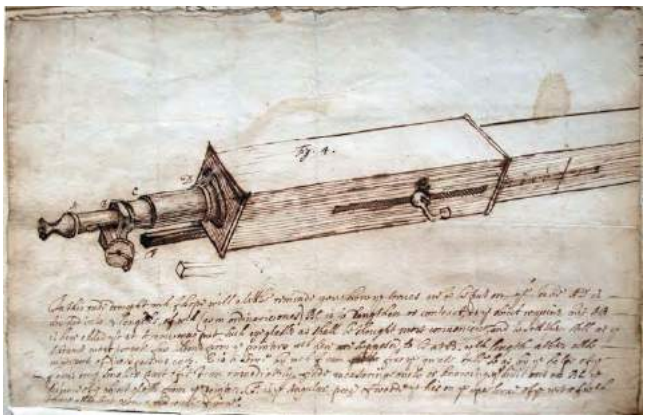




Figure III-238. cf. Richard Towneley, 'Micrometer installed on a telescope' and 'Stand', 1667. © Royal Society, Cl.P/2/13, fols. 1r & 2r.

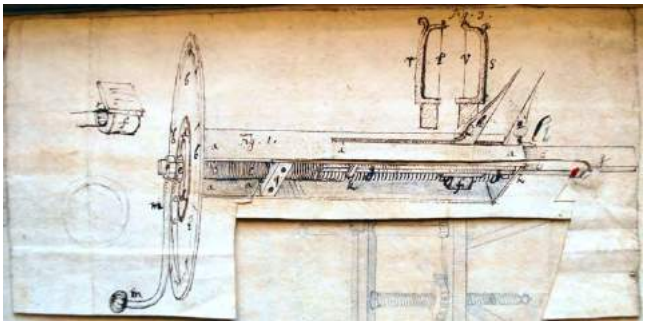


Figure III-239. Hooke, 'Pencil and ink drawing of Towneley's Micrometer', 1667. © Royal Society, MS Cl.P/2/13, fol. 3r.



Figure III-240. Hooke, 'Preparatory drawing for the engraver of Towneley's micrometer', 1667. © Royal Society, Cl.P/2/13, fol. 4r.

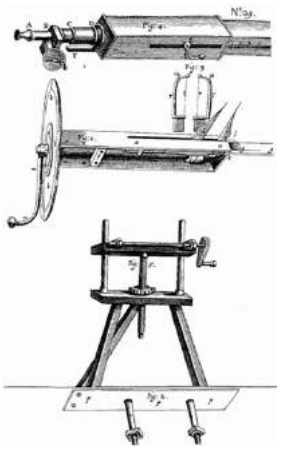


Figure III-241. cf. Anon., 'Towneley's micrometer', 1667. Source: *Philosophical transactions*, vol. 2, no. 29 (11 Nov. 1667), pl. facing p. 541.



Figure III-242. cf. Anon., 'The engraving from the bottom section of the engraving cut and glued, n.d. © Royal Society, RBO/3/65, p. 226.

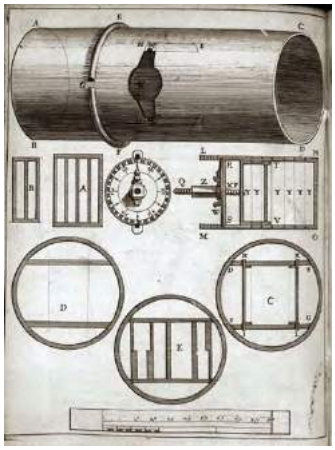


Figure III-243. cf. Adrien Auzout's micrometer published in Auzout, *Maniere exacte* (Paris, 1667).

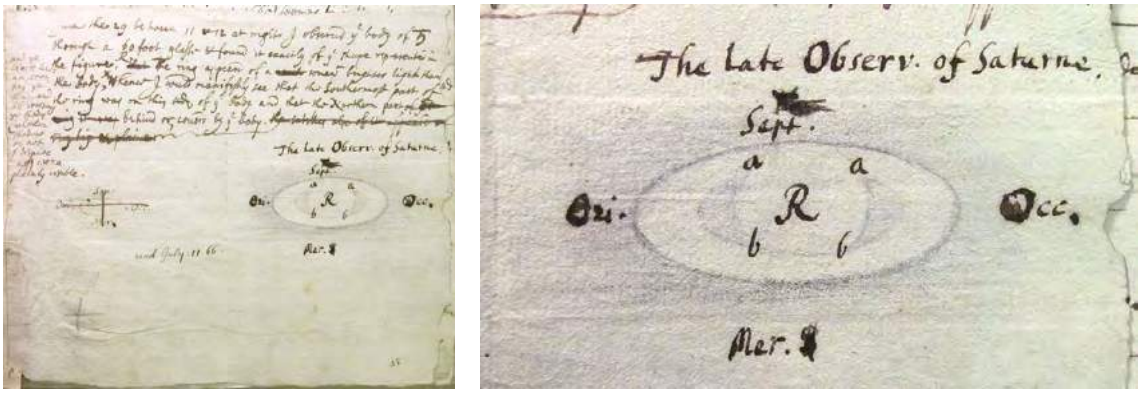


Figure III-244. Hooke, 'Late Observations of Saturn', 29 June 1666 [observation made], 11 July 1666 [paper read]; detail. © Royal Society, Cl.P/8i/18, fol. 38r.

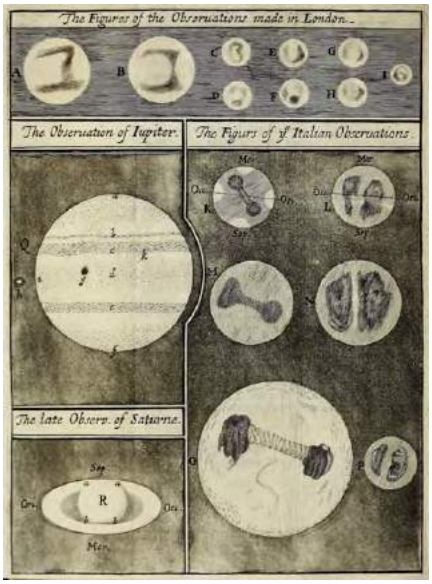


Figure III-245. cf. *Philosophical transactions*, vol. 1, no. 12 (2 July 1666), pl. facing p. 231. Illustrating 'The Particular Observations of the Planet Mars, formerly intimated to have been made [by Hooke] at London in the months of February and March 1665/6', 'Some observations lately made at London concerning the planet Jupiter [by Hooke on 26 June 1666]', and 'A late observation about Saturne made [on 29 June 1666] by the same', pp. 239-242, 245-247.

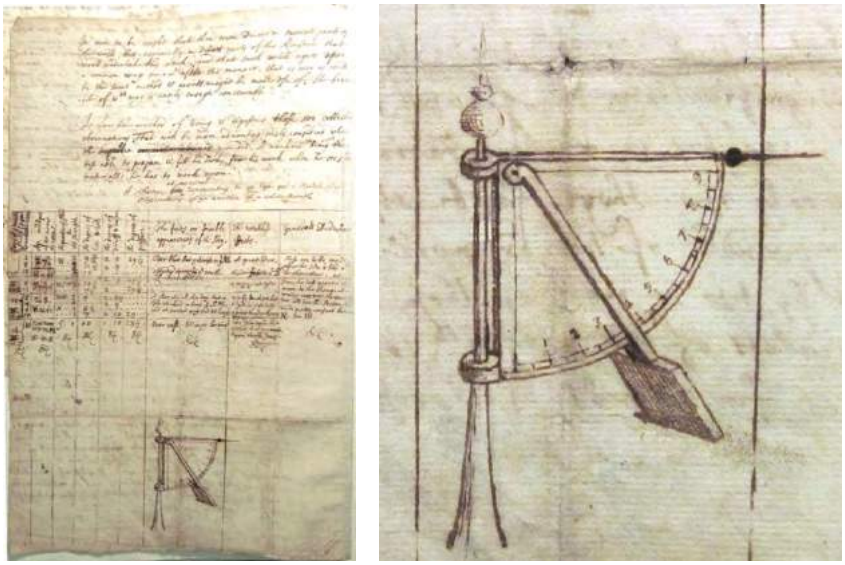


Figure III-246. Hooke, 'For the better making a history of the weather', 1663; detail. © Royal Society, Cl.P/20/02, fol. 3v.

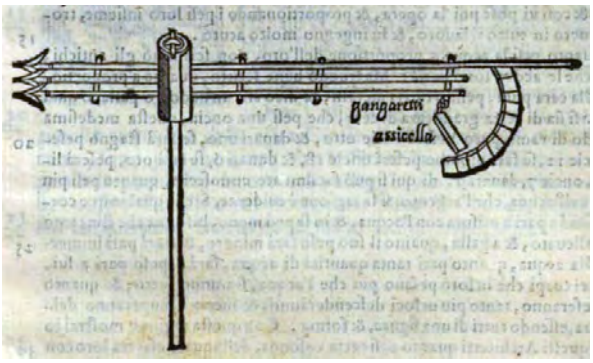


Figure III-247. cf. Leon Battista Alberti, 'Anemometer', published in *Opuscoli morali* (Venice, 1568), p. 253.

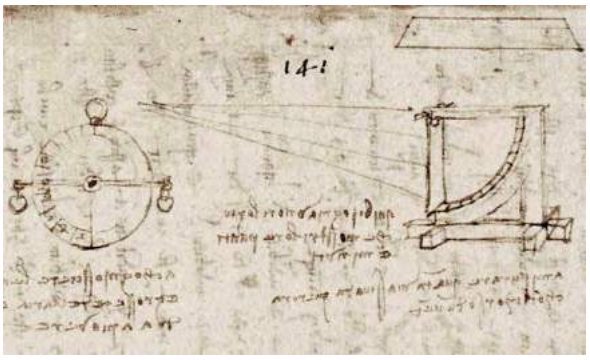


Figure III-248. cf. Leonardo da Vinci, detail showing anemometer; *c.* 1478–1519. Source: Biblioteca Leonardiana, Codex Atlanticus, fol. 675r; https://goo.gl/p1GTvJ.

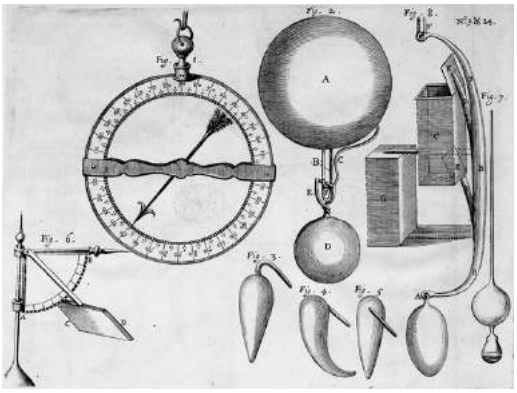


Figure III-249. cf. *Philosophical transactions*, vol. 2, no. 24 (8 Apr. 1667), pl. facing p. 433.

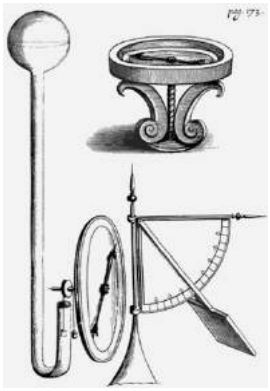


Figure III-250. cf. Thomas Sprat, *History of the Royal-Society of London* (London, 1667), pl. facing p. 173.

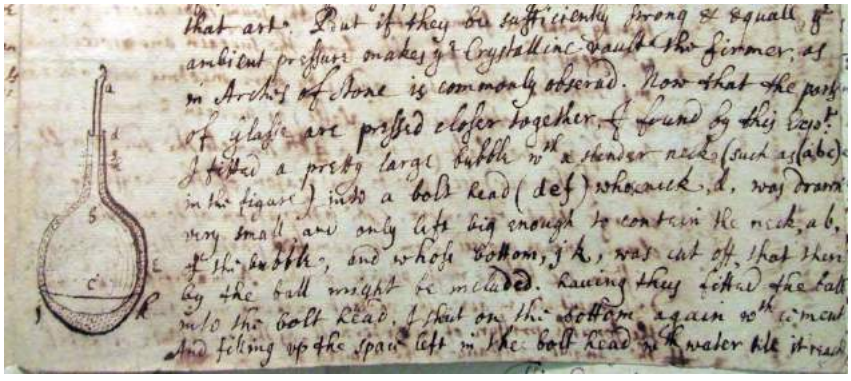


Figure III-251. Hooke, 'Experiments try'd with glass balls', 26 Sep. 1662. © Royal Society, Cl.P/20/03, fol. 5r.



Figure III-252. Hooke, 'Observables in the six branched figures in frozen urine', 10 Dec. 1662. © Royal Society, Cl.P/20/06, fol. 10r.

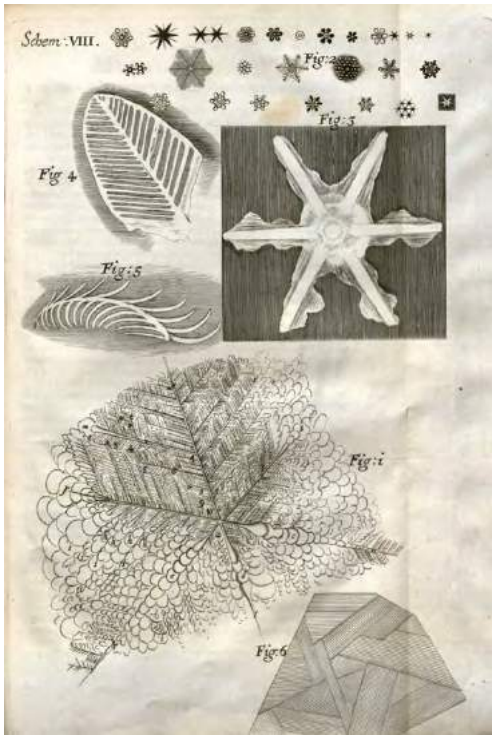


Figure III-253. cf. Hooke, *Micrographia* (London, 1665), Schem. VIII.

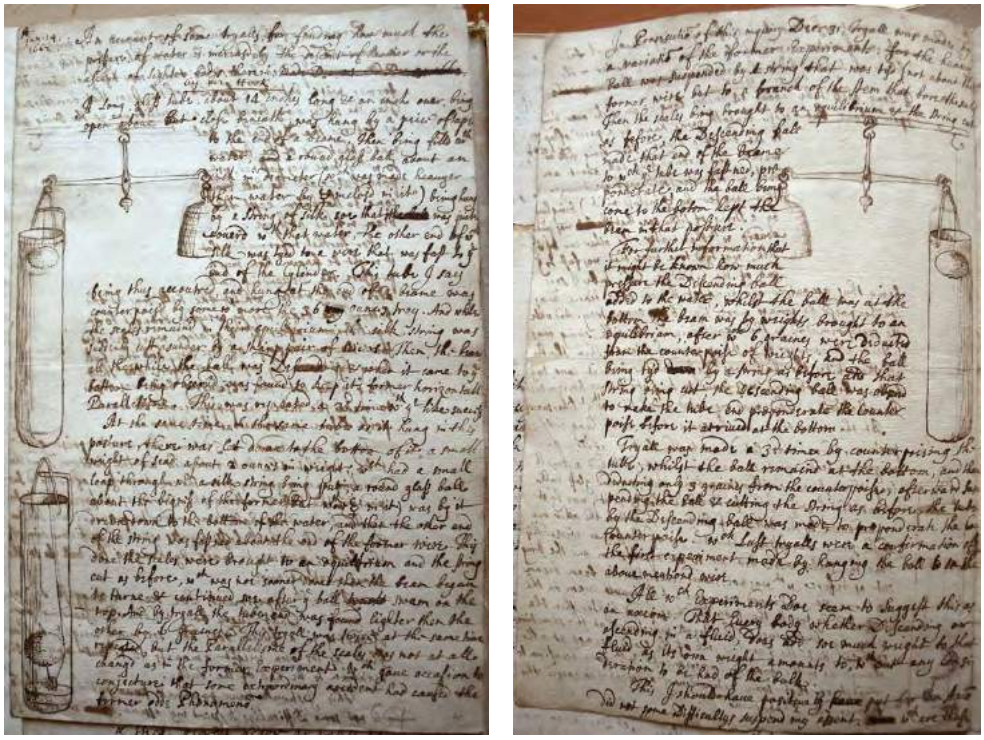


Figure III-254. Hooke, 'An account of some tryals for finding how much the pressure of water is increased, by the descent of heavier or the ascent of lighter bodys therein', 14 Jan. 1663. © Royal Society, Cl.P/20/09, fols. 15r-v.



Figure III-255. Hooke, 'Of refraction of ice', 11 Feb. 1663, detail. © Royal Society, Cl.P/20/11, fol. 19r.

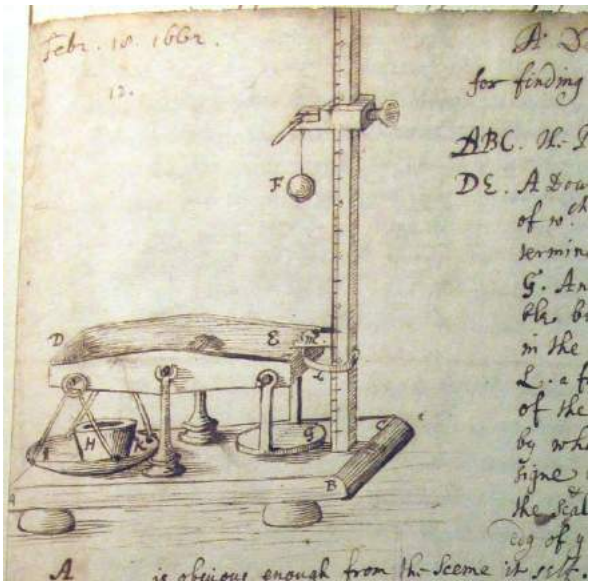


Figure III-256. Hooke, 'An instrument for finding the force of falling bodies', 18 Feb. 1663, detail. © Royal Society, Cl.P/20/12, fol. 20r.

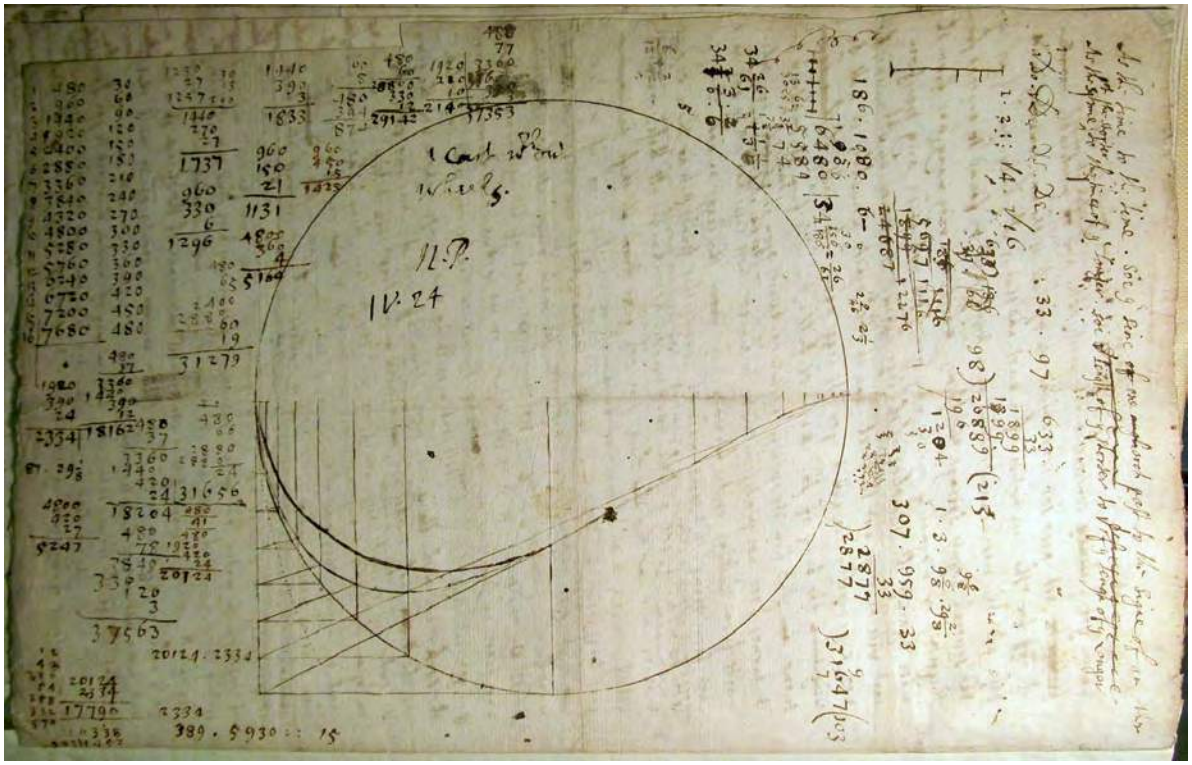


Figure III-257. Hooke, 'Of the Chinois cart with one wheel', 1 Apr. 1664. © Royal Society, Cl.P/20/15, fol. 27v.

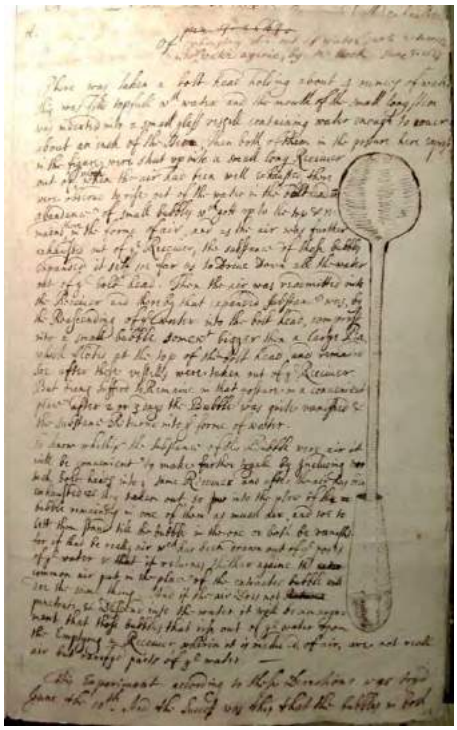


Figure III-258. Hooke, 'Of exhausting air out of water, &c.', 3 June 1664. © Royal Society, Cl.P/20/19, fol. 33r.



Figure III-259. Hooke, 'Of the uniting & mixing of air & water, &c.', 1 and 8 July 1663. © Royal Society, Cl.P/20/20, fol. 34.

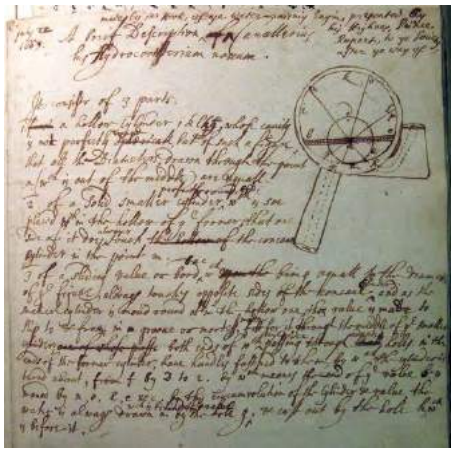


Figure III-260. Hooke, 'A breif . . . description of Cavallerius his *Hydrocontisterium novum*', 22 July 1663. © Royal Society, Cl.P/20/21, fol. 35r.

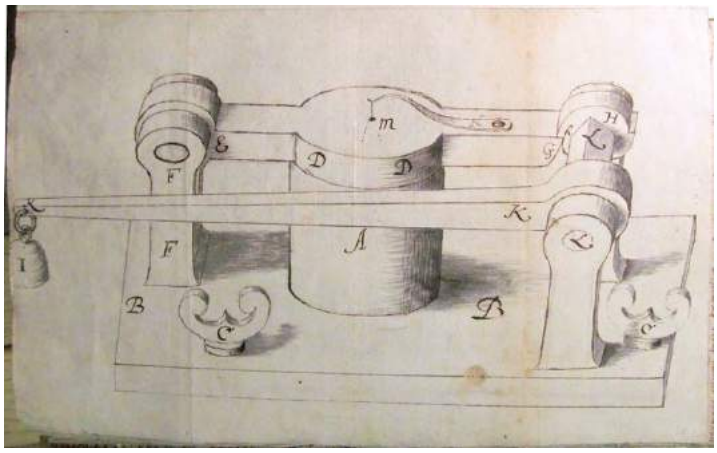


Figure III-261. Hooke, 'An engine for determining the force of gunpowder by weight', 7 Sep. 1663. © Royal Society, Cl.P/20/22, fol. 35r.

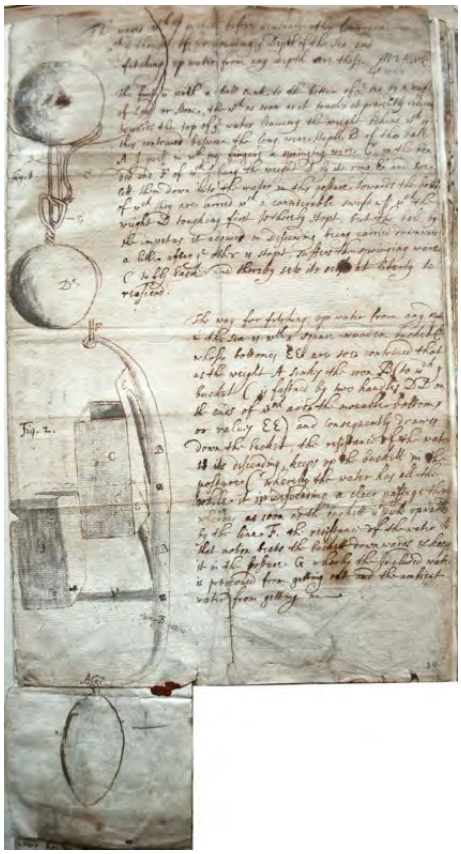


Figure III-262. Hooke, 'The way preferred to sound the depths of the sea', 30 Sep. 1663. © Royal Society, Cl.P/20/23, fol. 39r.

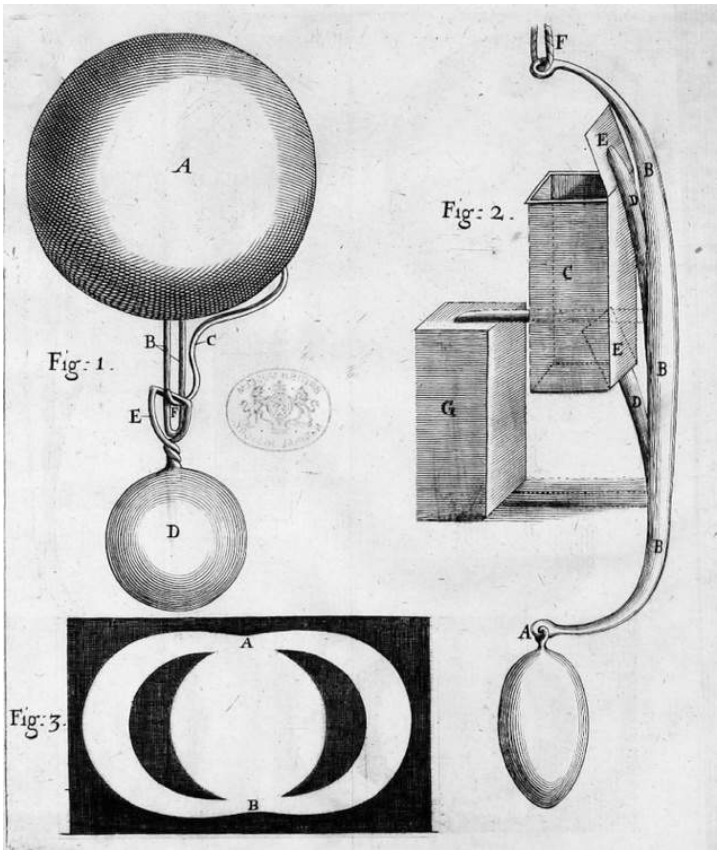


Figure III-263. cf. *Philosophical transactions*, vol. 1, no. 9 (12 Feb. 1666), pl. facing p. 147.

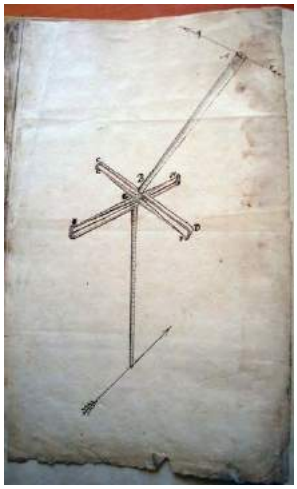


Figure III-264. Hooke, 'Instrument to describe plane dials', 21 Mar. 1667. © Royal Society, Cl.P/20/31, fol. 49v.

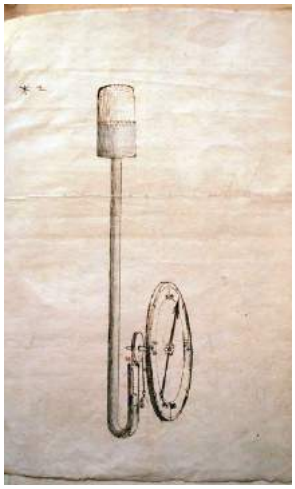


Figure III-265. Hooke, 'Wheel barometer', n.d. © Royal Society, Cl.P/20/32.

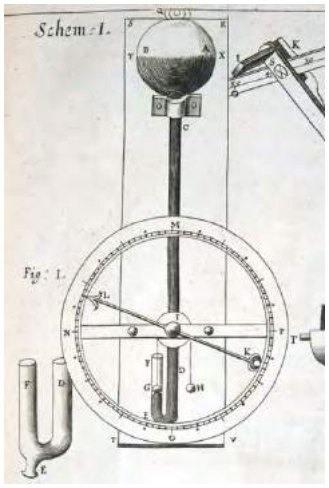


Figure III-266. cf. Hooke, *Micrographia* (London, 1665), Schem. I., Fig: I.

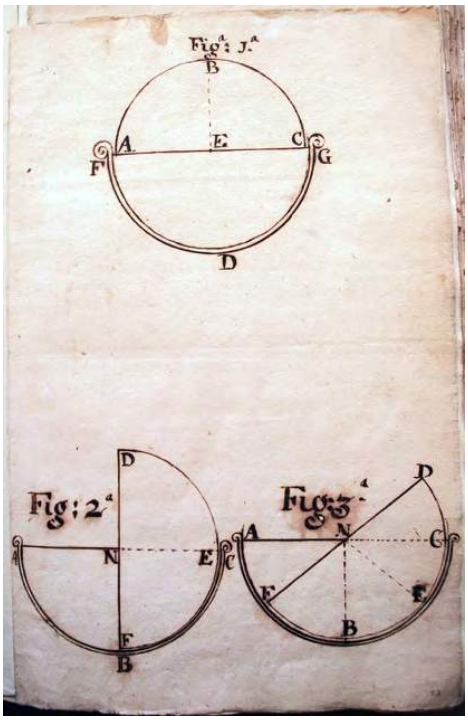


Figure III-267. Hooke, 'Constant level device', 14 Mar. 1667. © Royal Society, Cl.P/20/33, fol. 53r.

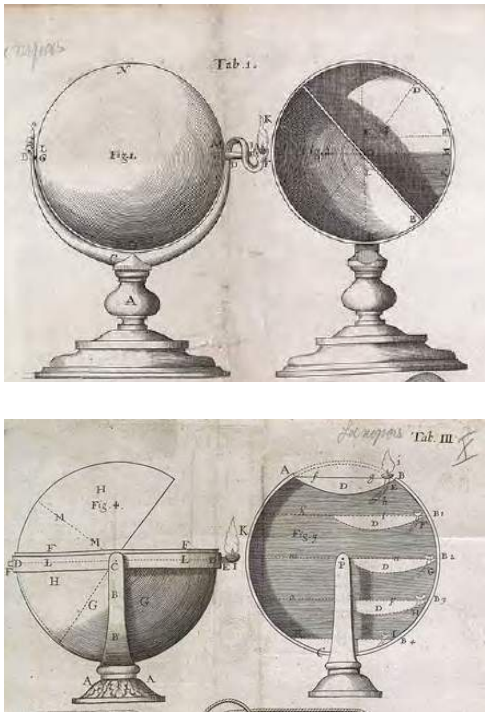


Figure III-268. cf. Hooke, *Lampas* (London, 1677), pls. I & III, details.

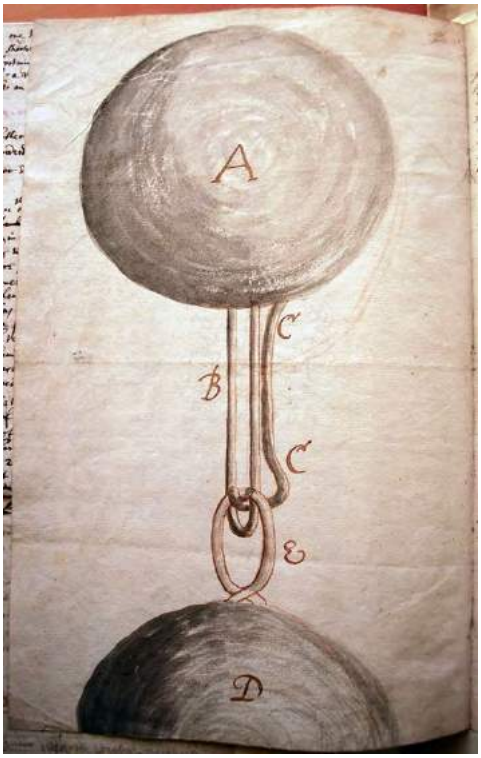




Figure III-269. Oldenburg, 'Copy of Hooke's way for sounding the depth of the sea without a line; and of fetching up water from any depth', after 1663. © Royal Society, Cl.P/20/35, fols. 60v & 61r.

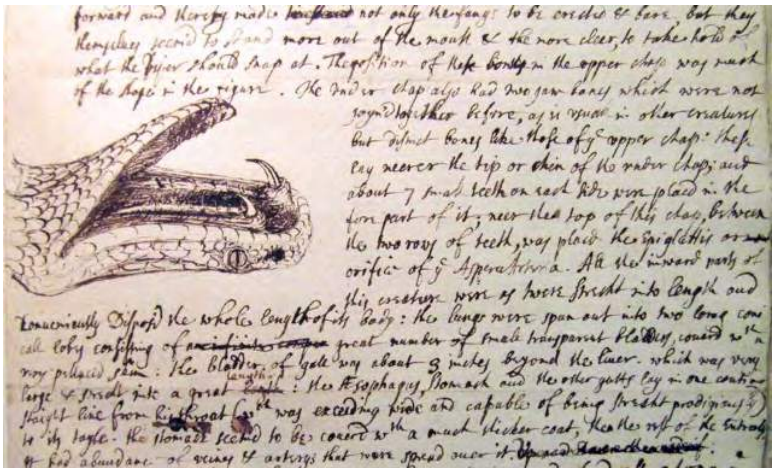


Figure III-270. Hooke, 'An account of a viper', 2 Nov. 1664. © Royal Society, Cl.P/20/37, fol. 63r.

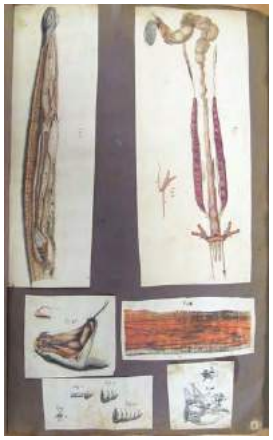




Figure III-271. cf. Tyson [?], 'Anatomy of a rattle-snake', 1683; detail. © Royal College of Physicians, MS 618, no. 6.

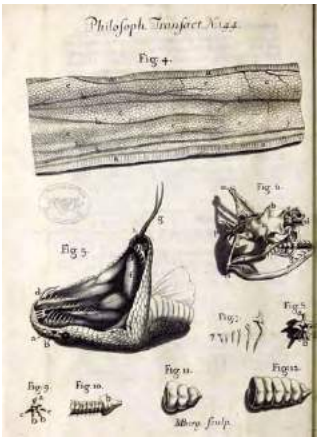


Figure III-272. cf. M. Burghers (engraver), Tyson, 'Anatomy of a rattle-snake', 1683, *Philosophical transactions* vol. 13, no. 144 (10 February 1683), pl. facing p. 25.

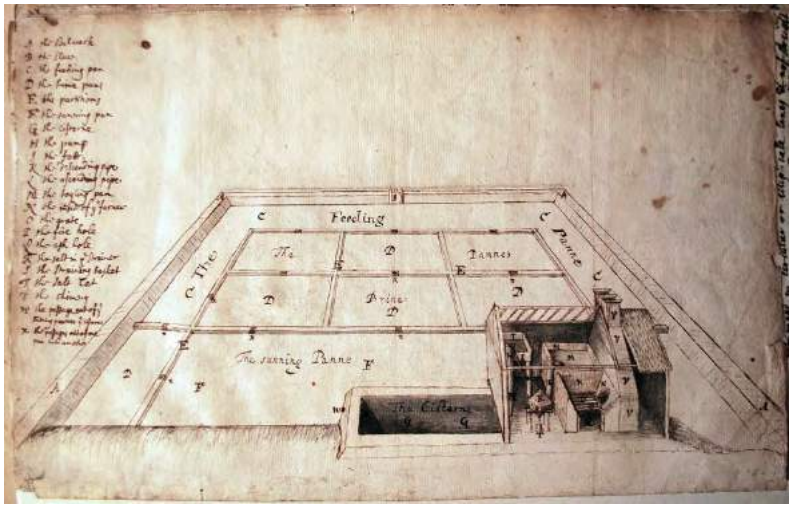


Figure III-273. Hooke, 'Description of the manner of making salt at a Saltern in a Hampshire', 25 July 1666. © Royal Society, Cl.P/20/40, fol. 69r.

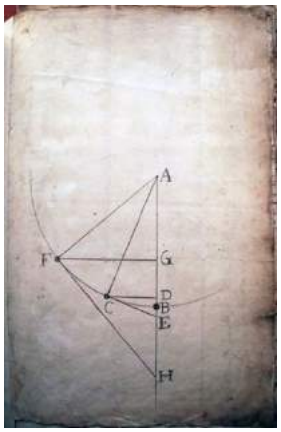


Figure III-274. Hooke, 'Motion in a curve', 23 May 1666. © Royal Society, Cl.P/20/41, fol. 73r.

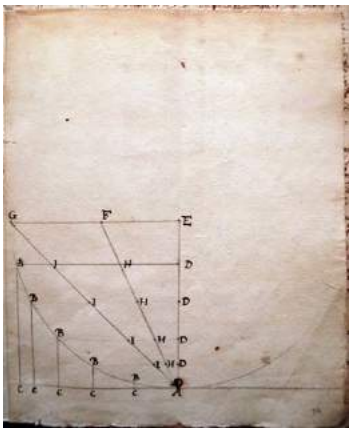


Figure III-275. Hooke, 'Inclining pendulum', 21 Nov. 1666. © Royal Society, Cl.P/20/41, fol. 74r.

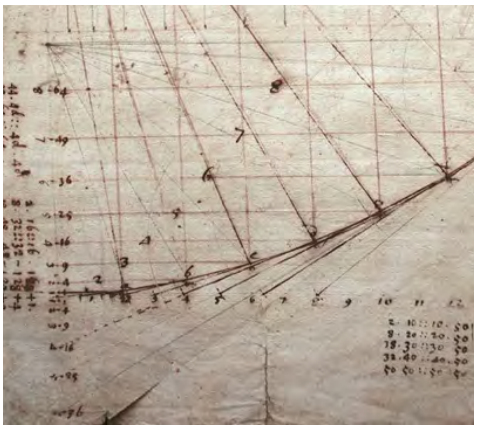


Figure III-276. Hooke, 'Circular pendulum', 1667[?], detail of Figure III-277. © Royal Society, Cl.P/20/53, fol. 116r, detail.

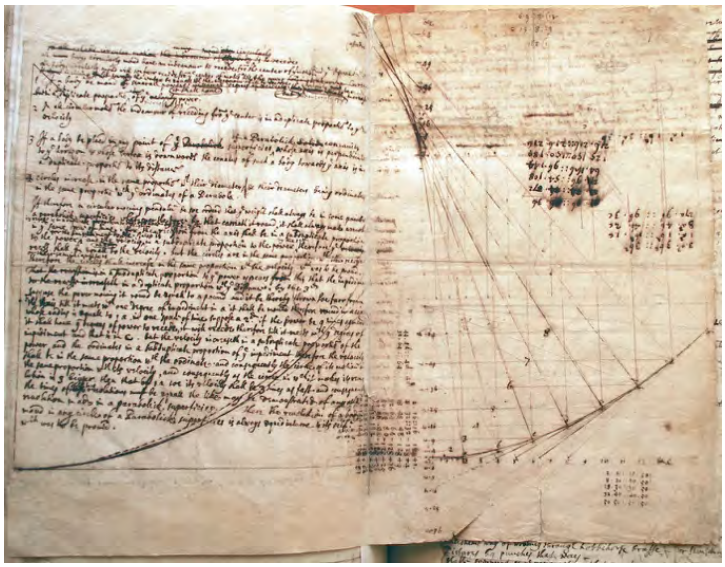




Figure III-277. [left] Hooke, 'Of velocity of motion; of the circular pendulum', 1667[?]; [above] detail. © Royal Society, Cl.P/20/53, fols. 115v-116r.

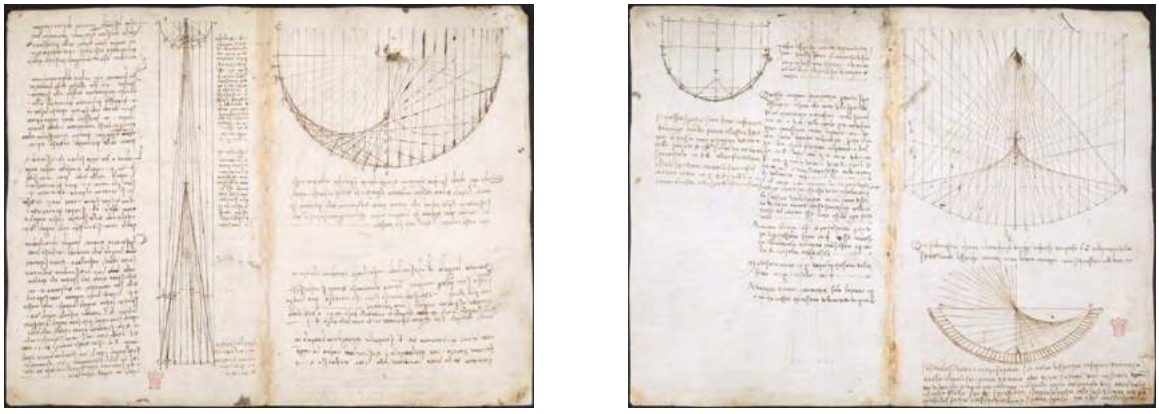


Figure III-278. cf. da Vinci, 'Studies of parabolic mirrors', 1503–1505. BL, Arundel MS 263, fols. 86v-88r.

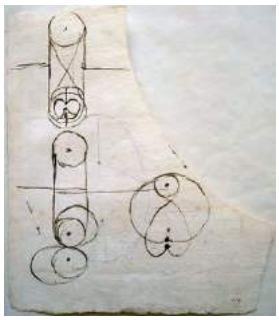


Figure III-279. Hooke, 'The flux and reflux of the sea according to Descartes [?]', n.d.
© Royal Society, Cl.P/20/55, fol. 119r.



Figure III-280. Hooke, 'The flux and reflux of the sea according to Descartes [?]', n.d.
© Royal Society, Cl.P/20/55, fol. 119v.

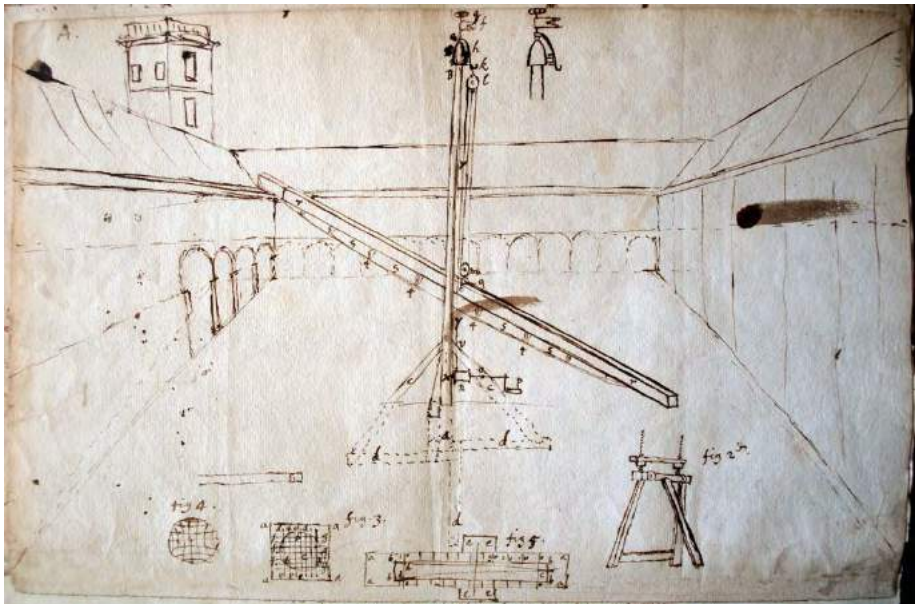


Figure III-281. Hooke, 'Of a telescope stand set up in the yard of Gresham College', *c.* September 1664. © Royal Society, Cl.P/20/61a, fol. 134r.

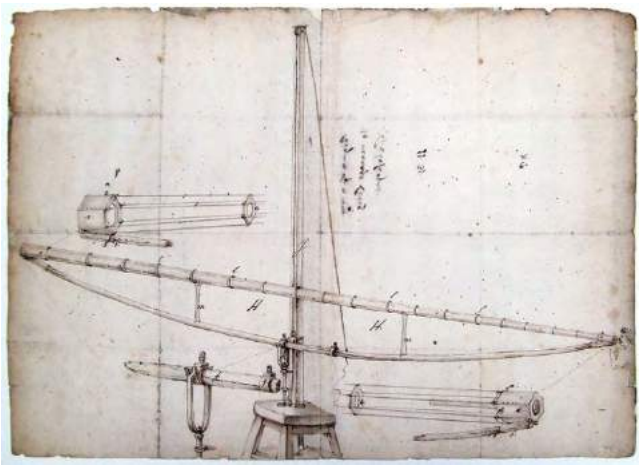


Figure III-282. Robert Southwell or Hooke[?], 'Figure of a way to manage long telescopes', n.d.
© Royal Society, Cl.P/20/61b.

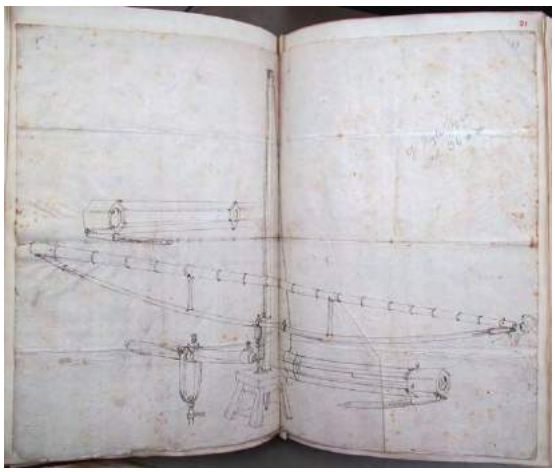


Figure III-283. Southwell or Hooke[?], 'Sketch of a telescope in Prince Leopoldo's court in Florence', attached to Southwell's letter to Robert Boyle, *c.* 1661.
© Royal Society, MS/248/21.

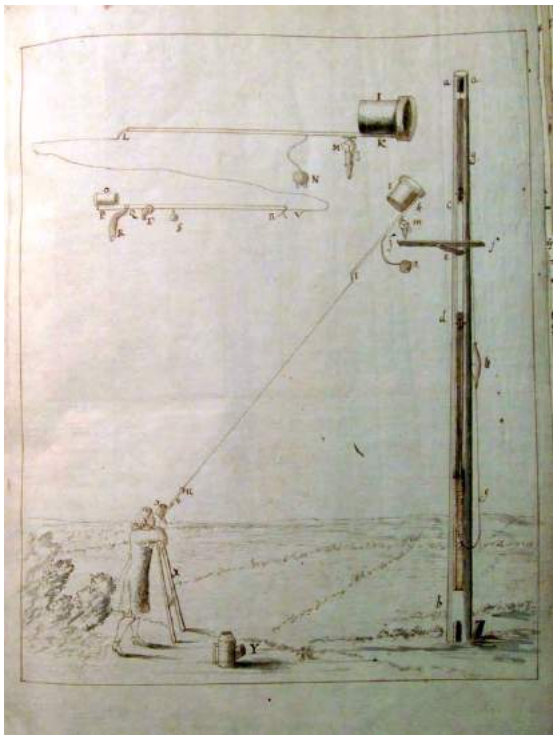


Figure III-284. Hooke, 'Copy of Huygens's engraving a tubeless aerial telescope', 25 June 1684.
© Royal Society, Cl.P/20/62.

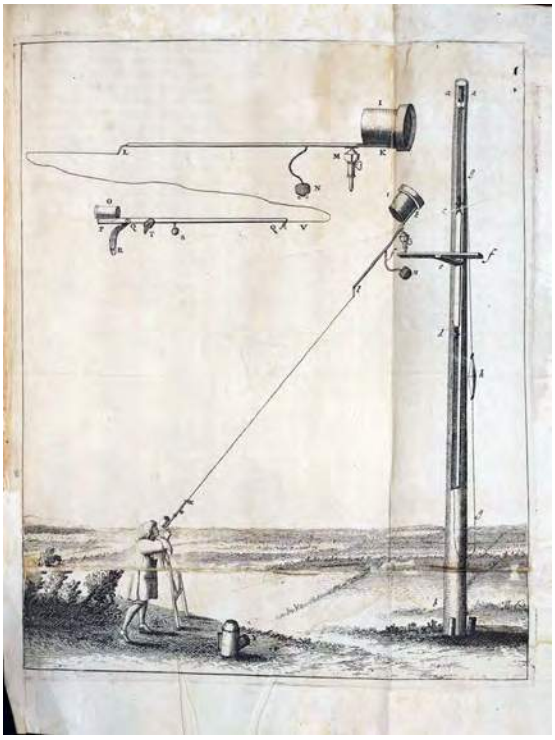


Figure III-285. cf. Illustration of a 'Tubeless telescope' in Christiaan Huygens, *Astroscopia compendiaria* (The Hague, 1684), facing p. 8.

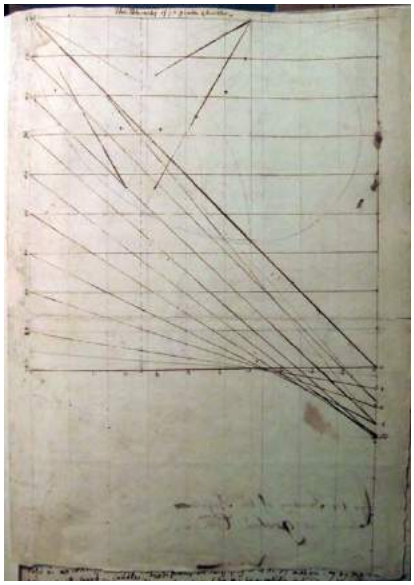


Figure III-286. Hooke, 'Account of Richard Norris's book about the Rhomb line', 2 Dec. 1685. © Royal Society, Cl.P/20/68.

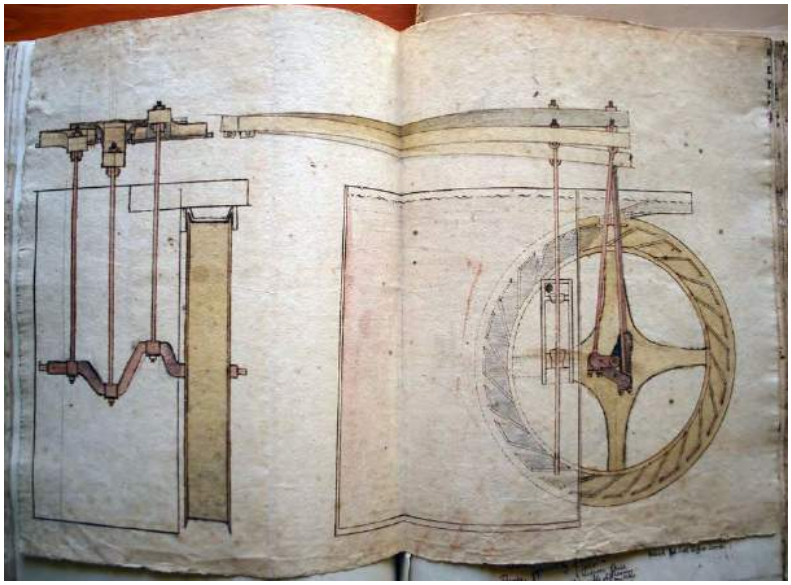


Figure III-287. Hooke, 'Waterwork nearly finished by Mr. Aldersey at Hackney', 2 June 1686.
© Royal Society, Cl.P/20/71.

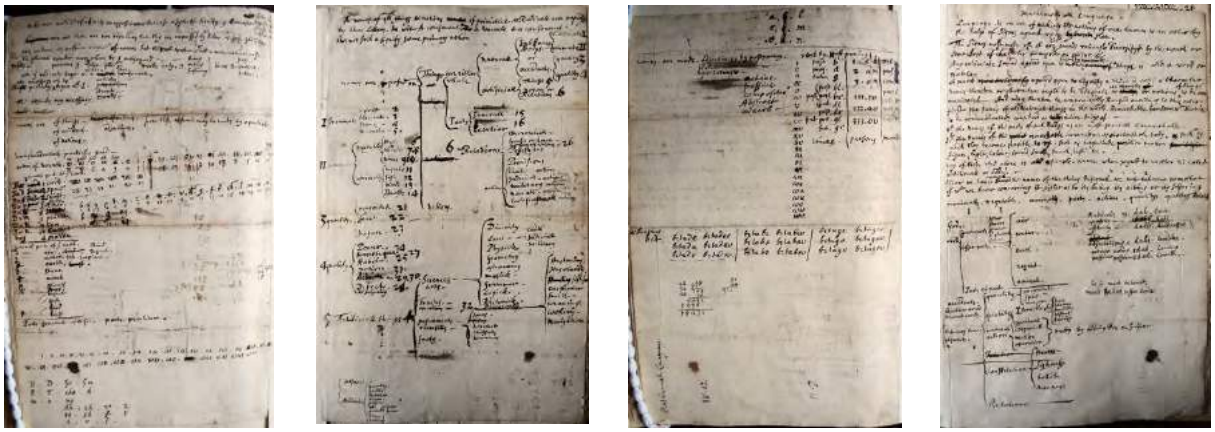


Figure III-288. Hooke, 'Of mathematical language', *c.* 1686.
© Royal Society, Cl.P/20/72.



Figure III-289. Hooke, 'Proportion of velocity to distance', n.d.
© Royal Society, Cl.P/20/74.

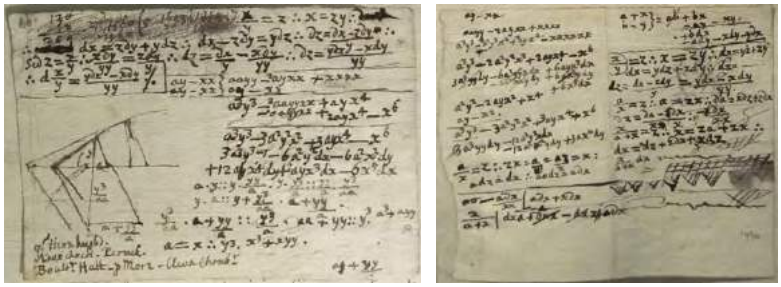


Figure III-290. Hooke, 'Notes to Marquis de l'Hôpital's *Analyse des infiniment petits* (Paris, 1696), after 1696. © Royal Society, Cl.P/20/87.

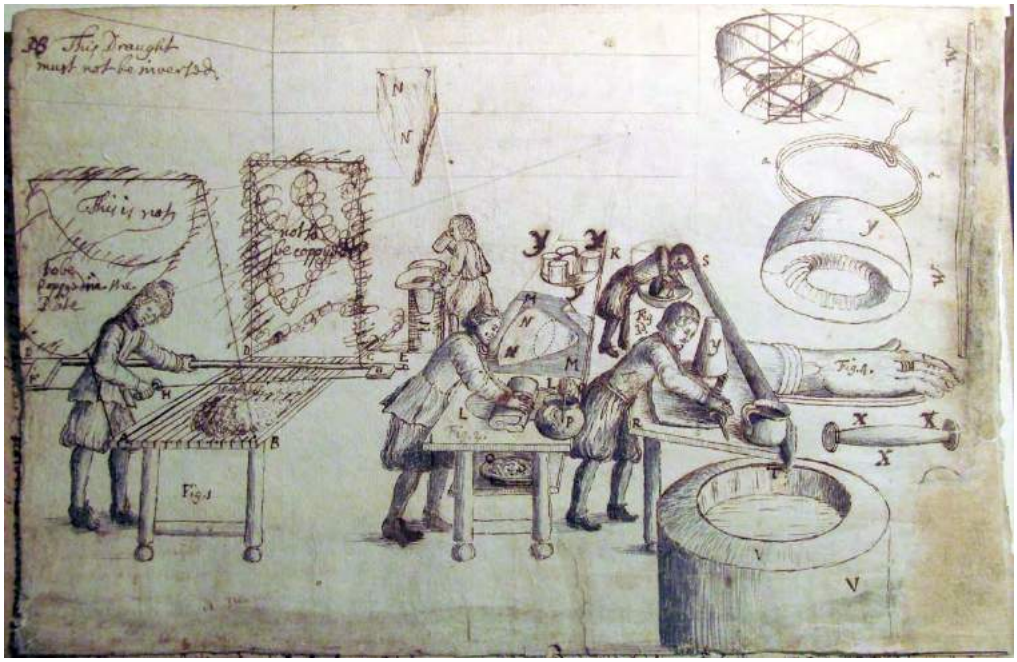


Figure III-291. Hooke, 'An Account of the felt-makers', 21 Feb. 1666. © Royal Society, Cl.P/20/96.

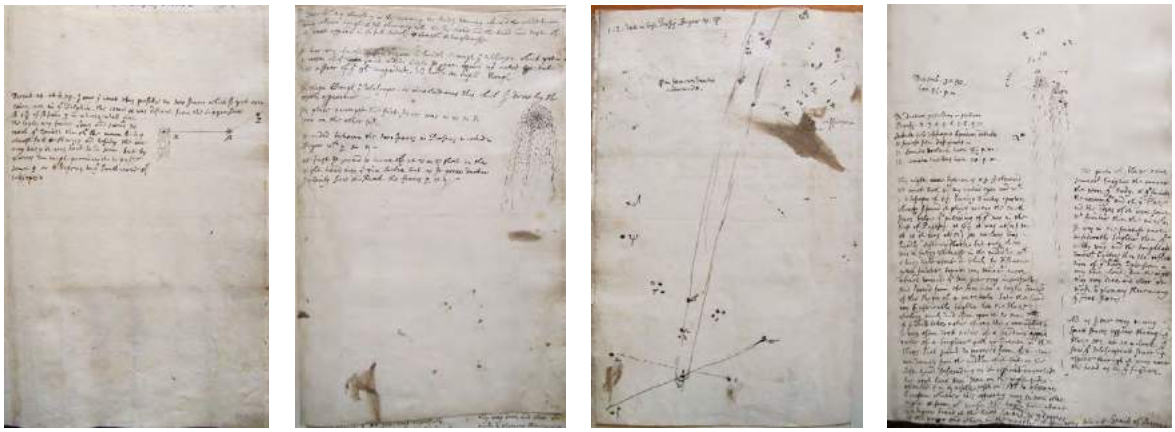


Figure III-292. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 282r, 283r-v, 284r.

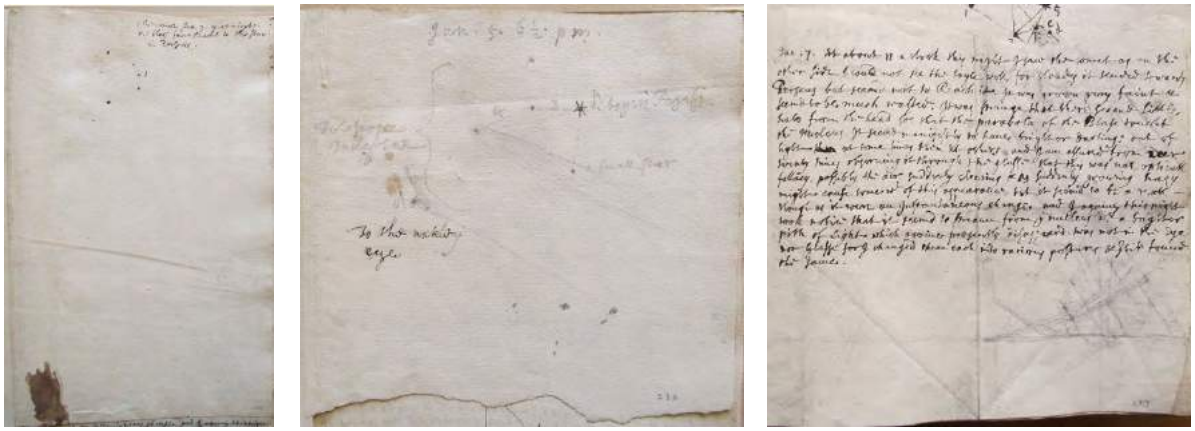


Figure III-293. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 285r, 286r, and 287r.

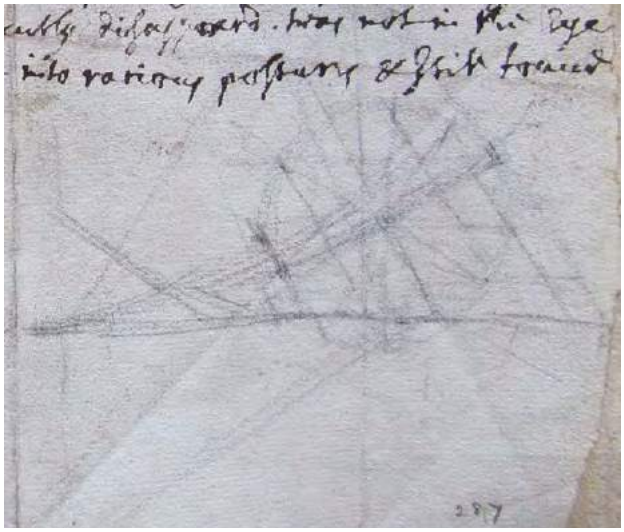


Figure III-294. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fol. 287r, detail.

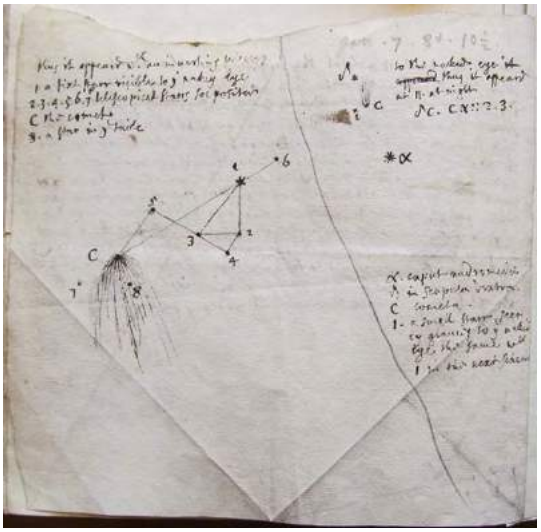


Figure III-295. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fol. 287v.

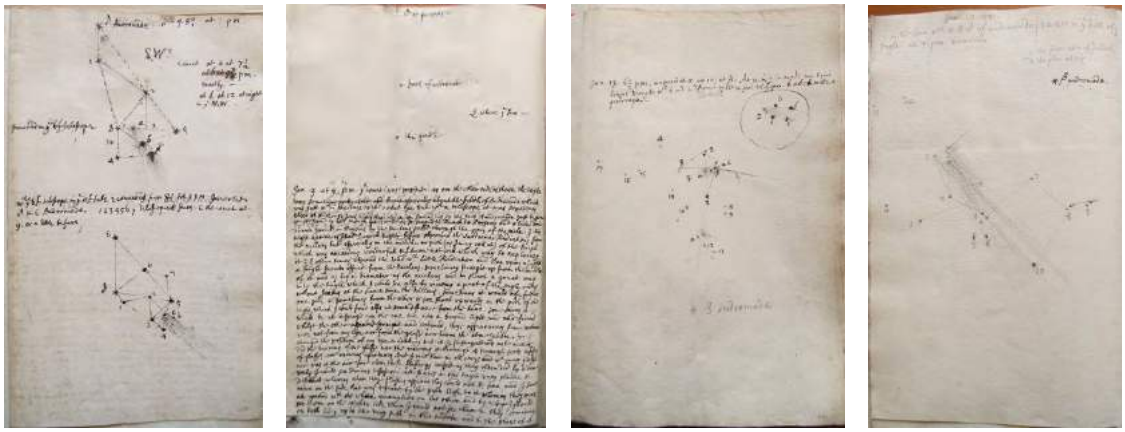


Figure III-296. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 288r-v, 290r, and 291v.

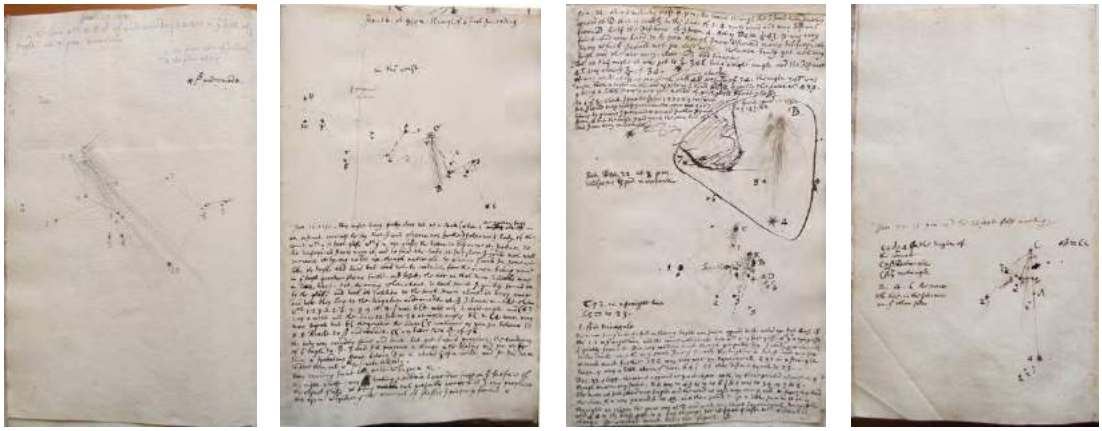


Figure III-297. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 292r, 293r, 295v.

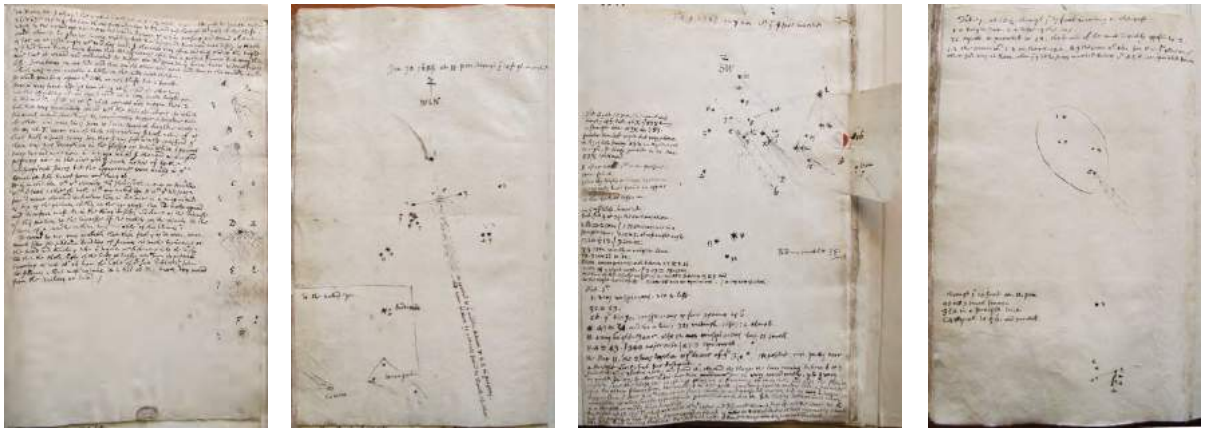


Figure III-298. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 296r, 297v, 298r, 299v.

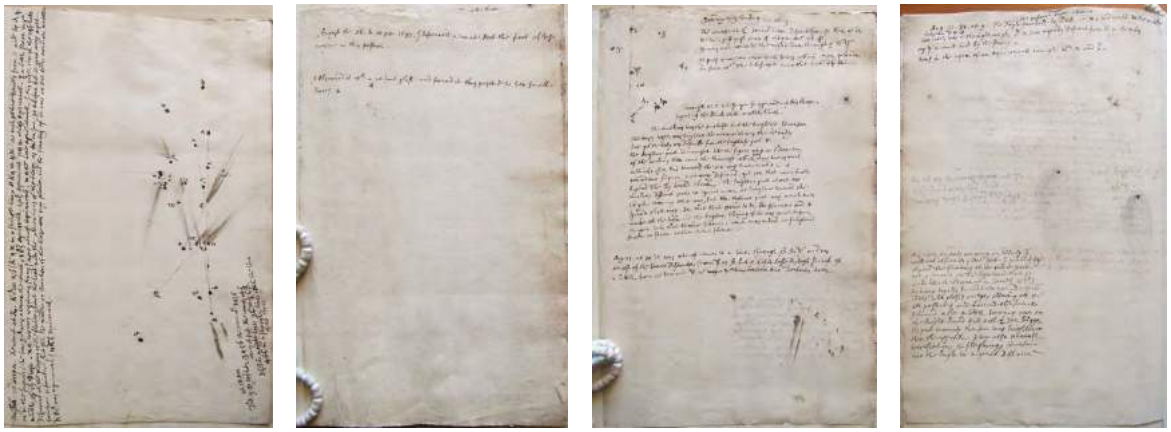


Figure III-299. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 300r, 301r, 302r-v.

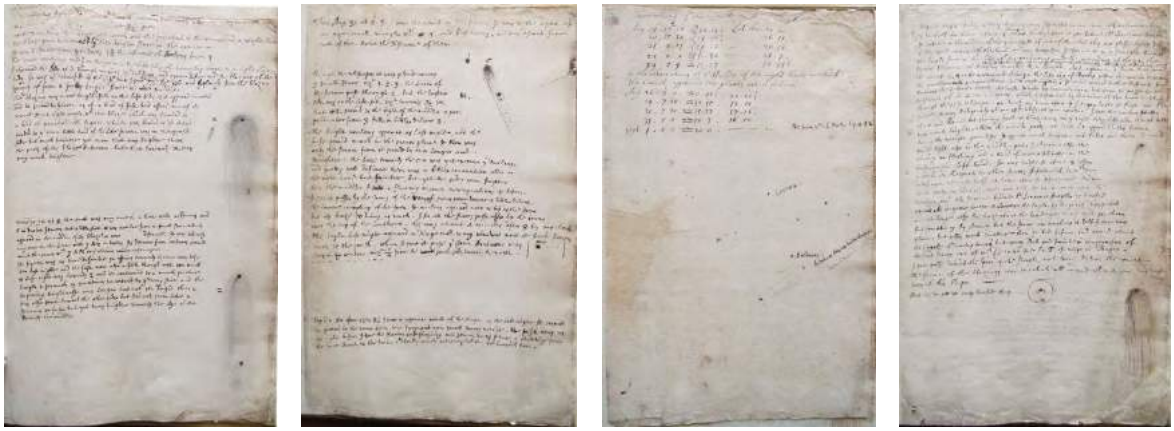


Figure III-300. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 303r, 305r, 306r, 307r.

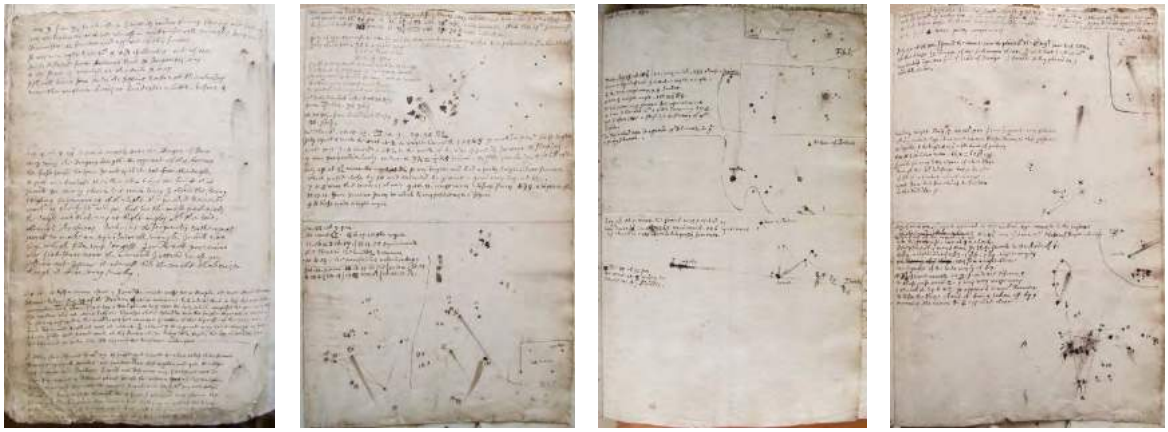


Figure III-301. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 307v, 308r-v, 309r.

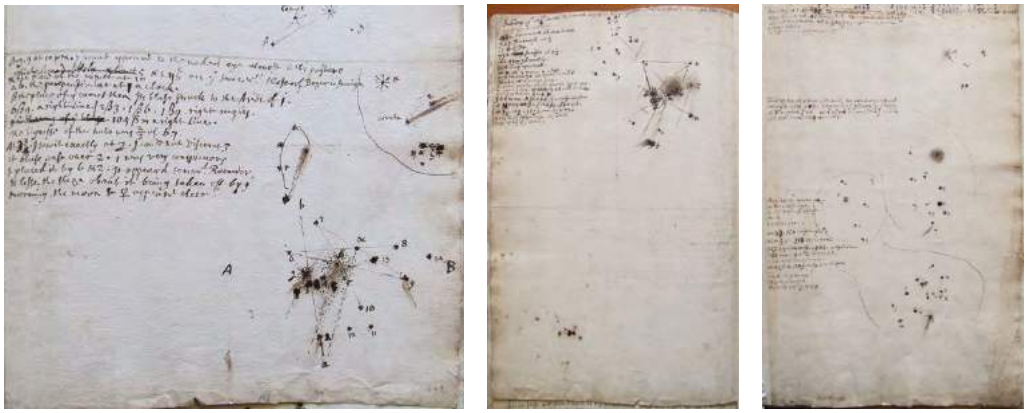


Figure III-302. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683. © Royal Society, Cl.P/24/88, fols. 309r detail, 309v, 310r.

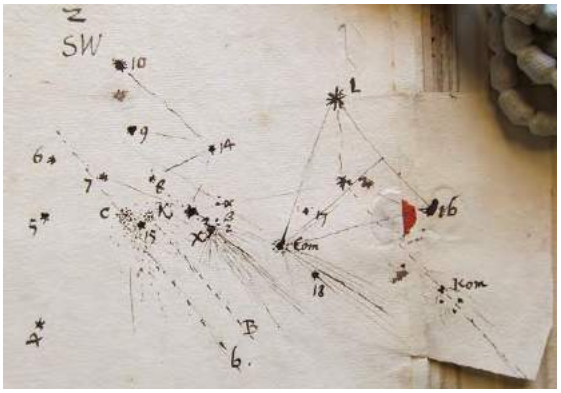


Figure III-303. Hooke, 'Astronomical observations', Dec. 1680 to Feb. 1681, Aug. to Sep. 1682, July to Aug. 1683, detail.
© Royal Society, Cl.P/24/88, fol. 298r detail.

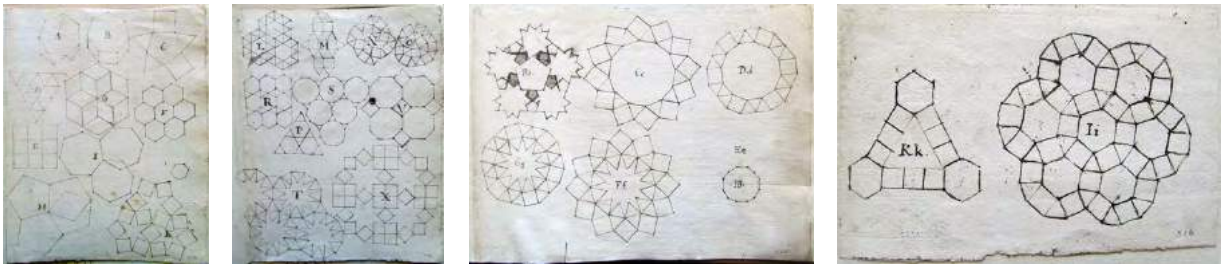


Figure III-304. Hooke, 'Copies of illustrations from Book 2 of Johannes Kepler's *Harmonices mundi* (Linz, 1619)', 1675?. © Royal Society, Cl.P/24/89, fols. 313-316.

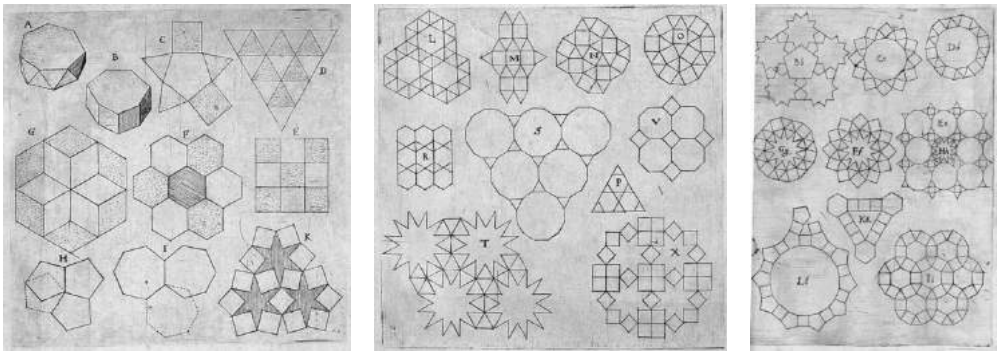


Figure III-305. cf. Kepler, *Harmonices mundi* (Linz, 1619), unnumbered plates of illustrations from Book 2.

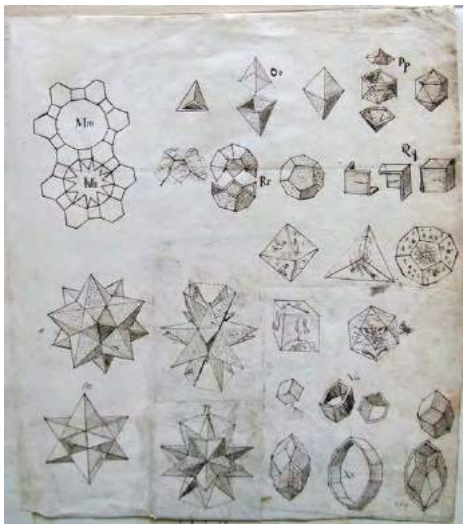


Figure III-306. Hooke, 'Copies of illustrations from Book 2 of Kepler's *Harmonices mundi* (Linz, 1619)', 1675?.
© Royal Society, Cl.P/24/89, fol. 317r.

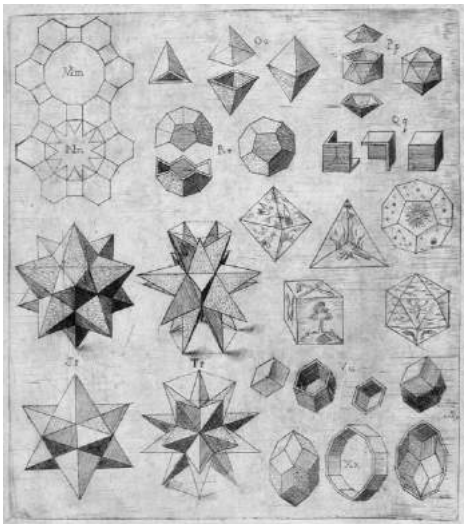
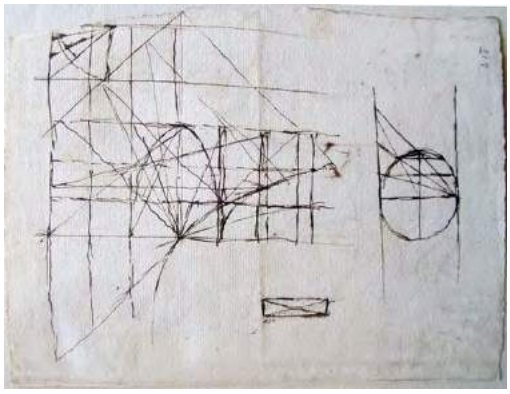


Figure III-307. cf. Kepler, *Harmonices mundi* (Linz, 1619), unnumbered plate of illustrations from Book 2.



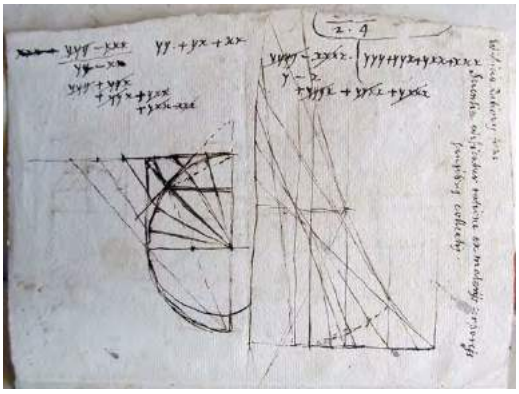


Figure III-308. Hooke, 'Mathematical sketches and calculations', n.d.
© Royal Society, Cl.P/24/89, fol. 318r-v.

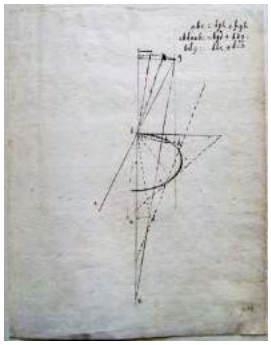


Figure III-309. Hooke, 'Mathematical sketches and calculations', n.d.
© Royal Society, Cl.P/24/89, fol. 319r.

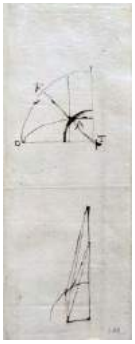


Figure III-310. Hooke, 'Mathematical sketches and calculations', n.d.
© Royal Society, Cl.P/24/89, fol. 320r.



Figure III-311. Hooke, 'Queries to Hevelius about comets and telescopic sights', n.d. © Royal Society, EL/H3/68.

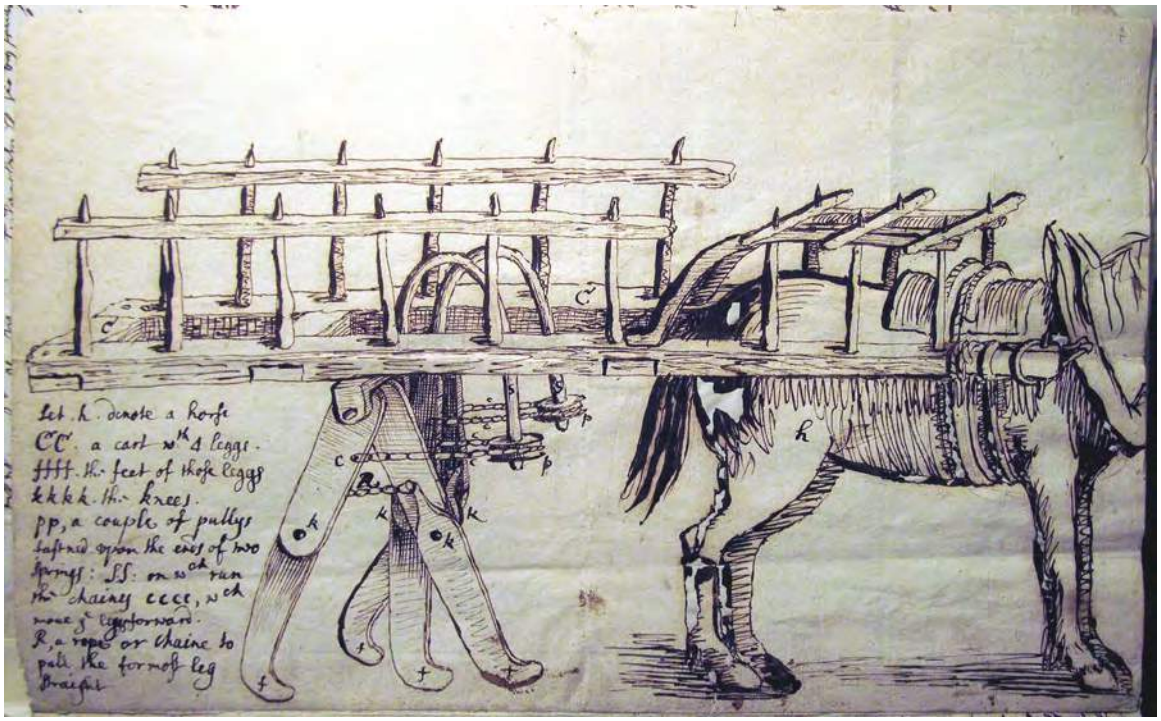


Figure III-312. Hooke, 'An account of Francis Potter's invention of a cart with legs', 11 Mar. 1663, attached to a letter from Francis Potter to John Aubrey dated 22 Feb. 1663.
© Royal Society, EL/P1/40.

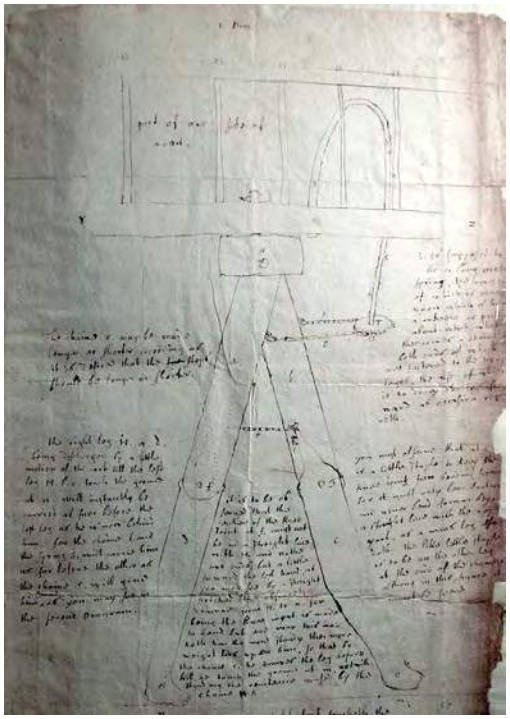


Figure III-313. cf. Francis Potter, 'Sketch of the leg of the cart', attached to a 22 Feb. 1663 letter from him to John Aubrey.
© Royal Society, EL/P1/39.



Figure III-314. Hooke, 'Urn design for the Monument', 1675.
© Royal Society, MS 131/54.

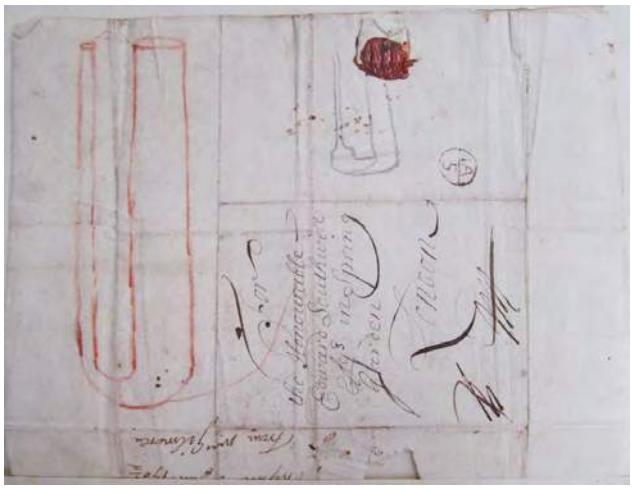


Figure III-315. Hooke, 'Sketch of an engine to transport water', 1702. © Royal Society, MS 248/17.

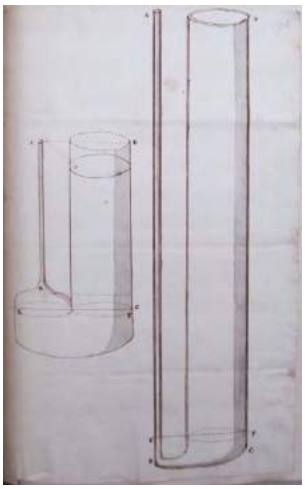


Figure III-316. Hooke's assistant [unnamed], 'Sketch of an engine to transport water', attached to a letter dated 1702. © Royal Society, MS 248/19.



Figure III-317. Hooke, 'Figures observed in snow', 1662. © Royal Society, MS 215/7.



Figure III-318. Hooke, 'Figures observ'd in snow', 10 Dec. 1662. © Royal Society, RBO/2i/12, attachment to p. 63.

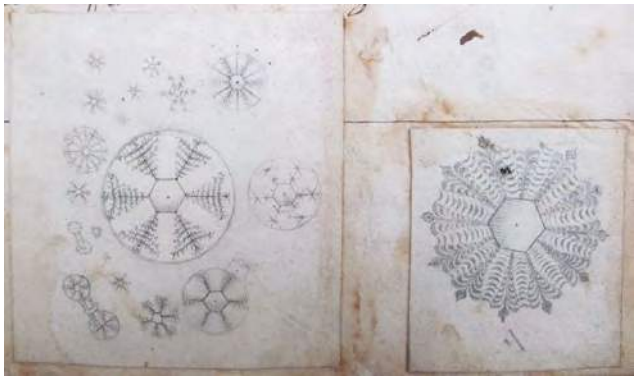


Figure III-319. cf. Anon., 'Copy of a letter communicated by James Hayes concerning some observations of snow fallen in March', 13 Mar. 1667.
© Royal Society, LBO/01/154, p. 403.



Figure III-320. Hooke, 'The scheme of the stones taken out of the Lord Belcarris his heart. Drawn by Mr. Hook, and presented to the Society, August the 19, 1663'. © Royal Society, RBO/2i/66, p. 290.



Figure III-321. Hooke, 'Concerning the disposition of the air and spots discovered in the planet Mars', 28 Mar. 1666. © Royal Society, RBO/3/32, p. 98.

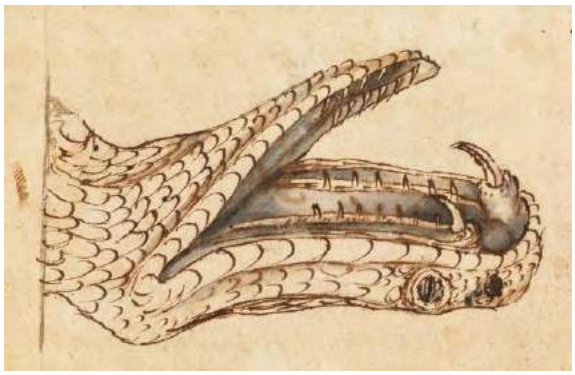


Figure III-322. Hooke, 'An account of a viper', 2 Nov. 1664. © Royal Society, RBO/3/22.

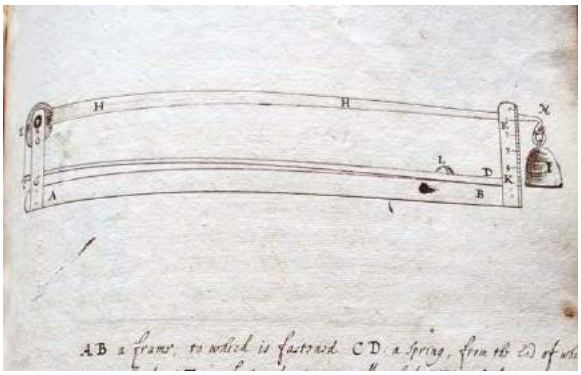


Figure III-323. Hooke, 'Instrument to measure gravitational differences', 1666. © Royal Society, RBO/3/31.

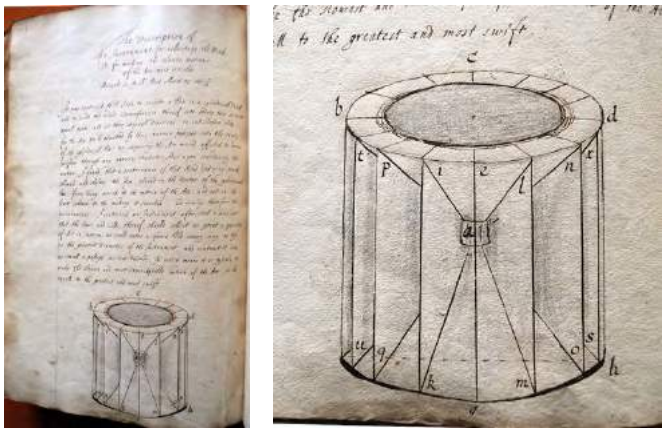


Figure III-324. Hooke, 'The description of an instrument for collecting of the wind, or, for making the slower motions of the air more sensible', 12 Mar. 1668. © Royal Society, RBO/3/79, p. 294.

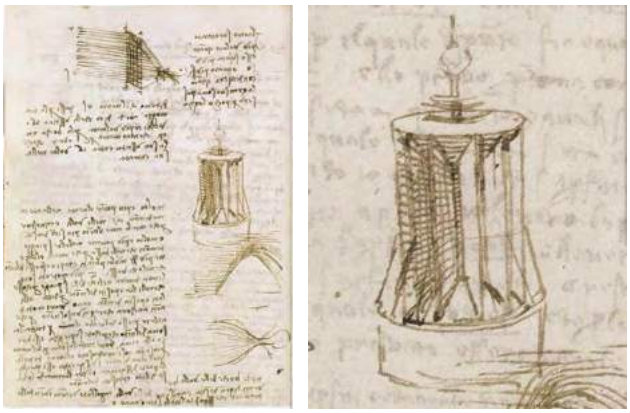


Figure III-325. cf. da Vinci, 'Study of the winds'. Source: Biblioteca Leonardiana, Codex Madrid II, fol. 74v.

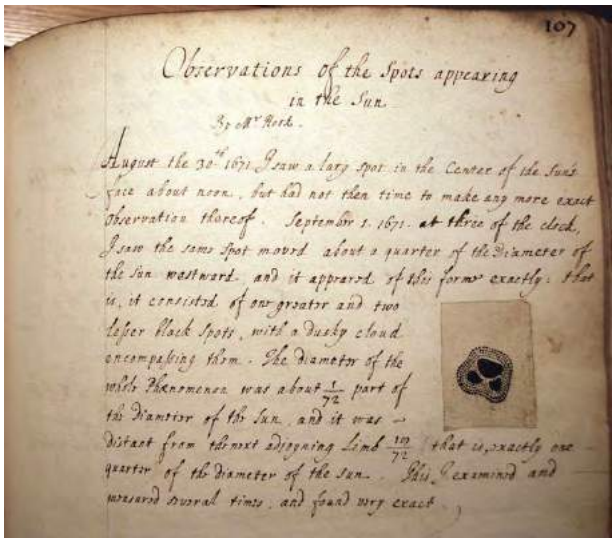


Figure III-326. Hooke, 'Observations of the spots appearing in the sun', 30 Aug. & 1 Sep. 1671. © Royal Society, RBO/4/32, p. 107.



Figure III-327. cf. *Philosophical transactions*, vol. 6, no. 77 (20 Nov. 1671), p. 2295.

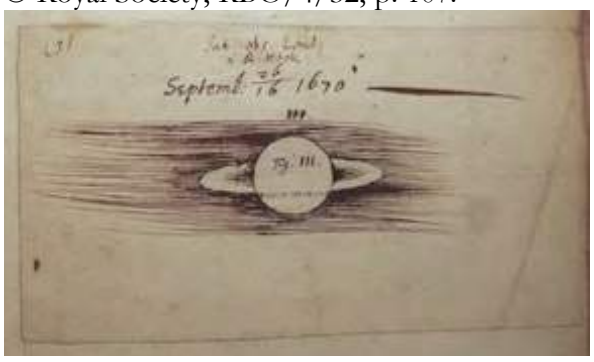


Figure III-328. Hooke, 'Observations of Saturn on 26/16 September 1670', 16 Nov. 1671 (read to the Society on). © Royal Society, RBO/4/33, p. 109.

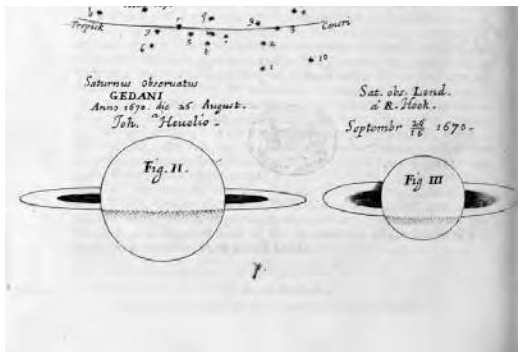


Figure III-329. cf. *Philosophical transactions*, vol. 5, no. 65 (14 Nov. 1670), pl. facing p. 2083.

ii. 17. SIR JOHN SOANE'S MUSEUM, LONDON

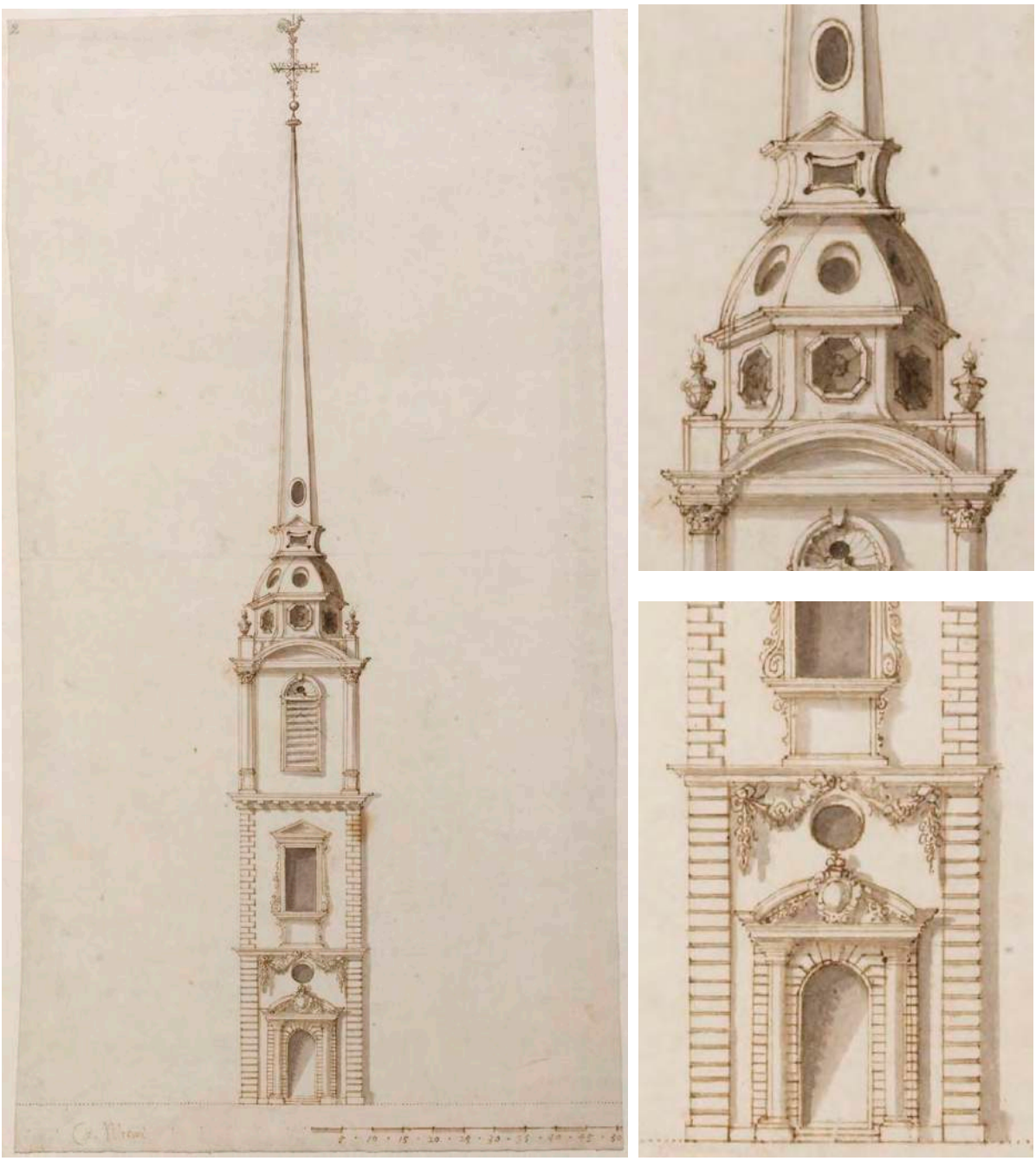


Figure III-330. Hooke (attrib.), 'Presentation drawing of the west facade of the tower and spire of St Benet, Gracechurch Street, London', *c.* 1681; details.
Source: Sir John Soane's Museum, SM volume 111/2.

ii. 18. SOCIETY OF ANTIQUARIES, LONDON

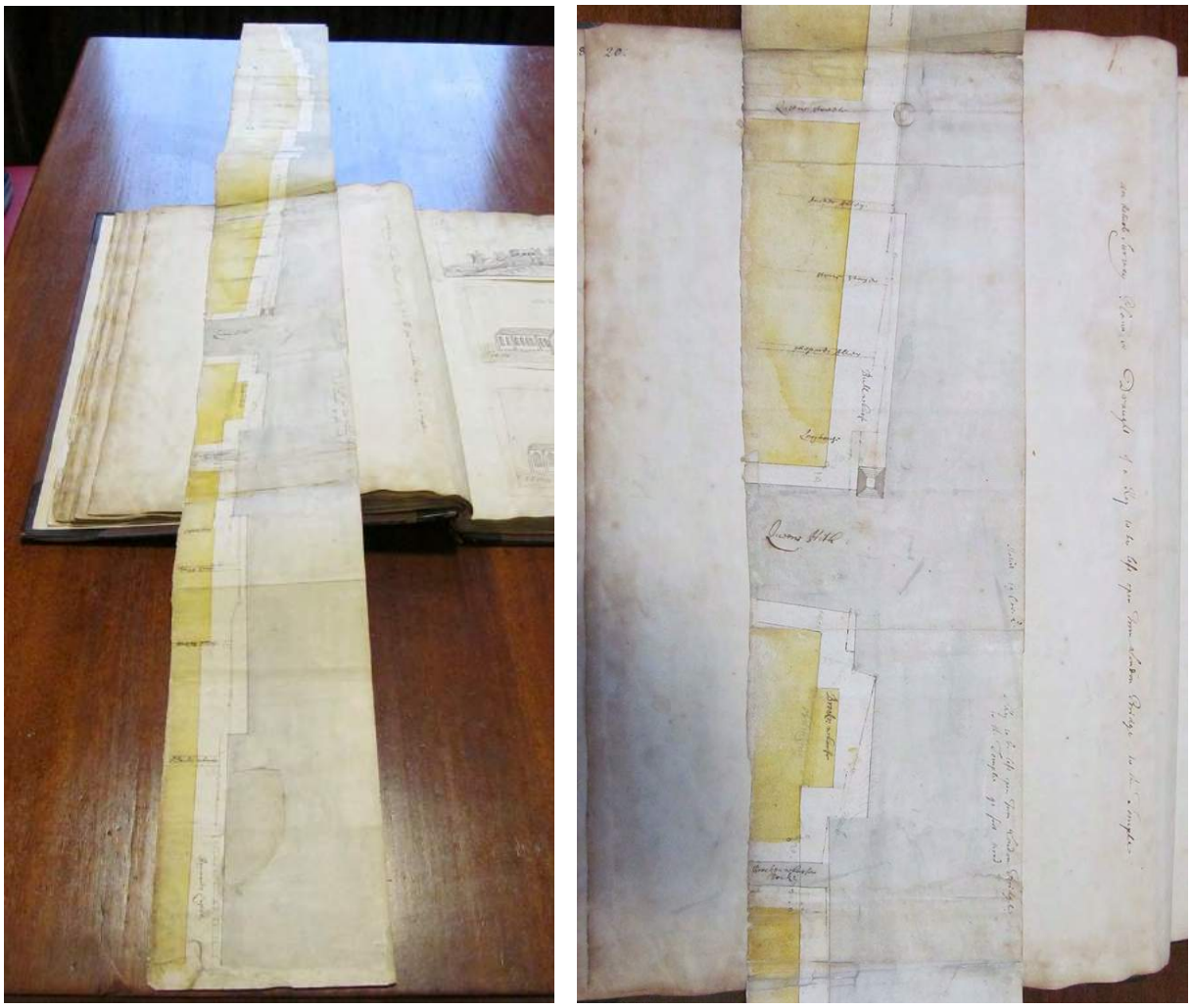


Figure III-331. Hooke (attrib.), 'An Actual Survey Plann or Draught of a Key to be left open from London Bridge to the Temple', *c.* 1673; detail.
Source: Society of Antiquaries, Drawings, vol. 2, p. 20.

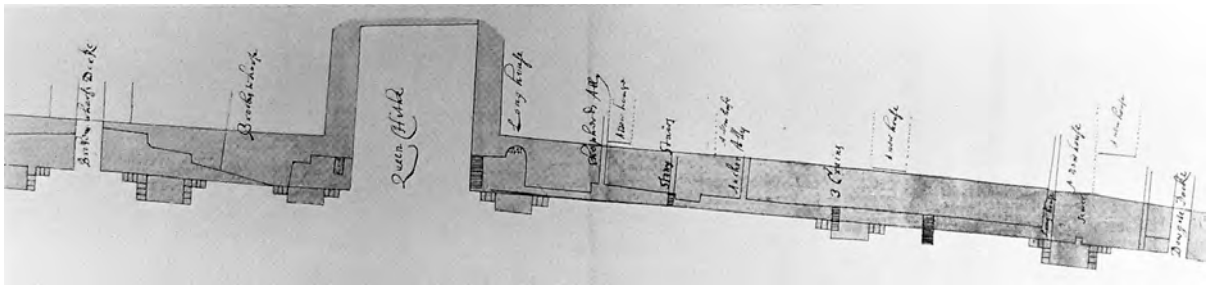
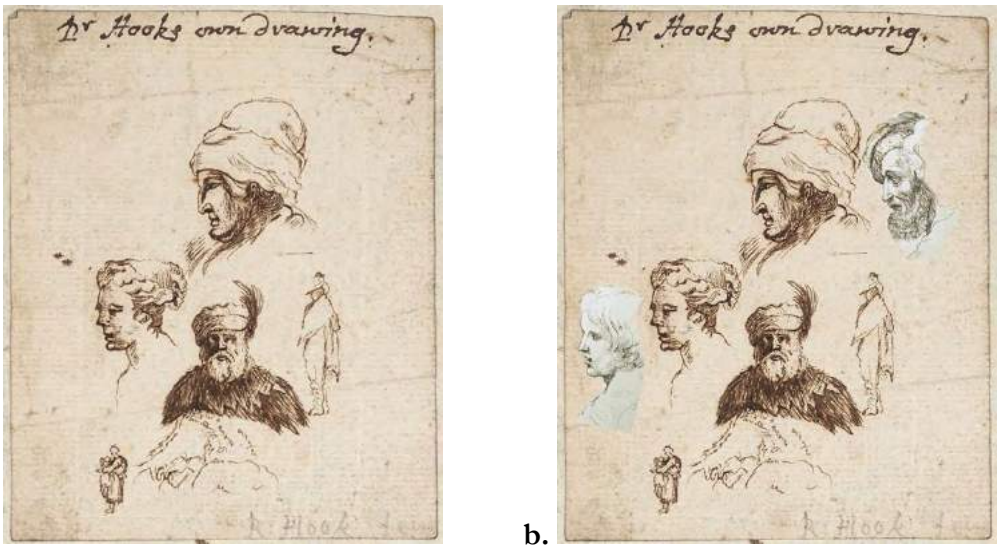


Figure III-332. cf. Hooke[?], 'Proposal for the new water line, attached to the 4 December 1671 *Letters Patent confirming the Design for making an open Wharf forty feet wide on the North side of the River Thames between London Bridge and the Temple*', 1671, detail.
Source: Sydney Perks, *The Water Line of the City of London After the Great Fire* (London, 1935), Fig. 3.

ii. 19. TATE BRITAIN, LONDON



a. **b.**

Figure III-333. a. Hooke (attrib.), 'Figural study', *c.* 1660?. © Tate Britain, London, T10678, reproduced as fig. 1 in Matthew C. Hunter, 'Hooke's Figurations: A Figural Drawing Attributed to Robert Hooke', *Notes and Records of the Royal Society* 64 (2010), p. 252. **b.** Author's collage illustrating the profiles copied from Figure III-65 (BL, Add. MS 5238, no. 44).

ii. 20. WARWICKSHIRE C.R.O.



Figure III-334. Edward Pearce (attrib.), 'Design for an unidentified church', n.d.
Source: Warwickshire C.R.O., CR2017/B1/1.



Figure III-335. Pearce (attrib.), 'A design for a church, possibly an alternative scheme for St. Edmund King and Martyr', n.d.
Source: Warwickshire C.R.O., CR2017/B1/2.

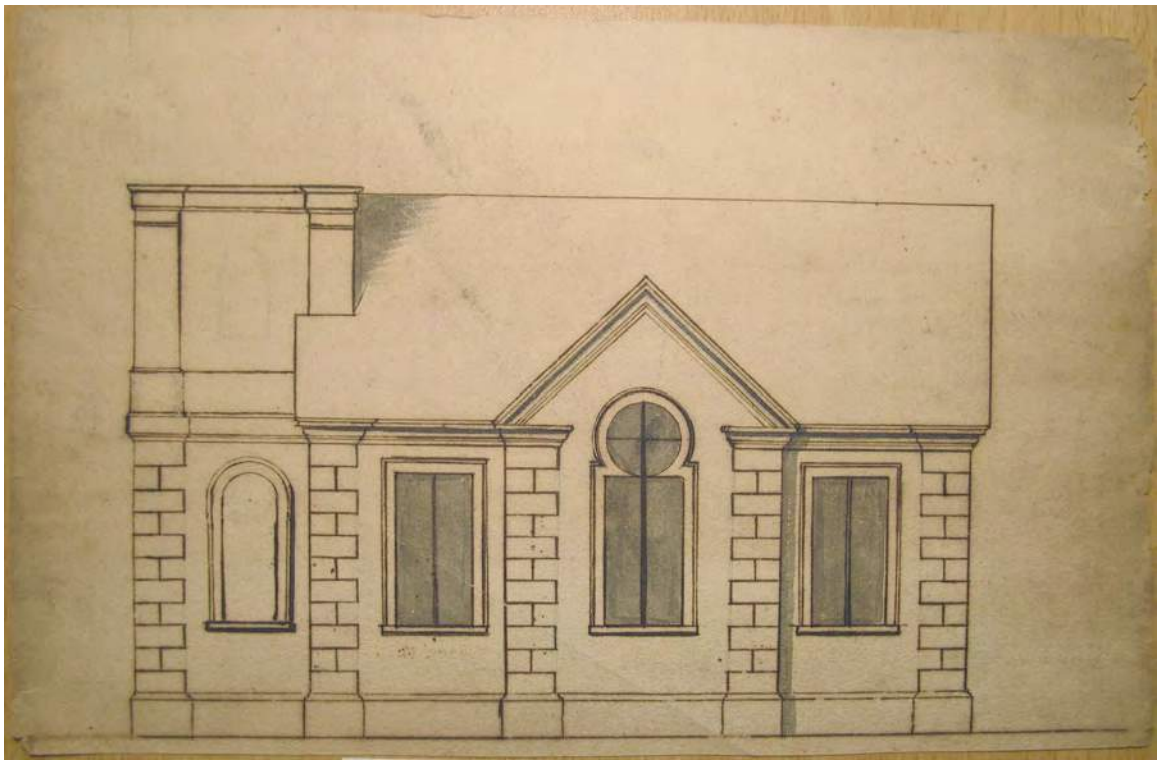


Figure III-336. Hooke, 'Alternative design for the church in Willen', *c.* 1678. Source: Warwickshire C.R.O., CR2017/B1/3.

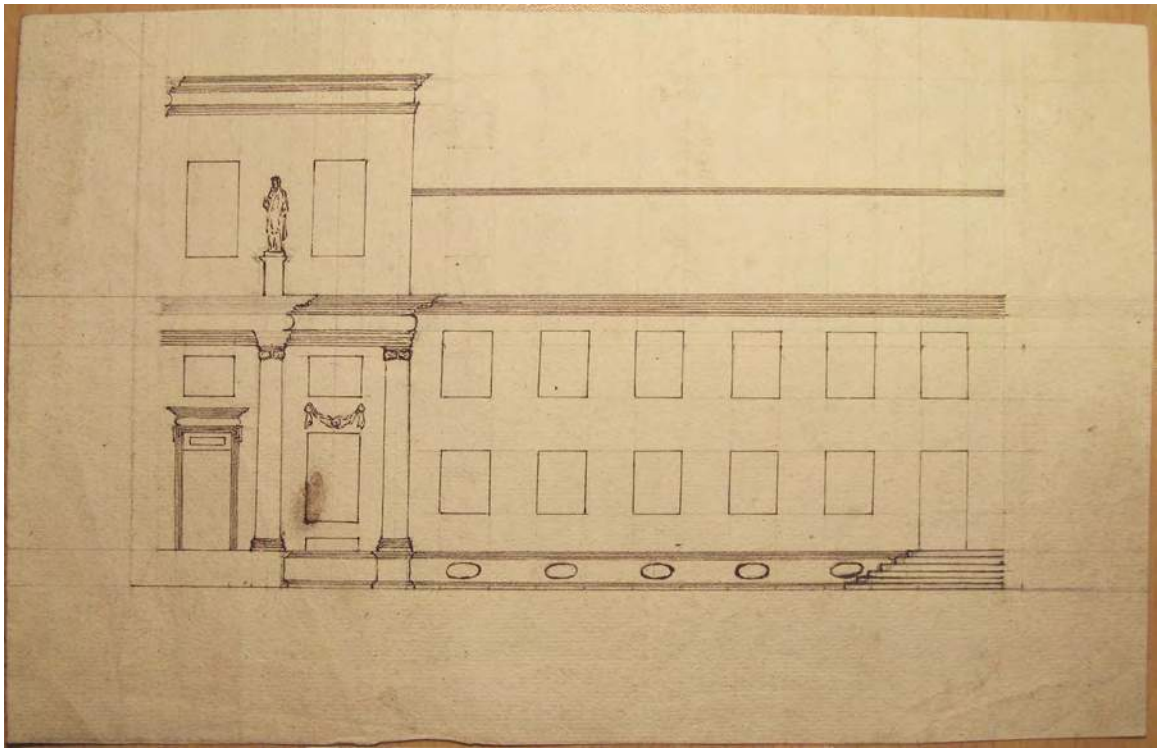


Figure III-337. Hooke, 'Colledg [sic] front [Partial elevation of the Royal College of Physicians]', 1671. Source: Warwickshire C.R.O., CR2017/B1/4.

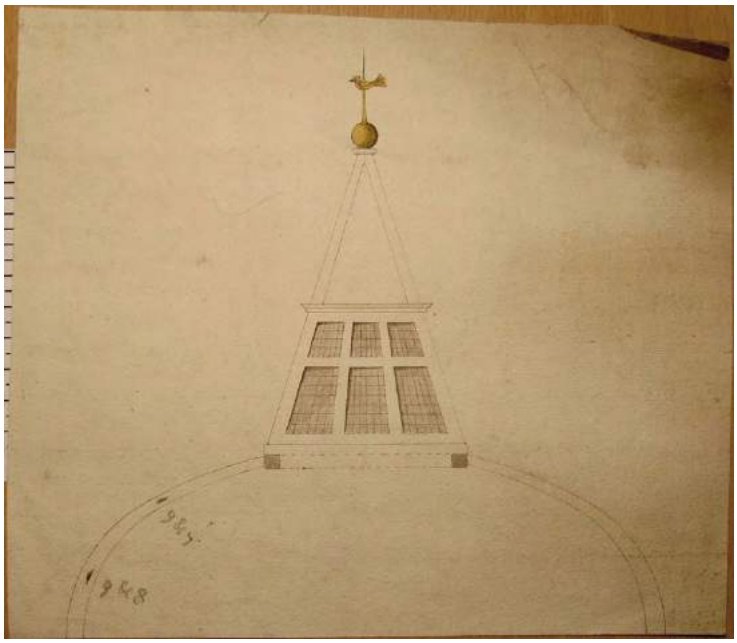


Figure III-338. Hooke, 'Section through the anatomy theatre of the Royal College of Physicians', 1676. Source: Warwickshire C.R.O., CR2017/B1/5.

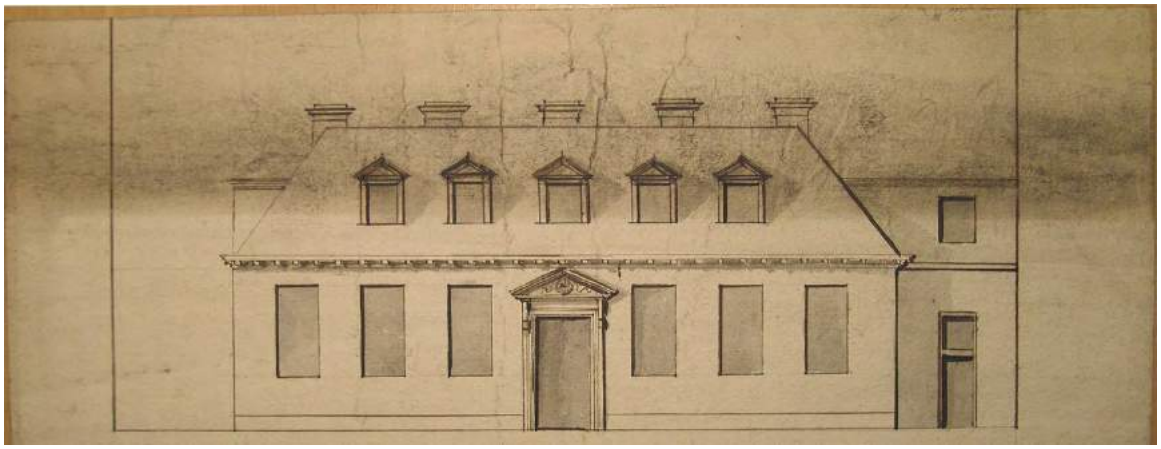


Figure III-339. Hooke[?], 'Elevation of an unidentified building', n.d., detail. Source: Warwickshire C.R.O., CR2017/B1/6.

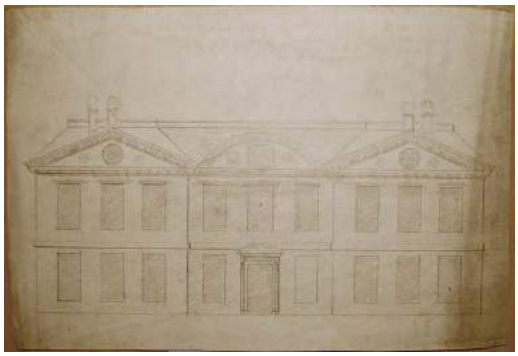


Figure III-340. Hooke[?], 'Elevation of an unidentified building', n.d. Source: Warwickshire C.R.O., CR2017/B1/7.

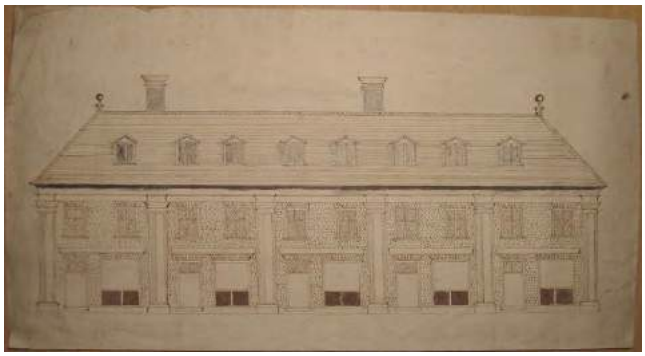


Figure III-341. Hooke[?], 'Elevation of an unidentified building, perhaps almshouses', n.d. Source: Warwickshire C.R.O., CR2017/B1/8.

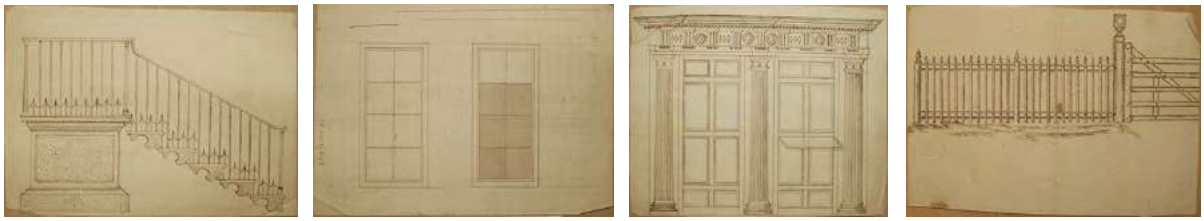


Figure III-342. a-d. Anon., 'Various drawings', n.d.
Source: Warwickshire C.R.O., CR2017/B1/9r, 9v, 10, and 11.

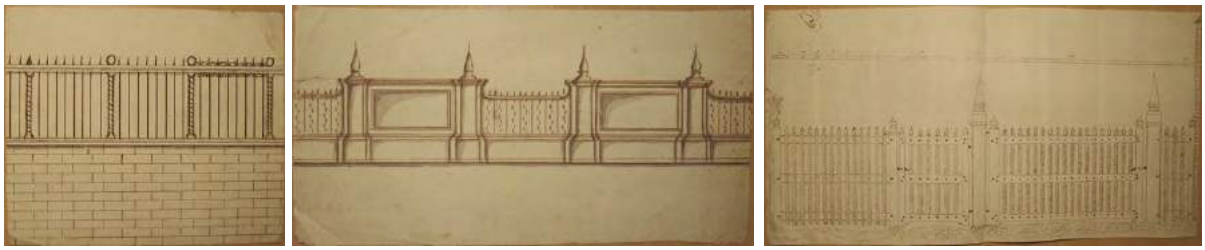


Figure III-343. a-c. Anon., 'Various elevations of boundary walls and fences', n.d.
Source: Warwickshire C.R.O., CR2017/B1/12, 13, and 14r.



Figure III-344. a-c. Anon., 'Description of "L^{ds}: draught of Gates", boundary wall and fence, and two statues', n.d. Source: Warwickshire C.R.O., CR2017/B1/14v, 15, and 16.

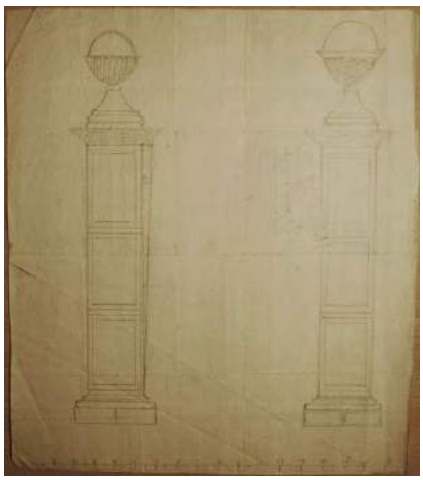


Figure III-345. Anon., 'Elevation of posts for a fence', n.d.
Source: Warwickshire C.R.O., CR2017/B1/17.



Figure III-346. Anon., 'Fence and post with urn', n.d.
Source: Warwickshire C.R.O., CR2017/B1/18.



Figure III-347. Print from Jean Lepautre, *Portails d'Eglise a l'Italienne, nouvellement inventés & gravés par J. Lepautre.* A Paris, chez P. Mariette, avec privilége du Roy. Source: Warwickshire C.R.O., CR2017/B2/1.



Figure III-348. Print from Lepautre, *Portails d'Eglise a l'Italienne, nouvellement inventés & gravés par J. Lepautre.* A Paris, chez P. Mariette, avec privilége du Roy. Source: Warwickshire C.R.O., CR2017/B2/2.



Figure III-349. Anon., 'Engraving of a Corinthian capital', n.d. Note the small vertical line outside of the frame at the bottom of the plate. Source: Warwickshire C.R.O., CR2017/B2/3.



Figure III-350. cf. Anon., 'The Corinthian Capitel', printed in Godfrey Richards (translator and publisher), *The first book of architecture by Andrea Palladio* (London, 1663), pl. 9, p. 179. Note the small vertical line next to the title printed at the bottom. Source: Collection CCA, CAGE NA44.P164 (ID:90-B1597).



Figure III-351. cf. Anon., 'Chapiteau Corinthe', printed in Pierre Le Muet, *Traicté, des galleries, entrées, salles, antichambres, & chambres* (Paris, 1645), pl. 9. Source: Collection CCA, CAGE NA44.P164 (6604).

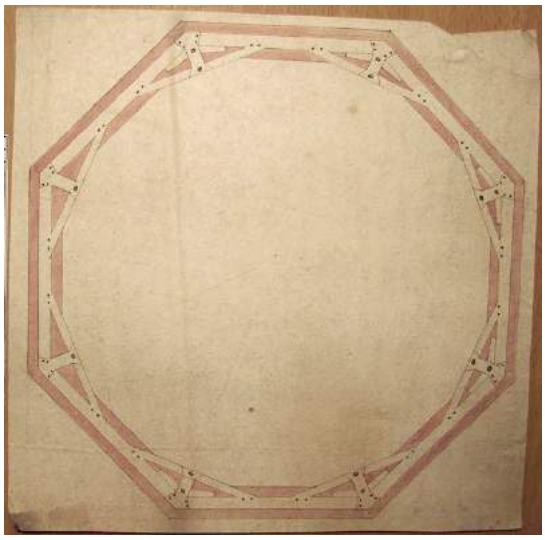


Figure III-352. Hooke, 'Roof plan of the anatomy theatre of the Royal College of Physicians', 1676. Source: Warwickshire C.R.O., CR2017/B3.

ii. 21. YALE UNIVERSITY, BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY

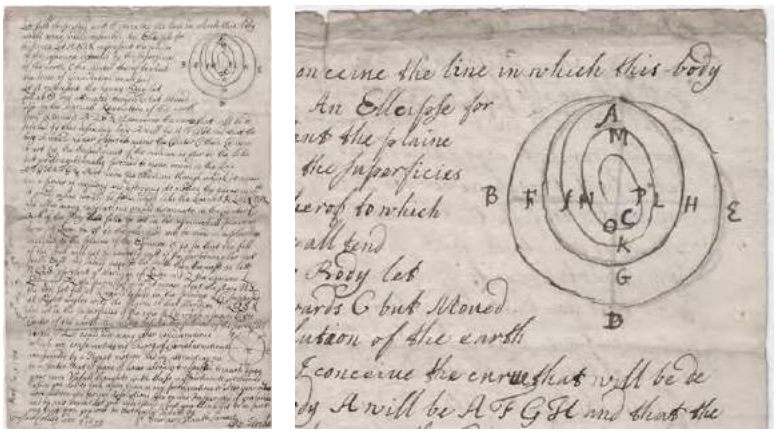


Figure III-353. Hooke, 'Letter to Newton', 9 Dec. 1679; detail. Source: Yale University, Beinecke Rare Book and Manuscript Library, GEN MSS MISC, Group 2583, F-1.

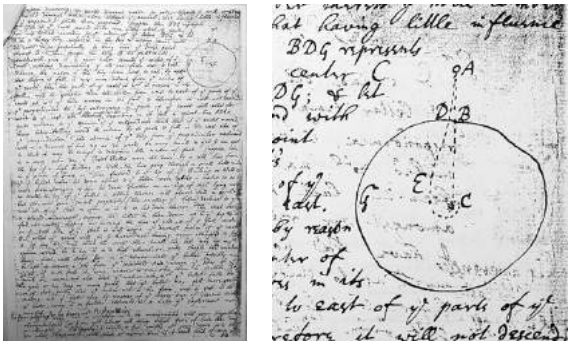


Figure III-354. cf. Newton, 'Letter to Hooke', 28 Nov. 1679; detail. Source: Trinity College, Cambridge, MS R.4.48.5.

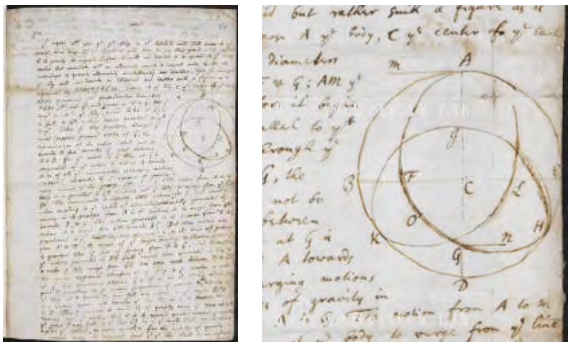


Figure III-355. cf. Newton, 'Letter to Hooke', 13 Dec. 1679; detail. © The British Library Board, Add. MS 37021, fol. 56r.

ILLUSTRATIONS FOR CHAPTER IV

ii. 1. PROPOSAL FOR POST-FIRE RECONSTRUCTION OF LONDON & CITY SURVEYORSHIP

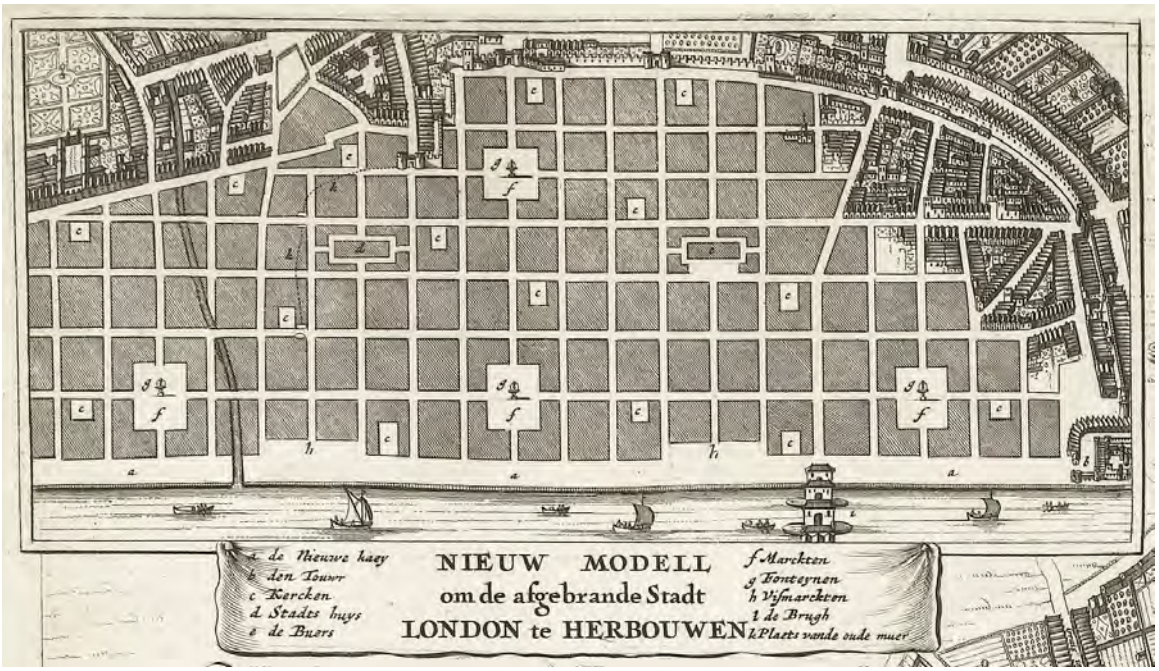


Figure IV-1. Marcus Willemsz Doornick, 'Platte grondt der Verbrande Stadt London' (Amsterdam, 1666), detail. Source: Rijksmuseum, RP-P-OB-82.345; https://goo.gl/s66sdF.



Figure IV-2. Matthaeus Merian, 'Grundtriss der Statt London wie solche vor und nach dem Brand anzusehen, sampt dem Newen Model, wie selbige widrum Auffgebauwet werden solle' (Frankfurt, 1670), detail. © The British Library Board, Maps Crace Port. 2.66.



Figure IV-3. Frederik de Wit (publisher), 'Platte grondt der stadt London met de aenwysinghe hoe die afgebrandt is' (Amsterdam, 1666).
Source: Rijksmuseum RP-P-OB-82.344; https://goo.gl/C7wGGF.

ii. 2. COLLEGES FOR THE ROYAL SOCIETY IN LONDON AND CHELSEA



Figure IV-4. John Barlow (engraver), Thomas Faulkner (publisher), 'King James's College at Chelsea, view looking south', 1829. Source: Wellcome Images, V 12922.



Figure IV-5. Benjamin Cole, 'The forefront and back-front of the Royal Hospital at Chelsea', 1756.
Source: Wellcome Images, V 12916.

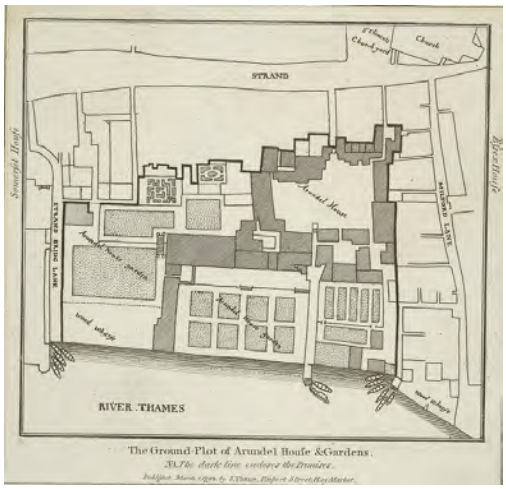


Figure IV-6. John Thane, 'The ground plot of Arundel House & gardens', 1792. Boundaries of the property are indicated in thick black line. © The British Library Board, Maps Crace Port. 13.57.

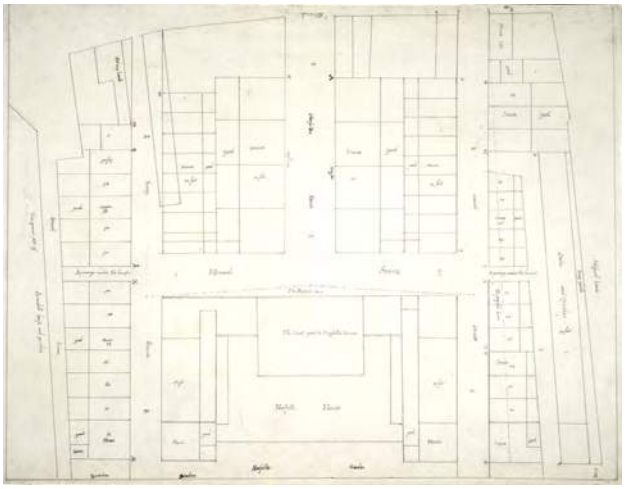


Figure IV-7. Anon., 'A drawn plan of the property of the Duke of Norfolk in the Strand, showing plan of Arundel House and garden in 1720', *c.* 1800. © The British Library Board, Maps Crace Port. 13.58.

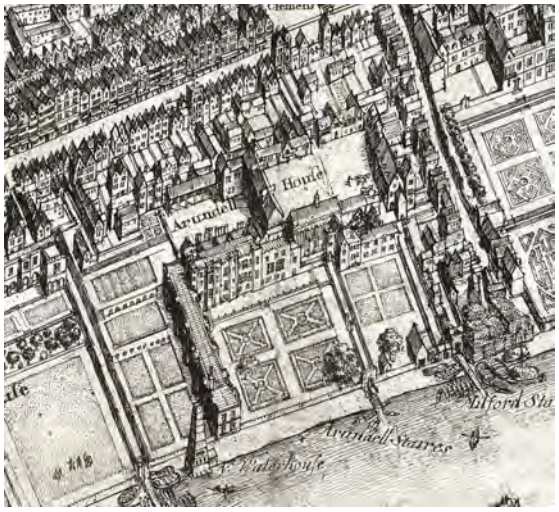


Figure IV-8. Wenceslaus Hollar, 'Bird's-eye plan of the west central district of London', *c.* 1660, detail showing Arundel House. Source: Folger Digital Image Collection, 22302.

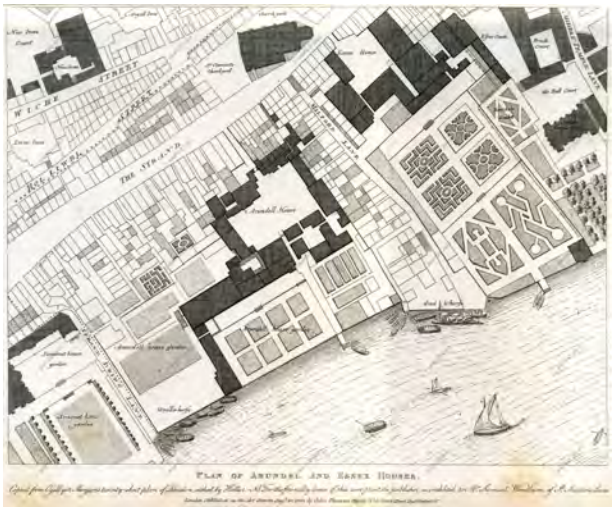


Figure IV-9. Hollar (etcher), John Thomas Smith (publisher), 'Plan of Arundel and Essex Houses, copied from Ogilby's & Morgan's twenty-sheet plan of London, etched by Hollar, [1677]', *c.* 1809. Source: MAPCO: Map And Plan Collection Online; https://goo.gl/xqd7bb.

ii. 3. HOUSE FOR THOMAS COVENTRY AT SNITTERFIELD, WARWICKSHIRE

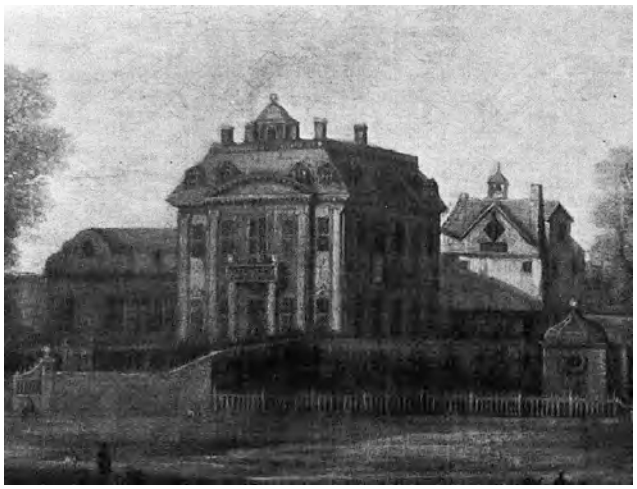


Figure IV-10. John Wootten (attrib.), 'Snitterfield House, Warwickshire', *c.* 1700, detail.
Source: Reproduced from John Harris, *The Artist and the Country House* (Totowa, NJ, 1979), no. 240 on p. 227.

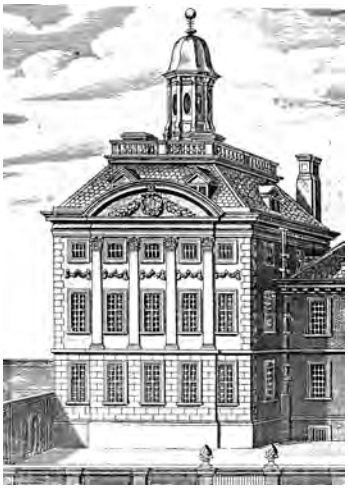


Figure IV-11. Robert White (engraver), 'Hospitium Mente-Captorum Londinense', 1677, detail showing the end pavilion of Bethlem Hospital, built in 1674–1676.
Source: Reproduced from Christine Stevenson, *The City and the King* (New Haven, 2013), fig. 110 on pp. 220-221.



Figure IV-12. Thomas Ward, 'Snitterfield House', early 19th-century. If they ever were there, the pediments and cupola appear to have been removed by this time.
Source: BL, Add. MS 29165, fol. 87 or 89; reproduced from John Shelby, *An Eighteenth Century Warwickshire Village: Snitterfield* ([Warwickshire], 1986), p. 11.

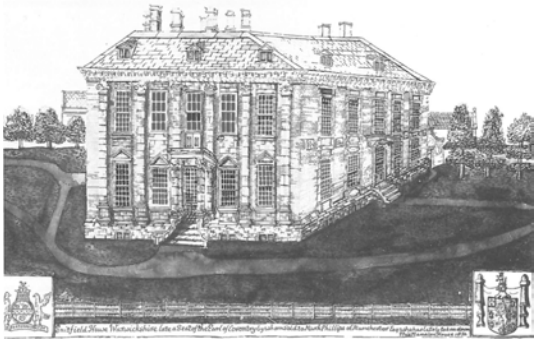


Figure IV-13. Thomas Ward, 'Snitterfield House', early 19th-century. If they ever were there, the pediments and cupola appear to have been removed by this time.
Source: BL, Add. MS 29165, fol. 87 or 89 [?]; reproduced from Geoffrey Tyack, *Warwickshire Country Houses* (Sussex, UK, 1994), fig. 190 on p. 265.



Figure IV-14. Anon., 'Snitterfield House in the late eighteenth century (watercolour).
Source: Shelby, *An Eighteenth Century Warwickshire Village: Snitterfield* ([Warwickshire], 1986), cover page.



Figure IV-15. Anon., 'The rear facade of Snitterfield Hall', *c.* 1820, detail. In addition to the pediments and cupola, the double-height pilasters with Ionic capitals and the embellished entrances are also absent here, although it is possible that the pilasters were only on the front facade.
Source: Birmingham Reference Library, Aylesford Collection, fol. 612; reproduced from 'Parishes: Snitterfield', in *A History of the County of Warwick: Volume 3, Barlichway Hundred* (London, 1945), p. 166.

ii. 4. STABLES FOR SOMERSET HOUSE, LONDON

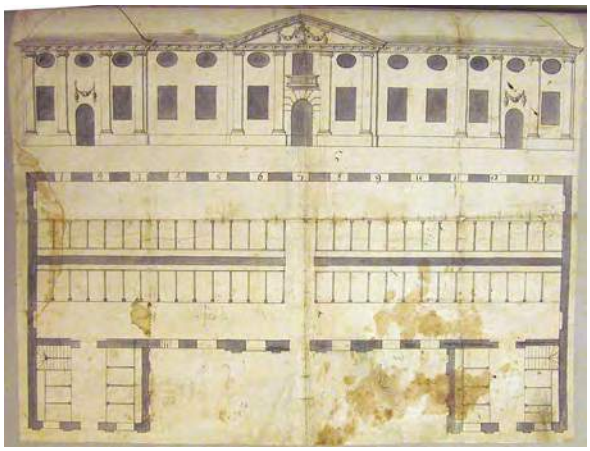


Figure IV-16. Hooke, 'Elevation and plan, in ink and ink-wash, of the Somerset House stables built for Queen Catherine of Braganza', 1669 or 1670. © The British Library Board, Add. MS 5238, no. 89.

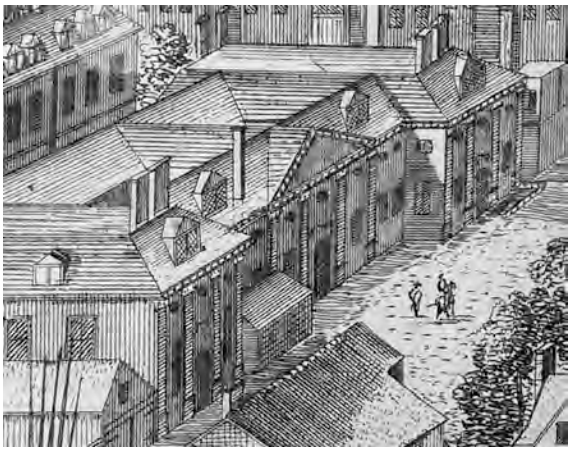


Figure IV-17. Detail of Figure IV-18, showing the facade of Hooke's stables at the Somerset House. Source: Johannes Kip and Leonard Knyff, *Britannia illustrata* (London, 1707), detail.

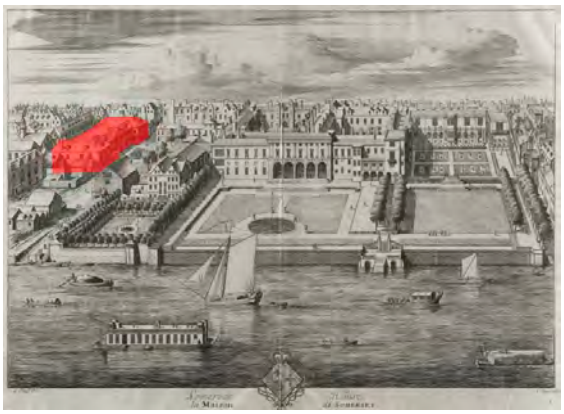


Figure IV-18. Kip and Knyff, 'Somerset House', *c.* 1705; Hooke's stables have been highlighted in red by the author. Source: Kip and Knyff, *Britannia illustrata* (London, 1707).

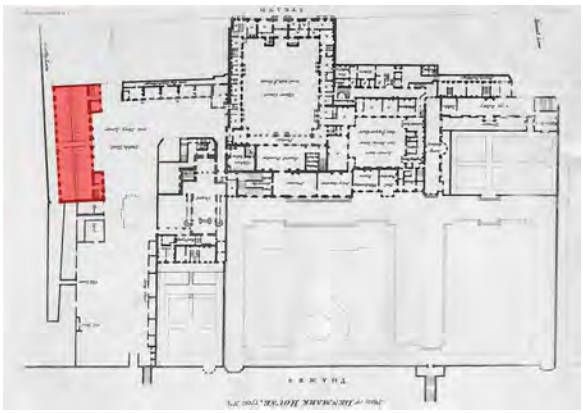


Figure IV-19. William Dickinson (draughtsman) and Barak Longmate (engraver), 'Plan of Somerset House from a 1706 survey by William Dickinson', 1806; Hooke's stables have been highlighted in red by the author. Source: Thurley et al., *Somerset House* (London, 2009), p. 112.

ii. 5. CITY CHURCHES, LONDON

See Chapter III for the relevant images.

ii. 6. MONUMENT

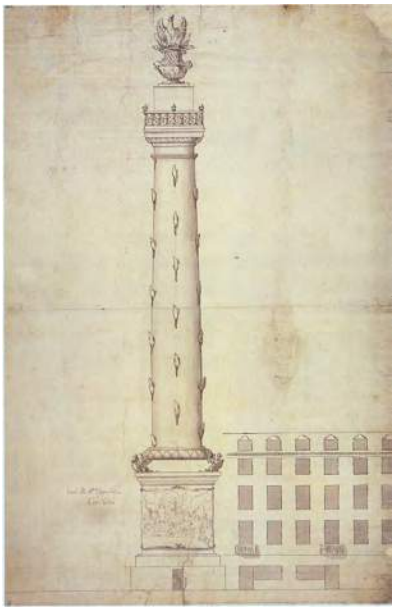


Figure IV-20. Hooke (attrib.), 'Elevation of the preliminary design of the Monument', 1671. Source: ASC, AS II.71; reproduced from Geraghty, *Architectural Drawings*, p. 259. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure IV-21. Hooke, 'Partial elevation of the base of the Monument', *c.* 1671. © The British Library Board, Add. MS 5238, no. 72.



Figure IV-22. Christopher Wren (attrib.), 'Partial elevation of the top portion of the Monument with a statue of Augusta', 1675. © The British Library Board, Add. MS 5238, no. 70.



Figure IV-23. Wren (attrib.), 'Partial elevation of the top portion of the Monument with an urn', 1675. © The British Library Board, Add. MS 5238, no. 71.



Figure IV-24. Wren, 'Design for the finial of the Monument', *c.* 1675; detail. © Trustees of the British Museum 1881,0611.205, AN290174001.



Figure IV-25. Edward Woodroofe (attrib.), 'Partial elevation of the top portion of the Monument', 1675; details. © The British Library Board, Add. MS 5238, no. 77.



Figure IV-26. a. [left] Woodroofe (attrib.), 'Elevation of the Monument with an alternative design of the top portion pasted', 1675.
b. [right] Hooke[?], 'Elevation of the Monument up to the finial', 1675.
© The British Library Board, Add. MS 5238, no. 78.



Figure IV-27. Hooke, 'Urn design for the Monument', 1675. © Royal Society, MS/131/54.



Figure IV-28. John Bowles, 'Representation of the carved work on the west side of the pedestal of the Monument of London', *c.* 1676. © The Trustees of the British Museum, 1880,1113.3869.



Figure IV-29. William Lodge (draughtsman and etcher), William Faithorne (printer), 'View of the Monument and surrounding square, off Fish Street Hill, near London Bridge', 1677. Lodge's partial sketch is now BM 1866,1114.677. © The Trustees of the British Museum, 1880,1113.3866.



Figure IV-30. Hulsbergh (engraver), 'Elevation of the Great Column of London . . . According to the First Design of the Architect Sr. Chr: Wren Kt. representing a Pillar in Flames', *c.* 1723. Source: London Metropolitan Archives, Collage record no. 4895, catalogue no. q8037215.



Figure IV-31. Anon., 'Le monument érigé en memoire du grand incendie de Londres', 1707. © The Trustees of the British Museum, 1880,1113.3870.



Figure IV-32. Sutton Nicholls (engraver) and John Bowles (printer) 'The Monument', *c.* 1728. Printed in Stow's Survey and Bowles's London Described. © The Trustees of the British Museum, 1880,1113.3868.



Figure IV-33. Thomas Bowles, 'The Monument of London in remembrance of the dreadfull Fire in 1666', 1752. © The Trustees of the British Museum, 1880,1113.3872.



Figure IV-34. Edward Dayes (draughtsman), Audinet (engraver), 'View of the Monument', 1796. Source: Hunter, *The History of London, and Its Environs*, vol. 1 (London, 1811), facing p. 512.





Figure IV-35.
a. [left] Hawksmoor, 'Capriccio of Wren's Fire Monument', 1723.
Source: Hart, *Nicholas Hawksmoor: Rebuilding Ancient Wonders* (New Haven, CT, 2002), fig. 199 on p. 148.
b. [right] Hulsbergh (engraver), *c.* 1723.
Source: London Metropolitan Archives, catalogue no. q8037451, Collage record no. 21707.

ii. 7. FLEET CANAL, LONDON



Figure IV-36. Ralph Agas, 'Map of London *c.* 1561', detail. Printed in 1633, this map is thought to have been produced from three extant copperplates of a map dating to *c.* 1560s. The Fleet River has been marked in light red by the author. Source: British History Online, https://goo.gl/BAQ7ZH.



Figure IV-37. John Ogilby and William Morgan, 'A Large and Accurate Map of the City of London', 1677, detail. The Fleet River has been marked in light red by the author. © The British Library Board, Maps.Crace 2.61; https://goo.gl/Ym2hYn.

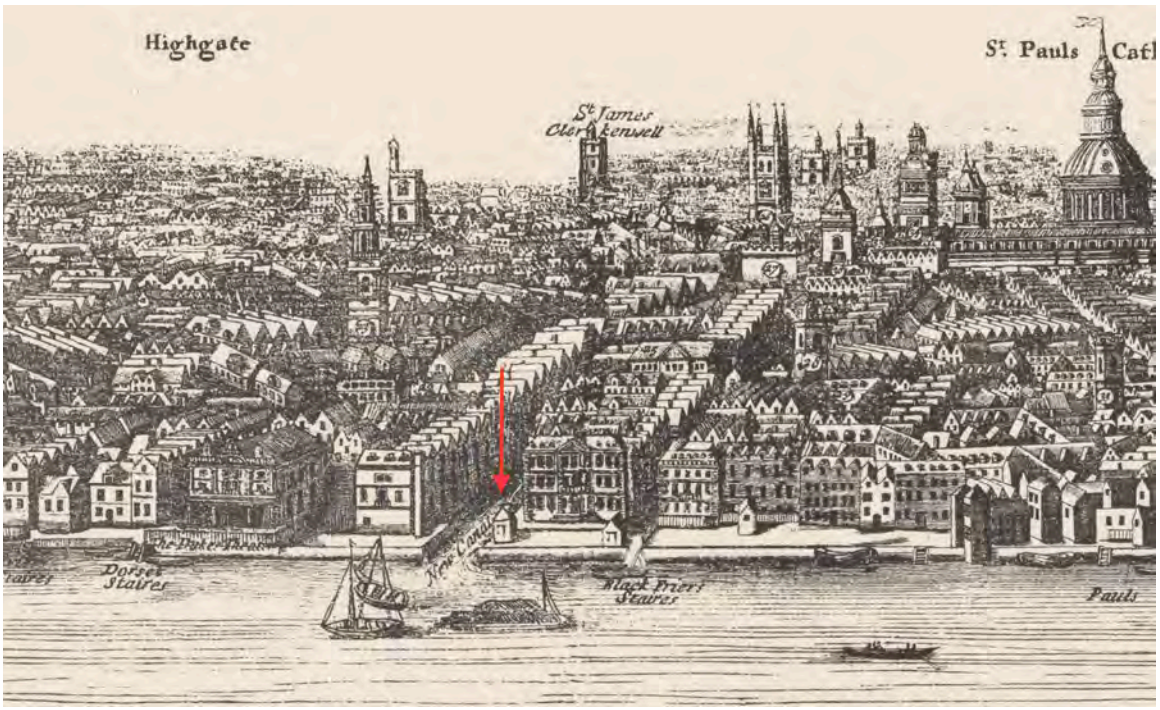


Figure IV-38. Robert Morden and Philip Lea, 'A prospect of London and Westminster taken at several stations to the southward thereof', 1682, detail. The arrow added by the author points to the newly-created Fleet Canal. Immediately to its right, just north of the 'Black Friers Staires' was Thomas Fitch's house; see Cooper, *Robert Hooke and the Rebuilding of London*, p. 173. Source: Library of Congress, Geography and Map Division, Washington, DC, call no. G5754.L7 1682 .M6 1904; https://goo.gl/aaxygo.

ii. 8. DORSET GARDEN [DUKE'S] THEATRE, LONDON



Figure IV-39. Walter Dolle (engraver), 'Dorset Garden Theatre facade', 1673; cropped. Source: Elkanah Settle, *The empress of Morocco* (London, 1673), frontispiece facing the title page.

ii. 9. THAMES EMBANKMENT, LONDON

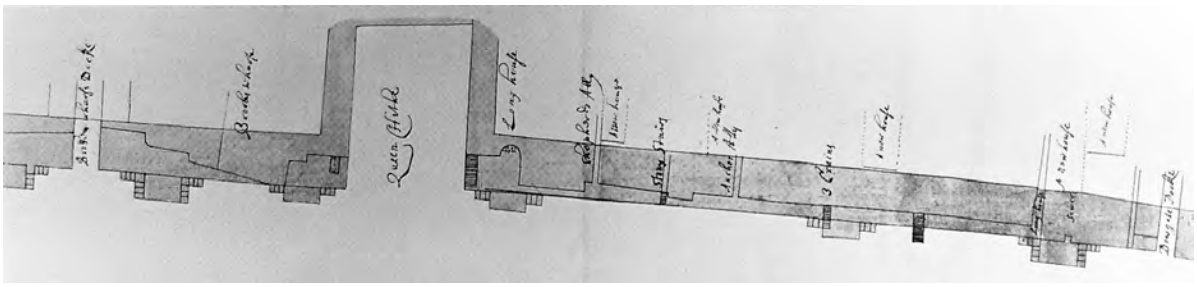


Figure IV-40. Hooke[?], 'Proposal for the new water line, attached to the 4 December 1671 letters patent', 1671, detail. Source: Reproduced from Sydney Perks, *The Water Line of the City of London After the Great Fire* (London, 1935), fig. 3.

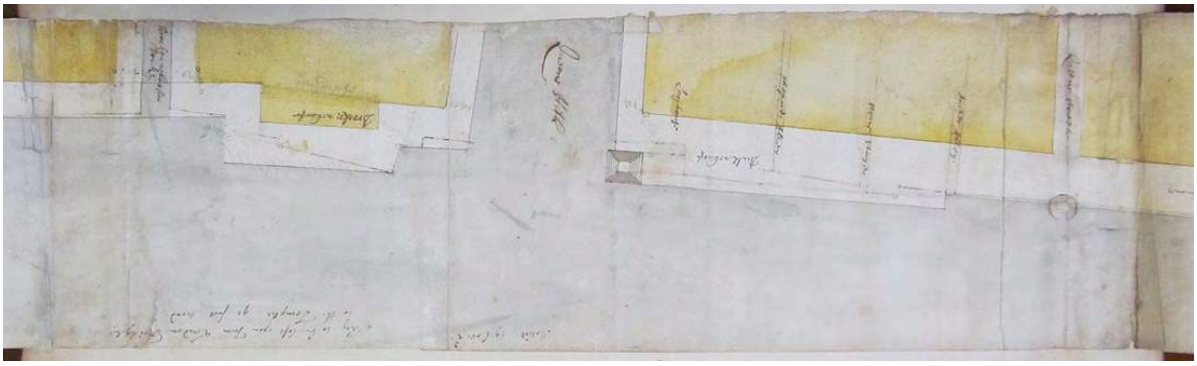


Figure IV-41. Hooke (attrib.), 'An Actual Survey Plann or Draught of a Key to be left open from London Bridge to the Temple', *c.* 1673; detail. Source: Society of Antiquaries, Drawings, vol. 2, p. 20.

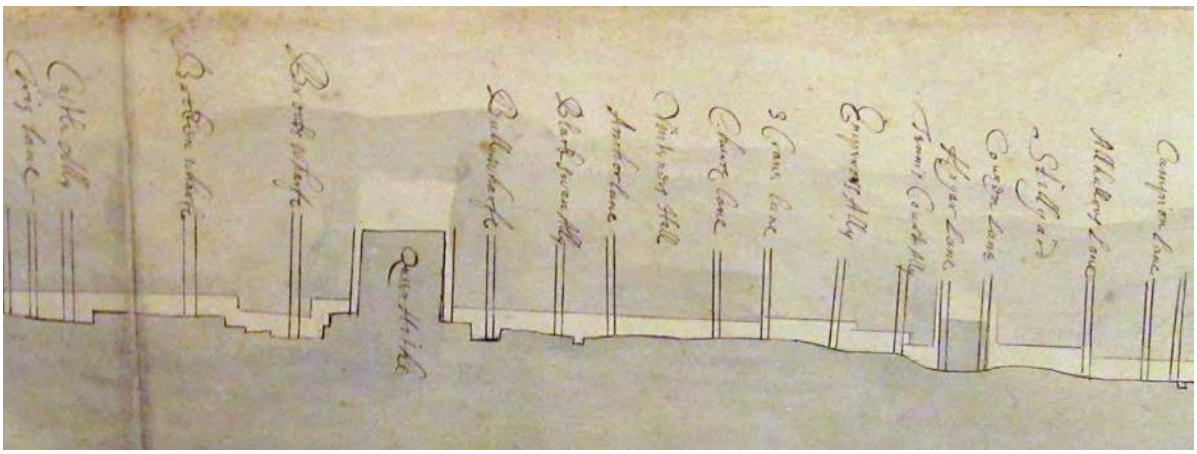


Figure IV-42. Hooke, 'Plan in ink and ink-wash of the north embankment of river Thames, from the Tower dock to Whitefryers Lane', *c.* 1672, detail. © The British Library Board, Add. MS 5238, no. 82, detail.

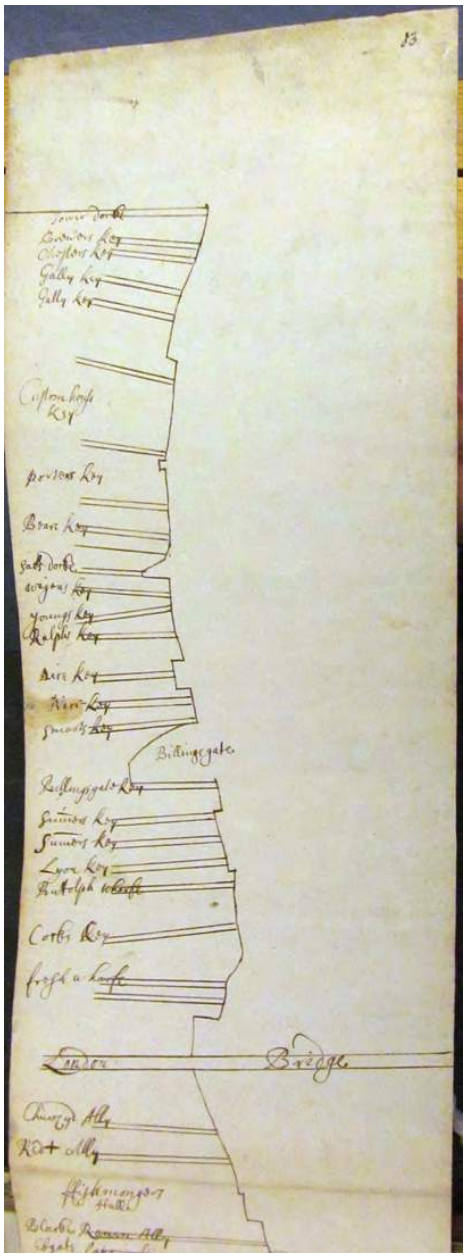


Figure IV-43. Hooke, 'Plan in ink of the north embankment of river Thames, from the Tower dock to Whitefryers Lane', *c.* 1672. © The British Library Board, Add. MS 5238, no. 83, detail.

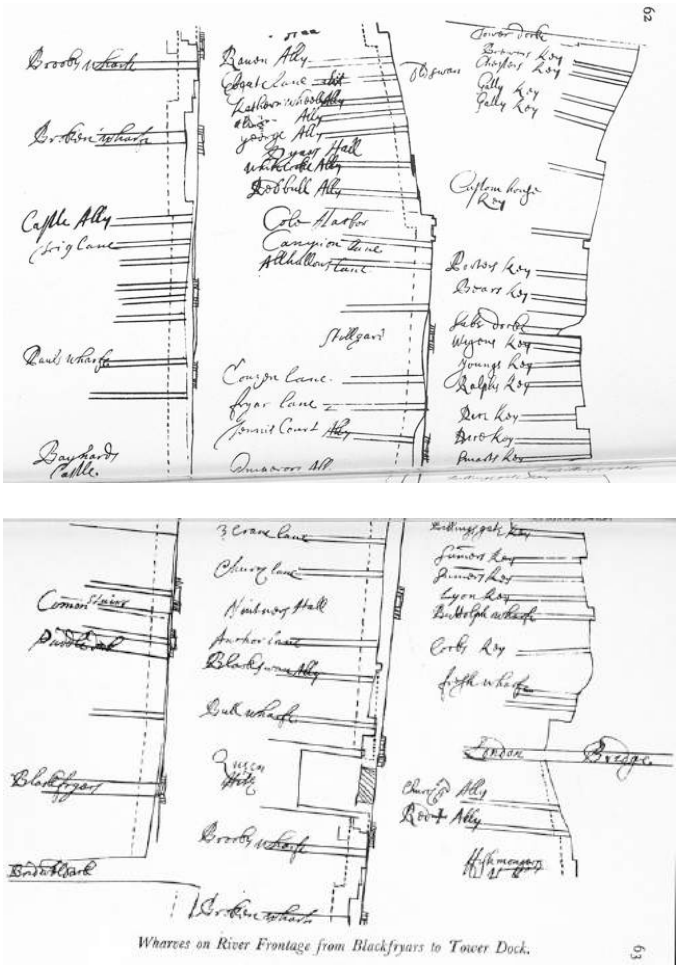


Figure IV-44. Hooke, 'Survey of wharves along the River Thames from Blackfryers to Tower Dock, with locations of public landing stairs', *c.* 1672.
Source: Reproduced from Gunther, *Early Science in Oxford* (Oxford: 1935), vol. 10, pp. 62-63.

ii. 10. ROYAL COLLEGE OF PHYSICIANS, LONDON

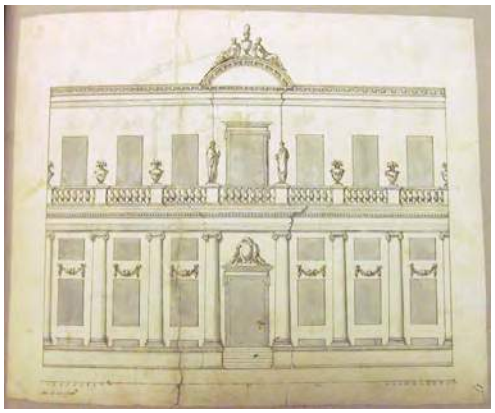


Figure IV-45. Hooke, 'Partial elevation of the main building of the Royal College of Physicians', *c.* 1671. © The British Library Board, Add. MS 5238, no. 57.

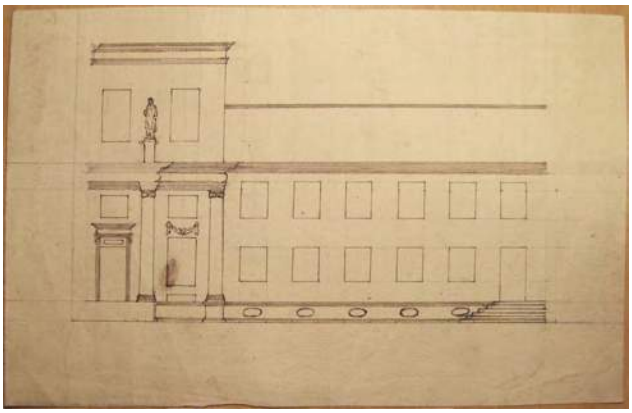


Figure IV-46. Hooke, 'Partial section/elevation of the main building of the Royal College of Physicians', *c.* 1671.
Source: Warwickshire C.R.O., CR2017/B1/4.

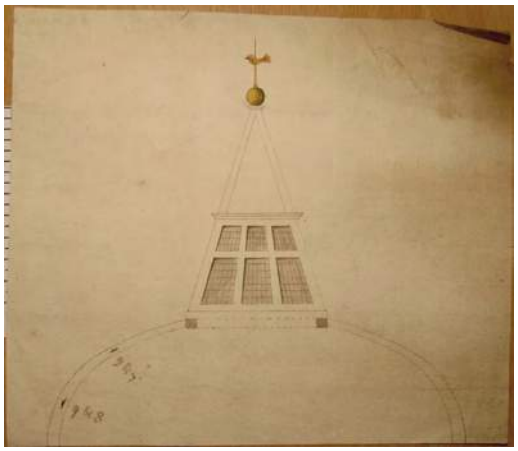


Figure IV-47. Hooke, 'Section through the anatomy theatre of the Royal College of Physicians', 1676. Source: Warwickshire C.R.O., CR2017/B1/5.

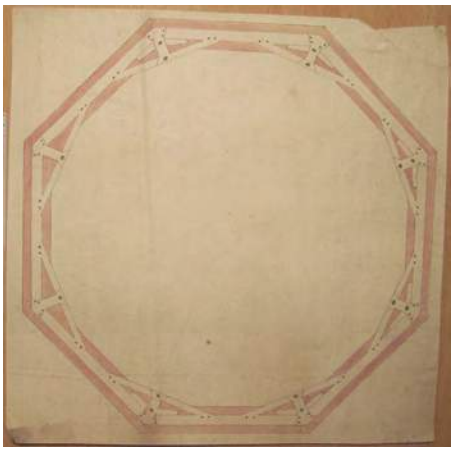


Figure IV-48. Hooke, 'Roof plan of the anatomy theatre of the Royal College of Physicians', 1676. Source: Warwickshire C.R.O., CR2017/B3.

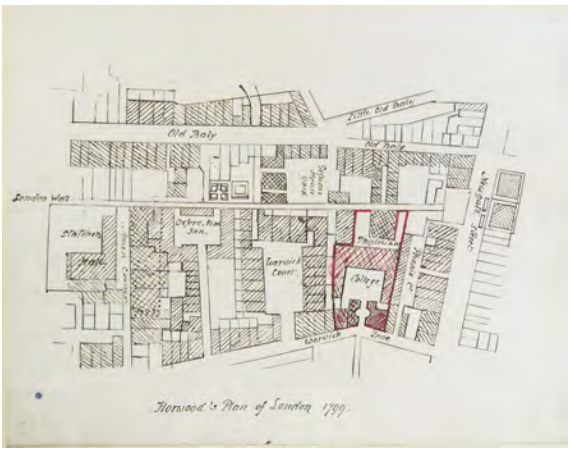


Figure IV-49. Anon., 'Location of the Royal College of Physicians marked on Horwood's 1799 plan of London', n.d. Source: Royal College of Physicians, MS 2245, fol. 40.

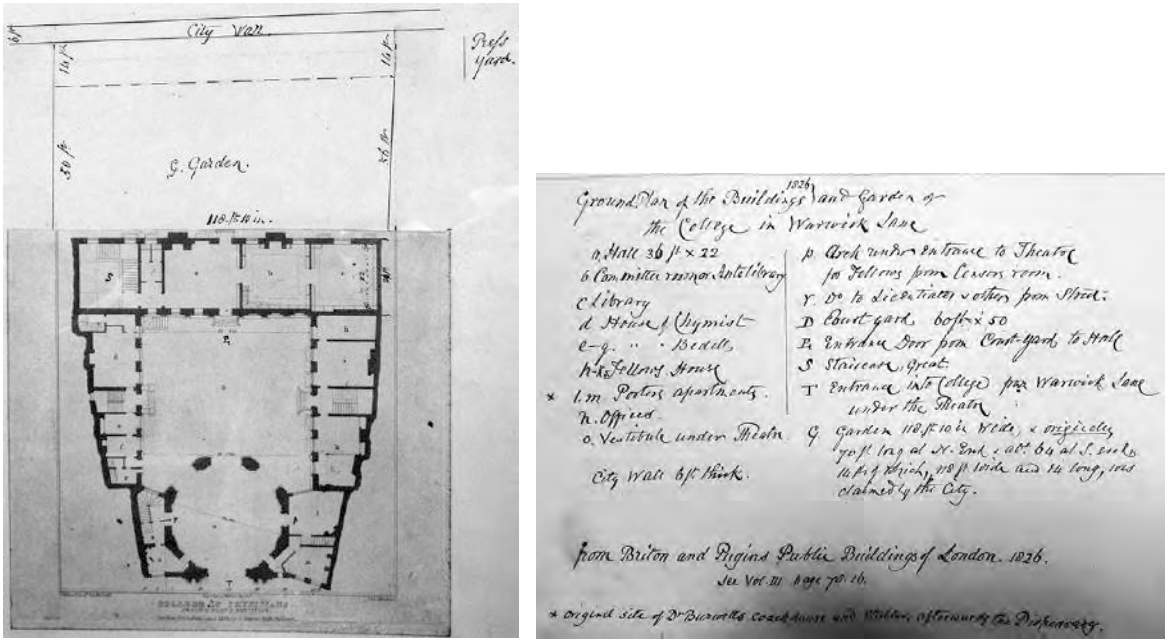


Figure IV-50. Anon., 'Groundplan of the buildings and garden of the College in Warwick Lane, with legend', n.d. Adapted from the plan printed in John Briton and Augustus Pugin, *Public Buildings of London* (London, 1826), vol. 2, pl. II. Source: Royal College of Physicians, MS 2245, no. 39a.

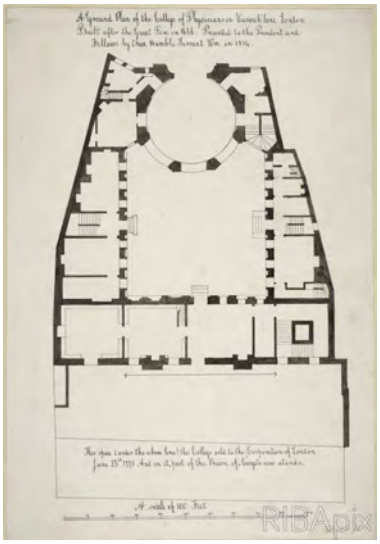


Figure IV-51. Anon., 'Plan of the Royal College of Physicians', 1814. Source: RIBA Collections, SD12/6.

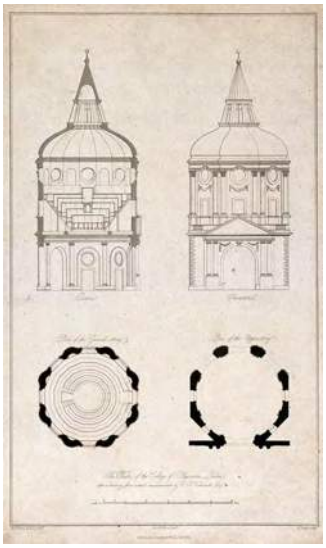


Figure IV-52. C. R. Cockerell, 'Section, elevation, and plans of the anatomy theatre', 1823. Printed in James Elmes, *Memoirs of the Life and Works of Christopher Wren* (London, 1823). Source: Wellcome Library, V0013114.

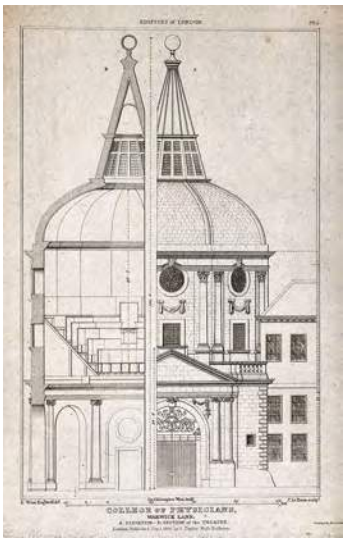


Figure IV-53. Samuel Ware and John Le Keux, 'The section and elevation of the anatomy theatre', 1825. Source: Wellcome Library, V0013113.

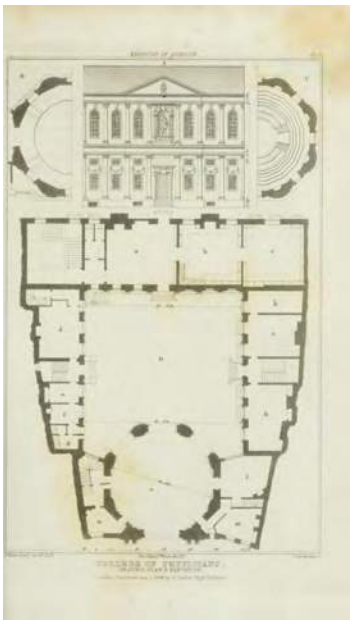


Figure IV-54. John le Keux (engraver), 'Plans and elevation of the College of Physicians', 1826.
Source: John Briton and Augustus Pugin, *Public Buildings of London* (London, 1826), vol. 2, pl. II.



Figure IV-55. J. Whichelo (draughtsman), J. Storer (engraver), 'Royal College of Physicians, Warwick Lane', 1804. Source: Wellcome Library, V0013096.



Figure IV-56. John Greig, 'Royal College of Physicians, Warwick Lane, with map and compass rose', 1817.
Source: Wellcome Library, V0013094.



Figure IV-57. Thomas Hosmer Shepherd, 'Physicians' College, Warwick Lane', 1829–1831. © The Trustees of the British Museum, 1880,0911.721.



Figure IV-58. Shepherd, 'Physician College, Warwick Lane', 1841.
Source: George Clark, *History of the Royal College of Physicians* (New York, 1964), pl. IX, facing p. 331.



Figure IV-59. Shepherd, 'Old College, Warwick Lane', 1841.
Source: Tufts Digital Library, Edwin C. Bolles papers; https://goo.gl/2tyKZM.



Figure IV-60. C. T. James, 'Royal College of Physicians, Warwick Lane', 1868. Source: Wellcome Library, V0013098.



Figure IV-61. Anon., 'Royal College of Physicians, Warwick Lane', n.d. Source: Wellcome Library, V0013093.



Figure IV-62. Anon., 'Royal College of Physicians, Warwick Lane', n.d. Source: Wellcome Library, V0017206.



Figure IV-63. John June, 'The march of the medical militants to the siege of Warwick-Lane-Castle in the year 1767', 1768. Source: Wellcome Library, L0012917.



Figure IV-64. Anon., 'Cutlerian Theatre in Warwick Lane seen from Newgate Street', 1866. Source: Royal College of Physicians, MS 2245, fol. 30a.



Figure IV-65. Anon., 'The entrance viewed from the north, when used as a brassfoundry', 1866. Printed in *The Illustrated London News*, 5 May 1866, p. 441. Source: Wellcome Library, V0013099.



Figure IV-66. David Loggan, 'Royal College', n.d. Printed in *Pharmacopoeia Londinensis,* 1677. Source: Wellcome Library, M0012550.



Figure IV-67. Anon., 'Royal College of Physicians, Warwick Lane, London', 1707. Source: Wellcome Library, V0013109.

Note the variations in the depiction of the iron gates in these figures..



Figure IV-68. Samuel Garth, 'Royal College of Physicians, Warwick Lane', 1709. Source: Wellcome Library, V0013107.



Figure IV-69. Anon., 'Royal College of Physicians, Warwick Lane', 1709. Source: Wellcome Library, V0013111EL.



Figure IV-70. Anon., 'Royal College of Physicians, Warwick Lane', 1709. Source: Wellcome Library, V0013110.



Figure IV-71. Anon., 'Architectural model of the Cutlerian anatomy theatre', mid-19th century; on display in the lobby of the current college. (Photograph by the author.)



Figure IV-72. J. Buckler, 'The College of Physicians from the Court, looking East', 26 May 1828. Source: British Library, Add MS 36370, fol. 157, reproduced from Batten, pl. 37a.



Figure IV-73. Anon., 'Cutlerian Theatre as seen from the courtyard', 1866. Note that the lantern is boarded up by this time.
Source: Royal College of Physicians Archives, MS2245, 30b.



Figure IV-74. Anon., 'View of the anatomy theatre from the courtyard', n.d. Source: Wellcome Library, V0013108.



Figure IV-75. Samuel Wale (draughtsman), James Taylor (engraver), 'Royal College of Physicians: courtyard viewed through the pillars of the entrance', *c.* 1761; note that the cupola and dormer windows are excluded. Printed in *London and its environs* (London, 1761). Source: Wellcome Library, L0001103.

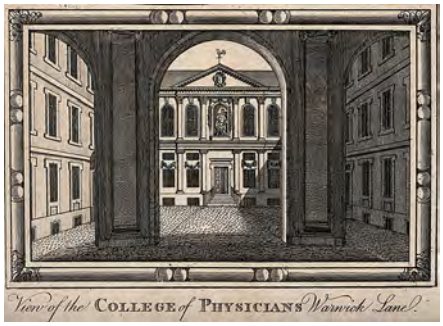


Figure IV-76. Anon., 'View of the College of Physicians from the gate', 1768; note that the cupola and dormer windows are excluded. Printed in Chamberlain, *History of London* (London, 1770). Source: Wellcome Library, V0013104.

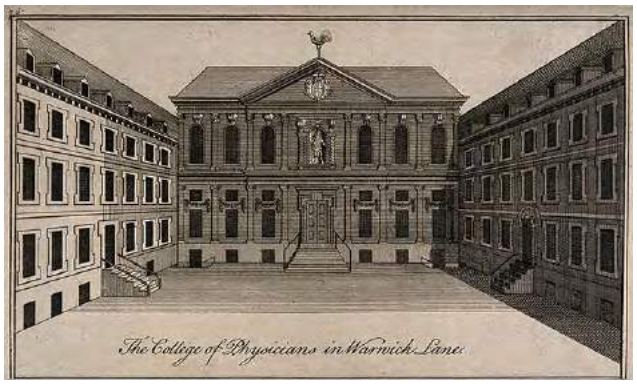


Figure IV-77. Anon., 'Royal College of Physicians, View of the courtyard', n.d.; note that the cupola and dormer windows are excluded. Source: Wellcome Library, V0013100.



Figure IV-78. J. Buckler, 'Principal front in the Court of the Physicians College', 29 May 1828. © The British Library Board, Add MS 36370, fol. 158, reproduced from Batten, pl. 36b.



Figure IV-79. Loggan, 'Royal College of Physicians: the courtyard, with lettering identifying the various doors', 1677; on the right are stairs to Dr. Whistler's house, and on the left, houses of the chemist and the beadle. Source: Wellcome Library, V0013117.



Figure IV-80. Anon., 'Tylors premises, formerly the College of Physicians, after the fire on 1 January 1879', 1879. Source: Royal College of Physicians, MS 2245, fol. 44.



Figure IV-81. Anon., 'Royal College of Physicians, view of the courtyard', n.d. Source: Wellcome Library, V0013101.



Figure IV-82. W. H. P., 'Royal College of Physicians, view of the courtyard', n.d. Source: Wellcome Library, V0013102.



Figure IV-83. Anon., 'Collg. Regale Medic. Londinen.', 5 Sep. 1722. Source: Bodl. Library, Gough Maps 20, no. 51B-c.



Figure IV-84. W. Stukeley, 'View of the courtyard of the College from the south side', 1725. Source: Royal College of Physicians, MS 2245, fol. 34.



Figure IV-85. James Mynde, 'Collegium regale, medicorum Londinensis', 1746. Printed in *Pharmacopoeia Collegii Regalis Medicorum Londinensis* (London, 1746).
Source: Wellcome Library, L0021817.



Figure IV-86. Anon., 'Courtyard of the College of Physicians', n.d.
Source: Wellcome Library, V0013106.



Figure IV-87. R. M. Massey, 'Gulgelmus [sic] Stukley, MD, hujus Collegii Socius & SRS', n.d.
Source: Bodl. Library, Gough Maps 20, 51B-a.



Figure IV-88. J. Harris, 'Collegium Royale Medicorum Londinensium', n.d.
Source: Bodl. Library, Gough Maps 20, no. 51B-b.



Figure IV-89. George Eleazar Blenkins, 'Demolition of the Royal College of Physicians, Warwick Lane', 1887. Source: Wellcome Library, V0013115.



Figure IV-90. William Hogarth, '*The reward of cruelty,* with a view of the interior of the Cutlerian Theatre', 1751. This illustration is more imaginative than accurate, as it is missing the oculus windows. Source: Royal College of Physicians Archives, MS 2245, fol. 24.



Figure IV-91. Augustus Pugin, Thomas Rowlandson, and John Bluck, 'Censors' room at the College of Physicians', 1808. Source: Wellcome Library, L0021819.



Figure IV-92. Anon., 'The Censors' Room in Pall Mall East with panelling from Warwick Lane', n.d. Source: George Clark, *History of the Royal College of Physicians* (New York, 1964), pl. XI.



Figure IV-93. Anon., 'The Censors' Room in Regent's Park', n.d. Source: Royal College of Physicians, postcard.

ii. 11. BRIDEWELL HOSPITAL, LONDON

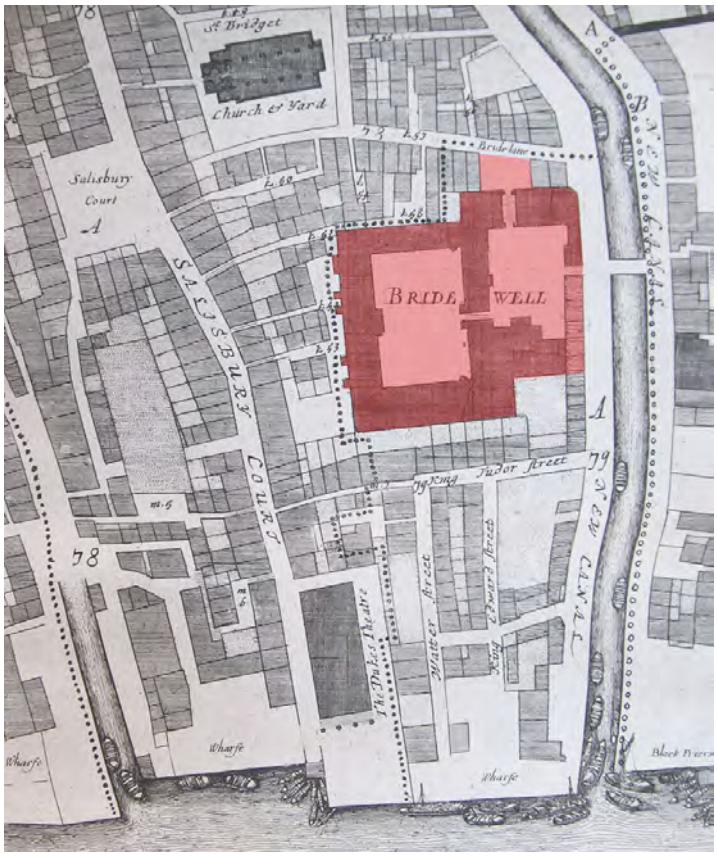


Figure IV-94. John Ogilby and William Morgan, 'Large and accurate map of the City of London', 1677, detail with Bridewell Hospital site highlighted in red by the author. To the east of the building is the Fleet canal. To the left is the so-called north quadrangle or 'green yard', and to the right is the chapel court. © The British Library Board, Maps.Crace II, no. 61.



Figure IV-95. 'North gate of Bridewell, built in 1676'. Source: O'Donoghue, *Bridewell Hospital* (London, 1929), vol. 2, facing p. 154.

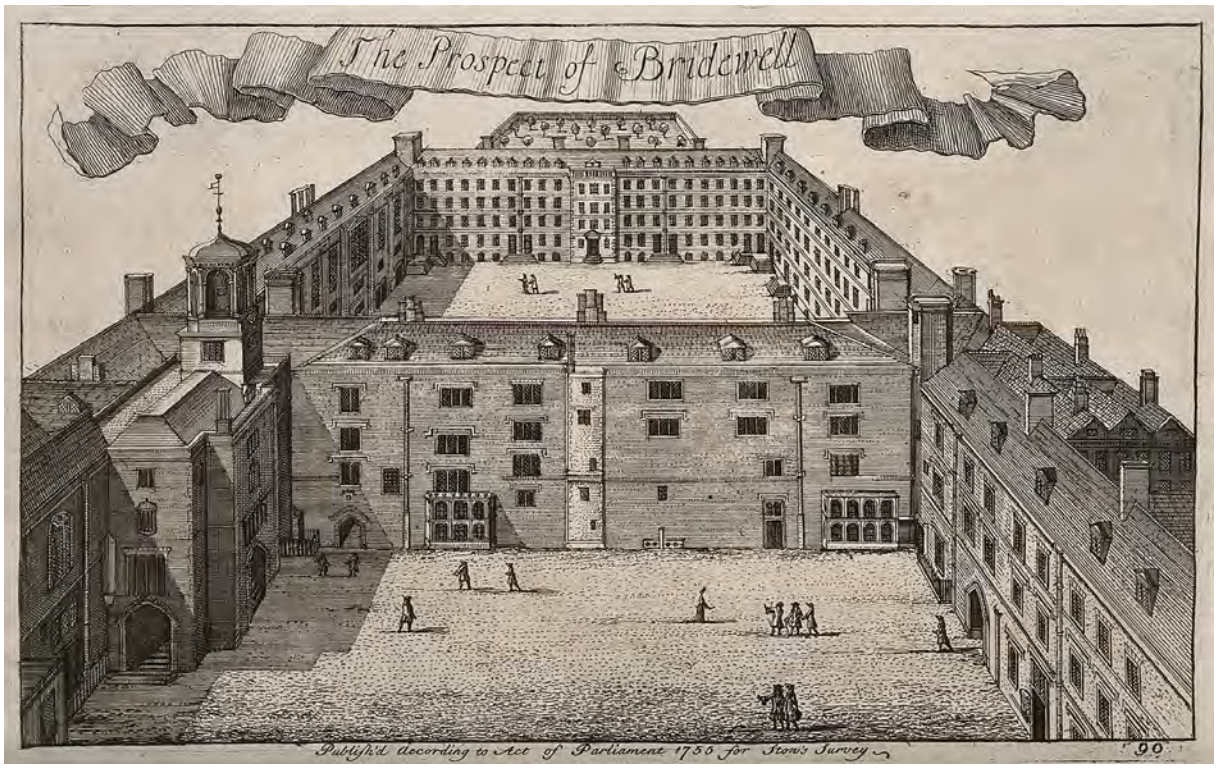


Figure IV-96. 'Bridewell Hospital: an aerial view', 1755. The view is looking west, so the chapel court is in the foreground, and the so-called 'northern quadrangle' is the middle. It is unclear what the garden in the rear may be. Source: Wellcome Library, London, V0012962.



Figure IV-97. Bartholomew Howlett (engraver), Robert Wilkinson (publisher), 'N. W. view of the chapel and part of the great stair-case leading to the hall of Bridewell Hospital, London', 1813. Source: Wellcome Library, London, L0009773.



Figure IV-98. Thomas Hosmer Shepherd (draughtsman), Thomas Dale (engraver), 'View of part of the quadrangle of Bridewell Hospital', 1822. Source: Wellcome Library, London, V0012965.

ii. 12. WILLIAM HOOKER'S GAZEBO, GREENWICH



Figure IV-99. Southeast view of the Grange, 1960. Source: English Heritage; reproduced from Richard Garnier, 'The Grange and May's Buildings, Croom's Hill, Greenwich', *The Georgian Group Journal* 14 (2004), fig. 9.



Figure IV-100. The 'Serliana' doorcase suggested to have been installed by Taylor, *c.* 1940. Source: English Heritage; reproduced from Garnier, 'The Grange and May's Buildings, Croom's Hill, Greenwich', *The Georgian Group Journal* 14 (2004), fig. 16.



Figure IV-101. View of the gazebo from the garden, 2012. (Photograph by the author.)



Figure IV-102. View of the gazebo from the street, 2012. (Photograph by the author.)



Figure IV-103. View of the interior of the gazebo, 2012. (Photograph by the author.)

ii. 13. WREST PARK, BEDFORDSHIRE

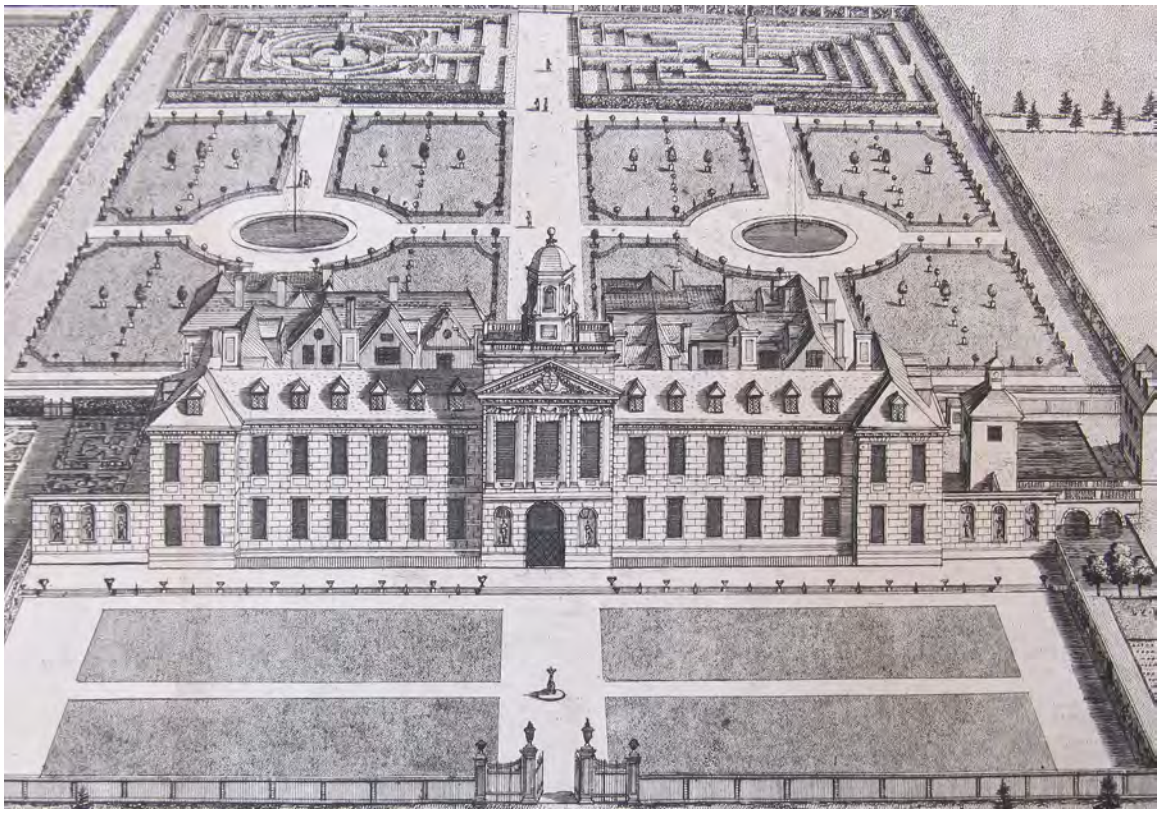


Figure IV-104. Kip and Knyff, 'Wrest House in Bedfordshire y^e^ Seat of y^e^ Rt. Hon^ble^ Henry Earle of Kent', *c.* 1705, detail. Source: Bodl., Gough Maps 1, no. 16, detail.

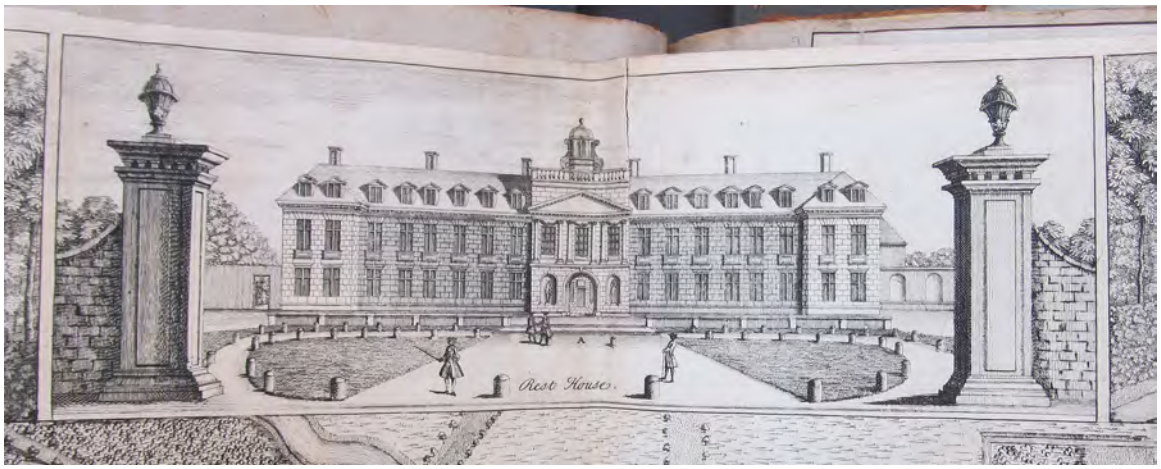


Figure IV-105. Jean Rocque, 'A plan & view of the buildings & garden at Rest [sic]', 1737, detail. Source: Bodl., Gough Maps 1, no. 16v, detail.

ii. 14. HOUSE FOR WILLIAM HOOKER, FISH STREET HILL, LONDON

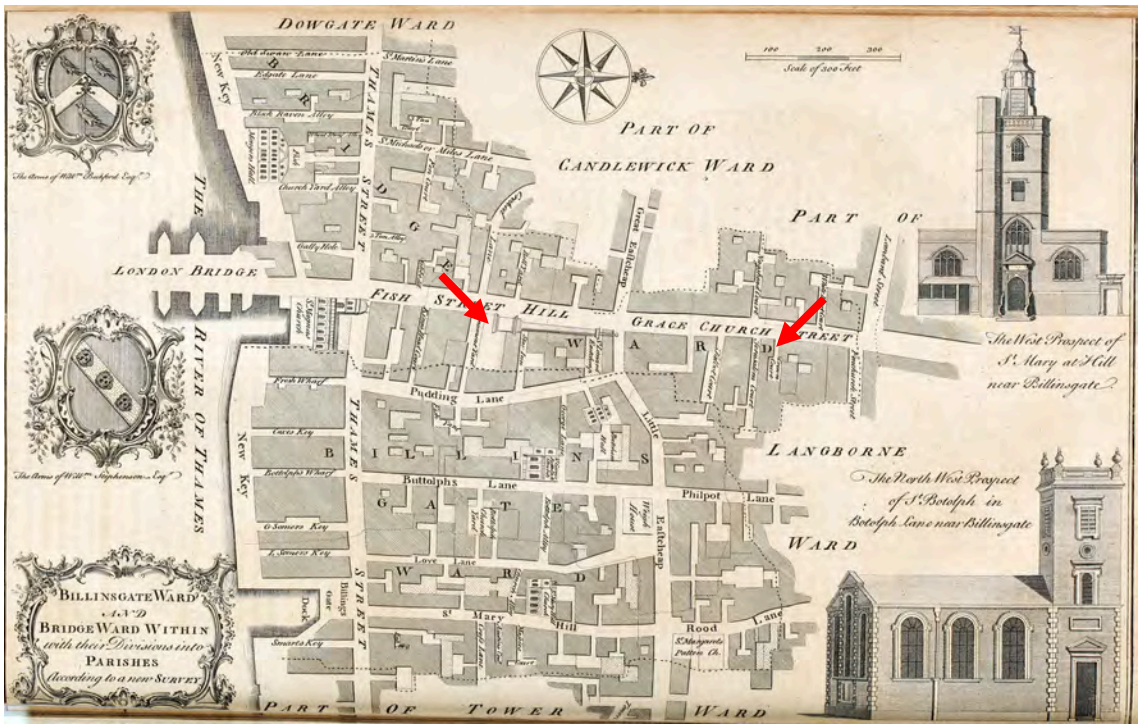


Figure IV-106. William Maitland, 'Map of Billingsgate Ward and Bridgeward Within, with their divisions into parishes according to a new survey', 1756. The arrow inserted by the author on the left points to the Monument to the Great Fire of London, and that on the right to Crown Court, the location of William Hooker's London residence.
Source: William Maitland, *The history and survey of London from its foundation to the present time: in two volumes* (London, 1756), vol. 2, between pp. 790 and 791.

ii. 15. WILLIAM TURNER'S HOSPITAL, KIRKLEATHAM, YORKSHIRE

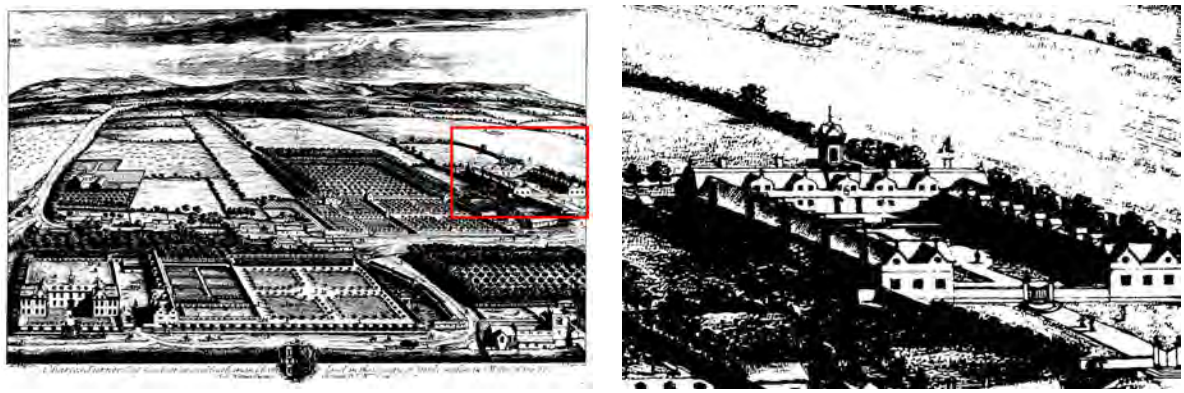


Figure IV-107. Kip and Knyff, 'Charles Turner's seat at Kirkleatham, Cleveland', *c.* 1720; and detail. Turner's Hospital is marked with a red box by the author. On the lower left is Kirkleatham Hall, built *c.* 1669 by an unknown architect. Source: Kip and Knyff, *Britannia illustrata* (London, 1720).

ii. 16. BETHLEM HOSPITAL, LONDON

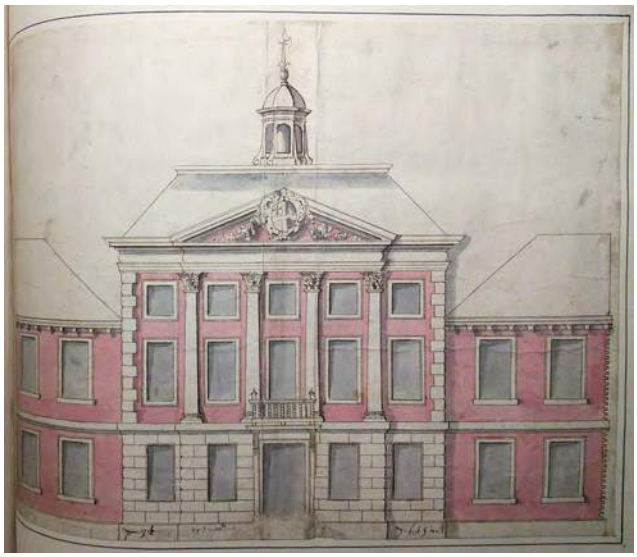


Figure IV-108. Hooke, 'Partial elevation of Bethlem Hospital', n.d.
Source: Bodl., Gough Maps 44, no. 119 on fol. 61.



Figure IV-109. Hooke, 'Presentation drawing for the Bethlem Hospital', *c.* 1674. © The British Library Board, Add. MS 5238, no. 55.

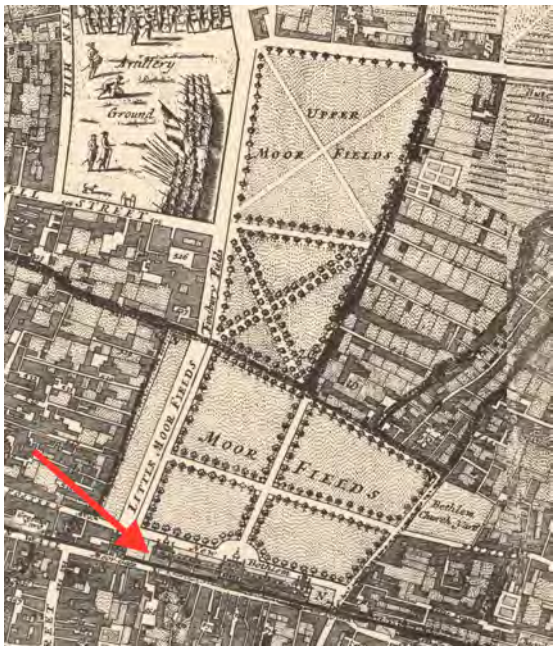


Figure IV-110. William Morgan and John Ogilby, 'London &c. actually survey'd', 1682, detail. The red arrow added by the author points to the location of Bethlem Hospital.
Source: U.S. Library of Congress, Map Collections, G5754.L7 1682 .M6 1904; https://goo.gl/g4CmHb.



Figure IV-111. John Dunstall, 'Watercolour of the north façade of Bethlehem Hospital', 1675–1693. The two sculptures by Caius Gabriel Cibber, 'Melancholy Madness' and 'Raving Madness', are in the foreground, adorning the main gate. © Trustees of the British Museum 1870,1008.2954.



Figure IV-112. Robert White (engraver), 'Hospitium Mente-Captorum Londinense', 1677.
Source: Wellcome Library, V0017202.



Figure IV-113. Robert Greene (printer), 'A Prospect of the Hospital called Bedlam for the releife and cure of persons distracted was begun in Aprill 1675 and finished in July 1676', *c.* 1678; detail. Source: Bodl. Gough Maps 20, no. 56.



Figure IV-114. James Nutting (engraver), 'A New Prospect of ye North-Side of ye City of London with New Bedlam & MooreFields, *c.* 1704; detail showing one of the grass yards where the patients could "air themselves" during the summer.
Source: London Metropolitan Archives, record number 27766.



Figure IV-115. Sely (engraver), Henry Overton (publisher), 'New Bedlam in More Fields', 1714. © The Trustees of the British Museum, 1880,1113.4090.

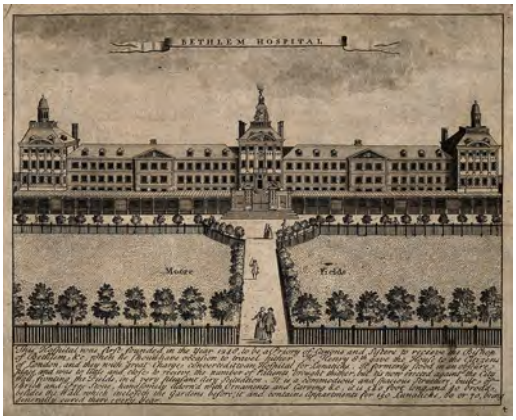


Figure IV-116. John Bowles (publisher), 'Bethlem Hospital', *c.* 1723. Printed in *British Views*. Source: Wellcome Library, V0013185.





Figure IV-117. J. Maurer (draughtsman), John Bowles (engraver), 'The hospital of Bethlehem / L'hospital de fou', 1747; detail. Source: Bodl. Gough Maps 20, no. 55B-c.



Figure IV-118. Henry Fletcher (engraver), 'The hospital of Bethlehem / L'Hospital de fou', *c.* 1750.
Source: Wellcome Library, V0013179.



Figure IV-119. William Henry Toms (engraver), 'Bethlehem hospital', *c.* 1750.
Source: Wellcome Library, V0013180.



Figure IV-120. Anon., 'View of the Hospital of Bethlem', *c.* 1755. © The Trustees of the British Museum, 1880,1113.4015.



Figure IV-121. Anon., 'View of Bethlem Hospital'. Printed in Chamberlain, *New and Compleat History and Survey of the Cities of London and Westminster*, 1770.
Source: Wellcome Library, V0013188.



Figure IV-122. Anon., 'Bethelehem Hospital, Moorfields, in 1720', n.d.
Source: Wellcome Library, V0013191.



Figure IV-123. Benjamin Cole (engraver), 'Bedlam in Moor fields', n.d.
Source: Wellcome Library, V0013183.



Figure IV-124. Thomas Bowles (engraver), 'Bethlem Hospital', n.d.
Source: Wellcome Library, V0013181.



Figure IV-125. J. Maurer (draughtsman), Thomas Bowles (engraver), and John Bowles (printer), 'The Hospital of Bethlehem, L'Hospital de Fou', n.d.
Source: Wellcome Library, V0013176.



Figure IV-126. Anon., 'Bethlem Hospital', n.d. Source: Wellcome Library, V0017220.



Figure IV-127. William Henry Prior, 'Old Bethlem Hospital, Moorfields, about 1750', 1880. Source: Wellcome Library, V0013201.



Figure IV-128. G. Arnald (draughtsman), R. Watkins (engraver), 'Bethlehem Hospital as it appeared in June 1811', 1811.
Source: Wellcome Library, V0013196.



Figure IV-129. John Thomas Smith, 'Bethlem Hospital seen from the south', n.d. Printed in Smith, *Ancient Topography of London,* 1814. Source: Wellcome Library, V0013199.



Figure IV-130. John Thomas Smith (draughtsman and etcher), 'South-west view of Bethlem Hospital and London wall', n.d. Printed in Smith, *Ancient Topography of London,* 1814. Source: Wellcome Library, V0013198.



Figure IV-131. William Hogarth, 'A Rake's Progress, Plate 8', 1735. © Trustees of the British Museum, 1868,0822.1536.



Figure IV-132. Anon., 'Ward in the Bethlem Hospital about 1745', 1882. Printed in Daniel Hack Tuke, *Chapter in the History of the Insane* (London, 1882), following p. 74. Source: Wellcome Library, M0017217.



Figure IV-133. William Sharp (engraver) and Thomas Stothard (draughtsman), 'Statues of 'raving' and 'melancholy' madness, each reclining on one half of a broken segmental pediment, formerly crowning the gates at Bethlem Hospital', 1783. Source: Wellcome Library, London, V0013192.



Figure IV-134. Andrew Birrell (engraver) and Stothard (draughtsman), 'Statues of 'raving' and 'melancholy' madness', 1813. Source: Wellcome Library, V0013197.



Figure IV-135. Samuel Wale (draughtsman), Charles Grignion (engraver), 'Figures on Bethlem Gate', n.d. Source: Wellcome Library, London, V0013194.

ii. 17. MERCERS' HALL AND CHAPEL

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ii. 18. MERCHANT TAYLORS' HALL AND SCHOOL

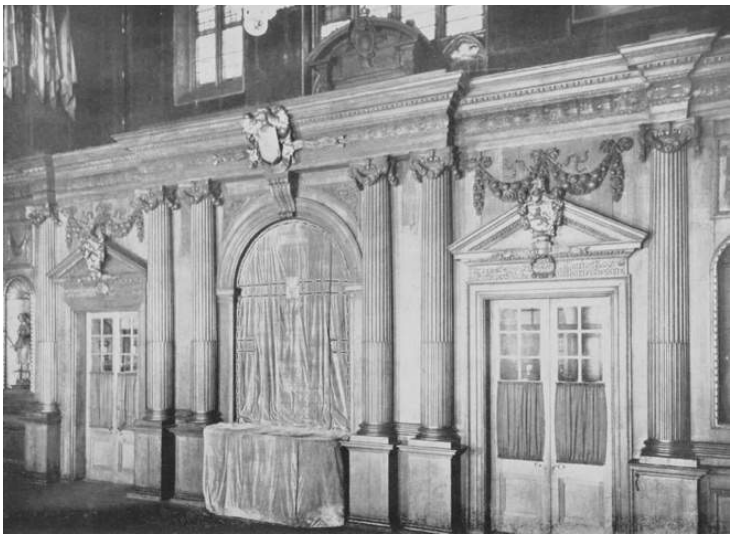


Figure IV-136. View of the screen in the Hall. Source: *An Inventory of the Historical Monuments in London* (London, 1929), vol. 4, pl. 86. Source: British History Online; https://goo.gl/f2zHqG.

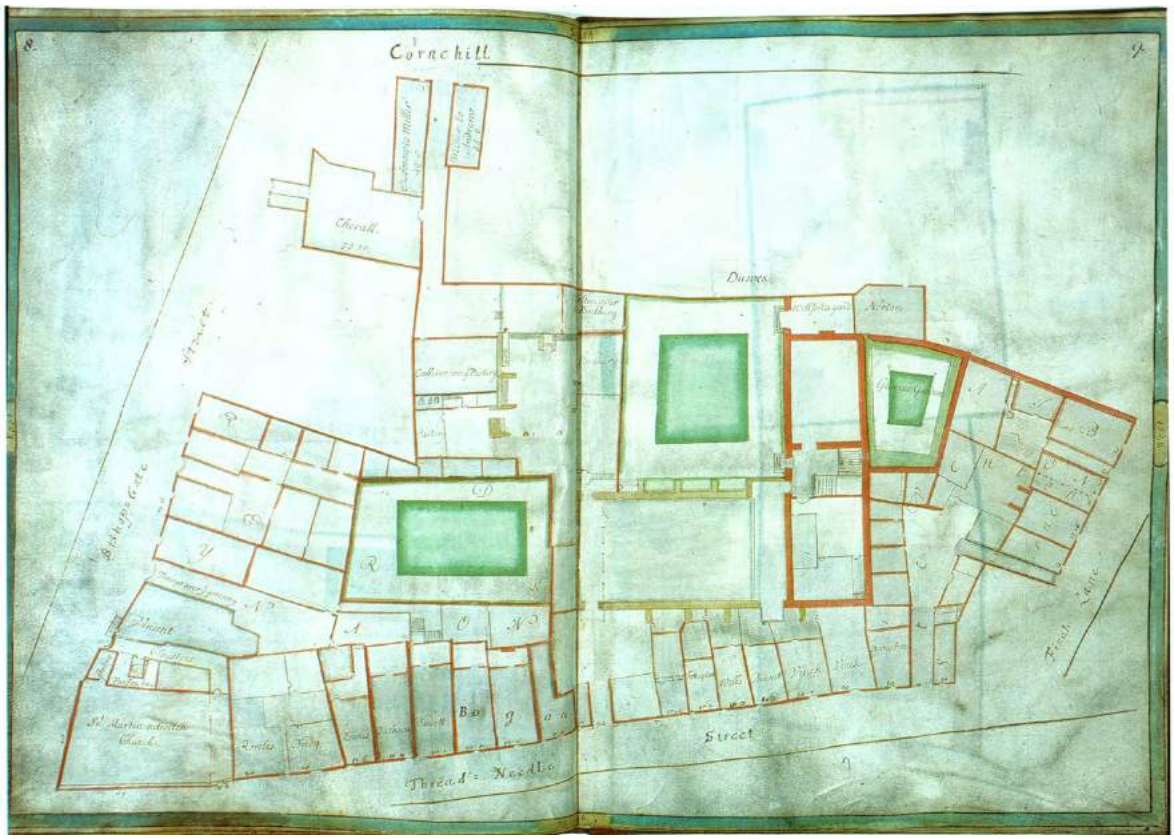


Figure IV-137. John Oliver [and William Leybourne?], 'Plan of the Hall and surroundings after the Great Fire', *c.* 1680. Source: Guildhall Library, MS 34216; reproduced from Matthew Davis and Ann Saunders, *The History of the Merchant Taylors' Company* (Leeds, 2004), pl. XVI.

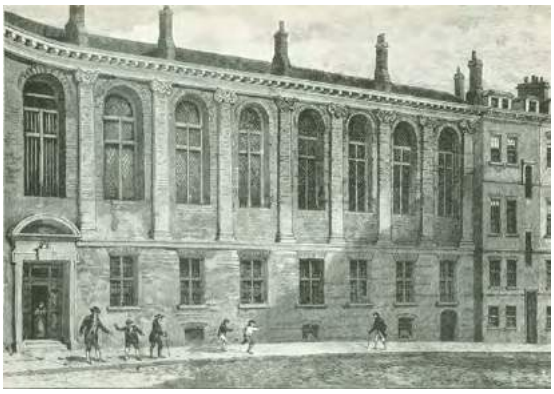


Figure IV-138. Engraving of the facade of the Hall, n.d. Source: Edward Wedlake Braylay, *The Beauties of England and Wales*, vol. 10, part 2 (London, 1814), facing p. 382.

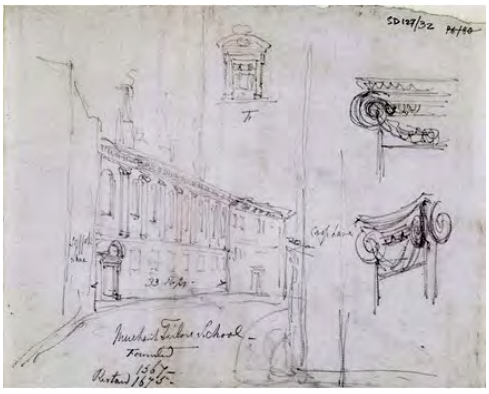


Figure IV-139. Sketch of the facade and details by Charles Robert Cockerell; the length along the street is measured as '33 steps', 1830. Source: RIBA Collections, SD127/32.



Figure IV-140. Elevation facing east by J. Mynde, 1756; the upper floor of the building on the left, marked B, is the headmaster's lodgings. Source: London Metropolitan Archives, City of London, Collage no. 5119.

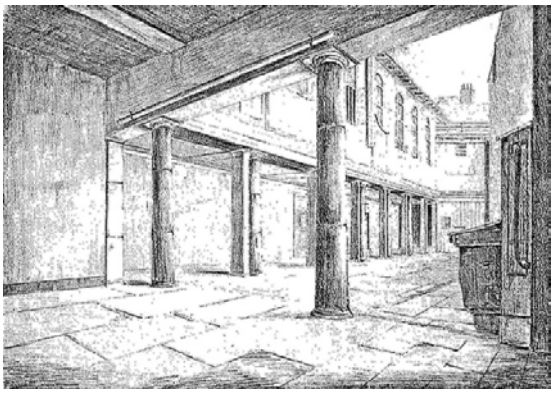


Figure IV-141. View of the cloisters, n.d. Source: Nixon, *The History of Merchant-Taylors' School* (London, 1832).



Figure IV-142. Lithograph of the courtyard by Maclure & Macdonald, n.d. Source: Charlie Matthew Clode, *Memorials of the Guild of Merchant Taylors* (London, 1873–1874), facing p. 410.



Figure IV-143. Hooke, 'Sketch of an unknown building', n.d. Source: Trinity College, Cambridge, MS O.11a.120(v).

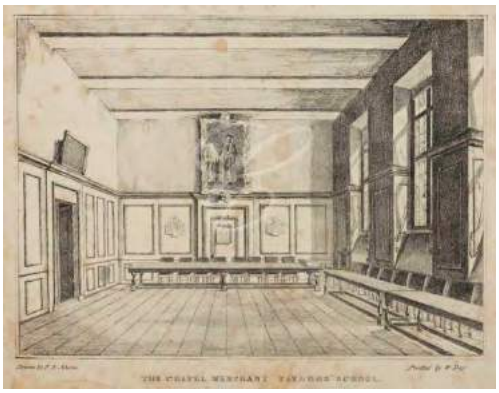


Figure IV-144. Francis Russell Nixon, interior view of the chapel (lithograph by W. Day), *c.* 1825. Printed in Nixon, *The History of Merchant-Taylors' School* (London, 1823). Source: London Metropolitan Archives, City of London, Collage no. 5118.

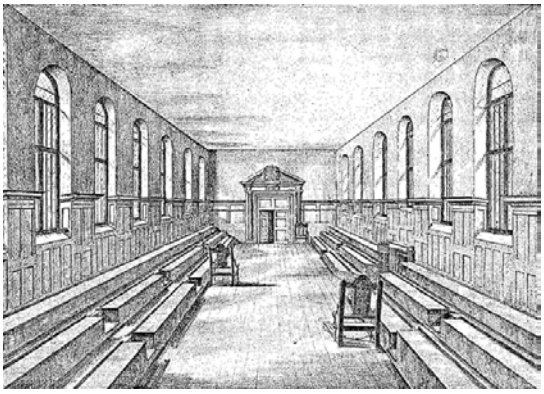


Figure IV-145. View of the interior of the school room, n.d. Source: Nixon, *The History of Merchant-Taylors' School* (London, 1832), pl. 1.

ii. 19. MONTAGU HOUSE, BLOOMSBURY, LONDON



Figure IV-146. Hooke, 'Presentation drawing of an unidentified building, possibly the Montagu House', 1686[?]. © The British Library Board, Add. MS 5238, no. 56.

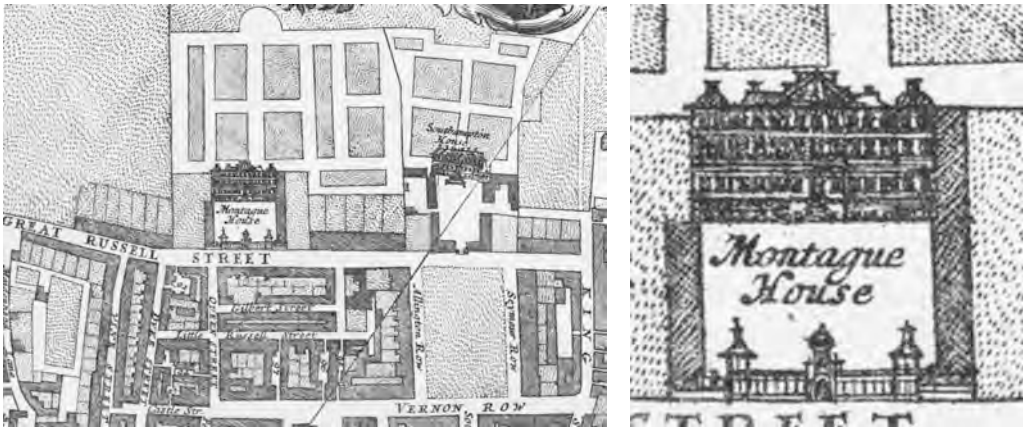


Figure IV-147. William Morgan and John Ogilby, 'London &c. actually survey'd', 1682, detail. Source: U.S. Library of Congress, Map Collections, G5754.L7 1682 .M6 1904; https://goo.gl/g4CmHb.



Figure IV-148. Robert Morden and Philip Lea, 'A prospect of London and Wesminster', 1682, detail. Source: U.S. Library of Congress, Map Collections, G5754.L7 1682 .M6 1904; https://goo.gl/g4CmHb.

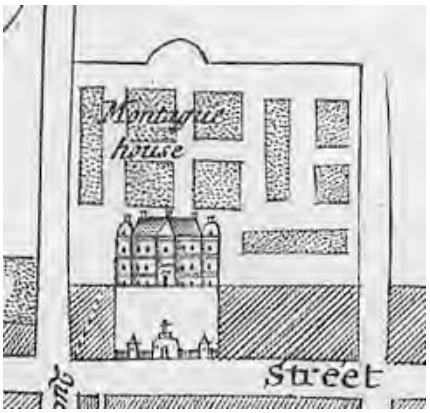


Figure IV-149. Henry Overton, 'A new and exact plan of the city of London and suburbs thereof', 1720, detail. © The British Library Board, Maps.Crace II, no. 83.

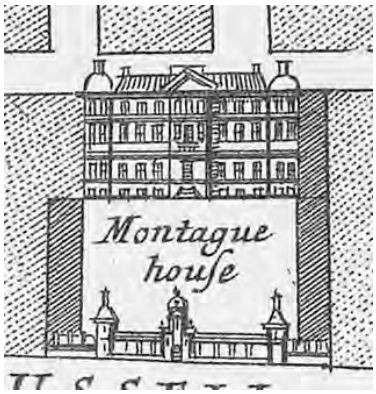


Figure IV-150. Richard Blome, 'A mapp of the parish of St Giles's in the Fields', 1720, detail showing Montagu House. Printed in John Strype, *Stow's Survey* (1720). © The British Library Board, Maps Crace Port. 15.1.(1.).

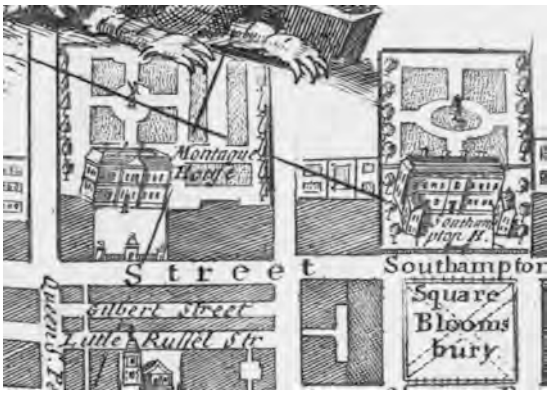


Figure IV-151. John Bowles, 'London surveyed or a new map of the cities of London and Westminster and the borough of Southwark', 1742, detail.
Source: Harvard University Library, Map Collection; https://goo.gl/4NWEXo.

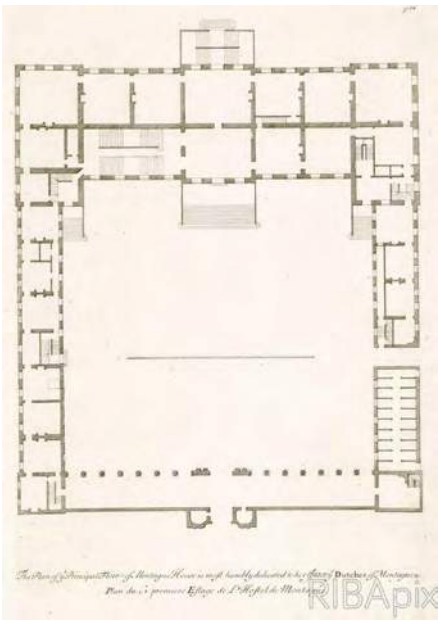


Figure IV-152. Colen Campbell, 'Plan of *th*e principal floor of Montague House', 1710. Printed in *Vitruvius Britannicus* (London, 1715), vol. 1, pl. 34. Source: RIBA, SC176VOL I pg.34.

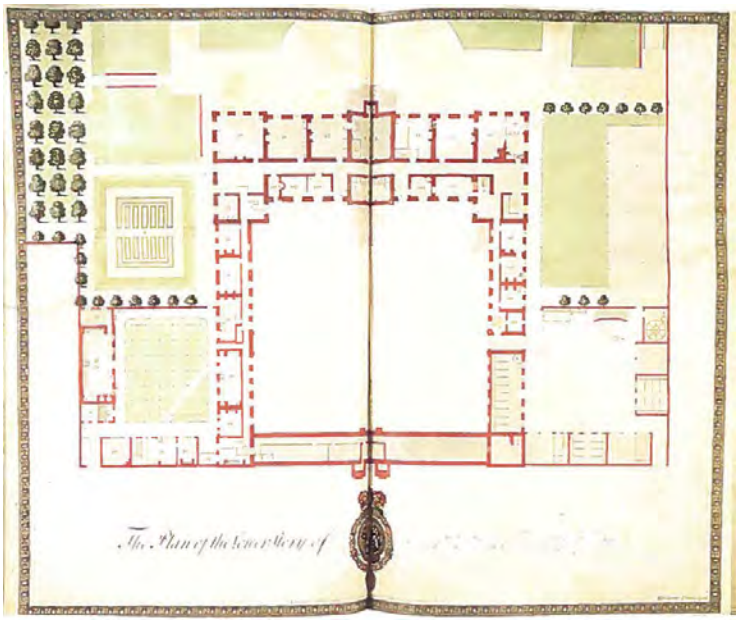


Figure IV-153. Henry Flitcroft, 'Plan of the lower story of Montagu House', 1725. Source: Caygill and Date, *Building the British Museum* (London, 1999), pl. 2.



Figure IV-154. Campbell, 'Elevation facing the courtyard of Montagu House', 1710. Printed in *Vitruvius Britannicus* (London, 1715), vol. 1, pl. 36. Source: RIBA, SC176VOL I pg.36.



Figure IV-155. Sutton Nicholls, 'The courtyard of Montagu House', 1725. Source: RIBA, SD64/8.

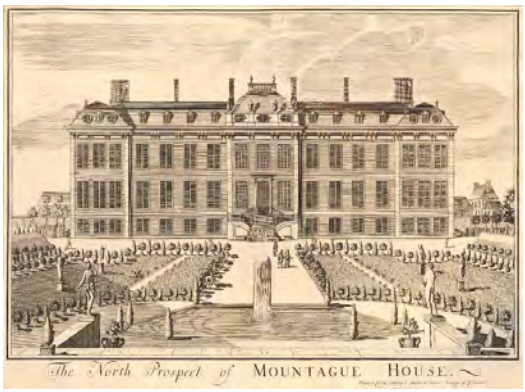


Figure IV-156. James Simon (engraver), 'The north prospect of Montague House', *c.* 1715. © The Trustees of the British Museum, 1880,1113.4412.



Figure IV-157. Paul Sandby, 'View from the north-east of the north facade of Montagu House', 1780, detail. Source: Royal Collection Trust, RCIN 451585. © Her Majesty Queen Elizabeth II.

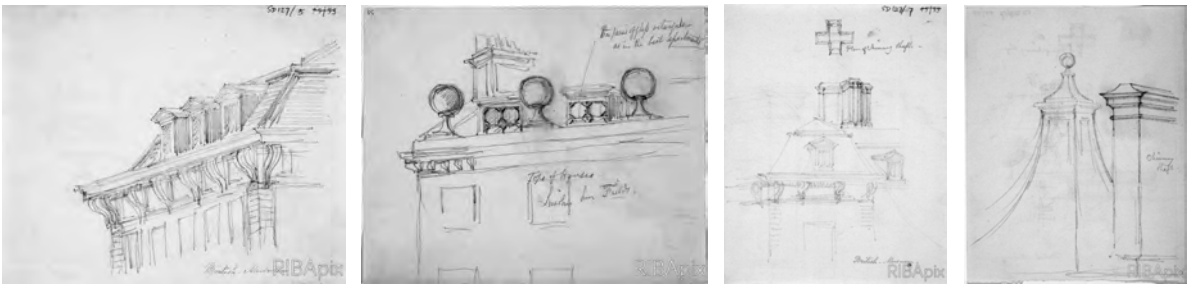


Figure IV-158. Charles Robert Cockerell, 'Sketches of Montagu house', 1830. Source: RIBA, SD127/5r, 5v, 7r, and 7v.



Figure IV-159. Campbell, 'Prospect of Montague House to the street', 1710. Printed in *Vitruvius Britannicus* (London, 1715), vol. 1, pl. 35. Source: RIBA, SC176VOL I pg.35.



Figure IV-160. Michael Angelo Rooker, 'Gateway of Montagu House; view looking east long Great Russell Street', 1778. © The Trustees of the British Museum, 1868,0328.334.



Figure IV-161. Shepherd, 'View of the front of the building from Great Russell Street', 1813. © The Trustees of the British Museum, 1880,1113.4419.



Figure IV-162. J. Findlay, 'View of the entrance gate and part of the screen wall to Montagu House, during its demolition', 1850. © The Trustees of the British Museum, 1880,1113.4425.



Figure IV-163. John Wykeham Archer, 'The courtyard of Montagu House looking towards the entrance', 1842. © The Trustees of the British Museum, 1914,0206.24.



Figure IV-164. Archer, 'The courtyard of Montagu House with views of keepers' residences', 1842. © The Trustees of the British Museum, 1914,0206.23.



Figure IV-165. George Scharf, 'Entrance to the old British Museum, Montagu House', 1845. © The Trustees of the British Museum, 1862,0614.628.



Figure IV-166. Archer, 'Entrance Hall and staircase of Montagu House, the old British Museum', 1842. © The Trustees of the British Museum, 1874,0314.443.





Figure IV-167. Augustus Charles Pugin, Thomas Rowlandson (engravers), and John Bluck (aquatint by), 'The hall and staircase, British Museum', 1808; detail showing the two figures on the pediment. © The Trustees of the British Museum, I,8.126.



Figure IV-168. Scharf, 'Staircase of the Old British Museum, Montagu House', 1845. Note the stuffed giraffes and rhinoceros displayed at the top of the stairs. © The Trustees of the British Museum, 1862,0614.629.

ii. 20. NAVY OFFICE, SEETHING LANE, LONDON

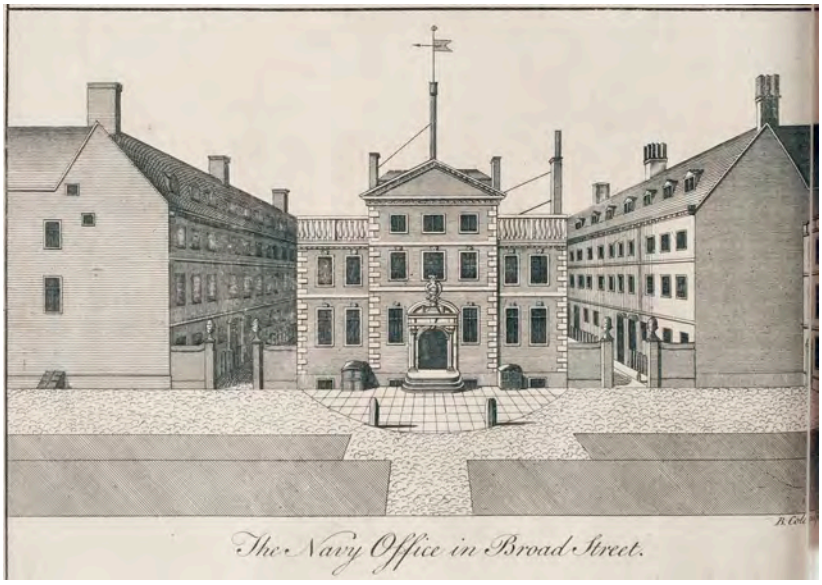


Figure IV-169. Benjamin Cole, 'The Navy Office in Broad Street', *c.* 1750. Source: Maitland, *The history and survey of London from its foundation to the present time: in two volumes* (London, 1756).



Figure IV-170. Anon., 'Part of the Tower Ward, showing the position of the Navy Office', n.d. Source: Henry B. Wheatley, ed., *The Diary of Samuel Pepys* (London, 1893), vol. 1, facing p. 224.

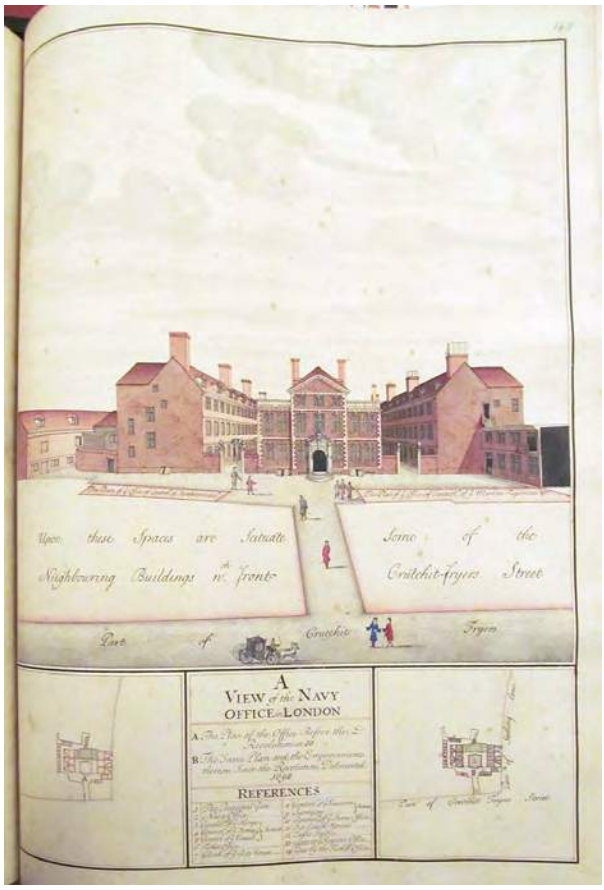


Figure IV-171. Dummer, 'A View of the Navy Office in London', 1698.
© The British Library Board, King's MS 43, p. 147.

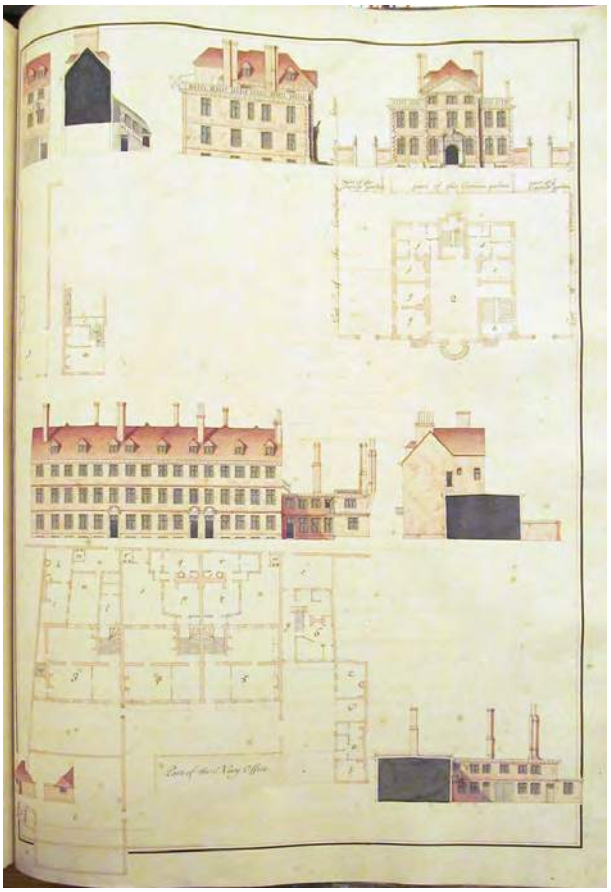


Figure IV-172. Dummer, 'Elevations, sections, and plans of the Navy Office in London', 1698.
© The British Library Board, King's MS 43, p. 149.

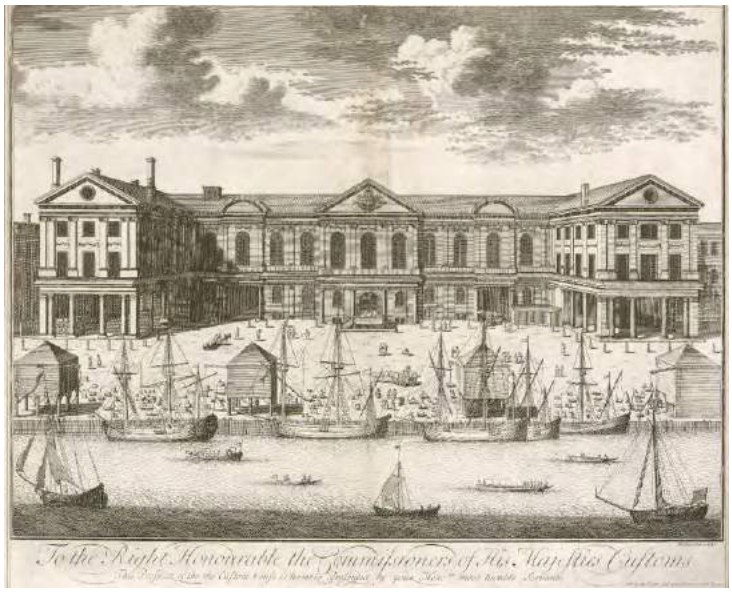


Figure IV-173. John Harris (printer), 'View of the Custom House from the river as it appeared in 1714'.
© Trustees of the British Museum, 1880,1113.1621.

ii. 21. CHRIST'S HOSPITAL, LONDON

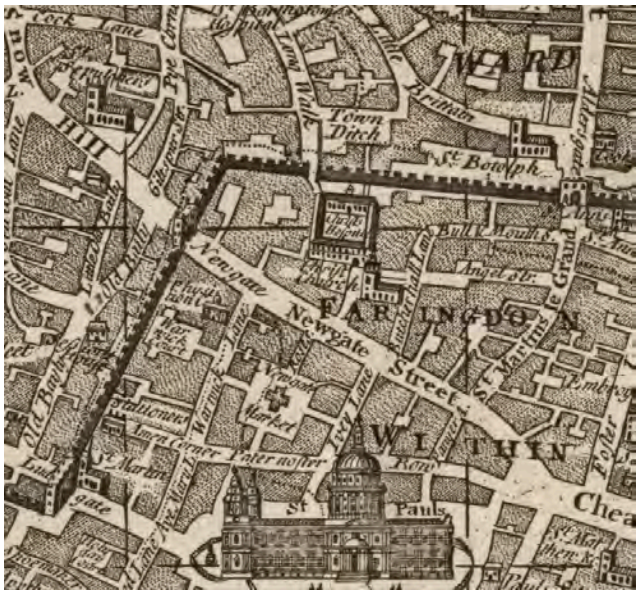


Figure IV-174. John Bowles (printer), 'London surveyed or a new map of the cities of London and Westminster and the borough of Southwark', 1742, detail. Source: Harvard University Library, Image Delivery Service, https://goo.gl/ezwsem.

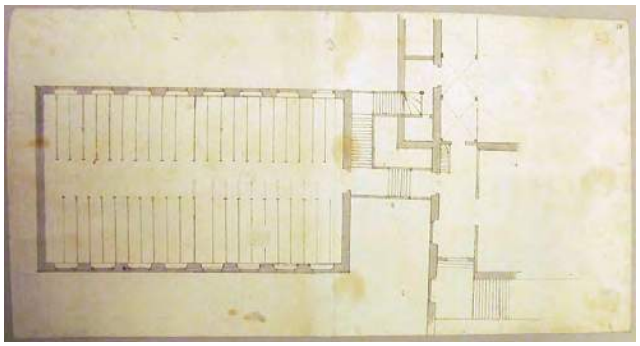


Figure IV-175. Hooke, 'Plan of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. © The British Library Board, Add. MS 5238, no. 50.

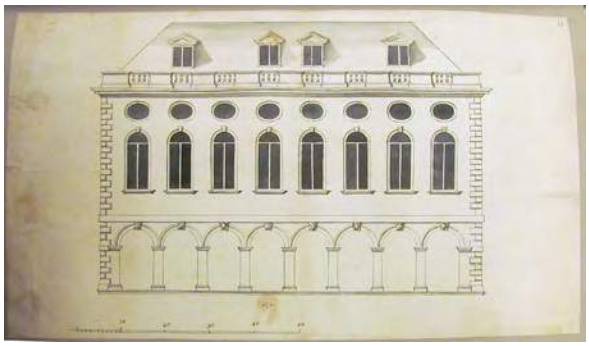


Figure IV-176. Hooke, 'Elevation of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. © The British Library Board, Add. MS 5238, no. 51.



Figure IV-177. W. Wallis (engraver), 'Christ's Hospital, Writing School', 1831. Source: Wellcome Library, London, V0013058.

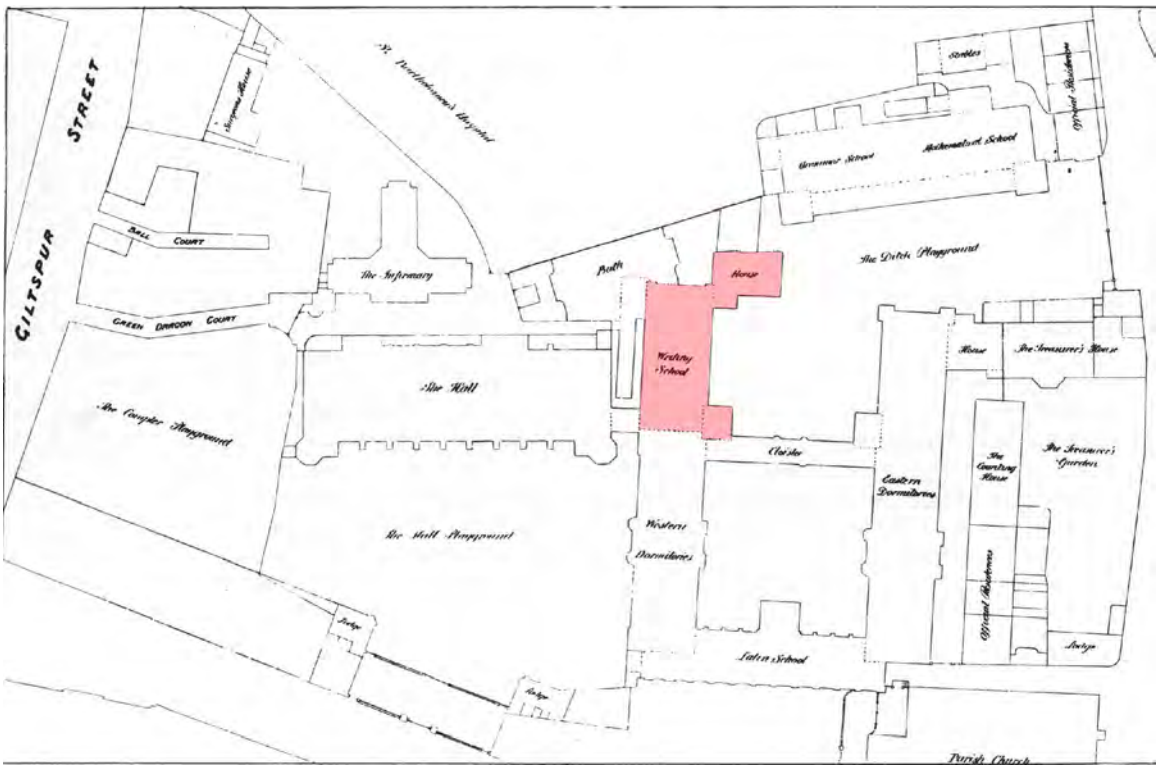


Figure IV-178. 'Ground Plan of Christ's Hospital *c.* 1901'. The Writing School is highlighted in light red by the author. Source: E. H. Pearce, *Annals of Christ's Hospital* (London: Methuen & Co., 1901).

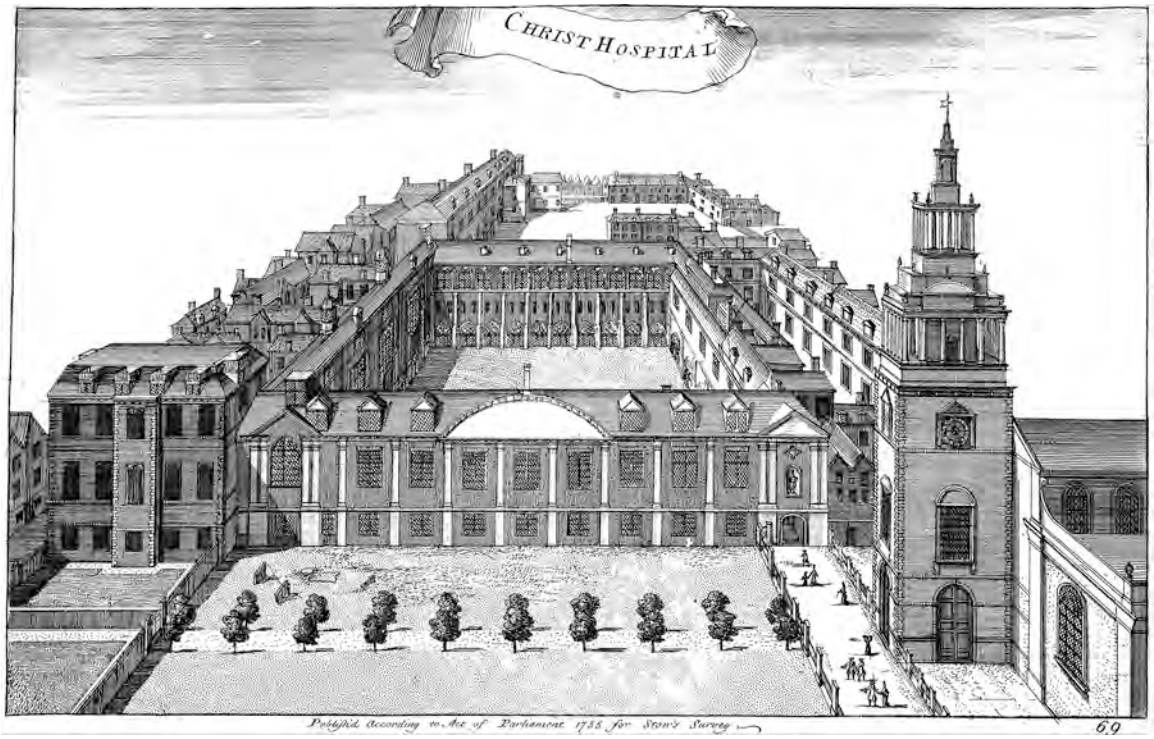


Figure IV-179. 'Perspective view of Christ's Hospital', 1755. Printed in Stow's *Survey of London*. Source: Wellcome Library, London, M0018981.



Figure IV-180. Hooke (designer of the instrument), 'An instrument of use to take the draught, or picture of any thing', 1694. Source: W[illiam] Derham, ed., *Philosophical experiments and observations of the late eminent Dr. Robert Hooke* (London, 1726), p. 295.



Figure IV-181. Hooke (design) and John[?] Roettier (die-engraver), 'Badge of the mathematical scholars of Christ's Hospital', 1674. The figure of Mercurius, depicted in the medal (see Figure IV-154), is absent in the badge. Source: National Maritime Museum, Greenwich, London, MEC0878; https://goo.gl/G9ek3x.



a.



b.

Figure IV-182. a. Hooke (design) and Roettier (die-engraver), 'Foundation medal of the mathematical school of Christ's Hospital (the Royal Mathematical Foundation)', 1674. Source: National Maritime Museum, Greenwich, London, MEC0878; https://goo.gl/ZLT37n.
b. John Evelyn's depiction of the commemorative medal struck in 1674. Source: John Evelyn, *Numismata* (London, 1697), no. LXXIII on p. 140.
The 1673 date depicted is of the foundation of the school. Note the figure of Mercurius standing behind 'Astronomy', holding a *caduceus* with his left hand, and pointing to the sky, i.e. *ad astra*, with the other.

ii. 22. HOUSE FOR RICHARD EDGCUMBE

No images.

ii. 23. HOUSE FOR ROBERT READING

No images.

ii. 24. WESTMINSTER ABBEY AND SCHOOL, LONDON



Figure IV-183. Anon., 'Westminster Choir, looking east to the sacrarium and high altar', n.d. The quire paving in black and white marble by Hooke can be seen in the foreground. Source: Tony Trowles, *Treasures of Westminster Abbey* (London: Scala Publishers Ltd., 2008), p. 30.

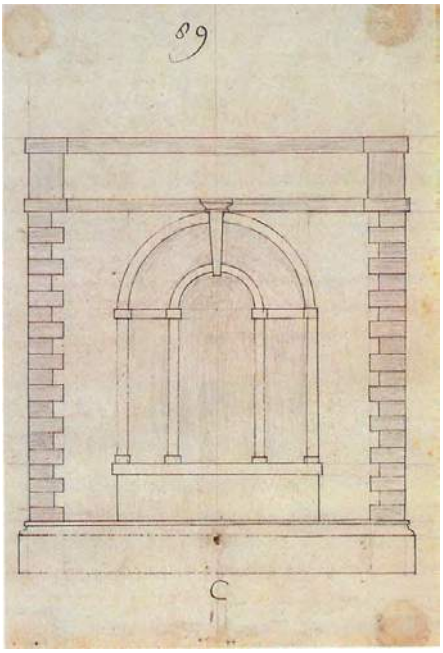


Figure IV-184. Hooke (attrib.), 'Elevation of an unidentified building, probably the Busby Library at Westminster School', *c.* 1681. Source: ASC, AS IV.89, reproduced from Geraghty, *Architectural Drawings*, p. 235. By permission of the Warden and Fellows of All Souls College, Oxford.



Figure IV-185. W. A. Clark (photograph by), 'Dormitory, Dr. Busby's Library and part of head master's house', *c.* 1934[?].
Source: Wren Society, vol. 11, pl. XXVIII.



Figure IV-186. Anon., 'Engraving showing Busby's library, prior to its destruction in World War II', 1877. Source: 'Westminster School', *The Graphic* XVI (1877), p. 413.



Figure IV-187. The Busby Library after its post-war restoration, 2017.
(Photograph by the author.)



Figure IV-188. The Portico leading into the School, 2017.
(Photograph by the author.)

ii. 25. CANTERBURY CATHEDRAL CHOIR, KENT

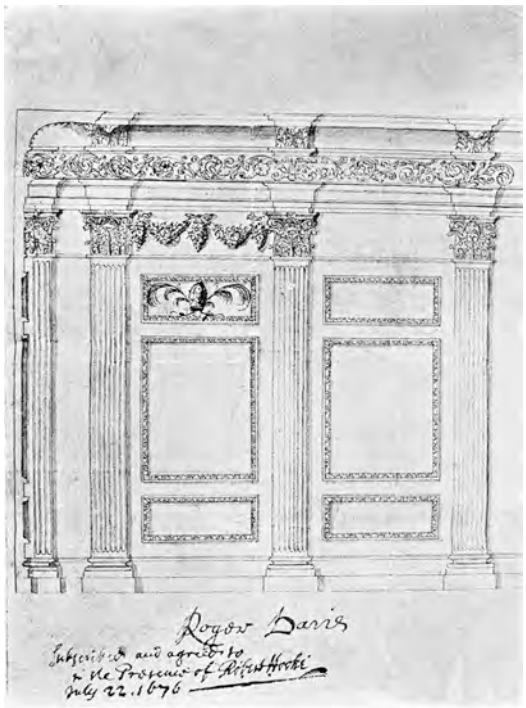


Figure IV-189. Drawing signed by Roger Davys, with a manuscript note in Hooke's hand. Source: C. Eveleigh Woodruff and William Danks, *Memorials of the Cathedral and Priory of Christ in Canterbury* (London, 1912).

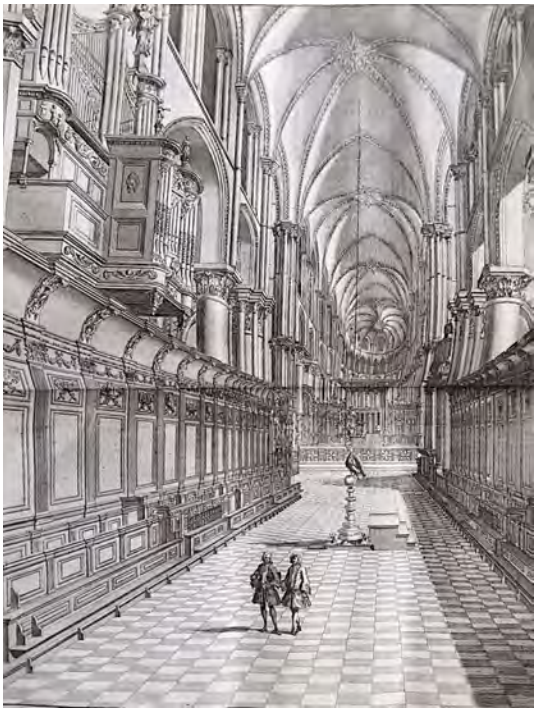


Figure IV-190. S. Cole (engraver), 'A prospect of the choir of the Cathedral Church of Canterbury', 1716. Source: J. Dart, *The history and antiquities of the Cathedral Church of Canterbury* (London, 1726).

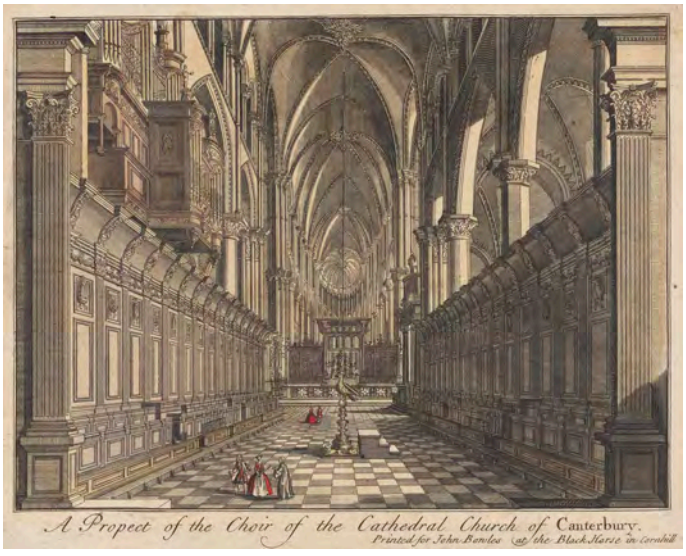


Figure IV-191. John Bowles (publisher), 'A Prospect of the Choir of the Cathedral Church of Canterbury', mid. 18th century. Source: V&A Museum, London, no. E.1372-1954.

ii. 26. TANGIER MOLE PROPOSAL



Figure IV-192. John Oliver (engraver) and John Seller (publisher), 'The royall citty of Tangier in Africa', 1677.
Source: https://goo.gl/FdEQ8A.

ii. 27. HOUSE FOR AUBREY DE VERE, EARL OF OXFORD, WHITEHALL, LONDON

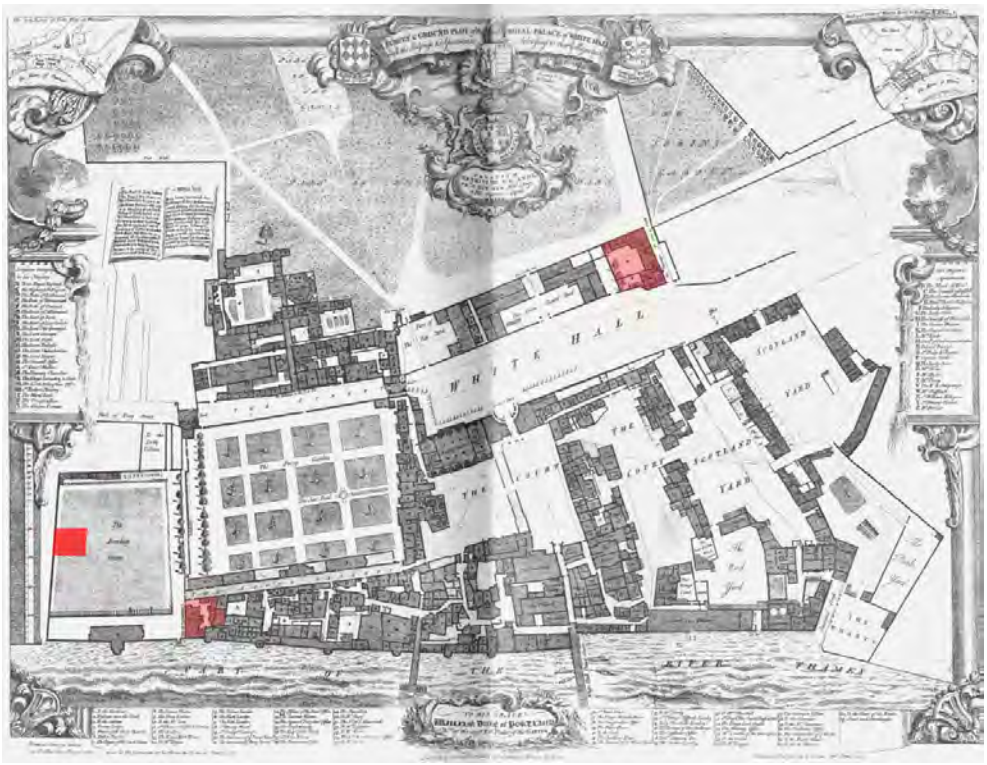


Figure IV-193. Ralph Greatorex (surveyor), George Vertu (engraver), 'Survey & ground plot of the royal palace of Whitehall', surveyed in 1670, engraved in 1747.
North is to the right of the map. Two of Mary Kirke's properties, identified in the legends in the drawing, are highlighted in lighter red by the author; the approximate location of de Vere's ground is marked in darker red by the author in Bowling Green on the far left.
Source: *Survey of London* (London, 1930), vol. 13, fig. 1; https://goo.gl/7XAqhN.

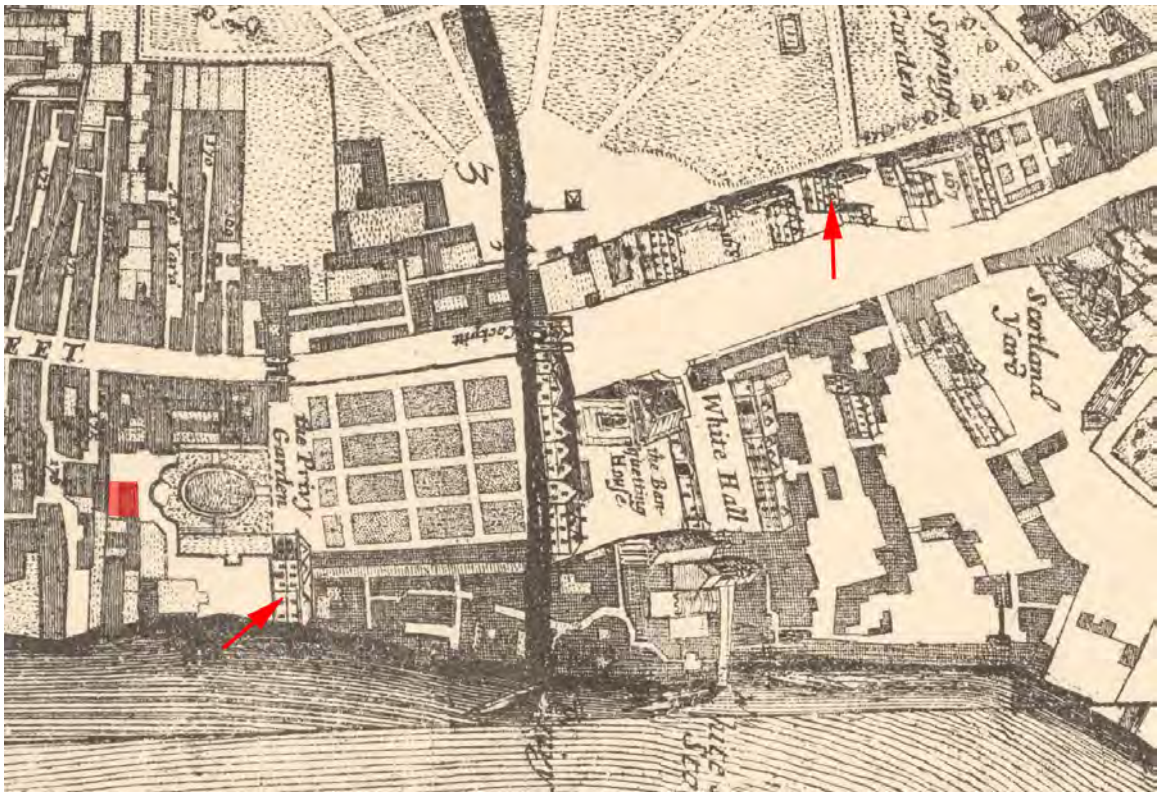


Figure IV-194. William Morgan, 'London &c. actually surveyed', 1682, detail showing Whitehall. North is to the right of the map; the 'speckt' areas (with dashes) are gardens, double-hatched are 'groundplotts'. The approximate area of de Vere's house is indicated with a red box added by the author, and the locations of Kirke's houses, with red arrows. Source: Library of Congress, Geography and Map Division, Washington, DC, call no. G5754.L7 1682 .M6 1904; https://goo.gl/aaxygo.



Figure IV-195. John Thomas Smith, 'North view of the City of Westminster . . . from the roof of the Banqueting House, Whitehall', 1807. Visible on the left is the house of the earls of Loudoun, the eastern half of which (to the left in this view) is on de Vere's ground. Source: Smith, *Antiquities of Westminster* (London, 1807).



Figure IV-196. John Caulfield, junior, 'The house formerly of the Earls of Loudoun and Mar', *c.* 1820.
The house was built on the grounds leased by de Vere and Paston.
Source: *Survey of London* (London, 1930), vol. 13, fig. 49; https://goo.gl/Ajaukm.

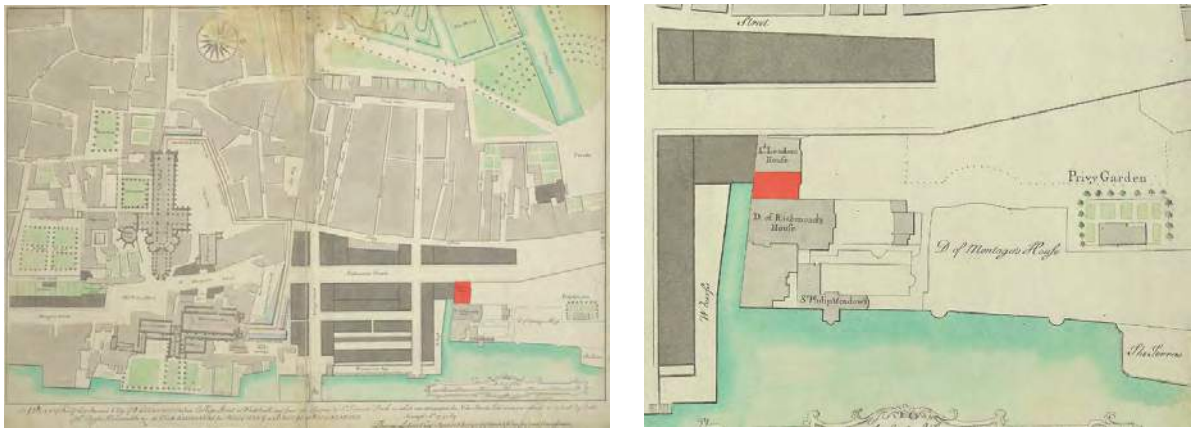


Figure IV-197. Thomas Lediard (surveyor), 'A Plan of part of the ancient city of Westminster', 1740; detail. On the full map on the left, 'Lord Loudoun's house' is highlighted in red by the author. On the detail on the right, the approximate location of de Vere's house is indicated in red by the author.
© The British Library Board, Maps Crace XI, no. 18

ii. 28. HOUSES AT NOS. 6 AND 7, ST. JAMES SQUARE, LONDON

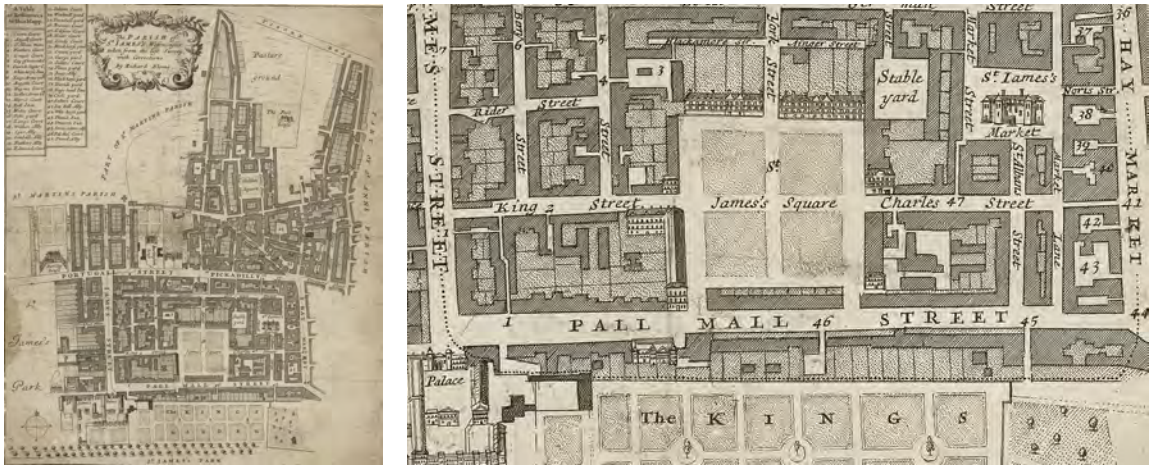


Figure IV-198. Richard Blome, 'The parish of St. James's, Westminster taken from the last survey with corrections', 1685, details.
© The British Library Board, Maps Crace Port. 12.2.



Figure IV-199. Sutton Nicolls, 'Bird's-eye view of St. James's Square, London', 1728. © The British Library Board, Maps K.Top.22.31.a.

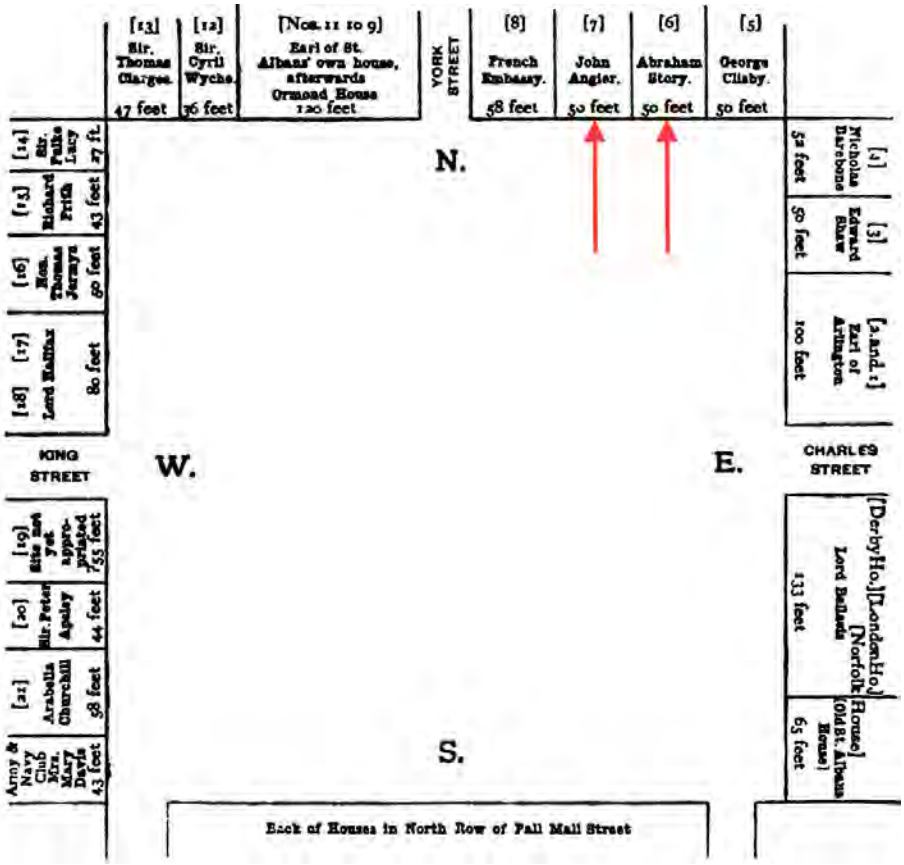


Figure IV-200. Arthur Irwin Dasent, 'Allocation of building sites in the square, 1676', 1895. The red arrows added by the author point to nos. 6 and 7, St. James's Square. Source: Dasent, *The History of St. James's Square* (New York, 1895), p. 22.

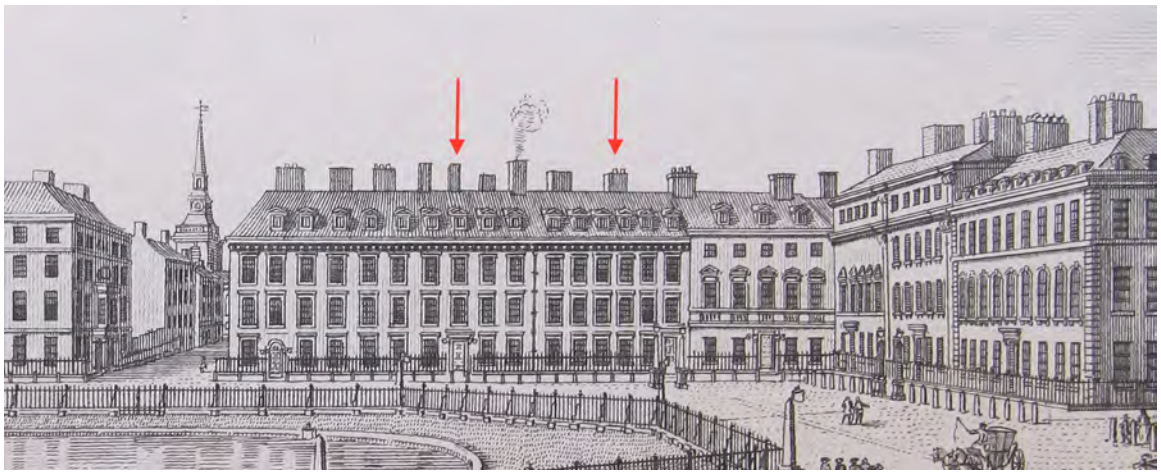


Figure IV-201. John Bowles, 'View of St. James's Square', *c.* 1752[?], detail. The red arrows added by the author point to nos. 6 and 7, St. James's Square
Source: Bodl., Gough Maps 22, no. 41B, detail.

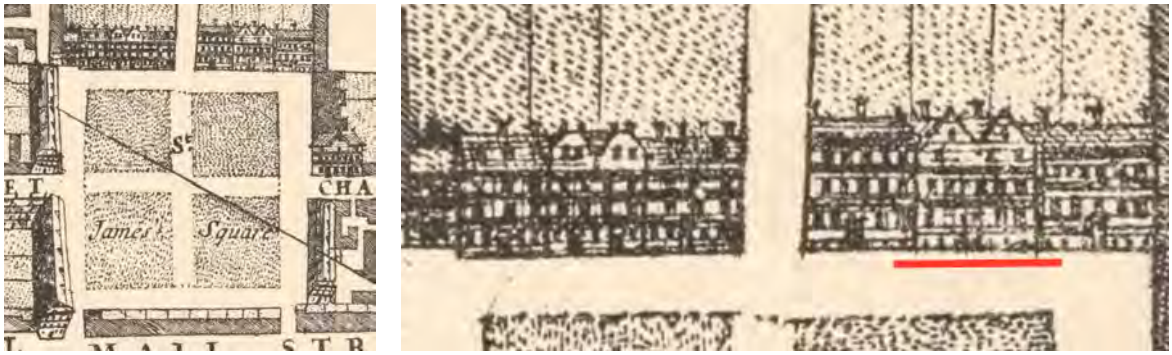


Figure IV-202. William Morgan and John Ogilby, 'London &c. actually survey'd', 1682, details. The red line added by the author point to nos. 6 and 7, St. James's Square.
Source: U.S. Library of Congress, Map Collections, G5754.L7 1682 .M6 1904; https://goo.gl/g4CmHb.

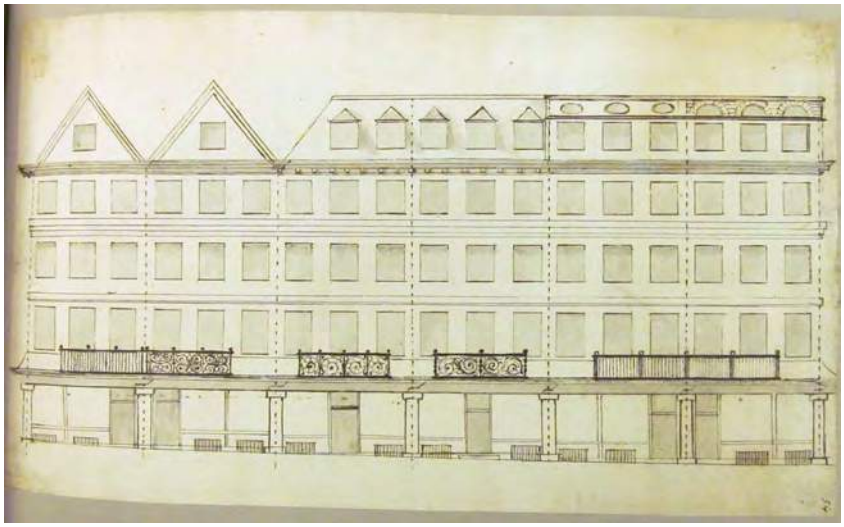


Figure IV-203. Hooke, 'Elevation of a row of buildings, with alternative designs', *c.* 1677.
© The British Library Board, Add. MS 5238, no. 54.

ii. 29. ALTERATIONS TO RICHARD BOYLE'S ESTATE IN LONDESBOROUGH, YORKSHIRE



Figure IV-204. Kip and Knyff, 'South-west view of Londesborough Hall, gardens, church, almshouses, and village', *c.* 1700. North is to the left of the drawing.
Source: The Gott Collection, accession no. A1.91 6/92; https://goo.gl/QMbTTY.

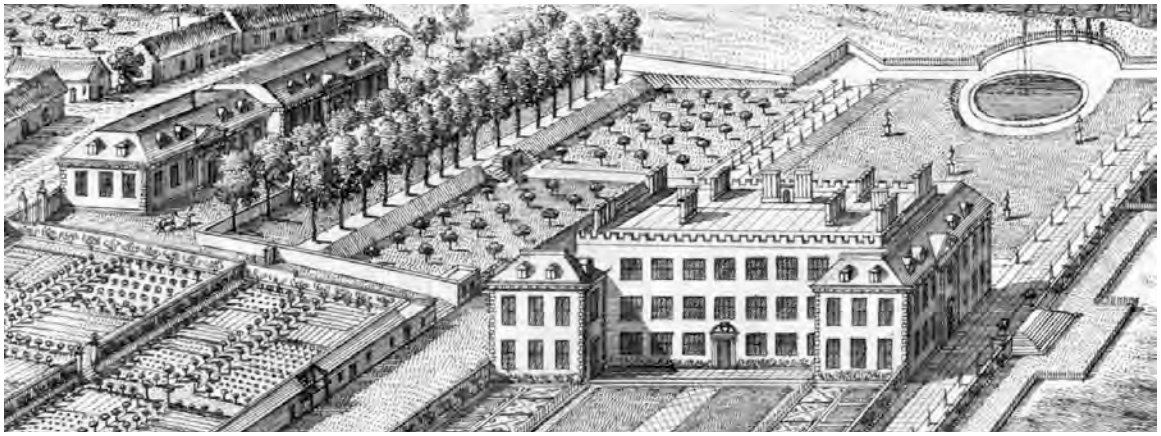


Figure IV-205. Kip and Knyff, 'South-west view of Londesborough Hall', *c.* 1700, detail. The two wings designed by Hooke can be seen on either side of the 16th-century Hall, the south one becoming the main entrance or 'front' of the house. On the left, north of the house, are the two stable blocks that have also been attributed to Hooke.
Source: The Gott Collection, accession no. A1.91 6/92; https://goo.gl/QMbTTY; detail.

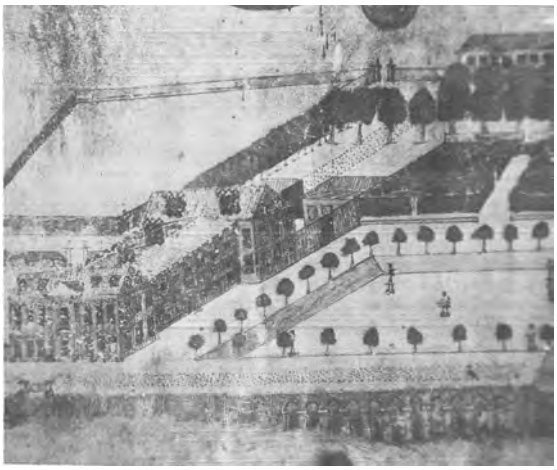


Figure IV-206. Anon., 'Londesborough Hall viewed from the south-east; on a damaged estate plan in the Humberside County Record Office', 1739.
Source: Neave, 'Lost Houses No. 4: Londesborough Hall', *The Georgian Society for East Yorkshire,* no. 5 (1978), fig. 3.

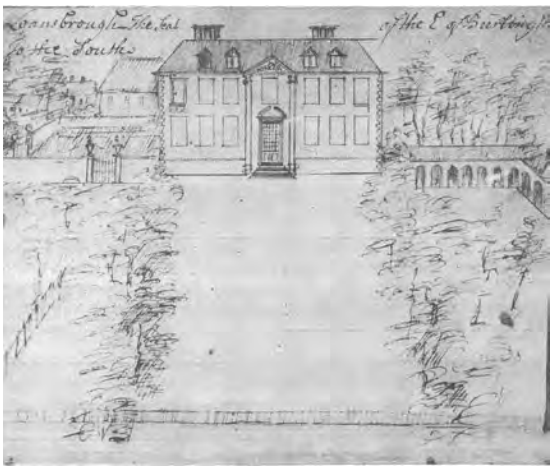


Figure IV-207. Samuel Buck, 'Unfinished drawing of the south front of Londesborough Hall', *c.* 1720.
Source: Neave, 'Lost Houses No. 4: Londesborough Hall', *The Georgian Society for East Yorkshire*, no. 5 (1978), fig. 2.

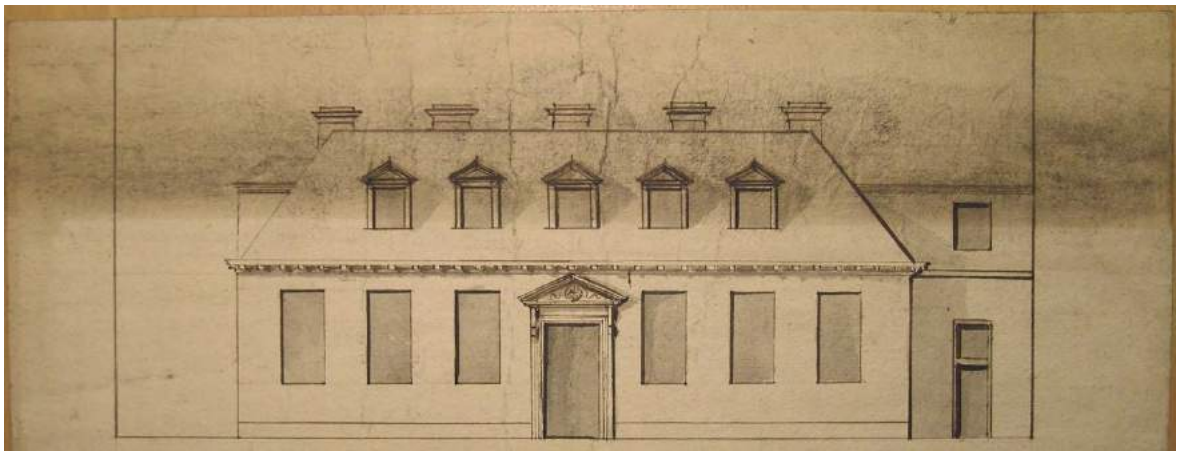


Figure IV-208. Hooke[?], 'Elevation of an unidentified building', n.d., detail.
Source: Warwickshire C.R.O., CR2017/B1/6.

ii. 30. ALTERATIONS TO LADY RANELAGH'S HOUSE IN PALL MALL, LONDON

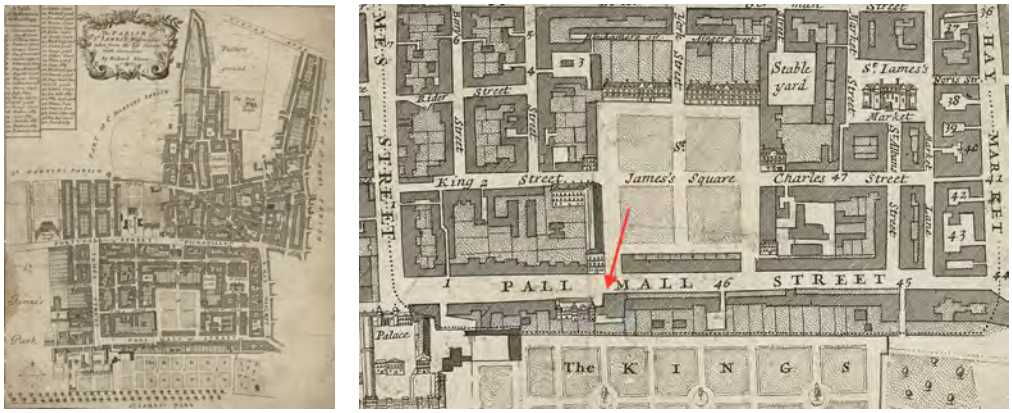


Figure IV-209. Richard Blome, 'The parish of St. James's, Westminster taken from the last survey with corrections', 1685; detail. The arrow added by the author points to the approximate location of the residence. © The British Library Board, Maps Crace Port. 12.2.



Figure IV-210. Kip, 'A Prospect of the City of London, Westminster and St. James' Park', 1710, detail. The arrow added by the author points to the approximate location of the house. In this orientation, St. James Square is on the left and St. James Park, on the right. Source: The Metropolitan Museum, Elisha Whittelsey Collection, accession no. 59.600.3; https://goo.gl/3F73ev.

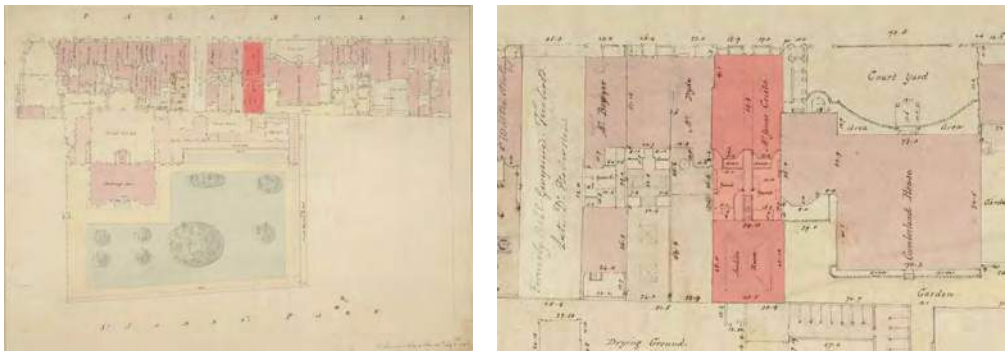


Figure IV-211. Thomas Chawner, 'Drawn plan of Marlborough House and garden and the several houses on the south side of Pall Mall to the fourth beyond the Marquis of Buckingham's House', 1796; detail. Ranelagh's house, which is just west of the Marlborough House, is highlighted in red by the author; the eastern half of it is labeled as 'Mr. James Christie' and the building in the back, as the 'Auction Room'. © The British Library Board, Maps Crace Port. 12.6.



Figure IV-212. Augustus Charles Pugin & Thomas Rowlandson, 'Auction sale of pictures at Christie's, 125 Pall Mall, London', 1808. This shows an interior view of the auction room at the rear of the property.
Source: RIBA, EW E.e.315/1; RIBA15426.

ii. 31. ALTERATIONS TO LADY RANELAGH'S CHISWICK HOUSE, LONDON

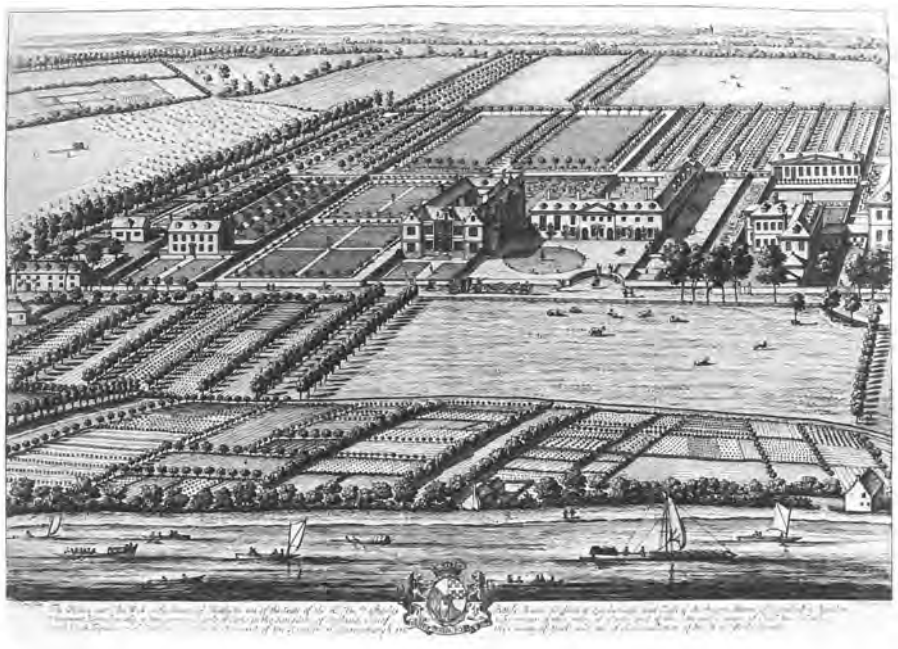


Figure IV-213. Kip and Knyff, 'Bird's eye view of old Chiswick House, *c.* 1698–1699'; *Britannia illustrata* (London, 1707), pl. 30.
Source: John Harris, *The Palladian Revival* (New Haven, CT, 1994), p. 52.

ii. 32. HOUSE FOR WALTER YONGE IN DEVON[?]

No images.

ii. 33. MAGDALEN COLLEGE, CAMBRIDGE

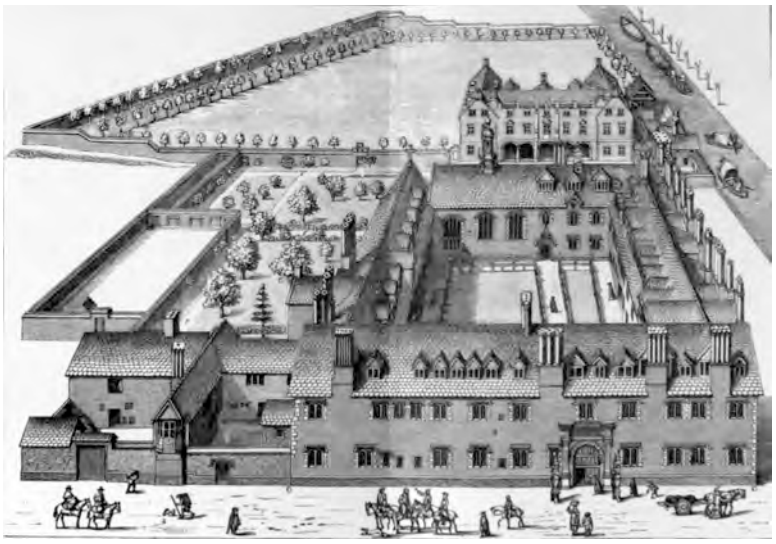


Figure IV-214. Loggan, 'Magdalene College, Cambridge', from *Cantabrigia illustrata*, 1690. Source: Robert Willis and John Willis Clark, *The Architectural History of the University of Cambridge* (Cambridge, 1886), vol. 2, fig. 4.



Figure IV-215. Anon., 'West front of the Pepys building', 1880. Source: Willis and Willis Clark, *The Architectural History of the University of Cambridge* (Cambridge, 1886), vol. 2, fig. 5.

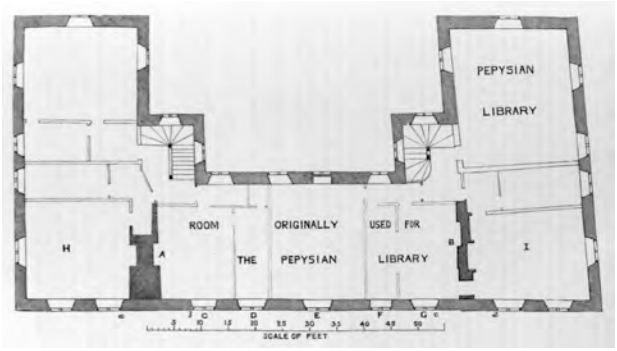


Figure IV-216. Anon., 'Plan of the Pepys building', 1880. Source: Willis and Willis Clark, *The Architectural History of the University of Cambridge* (Cambridge, 1886), vol. 2, fig. 6.

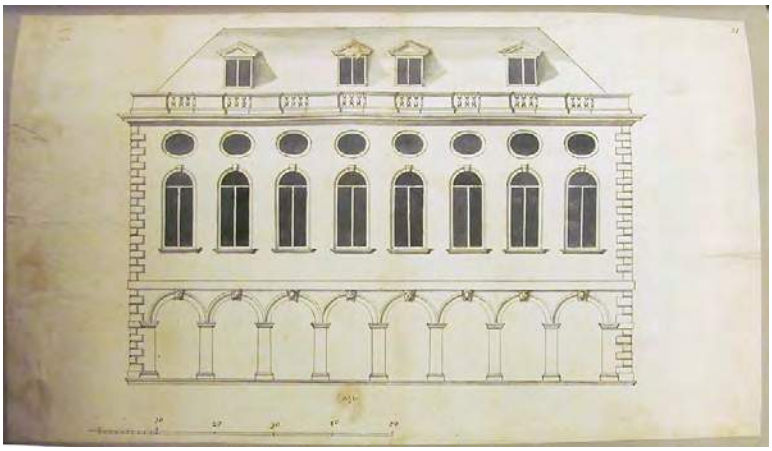


Figure IV-217. Hooke, 'Elevation of an unrealised design for the Writing School at Christ's Hospital', *c.* 1691. © The British Library Board, Add. MS 5238, no. 51.

ii. 34. CHURCH AND PORT IN WHITEHAVEN, CUMBRIA

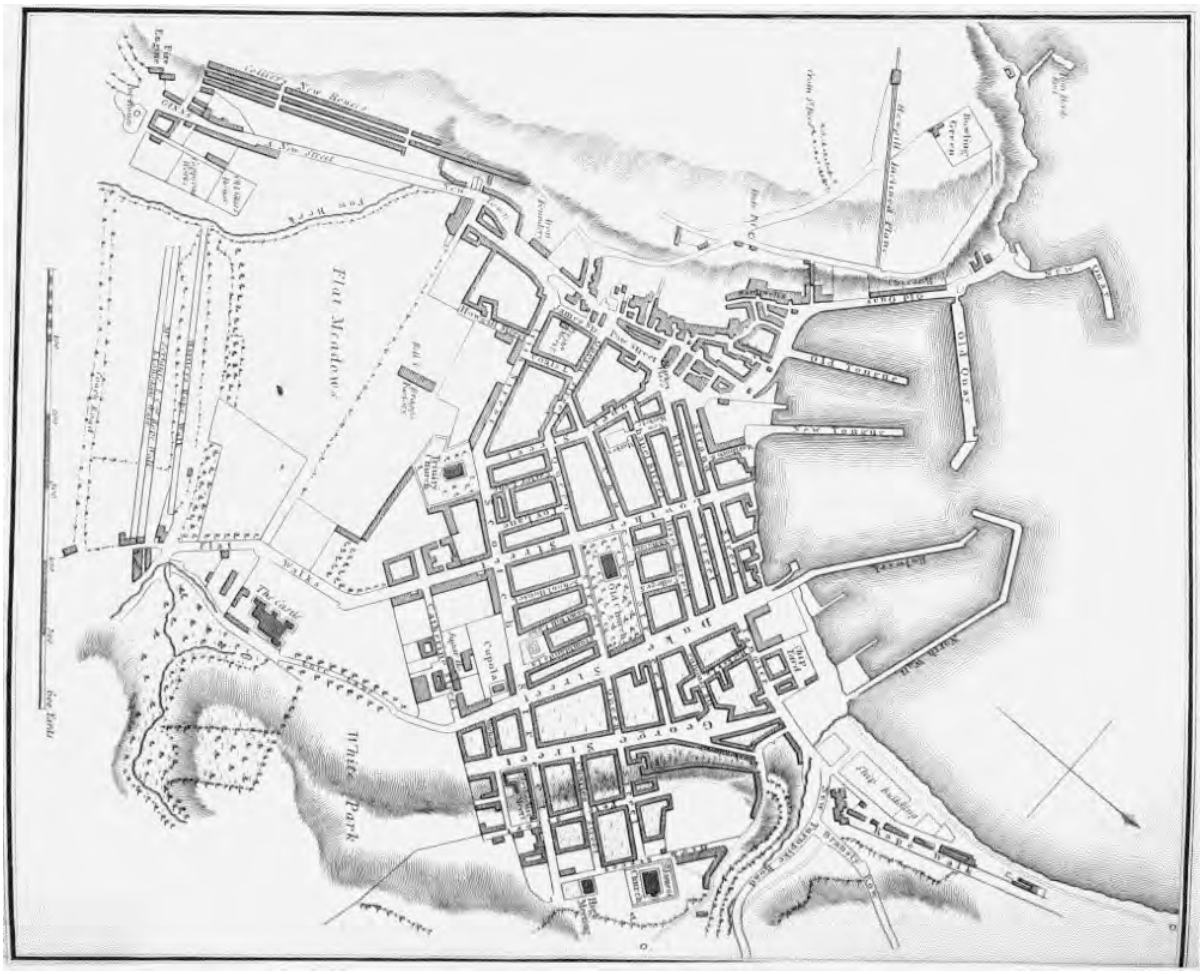


Figure IV-218. Plan of Whitehaven, n.d. Source: Daniel Lysons and Samuel Lysons, *Magna Britannia*, vol. 4, Cumberland (London, 1816), fig. 31 on p. 22.

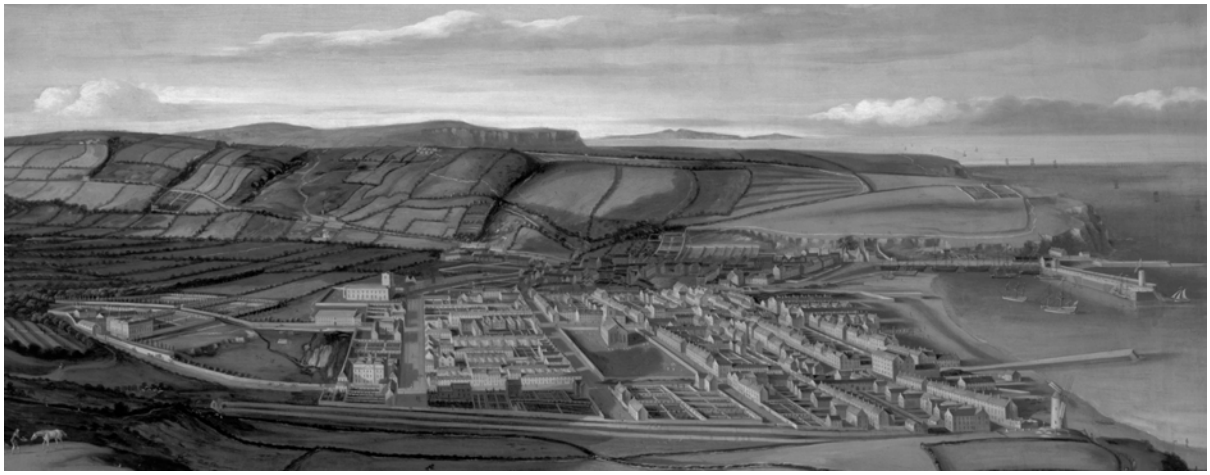


Figure IV-219. Matthias Read (painter), 'Prospect View of Whitehaven, Cumbria, showing Flatt Hall', *c.* 1730–1735 (detail). Source: Yale Center for British Art, Paul Mellon Collection, accession no. B1981.25.515; https://goo.gl/ZJBfiQ.



Figure IV-220. 'St. Nicholas Church' built in 1693 by an anonymous architect.
Source: William Hutchinson, *The history of the county of Cumberland* (Carlisle, 1794), vol. 2, p. 43.

ii. 35. CHURCH OF ST. MARY MAGDALENE IN WILLEN, BUCKINGHAMSHIRE

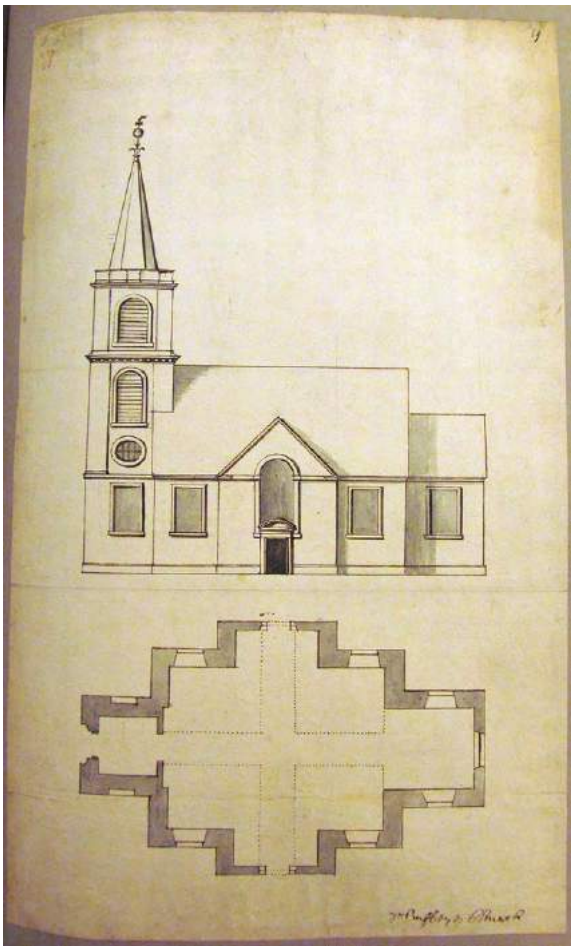


Figure IV-221. Hooke, 'Elevation and plan of an alternative design for St. Mary Magdalene church', *c.* 1678. © The British Library Board, Add. MS 5238, no. 59.



Figure IV-222. Hooke, 'Alternative design for the church in Willen', *c.* 1678.
Source: Warwickshire C.R.O., CR2017/B1/3.



Figure IV-223. Northwest view of the church before the lead roof of the cupola was removed and an apse was added to the back. Source: *The Gentleman's Magazine: and Historical Chronicle*, vol. 62, Part 2 (London, 1792), p. 1168, pl. 2.



Figure IV-224. West facade, 2012. (Photograph by the author.)



Figure IV-225. South facade, 2012. (Photograph by the author.)



Figure IV-226. Interior view towards the entrance, 2012. (Photograph by the author.)



Figure IV-227. Interior **elevation** of a window, 2012. (Photograph by the author.)



Figure IV-228. Ceiling detail, 2012. (Photograph by the author.)

ii. 36. HOUSE FOR EDWARD CONWAY, RAGLEY HALL IN WARWICKSHIRE

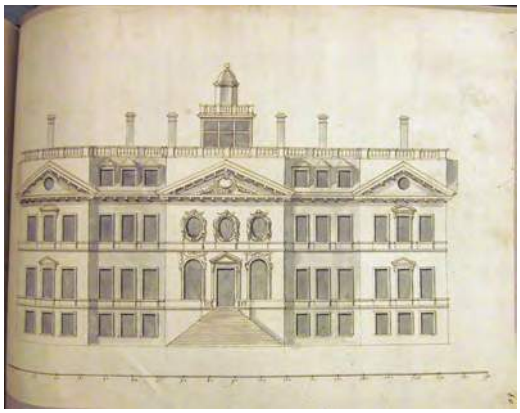


Figure IV-229. Hooke, 'An early design for Ragley Hall', *c.* 1679. © The British Library Board, Add. MS 5238, no. 60.

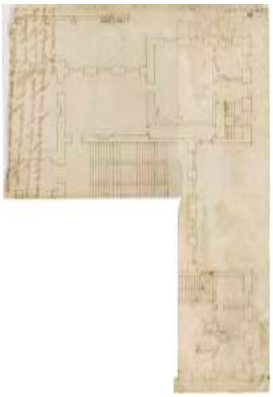


Figure IV-230. James Gibbs[?], 'Plan fragments of Ragley Hall, Warwickshire', *c.* 1750[?]. Oriented to match Gibbs's survey drawing below (Figure IV-232). Source: Author's collage of RIBA, SD12/14a and SD12/14b.

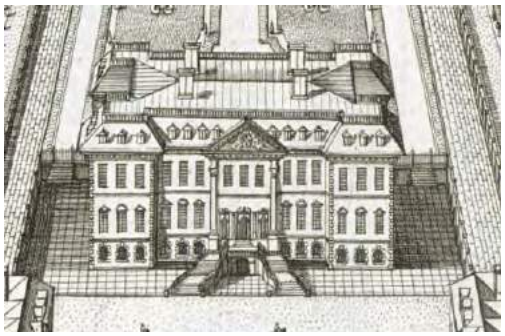


Figure IV-231. Kip and Knyff, detail of 'Ragley in the County of Warwik the Seat of Popham Conway Esq.', engraved *c.* 1698. Source: Kip and Knyff, *Britannia illustrata* (London, 1707).

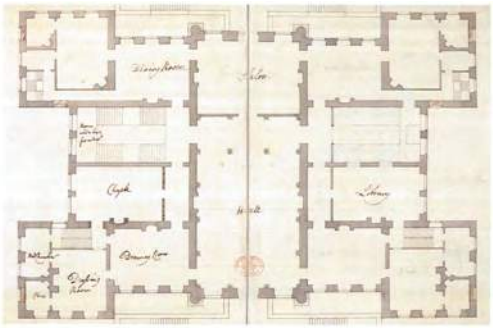


Figure IV-232. Gibbs, 'Ragley Hall, plan of the principal floor', *c.* 1750. Source: British Library, Add. MS 31323 W[3]; reproduced from Smith, "Contriving Lord Conway's house", *Georgian Group Journal* 21 (2013), p. 3.



Figure IV-233. East facade of Ragley Hall, 2012. The portico was added by James Wyatt in 1778. (Photograph by the author.)



Figure IV-234. Garden facade of Ragley Hall, 2012. (Photograph by the author.)

ii. 37. HOUSE FOR WILLIAM JONES, RAMSBURY MANOR IN WILTSHIRE



Figure IV-235. Anon. 'North-east view of Ramsbury manor', 1907. Source: Louw, 'New Light on Ramsbury Manor', *Architectural History* 30 (1987), p. 46.



Figure IV-236. Anon., 'New Bedlam in Moor-fields', n.d., detail. Source: Wellcome, L0012307.

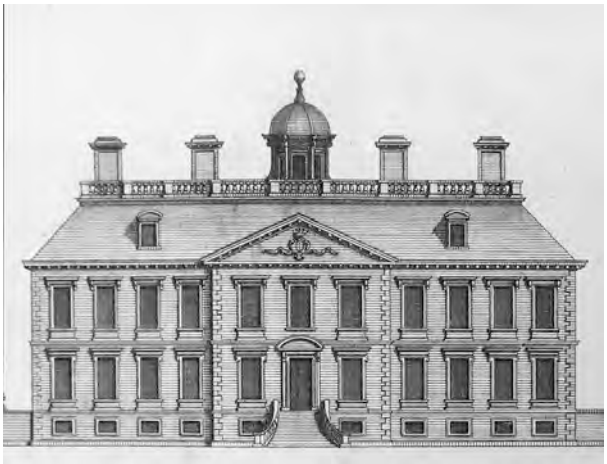


Figure IV-237. Roger Pratt, 'Horseheath Hall, Cambridgeshire', 1663–1665. Source: *Vitruvius Britannicus* (1725), vol. 3.

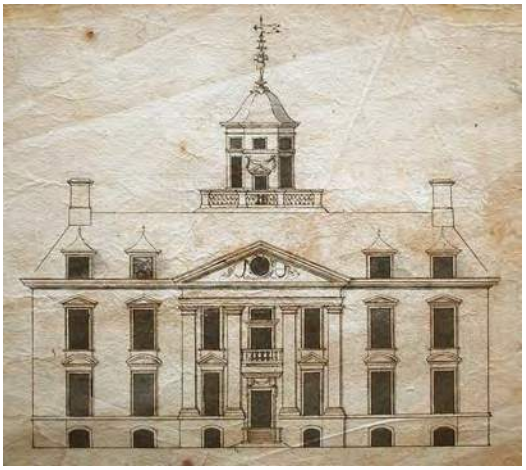


Figure IV-238. Hooke (attrib.), 'Design for a Country House with Ogee Dome, with Subsidiary Studies of the Dome and Entablature', n.d. Source: Worcester College, Oxford, Colvin 525.

ii. 38. BOONE'S CHAPEL, LEWISHAM, LONDON



Figure IV-239. The original Boone's almshouses before they were demolished in 1877; the chapel is visible further down the street. Source: Adams, MacKeith, and Mills, *Boone's Chapel: History in the Making* (London, 2010), fig. 19 on p. 28.



Figure IV-240. The chapel after its restoration in 2008. Source: https://goo.gl/dZ1CcB. © Tim Crocker.

ii. 39. EASTON NESTON, NORTHAMPTONSHIRE



Figure IV-241. North wing of Easton Neston, n.d. Source: Downes, 'Hawksmoor's House at Easton Neston', *Architectural History* 30 (1987), fig. 18.

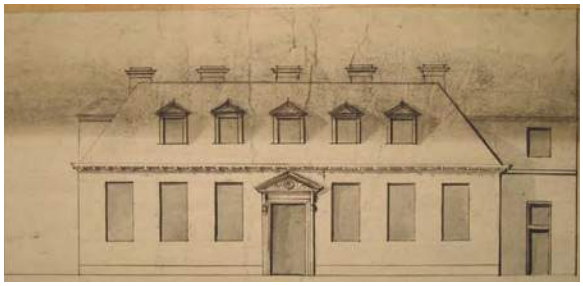


Figure IV-242. Hooke[?], 'Elevation of an unidentified building', n.d. [cropped]. Source: Warwickshire C.R.O., CR2017/B1/6.

ii. 40. ALMSHOUSES FOR SETH WARD, BUNTINGFORD, HERTFORDSHIRE



Figure IV-243. Anon., 'Ward's hospital, Buntingford, from the East'.
Source: William Page, ed., *The Victoria History of the Counties of England, Hertfordshire* (London, 1914), vol. 4, p. 79.

ii. 41. HOUSE FOR ROBERT SOUTHWELL, SPRING GARDENS, LONDON

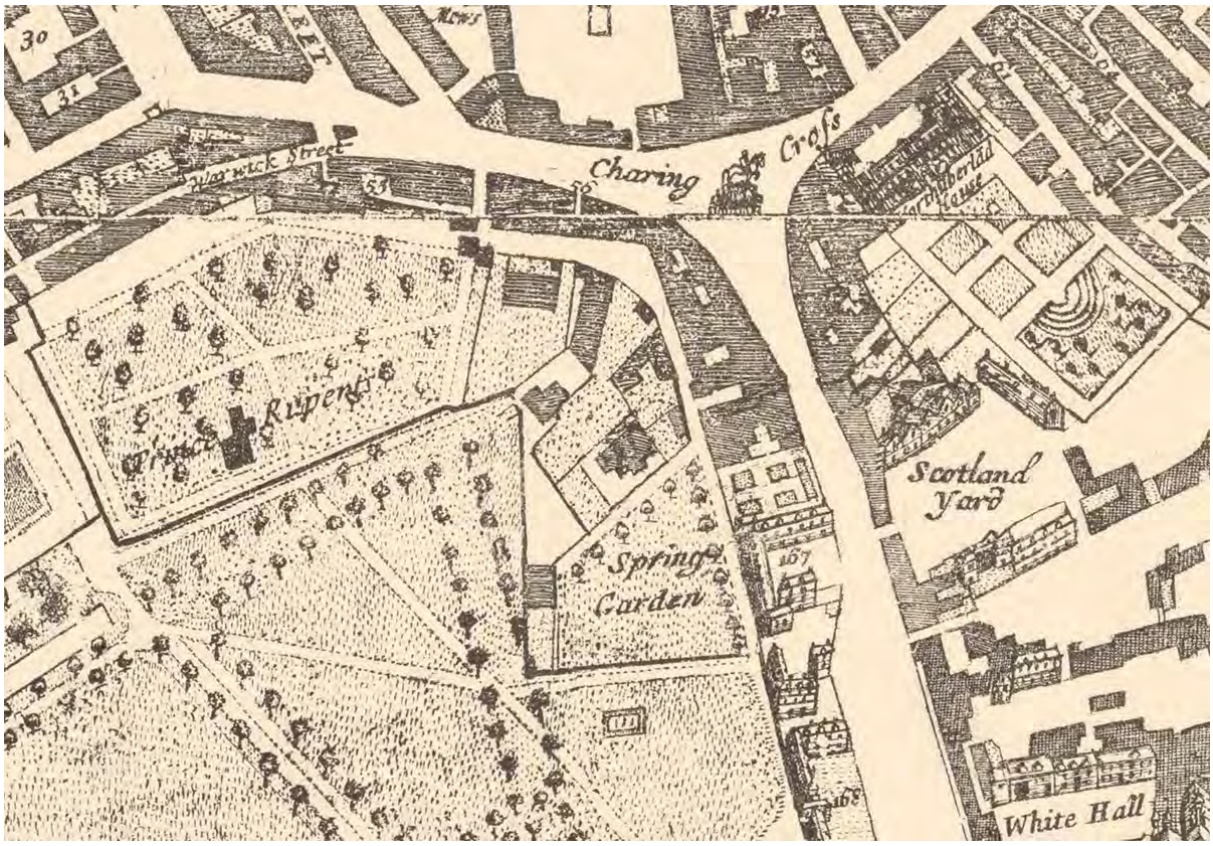


Figure IV-244. William Morgan, 'London &c. actually surveyed', 1682, detail showing the Spring Garden area. Source: Library of Congress, Geography and Map Division, Washington, DC, call no. G5754.L7 1682 .M6 1904; https://goo.gl/aaxygo.



Figure IV-245. Kip, 'A Prospect of the City of London, Westminster and St. James' Park', 1710, detail. This is a bird's eye view taken from St. James Park, looking east. On the left is the end of the King's Garden and just beyond it is Prince Rupert's gardens. Spring Gardens is in the middle foreground but the trees obscure some of the other buildings in the area. Source: The Metropolitan Museum, Elisha Whittelsey Collection, accession no. 59.600.3; https://goo.gl/3F73ev.

ii. 42. BOUGHTON HOUSE, NORTHAMPTONSHIRE



Figure IV-246. Anon., 'Boughton House, north wing', n.d. Source: Downes, *English Baroque Architecture* (London, 1966), pl. 134.



Figure IV-247. Anon., 'Aerial view of Boughton House', n.d. The stable block is on the far left-hand side. Source: 'Boughton House & Gardens', *Northamptonshire*, https://goo.gl/mgG6Xs.

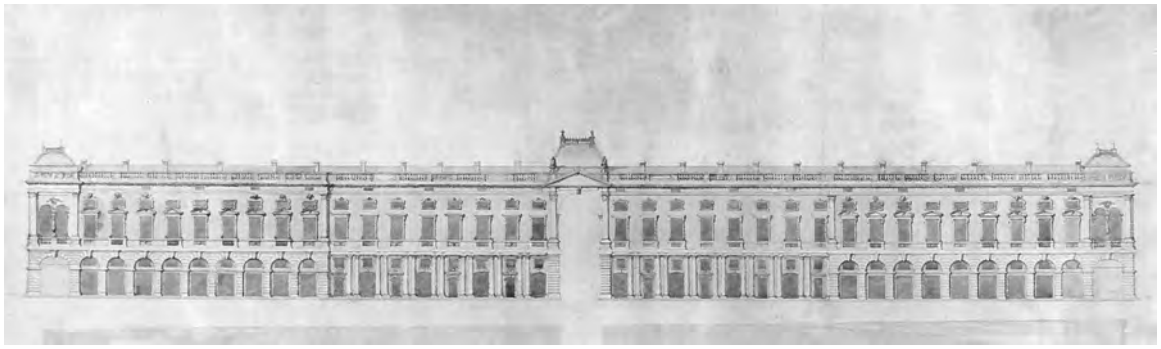


Figure IV-248. Pierre Puget, **'**La Place Royale de Marseille', 1686. Source: *Pierre Puget: Peintre, Sculpteur, Architecte, 1620–1694* ([Marseille, 1994]), fig. 115 on p. 249.



Figure IV-249. Anon., 'The Stable Block, Boughton House', n.d. Source: T. V. Murdoch, *Boughton House: the English Versailles* (London, 1992), fig. 57 on p. 62.

ii. 43. LOWTHER [ST. MICHAEL'S] CHURCH

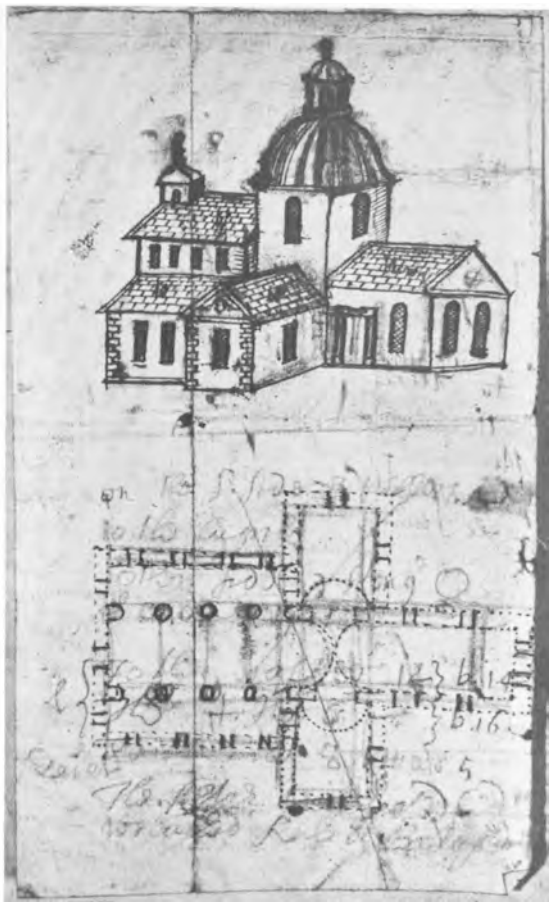


Figure IV-250. Thomas Machell, 'Sketch of Lowther Church', *c.* 1686.
Source: Colvin, Crook, and Friedman, eds., *Architectural Drawings from Lowther Castle, Westmorland*, Architectural History Monographs: No. 2. ([London], 1980), no. 25.

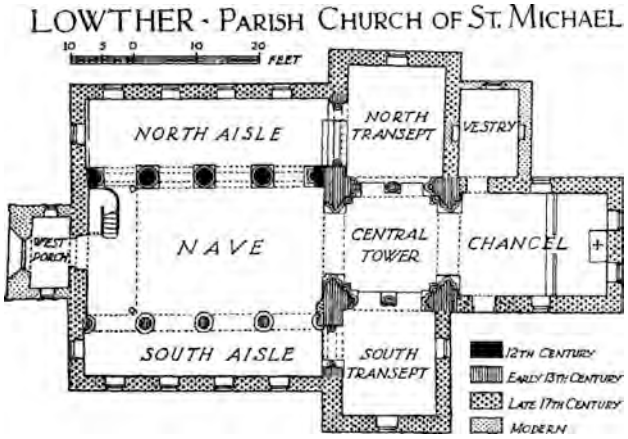


Figure IV-251. Plan of St. Michael's Church with dates of phases of construction, 1936.
Source: *An Inventory of the Historical Monuments in Westmorland* (London, 1936), p. 158.

ii. 44. PETWORTH HOUSE, SUSSEX

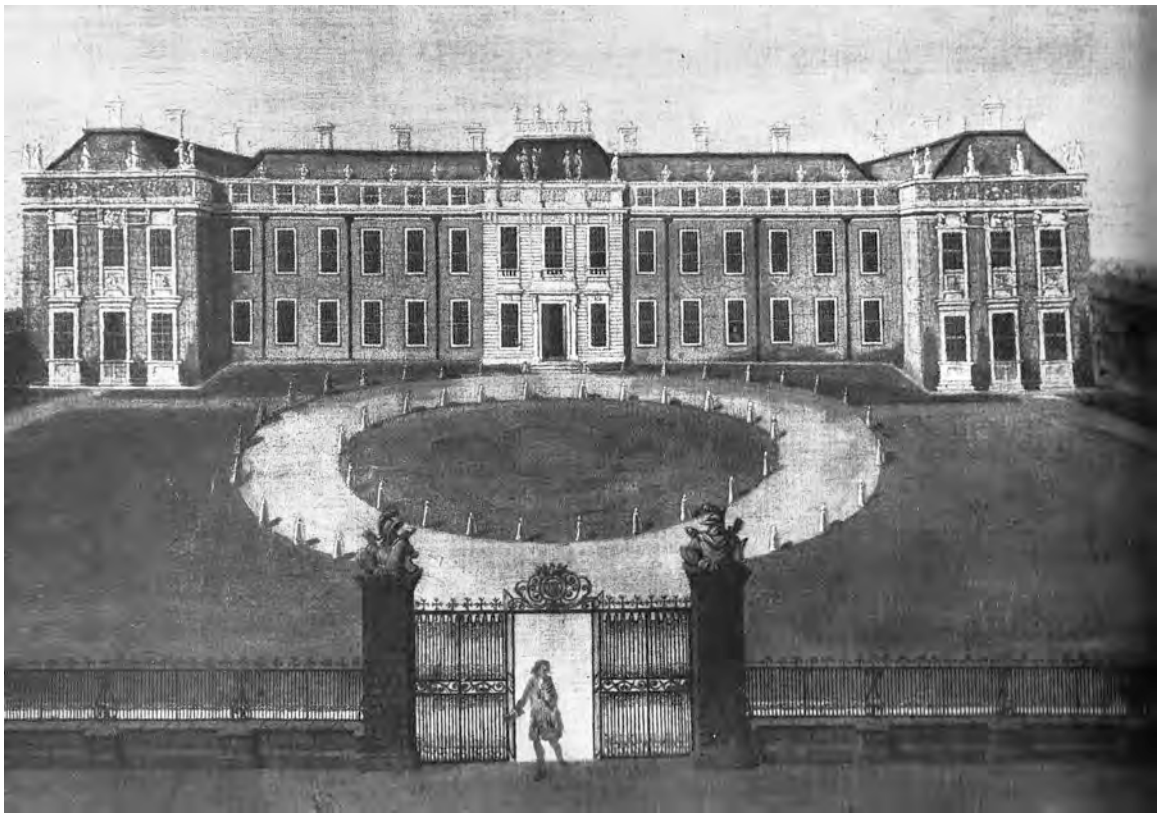


Figure IV-252. Anon., 'Petworth House in Sussex, view of the west front with forecourt', *c.* 1695, detail. Source: Wikimedia commons; https://goo.gl/F8HicJ.

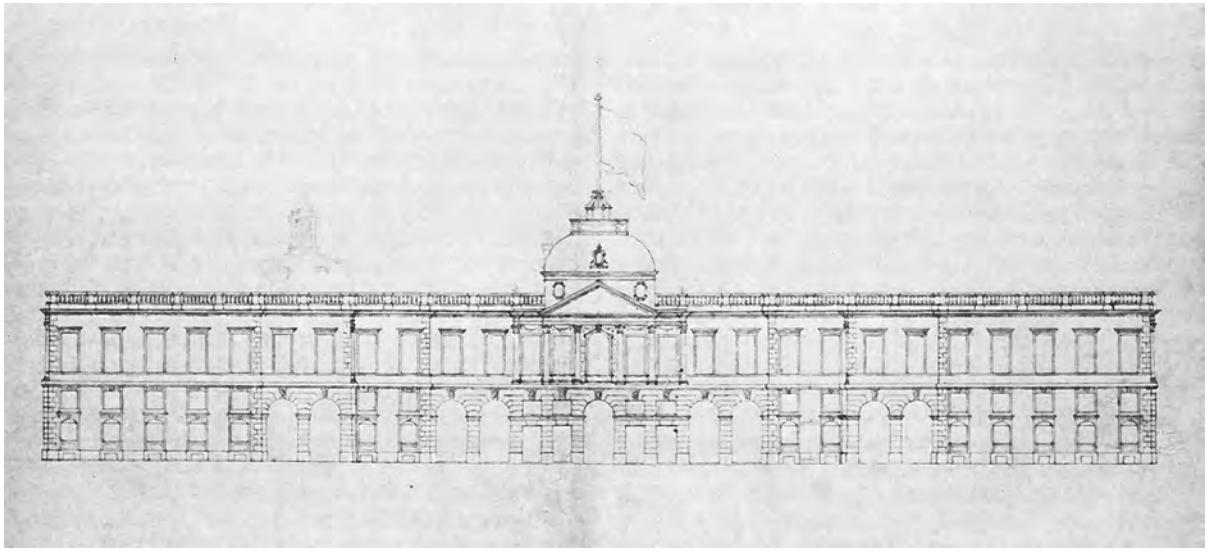


Figure IV-253. Wren, 'Preliminary design for Winchester Palace', 1682–1683.
Source: Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), p. 11, fig. 3.

ii. 45. HOUSE FOR [EDWARD?] GOULD, HIGHGATE, LONDON

No images.

ii. 46. HOUSE FOR RICHARD VAUGHAN AT SHENFIELD PLACE, BRENTWOOD, ESSEX



Figure IV-254. Old Shenfield Place, *c.* 2017. Source: Amba Care Homes Group website; https://goo.gl/KtDUQY.

ii. 47. ASKE'S ALMSHOUSES [OR HOSPITAL], HOXTON, LONDON

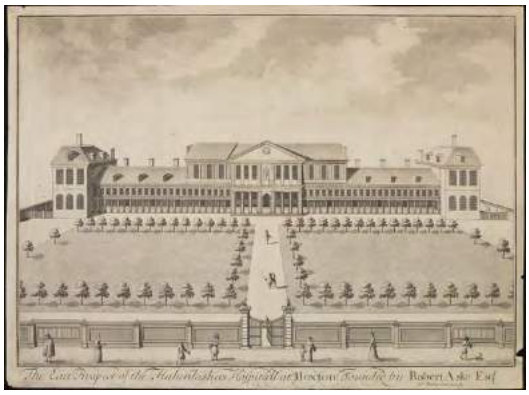


Figure IV-255. John Harris (engraver), 'The East Prospect of the Haberdashers Hospitall at Hoxton Founded by Robert Aske Esqr', 1715. Source: Victoria & Albert Museum, London, no. E.4841-1923; https://goo.gl/m3HGw2.



Figure IV-256. Anon. engraver [Kip?], 'Hoxton Hospitall', n.d. Printed in John Stow, *A Survey of the Cities of London and Westminster*, 1720, vol. 1, p. 212. Source: Victoria & Albert Museum, London, no. E.4838-1923; https://goo.gl/oDmVov.

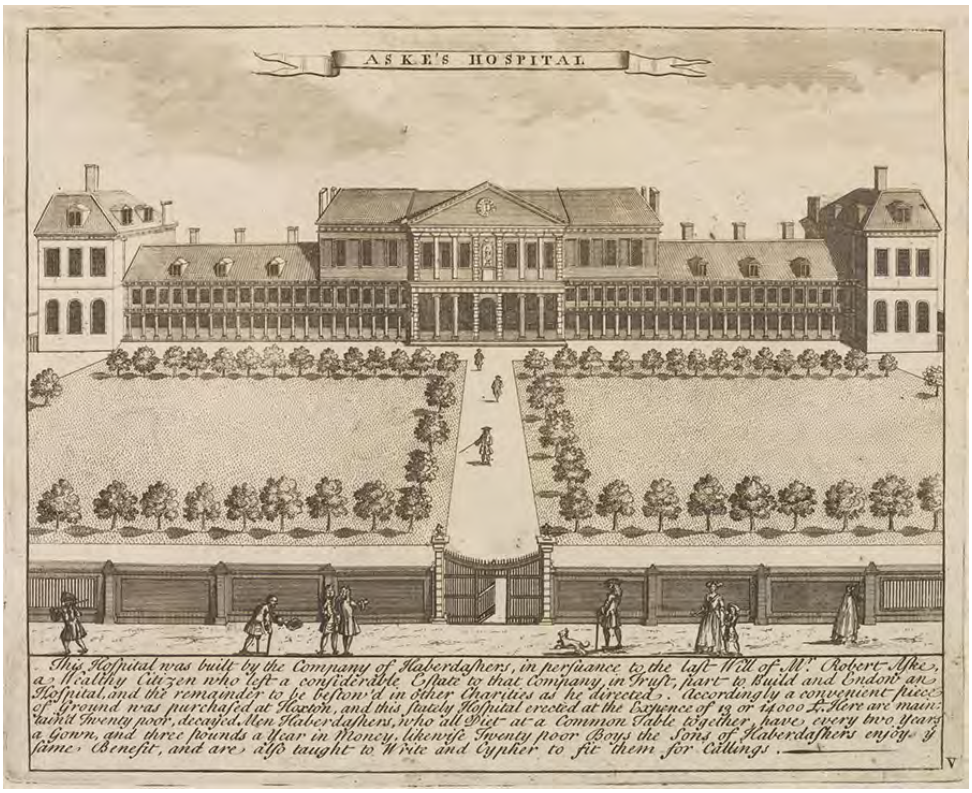


Figure IV-257. Anon., 'Aske's Hospital' for John Bowles, *British Views*, 1724.
The text reads "This Hospital was built by the Company of Haberdashers, in persuance to the last will of Mr Robert Aske a wealthy citizen who left a considerable estate to that Company in Trust, part to build and endow an Hospital and the remainder to be bestowed in other charities as he directed. Accordingly a convienient piece of ground was purchased at Hoxton and this stately hospital erected at the expense of 13 or 14000 £. Here are maintained twenty poor, decayed men Haberdashers, who all diet at a common table together, have every two years a gown and three pounds a year in money, likewise twenty poor boys the sons of Haberdashers enjoy the same benefit and are also taught to write and cypher to fit them for callings."
Source: Victoria & Albert Museum, London, no. E.4837-1923; https://goo.gl/XdFNAc.

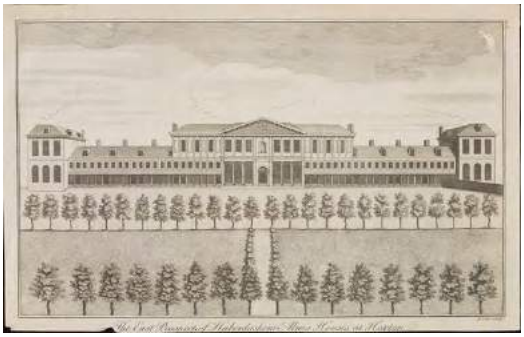


Figure IV-258. Benjamin Cole (engraver), 'The East Prospect of Haberdashers Alms Houses at Hoxton', 1756. Source: Victoria & Albert Museum, London, no. E.4843-1923; https://goo.gl/mht7Zu.



Figure IV-259. Anon. engraver, 'Aske's Hospital', *c.* 1760. Note the cupola in the centre; it was not built and is only shown in this illustration.
Source: Victoria & Albert Museum, London, no. E.4840-1923; https://goo.gl/XD586M.

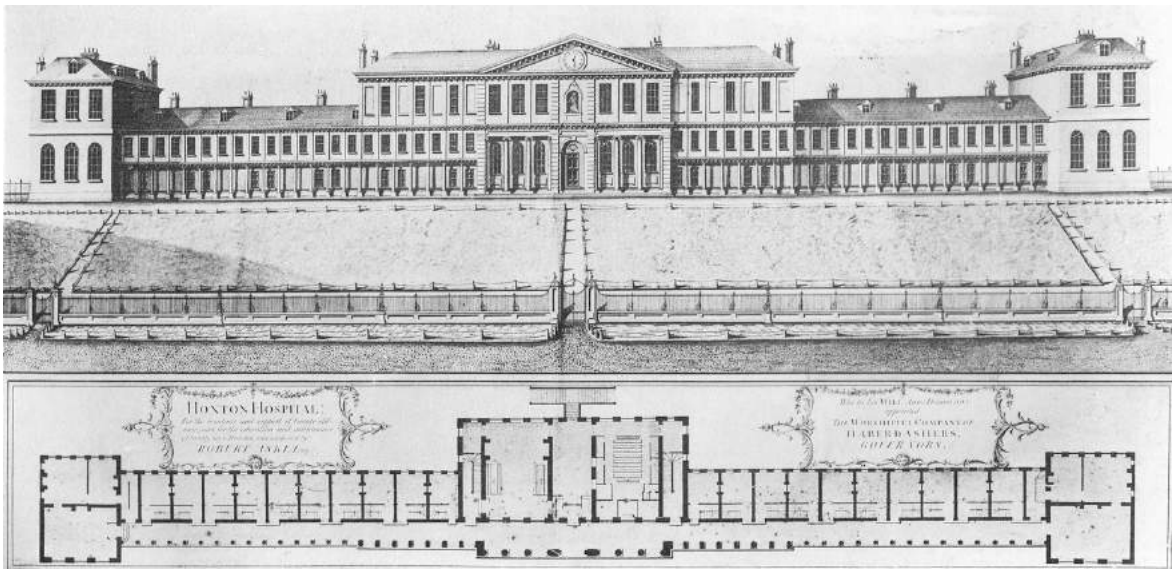


Figure IV-260. John Baker, surveyor, 'Elevation-plan composite drawing of Hoxton Hospital', 1792. This drawing is still in the collection of the Haberdashers' Company; I thank Dr. David Bartle, Archivist of the Company, for providing a photograph of it. Another copy of the drawing, dated 7 July 1792, appears to be at the British Library under shelfmark 'Cartographic Items Maps Crace Port. 16.10' bearing the note "Hoxton plan copied 7 July 1792 from an Old plan of Wm. Leybourns made in May 1690. J. Baker;" see the British Library catalogue record at https://goo.gl/E9NnjP. Source: Batten, pl. 40b.

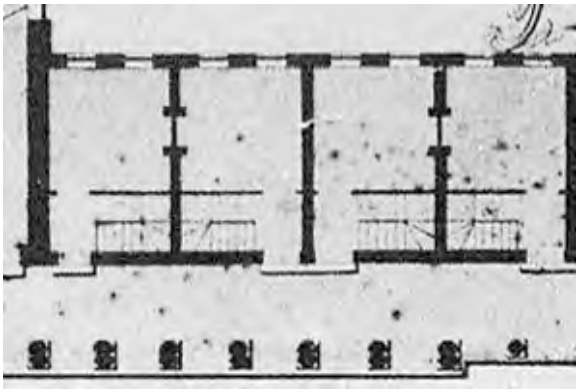


Figure IV-261. Detail from John Baker's 1792 plan, showing the living quarters of the almshouse residents. Source: Batten, pl. 40b.

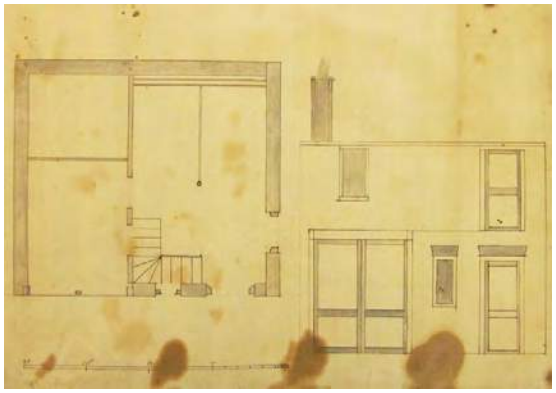


Figure IV-262. Hooke, 'Plan and elevation of a small unidentified building', n.d. This drawing could be related to Aske's Almshouses or other similar institutional projects of Hooke's. © The British Library Board, Add. MS 5238, no. 4.

ii. 48. ROYAL DOCKYARD IN HAMOAZE, PLYMOUTH

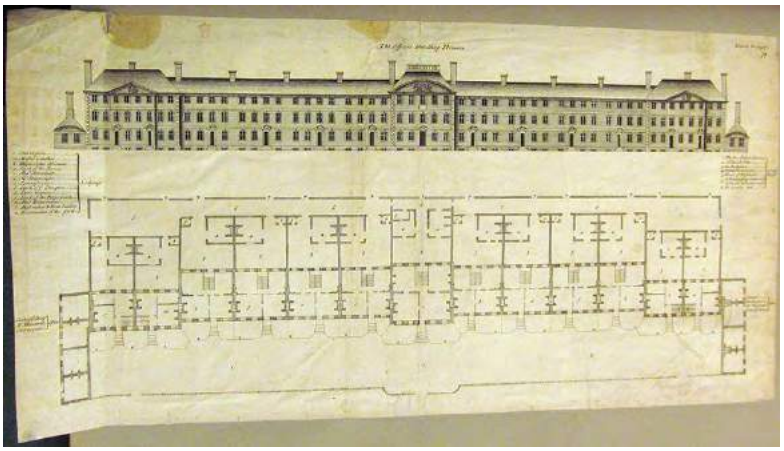


Figure IV-263. Anon. (engraver), Edmund Dummer (draughtsman), 'Fourth draught: engraved elevation and plan of the officers' dwelling houses in Plymouth', 1694.
© The British Library Board, Add. MS 5238, no. 79.

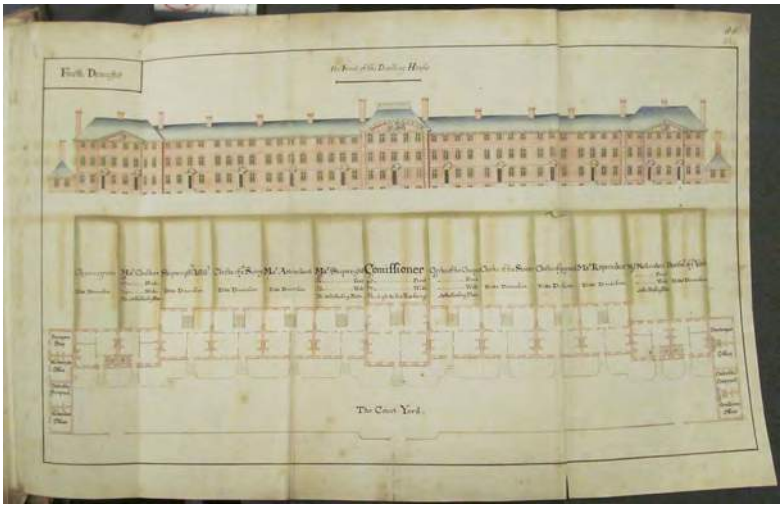


Figure IV-264. Dummer, 'Fourth draught: elevation and plan of the officers' dwelling houses in Plymouth', 1694.
© The British Library Board, Lansdowne MS 847, fol. 46.

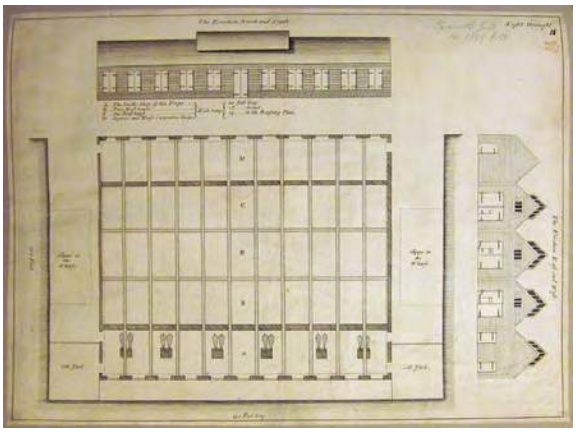


Figure IV-265. Anon. (engraver), Dummer (draughtsman), 'Eighth draught: engraved plan and elevations of Plymouth Yard', 1694.
© The British Library Board, Add. MS 5238, no. 81.

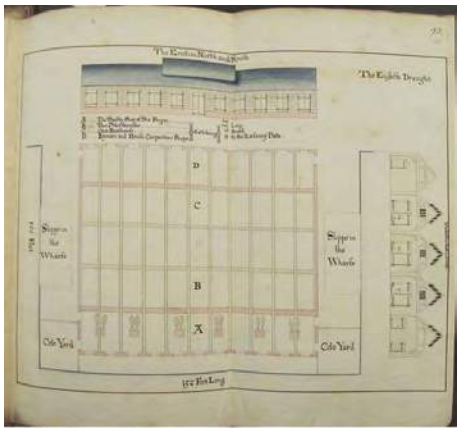


Figure IV-266. Dummer, 'Eighth draught: plan and elevations of Plymouth Yard', 1694.
© The British Library Board, Lansdowne MS 847, fol. 50.

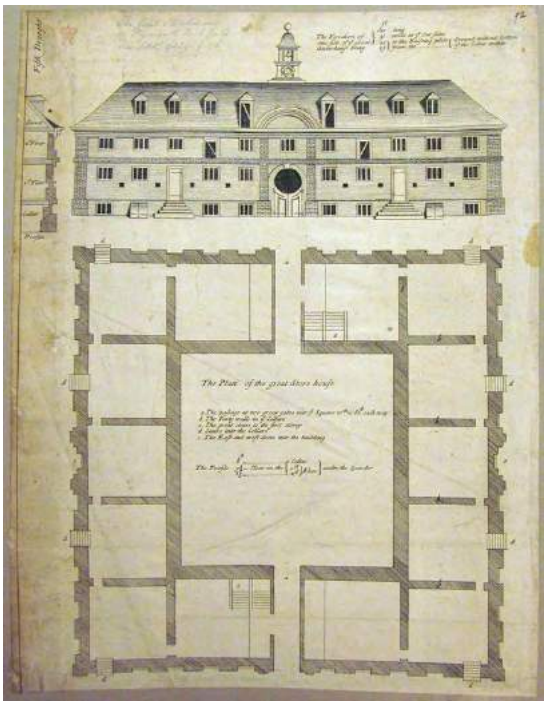


Figure IV-267. Anon. (engraver), Dummer (draughtsman), 'Fifth draught: engraved profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Add. MS 5238, no. 92.

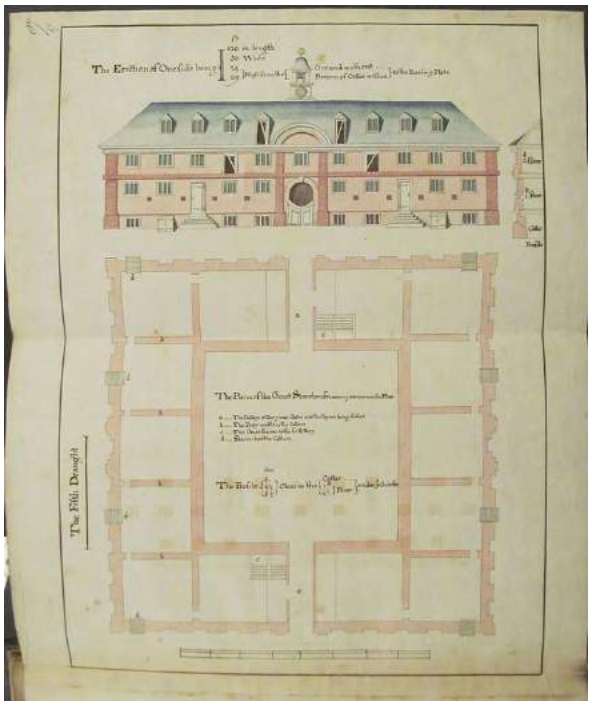


Figure IV-268. Dummer, 'Fifth draught: profile, elevation, and plan of the Great Storehouse in Plymouth', 1694. © The British Library Board, Lansdowne MS 847, fol. 47.

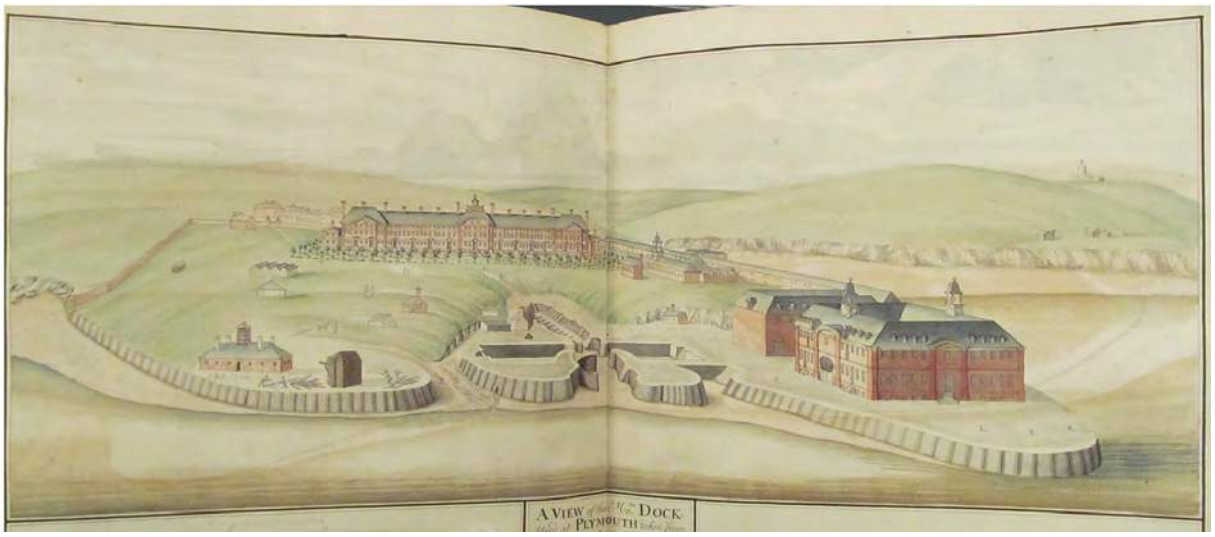


Figure IV-269. Dummer, 'View of his majest's dock yard at Plymouth', 1698. At the centre in the background is the Officers' Terrace, and to the right in the foreground is the Great Storehouse. © The British Library Board, King's MS 43, fol. 130.

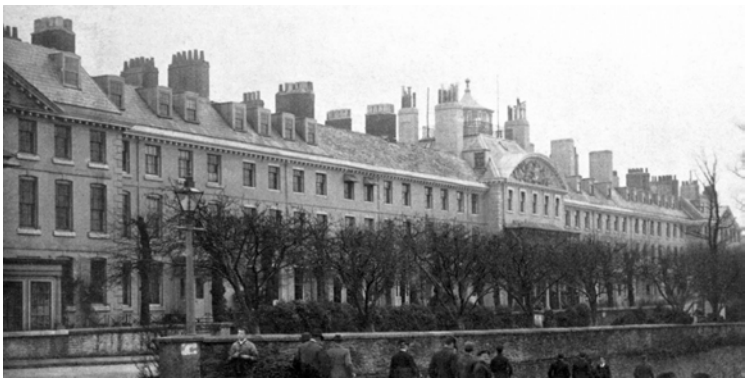


Figure IV-270. Anon. 'The officers' terrace, South Yard, Devonport Royal Dockyard', *c.* 1902. Most of this building was bombed in 1944; only the northern end is extant. Source: Tom Bowden, 'The Plymouth Blitz in 1941', 2011; https://goo.gl/vB6Mmd.

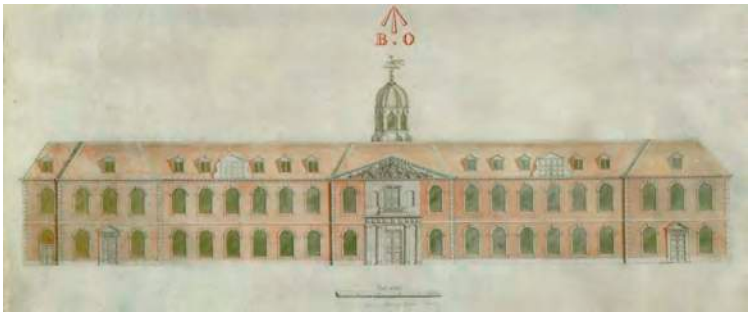


Figure IV-271. John Hanway, 'Elevation of the South Front of the Grand Storehouse at the Tower of London', *c.* 1710. Source: Government Art Collection, GAC no. 45; https://goo.gl/jf79p8.



Figure IV-272. Anon., 'Carved pediment of the Grand Storehouse at the Tower of London, with the arms of William III', n.d. Source: *An Inventory of the Historical Monuments in London*, vol. 5, East London (London, 1930), pl. 133.



Figure IV-273. Hooke (attrib.), 'Design for a military building', n.d. Source: RIBA, SA11/3.

ii. 49. SLUICES FOR SOUTHWELL AT KINGS WESTON, BRISTOL



Figure IV-274. Captain Grenville Collins, 'Visit of King William III to Kings Weston; view from the Severn estuary, looking towards river Avon', 1690.
Source: Kings Weston Action Group, 'Sir Robert Southwell'; https://goo.gl/6ikuAQ.



Figure IV-275. Kip, 'Kings Weston estate viewed from the east', *c.* 1710–1712.
Source: Kings Weston Action Group, 'Sir Robert Southwell'; https://goo.gl/6ikuAQ.

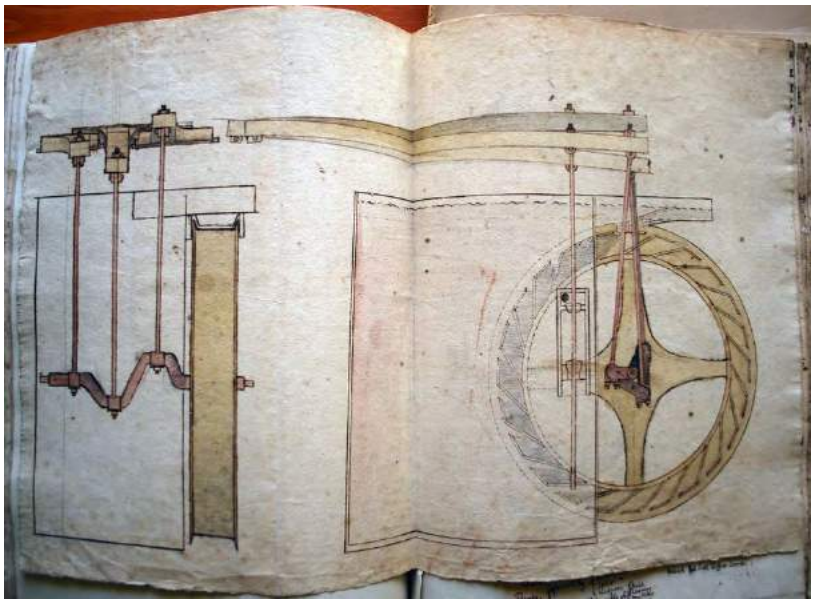


Figure IV-276. Hooke, 'Waterwork nearly finished by Mr. Aldersey at Hackney', 2 June 1686.
© Royal Society, Cl.P/20/71.

ii. 50. CHURCH OF ST. NICHOLAS, LUTTON, LINCOLNSHIRE

No images.

ii. 51. KIVETON PARK, YORKSHIRE

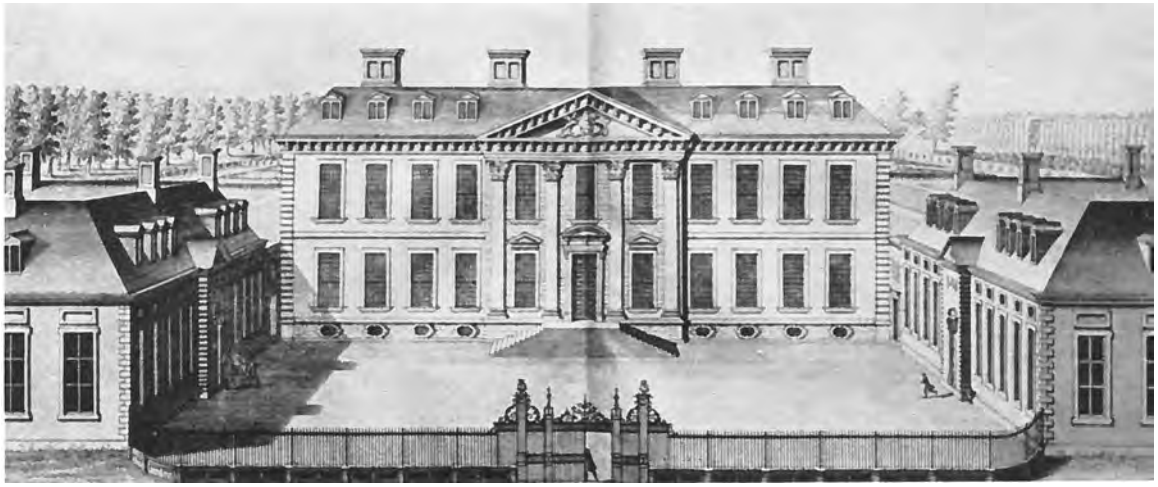


Figure IV-277. J. Badeslade and J. Rocque (engravers), 'Kiveton Park, Yorkshire', engraving from *c.* 1739, detail. Source: Downes, *English Baroque Architecture* (London, 1966), pl. 147.

ii. 52. BURLEY-ON-THE-HILL, RUTLAND

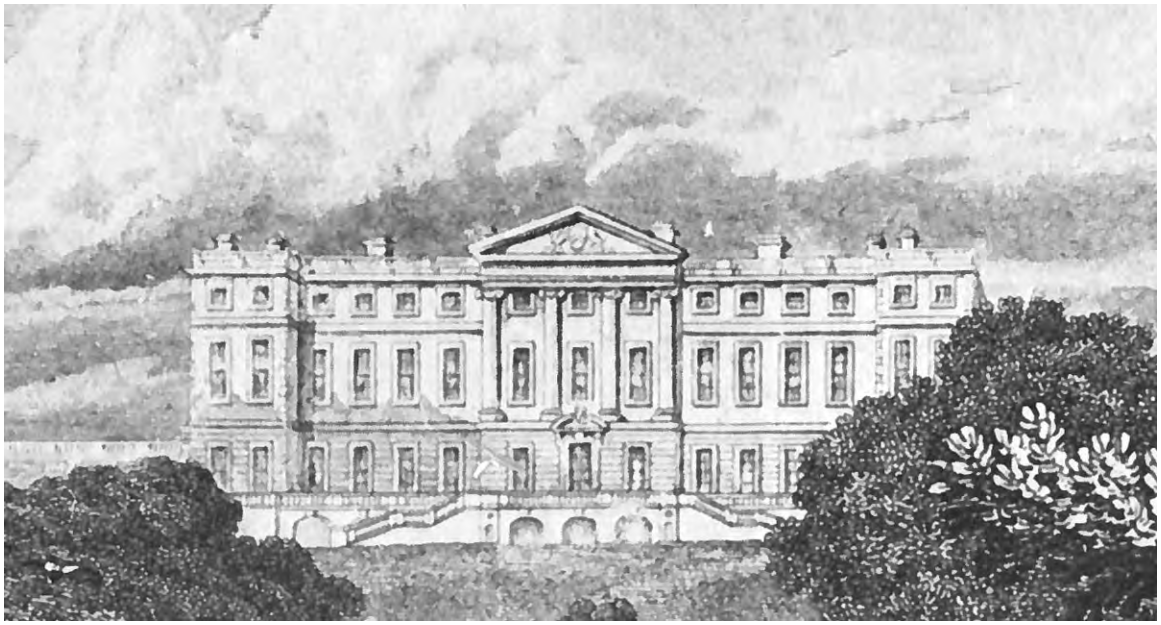


Figure IV-278. Neale (engraver), 'Burley from the south', 1822.
Source: Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), fig. 178 on p. 112.



Figure IV-279. Anon., 'An old aerial view, showing the extent of the colonnades and forecourt', n.d. Source: Lees-Milne, *English Country Houses: Baroque, 1685–1715* (Toronto, 1970), fig. 181 on p. 114.

ii. 53. KNELLER HALL [WHITTON HOUSE], MIDDLESEX

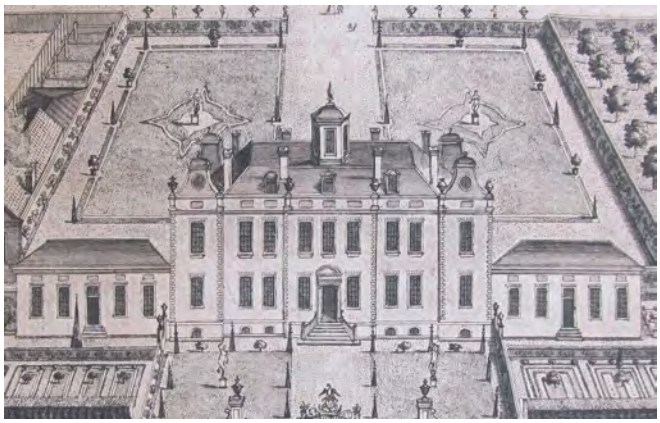


Figure IV-280. Kip, 'Whitton, Villa Godefridi Kneller', *c.* 1715–1722, detail.
Source: Bodl., Gough Maps 18, no. 1.



Figure IV-281. Kneller, 'Self portrait', 1720, detail showing Whitton House.
Source: Art UK © Bodleian Libraries.

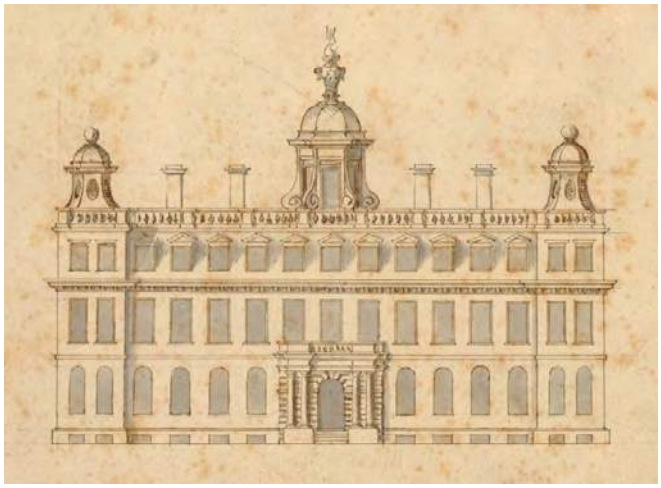


Figure IV-282. Hooke (attrib.) or Pearce (attrib.), 'Elevation of a 17thC building with cupola Pen and brown ink, with grey wash, over graphite', n.d., detail. © Trustees of the British Museum, Ee,2.119, AN1265760001.