The Origin of the Paris Observatory
Contributions to the Study of Early Modern Architecture

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Abstract

This study is predicated on a belief that all works of architecture retain a capacity to manifest, organize, and articulate the everyday existence of the communities who build them. Some works, however, are given extraordinary callings, and respond by setting up not only the daily practices and affairs of their particular historical people but by establishing the meaningful framework for everything that is anything at all. I propose that the Paris Observatory was such a work, standing as the focus for the emergence of a new way of being, and that this emerging world is, in a maturated form, the scientific world in which we live today. Thus, this study brings into sharper clarity our contemporary world in the moments when it was becoming what it is—that is, as it gained structure in the world being forwarded by the Observatory. Given that it is in the capacity of architecture to bring together and harmonize many latent levels of existence, any serious study of this sort must accept as its purview many diverse areas of modern scholarship. In response, the text is built upon six chapters of six semi-distinct historical subjects. My aim is to reassemble these cognate but now-fragmented histories into a more originary and defining whole—that is to say, one along the lines that the Paris Observatory, as a working work of architecture, had naturally assembled in the first place. If allowed the time to unfold in their own ways, some significant pieces of each of these histories will also be enriched, as they can be viewed in the context of the work of architecture that originally grounded them.

Résumé[1]

Cette étude est élaborée sur la croyance que toutes les œuvres architecturales maintiennent une capacité à manifester, organiser, et articuler l'existence quotidienne des communautés qui les érigent. Toutefois, certaine œuvres sont dotées de vocations extraordinaires et répondent non seulement en établissant les pratiques quotidiennes et affaires des gens à une époque donnée, mais en élaborant le cadre sensé pour tout ce qui peut possiblement être. Je propose que l'observatoire de Paris fût une de ces œuvres en tant que point focal pour l'émergence d'une nouvelle manière d'être, et, que ce monde qui émerge est, en une forme menée à maturité, le monde scientifique au sein duquel nous vivons aujourd'hui. Ainsi, je prévois que cette étude nous éclaire davantage sur notre monde contemporain dans les moments mêmes où il devenait ce qu'il est, c'est-à-dire lorsqu'il prit forme dans le monde transmis par l'observatoire. Comme c'est dans les capacités de l'architecture de rassembler et harmoniser plusieurs niveaux latents d'existences, toute étude sérieuse de cette nature doit accepter comme portée divers domaines de savoir moderne. En réponse, le texte est construit sur six chapitres de six sujets historiques semi-distincts. Mon but est de réassembler ces histoires connexes aujourd'hui fragmentées en un tout originaire et déterminant, c'est-à-dire, un tout qui considère que l'Observatoire de Paris, en tant qu'oeuvre fonctionnelle d'architecture, avait d'emblée naturellement assemblée. Étant accordées le temps de se déployer à leur manière propre, certaines parties significatives de chacune de ces histoires seront aussi enrichies, comme elles peuvent être vues dans le contexte de l'œuvre architecturale sur laquelle elles reposent.

[1] Translation by Natacha Boucher.

Acknowledgements

As my work on this project finally ends, the list of the names of those from whom I received help along the way seems endless to me, and I do not pretend that the few acknowledgements I can offer will in any way substitute for the personal thanks that I will find ways to express. Some were so important to me as to now seem essential. First, of course, is my life-partner and co-conspirator, Courtney, whose patience has been tried so many times by me and my constant missions impossible that she is certainly a saint. I wake up thankful that, as far as I can tell, she seems to also enjoy it. Those who know her know why I lead the charmed life that I do. My daughter, Louisa, should know that as we simultaneously wrote—I in a Montréal basement and she at a Washington, DC think-tank—her indefatigable spirit and her dedication to her own deadlines raised my own endurance. Next, I will never forget my editor and muse, Joanne Muzak—an angel, really, who recognizes the value of em dashes—who miraculously saw something in my writing that I hoped might be there. She instantly understood me and my aspirations, and her guidance and encouragement made me want to become a writer. Friends and colleagues Nathalie David and Éric Laurendeau have offered me advice that only decades of friendship could generate.

I would next like to mention my academic advisors, especially Nicholas Dew and Robert Berger. Nick graciously adopted me and my project, and provided guidance whenever I asked, even though he had so many students of his own. He patiently viewed my project through my own, naive eyes. At many junctures, I demonstrated that I knew less about what I was doing than would his own undergraduates. Nick instilled in my research a discipline where there was none before. So did Robert, who I believe is the greatest kind of teacher: he knows unapologetically what he knows, which is an absolute treasure-chest of valuable, meticulous learning. He could be tough, frank, and certain—an enforcer of Occam's Razor—

but he is also sincerely curious about my own divergent perspectives. Robert was willing to follow me wherever I wanted to go—at least until I could no longer defend myself. In the end, he showed an open appreciation and support for my work that I will never forget. Of course, I will be forever grateful to Alberto Pérez-Gómez, my supervisor, for inviting me to McGill to be part of the incredible intellectual world that had formed around him. From that instant forward my life has been immeasurably enriched. I now follow many new, thoughtful paths.

I also thank those professors who read my text and offered their opinions and questions as a part of my defence review. In addition to professors Dew and Pérez-Gómez, McGill professors Faith Wallis, Annmarie Adams, and Martin Bressani all took the time to read my text and tried to understand my point of view. Professor Bressani deserves special thanks. It was in his course that I was first able to develop my interests in understanding and explaining past events and people. He claims to have observed a passion in my investigations, which gives me energy to continue. External examiner J.B. Shank at the University of Minnesota read my text and provided a very helpful review for which I am very grateful.

In a list that is unfairly brief, I want to mention a few other special teachers of mine: Bill Sloan at the University of Idaho, and David Leatherbarrow, Peter Carl, and Homa Farjadi at the University of Pennsylvania—all of whom took me seriously at critical moments of my life. If it were not for Bert Dreyfus at Berkeley and Albert Borgmann at the University of Montana, the wisest of all, it would not have been in my imagination to undertake this crazy enterprise. My intellectual heritage is thereby set and I am indeed proud to claim it.

There are others who by just doing their jobs made my work so much easier and enjoyable. In the School of Architecture McGill, David Krawitz administered my existence there with aplomb, and Luciana Adoyo was kind, helpful, encouraging, and always gracious. In McGill Library's Rare Books Collection, Ann Marie Holland and Raynald Lapage were

always very kind and helpful. In Paris, at the Archives of the Academy of Sciences, Florence Greffe graciously interpreted my debutant French long enough to point to the copy of Tome 1 of the Procès-Verbaux that proved so important to my research. Nicolas Leste-Lasserre, became my key contact, friend, and very gracious host at the Paris Observatory, the building that he adores as much as I do. Our exploration of the Observatory underground will remain a highlight of my life. Dr. Suzanne Débarbat was curious, gracious, and encouraging. Amelia Laurenceau could not have known the profound effect she had on me the day I arrived for the first time at the Observatory, only a few minutes before closing on a Friday afternoon of a three-day weekend. After politely sharing with me the last few minutes of her day, she said, in effect, "don't break anything," and trusted me to explore the building on my own, where I stood, alone, bathed in a Paris sunset, on the stairs where the men I would come to know in my research had stood some 350 years earlier.

I relish the opportunity to mention some colleagues involved in my work, the amazing thinkers that made up the intellectual world—the golden years, it has been said—of Professor Pérez-Gómez's world. They all matter to me in private ways and I cherish those memories. In the beginning there was Rafico Ruiz, Jonathan Powers, Diana Cheng, Gül Kale, Edward Houle, Ehsan Daneshyar, Suresh Perera, Maria Elisa Navarro, Negin Djavaherian, Yoonchun Jung, Zubin Singh, Paul Holmquist, and Jason Crow. Later, there arrived Keith Ragsdale, Anca Matyiku, Brighita Lungu, and Sonya Kohut. In each case, I tried to see into the curious openings that only these amazing thinkers had so far seen; I always believed that each one had earned our support—no matter their wanderings and uncertainties—simply on their own standing as original thinkers.

No colleague has played a larger role in my work than Natacha Boucher. Her friendship, insights, and unique ability to tune into my meaning, and oscillate meaningfully between

English and French made her indispensable. Lastly, I must mention Angeliki Sioli, my McGill mate, who had an extraordinary ability to see right through me and my objectives. How can I be so fortunate?

In memory of Dalibor Vesely, the patron saint of my project.

Origin means here that from where and through which a thing is what it is and how it is. That which is, as it is, we call its nature. The origin of something is the source of its nature. The question of the origin of the artwork asks about the source of its nature.

Martin Heidegger, "The Origin of the Work of Art"

In all science—therefore in metaphysics—it is a question of proving. To prove consists in grounding appearances in order to know with certainty, leading them back to the ground in order to lead them to certainty. But in phenomenology—that is to say, at least in what it intends, in the attempt to think in a nonmetaphysical mode—it is a question of showing. To show implies letting appearances appear in such a way that they accomplish their own apparition, so as to be received exactly as they give themselves.

Jean Luc Marion, Being Given: Toward a Phenomenology of Givenness

This book, like most books, has a primary structure and a tertiary structure. The primary structure is, of course, the linear string of symbols, words, paragraphs, and chapters that is mandated by the nature of the language. But just as with a molecule of globular protein, which must fold in order to become active, this linear string must be folded back on itself, so as to bring parts remote in the string into close contact.

Robert Rosen, *Life Itself*

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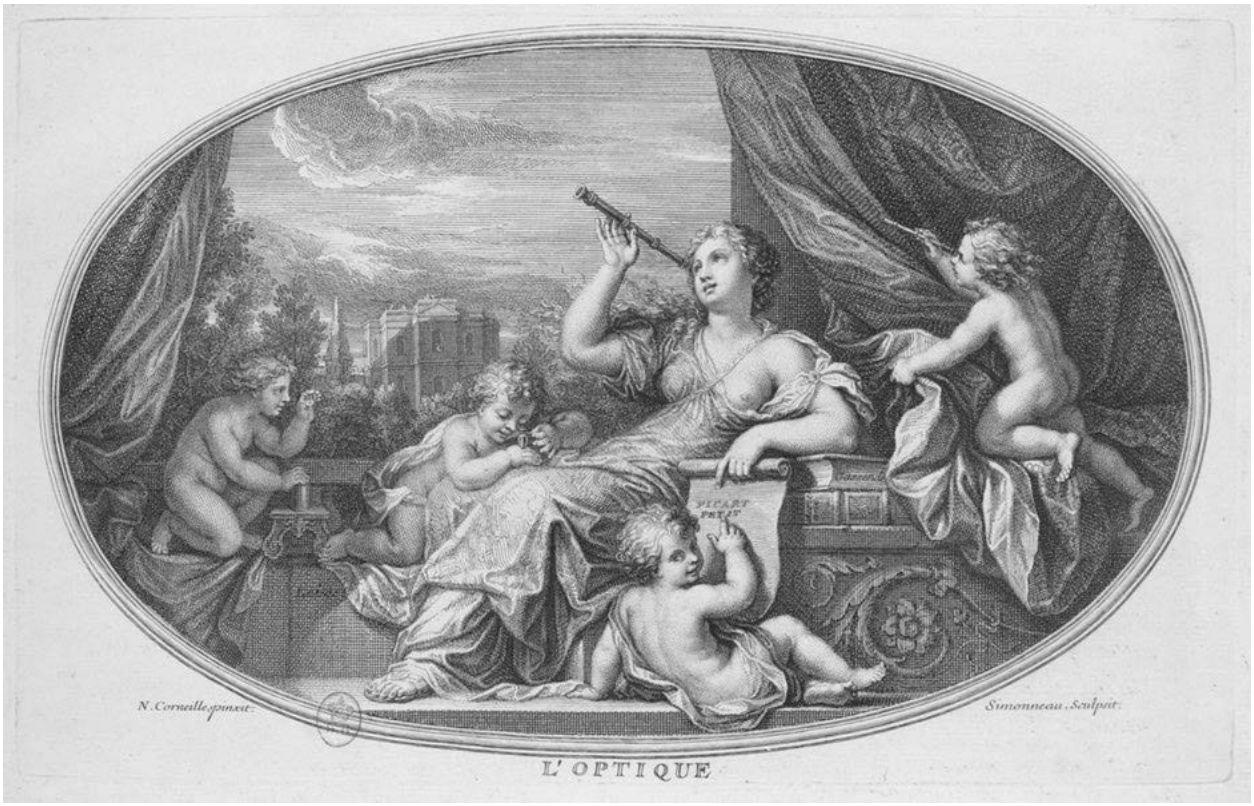

Figure 1. Pierre Corneille, chapter title page, "L'Optique," from Charles Perrault's *Le cabinet des beaux arts,* 1690.

Introduction

Portraying the Paris Observatory

There is something peculiar about the way in which artists chose to treat the Paris Observatory around the time of its origin. In image after image, the figure of the Observatory is set deep into the background of the artists' scenes. Nearly without exception, the Observatory is depicted off in the distance, remote, sitting alone behind the main scene, back on the farthest horizon (Figures 1–8). It is often rendered with lines so faint or washes so transparent that its form is barely discernible. It is almost never rendered as the primary figure. Sometimes, the artist does not even situate the Observatory in the same realm as the primary scene. In one engraving, "Louis XIV Visiting the Royal Academy of

Figure 2. Sebastien Le Clerc, "Louis XIV Visiting the Royal Academy of Sciences," from the *Mémoires pour servir a l'histoire naturelle des animaux*, 1671.

Sciences" (Figure 2), artist Sebastien Le Clerc places an exterior wall between the Observatory and the main subjects of his illustration. Far off on a remote horizon, the Observatory can be seen only through a window.

In some images, the Observatory is in the scene only in the abstract, appearing as a drawing or rendering hanging on a back or side wall (Figures 3 and 4). In another, a piece of the Observatory's architectural floor plan can be seen sticking out from the bottom of a stack of other architectural drawings (Figure 6). This curious phenomenon also occurs in the famous

Figure 3. Henri Testelin (after Charles Le Brun), "The Presentation of the Members of the Academy of Science to Louis XIV in 1667," 1673?

frontispiece for Claude Perrault's translation of Vitruvius, also made by Le Clerc (Figure 7). In it, Le Clerc seems to have wanted to test the limits for how far he could push the Observatory into the background and still allow a place for it in his composition. He situates the Observatory as remotely as possible, alone on the crest of a mountain on the farthest horizon. Moreover, he rendered it with such delicate line work and with so little detail that, even when closely examined in an original print, the form of the Observatory is barely visible.

In fact, in most secondary reproductions of Le Clerc's engraving, his Observatory fades away entirely, concealed in the haze between the earth and sky. This gesture of the Observatory's betweenness and ephemerality may have been a product of Le

Figure 4. Louis Cossin, engraver, portrait of Jean-Dominique Cassini, about 1670. Source: Bibliothèque nationale de France.

Figure 5. Jean-François Millet, "L'Observatoire, vu de la Butte-aux-Cailles," about 1710.

Figure 6. Philippe Lallement, portrait of Charles Perrault, about 1672.

Figure 7. Sebastien Le Clerc, frontispiece for *Les dix livres d'architecture de Vitruve,* Claude Perrault, 1673.

Clerc's artistic wit. After all, it is the *Paris Observatory* that Le Clerc renders—the tower whose nature it would be to sit between earth and sky. Nonetheless, the overall effect of such a gesture must have been difficult to justify when we take into account the main purpose of the drawing—namely, to illustrate the title page of Claude Perrault's translation of Vitruvius, and in so doing to lionize what is generally accepted to be Perrault's architectural design triumvirate: the Arc de Triomphe du Trône (left), the east façade of the Louvre Palace (central), and the Paris Observatory (distant). What motivated Le Clerc to represent the Observatory in such a deferred fashion? Could he have been given such artistic licence? Perhaps. But even so, that does not go far in helping us understand the larger phenomenon of the backgrounded Observatory, a phenomenon in which Le Clerc played only a part.

In fact, another artist later took Le Clerc's gesture to an ironic extreme. In 1690, Valentin de Boulogne followed Le Clerc's famous frontispiece with a version of his own. Boulogne had been asked to provide an illustration for the chapter about architecture in a book on the beaux-arts by Charles Perrault, Claude's brother (Figure 8). In Boulogne's version, the Arc de Triomphe, the Louvre Palace, and the Observatory are again in the scene, and Boulongne also positions the Observatory in the background. However, he obscures it even further, by hiding it almost entirely behind the Arc de Triomphe. If one looks very closely, a corner of the Observatory can be made out through the portal of the central arch.

Why these artists intentionally rendered the Observatory with such apparent abjection is a question that art historians have not yet considered. I contend that these artists did not mean to portray the Observatory as less important than the other figures in the scenes. The Paris Observatory, as we will see in the following chapters, was a structure with celebrity status in France and beyond. I suggest instead that the artists recognized that no contemporary scene

Figure 8. Valentin de Boulongne, painter, chapter title page image, "L'Architecture" from Charles Perrault's *Le cabinet des beaux arts,* 1690.

(Detail of the Observatory)

would have made sense apart from the context of the Observatory. In each case, these renderings show the Observatory to be quietly overseeing the cultural and discursive space that it was, at that moment, making available. Thus, the Observatory was not pushed back out of the scenes in so much as everything else—in fact, every aspect of culture at that moment—was being gathered and re-presented in its foreground. An emerging world was acquiring its significance and meaning in light of the Observatory, a world that the Observatory structure was mutely overseeing from the background.

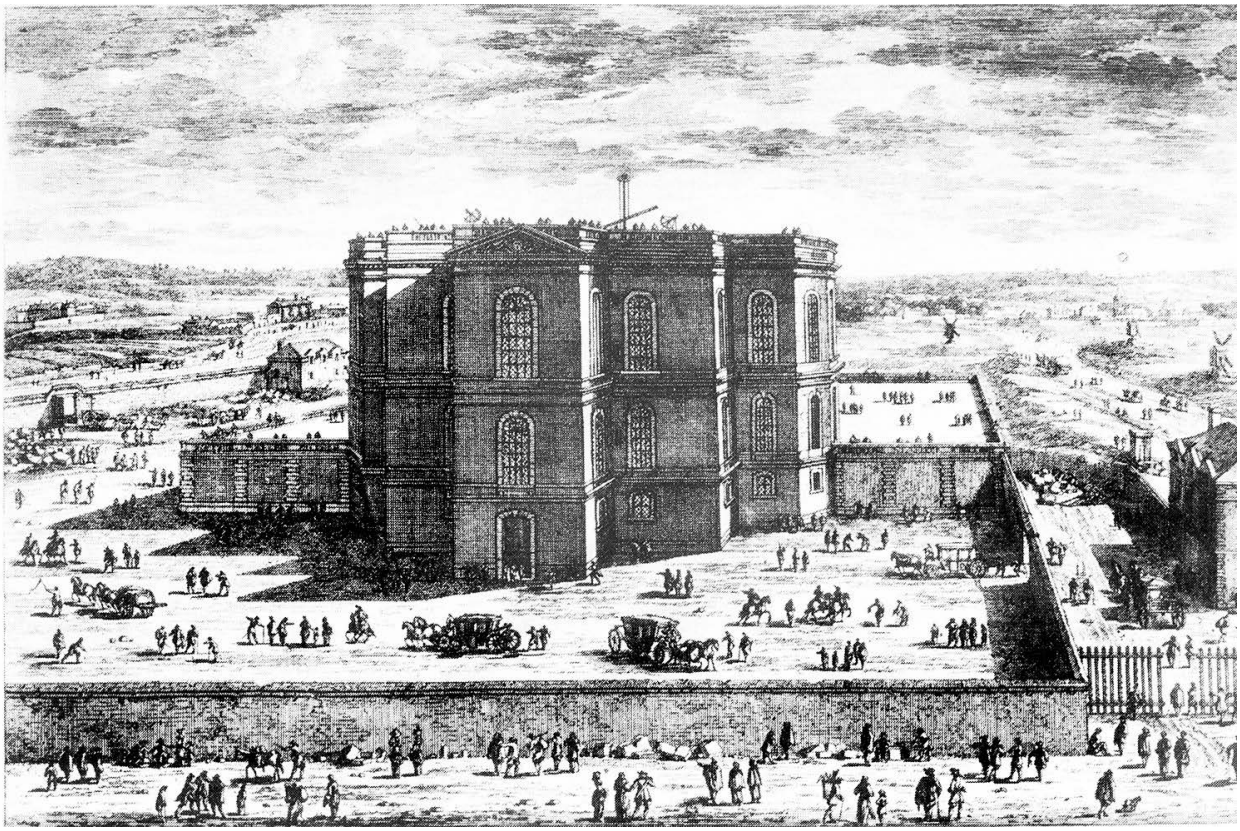

Figure 9. Nicolas Perelle, "Cette face de l'Observatoire regarde le Faubourg de St Jacques...," 1680? (Engraving available at the National Maritime Museum, Greenwich, London.)

There is another kind of illustration of the Observatory from that time that augments my reading. Unlike the aforementioned illustrations, in these images the Observatory is not concealed or demurred but is treated as the central figure in the scene—at least compositionally (Figures 9 and 10). Its centrality is misleading, for the artists still find ways to relegate the Observatory. Here, the prominence of the Observatory is eclipsed by the multitude of people that crowd its site. In fact, they swarm it, like ants on a sugar cube, moving about its large terraces and clambering over its form. They crowd together on its roof, where they can be seen above its parapets, peering outward to survey their city, kingdom, and world and its horizons, or upward towards the heavens.

To be sure, the people populate the Observatory renderings, but they are not there to admire the architecture in the way we see figures in other architectural illustrations, who are

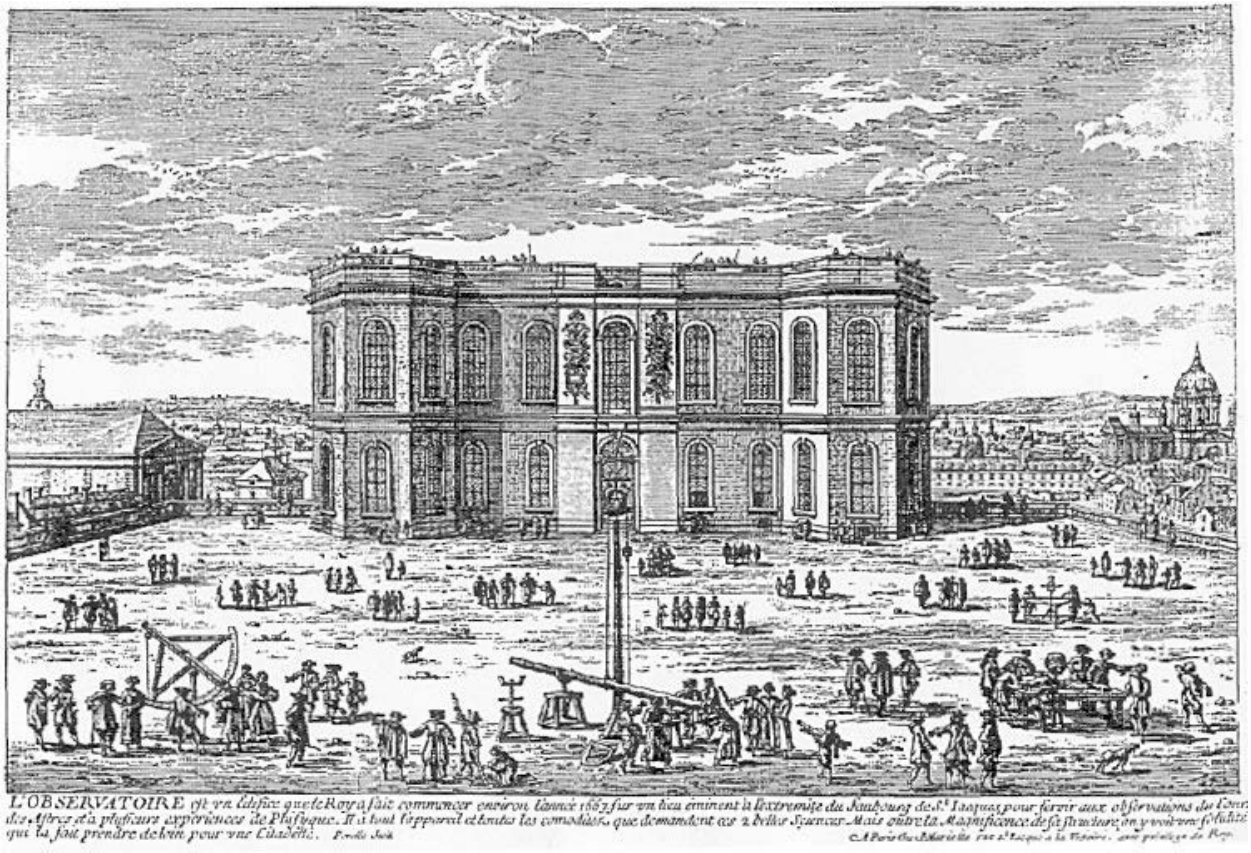

Figure 9. Nicolas Perelle, "L'observatoire est un edifice que le roy a fait commencer environ..." Perelle fecit., 1680? (Engraving available at the Beinecke Library, Yale University.)

there like ornaments, to admire the building or to give their buildings a human scale. On the contrary, the people in the Observatory renderings are much too busy with their own interests to take notice of the building. What the engravings reveal is that as it stands there mutely, the Observatory sets up a new world for people to act out their emerging roles. They have been pulled out of their ordinary lives and into the world of the Observatory. And once they are in its world, they act together in new ventures and activities.

We can conclude that everyone is occupied by scientific endeavours. They are drawn to use the instruments that the Observatory affords them, such as telescopes and quadrants. Elsewhere on the site, they gather around tables, where they witness experiments. Other people stand in circles, absorbed in discourse. Everyone is taking in all that the Observatory is setting up for them. They are engulfed in the mood of a new and emerging world. In similar

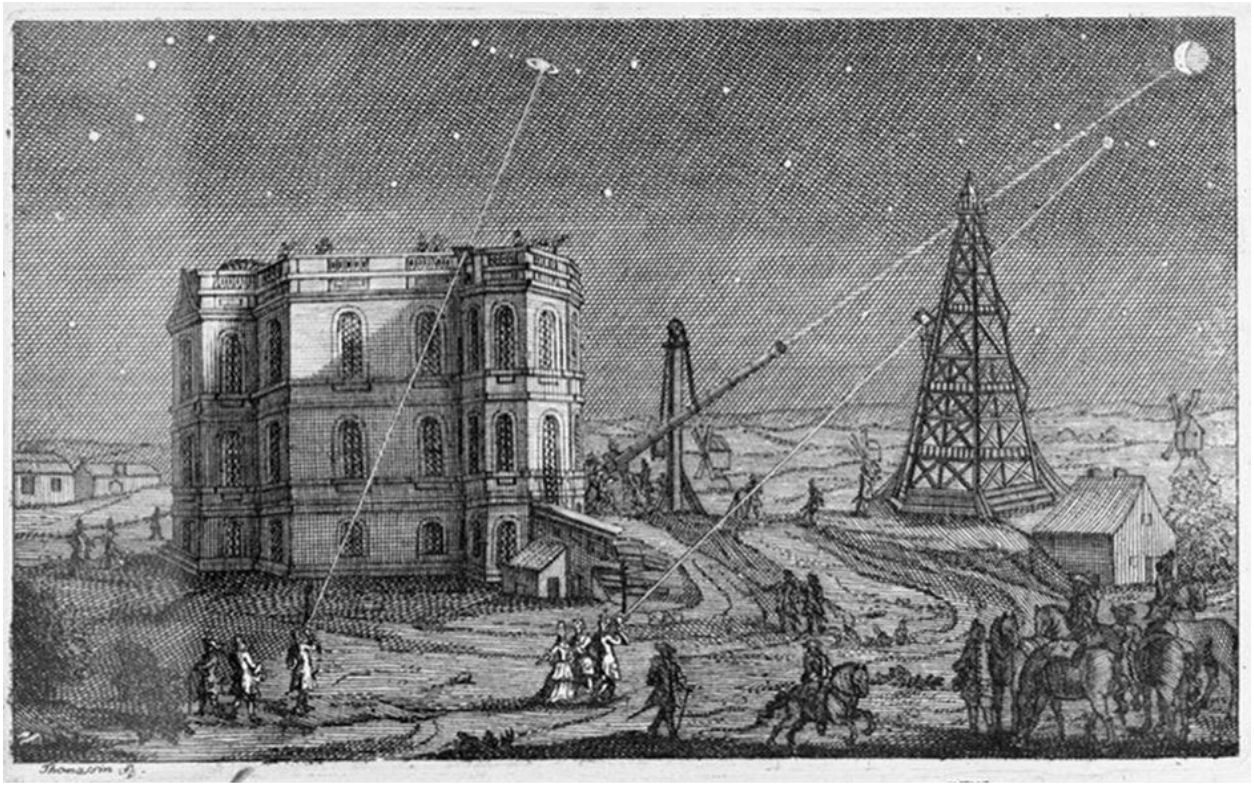

Figure 11. Simon Thomassin, engraver, a scene showing stargazers around the Paris Observatory at night, 1680?

scenes, the Observatory is portrayed in its nighttime role (Figure 11). Here it is the astronomers who hold sway. They use their instruments to look past their terrestrial world into other worlds entirely. They spy on the moon and planets. They can even see Saturn and its rings. They take advantage of opportunities that could only be imagined a decade earlier.

It is true that all these activities could happen elsewhere—in a square or garden, or on another rooftop. But they do not happen elsewhere. They happen at the Observatory. It is the Observatory that first draws these people together, and then draws from them a particular kind of involvement. The Observatory and the latent organization of activities and existence that flow around it work together as a kind of gestalt. On the one hand, it is the Observatory that sets up the meaningful structure that organized the constituents of its world. On the other hand, it is only from those constituents and their practices that the Observatory gets its meaning and purpose. Unlike a painting or literary work, the Observatory offers no outward

explanation as to why it is to be taken as it is—a place for scientific studies. Nonetheless, it does somehow evoke its purpose. And although its form does not appear to play a mechanical role in the activities that take place there—a characteristic that will become a design controversy later on—the Observatory gives meaning to the world of the people who populate it. It alters their outlook not only on themselves but on all things. In the world of the Observatory, what were once heavenly bodies become stars and planets, and creatures of God show up as bodies with internal systems that can be analyzed and compared.

All in all, we must admit that we know very little about the people in these illustrations. However, what we are led to understand about them is that, for the time being, their lives have been reoriented around a new, shared, scientific world, and it is a world that has been opened up by the Paris Observatory. Architectural historian Dalibor Vesely describes this phenomenon of works of architecture: in these works, he sees the unifying power of a historical work of architecture. This power is a characteristic that all works of architecture retain, but has been lost to contemporary works. The gathering and organizing of worlds comes about by architecture's integral capacity to create what Vesely refers to as "communicative space," a latent but highly structured continuum of meaningful relationships that is opened up by a work of architecture.[1]

Vesely does not conjure an intentional space, structured "mechanically, to fulfill predictable functions." Rather, the structure he imagines is the latent framework upon which a shared reality of relationships of abstract ideas and concrete situations of everyday life can be organized—the "topological and corporeal foundation of culture." For Vesely, the communicative space opened up by architecture works more in the fashion of a musical

[1] Dalibor Vesely, *Architecture in the Age of Divided Representation: The Question of Creativity in the Shadow of Production* (Cambridge, MA: MIT Press, 2004), 1–8.

instrument, "which can send reverberations through other levels of culture and help embody them." In that light, the Observatory sets its constituents in harmony with each other and with all parts of their referential totality. It is exactly this kind of resonant and discursive space that I see in the foreground of the Observatory—a space that is opened for the purposes of scientific communication, but even more broadly, a space that embodies what matters at all for that particular historical people. For Vesely, restoring this role of architecture—a role that works of architecture like the Paris Observatory seem to taciturnly play—is a step towards returning architecture to its historical place as the foundation of contemporary life.[2]

Vesely's thinking is along the lines of Martin Heidegger's. In his essay "The Origin of the Work of Art," Heidegger uses the example of a Greek temple to study the nature of art. For Heidegger, the temple offers a specific insight into what art is because, unlike a painting or literary work, which can be narrative, architecture never is. The temple, explains Heidegger, "portrays nothing." Outwardly, it tells no story about itself or anything else. It simply stands there, jutting from the earth's crust. However, the temple offers something more: as it stands there, the temple somehow makes present more than what appears. Somewhere inside, Heidegger explains, is concealed the figure of a god, "and through that concealment, the temple work makes the god fully present."[3] The temple, its god, and its world are together saturated with the meaningfulness of a tradition. And, like Vesely's musical instrument, the temple projects and delimits an extension of that meaningfulness out into the world around it.

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[2] Ibid., 8.

[3] Martin Heidegger, *Off the Beaten Track*, trans. Julian Young and Kenneth Hayes (Cambridge: Cambridge University Press, 2002), 20. We can see here a comparison to the Holy of Holies in the Temple of Solomon described in the Book of Exodus (26:33). As in that case, it is the concealing of God that allows for the faith in His presence.

Figure 12. Greek temple ruin. Public domain image. Digital artwork by the author.

In its standing and concealing, the temple sets up for Heidegger a "holy precinct," a term comparable to Vesely's communicative space.

The meaningfulness that was somehow embodied in the temple sets up a complex structure of qualitative difference for this historical people. In the same way that the Paris Observatory would later create and orient its own emerging culture, the temple reflects back to its particular historical people in concrete ways who they are and who they ought to be at that moment. As Heidegger explains, the temple tacitly sets up the relationships that constitute both the conceptual and concrete human being. "It is the temple," writes Heidegger, "that first structures and simultaneously gathers around itself the unity of those paths and relations in which birth and death, disaster and blessing, victory and disgrace, endurance and decline acquire for the human being the shape of its destiny." All being is given meaning by way of the temple. In its standing against the sky, the temple even makes the invisible air

visible by distinguishing itself against it. The crafted stone walls and columns are made visible and intelligible as stone by means of the sun's light, which plays upon the surface. The temple first reflects the light of the sun on its pediments, heralding the day's return. "The breath of the sky and the darkness of night" are measured as wide and dark, only in the way that they push to the background and conceal the temple.

It is the temple that makes visible the invisible violence concealed in a storm, when the rain lashes against its walls and columns. For this historic people, they are who they are in reference to the temple. The temple "first gives to things their look, and to men their outlook on themselves." All things in the world show up as what they are in its light: "tree, grass, eagle and bull, snake and cricket first enter their distinctive shapes and thus come to appearance as what they are." In its standing, the temple draws out of the dark and mysterious earth the "unstructured but unforced support" that it conceals.

Earth, therefore, was for that historical people a fundamentally sheltering earth, "the protecting one." The idea of earth that Heidegger poses is "far removed from the idea of a mass of matter, or the astronomical idea of a planet" that our own modern world asks us to accept as an adequate definition.[4] Embodied in and enacted through the temple, nature, or earth—that is, *physis*—was that in which all things arise, exist for a time, and then are brought back into it. Crafted from earth and rising from it, the temple stood for a reality of a continuity

[4] Ibid., 20, 21.

of cyclical recurrence. The temple made clear the constant returning to what has always been.[5]

Working for a particular people within a particular tradition at a particular time, architectural works like the temple are epochal. The bonds between people and their architecture are therefore ephemeral. The capacity of the Greek temple to organize and orient has waned and the temple structure has lost its sway. As we now encounter them, writes Heidegger, works such as the temple "are no longer what they were...They themselves are what has been" (Figure 12). Today, looking at it, we sense that the temple must have *meant something to somebody*. However, it no longer provides our contemporary world with any real orientation or alignment with what ought to matter to us. Nor would it have offered much clarity to a sixteenth-century Christian world, whose definition was being framed and oriented by equally potent but more relevant works.

Those orienting powers are available only while "the god has not fled from it," explains Heidegger, or until the latent bond between culture and architecture—the complex structure of meaningful relations described by Vesely—gives way to a new order. Nor can that relation be restored by people who might sentimentally long for or envy it. "World-withdrawal and world-decay," Heidegger assures us, "can never be reversed," a point also made by Vesely. And until architecture's unifying power is "rediscovered," we can, like Vesely, learn from

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[5] As Octavio Paz explains, ancient societies were unaware of tradition. For them, "the past protects society from change by serving as a model for imitation and by being periodically actualized in ritual. The past has a double nature: it is an immutable time, impervious to change; it is not what happened once, but what always happens." In that way, the temple, in its standing there, perpetuates without contradiction the revolving continuity of reality for its historical people. See Octavio Paz, *Children of the Mire: Modern Poetry from Romanticism to the Avant-Garde* (Cambridge, MA: Harvard University Press), 9.

historical works of architecture such as the Paris Observatory, as they worked, and marvel at their incredible communicative powers.

Definitions, Aims, and Points of Departure

When we talk about "origin," what do we mean? Heidegger opens "The Origin of the Work of Art" with an important definition, which I adopt as a guiding principle for my own study. He writes, "Origin means here that from where and through which a thing is what it is and how it is. That which is, as it is, we call its nature. The origin of something is the source of its nature. The question of the origin of the artwork asks about the source of its nature."[6] It is the "that" in Heidegger's definition—the "that from where and through which" something is—that mattered to him. It is the path towards art's source and grounds for its possibility that he followed. Philosopher Karsten Harries helps us understand that Heidegger was not inquiring "into archaic art" or "when and where humans first created works of art." By "origin," or "Ur-sprung," Heidegger intended something more like "primordial leap." His inquiry was into "the meaning of the nature of that leap," that is to say, the source of that which "carries those who come under its spell to some other place."[7]

Thus, if my interest is in the origin of the nature of the Paris Observatory, then it should be clear that the Observatory building itself—the mute but omnipresent structure represented in the artists' illustrations—is not the object of my investigation. Rather, I see the Observatory as that which gives us access to its origin. It is that which both gathers together the true subject matter and brings it out so that I can try to bring it into sharper clarity. The Observatory shall be that on the basis of which its nature becomes available.

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[6] Heidegger, *Off the Beaten Track*, 1.

[7] Karsten Harries, *Art Matters: A Critical Commentary on Heidegger's "The Origin of the Work of Art"* (Springer Netherlands), e-book, 63–69.

Another of this study's defining guideline is derived from Vesely. We see in his writing that any work of architecture conceals a certain integrity. As he explains, all architecture retains a capacity to organize, embody, and sustain the meaningful existence of the communities that build it. However, it is just as clear that not all architecture is endowed with equal unifying powers. What is evoked by a bicycle shed is not the same as what is evoked by Lincoln Cathedral.[8] Some works of architecture are extraordinary and have extraordinary callings. Works such as the temple give not only orientation to the daily affairs of their particular historical people but definition and meaningfulness to everything that is anything at all.

I assert that the Paris Observatory—like the Greek temple in Heidegger's example—was such a work. It was an extraordinary, reconfiguring work of architecture that assumed the focus of the emergence of a new epoch of being. In his study of Heidegger's ontology of art, Hubert Dreyfus explains that when a work of art "works," it "performs at least one of three ontological functions. It manifests, articulates, or reconfigures the style of a culture from within the world of that culture."[9] Examples throughout this study will show that the Observatory served as the work of architecture that brought to the fore marginalized or emerging practices and beliefs, and led to a reorienting of the latent continuity of one part of seventeenth-century reality. Furthermore, I suggest that this emerging epoch is, in a maturated form, the world in which we live today. Consequentially, I expect to bring into sharper clarity the origin of our contemporary world as it was becoming what it is, as it gained structure and organization around and through the Observatory.

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[8] See Nikolaus Pevsner, *An Outline of European Architecture* (Harmondsworth: Penguin, 1957), 15.

[9] Hubert Dreyfus and Mark Wrathall, eds., *A Companion to Heidegger* (Malden, MA: Blackwell, 2005), 407.

It would follow then that because it is in the capacity of architecture to bring together and harmonize many latent levels of reality, any serious study of the origin of a work of architecture must take as its purview many areas of scholarship—most of which will at first seem unrelated to architecture. This infers that such a study might find a readership with equally diverse backgrounds and interests. Thus, it is inevitable that through the course of this study there will be discussions that for one particular historiographical group might seem original and enlightening, while, for others, the same discussions will seem familiar and derivative.

Take for example two significant figures in this study: Jean-Baptiste Colbert and Gian Lorenzo Bernini. As historical figures, both are very well known in their own historiographical realms. Yet each, it is safe to say, seldom appears in the historical records of the other. The fragmentation of historical knowledge also occludes our familiarity with other important figures involved in the Observatory project. Savants such as Henry Oldenburg, Christiaan Huygens, Melchisédech Thévenot, Henri Justel, Jean Chapelain, and most notably the French polymath Adrien Auzout all played fundamental roles in the development of the Observatory project. Nevertheless, each is virtually unknown to the architectural reader.

The reader must expect that depending upon his or her background, as the comprehensive story of the Observatory's origin is pursued, the study will inevitably oscillate between the familiar and unfamiliar. This study aims to reassemble these cognate but fragmented histories into a more original and descriptive whole—that is to say, one along the lines that the work of architecture had naturally assembled in the first place. If allowed the time to unfold in their

own ways, pieces of each of these histories will also be enriched, as they can be viewed in the context of the work of architecture that originally grounded them.

Strategy and the Plan for the Chapters

If it is not the Observatory itself but the source of its nature that is the subject of this study, then where do I find that source to study? How do I identify the thing that I seek to understand and explain? Where does this study begin, where can I find the origin of that origin? Rather than getting entangled in the circularity of the thing and its definition, I have chosen a simple beginning point. Each of the following six chapters begins with a single, monumental occurrence—an auspicious event that I will assert focused, for a brief time, all layers of every population on earth. In the final days of 1664, there spontaneously appeared a spectacular comet. It remained highly visible nightly for weeks. It baffled onlookers and sent waves of wonder and dread through populations worldwide. It excited peoples' thinking. In Paris, its timing was prodigious. It provoked a culture there that was already experimenting with ideas of change. The comet was a focal event whose transformative influence, I insist, has been curiously underestimated by historians.

In Chapter 1, following a brief prelude that sets the scene, I introduce the phenomenon of the comet and the cascade of reactions that followed its appearance. The comet was a spontaneous, external event that was witnessed by every population in the world. As arguably the world's first shared experience, it imposed its presence on daily affairs and focused the attention of cultures worldwide. The comet's appearance unavoidably set into contrast opposing beliefs, and set up a discursive space for re-examining the prevailing understandings of reality. I will show that in Paris it was nothing short of a sensation—in fact, it caused a kind of mania—and provided a focus for a culture that had been looking for orientation and

impetus. From that focus came an organized response that led to the creation of the Observatory.

As the story of the comet evolves, one savant emerges as a central figure: Adrien Auzout. Even in the domain where his life and exploits are most at home—the history of science—Auzout is today almost entirely unknown—an unfortunate oversight that my study hopes to correct. Auzout, a leading astronomer in France and the subject of Chapter 2, provided an audacious explanation for the comet: that it was a phenomenon following laws of nature—an assertion that no one had ever dared make before him. What he offered his king was a search ephemeris, a detailed prediction of the comet's future positions. But even more bold was the open letter he appended to his publication, in which he invented the project of the Observatory—the building as well as the group of scientists who would belong to it. For a period of time critical to this study, Auzout was a celebrated and influential French scientist. From beginning to end, he will be a determinant figure in the story of the origin of the Paris Observatory.

Chapter 3 is dedicated to Jean-Baptiste Colbert, the minister who I will demonstrate was Auzout's intended target for the Observatory project proposal, and whose job it would be to develop it. All things considered, the scope of Auzout's proposal called for enormous systemic reform, and Colbert was geared for it. Colbert was in the background of the project from the start, soliciting advice and ideas and encouraging experts like Auzout. Colbert was bent on reform. His deliberate planning was aimed at transforming the antiquated and corrupted systems that were concealed in the background practices of daily life in France. His reform aspirations are well known, but I will introduce a new reading: that his genius was in his orchestration of certain focal events—in effect, to cause and exploit a sensation—in order to

pull the corrupted practices from the margins of everyday life and into the foreground, and thus clear the way for his reform enterprises. Three of these staged events are highlighted in this study: the Fouquet affair, the appearance of the comet, and the Bernini affair. I will show how Colbert used each event to initiate reforms in their own domains, the last being his important attempt to reform the practice of architecture.

In Chapter 4, I discuss the process of the creation of the group of savants meant for the Observatory: the Compagnie of sciences and practical arts (La Compagnie des sciences et des arts). Auzout's proposal was celebrated and controversial not just because he called for a new observatory facility. He also called for the creation of a Compagnie employing a small group of professional savants who would work for the king for the progress of France. They would work to reveal the secrets of nature by transforming the methods of the production of knowledge of the natural world. Their Compagnie would work to perfect the generations of failed attempts in France and elsewhere.

Once the Compagnie membership was in place, Colbert then turned to the second part of the Observatory project: the development of the Observatory structure itself. As Colbert was establishing the Compagnie, he was also all the while engaged in reforming the practices of architecture. In Chapter 5, I document the carefully planned process that Colbert undertook to reform the practice of architecture. Exploiting another focal event—the attraction to Paris of Europe's most famous artist and architect, Gian Lorenzo Bernini—Colbert drew the attention of Parisians to the exhausted and futile tradition of architectural practice in Europe. He attempted to replace the paradigmatic architect-artist with a new system that he believed would eliminate the fallibility of the individual man and take advantage of the communal

capabilities within the group of experts at his disposal—a system that I will suggest produced the design of the Observatory.

In Chapter 6, the final chapter, I examine the genesis of the Observatory plans. Because nearly all of the official architectural records from the time are lost, historians interested in this era have been forced to speculate, leading to explanations that cannot be substantiated. My study takes an alternative course. As I have suggested, one product of this study is the possibility of fresh perspectives, taken from the viewpoints of the many other actors around whom thoughts of Observatory emerged. Memories of the development of the Observatory project may have been lost to the architectural world, but the Observatory's possible realization was a very exciting topic among the savants and politicians of the time. Because of the nature of their correspondence, and the polyvalent and cross-topic interests of the savants who were the correspondents, they offer not only commentary on the progress of the Observatory project but also unfiltered insights into the moods underpinning the times. Although not yet utilized by architectural historians, this correspondence is largely intact, and it provides this study with a critical resource.

Resources for This Study

One of the aspects of the story of the origin of the Paris Observatory that makes it unusually intriguing and worthwhile is the fact that most of its core documents and artifacts have either been lost or destroyed. Mentioned briefly above, the relevant architectural records for the Bâtiments du Roi (Royal Building Works) are lost. They were believed to have been archived in the royal library adjacent to the Tuileries Palace. In 1871, a military commander was sent to the palace to protect it against a communist rebellion. Instead, he set it afire. The palace was destroyed, along with the adjacent library and its contents.

Nonetheless, given the emphasis I place on the person-to-person interactions that were happening at the time, I have tried to consult only primary source material. Most helpful was the enormously rich but under-utilized collection of letters to and from Henry Oldenburg, which was made available in the twentieth century by A. Rupert Hall and Mary Boas Hall.[10] Oldenburg was a German-born Londoner, the first secretary of the Royal Society, founder and publisher of the Society's scholarly journal, and a prodigious correspondent and archivist. Two other collections of primary source materials were also important in assembling the story of the Observatory. The first was Pierre Clément's extensive collection of the letters and memoranda of Jean-Baptiste Colbert.[11] The second was the archive of the projects and letters of Christiaan Huygens.[12]

My emphasis on primary source material does not mean that I did not also integrate secondary authors. Throughout my research, I discovered scholars—historians with lifelong devotions to the subjects we now share—who offered important insights. I lean on a few of them not only as the portal to much of the rich primary source material with which they were closely familiar, but also on the occasions when their observations were, in my opinion, particularly insightful and helpful in simplifying the background to establish a more genuine overarching story.

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[10] A. Rupert Hall and Marie Boas Hall, eds. and trans., *Correspondence of Henry Oldenburg*, 13 vols. (Madison: University of Wisconsin Press, 1965–1973).

[11] Jean-Baptiste Colbert, Pierre Clément, and Pierre de Brotonne, *Lettres, instructions et mémoires de Colbert publiés d'après les ordres de l'empereur, sur la proposition de Son Excellence M. Magne, ministre secrétaire d'état des finances*, 8 vols. (Paris: Imprimerie impériale, 1861).

[12] Christiaan Huygens, *Oeuvres complètes: Publiées par la Société hollandaise des sciences* (La Haye: M. Nijhoff, 1888). The original seventeenth-century French material has been transcribed throughout the notes exactly as it appeared in the original texts. I have attempted to preserve the writing conventions of the day as well as original typesetting and its occasional errors.

Figure 13. Sebastien Le Clerc,"Louis XIV Visiting the Royal Academy of Sciences," from the *Mémoires pour servir a l'histoire naturelle des animaux*, 1671.

There is another benefit inherent in focusing each chapter around a single event. The text resists the temptation to be understood as a continuous flow of causalities, actions, and consequences. Rather, as each chapter returns to the same starting point, the text can be understood as a stack of many distinct but overlapping stories that could be vertically drilled down through. In the preface to his book *Life Itself*, theoretical biologist Robert Rosen describes his book similarily. He writes,

> This book, like most books, has a primary structure and a tertiary structure. The primary structure is, of course, the linear string of symbols, words, paragraphs, and chapters that is mandated by the nature of the language. But just as with a molecule of globular protein, which must fold in order to become active, this linear string must be folded back on itself, so as to bring parts remote in the string into close contact.[13]

Seen in that way, the beginning and end of each of my chapters are folds or hinges in the overall text. Each chapter is therefore allowed its own historiographical independence while, simultaneously, its critical place in the broader story of the origin of the Paris Observatory.

Finally, there is more to be taken from one of the illustrations we saw earlier (Figure 2)—the scene with the Observatory visible in the window.[14] Looked at more carefully (Figure 13), we see that it imagines an event happening in the foreground of the Observatory: the king and two other royal dignitaries are being given a tour of the atelier of the new Compagnie by Jean-Baptiste Colbert. Despite the fact that Le Clerc portrays the scene with documentarian accuracy—note his faithful portraiture renditions and the intricate skeletons and mechanical devices decorating the atelier—he certainly invented its overall setting. There was never such

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[13] Robert Rosen, *Life Itself: A Comprehensive Inquiry into the Nature, Origin, and Fabrication of Life* (New York: Columbia University Press, 1991), xv.

[14] A copy of the engraving, "Louis XIV Visiting the Royal Academy of Sciences," is held at the New York Metropolitan Museum, in the Elisha Whittelsey Collection, the Elisha Whittelsey Fund, 1962, accession no. 62.598.180.

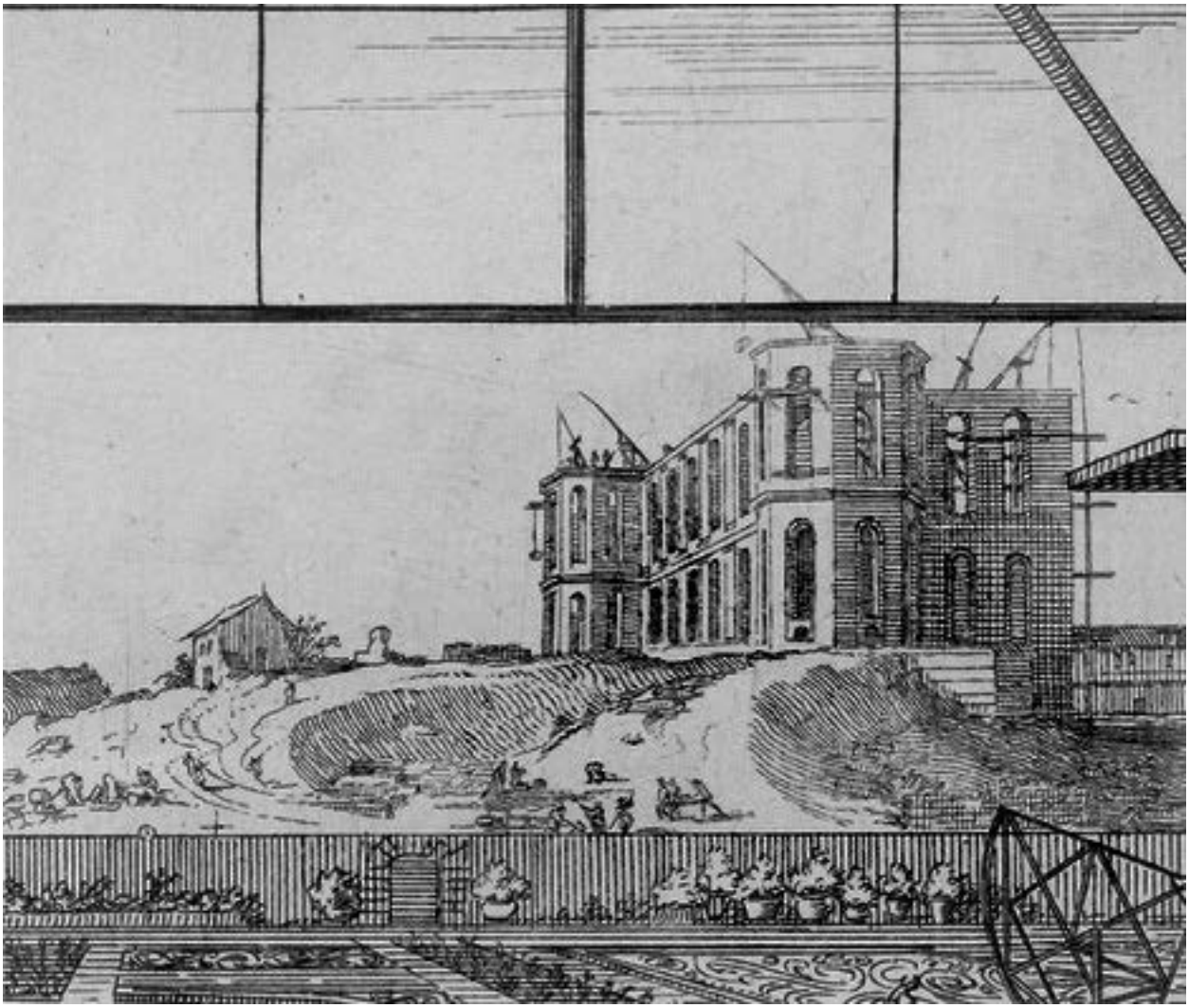

Figure 14. Sebastien Le Clerc,"Louis XIV Visiting the Royal Academy of Sciences," detail of Observatory.

a room in such a place. By depicting a historical event in an invented setting, Le Clerc can claim the role of historical commentator, freeing himself to elaborate and portray what he thought ought to be remembered about the event.

What might have mattered to the commentator Le Clerc that he may have wanted to communicate? First of all, although the king and his entourage were the most powerful men in the room—in fact, the entire kingdom—it seems that it was Colbert who mattered most in this particular scene. Le Clerc positions Colbert exactly at the centre of the composition, and stages the activities to circulate around his axis. With Louis on his arm, Colbert and the king

are locked eye to eye. With his other arm, he draws attention to the products of the Compagnie, whose members fill the room. Note that although the savants share the room with the most powerful monarch in Europe, they pay him almost no attention. Only the savant over Colbert's shoulder—probably Christiaan Huygens, the Compagnie's de facto director—takes notice of their royal patron. The others are too busy with their tasks. To the left, two savants consult a large book. Behind the royal family, two others exchange opinions regarding a mechanical device. In the back of the room, Compagnie members work on other projects. At the far right, several prepare an illustration for a book,[15] while others gather around a large architectural model as it is being carried in. Although the room is filled with the appurtenances of diverse sciences, there is nothing to indicate ranks or disciplines among the men. Everyone seems entirely absorbed in what they are doing at that moment, sharing their works in one polyvalent workspace.

Beyond the window, we see another group of men busy with their own project. Perched on the horizon is the Paris Observatory, under construction, and being prepared as the new home and workplace for these savants. Le Clerc shows the Observatory to be only a hollow stone shell. Interior scaffolding can be seen through the upper windows (Figure 14). The stonemasons use high cranes to hoist each stone into its proper position. The reference to the aerial telescopes that will someday be mounted on the Observatory's roof could not have been unintended, nor could the parallel between the robed savants working in their atelier with their modern instruments, and the brotherhood of stonemasons labouring with their ancient tools and techniques at the foot of the new structure. Le Clerc depicts the masons' labours to

[15] In a clever embedded reference, Le Clerc includes in his illustration a leaf from the very book in which his engraving appears as its frontispiece. It is the gazelle illustration that was eventually bound in *L'histoire naturelle des animaux*, between pages 40 and 41.

cut, carry, and stack the building's massive stones into their places. Theirs was an embodied knowledge, passed down from master to apprentice. Perfected through experience and trial and error, it was a form of knowledge that the savants also valued.

The story of the origin of the Paris Observatory is best grasped, I suggest, as a series of intertwined biographies, and with this single drawing, Le Clerc captures all its likely protagonists at an emergent moment. First, there is the handful of savants who conceived themselves as a Compagnie of professionals, who imagined working in such a building. Next, there is the king, Louis XIV, for whose *grandeur et magnificence* the Compagnie would aspire. After the king, there is Colbert, the project's developer and central figure—around whom the entire project turns. Lastly, there in the background is the Observatory structure itself—the first home for the sciences and the defining focus for those in the scene—just as it is being brought into being. All things considered, I might say that Le Clerc, through his art, was trying to capture the same essence as I am.

The two-part project of Compagnie and Observatory is unified in Le Clerc's artwork. By portraying the Observatory structure with the stone walls completed to the second floor, Le Clerc documents a time of around the spring of 1669. If capturing the mood of the project at that moment was Le Clerc's intention, his choice is propitious for my purposes; for, as we will see, it marks a turning point in the origin of the Paris Observatory—in my view, its denouement. Thus, it is the space of time between that moment and the apparition of the comet in 1664—the project's awakening—that I take as the period and purview of this study.

Chapter 1 — The Comet of 1664: the Focal Event

> No one is so slow and dull-witted and bowed down toward the ground that he does not stand up straight and rise with his whole mind toward the divine, especially when some new marvel has shone from the sky. As long as things follow their usual courses, familiarity detracts from the greatness of the events; for we are so constituted that everyday things, even if they deserve admiration, pass us by, and, conversely, the sight of even the least important things gives pleasure if their appearance is unusual. So the host of stars that enhance the beauty of this immense body does not draw a crowd; but when something is different from normal, everyone's gaze is fixed on the sky.
>
> Seneca, ca. 65

Prelude: Marie de l'Incarnation and New France

> This divine spirit who saw my struggles had no sympathy for my feelings, saying to me in the depths of my heart, "Quickly, quickly, it is time, delay no longer. There is no longer anything good left for you in the world."
>
> Marie de l'Incarnation, 1669

Marie Guyart was born in Tours, France, in the final days of the sixteenth century. At seventeen she married a silk merchant in an arranged marriage. Within two years, she was a mother of a six-month-old son and a widow. After her husband's death, she felt a release to follow the calling from God that she claimed to hear persistently throughout a childhood full of mystical interludes. Her husband's business had not been a prosperous one, but she improved it enough to sell it. She assisted in the management of her brother-in-law's business and devoted herself to service to the Church. Marie recalled several mystical experiences

during that time but none so intense as one apparition that she witnessed while walking through Tours. She described being descended upon by a crucified Christ, which stupefied her for a time in the centre of the street. She revived from that experience with "a distinction and clarity more certain than any certainty that human industry could express."[1] Resolved to abandon her current life without delay, she entered the Ursuline monastery in Tours. Marie's sister assumed all of her earthly responsibilities, including care of her eleven-year-old son, Claude. "I could see the tears in his eyes," Marie remembered later. "It seemed to tear at my soul, but God was dearer to me than all of that. And leaving him to her hands, I said *adieu*, laughing."[2]

Once in the monastery, Marie Guyart became Marie de l'Incarnation. She spent the first two years in a state of private introspection, and in 1633 she professed her vows. A year later, during the liturgical period of Christmastide, she was awakened from a dream in which she recalled being in the company of an unfamiliar secular woman. In her dream, the two women were walking through a beautiful place where they saw the Blessed Virgin seated on the pinnacle of a marble church. Around them laid "a great and vast country, full of mountains, of valleys." A mist hung over everything except the church. From their promontory, the three overlooked a terrain "as much pitiful as terrifying."[3] Marie claimed to sense a distinct joining between herself, the Virgin, and this topography. She was perplexed by her dream until a

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[1] Henri Bremond, *Histoire littéraire du sentiment religieux en France* (Paris: A. Colin, 1967), 18.

[2] Claude Martin, Marie de l'Incarnation, and Louis Billaine, *La vie de la venerable mere Marie de l'Incarnation: Premiere superieure des Ursulines de la Nouvelle France: Tirée de ses lettres et de ses écrits* (Paris: Chez Loüis Billaine, 1677), 172–79. "Je lui voyais couler les larmes des yeux…il me semblait qu'on m'arrachait l'âme, mais Dieu m'était plus cher que tout cela. Le laissant donc entre ses mains, je luis dis adieu en riant."

[3] Martin, Marie de l'Incarnation, and Billaine, *La vie de la venerable mere*, 229. "Autant pitoyable que effroyable."

Jesuit priest and religious advisor provided her with his interpretation: the land she saw was certainly the new world of New France. She resolved that the dream was meant to be a premonition revealing the calling of her new life: to establish the Ursuline order in Québec.

For several years Marie laboured to find ways to fulfill her calling, until the Jesuits again helped her unlock another part of her dream. The secular woman she met in her dream was someone of whom they had recently become aware—someone, in fact, with a remarkably similar background and aspirations as Marie. Madame de le Peltrie was a Rouen woman who was also widowed early in her life, and, like Marie, she had committed herself to service to the Church.[4] However, Peltrie was unlike Marie in a significant way: she was wealthy, having been left pensions by her husband and father. The Jesuits made arrangements for a meeting. Together, the two women resolved a plan, and after receiving approval for their venture from their church bishop, they travelled to Paris in 1638 to propose their enterprise to the Compagnie de la Nouvelle-France, the colonization company chartered by Richelieu a decade earlier to manage the colonization of New France. The Compagnie agreed to the expedition and offered the women a building site in Québec if they could provide the necessary funds for the expedition and for the construction of new buildings.

They departed France with three other Ursulines in May 1639 and arrived in New France in July. In the beginning, they took up residence in the lower village in a makeshift house that Marie called "the Louvre." Within three years, she and her new Ursuline order began occupying a three-story stone structure on a site in the upper village that had been designated

[4] Marie-Madeleine de Chauvigny de la Peltrie (1603–1671) was wed in an arranged marriage and widowed at age twenty-two. During a serious illness, an answered prayer induced her to devote herself to God. As a laywoman in the Rouen church, she became influenced by reading the *Jesuit Relations*, Jesuits' accounts of their settlements in New France. She became determined to assemble an expedition and join that mission.

for that purpose thirty-one years earlier by the explorer Champlain. The Ursulines established a mission on the site to teach Christianity to the children and native people.

Marie admired the native people and their languages. In her correspondence, she described studying Huron, Algonquin, and Montagnais, and creating "a big Algonquin book about sacred history and holy things."[5] The Iroquois were more difficult and dangerous for the French. At times, violent conflicts between them threatened the existence of the French settlements. As Marie saw it, it was a holy war, a battle between Christ and the devil, who was present in the actions of the Iroquois, whose intent it was to obstruct the Christian progress in New France.[6]

In addition to her daily work as apostolate, Marie used the business skills she had learned in Tours. Much of her work involved the management of the convent operations. Working late into the night was often required because, as she put it, "the urgency of our business concerns and of our building leaves me no free time during the day to take care of my correspondence."[7] As it was for many women in the seventeenth century, her writing career was a fundamental aspect of her intellectual life. The amount of Marie's correspondence—estimated at more than thirteen thousand pieces—distinguishes her even from other well-known seventeenth-century authors. Her epistolary career is even more impressive when we consider not only that much of her correspondence was in the form of long and involved treatises, but also that her isolated location in Québec and the harsh winters made mail

[5] Marie de l'Incarnation and Claude Martin, *From Mother to Son: The Selected Letters of Marie de l'Incarnation to Claude Martin*, trans. and intro. Mary Dunn (Oxford: Oxford University Press, 2014), 23.

[6] Ibid., 16.

[7] Ibid., 13.

exchanges possible for only a few months each year.[8] Today, while her letters and mystical treatises attract much interest among religious scholars, Marie's correspondence is broadly valued for its portrayal of French life and belief in seventeenth-century Québec.

Most of her letters are now lost. Those that remain, however, show Marie to be a profound spiritual thinker and mystic, as well as a valuable chronicler of colonial life in the new world of Québec. Her credulous and unadulterated reports of what she felt she was experiencing are critical for this study, as they give us rare insights into a worldview that is otherwise difficult for us to conjure. Marie saw a world grounded in an undiluted and infallible Christian tradition. Yet she was also an author and social critic with an awareness of her status as a colonist and explorer who, for a variety of reasons, was drawn out of an older and predictably traditional world and into a new, astounding, and original one. She wrote as if the details of her life should matter not only to her son but to a wider audience that may one day find the records of her new life valuable.[9] In this chapter, we will see that her open, pre-reflective point of view offers us the possibility of understanding an existence of someone in a world saturated with meaning and unencumbered by a need for rational certitude.

The New World of Marie de l'Incarnation

Marie de l'Incarnation departed from Dieppe bound for the New World in 1639. Claude was raised by his aunt and uncle and the Jesuits who ran the school in which he was enrolled. Claude would eventually become a Benedictine priest. As a principal correspondent for his mother, he traded letters with her on a wide variety of topics. Their religious exchanges covered theological questions that she expanded into long, mystical speculations. However, it

[8] Each year, the ships from Europe did not arrive until July and would be forced to depart no later than November, when ice in the St. Lawrence River made navigating it impossible.

[9] At a point, Marie's son began to anticipate the future interest in her letters and negotiated with his mother to acquire publication rights.

is her candid letters describing the everyday occurrences in the life in Québec that are useful to this study. Her accounts of the strange occurrences that she and the French settlers encountered in the new world of Québec are original and constitute some of the earliest descriptions of French colonial life. Especially germane are her accounts of her experiences of the natural world in New France, beginning with a major earthquake that terrorized the settlements of New France in 1663. "My very dear son," one letter begins, "I have withheld from you to make a separate story of the earthquake that happened this year in our New France, which was so prodigious, so violent and dreadful that I have no words strong enough to express it and I am even afraid that what I say passes as incredible and fabulous."[10]

According to Marie's reports, it was the native women who first reported premonitions of disaster. The community was set on edge when they heard of the women seeing "four furious and enraged demons at the four corners of Québec…who wanted to knock everything down."[11] The day of the earthquake began calm and serene, until Marie heard in the distance a curious buzzing or rumbling sound—as if "a large number of carriages were rolling on cobblestones with speed and impetuosity." Within seconds the earthquake was upon them. The noise around them grew more and more intense, soon coming from all sides, as if they were being pelted with "a shower of stones on the roofs, in the attics and in the bedrooms." The roofing slate started crackling, and it seemed to Marie that all the stones of Québec,

[10] Marie de l'Incarnation and Pierre François Richardeau, *Lettres de la révérende mère Marie de l'Incarnation (née Marie Guyard)* (Paris: Librairie Internationale-Catholique; Tournai: Vve H. Casterman, 1876), 575. "Mon tres-cher fils. J'ai reservé à vous faire separément le recit du tremblement de terre arrivé cette année dans nôtre nouvelle France, lequel a été si prodigieux, si violent, & si effroiable, que je n'ay pas de paroles assez fortes pour l'exprimer: Et je crains même que ce que j'en dirai ne passe pour incroiable & pour fabuleux."

[11] Ibid., 576. "Incontinent après, et un peu avant que le tremblement arrivât, elle aperçut quatre demons furieux et enrages aux quatre coins de Québec, qui ébranlaient la terre avec tant de violence, qu'ils témoignaient vouloir tout renverser."

"which are the basis of this country and from which everything is made, and from which our houses are built, were opening up and breaking into pieces to swallow us."[12]

When the earth first began to convulse and heave, Marie was inside one of the convent buildings. Tranquility turned into terror and confusion as everything began to shake violently. The scene became surreal. Dust filled the air and the architecture became animated: "The doors were opening by themselves, others that were already open were closing," wrote Marie. "The bells of all our churches and the chimes of the clocks rang themselves, and the steeples as well as our houses were swaying like trees when it is windy; and all this in a horrible confusion of overturning furniture, falling stones, floorboards that were separating, walls that were splitting."[13]

The events grew even more extraordinary as the pets raced around in a frenzy: "Above all this we could hear the howling of the pets. Some were coming out of the houses, the others were going in. In a word it was so frightening that we estimated to be on the eve of judgment,

[12] Ibid. "L'on entendit de loin un bruit et bourdonnement épouvantable, comme si un grand nombre de carrosses roulaient sur des pavés avec vitesse et impétuosité. Ce bruit n'eut pas plus tôt réveillé l'attention, que l'on entendit sous terre et sur la terre et de tous côtés, comme une confusion de flots et de vagues qui donnaient de l'horreur. L'on entendait de toutes parts comme une grêle de pierres sur les toits, dans les greniers et dans les chambres. Il semblait que les marbres dont le fond de ce pays est presque tout composé, et dont nos maisons sont bâties, allaient s'ouvrir et se mettre en pièces pour nous engloutir." Apocalyptic imagery shows up in several places of Marie's descriptions of the earthquake events. Here, she may have had in mind this line from the Book of Revelation (6:12): "Everyone, slave and free, hid in the caves and among the rocks of the mountains, calling to the mountains and rocks, 'Fall on us and hide us from the face of the one seated on the throne, and from the wrath of the Lamb.'" For this and similar quotations, see Michael David Coogan et al., eds., *The New Oxford Annotated Bible with the Apocryphal/Deuterocanonical Books: New Revised Standard Version* (New York: Oxford University Press, 2007).

[13] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 228."Une poussière épaisse volait de tous côtés. Les portes s'ouvraient d'elles-mêmes, d'autres qui étaient ouvertes se fermaient. Les cloches de toutes nos églises et les timbres de nos horloges sonnaient toutes seules, et les clochers aussi bien que nos maisons étaient agités comme des arbres quand il fait vent; et tout cela dans une horrible confusion de meubles qui se renversaient, de pierres qui tombaient, de planchers qui se séparaient, de murs qui se fendaient."

having witnessed the signs."[14] The shaking did not let up, and the buildings did not appear able to sustain it. In a panic, some people tried to escape outside but quickly discovered that there was no safety in nature either. Nothing in their world was familiar or stable: "We found no more assurance outside than in, because of the movement of the earth, which wriggled under our feet like troubled waters under a boat." Some tried running into the forests but were confronted with trees whipping back and forth violently and twisting into tangles. Some people tried to take hold of the trees and cling to them, but when they did, "they were hit sharply in the chest by the moving limbs."[15]

For the half hour that the earthquake shook, there was simply no place to escape the violence. In a matter of seconds, the everyday world and everything in it had been cataclysmically transformed. Every aspect of the landscape was in turmoil. "War seemed to be waged, even by the Mountains," a Jesuit priest recalled later. "Some of them being uprooted, to be hurled against others, and leaving yawning chasms in the places whence they had sprung…They buried the trees with which they were covered, deep in the ground up to their topmost branches; and at other times they would re-plant them, branches downward, which would then take the place of the roots, leaving only a forest of upturned trunks."[16]

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[14] Ibid. "Parmi tout cela l'on entendait les animaux domestiques qui hurlaient. Les uns sortaient des maisons, les autres y rentraient. En un mot l'on étoit si effraïé, que l'on s'estimoit être à la veille du judgment, puisque l'on en voioit les signes."

[15] Ibid., 229. "On ne trouva pas plus d'assurance dehors que dedans : car par le mouvement de la terre, qui trémoussait sous nos pieds comme des flots agités sous une chaloupe, on reconnut aussitôt que c'était un tremblement de terre. Plusieurs embrassaient les arbres qui, se mêlant les uns dans les autres, ne leur causaient pas moins d'horreur que les maisons qu'ils avaient quittées; d'autres s'attachaient à des souches qui, par leurs mouvements, les frappaient rudement à la poitrine."

[16] Claude Dablon, *Relation de ce qui s'est passé de plus remarquable aux missions des pères de la Compagnie de Jésus en la Nouvelle-France les années 1673 à 1679* (Nouvelle York: De la Presse Cramoisy de J.-M. Shea, 1860), http://catalog.hathitrust.org/api/volumes/oclc/726100931.html. See especially Chapter 2, "Universal Earthquake in Canadas, and Its Marvelous Effects," 41.

It wasn't only the French settlers who were forced to endure the chaos. The native peoples of Québec also tried to understand the destructive force. "The savages were extremely frightened," wrote Marie, "and claimed that the trees were punishing them." According to Marie, those who had converted to Christianity believed that the trees had been turned into biblical demons "that God was using to punish them, because of their drinking excesses of the *eau de vie* that the evil French had given them." And for those not yet converted, those "less educated savages who came to hunt in these areas, said it was the spirit of their ancestors who wanted to return to their former home." After Marie advised the native people "of their error, they took their guns and were firing them into the air against a band of spirits."[17]

As local communications were restored and she traded experiences with others in the French communities of Tadoussac and Trois-Rivières, Marie began to realize that the earthquake was more widely experienced than she had originally imagined. In the settlement of Trois-Rivières, similar experiences were reported. Houses there "were in the same agitation as trees in a storm, with a noise that gave the impression that several fires crackled in the attics." Settlers at Trois-Rivières recalled surreal images of a landscape transforming before their eyes. The fence posts of the stockade "seemed to dance."[18]

Most dreadful was watching the surface of the earth—which had always been permanent and immobile—moving wildly. Witnesses watched as it rose "more than a foot above its

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[17] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 229–30. "Les sauvages, extrêmement effrayés, disaient que les arbres les avaient bien battus. Quelques-uns d'entre eux disaient que c'étaient des démons dont Dieu se servait pour les châtier, à cause des excès qu'ils avaient faits en buvant de l'eau-de-vie, que les mauvais Français leur avaient donnée. D'autres sauvages moins instruits, qui étaient venus à la chasse en ces quartiers, disaient que c'était l'âme de leurs ancêtres qui voulaient retourner dans leur ancienne demeure. Prévenus de cette erreur, ils prenaient leurs fusils, et faisaient des décharges en l'air contre une bande d'esprits."

[18] Ibid., 237. "Les maisons étaient dans la même agitation que les arbres dans une tempête , avec un bruit qui faisait croire à plusieurs que le feu pétillait dans le greniers. Les pieux de notre palissade et des clotures particulières semblaient danser."

regular consistency, jumping and rolling like troubled waters."[19] The violent shaking must have seemed eternal to those caught in its terror. More shaking continued intermittently for months, and every instance prompted a prayer or two from Marie, who, each time, wondered if the end was nigh. She wrote of a day in April when the earth shook hard, lasting "about *deux Miserere*.[20] It caused some debris towards the Cap de Tourmente, and it was felt in all these parts, even into the land of the Iroquois. We felt it only once in Québec, but they were more frequent beyond."

As wonder overcame fear, the settlers began exploring the countryside. On first account, they discovered the extraordinary effects of the earthquake and how much of the natural world had been reconfigured. "We began to discover the ordinary effects of the earthquakes when they were violent," wrote Marie, "namely the number of new crevices in the earth, new rapids, new springs, new hills where there had been none before." Elements of nature that were thought to be permanent had disappeared: "flattened earth where there were mountains before." There were new abysses and crevices cutting deep into the crust of the earth. From them flowed sulphurous fumes. Plains previously covered with brush and thickets, "all emptied…overturned rocks extracted from the earth, destroyed forests, trees were partly overturned and partly driven into the ground, up to the tops of their branches."[21]

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[19] Ibid. "Et ce qui était le plus effroyable, fut que la terre s'élevait à l'œil de plus d'un grand pied au-dessus de sa consistance ordinaire, bondissant de roulant comme des flots agites."

[20] A *Miserere* is a pray for mercy. "Miserere mei Deus" are the first words in the Latin version of Psalm 51: "Have Mercy on me dear God."

[21] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 232–33. "L'on commença à découvrir les effets ordinaires des tremblements de terre, quand ils sont violents; savoir quantité de crevasses sur la terre, de nouveaux torrents, de nouvelles fontaines, de nouvelles collines, où il n'y en avait jamais eu; la terre aplanie où il y avait auparavant des montagnes; des abîmes nouveaux en quelques endroits, d'où sortaient des vapeurs ensouffrées, et en d'autres de grandes plaines toutes vides, qui étaient auparavant chargées de bois et de halliers; des rochers renversés, des terres remuées,

Most unsettling was the transformation of the rivers and streams of Québec. The settlers discovered that two rivers had vanished. There were springs flowing from the earth where there had been none before, "one white as milk, and another red as blood." But there were no changes so awe-inspiring as those affecting St. Lawrence River. It was thought to be so wide and deep that it was the most stable and unchanging element in the natural world. However, "nothing has surprised us more than seeing the great St. Lawrence River, which for its prodigious depth, never changes, not by snowmelt, which usually changes the rivers, nor by the joining of more than five hundred tributaries that fill it, not to mention more than six hundred very large springs at least, to see this river change to take the colour of sulphur and stay that way for eight days."[22]

The fact that no one had yet been killed could only be attributed to "our good God having wanted to show mercy toward his people and give them time to repent."[23] For Marie it was clear that New France, as a part of the natural world, was entirely under the sovereignty of God. The mountains and massive stones that make up Québec "are but bits of straw for him to move."[24] Nothing in the earthly background of the residents of New France could have prepared them for the domination of the earthquake, and they were awestruck by its violent, transformative powers. No one was left unchanged by that experience; nor were they

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des forêts détruites, les arbres étant en partie renversés, et en partie enfoncés en terre jusqu'à la cime des branches."

[22] Ibid., 233. "L'on a vu deux rivières disparaître; l'on a trouvé deux fontaines nouvelles, l'une blanche comme du lait, et l'autre rouge comme du sang. Mais rien ne nous a plus étonnés que de voir le grand fleuve de Saint-Laurent, qui, pour sa profondeur prodigieuse, ne change jamais, ni par la fonte des neiges, qui fait ordinairement changer les rivières, ni par la jonction de plus de cinq cents rivières qui dégorgent dedans, sans parler de plus de six cents fontaines très grosses pour la plupart, de voir, dis-je, ce fleuve, changer et prendre la couleur du soufre et la retenir durant huit jours."

[23] Marie de l'Incarnation and Martin, *From Mother to Son*, 179.

[24] Ibid.

confident in their future existence in Québec. As Marie wrote, "For...more than two months not a day went by that I did not prepare myself to be swallowed up alive in some abyss, because we knew neither where nor when such a violent quake would rupture the earth."[25]

As it happened, the cataclysmic earthquake was not the only unsettling episode that shook their confidence in reality through this time. In an intense ten-day period at the end of 1664—with the evidence of the transformative forces of God all around them—three other extraordinary events further unnerved the people in New France. On a late December afternoon in 1664, with tremors still periodically shaking the earth, a bizarre celestial event bewildered those who witnessed it. As they watched, the sun, which was sitting on the afternoon horizon, began to multiply. Marie noted, "On the 20th of December, at three o'clock in the afternoon, there appeared to us three suns, separated from each other by about a quarter league, they lasted about a half hour, and then returned to join the regular sun."[26] Those witnessing this peculiar transformation watched in awe. This abnormality had followed a previous celestial event a week earlier. A few minutes after midnight, some of the women looked up to see the moon in a very surprising and extraordinary state. They stood in awe, "because half of it was red as blood, and the other half so bright that it dazzled the eyes." Their confidence in a stable reality had already been undermined by the tremendous earthquake. Now, in the span of a week, their faith in the immutable heavens was also called into question. What was implied by the violence that was unleashed by the earthquake? What

[25] Ibid.

[26] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 245. The sighting of multiple suns may not have been an entirely rare experience in Québec. She recorded this experience at least one other time, when she saw "the most extraordinary appearance of three suns" sitting in a straight line above the St. Lawrence River. These, she thought, were separated by a few yards. This spectacle lasted over two hours, when the two suns on the ends "slipped away, leaving the middle one as victorious."

could have been meant by the barrage of abnormal events? What was the meaning of these world events?

They knew of blood moons. A blood moon is described in the Book of Revelation, marking the opening of the sixth seal, the penultimate seal:

> When he opened the sixth seal, I looked, and there came a great earthquake; the sun became black as sackcloth, the full moon became like blood, and the stars of the sky fell to the earth as the fig tree drops its winter fruit when shaken by a gale. The sky vanished like a scroll rolling itself up, and every mountain and island was removed from its place. The kings of the earth and the magnates and the generals and the rich and the powerful, and everyone, slave and free, hid in the caves and among the rocks of the mountains, calling to the mountains and rocks, "Fall on us and hide us from the face of the one seated on the throne and from the wrath of the Lamb; for the great day of their wrath has come, and who is able to stand?"[27]

From the viewpoint of the settlers of New France, surely, these were the events that they had been promised. All of the other catastrophic cosmic events that they had been experiencing were the effects that could have been anticipated. Yet we will learn that the apprehension stirred by these unnatural celestial events had already begun. Two days before seeing the multiplied suns, the community witnessed an even more foreboding celestial event. Around midnight on the evening of 18 December, Marie and her community had looked skyward to see a new comet, with a head and a long tail, hanging above them in the sky. It was a thoroughly baffling and frightening vision. Every night since its arrival, it had wandered across the skies, following an erratic, wandering path, in contradiction to any of the perfectly orderly patterns of the stars and constellations.

[27] Coogan et al., eds., *The New Oxford Annotated Bible*, 430.

On the first night, Marie and the others observed it in awe until it faded in the daylight. But it returned the next night, and then nightly for weeks afterward in no predictable pattern or behaviour, moving about on unpredictable courses. Marie's observations of the comet were detailed: "The star, or the head of the meteor, seemed to be square, its tail was like rays that by projection seemed to emit effects (launching fumes). These rays were on the earth side of the comet between the north and northwest." There was no predicting its behaviour or where in the sky it might appear. On the next night, "it rose again, and from the south side, it carried its tail on its side. It was noted that in the morning we saw it carrying its tail on the south side and then it seemed to fall to earth, and its rays shot skyward."[28]

The comet would not go away, and Marie and the others followed its actions with bewilderment, wondering about the strange sight. One morning, the comet was encircled by a rainbow, "with the regular colours; and a black vapour exited the sun, and from this vapour a spot of fire."[29] In one letter to her son, Marie compared the comet and its tail to a spear. "It was reddish and enflamed and so long that we could not see the end." These consecutive celestial abnormalities, along with the enormous earthquake, only confirmed for Marie that significant transactions were underway in the universe.

The comet was mysterious and concealing, and deciphering its deeper meaning was important. Marie believed that it was particular to the residents of Québec and relatable to

[28] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 290. "Pour celui de Dieu, le 18 de décembre de l'année dernière (1664), il parut une comète à Québec, vers l'heure de minuit, laquelle parut jusqu'à six heures du matin et continua quelque temps. L'étoile ou la tête de ce météore paraissait carrée, sa queue était comme des rayons qui, par saillies, semblaient jeter des influences (lancer des vapeurs). Ces rayons étaient tournés de côté de la terre entre le nord et le nord-ouest. Elle montait encore, et venant du côté du sud, elle portait sa queue à côté d'elle. On a remarqué qu'au matin on lui vit porter sa queue du côté du sud, puis elle sembla tomber à terre, et ses rayons tournés vers le ciel. Depuis ce temps-là, elle n'a plus paru."

[29] Ibid., 291. "Le même jour le soleil a paru en se levant entouré d'un iris (arc-en-ciel) avec ses couleurs ordinaires; et une vapeur noire sortit du soleil, et de cette vapeur un bouton de feu."

them and their daily existence. She related it to local experiences: "a few times we saw fires flying through the air."[30] These flying fires seemed undoubtedly related to the great comet fire. Even though she could understand that the floating fires might be after-effects of the earthquakes, "which have permanently exposed many places leaving underground fires that issued freely to rise into the air,"[31] that did not mean that the comet and the earthquake were not in some ways intimately united. For Marie and her community, the cosmos in its incomprehensible generality, and the experiential world in all its particularities, showed themselves as basically inseparable. "We also noticed a kind of arrow very high in the air," a familiar weapon to Marie, "and because it was directly between us and the moon, it seemed as if it was in the moon itself." She further justified her speculation: "there are those who believe and who have said they had seen the moon pierced by an arrow."[32]

Marie's letters betray a credulous detachment in the ways she allowed the many mysterious, terrifying, and fascinating experiences to play out before her. Her descriptions demonstrate her ease in merging the celestial and terrestrial phenomena, all of which were simply given by a creator of all things, who caused all happenings. All these events were interdependent and connected but in unknowable ways. The separation between the celestial events and her own existence in a physical, real world was not ambiguous. What the comet

[30] Ibid. "Le deuxième de janvier [1665], l'on découvrit une seconde comète semblable à la première. Sa queue était longue de soixante pieds ou plus; elle différait de la première en ce qu'elle portait sa queue devant elle. Il en a paru une troisième au mois de février, presque semblable, excepté qu'elle portait sa queue après elle, et qu'elle paraissait le soir, sur les six heures, au lieu que les autres paraissaient le matin. L'on a vu plusieurs fois des feux voler par l'air."

[31] Ibid. "Ce sont peut-être des restes des tremblements de terre, laquelle étant demeurée ouverte en plusieurs endroits a laissé aux feux souterrains des issues libres pour s'élever en l'air."

[32] Ibid., 292. "On a aussi remarqué une espèce de dard fort élevé en l'air; et parce qu'il était directement entre nous et la lune, en sorte qu'il semblait qu'il fût dans la lune même, il y en a qui ont cru, et qui ont dit, qu'on avait vu la lune percée d'une flèche."

might be, or what it might mean, is not certain. But what was certain was that it was occurring for them, there in New France. That she was able to estimate the length of the comet's tail to be sixty feet long, or that the multiple suns might be a quarter league apart is indicative of that understanding. An immediacy to a natural world that might now be mistaken merely as scientific naïveté ought to make us wonder, what did she think she meant? In what ways was she able to ground such abstract experiences in order to make them intelligible to herself and her correspondents?

It may be impossible for us now to imagine what Marie thought that she was seeing. For Marie and the others, the universe in its totality was a meaningful creation. Earthquakes, blood moons, dividing suns, shifting mountains, and vanishing rivers did not happen without purpose. And comets did not contradict the perfect heavens, arranged in meaningful constellations, and embodied with centuries of narratives, without serious cause. Through history, the visitation of comets was interpreted as a warning, a signal to prepare the people on Earth for bad events to come, and that was certainly the case for Marie. "We have had evil omens of all these woes," she wrote. The comets had "rods [that] were pointed towards the side of the earth"; these were directing warnings to the people of New France. There were also other obvious signs: "We saw what seemed like a man on fire, and enveloped in fire. We have also seen a canoe of fire, and also a large crown of fire on the Montréal side."[33]

The sensitivities of the people of New France were already heightened by these unusual events, and they recognized other omens as well. The world was becoming unsettled. Marie summarized for her son: "we have heard that on the Île d'Orléans[34] a child cries in the

[33] Ibid., 563. "L'on a veu en l'air un homme en feu, & enveloppé de feu. L'on y a veu encore un canot de feu, & une grande couronne aussi de feu du côté de Mont-Real."

[34] Île d'Orléans is an island in the St. Lawrence River near Québec City.

stomach of his mother," wrote Marie. Other events added to the list of extraordinary happenings: "we heard what seemed like confused voices of women & children with some lamenting cries. In one other case we heard what seemed like a thunderous & horrible voice. All these incidents terrorized to the point that you might imagine." Marie saw that the ill effects that the comet portended had eventually come to pass: "The country has felt the effects of the Comet…that is to say, of the illnesses from colds that were universal & so bad that many were on the verge of death. They began with boils like measles; & they were accompanied by continuous fevers, sore throats & other dangerous side effects." But as with God's reminders concealed in the aftershocks, the residents of New France had been spared full retribution for their misdeeds: "Nevertheless, nobody died," assessed Marie.[35]

Although there was terror and dread in these experiences, Marie eventually came to see only the beneficence in these events. In fact, she was thankful for them and desired to take on the sins that may have warranted such destruction, "as if they had been my own, so as to alone receive punishment for them…that all these abominations should appear before the eyes of men as my own crimes." She expressed thanks to God for his incomprehensible powers to dominate "every heart, when he wants to rattle them."[36] She came to realize the intention behind God's actions in the world: "So many people who could not be swayed by the wrath of the Church were softened and transformed in a single moment. At the same time that he was

[35] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 633. "Depuis mes derniers res écrites, le païs a ressenti les effets de la Comete…, sçavoir des maladies de rhumes qui ont été universels & si fàcheux que plusieurs ont été à deux doigts de la mort. Ils commençoient par des ébullitions comme de rougeole ; & ils étoient accompagnez de fièvres continuës , de maux de gorge & d'autres accidens dangereux. Personne neanmoins n'en est mort."

[36] Marie de l'Incarnation and Martin, *From Mother to Son*, 179.

terrifying us…we had the consolation of seeing stubborn and hardened hearts soften and become as supple as those marbles when they moved about."[37]

In the final tally, she concluded that the damages to the earth could have been worse. At least for a time, even though the land of New France had been radically modified, and the hearts of everyone had been touched, they and their world had been spared destruction. The omens had been imposing, and local landscape may have been reshaped by an overpowering force to awesome effect, nevertheless, "this Comet caused no harm to the corn, whose harvest was abundant, so that we are subject to hope that we will find enough to feed everyone. We make our thanksgiving to Him who fills us with so many goods, and who while feeding birds of heaven does not refuse to men, although sinners, their food & their support."[38] The greater world remained complete and God and nature, endlessly giving. "The winter has been as mild as those I have seen in France, and the summer as warm & as hot as the American Isles. It almost does not rain, and nevertheless all these extraordinary seasons caused no damage to the goods of the earth. I beg you for your remembrance before God of the needs of this Church, of our Community & of mine in particular."[39]

Each of these events was a "miracle" in its own right, and each with "prodigious" effects. "Prodigious" was a term used often by Marie and several writers to describe these bewildering

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[37] Ibid.

[38] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 633–34. "Quoi qu'il en soit, cette Comete n'a causé aucune malignité sur les bleds; dont la soisson a été abondante, en sorte qu'il y a sujet d'esperer que l'on trovera de quoi nourrir tout le monde. Nous en rendons nos actions de graces à celui qui nous comble de tant de biens, & qui nourrissant les oiseaux de Ciel ne refuse pas aux hommes, quoi que pecheurs, leur nourriture & leur soûtien. de Québec le 17 octobre 1668."

[39] Ibid., 629. "L'hiver a été aussi doux que j'en aie veu en France, & l'été aussi chaud & aussi brûlant que dans les Isles de l'Amerique. Il n'a presque point plu, & neamoins toutes ces saisons extraordinaires n'ont causé aucun dommage aux biens de la terre. Je vous supplie de vous ressouvenir devant Dieu des besoins de cette Eglise, de nôtre Communauté & des miens en particulier."

events—a word that meant more then than it does now. Besides its now standard meaning of "impressively great in extent," it was, at the time, "a surprising effect that arrives counter to the ordinary course of nature."[40] The belief was that oftentimes momentous events were preceded by these eccentricities, or *prodiges*. A phenomenon thought to be a miracle would have been accepted as a good thing, but because it stood in defiance to the natural order of the world, it must also carry some significance. Earlier in the century, a French writer forewarned, "Nul terre tremble sans signifiance" (no earth shakes without significance).[41] Marie felt assured that the earthquake and all its extraordinary effects "are blows from the justice of God, like a good Father wanting to chastise his people."[42] That was not strictly a sentiment exclusive to Christian theology, as we have seen.

Once communication with other settlements was re-established, Marie learned that the earthquake that reshaped their landscape had extensive effects across the region. In fact, she soon learned that it was felt as far away as Montréal, nearly fifty leagues southward. Marie learned from the people native to the region that it was experienced westward as well. No doubt, she would have been amazed to learn that its effects extended far beyond Québec and Montréal. It was felt as far away as the colonies of New Amsterdam and New England, where it snapped off clay chimneys in the villages along Massachusetts Bay.

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[40] *Le dictionnaire de l'Académie française*, 1st ed., s.v. "prodigieuse" (Paris: Vve de J.B. Coignard, 1694).

[41] Lynn Berry, "'Le ciel et la terre nous ont parlé': Comment les missionnaires du Canada français de l'époque coloniale interpréterent le tremblement de terre de 1663," *Revue d'histoire de l'Amérique française* 60, no. 1–2 (2006): 11-35.

[42] Marie de l'Incarnation and Richardeau, *Lettres de la révérende mère*, 633. "L'on dit que ce sont là des effets de la Comete, mais je crois que ce sont des coups de la justice de Dieu, qui comme un bon Pere veut châtier son peuple."

It is difficult for us to grasp the penetrating effects that the powerful the earthquake had on Marie's New France community. Today, we are tempted to put ourselves in their places and imagine how utterly unseeable forces had transformed their lives and landscapes, and unsettled every aspect of their existence. Nonetheless, it would have been impossible for them to comprehend that in a broader context, it would be the comet that would have the greatest impact. In fact, it would be the comet that would change the world. For what Marie could not have fathomed was that at the moment that she and her colony watched the comet in their Québec skies, virtually every other human on Earth was also watching it, all with their own ways of understanding it and its portentous presence.

The Comet in the World

While it is true that the earthquake was experienced across a wide region of the North American continent, records gathered a century later show that the comet of 1664 was visible from virtually every place on Earth. Eighteenth-century French priest and astronomer Alexandre Guy Pingré spent a career gathering astronomical records that show that this comet was witnessed by people in every corner of the world.[43] So extensively was it followed that it might be characterized as humankind's first shared experience.[44] As she detailed her experiences of the comet sightings in her letters to her son, Marie could not have imagined that at that moment, he and everyone else in France was seeing the same sight. The comet had

[43] Alexandre Guy Pingré, *Cométographie ou, Traité historique et théorique des comètes*, 2 vols. (Paris: De l'Imprimerie Royale, 1783). Pingré (1711–1796) was the chancellor of the University of Paris, professor of theology with Jansenist leanings, and a corresponding member of the Royal Academy of Sciences. In 1783, his large treatise on cometology that has become the definitive work for the history of comets.

[44] There had certainly been previous events that in retrospect can be said to have been experienced worldwide. What makes the comet of 1664 unique was that, at that moment, there was a relatively new worldwide distribution of explorers and missionaries experiencing the comet—many educated in astronomy—who were interconnected in networks of communications. It is also important to realize that they were aware that they were sharing their experience.

first become visible in Paris two nights before Marie reported seeing it. In fact, people all over the world were also seeing it. Most were contemplating and dreading it as a sign of foreboding. Others, in certain parts of Paris and elsewhere, were carefully examining and measuring it, also seeing it as a godsend—and as a fortuitous subject of study.

According to the records gathered by Pingré, the comet that Marie saw in December had already been reported by a now anonymous astronomer in Spain a month earlier.[45] Soon its visibility began to be recorded in many other points around the earth. In short, the comet of 1664 was spectacular, and it was documented by astronomers worldwide who had been trained in that expertise. An Italian priest, missionary, and explorer, Nicoló Mascardi,[46] was at that time searching for a mythical city on the island of Chiloé off the coast of Chile, and he reported seeing the comet there on 15 December. He reported its positions to his former teacher in Rome, Athanasius Kircher, and included calculations of the comet's altitude, its angular distance from other stars, and estimates of the length of its tail. Francisco Ruiz Lozano, another of Kircher's South American correspondences, also charted the same comet from his home in Bahia, Brazil.

Pingré's research documented that the comet was charted throughout Asia as well. There were several recorded sightings in China, with logs of two different astronomers dating as early as 17 November, the same evening that the comet was first seen in Europe. It is noted in their logs again on 15 December, which continued for several months. The existence of the comet was also mentioned in Chinese almanacs. One noted seeing a "broom star" in

[45] Pingré, *Cométographie*. See also Gary W. Kronk, *Cometography: A Catalog of Comets*, vol. 1, *Ancient–1799* (Cambridge: Cambridge University Press, 1999).

[46] Mascardi (1625–1673) arrived in Chile in 1651 and is better remembered for his exorcisms of the native people.

November. In another it was noted that "a comet appeared at the I and Chang lunar mansions with a tail of over 30° pointing towards the Northwest. After more than 50 days, it went out of sight on reaching the Lou lunar mansion."[47]

In a more recent survey of the history of comets, Gary Kronk was given access to the diary of a twelve-year-old Japanese boy who wrote of seeing the comet from his bedroom in Tosa (now Kochi). The boy made a note of seeing a "bush star" in the four hours before sunrise on 16 December and again periodically until early February. He described the comet's tail as looking like that of a tiger.[48] Kronk discovered other recorded sightings from Asia. One was in a text by Robert Knox, an English sailor living at the time in Ceylon (now Sri Lanka). In Knox's memoir, he proclaimed that the comet had demonstrated evil effects. It had "ushereth in the Rebellion made against the King."[49] He and his companions witnessed a "fearful Blazing Star" that suddenly appeared directly overhead "just at the Instant of the Rebellion."[50] What puzzled and astounded Knox was that, prior to the rebellion, the tail of the comet pointed off towards the west, in the direction of the rebellion uprising but, immediately after the battle began, the tail reversed direction and pointed to the east. And, as the rebellion was suppressed, "by degrees the comet diminished quite away."[51]

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[47] Kronk, *Cometography*, 1:351–52. In his book on the history of comets, David Levy notes an earlier star watcher, Epigones, possibly from the fourth century, who identified one type of comet "with hair on all sides." See David H. Levy, *Comets: Creators and Destroyers*, vol. 1 (New York: Simon & Schuster, 1998), 9.

[48] Kronk, *Cometography*, 1:356.

[49] Robert Knox, *An Historical Relation of the Island Ceylon, in the East Indies* (London: Printed by R. Chiswell, 1681), 58, https://books.google.ca/books/about/An_historical_relation_of_the_island_Cey.html?id=LBcuz37GrLQC&redir_esc=y. See Part 2, Chapter 7, "A Relation of the Rebellion Made against the King."

[50] Ibid.

[51] Ibid., 58. Kronk refers to Knox's account. See Kronk, *Cometography*, 1:354.

In Korea, the Dutch explorer Hendrick Hamel and his fellow sailors watched the comet nearly nightly for two months. Hamel later related that his Korean hosts were so alarmed by the comet "that the King caused the guards to be doubled in all his ports, and aboard his ships: he also caused his fortresses to be furnished with provisions, and warlike stores: he made all his forces, both horse and foot, exercise every day."[52] A foreign invasion was considered so likely "that he forbade making any fire at night in those houses which might be seen from sea." The Korean population retreated to subsistence-level provisions because, the Dutch were told, they were familiar with the signs, like "when the Tartars over-ran their country," and when "the Japanese declared war against them." The Koreans asked the Dutch explorers about their own traditional beliefs and were assured by their European guests that comets always spell doom, presaging "some signal judgment, generally the plague, war, or famine, and sometimes all three." The Koreans had no trouble accepting that testimony, "having had experience of it themselves."[53]

The comet was also visible on the continent of Africa. The authors of *Comets in Old Cape Records* quote a 1664 government journal in which Commander Zacharias Wagenaar of Cape Town, South Africa, reported a unique experience around midnight on 15 December: "We all here saw a star with a darkish ray or tail, which it is said showed itself much more clearly and distinctly about 3 o'clock when it was near day; the star rose in the East and the tail pointed directly north."[54] After a month of these sightings, the journal reported that a governmental

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[52] Hendrik Hamel, *Travels of Some Dutchmen in Korea* (London, 1808), quoted in John Pinkerton, *A General Collection of the Best and Most Interesting Voyages and Travels in All Parts of the World…* (London: Longman, Hurst, Rees, and Orme [etc.], 1808), 528. Kronk also mentions Hamel (*Cometography*, 1:355).

[53] Hamel, cited in Kronk, *Cometography*, 1:355.

[54] Donald McIntyre and C. Graham Botha, *Comets in Old Cape Records* (Cape Town, South Africa: Cape Times Ltd., 1949). This entry was uncovered by Kronk, *Cometography*, 1:355–56.

proclamation had been issued demanding heightened religious atonement, in recognition of "the great and jealous God, praying that He may ward off the punishment that hangs over our heads, of which we are warned by the long-rayed star—a terrible sign of vengeance which threatens us nightly from the heavens."[55]

In Massachusetts, Samuel Danforth saw the comet from his home observatory, and his reaction plays an interesting role in understanding the general background of beliefs at the time. Danforth was a Harvard College puritan minister and an orator, author, and amateur astronomer. Following his interaction with the comet, he published a twenty-four-page treatise titled *An Astronomical Description of the Late Comet or Blazing Star; As It Appeared in New-England in the 9th, 10th, 11th, and in the beginning of the 12th Moneth, 1664. Together with a brief Theological Application*.[56] His treatise was of two parts. The first was a table of chartings and calculations of the comet—something that a trained astronomer could produce. But, as his title indicates, the comet's scientific description was not all that was at stake in the comet for Danforth. His calculations served him as the rational platform for the second half of his treatise, where he ranked this particular comet among the historical record of all known comets. Danforth opens his study with this grim epigraph:

[55] Ibid.

[56] Samuel Danforth, *An astronomical description of the late comet or blazing star: as it appeared in New-England in the 9th, 10th, 11th, and the beginning of the 12th moneth, 1664 : Together with a brief theological application thereof.* Cambridge [Mass.]: Printed by Samuel Green. http://opac.newsbank.com/select/evans/99.

Du Bartas

There, with long bloody Hair, a Blazing Star
Threatens the World with Famine, Plague & War:
To Princes, death; to Kingdomes many crosses:
To all Estates, Inevitable Losses:
To Heardmen, Rott: to Plow-men hapless seasons:
To Sailors, Storms: to Cities, civil Treasons.[57]

Danforth first noticed the comet on 15 December,[58] and he continued to make observations until the following February. His observations led to twenty-six new axioms. For instance, he claimed that the comet was neither sublunar nor a new, fixed star "but a Planetick or Erratick Body, wandring up & down in the etherial firmament." This revelation reminds us that the comet's relative position in the heavens was a debated proposition at the time, and considered in almost every comet study.[59] Further, Danforth made two another assertions that were timely: that the comet was a body in some kind of an established orbit; and that "The Coma or Blazing Stream that issues from the Comet, is no real flame, but the irradiation and resplendence of the Sun through the Transparent and Pellucid Body of the Comet."[60] Danforth decided that the comet must be following a circular orbit, one not centred on the earth but on a point slightly eccentric to it. He proposed other axioms: in what constellations it had begun its journey and the order of which it had passed through them; that it had

[57] Danforth quoted a fragment of the poem "Divine Week and Works," by Du Bartas, a sixteenth-century French poet. It was translated into English by Joshua Sylvester. See Guillaume de Salluste Du Bartas and Susan Snyder, *The Divine Weeks and Works of Guillaume de Saluste, Sieur du Bartas* (Oxford: Oxford Unviersity Press; New York: Clarendon Press, 1979).

[58] It is not clear why in his title he suggests that the comet appeared in New England as early as September.

[59] Consider Marie's belief that it was a local event with local meaning, with a tail sixty feet long.

[60] Danforth, *An Astronomical Description of the Late Comet*.

experienced periodic accelerations in motion; that there were certain equalities and symmetries in its motions that he noticed; and that despite appearing to the contrary, the comet's magnitude and colour were actually constant.

Danforth's analysis of the comet as a theoretical entity did not conflict with his parallel understanding of it as a temporal event in his Christian tradition. In the second part of his treatise, Danforth presented a lesson of how this comet related to the long history of comets and the subsequent disasters they had forewarned. His list begins with Seneca:

> *Anno Christi* 56. There appeared a Comet. The same year *Claudius* died, and bloody *Nero* succeeded, who slew his *Mother*, his *Wife* and his *Master Seneca*, and exercised a great deal of cruelty and wickedness; *Anno* 323. There were diverse Comets which preceded the *Pestilent Heresie* of *Arius*. *Anno*. 337. A Comet appeared before the death of *Constantine* the great, and innumerable evils followed…*Anno*. 729. Two Comets appeared, and the same year a great *Plague* invaded the World.

One by one, Danforth worked his way through the history of known comets and their disastrous effects, preparing the foundation for the doom he promised from the new comet. Backed by the certainty found in his Christian belief, Danforth predicted a dire future. He reminded his readers of other omens associated with the comet, notably the earthquakes they had recently experienced—undoubtedly the same earthquakes that had been experienced in Québec—when "our houses rock't like a cradle." That was, preached Danforth, only "the Lords shaking the foundation of our Churches and of our civil state." [61]

He connected the influence of the comet with "the late removal by Death" of some of the prominent members of the community and the "sad Mildew and Blasting" of their recent harvest, which resulted in "our principal grain being turned into an husk & rotteness." He

[61] Ibid.

recalled that there had also been a severe drought the summer before, and early frosts the next fall, which "smote our Indian Corn, and greatly impoverished our latter harvest." He warned of the "jealous eye the Lord hath upon us, observing how we carry and behave our selves at such a time as this." The behaviour of his culture's highly favoured and privileged position warranted periodic correction. He cited many scriptural passages, interpreting them in light of the comet. Danforth uses a metaphor to alert his readers to the comet's influence on their earthly Christian existence. "God forbid," read Danforth's "astrological" closing prayer, "that any of us, should be Ασε΄ρες πλανη˜τας wandring Stars, Eccentrick and Erratick in our motions, as all Seducers and Impostors are: for whom is reserved the blackness of darkness for ever." There is a "Heavenly order prescribed in his holy word," wrote Danforth, in which he and they are all illuminated by the "Sun of Righteousness." He offered his readers the assurance that they might not be cast from the Heavens—like the wandering comet might portend—but rather be offered the gift to "finish our course with joy." Choosing to follow the righteous path would allow them to "shine forth as the Sun, and as the brightness of the firmament, and as the Stars forever and ever, Amen."[62] As a scholar of both theology and astronomy—a training that was not unusual at the time—Danforth supplies us with an example of the broad divide of contemporary understanding of reality. He made mathematical observations with his utmost precision and from them drew rational, timeless axioms; and in parallel, he developed an exegesis of the history of comets and their symbolism. Reconciling the two studies was not difficult.

We have seen that the comet was witnessed in Asia, Africa, and North America. And in nearly every location, it was treated in the same two distinct ways: as something awesome and

[62] Ibid.

feared, and as a thing to be measured and understood. But among its worldwide audience, there was no population for whom the comet was more momentous—and contentious—than among the Europeans. For most, it was their first major comet and, for most, a harbinger of disaster. But it also gave a few others the opportunity to debate comet doctrine and to argue comet theories. The comet produced a sensation among the writers and philosophers of the time: "this comet of 1664 had singularly exercised the printing presses,"[63] wrote Pingré, almost all of which were treatises of religious content.[64]

At the time, astronomy was one of the seven primary subjects of the basic formal education.[65] Within studies of astronomy, comets were the least understood and the most theorized of the heavenly bodies. And while it was true that they had read about earlier comets in the texts of Galileo, Kepler, Grassi, and Tycho Brahe, few people alive in 1664 could have remembered the last major comet, which had been forty-six years earlier in 1618. A comet of this prominence was an enormous opportunity for the astronomers and savants in Europe. Although astronomers were spread across the continent, they had never been more interconnected. A common scholarly language and much more accurate clocks made for independent verifications and cross-references. As we will see later in this study, curiosity among observers about each other's work was high, and there was a maturing network of correspondents who wanted to share their discoveries.

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[63] Pingré, *Cométographie*, 2:10.

[64] Looking backward, Pingré would write, "Astrologers dreamed it threatened the most horrible disasters in the Universe; they did their part in deluding the Public." Ibid.

[65] The trivium and quadrivium. For more on the role of astronomy in the formal education during the Early Modern era, see Victor Navarro-Brotóns, "The Cultivation of Astronomy in Spanish Universities in the Latter Half of the 16th Century," in *Universities and Science in the Early Modern Period*, ed. Michael Feingold and Victor Navarro-Brotóns (Dordrecht: Springer, 2006), 83–98.

There was so much about astronomy that was unknown and seemingly impossible to verify. A comet could be observed, and the calculations could be shared, but what of its nature was actually being experienced? Were comets stars, planets, or something else? In what part of the heavens did they exist? Were they sublunary or superlunary entities? From what kind of matter were comets composed, if they were matter at all? What remained most puzzling about the comet was its erratic motion. In a heavenly, rational order, a comet was contradictory and unintelligible. It wandered and roamed across the sky. As night fell, it would mysteriously be in a different part of the sky. At one moment, the head of the comet led its tail, and at other times, it would follow it. Sometimes the tail was perpendicular to its motion. It seemed to taunt the rational person.

In important ways, the conditions of the comet of 1664 could not have been better. Besides the wide distribution of observers, the practices of celestial observation had recently evolved to make celestial observations simpler and more accurate. New forms of computation had been developed. Prior to this time—like in the astronomical works of Kepler or Brahe—astronomy was chiefly a work of tedious mathematics, involving error-prone long division and multiplication. But, by the arrival of this comet in 1664, logarithmic calculations were widely employed, which resulted in shortened calculation time and a limited chance for error.[66] Also, professional networks of European savants and university scholars that promoted their common interests had been developed. Moreover, the shared written language of Latin facilitated the communications between foreign savants. Explorers and expatriated savants exchanged foreign languages and translation abilities. Most notably, in the time since the last

[66] Logarithms were discovered by John Napier working in Scotland earlier in the century, and later improved by Napier and Henry Briggs. For how logarithms affected astronomical work, see Victor J. Katz, *A History of Mathematics: An Introduction* (New York: HarperCollins, 1993), 420.

great comet, astronomical instruments had been invented. The telescope, invented at the beginning of the seventeenth century, was rare and rudimentary for the 1618 comet. By 1664, telescopes were in the hands of those who held an interest in astronomy.

Pingré's records show that the comet was observed throughout Europe. A few weeks after it was first seen in Spain, the Dutch savant Christiaan Huygens reported seeing it from his Leiden observatory,[67] and as weather conditions allowed, astronomer Johannes Hevelius saw it for the first time on 14 December from an observatory on the roof of his house in Danzig. Stanisław Lubieniecki, in Raków, Poland, traded observation knowledge and calculations with Petrus van Bruxelles and Ismaël Boulliau in Paris, and Henry Oldenburg in London.[68] In southern Europe, astronomers Gian Dominico Cassini and Giovanni Alfonso Borelli observed the comet in Italy. Cassini was in Rome and watched the comet "in the presence of the Queen Christina of Sweden, the night of the 17 to 18 of December, and the following night."[69] Another Italian, Geminiano Montanari, also reported seeing it from Bologna.[70] John Ray, an Englishman who was travelling through Europe, wrote of seeing the comet on 20 December while in Rome. It looked "somewhat like rays of a candle burning in a mist."[71]

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[67] That was on 2 December. Pingré, *Cométographie*, 2:10.

[68] In a few years, Lubieniecki would publish a beautiful three-volume compendium of his observations and those of others. Stanisław Lubieniecki's *Theatrum cometicum, duabus partibus constans* (1668) is an illustrated anthology of 415 comets from the biblical epoch of the deluge up until 1665. For a description, see Thomas A. Hockey et al., eds., *Biographical Encyclopedia of Astronomers* (Springer New York, 2014), 715, http://dx.doi.org/10.1007/978-1-4419-9917-7.

[69] Pingré, *Cométographie*, 1:113. "La Comète de 1664 parut: Cassini l'observa à Rome en présence de l Reine Christine de Suede, la nuit du 17 au 18 décembre & la nuit suivant." By that time, Christina had abdicated the Swedish throne and was living in Rome.

[70] Pingré does not locate Montanari, but he had moved to Bologna in 1662–63.

[71] Kronk, *Cometography*, 1:352.

There was much interest in the comet in Ray's homeland. Observation notes taken in by Peter Mundy under clear Cornwall skies describe his sightings. His 18 December journal[72] entry reads, "about five of the clocke in the morning with others saw a commet or blasing starre in the south, it being by my course computation in 175 degrees of right ascention and about 15 degrees south declination, about the 25 degree of Virgo, a little to the westward of Corvus the Crow. It had bin noted by others four or five daies since from Pendennis Castle." At this point, Mundy inserted a small drawing of the comet, with this description: "The head of it like a great starre in a mist, the tayle of it smalle at first, extending wider and wider to a great length, about 10 or 12 degrees."[73] He reported seeing it again with a telescope, "but discerne no forme, only a reddish collour appearing like a fire in the mist afar." On 18 January, Mundy confirmed that the comet was no longer visible.

In London, Samuel Pepys wrote about the comet several times in his December diary entries. On the 15th, at the coffeehouse, there was "great talke of the comet seen in several places." It was apparently an experience he shared with many: "by our men at sea and my Lord Sandwich," recorded Pepys. Two days later, he wrote about "mighty talke there is of this Comet that is seen a'nights; and the King and Queene did sit up last night to see it."[74]

A week passed and Pepys still had not been able to see it. He wrote that Lord Sandwich saw it for a second time. He had travelled to the south, to Portsmouth, "and says that it is the

[72] Mundy's journal date is December 8th, but he was using the Julian calendar.

[73] Mundy's notes, including his unedited his liberal spellings, were republished in a letter to the editors of *The Observatory*, Peter Mundy and A.S.D. Maunder, "The Observatory," *The Observatory* 57 (1877): 278–81. Kronk mentions Mundy; see *Cometography*, 1:352–53.

[74] Samuel Pepys, Richard Griffin Braybrooke, Mynors Bright, and H.B. Wheatley, *The Diary of Samuel Pepys* (London: Bell, 1899), 8:287. The earl's own journal reads, "About 6 at night or 5 minutes sooner I saw the Blazing Star again between the Whale's Mouth and the River Eridanus, but his stream could not be seen because the full moon shone bright."

most extraordinary thing that ever he saw." In London, Pepys continued to try but felt his chances were low. Although 23 December was a clear night, he had little hope because, according to his calculations, he expected the comet to rise "in the east but 16 degrees, and then the houses will hinder us." Pepys did eventually see the comet on the 24th and then again the next night, but, "whether worn away or no I know not, but appears not with a tail, but only is larger and duller than any other star." By that time, he had come to believe that the comet "is gone quite to a new place in the heavens than it was before: but I hope in a clearer night something more will be seen."

In Oxford, a group of British scholars had been meeting informally for several decades to speak and listen to lectures about their shared scientific interests. In the early 1660s, they formalized their membership and meeting schedules, and in 1662 a dozen received a royal charter and adopted the name of the Royal Society of London. The comet of 1664 was an auspicious opportunity. It was a phenomenon with measurable parameters. It was visible and chartable, and a subject on which the British could experiment with their new equipment. But because so much about the comet is unverifiable, it was a rich source for speculation. It was certainly a hot topic among the Royal Society membership, which by the winter of 1664 numbered more than one hundred and included many with a personal interest in astronomy. The interest in the comet was wide, and the Society collected many reported sightings.

The young British savant Robert Hooke[75] made plans to create a history of the sightings, but Christopher Wren, the chair of astronomy in Oxford, had considerable interest and

[75] Hooke was publishing his famous *Micrographia* at exactly this time. He would not be thirty until July. See Robert Hooke and R.T. Gunther, *Micrographia, or, Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses: With Observations and Inquiries Thereupon* (New York: Dover Publications, 1961).

standing, and he was given the responsibility for the Society's official position.[76] At Oxford, Wren exchanged comet theory with geography professor John Wallis, as well as with Hooke and society founder, Robert Moray. Seth Ward, the bishop of Salisbury and another founding member of the Society, and member of Parliament William Lower were also studying the comet. By 1 February, Wren submitted his theory of comet motion to the Royal Society.

For Isaac Newton, a twenty-one-year-old undergraduate at Trinity College in Cambridge, the comet's arrival could not have been more timely. The comet of 1664 was his introduction to cometology, and the principal event that projected him into the study of astronomy. In what is now seen as a landmark encounter, when Newton looked in fascination at the comet from Cambridge he decided to begin a self-directed study of astronomy. His unorthodox methodology and the terminology he invented for his notebook, as well as his erroneous recordings (which he later corrected), give away his debutant status.[77]

In summary, the comet of 1664 must have been observable from any point on Earth where there was someone to see it—from the southern-most tips of South America and Africa to the northern-most settlements of North America. It was seen across Asia and Europe. It was an abnormality that affected people all over the planet, disrupting patterns of everyday life and the way rulers governed. It reintroduced conflicts inherent in peoples' most fundamental

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[76] René Taton and Curtis Wilson, *Planetary Astronomy from the Renaissance to the Rise of Astrophysics* (Cambridge: Cambridge University Press, 1989), 2:226.

[77] "On Saturday, December 10, 1664," wrote Newton in his notebook, "by a subtle observation I found the distance of a comet from the center of the Moon to be 9°48'. Its altitude 3° 40' or 4°. The Moon's altitude, 8° 40'. Her place being Capricorn 26° 2' or else Aquarius 5°." As biographers McGuire and Tamny note, Newton later cancelled the last sentence before cancelling the entire entry. They note further that his methods of locating the comet by the position of the moon were highly unorthodox and inaccurate even if he had located it correctly, which he did not. He quickly adapted his methods, and this astronomical apprenticeship was soon behind him. For a description of Newton's baptism in comets, see J.E. McGuire, Tamny Martin, and Newton, "Newton's Astronomical Apprenticeship: Notes of 1664/5," *Isis* 76, no. 3 (1985): 349–65.

beliefs. We see that the Europeans were primed for its arrival, and from the moment of its first appearance, it fell under the scrutiny of many inquisitive people. Like the majority of the populations in the world, most Europeans were fully predisposed to dread it. However, there were also many who were eager to try to understand it as a subject of study. And as we will now see, within Europe there was one place where the comet was more than an event. In Paris, the comet was a sensation.

The Comet in Paris

In the early morning of 18 December 1664, the comet first became visible in Paris. It effectively burst on the scene and would remain visible for about three months.[78] Given the late date of its visibility in Paris, its arrival had been anticipated more there than elsewhere and suspense had certainly been forming.[79] The comet was scrutinized by the same educated classes that were seeing it across Europe—those with a university education that included astronomy. Some celebrated savants were part of the Paris crowds: men like Adrien Auzout, Gilles Personne de Roberval, Pierre Petit, Jean Picard, Jacques Buot, Melchisédech Thévenot, and Ismaël Bouillau, among others. But, of course, one did not need to be an astronomer to have an interest in the comet. In fact, for any man, woman, or child who happened to glance skyward on a clear Paris night, the comet was easily visible to the naked eye and undoubtedly startling.

[78] Obviously local atmospheric conditions and light overspill from the moon and other heavenly bodies played a role in the comet's visibility. Comier writes that it was first visible "around an hour after midnight of the 17 December," and that its diameter was "almost twice that of Venus" (.10). Pingré writes that it was visible until April, and elsewhere that De la Voye saw it from Rouen "well into the month of March." See Pingré, *Cométographie*, 2:11.

[79] They had undoubtedly heard of the discovery in Spain a month earlier, and Huygens, who had seen it in Leiden three weeks earlier, was at that time in routine conversation with many Parisian colleagues.

After only a week in the Paris sky, on the evening of 29 December the comet reached its greatest apparent magnitude,[80] estimated to be an impressive –1. That would mean that only three celestial bodies would have been brighter: the Moon, Venus, and Sirius.[81] But it was not its brightness that made the comet extraordinary. Two other characteristics of the comet distinguished it from the other stars; first, of course, was its tail. On average, the tail was measured to be between twelve and thirty degrees. But at its maximum length of forty-four degrees it must have been a spectacular display, stretching nearly a quarter of the way across the sky. Second, the comet's peculiar behaviour distinguished it in an otherwise perfectly ordered heavens. Its erratic motions and random locations in the sky put it dramatically out of sync with the rest of the universe and generated much concern.

Among the savants of the time, there was a mood of competitive fellowship, or *emulation*,[82] and a compulsion to share and publish their discoveries and ideas. "The Comet made much more of a sensation" than anything had before, wrote Pingré, and "occasioned an infinite number of Writings, Treatises, Dissertations, Conferences, Ephemerides, Systems, etc.…singularly exercising the printing presses of the time."[83] Those presses published many pages that were inspired by the comet. But even more were written about comets in general. Petit's 1665 *Dissertation de Pierre Petit, Sur la nature des comètes* was the most substantial of

[80] Apparent magnitude is the measurement of the brightness of a celestial object from Earth: the lower the number, the brighter its appearance.

[81] Sirius, the brightest star seen from Earth, is measured at -1.46. The apparent magnitude of Venus is -4.9 and for the Full Moon, -12.7.

[82] *Le dictionnaire de l'Académie française*, 1st ed., s.v. "emulation."

[83] Pingré, *Cométographie*, 1:105. "Cette Cométe de 1664 a singulièrement exercé presses des Imprimeurs."

contemporary publications.[84] The goal of this science-based treatise was to officially promote a rational thesis to refute the superstitious interpretations of the comet. Nonetheless, it was simultaneously counterpoised by a pseudo-scientific text written by theologian Claude Comiers. Titled *La nature et presage des cometes*, Comiers's treatise was in line with Danforth's, using the scientific data to substantiate his religious interpretations. On the question of the cause of the comet, or in Comiers's terms, the "new body of light," his answer was clear: "Dieu dit, la lumiere soit faite, & la lumiere fut faite" (God said, let there be light, and there was light).[85] There were others, such as Petit, who did not question God as the ultimate cause but believed that there was more to be gained from scientific explanations of the comet than solely theological ones. Those savants will play important roles in this study.

After two weeks of wandering across the Paris skies, the comet was the central topic of conversation and controversy. Everyone was curious to understand what they were seeing and to speculate on its cause and purpose. The savants and the astrologers were pressed and tempted to provide answers. Thus, a general summary of contemporary thought on the heavens is now useful.[86] This thought was Aristotelian and Ptolemaic. Unlike the terrestrial

[84] In the same year, Jean-Baptiste Denys, a medical doctor, published a text with a similar name, *Discours sur les Cometès*, "favouring some of the hypothesis of Descartes." Ibid., 1:107.

[85] Claude Comiers, *La nature et presage des cometes: Ouvrage mathematique, physique, chimique & historique: Enrichi des prophéties des derniers siècles, et de la fabrique des grand lunettes* (Lyon: Chez Charles Matheuet 1665), 403.

[86] I take into account the caution expressed by science historian Steven Shapin: "There is no such thing as the Scientific Revolution, and this is a book about it." Further, "historians of science have now grown used to condemning 'present-oriented' history, rightly saying that it often distorts our understanding of what the past was like in its own terms. Yet, there is absolutely no reason we should not want to know how we got from there to here, who the ancestors were, and what the lineage is that connects us to the past." Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 1996), 1.

world, which was constantly transforming, the heavens were immutable and elemental.[87] Therefore, new things like comets had to be terrestrial. Ptolemy's input was to organize the universe into a stack of concentric spheres of planetary domains with Earth at its centre. The Ptolemaic system could easily be absorbed into a Christian cosmology, but even then it was known that actual observations of the planets refused to corroborate the logic of this system.

The next big turn came with the text of Copernicus. He tried to reconcile the errant paths of the planets by first reviewing the writings of others who had come before him who had speculated on the motions of the planets. He researched the ancient philosophers "to learn whether anyone had ever proposed other motions of the universe's spheres…And in fact first I found in Cicero that Hicetas supposed the earth to move. Later I also discovered in Plutarch that certain others were of this opinion…I too began to consider the mobility of the earth." Copernicus got the idea of a moving Earth from others, assuming the freedom to explore the possibility was what mattered most. "Even though the idea seemed absurd, nevertheless I knew that others before me had been granted the freedom to imagine any circles whatever for the purpose of explaining the heavenly phenomena."[88]

If Earth was not a central fixed body but rather a planet revolving around a fixed sun, that would resolve much of the discord in the system. The radicalness of that explanation is difficult to grasp, and even a century after it was first offered it remained widely refuted. It was irreconcilable with Catholic theology, however Galileo and Kepler famously defended the Copernican model. While the astronomers and savants traded calculations and theoretical

[87] I owe this brief summary of Aristotelian cosmology primarily to Peter Dear, *Revolutionizing the Sciences: European Knowledge and Its Ambitions, 1500–1700* (Princeton: Princeton University Press, 2001).

[88] Nicolas Copernic, *On the Revolutions*, ed. Jerzy Dobrzycki, trans. Edward Rosen (Baltimore: Johns Hopkins University Press, 1978), 4–5. See also Dear, *Revolutionizing the Sciences*, 34–35.

explanations grounded in the traditions of mathematics and astrological studies, the theologians, astrologers, and *cométomancies*[89] were trying to make sense of the implications of the comet as it cut across the otherwise perfectly ordered sky by linking constellations and the complex mythic structure that they represented. After all, as Comiers wrote in the opening lines of his Preface, "the most brilliant works that are out of the all-powerful hand of the Creator."[90] These two groups, then, offered their itineraries to the Paris population at large, and in a population already puzzled by the comet, confusion on the matter certainly reigned.

The fascination with the comet had few limits. The royal families of Europe were among the hundreds of thousands of curious onlookers. Queen Christina of Sweden and the king and queen of England were famously attempting to spy the strange comet. After days of French fervour over the comet and listening to the various interpretations, it comes as no surprise that France's young king, Louis XIV, was also famously curious. It was reported that Louis's interests were personal and sincere, and that he and members of the royal court, notably his brother, Philippe, had all awakened in time to catch sight of the comet. Consequently, sometime during the comet sensation and clamour of opinions being exchanged in Paris, Louis decided to sponsor an official conference where these theories could be presented and debated with a hope of offering explanation of the comet's curious movements. Those who were gathered were there to make their ideas public and share their various interests in the comet.

[89] Pingré may have coined this term. Pingré, *Cométographie*, 1:10.

[90] This is from the first lines of Comier's Preface: "Le plus visible avantage que l'homme ait par dessus le reste des animaux, est sans doubte, d'avoire la téte élevée en une situation commode pour contempler les Astres, comme les plus brillans ouvrages qui soient sortis de la main Toute-puissante du Createur." Comiers, *La nature et presage des cometes*, 1.

The sensational comet awakened all levels of French culture—from peasant to royalty, savants to nobility. The clergy all showed a vested interest. Madame de Sévigné,[91] a prominent member of the aristocratic circles of Paris, was among the crowd of spectators. Her published letters to her daughter and others would eventually make her one of France's sharpest and most celebrated social critics and chroniclers of seventeenth-century Parisian life. Her letters concerning the comet are particularly noteworthy. In a letter to Simon Arnauld de Pomponne,[92] one of her regular correspondents, Sévigné sardonically discusses the popular fad that the sensational comet had become:

> First, there is a comet that has been seen for four days. In the beginning it was heralded only by women, we were laughed at; but by now everyone has seen it. M. d'Artagnan watched it last night and saw it easily. M. Nevré, a great astrologer, says it is of considerable grandeur. I saw M. de Foix[93] who observed it with three or four scientists. I say to you, I'm definitely going to see it tonight also: it appears at 3:00 a.m.; I forewarn you, you can have the pleasure or the displeasure.[94]

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[91] Marie de Rabutin-Chantal, marquise de Sévigné (1626–1696).

[92] Pomponne (1618–1699) was primarily a diplomat and another member of Sévigné's social circle. He was periodically a member of the royal court, and at times an ambassador for Louis XIV.

[93] Charles Ogier de Batz de Castelmore, Comte d'Artagnan (1611–1673) was a captain of the Musketeers of the Guard for Louis XIV. I can find no record of Nevré, other than that he is involved in correspondence with Jean-Baptiste Morin and Pierre Gassendi in the defence of astrology. M. de Foix was probably Henri-Charles de Foix, a correspondent of Mme de Sévigné.

[94] Marie de Rabutin-Chantal Sévigné and Emile Gérard-Gailly, *Lettres de Madame de Sévigné* ([Paris]: Gallimard, 1953), 140. "Premièrement, il y a une comète qui paroît depuis quatre jours. Au commencement elle n'a été annoncée que par des femmes, on s'en est moqué; mais présentement tout le monde l'a vue. M. d'Artagnan veilla la nuit passée, et la vit fort à son aise. M. de Nevré, grand astrologue, dit qu'elle est d'une grandeur considérable. J'ai vu M. de Foix qui l'a vue avec trois ou quatre savants. Moi qui vous parle, je fais veiller cette nuit pour la voir aussi: elle paroît sur les trois heures; je vous en avertis, vous pouvez en avoir le plaisir ou le déplaisir." The letter is dated 17 December 1664, in the Julian calendar. Quoted also in D.J. Sturdy, *Science and Social Status: The Members of the Académie des sciences 1666–1750* (Woodbridge, UK: Boydell Press, 1995), 73.

A few days later, the comet again came up in a letter to her cousin, Roger de Rabutin, Comte de Bussy:[95] "Today I saw the comet, its tail is a beautiful length. I placed into it some of my wishes."[96]

There was another Parisian world that was captivated by the comet: the artists and poets. For some of them, the comet was a source of inspiration, brimming with material for the "*comédie de mœurs*." Jean Loret[97] was a writer, poet, playwright, and theatrical *feuilletonist*[98] who published a weekly gazette called *La muse historique*,[99] which included reports on the current events in Paris. His articles were written in verse and took the form letters to his muse, Marie d'Orléans Longeuville.[100] On Saturday nights, Loret's letters were adapted as dialogues or lyrics and performed as part of a live theatre by Molière and his troupe of actors.[101]

A performance for Molière and his troupe for a Saturday in early January 1665 was a recital of Loret's letter to his muse, observing Parisians' current obsession with the comet and the "*funestes effets*" (fatal effects) that accompanied it. Loret called his satire *Prestigieuse,* and his

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[95] Roger de Rabutin, Comte de Bussy (1618–1693). It was in his collection of correspondence with Mme de Sévigné that her letters were first published.

[96] The impulse to "wish upon" the comet is not mentioned elsewhere, but it must certainly have been somewhat common at the time. Mme de Sévigné closed a December letter to Comte de Bussy, "Adieu, mon pauvre Monsieur,...J'ai vu aujourd'hui la comète, sa queue est d'une belle longueur. J'y mets une partie de mes espérances. Mille complimens à votre chère femme." Marie de Rabutin-Chantal Sévigné, L.J.N. Monmerqué, Paul Mesnard, and E. Sommer, *Lettres de Madame de Sévigné: De sa famille et de ses amis* (Paris: L. Hachette et cie, 1862), 1:146–49.

[97] Jean Loret (ca. 1600–1665).

[98] A *feuilletionist* was a writer of light topics whose works might appear in a newspaper or novel appearing in installments.

[99] The first edition was on 12 May 1650 and was published weekly thereafter for fifteen years. The volumes were eventually published. Jean Loret, *La Muse historique; ou Recüeil des lettres en vers, escrites à son altesse mademoiselle de Longueville,* Livre 1, (Paris: Chenault, 1656).

[100] Marie d'Orléans-Longueville (1625–1707).

[101] This poem and the one that follows are provided by a project called Molière 21, a compendium of Molière's works made available online at http://www.moliere.paris-sorbonne.fr (accessed 9 September 2016).

audience would have known that his title had layered meanings. First, with *Prestigieuse,* Loret would have certainly intended something like today's meaning; that is, that the comet and all its significations commanded respect. By extension, one might also assume he meant a similar admiration for the group of "profound thinkers" savants, both secular and theologian, whose explanations and theories were being promulgated at the time. But *prestigieuse* would have had another current and familiar connotation: as in someone who had been put under a spell, as a magician might create an illusion by sorcery *("illusion par sortilege")*: *"Les magiciens d'Egypte n'agissoient que par prestige."*[102] The comet that was casting the spell over the various classes of Paris, or so it was for Loret, and the source of the bewitching spell is opened by him for consideration. Was it the savants, the theologians, the "charlatan *horoscopeurs*," or the comet itself? Loret seems to have decided that it was the entire lot who were made ill by their obsession, both physically and mentally. Loret's title leaves open these interpretations.

Loret's letter to his muse that week was on the subject of the most current and popular event of the day: the comet that had mesmerized them for the past few weeks. With its long, mysterious tail and unintelligible movements, it tested the *esprit* of all classes, and brought out the greatest thinkers of the time, who drew upon their learned experience to provide answers to those who were ignorant of the ancient knowledge of astronomy. Those who could merely look in awe may not yet realize that there is much more to know about comets than their mere perceptions of it:

Prestigieuse

La Comète qu'on voit en l'air,	(The Comet that we see in the air,
Quand le temps est serein et clair,	When the weather is serene and clear,

[102] "Illusion par sortilege. Les magiciens d'Egypte n'agissoient que par prestige. Tous les changemens qu'on croyoit qu'ils faisoient n'estoient que des prestiges, que de purs prestiges. Il y a du prestige à cela." *Le dictionnaire de l'Académie française*, 1st ed., s.v. "prestigieuse."

Et dont la moitié de la queue	And half of its tail
Est de plus de cent une lieue,	Is more than one hundred and one leagues,
A bien exercé dans Paris	Has well exercised in Paris
Les faibles et les forts Esprits.	The weak and strong Minds.
Le bas Peuple parle en pécore	The lower people speak in ignorance
De cette vaste Météore;	About this immense Meteor;
Et le savant et le profond,	And the savant and the deep thinker,
D'admirables discours en font	In the admirable speeches made
Lisant (le Compas sur le Globe)	Reading (the Compass on the Globe)
Strabon,[103] Ptolémée et Macrobe,	Strabon, Ptolomy and Macrobe
Les Nostradamus, les Cardans,[104]	The Nostradamuses and Cardans
Les Copernics, les Arcandans,[105]	The Copernicans and Arcandans
Les Gassendi, les Zoroastres,	The Gassendists, the Zoroasters
Gens experts en matières d'Astres.	All experts in matters of the Stars.)

As one who had listened to the speeches of these great "modern astrologers," Loret was often impressed by their reasoning, contentious as it might be. Intent on defending their diverse theories about "this great, prestigious fire" and its progress and path, the savants nevertheless will never be able to prove their theories; thus, it comes as no surprise that the most that they can do is argue with each other:

J'ai souvent entendu plusieurs,	(I have agreed many times,
Plusieurs de ces doctes Messieurs,	Many times with these learned Sirs,
De ces modernes Astrologues,	With these modern Astrologers
Faisant entre eux des Dialogues,	Discussing between themselves,
Apparemment contentieux,	Contentiously, it seems,

[103] Strabōn (64 BC–ca. AD 24) was a Greek geographer, philosopher, and historian.

[104] This is the famous renaissance mathematician, physician, and savant Giorlamo Cardano (1501–1596).

[105] An Arcandan was someone ascribing to the Arca system of astronomy of ancient Arabia.

Sur ce grand feux prestigieux,	Regarding this great mesmerizing fire,
Témoignant, dans leurs controverses,	Testifying, in their debates,
Être d'opinion diverses,	To be of diverse opinions,
Touchant ses progrès et son cours,	About its progress and its path,
Dont on tient différents discours:	Thus we hold different discussions:
Mais comme ces Gens de Doctrine	But like these People of Theory
Ne parlaient qu'en Langue Latine,	Speaking only the Latin Language,
Je croquais, illec, le marmot,[106]	I chew, as it were, on the door knocker,
Et n'y comprenais pas un mot,	And do not understand a single word,
Car parler en notre présence	But speaking in our presence
En franc langage de Térence,	In the uncomplicated language of Terence,
De Sénèque, de Cicéron,	Of Seneca, of Cicero,
De Tite-Live, ou de Néron,	Of Titus Livius, or of Nero,
C'est, pour moi, jargon Arabesque,	This is, for me, Arabic jargon,
Goth, Samaritain, ou Tudesque;	Gothic, Samaritan, or Teutonic;
Ainsi, quand j'en devrais mourir,	This way, when I die,
Je ne saurais bien discourir	I will know to speak properly
De cette Comète enflammée	About this blazing Comet
Dont si grande est la renommée.	Which is so great and renowned.)

After a few weeks of theories and debates, Loret was beginning to grow impatient. The savants had him "chewing on the door knocker," as he waited to glean some clarity from the serious speculations. Although their Latin was the language of the ancient masters, it might as well be Arabic (or maybe Gothic, Samaritan, or even German). All the Latin theorizing may have had long-term benefits: when he dies and gets to heaven, he will know what to say about the comet he experienced in Paris.

[106] This phrase is meant to conjure the image of someone waiting on the edge, or literally, "chewing on the door knocker."

Everyone wanted to see the comet, not just those whose profession it was to understand it, and wanted to be convincing that they understood it. From the peasant to the king and every layer of Paris culture in between, they were all trying to see it. Thousands were being drawing out of their houses out into the cold January nights to ogle and pine over it:

Outre les sieurs horoscopeurs,	(Besides our honoured Horoscopers
Dont la plupart sont gens trompeurs,	Who are for the most part, charlatans,
Le roi, les princes, les princesses,	The king, the princes, the princesses,
Marquises, comtesses, duchesses,	Marquises, countesses, duchesses,
Gens ignorants, gens de savoir,	The common folk, the educated,
Tout le monde l'a voulu voir.	Everyone wants to see it.
Pour lorgner[107] sa lueur blanchâtre,	To ogle at its whitish pallor,
Les tuiles servaient de théâtre,	The roof tiles serve as a theatre,
Les lucarnes, les hauts planchers,	The skylights, the upper floors,
Les terrasses et les clochers;	The terraces and the clock towers;
Et comme les nuits hivernales	And like the wintery nights
Aux forains sont toujours fatales	For the Fair Men are always fatal,
(Id est, à ceux qui sont dehors),	(that is, for anyone outside),
Plus de cent trente mille corps,	More than 130,000 bodies,
Et possible encor plus grand nombre,	And maybe even more,
Respirant un air froid et sombre,	Breathing in a cold and somber air,
Sont enrhumés, en vérité,	All have colds, for sure,
Tant dehors que dans la cité,	Both in the countryside and the city,
Et la plupart, foi de poète,	And to top it all off (believes the poet)
À cause d'icelle comète,	Because of this here comet
Dont moi qui vous parle à présent	Of whom I speak to you now,
N'en suis aucunement exempt	Am in no way excluded.)

[107] Regarder en tournant les yeux de costé & comme à la desrobée.

The tiles of the Paris rooftops were filled like seats in a theatre with the comet's captivated audience. But the excitement that had drawn those curious onlookers together had also drawn them out into the January nights, and that cold night air had taken its toll. A third of the population of Paris was sick, had "colds, for sure."[108] Or did the poet mean that they had gone mad and were mesmerized by a bewitching comet? Either way, in the end the poet himself had not escaped the epidemic shared by everyone in Paris.

In the 1660s, Paris society had a class of intelligent and cultivated people that made the sophisticated social commentary of artists like Loret and Molière possible. Works like Loret's *Prestigieuse* anticipated an audience that had a curiosity about the events of the day and a grasp of the complicated social conventions being scrutinized and parodied. In that way, they acted as a kind of social leveller and spread various editorial commentary through many strata of the culture. It is known that due to its two-sided edginess and frequent ribbing of the upper classes, Molière's works were widely attended by members of the lower classes of France as well.[109]

What is unknown about the performance is its location in Paris. It might have been in the Théâtre du Palais-Royal, adjacent to the Palais Louvre, where Molière's performances were often held during this time.[110] What is not in doubt is its date. Loret's satire of the obsessions in Paris over the comet was performed by Molière and his troupe on Saturday, 10 January 1665. As it happens, that was an auspicious day for the city. Coincidently, a conference was

[108] At the time, 130,000 would have been about one-third of the population of Paris. This is an interestingly precise choice of wording for Loret. Perhaps as part of a quasi-news story, there is a bit of accuracy in this number.

[109] Molière reportedly enjoyed these lower-class audiences and admired what he thought was their special understanding of his works.

[110] The king was a defender of Molière and was known to attend performances. His brother, Philippe, or Monsieur le Prince, was the Troupe's official sponsor.

convened on the same day by King Louis XIV around midday, across town at the Jesuit College at the University of Paris. Louis had summoned those in his kingdom who could provide answers to some of the vexing questions posed by the comet. Louis asked for explanations of the comet's bizarre movements. The hope was that by providing some scientific explanation for its erratic path, they might clear away some of the anxiousness and confusion. The agendas of the conference and Loret's satire were in that way not unlike, and it would not be surprising to learn that some of the performance participants had also attended the conference earlier that day.

If Loret can be taken at his word, at least one-third of the population of Paris was suffering the physical effects of overnight vigils of sitting on the cold roof tiles or leaning over parapets to catch a glimpse of the extraordinary apparition in their sky. The comet was a mesmerizing experience. It occupied their daily lives and conversations. After a few weeks caught up in this mania, people had many questions. The astrologers were offering their own exegeses, and no doubt the comet was a prime topic from the pulpits of Paris. A handful of savants and astronomers were clamouring to make their explanations known. They defended rational explanations founded on contemporary theories that could displace the groundless superstitions. Could the comet be explained as a naturally occurring phenomenon, in the context of the known elements of the universe? The comet had ignited long-argued theories about comets in the various academic circles in Paris, as Louis XIV's official conference on the theories of the comet illustrates.

The Comet Conference at Clermont College

At the end of 1664, Louis sought to manage the confusion about the comet and, in so doing, to promote his reputation as a progressive ruler who was open to the possibilities being made available by the study of the new sciences. To those ends, he decided to summon together

members of the Parisian savant community and encourage them to discuss the most current comet theories, emphasizing explanations for the comet's erratic behavior. The conference was held at the Clermont College, the Jesuit College at the University of Paris, on 10 January 1665.

If there was ever an official record of the conference proceedings, it is now lost. However, a reporter from a week-old academic journal published a summary of the proceedings. Only five days earlier, at a time when most Parisians were occupied by their first experiences with the comet, Parisian lawyer Denis de Sallo began publishing a new erudite journal he named, the *Journal ∂eſ Sçavanſ*.[111] Its introduction at the very moments of the comet warrants a brief review here: On the *Journal*'s front page, de Sallo established the publication's mission would be to make public "everything that passes as new in the Republic of letters."[112] He outlined six specific areas of interest. First, the *Journal* would publish reviews of important books: "not just their titles, but to look at them carefully in order to determine their usefulness."[113] Second, the *Journal* would provide information about interesting people, their theories and works, their biographies and deaths. Third, any new experiments "explaining the effects of Nature" would be reported, as well as discoveries "in the Arts and Sciences, like machines and useful inventions, or curiosities coming out of Mathematics." Fourth, there would be reports of celestial observations. Likewise, they promised news about anatomy and animals. Fifth, they

[111] De Sallo's *Journal ∂eſ Sçavanſ*, later *Journal ∂eſ Savantſ*, was the first academic journal, first printed as a quarto pamphlet. Except for a few years of interruptions due early on to controversies related to the Catholic Church, and later due to the French Revolution, the *Journal* continues today as a world-renown journal in world culture. Denis de Sallo, *Journal ∂eſ Sçavanſ...1665–1792, 1797* (Paris: Bibliothèque nationale, 1665). All citations in this study are from the first volume, 1665.

[112] See "l'Impremeur au Lecture," ibid. "Le dessein de ce Journal estant de faire sçavoir ce qui se passe de nouveau dans la Republique des letters, il sera composé."

[113] Ibid. "Premierement d'un Catalogue exact des principaux livres qui s'imprimeront dans l'Europe. Et on ne se contentera pas de donner les simples titres,…& à quoi ils peuvent estre utiles."

would report on new tribunal decisions, both secular and ecclesiastical, and on the censures being carried out at "the Sorbonne and of other universities," domestic and foreign. In summary, "we will strive to ensure that this journal will report on everything that happens in Europe worthy of the curiosity of the People of letters."[114]

The writing style of the *Journal* reflected de Sallo's law background, as the publication promised to be "exempt of passion and partiality."[115] No article was ever to be published with a by-line. In keeping with a detached and objective style of reporting, all editorials were published under the pseudonym of the "Sieur de Hedouville." De Sallo's timing was auspicious: the conference was exactly the kind of event with which the new publication must have hoped to affiliate. The comet conference report was the feature article in the *Journal*'s fourth weekly edition, on Monday, 26 January 1665 (Figure 15). It begins, "The tenth of this month, there has been a large assembly at the Jesuits College of this city, where was found Monsieur le Prince, Monsieur le Duc, and Monsieur le Prince de Conty, followed by a large number of Ecclesiastics and Lords of the Court. We would try to determine there the causes and the effects of Comets."[116]

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[114] Ibid. "On taschera de faire en sorte qu'il ne se passe rien dans l'Europe digne de la curiosité des Gens de lettres, qu'on ne puisse apprendre par ce Journal."

[115] Ibid. "Un ouvrage qui ne doit pas etre moins libre de toute sorte de prejuge qu'exempt de passion et de partialité." In his article "History and the Learned Journal," Harcourt Brown points out another important warning offered by the editors: "the reader must not be surprised to find in the Journal opinions which differ from his own, because the editor will take no responsibility for the views of authors discussed, neither guaranteeing their validity nor offering criticism of them." The aim, clearly, was to report the most current news. Harcourt Brown, "History and the Learned Journal," *Journal of the History of Ideas* 33, no. 3 (1972): 369.

[116] Sallo, *Journal des Sçavans*, 1:41. "Le dixiéme de ce mois il y eut une grande assemblée au College des Jesuites de cette ville, où se trouverent Mr. le Prince, Mr. le Duc, & Mr. le Prince de Conti, suivis d'un grand nombre de Prelats & de Seigneurs de la Cour. On y rechercha les causes & les effets des Cometes."

Le Cocu batu & content. Nouuelle, tirée de Bocace, par M. de La F.

CEtte traduction eſt du meſme Autheur que celle de Ioconde: mais elle eſt traitée d'vne maniere bien differente. Car la premiere eſt en vers libres, & l'autre en vers imitez du temps de Marot. Auſſi cet Autheur fait-il l'eſſay dans ces deux pieces de ces eſpeces de vers, qu'il a iugez plus propres pour rimer des contes: & il ſe propoſe, ſelon que l'vn ou l'autre plaira dauantage, de s'en ſeruir dans d'autres ouurages de cette nature, qu'il a deſſein de donner au public.

DE LA COMETE.

LE dixieſme de ce mois il y eut vne grande aſſemblée au College des Ieſuites de cette ville, où ſe trouuerent Monſieur le Prince, M. le Duc, & M. le Prince de Conty, ſuiuis d'vn grand nombre de Prelats & de Seigneurs de la Cour. On y rechercha les cauſes & les effets des Cometes.

Le Pere d'Arroüis fit l'ouuerture de la Conference, & ſouſtint, que les Cometes ne ſont qu'vn amas de pluſieurs petites eſtoilles errantes, qui ſuiuant la nature des autres planetes qui ont des mouuemens inegaux, ſe doiuent neceſſairement ioindre enſemble de temps en temps, & ſe rendre viſibles par cette vnion. En effet il ſemble qu'on ne peut pas nier qu'il n'y ait dans le Ciel quantité d'eſtoilles, dont la petiteſſe iointe à noſtre éloignement,

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Figure 15. Title page from the report of the comet conference at Clermont College, *Journal des Sçavans*, 1:41.

There is no record of how the conference might have been promoted, who was invited, how many attended, or how it was decided who would be allowed to speak. The invitations seemed to lean towards the Jesuits, the sponsors of the event, as well members of the royalty and court insiders. It seems that the meeting was organized rather spontaneously and not

everyone who would have been expected to attend did.[117] The *Journal* reported that there were "a great number of Prelates[118] and Lords of the Court,"[119] all led by three of the most important members of the royal family: Monsieur le Prince, that is, le Prince de Condé, his eldest son, the duc d'Enghien, and Condé's younger brother, Armand de Bourbon-Conti.[120]

A few of the members of the assembly had been invited to present their theories. The Jesuit priest Père d'Arroüis directed the proceedings and opened with one of the primary questions of the day: Were comets celestial or terrestrial bodies? According to the *Journal* report, Arroüis presented an explanation that would have likely been familiar to everyone there. It was an application of an ancient theory by Democritus[121] that posited that comets were stars. As stars, comets would then be celestial, and therefore part of a fixed and immutable whole. That contradicted their erratic motion. Arroüis clarified that comets are not ordinary stars. They were small clusters of many small stars, which "must join together from time to time, and make themselves visible through this union." Surely, argued Arroüis, in the heavens there are many stars that are too small or too remote to see, and their movements would be "uneven," since no two stars that are visible seem to move together. "Indeed," goes

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[117] Pingré reported that the well-known french astronomer Pierre Petit said that "he would have attended the conference had he been warned." Pingré, *Cométographie*, 1:106.

[118] A prelate was a church dignitary, like bishops and archbishops, abbes, treasurers, deans and archdeans, and other lower-ranking church officials.

[119] Sallo, *Journal des Sçavans*, 1:41.

[120] I own thanks to Nicholas Dew for insights and corrections in my understanding of this royal assembly. Why the conference seems to have been the affair of this part of the royal family has not been considered here.

[121] Democritus of Abdera (ca. 460–370 BCE) was a contemporary of Plato, most famous for his formulations concerning the nature of worlds: "The worlds are unequally distributed in space; here there are more, there fewer; some are waxing, some are in their prime, some waning: coming into being in one part of the universe, ceasing in another part. The cause of their perishing is collision with one another." Hippolytus, J.H. Macmahon, S.D.F. Salmond, and Hippolytus, *The Refutation of All Heresies* (Edinburgh: T. & T. Clark, 1868); see Chapter 11.

the article, "the Father concluded that in Heaven we must sometimes see new stars, whose duration is shorter or longer, depending on whether there is more or less inequality in their movement."[122]

Next to speak was Gilles Personne de Roberval, a high-ranking and spirited Parisian mathematician, chair of the mathematics department at the Royal College of France, and a vociferous adversary of the theories of Descartes. Roberval put forward a Copernican explanation for comets, with the intention of broaching the most controversial topic of their time: "the placement and the movement of the earth." The comet, reported the *Journal*, provided a prime opportunity to study that controversial question. Comets, Roberval is quoted, "are from exhalations of the elementary spheres" that are emitted from some heavenly body, which form tails of fire. He also suggested that the phenomenon of the comet's motion is something of an illusion: "the daily movement is not in it, but in the earth that revolved round about its axis."[123] By reputation, Roberval was a brilliant scholar but an academic boor, and his style that day may not have been passive. The *Journal* does not detail how those at the meeting received his Copernican presentation, but at that time and place it must have generated debate.

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[122] Sallo, *Journal des Sçavans*, 1:42. "Cometes ne sont qu'un amas de plusieurs petites estoilles errantes, qui suivant la nature des autres planetes qui ont des mouvemens inegaux, se doivent necessairement joindre ensemble de temps en temps, & se rendre visibles par cette union. En effet il semble qu'on ne peut pas nier qu'il n'y ait dans le Ciel quantité d'estoilles, dont la petitesse jointe à nostre éloignement."

[123] Ibid.

[124] Sallo, *Journal des Sçavans...1665–1792, 1797*, 43. "Et cela n'a rien de chimerique: au contraire il est tres probable, & mesme la beauté de l'univers semble l'exiger, qu'il y ait ains dans le monde de ces astres communs qui appartiennent à tous les cieux, de mesme qu'il y en a qui appartiennent à certains cieux particuliers."

The *Journal* continued: "Monsieur Phelippeaux, a Flemish doctor, spoke next, to explain the opinion of Monsieur Descartes." Phelippeaux was one of the Descartes promoters and defended Descartes's vortex cosmology. A comet, Phelippeaux is reported to have said, is not a star but a special kind of planet. Unlike all other planets, which are contained and remain in a particular vortex in Heaven and follow around a particular star that they never leave, comets "have the following particularity: [they] set an orbit around the star to which they belong, that is to say, they do not belong to any one particular vortex, but belong to all vortices in general, or at least to many of them." How it does this "we cannot know," said Phelippeaux. He was willing to suggest some possibilities: it might be following a path set for it by its mass and its "impetuosity of the movement that it has acquired" through its journey.

Fixed stars, Phelippeaux continued, are like the sun in several ways. They are self-luminous and the centre of a vortex. Therefore, there are as many heavens as there are different stars. "This is not chimerical," the *Journal* observed. "On the contrary it is very probable." In fact, "even the beauty of the universe seems to demand it, that there is therefore in the world of those common stars that which belong to all heavens, just as there are those which belong to particular heavens."[124] Phelippeaux's presentation of Descartes's theories may have gone on a bit longer and in more detail than the *Journal* authors thought was necessary. In any case, they cut the report of his presentation short, explaining that going into anymore of the Descartes explanation "would be too long a discussion."[125]

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[124] Sallo, *Journal des Sçavans...1665–1792, 1797*, 43. "Et cela n'a rien de chimerique: au contraire il est tres probable, & mesme la beauté de l'univers semble l'exiger, qu'il y ait ains dans le monde de ces astres communs qui appartiennent à tous les cieux, de mesme qu'il y en a qui appartiennent à certains cieux particuliers."

[125] Ibid. "Et par là l'on peut aisement, expliquer tout ce qui a esté jusques icy observé touchant les Cometes. Mas cela seroit d'une trop longue discussion."

The next savant to present his theories was another Jesuit priest, Père Jacques Grandamy. Although there were few at the conference who could have remembered the 1618 comet, the eighty-year old Grandamy had "observed it curiously" forty-seven years earlier. According to the *Journal* report, he recounted a theory that he had first posited at the time—namely, that comets are "parts of Heaven" that have been condensed by the actions of the stars, and their proper movement become visible when they interrupt and partially reflect the rays of the sun, appearing with one head and one tail. On the question of their motion, Grandamy suggested that it "comes from the stars that they follow."[126] Eventually their motion ceases when it is destroyed by the action of other stars, or likewise if the star that they are following stops its own motion.

Grandamy is relatively unfamiliar as a historical figure, but a few things about him make him interesting to this study. To begin, Jacques Grandamy (sometimes Grandami or Grand-ami) (1588–1672) was a Jesuit priest. He was esteemed for his involvement in physics, mathematics, and astronomy. He was a professor, and taught philosophy and theology in various colleges in France. He had been the rector in Bourges, Rennes, La Flèche, Tours, and Rouen, and in Italy at the Collegio Romano.[127] At the time of the conference, he was a professor of theology at Clermont. He wrote about astronomy, including one treatise concerning two eclipses[128] and the piece he would later write on the comet, which likely

[126] Ibid. "Que leur mouvement propre venoit des astres qu'elles suivoient."

[127] There is some evidence for this in a letter found by Antonella Romano. Antonella Romano, "Les Pascal de Rouen 1640–1648" (paper presented at the Les Pascal de Rouen 1640–1648: Colloque de l'Université de Rouen, GRHIS-UPRESA 6064-CERHIS, Rouen, Nov., 1999), 231.

[128] Le P. Jacques Grandamy, *Deux eclipses en l'espace de quinze jours: Explication de la fameuse eclipse de lune qui doit arriver le mercrady 16. de juin dela presèbte abbeé* (Paris: Prome, 1666).

spurred his involvement at this conference.[129] His most noteworthy publication was *Nova demonstratio immobilitatis terrae* (1645), in which he defends the proposition of the immobility of Earth. He corresponded with Descartes, which could account for similarities in their cosmologies. Those two facts alone would lead us to believe that he likely clashed with Roberval during the conference proceedings.

Beyond his scientific activities, Grandamy plays another part in this study. As just mentioned, Grandamy had been the rector in Tours, France. As it turns out, his time there coincided with the stay of Marie de l'Incarnation. In fact, it was Grandamy, along with a M. Forget,[130] to whom Marie and her collaborator, Mme de la Peltrie, made their original appeal to leave the Tours convent and establish the Ursuline mission in New France, and it was Grandamy who granted the permission for their expedition. Moreover, Grandamy seems to be the one who put the two women in contact with each other, telling Marie that she needed company on her voyage. Final permission was granted by M. Forget, who first got his permission from

> the reverend Father Grandamy, [granted] to our reverend Mother, to Madame de la Peltrie, to Monsieur de Bernieres, who will accompany on this voyage, and to me, who will be the least capable of all…and the Reverend Father Grandamy, who was rector of the college, confirmed orally everything that had been written, having received orders from the provincial Reverend Father to do it.[131]

Returning to the *Journal* report and conference, next on the agenda was another Jesuit, Père Garnier. Unfortunately for Garnier, the time at the conference had run out. After five

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[129] Jacques Grandami, *Le cours de la comète qui a paru sur la fin de l'année 1664, et au commencement de l'année 1665: Avec un traité de sa nature, de son mouvement et de ses effets*, n.p. (Paris, 1665).

[130] Forget was their direct superior and chancellor of the church in Tours.

[131] Martin, Marie de l'Incarnation, *La vie de la venerable mere*, 358. "To the Community of Ursulines of Tours."

hours of listening to the savants present and defend their theories, the approaching darkness forced the conferees to adjourn. According to the *Journal*, Garnier would have made the case that comets are composed entirely of globes of fire that are trapped in air, "in much the same manner that we see air bubbles trapped in bottles of water."[132] Garnier was expected to explain that the globes reflect a part of the rays of the sun, which makes the head of the comet visible. Having been penetrated by remnant parts, the comet begins to disintegrate. From that point the comet follows the laws of refraction, which makes the tail resemble a swallow.

Pingré's study a century later mentions the conference, and he discovered that several other authors later wrote about the conference. One anonymous work titled "l'Esprit du Sage informé, Etc," or "The Mind of the Informed Savant,"[133] criticized the entire conference. Pingré noted that it "criticized with much justice and bitterness the sentiments of all the actors of the conference." Nevertheless, its author "did not show himself wiser than they, in claiming that Comets owe their existence to exhalations that the Sun rises or attracts from the body of all the planets."[134]

A week after the Clermont conference—and coincidently, Loret's first parody of the comet sensation—neither the comet's luminance nor its attraction had diminished. Likewise for Loret, not all the humour had been extracted from the social phenomenon. After all, since his

[132] Sallo, *Journal des Sçavans*, 1:44. "Les Cometes son composées de feux renfermez dans l'air, presque de le même maniere que nous voyons quelque-fois de l'air renfermé dans l'eau formée en bouteilles."

[133] At the time the French word *informe* also had the meaning of "formless" or "imperfect." A star that was not a part of a constellation was said to be "*informé*." A pun could have been intended by the anonymous author. *Le dictionnaire de l'Académie française*, 1st ed., s.v. "informe."

[134] Pingré, *Cométographie*, 1:107. "Un anonyme, dans un Ouvrage intitulé, l'Esprit du Sage informé, etc. critiqua avec beaucoup de justesse & d'amerume les sentimens de tous les Acteurs de la conférence: mais il ne se montra pas plus sage qu'eux, en prétendant que les Comètes doivent leur existence aux exhalaisons que le Soleil élève ou attire du corps de toutes les Planètes."

first parody, royal attention had been lavished on the comet, and the scholarly class had organized a grand affair dedicated to thinking about it. Loret focused his next letter on that sage event, at the expense of those who had gathered to offer their theories. Loret's second work dedicated to the comet expressed the more sardonic side of the *Journal* article.[135]

He called his second comet letter *Astrologique*, or "Astrological."[136] Loret was clearly unimpressed by the erudite event and its performers, and his second comet satire took aim at the conference with which he shared the previous Saturday. Loret began by introducing the many clerics and lords of the court who attended the event, all led to Clermont College by the three illustrious Bourbon Princes:

Astrologique

Condé, ce Prince illustrissime,	(Condé, this illustrious Prince,
Dont partout on fait tant d'estime;	Who we often show much esteem;
Monsieur le Prince de Conti,	Monsieur le Prince de Conti,
Qui des vertus tient le Parti;	Whose virtues are taken advantage of;
Monsieur le Duc, dont la jeunesse	Monsieur le Duc, who is young
Est pleine d'esprit et d'adresse,	And full with spirit and skill,
Et plusieurs Seigneurs de la Cour,	And many lords of the Court,
Se transportèrent, l'autre jour,	Took themselves, the other day,
Au collège de Saint Ignace,[137]	To the college of Saint Ignatius,
Qui, comme un autre Montparnasse,	Who, like another Montparnasse,
Des Sciences est l'aliment,	The Sciences is the main diet,
(Ce serait mieux dit l'élément)	(Or to put it better, element)
Pour entendre la Conférence	To listen to the Conference

[135] There are several parallels between Loret's letter and the *Journal des Sçavans* article a week later. Perhaps there was either some private collusion, or the journal author happened to be in the audience.

[136] Given the eventual tenor of his poem, it might have been that Loret had in mind the internal pun, "astro-logique."

[137] Clermont College at the University of Paris.

De plusieurs Gens de conséquence	so many People of consequence
Touchant la Comète qui luit	Concerning the Comet that shines
Dans les airs, le long de la nuit,	In the skies, the length of the night,
Comète errante, dont la queue	Wandering Comet, whose tail
N'est pas incarnate, ni bleue:	Is neither reddish, nor blue:
Mais d'une certaine couleur,	But of a certain colour,
Qui tient un peu de la pâleur,	Which holds a bit of pallor,
Sur qui ces Gens Astrologiques,	On which these Astrologist types,
Qui savent les Mathématiques	Who know Mathematics
Mieux que je ne sais mon Pater,	Better than I know my Paternoster,[138]
Entreprirent de disputer.	Undertook some debate.)

For Loret, the conference had an atmosphere something like a Dionysian feast, but instead of an orgy of food and drink in the shadow of Greece's Mount Parnassus, this one was an overindulgence of the sciences, at the foot of the modern Montparnasse. According to Loret, the comet conference attracted many people of consequence, the astrological types, who knew "mathematics better than I know my own father." He reminded the audience that these astronomers—the heroes of the astrolabe[139]—were all good citizens who warrant esteem. The honourable Father Arroüis, a Jesuit priest and friend of Louis, was the master of ceremonies, explained Loret. Arroüis was smart and virtuous, he thought, and had the backing of Louis. Better than that, he had a good grasp of Ptolemy. But even better: he was Jesuit. The verse continued:

[138] I am grateful to Professor Faith Wallis for this translation. "Mon Pater" would be "my Paternoster" i.e. the Lord's Prayer – the first element of the catechism, instilled into very young children.

[139] An astrolabe was an instrument used to make astronomical measurements, typically of the altitudes of celestial bodies.

Entre ces Héros d'Astrolabe,	(Between these Heroes of the Astrolabe,
Tous Chrétiens, et pas un Arabe,	All Christians, and not one Arab,
Étaient le Père d'Harrouis,	There was the Father Harrouis,
Qui vaut son pesant de Louis,	Who earns his weight from Louis,
Homme de bonne renommée,	Man of good repute
Qui possède fort Ptolémée,	Who really understands Ptolemy,
Esprit laborieux, actif,	Mind laborious and active,
Spéculatif, démonstratif,	Speculative, demonstrative,
Par qui la jeunesse est instruite,	From whom the youth are educated,
Et qui, de plus, est Jésuite;	who, even more, is a Jesuit;)

Grandamy, Roberval, and Phelippeaux and their conference performances all were mentioned by Loret. Grandamy, a dear friend of the sciences, and Roberval, the mathematics professor from the royal college, are treated kindly by the poet, and he appropriates Phelippeaux's name into a terrible pun. Each of these men, advises Loret, were famous for their algebra, and although these savants managed to discuss "in less than five hours, one hundred curious things," anything that anyone said was quickly disputed. There was apparently no middle ground, no point in agreement, "everything contentious," and in the end they decided nothing about the comet.

Item, le Père Grandamy,	(Likewise, the Father Grandamy,
Des Sciences le cher ami,	The dear friend of the Sciences,
Autre Jésuite Confrère,	Another Jesuit Conferee,
Qui sait parfaitement la Sphère.	Who understands perfectly the Sphere.
Monsieur, aussi, le Roberval,	Sir, also Roberval,
Qui dans le Collège Royal,	Who in the College Royal,
Avec esprit, avec adresse,	With mind, with skill,
Les Mathématiques professe,	The Mathematics he professes,
Et, même, le sieur Phélipau,	And, likewise, the lord Phélipau,

De Hollande, et non pas de Pau,[140]	From Holland, and not from Pau,
Chacun d'eux étant fort célèbre	Each of them were very famous
Touchant l'usage de l'Algèbre.	Concerning the usage of Algebra.
Iceux parlant et discourant	Here speaking and discussing
Pour le moins cinq heures durant,	For at least a whole five hours,
Dirent cent choses curieuses,	Spoke one hundred curious things,
Mais, toutefois, contentieuses,	But, everything, contentious,
Entre eux peu, ni point s'accordant,	Sharing little, no point in agreement,
Et du fait rien ne décidant.	And deciding on nothing.
Quelques-uns d'icelle pelote	A few, thereof, the simpletons
Étaient pour l'avis d'Aristote,	Were for the opinion of Aristotle
Le plus sublime des Auteurs,	The most wonderful of Authors,
Et d'autres, pour les Novateurs.	And others were for the innovators.)

The three princes in attendance listened to the beautiful, clear, and rational arguments being presented about the birth and life of the ethereal comet. They were content to sit and be enlightened, since they could find no way to enter the discussion. They offered no points of their own, only displaying their Bourbon charm and at the same time, their mortality:

Les trois Princes, qui de lumières	(The Three Princes, who enlightened
Ne manquent point sur ces matières,	Do not make a point on these matters,
Parurent assez satisfaits	They seem satisfied enough,
Des beaux discours qu'on avait faits	With the beautiful speeches were made
Sur la naissance et la durée	On the birth and life
De cette Comète éthérée,	Of this ethereal Comet,
Répondant, par raisonnements,	Answered reasonably,
Souvent, aux plus fins arguments,	Often, with their finest arguments,
Et par leurs clartés naturelles	And with their natural clarity

[140] Pau is a small city in the south of France, west of Toulouse. It would have been famous at that time as the birthplace of Henri IV, the king's grandfather.

Charmants les plus doctes Cervelles:	Charming the very learned Brains:
En effet, les Bourbons sont tels,	In fact, the Bourbons are of a kind,
Que l'on voit fort peu de Mortels	That we rarely see amongst mortals:
Pour qui les Lettres et les Armes	For whom literature and [feats of] arms and the Armies
Aient tant d'appas et de charmes.	Have so much appeal and attraction.)[141]

At the end of the day, Loret had to admit that these pre-eminent *∂octeurs* demonstrated that they really did seem to know much about comets, in fact, "one hundred times as much as I have learned, (I, who understand nothing)"; this undoubtedly a pseudo-mathematical pun and a signal of his sarcastic view of the affair. When "pushed to the brink," the savants demonstrated their debating skills and no more. The poet is sorry to say that the report from the conference is that despite the presence of so many masters and skilled rhetoricians, nothing was accomplished because no one could agree on anything. In the end, this feast of the sciences amounted to nothing more than whipped cream.

Enfin, les Docteurs susnommés,	(In the end, the above mentioned Doctors,
De tous les Savants estimés,	Esteemed by all the Savants,
Qui s'entendent mieux en la Sphère	Who have learned better in the Sphere
Cent fois que je ne saurais faire	A hundred times more than I have learned
(Moi qui n'y comprends rien du tout)	(I who don't understand anything)
Poussèrent (comme on dit) à bout	Pushed (as is said) to the brink
Tout ce que les Gens de leur Robe	Everything that the Men of the Robe
Peuvent dire touchant le Globe	Can say concerning the Globe
Mais, comme j'ai tantôt écrit,	But, like I have elsewhere written,
J'ai su d'un excellent Esprit,	I have known an excellent Mind,
Lequel paya de sa présence	Who paid for his attendance
En cette illustre Conférence,	At this illustrious Conference,

[141] Professor Wallis also provided assistance on the last four lines of this stanza.

Que Messieurs les Déclamateurs	These Masters and Rhetoricians
Eurent beaucoup d'Admirateurs,	Had many Admirers,
Que savamment ils discoururent,	That skillfully debated,
Mais rien, pourtant, ils ne conclurent:	But nothing, and yet, did not conclude:
Bénévoles Lecteurs, ainsi,	Benevolent Readers, this way,
Tout ce que j'en rapporte ici	All that I report on here
Dans une heure précipitée,	In this hasty hour,
Se peut nommer crème fouettée.	Can be declared whipped cream.)

Although the experts at the conference could provide no definitive answers about the comet, which "stupefies many an imbecile," others believe it to be "nothing of misfortune, nor a warning" of any kind. Nonetheless, not wanting to leave his muse and his readers with a bad taste for the conference and the despair that they could not provide any comfort at those moments of impending doom, Loret wanted to report some news he had heard from some "makers of horoscopes." Their claim was that in truth, the comet actually does not forebode doom for Europe. It is actually pointed somewhere else, beyond France's horizons, maybe the Nile, Ganges, and or Euphrates. At least, that could be hoped:

J'entends quelquefois sermonner,	(I hear sometimes sermonized,
Argumenter et raisonner	Arguing and reasoning
Sur ce flamboyant Météore,	About this blazing Meteor,
Qui fait pâlir mainte pécore;	Which stupefied many an imbecile;
Mais on tient que son triste aspect,	But we believe that its sad appearance,
A quantité de Gens suspect,	Many People suspect,
Étant de l'air un pur ouvrage,	Could be the work of purity in the skies,
Rien de malheureux ne présage	Nothing unfortunate no imperative
Ou, si par quelque sort maudit,	Or, if it is some sort of curse,
Quelques dommages il prédit,	Some harm it predicts,
Ce ne sera point sur l'Europe,	That it does not aim at Europe,

(Ce dit un Faiseur d'Horoscope)	(So says a Maker of Horoscopes)
Mais qu'il répandra ses poisons	But that it will spill its poisons
Surtout pleins d'autres horizons,	Mostly beyond other's horizons,
Vers le Nil, le Gange et l'Euphrate.	Towards the Nile, Ganges, or Euphrates.)

After two performances that focused on the comet—a first that lampooned the cultural obsession with it, and a second that lampooned the resplendent but entirely unaccomplished theorizing that was spent on it—Loret had apparently drained that particular sensation of its sarcasm. His verses show that, from a popular point of view, for the first two weeks of 1665, the phenomenon of the comet mesmerized the population of Paris and bewildered even the savants who dared to explain it. It had triggered something important in the people of Paris—every layer of the population—and had focused them on a single, shared phenomenon. From king to commoner, "*gens ignorants*" to "*gens de savoir*," no person with eyes and access to the night sky on a clear night could have been denied the chance to experience it.

The comet gathered the attention of bystanders, who began to organize around it, and challenged them to evaluate what they believed to be true about the universe. It forced into relief a traditional way of understanding, and counterposed that to other possibilities. The event of the comet began a movement of all previous ways of understanding from the margins to the centre of the conversation. The comet brought to light what was once believed about the universe, what was believed at present, and what could be believed. New ways of understanding may have been immature and uncertain, but they were gaining attention in important circles. Everyone was curious and apprehensive. Most were fearful, and retreated to their familiar sources to find traditional interpretations of the event.

There were others, however, who were apprehensive in another way. For them, the appearance of the comet was an opportunity long desired. Until that moment, comets were

historical and theoretical. The savants finally had been given a comet. They saw themselves on the verge of understanding wonders that were centuries old. Of course, it was not only in Paris that the comet of 1664 gathered its followers. There appears to be no place on Earth that did not have the same opportunities and the same encouragement to wonder, speculate, and doubt. In Paris, the knowledgeable, although given the opportunity, could not seem to provide any answers. But in what follows, we will see that some there tried to find a new method of explaining the motion of comets.

Chapter 2 — Adrien Auzout and the Inception of the Observatory Project

> It does not appear at all that God has wanted to teach us anything in particular about nature; on the contrary, almost all who have wanted to find the principles of their philosophy in the Scripture have fallen into unsupportable errors, since we must only look there for the maxims of religion and morality, and not for the principles of physics or astronomy, which are as useless for the other life as they are useful for this one.
>
> Adrien Auzout, 1665

Adrien Auzout and His Ephemerides

Loret was not the only one to notice the theoretical presentations that dominated the Clermont College conference. De Sallo and the *Journal des Sçavans* editors also took note of the fact that the comet in question—the one in the skies at that very moment and the one that had precipitated the conference—had not even been mentioned. Instead, all that was discussed were theories about comets, some of which had been debated for decades. In fact, as the conference unfolded, it was not the comet but the theories that became the focus of the discussions, and as theories they offered no hope for resolution. The arguments that ensued may have impressed the uninitiated to the point of speechlessness, but Loret's disappointed assessment of the general unproductiveness was likely fairly common. As the conference was suspended by nightfall, the comet was still in the sky, its existence and bizarre movements no less bewildering.

However, the *Journal* editors had more pertinent news about the comet to report. They had learned of another study being conducted in Paris, in parallel to the conference, and they used the second part of their article to provide their readers with news of it. As the *Journal* explained, "we only spoke in this Conference that of Comets *in general.* Here," they promised,

"is something *in particular*."[1] The study was being conducted by a Paris savant named Adrien Auzout, and unlike the conference presenters, who effectively disregarded the main objective of the conference, "Monsieur Auzout had been looking for the means for contributing to the satisfaction of his Majesty, who confessed a curiosity to know the movement we now see." According to the *Journal* reporter, Auzout had conceived "a hypothesis which he easily explained,"[2] and they would provide the details of it. In complete contrast to the conference speakers, Auzout did not begin with a traditional theory about comets, but instead began his investigation by looking specifically at the comet itself. He began his study with the problem that was given: to discover a method to understand its movements.[3]

The *Journal des Sçavans* article explained that, upon first seeing the comet, Auzout immediately began recording measured positions of it.[4] After recording a few positions from a handful of observations, he took his calculations and created a physical model of the comet's motion on a celestial globe. His experiments were still active at the time of the *Journal* publication, but with Auzout's experiment in hand, the editors of *Journal* had their first scientific experiment to report to their readers. The *Journal* reported that after compiling a few

[1] Sallo, *Journal des Sçavans*, 1:44, my emphasis. "On n'a parlé dans cette Conference que des Comètes en general: voici quelque chose de particulier. "

[2] Ibid. "Monsr. Auzout recherchant les moyens de contribuer à la satisfaction de sa Majesté, qui a témoigné de la curiosité pour connoistre le mouvement de celle que nous voyons maintenant; a inventé une hypothese, sur laquelle il explique aisément son cours." The 1694 edition of the *Dictionnaire de l'Académie française* provides this definition: "Hypothese. s.f. Terme de Philosophie, Supposition d'une chose, soit possible, soit impossible, de laquelle on tire une consequence." (A philosophical term supposing that a thing is either possible or impossible, from which one can draw a result.) Given this use, I heretofore will use this term to describe Auzout's comet modelling project.

[3] There is no record that Auzout attended the conference.

[4] As noted earlier, to maintain an objective voice, no *Journal* article ever identified its author.

readings of the comet's positions,[5] Auzout determined that the comet must be "in a plane of a large circle inclined at the Equator at about thirty degrees…and to the ecliptic was about forty-nine degrees, or forty-nine degrees, thirty minutes, and the circle cuts the Equator at forty-three degrees, thirty minutes; and the ecliptic to twenty-eight degrees from Aries, or a little more."[6] This kind of thorough reporting and degree of detail of Auzout's process—the "how-to" of his comet experiment hypothesis—satisfied the curious reader and helped the young *Journal* define itself as a news source for the educated classes of Paris and France. But there was a second important reason to publish the details: Auzout was asking others to participate in the study.

Auzout explained the details of his experiment to his colleagues: first, he traced the circle directly on the surface of a celestial globe that had likely been fabricated for him by his colleague Jacques Buot,[7] "raising the Equator slightly less than thirty degrees." Auzout then physically rotated the globe until the horizon "cuts the Equator at about forty-five degrees, thirty minutes." After marking the circle on the celestial globe, Auzout then located the known comet positions on it. By extrapolating the comet path across the model and coordinating that with a calendar of dates, he was able to "determine day to day, where in the sky the Comet

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[5] These observations were likely the ones mentioned earlier that Auzout and his colleague Jacques Buot reportedly made of the comet.

[6] Sallo, *Journal des Sçavans*, 1:45. "Il juge qu'elle a toujours esté assez juste dans le plan d'un grand cercle, incliné à l'Equateur d'environ trente degrez, & à l'écliptique d'environ 49 degrez, ou 49 d, 30 minutes: & que ce cercle coupe l'Equateur au 43 degré, 30 minutes, & l'écliptique au 28 du Belier, ou un peu plus." Note, the ecliptic is the imaginary plane defined by the Earth's motion around the Sun. In Auzout's analysis, that idea is reversed. The Ecliptic is defined by the Sun's motion around the Earth.

[7] There is evidence that Buot was the source of these globes. Elsewhere in this edition of the *Journal*, it is written that on "Thursday 15, this month, M. le Duc de St Agnan presented the King a map of the sky, that M. Buot, Cosmotographer and engineer made to order, which shows the constellation in which passes the circle that marks the route of the comet we have seen." Ibid., 1:44.

would be found."[8] The *Journal* article published a few of Auzout's predictions about the comet's future positions. "He finds by his speculation," reads the report, "that its greatest daily movement has been twenty-three degrees, twenty-five minutes, which is apparently the time when it was closest to the Earth." Per Auzout's predictions, "on 10 February, this motion will not go beyond eight minutes."[9] Auzout told the *Journal* that he expected his study would provide grounds for further important investigations. He determined that the ratio of the comet's "daily motion to its distance to Earth was 3.14. That happened on 29 December, when the Comet was opposite to the sun; & he hoped to shed some light there on the decision of the famous problem of the movement of the earth."[10]

Auzout's project was neither an abstract theoretical paper—the likes of which were presented in quantity at the Clermont conference—nor the traditional astronomer's observation log that merely document the comet's previously observed positions. Auzout's project was a *search ephemeris*,[11] a day-by-day determination of not just where in the sky the comet had already been seen, but also a prediction of what position in the sky the comet will be found in the future. With his hypothesis, Auzout was attempting to provide a solution to the question that everyone, including Louis, had been asking: Are there possible methods by which we can understand the motion of the comet? Of course, the novelty of the experiment was in the predictions, and therefore the timing of Auzout's publication was critical. The

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[8] Ibid., 1:44–45.

[9] Ibid., 1:45. "Il trouve par ses supputations que son plus grand mouvement journalier a esté de 13. Degrez 25 minutes, qui est apparemment le temps auquel elle estoit plus proche de la terre : & que le 10. De Fevrier ce mesme mouvement ne passera pas 8. minutes, & qu'il diminuëra advantage."

[10] Ibid.

[11] The word *ephemeride* grew into use in the sixteenth century; from Greek *ephēmeros*, meaning "lasting only one day."

comet's appearance was spontaneous, and in order for his predictions to remain authentic and his experiment relevant, they needed to be made public while the phenomenon was taking place.

He began his experiment with only a few data points. "He had probed four or five observations at most," explained the *Journal*. As we know, it was its immediacy that made his modelling project experiment daring and worthwhile. Its urgency created an impetuousness that forced Auzout into action. The *Journal* reported that a few of his predictions had already been borne out. For example, he had predicted that "the tail of the comet must be turned towards the West, ranging toward the North up to the 29th of December, at which time it looked directly northward; And that since, it must be toward the East." As the days passed and the edition of the *Journal* was published, the editors were pleased to report that the motion of the comet "agrees wonderfully well with the experiment."[12]

The *Journal* author stressed the vast potential of Auzout's experiment. His study, and ones like it, might help unravel the central debates and misunderstandings of the day, and offer some grounds for resolving the ongoing theological and scientific conflicts. The reporter speculated that if Auzout's experiment works, and the observations end up corresponding to his predicted ones, "we will no longer doubt the truth, and we will find that there is nothing more regular than the path of Comets, which is counter to the feeling of all the astronomers who preceded him."[13] Nothing could be more effective in taking comets out of the realms of speculation and superstition than to show that their motions are not unintelligible, but easily

[12] Sallo, *Journal ∂es Sçavans*, 1:45. "Ce qui s'accorde merveilleusement bien avec l'experience."

[13] Ibid. "D'où on alieu de bien esperer de son hipothese; laquelle si elle se trouve conforme à toutes les observations qui se feront, on ne doutera plus de la verité, & l'on trouvera qu'il n'y a rien de plus regulier que le cours des Cometes, contre le sentiment de tous les Astronomes qui ont precede."

explainable. Louis had asked his savants to provide a rational explanation of this particular comet for that reason: he hoped to move the comet out of the world of religion and folklore and into the world of a natural philosophy, where it could be understood as an object of scientific study. Through this process the savants would at the same time gain some popular credibility. In that regard, the conference was an utter failure, and the *comédiens* let that fact be known. Auzout's approach, less general and more particular, was more on the right track.

Nonetheless, there was still considerable risk for savants like Auzout. They could be subject to peer and public derision, or worse. The *Journal* author hoped to provide Auzout and the savants like him with some political cover. At such an early stage, these kinds of studies exposed their errors and shortcomings to a skeptical population. In the end, even if Auzout's predictions were not right, what mattered was his willingness to ignore the day's conventions and look in a new direction. As the *Journal* article explained, "Moreover, if these conjectures are not successful, that does not take away any of the glory due this Author; since in these things there is so many difficulties, and so little help in overcoming them, it is always great to have tried."[14] Working through these questions would have everyday benefits, but for the time being, as long as the experiment was a work in progress, all that could be done was to offer encouragement and wait to see what would be learned from Auzout. One should be satisfied, suggested the *Journal*, that at least the right questions were being addressed by the right people. The authors promised their readers that when Auzout received the corrections and

[14] Ibid., 1:46. "Au reste si ces conjectures ne reüssissent pas, cette tentative ne laissera pas d'estre glorieuse à son Auteur; puisque dans les choses où il y a tant de difficutez, & si peu de secours à les surmonter, c'est toûjours beaucoup d'avoir essayé."

revisions that he expected from his colleagues, "we will not fail to insert them in this Journal."[15]

Given the time-sensitive nature of his work, Auzout could not delay in making his conjectures public, and by the time the *Journal*'s report made it into the hands of its readers in its fourth edition, on Monday, 26 January 1665,[16] Auzout had already published a version of his experiment in the form of a scientific paper. In the first days of January, while the comet was still in the skies, Auzout sent his treatise to a local publisher.[17] His *L'Ephemeride du comete*, became the first of many comet dissertations to be published in subsequent years.[18] The urgency that was fundamental to his project contributed to its temerity and provoked him to take risks of convention. His intended readers were his savant colleagues, and by way of introduction, he wanted them to know that he was aware that they could consider him mad for his undertaking. Auzout began his *Ephemeride* by telling his colleagues that he was aware that, up to that point, the belief among them was that comets were outside of the order of the universe: "I shall defend my position of which someone could accuse me of temerity for having dared to undertake to predict the movement of a Comet," wrote Auzout, "because that is

[15] Ibid., 1:48. "Lors qu'on aura peu ramesser les differentes opinions & observations qui se sont faites dans les pays estrangers, on ne manquera pas de les inserer dans ce Journal."

[16] "De La Comete" was the feature article in the fourth edition of the *Journal*. The last nine pages were dedicated to Auzout's comet hypothesis project.

[17] Auzout writes at the end of his treatise, "Fait à Paris le 2. Janvier 1665"; however, it is certain that it did not get published until at least a week or so later, which means its publication corresponds roughly with the Clermont College conference and the Molière performance on 10 January.

[18] Adrien Auzout, *L'éphéméride du nouveau comète. (Fait le 16 avril 1665)* (I. Cusson: Paris, 1665). The pages of Auzout's cover letter were not numbered. Although only Auzout's name appeared at the bottom of the essay, it is easy to believe that he received assistance from those with whom he was collaborating at the time, including Jacques Buot, Pierre Petit, Thévenot, Huygens, and Du Clos.

something no one has yet attempted, and that almost everyone believes that there is nothing more irregular nor so extravagant."[19]

Next, Auzout acknowledged the likelihood that his speculations would not hold up under the careful scrutiny that he expected his colleagues to provide. But it was a risk that he felt was worthwhile. Potential failure was outweighed by the opportunity for him to share his experiment with them, and to make his suppositions public so that they could be considered and augmented. He hoped that his theories, and the theories that he expected to replace them, would become a cooperative venture for anyone interested in participating. He assured his colleagues that he was not worried about being wrong, and that he did not expect that they would treat him harshly merely for attempting this comet experiment:

> I will be quite satisfied if my predictions were to be true, and when they will have not succeeded, I do not see how one could find it to blame me for having wanted to test if a conjecture that I thought most reasonable is true, and one should rather pity me for having wasted my time and racked my brain from all the calculations, but I will have no regrets, because I will have in that way learned that another hypothesis must be invented to explain these admirable phenomena. I do not explain it at all at present, reserving [the right] to do so later, if I have been lucky enough to have met good ends.[20]

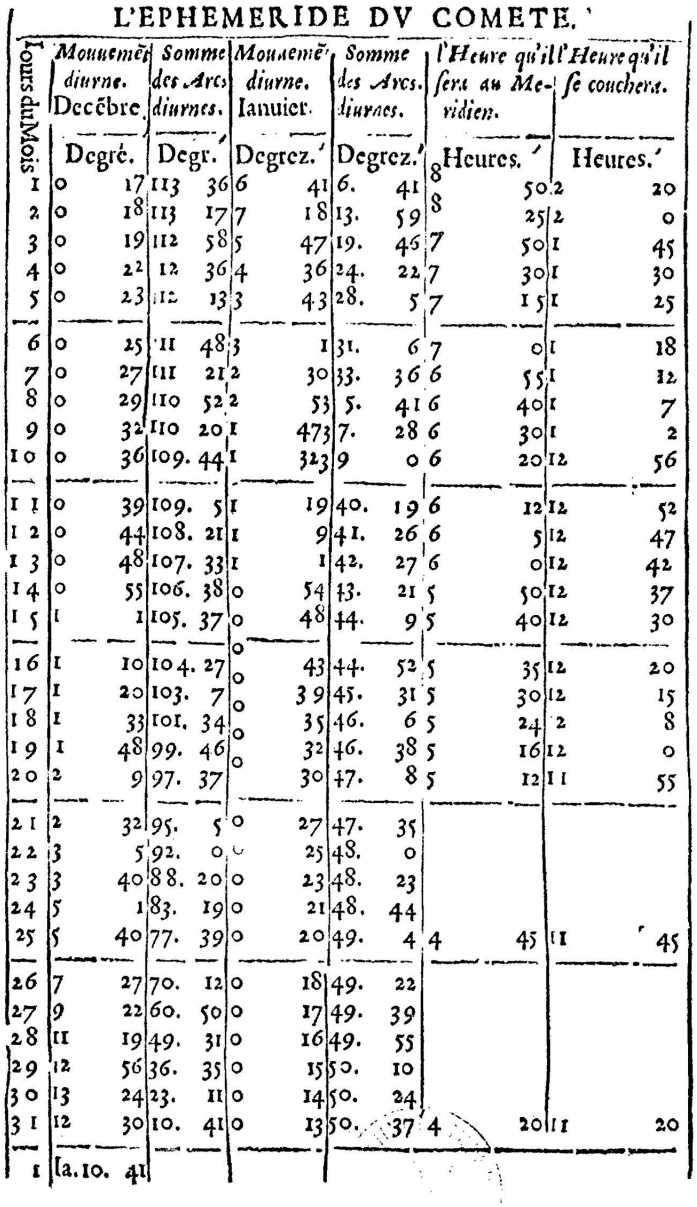
He anticipated their responses, and felt forced to admit that in his rush to take advantage of the comet event in progress, he was obliged to reduce his normal precision: "I did not have the

[19] Ibid., 1. "Je ne me defendray point de ce que quelques-uns pourroient m'accuser de temerité d'avoir osé entreprendre de predire le mouvement d'un Comète, parce que personne ne 'a encore tenté, & que presque tout le monde croit qu'il n'y a rien de si irregulier ni de si extravagant."

[20] Ibid. "Je seray assez justifié si mes predictions sont veritables, & quand elles ne reüssiroient pas, je ne voi pas que l'on eust sujet de me blamer d'avoir voulu éprouver si une conjecture que j'ay cruë la plus raissonnable est vrae, & l'on deuroit plutôt me plaindre d'avoir perdu du temps & de m'estre rompu la teste apres tous ces calculs, mais je n'y aurai pas de regret, puisque j'aprendray par là qu'il faudra inventer une autre hypotheses que celle-là pour rendre raison de ces admirables Phenomenes. Je ne l'explique point à present, reservant de le faire dans la suite si j'ay esté assez heureux de bien rencontrer."

time to calculate everything by way of Trigonometry, and I made myself content with nothing outside the movements."[21] He was also taking into consideration the changes in the weather in the various viewing locations. Given the time of year, the precision of the observations in Paris would not be dependable. By broadcasting his experiment to all who might be interested, he hoped others might follow his lead and stage their own experiments. Auzout created a role for other astronomers, who might use his methods in places with weather conditions superior to his in Paris. They may be able to provide more precise input to the experiment. After all, the centre of his treatise provided his colleagues with a detailed, step-by-step description of his process, which allowed anyone with the comparable equipment to try to duplicate it. According to Auzout, once he explained his process, everyone would see that its elements are fairly easy to follow. And if he is right, then the predictions about all the

[21] Ibid. "Je n'ay pas eu le temps de calculer tout par la Trigonometrie, & Je me suis contenté hors les mouvemens."



L'EPHEMERIDE DV COMETE.

Jours du Mois	Mouuemẽt diurne. Decẽbre.	Somme des Arcs diurnes.	Mouuemẽt diurne. Ianuier.	Somme des Arcs diurnes.	l'Heure qu'il sera au Meridien.	l'Heure qu'il se couchera.
	Degré.	Degr. ′	Degrez. ′	Degrez. ′	Heures. ′	Heures. ′
1	0 17	113 36	6 41	6. 41	8 50	2 20
2	0 18	113 17	7 18	13. 59	8 25	2 0
3	0 19	112 58	5 47	19. 46	7 50	1 45
4	0 22	12 36	4 36	24. 22	7 30	1 30
5	0 23	12 13	3 43	28. 5	7 15	1 25
6	0 25	11 48	3 1	31. 6	7 0	1 18
7	0 27	111 21	2 30	33. 36	6 55	1 12
8	0 29	110 52	2 53	5. 41	6 40	1 7
9	0 32	110 20	1 473	7. 28	6 30	1 2
10	0 36	109. 44	1 323	9 0	6 20	12 56
11	0 39	109. 5	1 19	40. 19	6 12	12 52
12	0 44	108. 21	1 9	41. 26	6 5	12 47
13	0 48	107. 33	1 1	42. 27	6 0	12 42
14	0 55	106. 38	0 54	43. 21	5 50	12 37
15	1 1	105. 37	0 48	44. 9	5 40	12 30
16	1 10	104. 27	0 43	44. 52	5 35	12 20
17	1 20	103. 7	0 39	45. 31	5 30	12 15
18	1 33	101. 34	0 35	46. 6	5 24	2 8
19	1 48	99. 46	0 32	46. 38	5 16	12 0
20	2 9	97. 37	30	47. 8	5 12	11 55
21	2 32	95. 5	0 27	47. 35		
22	3 5	92. 0	0 25	48. 0		
23	3 40	88. 20	0 23	48. 23		
24	5 1	83. 19	0 21	48. 44		
25	5 40	77. 39	0 20	49. 4	4 45	11 45
26	7 27	70. 12	0 18	49. 22		
27	9 22	60. 50	0 17	49. 39		
28	11 19	49. 31	0 16	49. 55		
29	12 56	36. 35	0 15	50. 10		
30	13 24	23. 11	0 14	50. 24		
31	12 30	10. 41	0 13	50. 37	4 20	11 20
1	[a. 10. 41					

Figure 16. Adrien Auzout, Ephemerides tables from *L'éphéméride du nouveau comète*, 1665.

comet's future movements would be just as readily forthcoming. If they differ, then the errors can also be enlightening. He wrote, "[The *Ephemeride*] can be used to easily follow the path and movement of Comets, when it will appear and so on, after we have made three or four observations, since it is apparent that these Bodies follow (at least usually) the same Laws as

the examples from the past we will suggest, and I can perhaps determine how far it is from the earth, so my observations are consistent with Calculations or if different for some reason."[22]

The final two pages of his publication contained the comet data and the ephemeride itself. Tables on the next-to-last page contain rows of numbers that list celestial positions at specific dates (Figure 16). The first five rows identify the "given" position of the comet that he and his colleagues optically observed between 31 October and 5 November. The remaining rows of numbers are the projection of positions that the comet "will make" at specific dates in the preceding weeks. The final page has rows of numbers that coordinate the daily position of the comet for every day in December. Auzout offered these numbers to anyone interested so that they might compare their own observations to his. In summary, by transferring visual positional readings of the comet onto the surface of the celestial globe and then manually scribing a path through them, and then conceiving a mathematical strategy to extrapolate that path into the future, Auzout's experiment did what might at first seem incongruent if not impossible: to grasp something as abstract as the movement of a celestial body by way of the contrivance of a physical experiment.

In London, Henry Oldenburg, the secretary of the Royal Society, also had in mind establishing a scientific journal, and he had been asking the Royal Society membership to sponsor it, but they were apparently hesitant. However, the popular sensation of the comet and the foundation of De Sallo's *Journal des Sçavans* in Paris in January may have provided the necessary impetus to get the project off the ground, and during the 1 March Royal Society

[22] Ibid. "Elle pourra servir pour predire facilement le chemin & le mouvement des Comètes, quand il en paroistra d'autres, apres que l'on en aura fait trois ou quatre Observations, puisqu'il y a apparence que ces Corps suivent (au moins pour l'ordinaire) les mesmes Loix, comme les exemples passés nous le persuadent, & je pourray peut estre determiner à quelle distance celuy-cy est de la terre, si mes Supputations sont conformes aux Observations ou en diffèrent en certaine raison."

assembly, Oldenburg was finally voted the authority to create the journal. It was called *Philosophical Transactions*,[23] and Oldenburg would be entirely responsible for the publication, including article authorship, translations, and editing. He was even personally responsible for its expenses. For their part, the Society membership would hold the licence for the journal and maintain final editorial rights. The plan was to publish an edition on the first Monday of each month, "if he have sufficient matter for it."[24]

Oldenburg was not short of interesting texts to publish. For the first edition, it seems that he had ready a few scholarly essays from Robert Boyle: one titled "Experimental History of Cold," and another on "a very odd, monstrous calf." He had a short passage on Cassini's observations of Jupiter, and another by "the Ingenious Mr. Hook," who reported seeing with a twelve-foot telescope a small spot on a belt of that planet. There was another article ready on a "useful" lead ore in Germany; an article on the success of pendulum watches used on ships; whaling in the Bahamas; and a catalogue of the library of Pierre Fermat. Lastly, Oldenburg explained that he had recently received some copies of *l'Ephemeride du Comete* from Auzout himself. "There was lately sent to one of the Secretaries of the Royal Society a Packet, containing some Copies of a Printed Paper, Entituled, The *Ephemerides* of the Comet, made by the same Person that sent it, called Monsieur Auzout,"[25] began Oldenburg's article, "The

[23] Thomas Sprat, *The History of the Royal Society of London, for the Improving of Natural Knowledge* (London: Printed for J. Knapton [and 8 others], 1722), 18.

[24] Ibid.

[25] John Evelyn et al., *Philosophical Transactions of the Royal Society of London* (London: The Society, 1665), 1:3–8.

Motion of the Late Comet Prædicted." Thus, Auzout's *Ephemeride* became the featured article in the first edition of the *Philosophical Transactions*.[26]

Oldenburg introduced Auzout to those who did not already know him as "a French Gentleman of no ordinary Merit and Learning." Auzout had sent several copies of his *comet hypothesis* to Oldenburg with the request to distribute them to various people, including the president of the Society, Prince Rupert, a royal sponsor, and a few others in the Society.[27] Oldenburg told his readers the story of Auzout's experiment, emphasizing its originality and boldness. He thought that his readership should know that it was an endeavour that "never yet was undertaken by any Astronomer, all the World having been hitherto perswaded, that the motions of Comets were so irregular, that they could not be reduced to any Laws…determining day by day, in what place of the Heavens this Comet shall be." Oldenburg explained that the purpose of Auzout's paper was first to explain that he had developed a method for predicting the motion of the comet "after he had seen it (as himself affirms) but 4 or 5 times," and that he wanted that "the Vitruosi of England, among others, might compare also their Observations with his *Ephemerides*, either to confirm the Hypothesis, upon which the Author had before hand calculated the way of this Star, or to undeceive him, if he be in a mistake."[28]

Oldenburg followed roughly the same scheme as the *Journal* author in explaining Auzout's experiment. After reporting on the experiment's originality and Auzout's brave effort, Oldenburg described the details of Auzout's methods, starting generally, and then

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[26] At five full pages, "The Motion of the Late Comet Prædicted" was, by several pages, the longest article in the first edition of the *Philosophical Transactions*. It was likely Oldenburg who translated from Auzout's original French to English.

[27] Evelyn et al., *Philosophical Transactions*, 1:3–8.

[28] Ibid.

"descending to particulars, he saith, that this Star, being disengaged from the beams of the Sun might have been observed, if his conjectures be good, ever since it hath been of 17 or 18 degrees Southern Latitude, and that about the middle of November last, and sooner, unless it have been too small."[29] Auzout could foretell that there would be a point when the comet would become unrecognizable as it got too far away. His experiment showed that the comet may appear to come and go, thus discounting the common belief that there might have been two separate comets. Like the *Journal* article that appeared several weeks earlier, Oldenburg provided his readers with a detailed exposé of Auzout's predicted path of the comet.

"He subjoyneth," reported Oldenburg, referring to Auzout and his calculations, "that the greatest way, which this Star could make in 24. hours, hath been 13. d. 25'; and in one houre, about 34'; and thinking it probable, that about the time, when it made so much way, it should be nearest to the Earth, he concludeth that its motion in 24. hours must be, in its least distance from the Earth, as about 3. to 14, or 1. to 4⅔, and that its motion in one hour was to be to the same least distance, as about 1. to 1021/7." Oldenburg thought that what Auzout had judged most remarkable based on his projections was that the comet would come closest to Earth on 29 December, "when the Comet was opposite to the Sun."[30] The value of this particular finding had to do with a significant question at the time: "whether it may not serve to decide the grand Question concerning the *Motion of the Earth*."[31]

Auzout had begun his experiment with two main assumptions: first, that the earth was stationary; second, that the comet's path was perfectly circular. The first assumption was

[29] Ibid., 1.

[30] Auzout's prediction was correct.

[31] Evelyn et al., *Philosophical Transactions*, 1:7.

almost certainly concession to the political times. As we will see later in this chapter, Auzout at least privately held to in the merits of the heliocentric system theory. Consequently, he likely did not expect to be correct about his comet predictions and surmised that basing his calculations on a geostatic universe would be the cause of the errors. His impulse to recruit the scientific community around him could be seen as his attempt to share the burden of exposing problems with the older system. If that were true, then it can be understood that he was trying to build a collaborative venture with anyone who wanted to join him.

Auzout's second assumption was also subject to some doubt. To judge whether or not there had been a parallax in the circle of the path, he had asked anyone following his experiment to very carefully observe at what angle the path of the comet cuts across the equator "and most of all, the Ecliptick." Oldenburg reported that Auzout had hoped to hear of observations that may have been taken from Madagascar, "Seeing that it began to appear over the middle of that Island, and passed twice over their heads; he judgeth, that they have seen it before us." And Auzout's last wish from those willing to collaborate on his astronomical experiment was "that there were some intelligent person in *Guiana* to observe it there, seeing that within a few daies, according to his reckoning, it will pass over their Heads, and will not remove from thence but 8 or 10 degrees Northward, where he saith, it will disappear; thinking it improbable, that it can still appear, after the Sun shall have passed it."

Oldenburg ended his report with a note of the date of Auzout's publication: 2 January 1665, which means that by the time the first edition of *Philosophical Transactions* made it to the hands of its readers, Auzout's comet hypothesis project was three months old and the comet was long gone. Although Oldenburg's version was the first in English, it was likely that many of his readers had already heard of Auzout's *Ephemeride*. How could anyone be sure that Auzout had not pre-dated his *Ephemeride* and falsified his study had his predictions turned out

to be valid? Oldenburg repeated for his readers the good faith that Auzout had originally offered: "that he hath not changed the least number in his Calculations," attested Oldenburg, "and that Monsieur Huygens, and several French Gentlemen,[32] to whom he saith, he hath given them long since, can bear him witness that he hath done so; as also many other friends of his, who saw upon his Globe, several daies before, the way of the Comet from day to day."[33]

As Oldenburg concluded his version of Auzout's comet experiment, he re-emphasized Auzout's call for participation and collaboration from his savant readers, especially those members of the Royal Society:

> Thus for the Parisian Account of the Comet, which is here inserted at large, that the intelligent and curious in England may compare their Observations therewith, either to verifie these Prædictions, or to shew wherein they differ; which is (as was also hinted above) the design of this Philosophical Prophet in dispersing his Conceptions, who declareth himself ready, in case he be mistaken in his reckoning, to learn another Hypothesis, to explicate these admirable appearances by.[34]

Oldenburg's words show that he understood Auzout's main motivation: not to resolve all the questions about comets in a single experiment, but to recruit colleagues to press on a larger movement; to redefine the ways in which the world may be investigated.

On Adrien Auzout

By now it should be clear that Adrien Auzout is a significant figure in this study. Given his relative anonymity, this section is dedicated to making him more familiar to us. To recall, we first became aware of Auzout as one of the half-dozen Parisian mathematicians who was studying the comet in Paris and carefully calculating its positions—the same comet, it should

[32] Auzout names "Messieurs Petit, Thévenot and others." Auzout, *L'éphémeride du nouveau comète*, 6.

[33] Evelyn et al., *Philosophical Transactions*, 1:8.

[34] Ibid.

be remembered, that Marie de l'Incarnation was contemplating in her own ways at the same moment in Québec. We learned that despite his fame as an astronomer, he did not participate in the theoretical debates that took place at the Clermont College conference. Instead, he was working behind the scenes on a project of his own, directing his attention not to some theoretical comet, but to this comet *in particular*.

His project was to discover a method for defining its future path—an experiment so original as to be considered audacious. Decoding a mystery so historically deep and so concealed beneath prophesy was a major step away from old beliefs and towards a new scientific production of knowledge. Reports of his experiment were waiting to be told by journalists at two new scientific journals that had formed within weeks of these events, and these publications circulated their detailed reports of Auzout's experiment to an unprecedented extent. Oldenburg called Auzout the "Philosophical Prophet in dispersing his Conceptions." Referring to Auzout's *Ephemeride du comete*, Jesuit mathematician and peer Jacques de Billy called him "l'Atlas de notre siècle" (the Atlas of our century).[35]

Yet, despite that notoriety, today Auzout is almost entirely unknown, even in the world of science. After three centuries of near total anonymity, Auzout and his record were briefly revived by Harcourt Brown in study of the earliest days of the scientific revolution in France, which he eventually published in 1934 as *Scientific Organizations in Seventeenth Century France (1620–1680)*.[36] Through his years of research, Brown disclosed a half-dozen undeservedly neglected leaders of the movement that we now refer to as the scientific revolution in France.

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[35] Jacques de Billy, *Discours de la comète qui a paru l'an 1665, au mois d'avril, par le P. Jacques de Billy* (Paris: S. Cramoisy, 1665), 4.

[36] Harcourt Brown, *Scientific Organizations in Seventeenth Century France (1620–1680)* (Baltimore: Williams & Wilkins Company, 1934).

"Chief among these," decided Brown, "is certainly Adrien Auzout."[37] Brown found very little to supplement his passages about Auzout's background. He writes, "having published little of permanent value, and left few manuscripts to find their way to the great collections of Paris, he has remained in a comparative obscurity. The biographical dictionaries have almost nothing to say about him, and his publications are found only in the larger and older libraries."[38] Brown then quotes the recollections of a contemporary of Auzout: "Monsieur Auzout was the son of a clerk in Rouen. He had an excellent mind, he was a great mathematician and philosopher. He was one of the chief members of the Académie des Sciences, and it was he who had drawn up the first plans of it."[39] Beyond that, he can offer little more personally about the enigmatic Auzout.

It was not until 1965 that anyone attempted to provide the missing pieces of Auzout's story. Robert McKeon's unpublished dissertation at the University of Paris is the first and only study dedicated to Auzout and his works.[40] McKeon's interest was in Auzout's astronomical works, specifically the one scientific exploit for which he has been remembered: his development of a working micrometer.[41] To his credit, McKeon recognized the need to supplement Auzout's short biography, and recovered all that was available about Auzout, the man.[42] Subsequent studies that refer to Auzout rely almost entirely on McKeon's unpublished

[37] Ibid., xvii.

[38] Brown, *Scientific Organizations*, 138.

[39] Ibid. For this quote, Brown cites the *Lantiniana*, a manuscript collection from the papers of "a lawyer of Dijon."

[40] Robert M. McKeon, "Etablissement de l'astronomie de précision et oeuvre d'Adrien Auzout" (PhD diss., Université de Paris, 1965).

[41] Even then, it is the instrumentalization of an existing design of a micrometer by William Gascoigne with which Auzout is credited.

[42] McKeon, "Etablissement de l'astronomie," 289–324.

work. As the pre-eminent Auzout scholar, McKeon supplied Auzout's entry in the *Dictionary of Scientific Biography* in 1970.[43] Since then, an exceptional work was published by David Sturdy in 1995 titled, *Science and Social Status: The Members of the Académie des Sciences 1666–1750*.[44] As a portion of his broader thesis, Sturdy provides a very useful summary of the previous biographies of Auzout, and contributes to the scholarship on Auzout by putting him in the social context as one of the original members of the Académie des Sciences in Paris.[45]

McKeon found that at different times in his life, Auzout modified the spelling of his name: Adrien, Adrian, Auzout, and/or Auzoult. In a very early letter that the Dutch savant Christiaan Huygens wrote to an acquaintance, we learn how Auzout's family name was pronounced. Huygens asked his friend to extend his greetings to a Mademoiselle Periquet, and to Auzout, which he was forced to spell phonetically: "avec mes tres humbles baisemains. *Item* a Monsieur Osou se vous le rencontrez."[46]

Auzout did not grow up in Paris; nor was he from a family of nobility. He was born in Rouen in northwest France on 28 January 1622. He was named after his father, who was himself named after his father. The father Adrian Auzout was a *greffier* (clerk) in the *bailliage et vicomté de Rouen*,[47] as was Auzout's grandfather. The lifestyle of a seventeenth-century minor justice official suggests that Auzout was not in any formal way from a background of science

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[43] Charles Coulston Gillispie and American Council of Learned Societies, *Dictionary of Scientific Biography* (New York: Scribner, 1970), 341–42.

[44] Sturdy, *Science and Social Status*.

[45] Ibid. Sturdy credits McKeon for family information (81n6).

[46] Huygens, *Oeuvres complètes*. In a letter of 15 March 1656 to Cl. Mylon, Huygens asks Mylon to express his good wishes to their friend, and "Item [in the same manner] to Monsieur Auzout if you meet him." See Huygens, *Oeuvres complètes*, letter 271, 1:391.

[47] Sturdy explains that a *bailliage* was a subdivision of a *gouvernement* (a large area controlled by the king's direct representative). *Science and Social Status*, 81.

or mathematics. Auzout's father expressed some interest in natural philosophy, but it is not clear whether he led or followed his son's interests.[48]

It is generally believed that since Auzout and Blaise Pascal were both from Rouen and nearly identical in age, and because they shared many projects and interests and famous mathematical skills, they must have been schoolmates at the Jesuit university in their hometown. Evidence that Auzout was versed in Hebrew and Arabic, which were at that time taught alongside mathematics in the Jesuit colleges, adds substance to such speculation.[49] However, there are no records to substantiate it. There is no doubt that they were friends and colleagues, and Auzout was familiar with the Pascal family, including his two sisters Jacqueline and Gilberte.[50] Pascal was not born in Rouen, but in Clermont, in south-central France. After his mother died, his father moved the Pascal family to Paris. The father, Étienne, was wealthy and was interested in the new sciences, and he became involved with the savant circles there. The most celebrated group met regularly at the house of Marin Mersenne, where Étienne developed a reputable position.[51] By age fourteen, Blaise began accompanying his father at the Mersenne meetings, where he encountered the elite scholars in France. He submitted his first mathematical paper to that group at age sixteen.

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[48] The senior Auzout was said to have followed with interest the vacuum experiments that Adrien and Pascal were performing in the late 1640s. McKeon, "Etablissement de l'astronomie," 292. McKeon cites a letter from Auzout to Mersenne, 21 August 1648.

[49] Ibid., 290. Sturdy cites François De Dainville, "L'enseignement des mathématiques dans les collèges jésuites de France du XVIe au XVIIIe." *Hist. Sci. 7* (1954): 6–21 and 109–23.

[50] This point is reinforced by the senior Pascal's famous resistance to public education for his son Pascal.

[51] In November 1635, Mersenne dedicated a treatise to Pascal, the "Traité des orgues" of his *Harmonie universelle* (1636). Roberval communicated to Pascal his first discoveries concerning the cycloid and intervened on his side in the debate concerning the nature of gravity. At the beginning of 1637, Fermat wrote his "Solution d'un problème proposé par M de Pascal."

While in Paris, Étienne's daughter Jacqueline became a poet and actress. Her performances won the attention of Cardinal Richelieu, and through their acquaintance, she negotiated a position for her father as the primary tax officer for Upper Normandy. In 1639, when Blaise was sixteen years old, Étienne took up that position and family moved to Rouen, and it was at some point after that Auzout became familiar with the Pascal family. Auzout was the oldest son in his family, but his father was not wealthy, so it is not certain that he could have afforded to send any of his children to the Jesuit college in Rouen.[52] Thus, it seems more likely that it was Étienne and Blaise, with their science and mathematics backgrounds, and their recent elite experiences in the Mersenne group, who may have been Auzout's real tutors.

There is no doubt that Auzout was known to the Pascal family. Jacqueline refers to him in a rather cryptic note to her sister: "Tell M. Dumésnil, if you see him, that a person who is no longer a mathematician, and some others who have never been, kiss the hands of one who is again. Mr. Auzoult will explain it all to you; I have neither the time nor the patience."[53] At the very least, this note shows that Auzout was familiar with both the Pascal sisters. In fact, one can read Jacqueline's riddle in a way to conclude that it was Auzout himself who was its source. Certainly, the one mentioned who "is no longer a mathematician" was their brother Blaise, who famously denounced his interest in mathematics in favour of religion. Who might

[52] David Sturdy writes, "There were three other boys and three other girls. The cost of feeding, clothing, educating, overseeing the careers of, and negotiating suitable marriages for this many children was bound to be financially burdensome. Whether or not Auzout senior could afford to send all or any of his sons to the Jesuit college in Rouen is unclear." *Science and Social Status*, p. 81.

[53] "Dis à M. Duménil, si tu le vois, qu'une personne qui n'est plus mathématicien, et d'autres qui ne l'ont jamais été, baisent les mains à un qui l'est tout de nouveau. M. Auzoult t'expliquera tout cela; je n'ai ni le temps ni la patience," Jacqueline Pascal to Gilberte Périer, 25 septembre 1647. Blaise Pascal, ed. Jean Mesnard, *Oeuvres complètes: Accompagnées de tous les documents biographiques et critiques*, 4 vols. (Bruges: Desclée de Brouwer, 1964), 2:482.

be "the others" who have never been mathematicians, or who never believed themselves to be? As we will see later in this study, it would not be surprising if one of them were Auzout.

Jacqueline's note to her sister mentions another friend and colleague of her brother and Auzout: "M. Dumésnil" was Raoul Hallé de Monflaines, *sieur du Mesnil*. He, Pascal, and Auzout became involved in an interesting episode at this time that sheds some light on the worldview developing around Auzout. The three friends became aware of the writings and preaching of an old Capuchin named Jacques Forton, *sieur de Saint-Ange Monteard*, who had arrived in Rouen at the beginning of 1647. They read his publications and listened to his lectures, and found them very troubling, especially his *Discourse sur l'alliance de la raison et de la foi*,[54] where Pascal wrote that Forton, known by the name Saint-Ange, had claimed that God had given him "a short and easy method...to teach the sciences of Philosophy and Theology."[55] As a self-proclaimed authority in such things, Forton espoused a position that the three young savants found fundamentally untenable: that theological truth is verifiable through reason. Saint-Ange posited that there was originally a "divine marriage between reason and faith,"[56] but the fall from grace had annulled that relationship. His mad preaching went from being worrisome to dangerous, thought the three, when he asserted that if given the proper rational framework, children could acquire a more profound theological knowledge after first being catechized in his rational system.[57]

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[54] Daniel T. Julich, "Pascal, Devout Savant: Science, Religion, and the Learned Community in Seventeenth-Century Paris" (PhD diss., University of Florida, 2009).

[55] Forton, *Discours sur l'alliance*, preface, quoted in Henri Gouhier, *Pascal et les humanistes chrétiens: L'affaire Saint-Ange* (Paris: J. Vrin, 1974), 31. I can find no trace of the Forton text.

[56] Ibid., 26.

[57] Julich, "Pascal, Devout Savant," 195.

Forton claimed to have deduced easy methods for restoring Adam's original state, leading to the complete knowledge of the natural world. He presented himself as a prophet who had been chosen by God to communicate these methods, which depended on a corollary that would have been very problematic for these savants: that one must begin by invalidating experience as the means for knowing the world, and instead substitute reason as a simpler and direct method. If his plan were followed, it would provide access to the knowledge in the final causes. There was probably no topic more timely and charged for the three friends. For these three savants, experience was the only true means of human knowledge. Accessing theological first principles was impossible and believing so was heretic. Monflaines, Pascal, and Auzout thought that all of Saint-Ange's interconnected claims were nonsensical to the point of being shocking, and they decided to arrange a series of interviews with him to discuss his positions first hand. To his credit, Saint-Ange agreed, and there were two conferences held. The details of their meetings are told by Henri Gouhier in his 1974 book *Pascal et les humanistes crétiens: L'affaire Saint-Ange.*[58]

Saint-Ange was no match for his three inquisitors, who tried to work him into untenable theoretical corners, and one by one, the three young and brilliant savants dismantled his rationalized systems. Nonetheless, Saint-Ange was intractable, and Pascal, Auzout, and Monflaines could not make him publicly recant his positions. Consequently, the three reported their experiences with Saint-Ange to the archbishop of Rouen with the hope that he would intervene. He assigned the local bishop to take up the negotiations and, by April,

[58] Gouhier, *Pascal et les humanistes chrétiens*. There are many other accounts of this affair. I have consulted two not yet mentioned: Charles de Robillard de Beaurepaire and Belles-lettres et arts Académie des sciences, *L'affaire Saint-Ange épisode de la vie de Blaise Pascal à Rouen: 1647* (Rouen: imp. de L. Gy, 1901); and Pascal and Mesnard, *Oeuvres complètes*.

agreements were reached. Saint-Ange signed a declaration repudiating his errors. The Saint-Ange story has attracted many Pascal biographers who use it in their biographies of him to draw a number of different conclusions about their subject. Given the underlying principles of the debates, and the direction of Auzout's writing interests in the following years, there is reason to believe that it was Auzout who was at the point of the spear.

The bulk of the disagreements are well documented and do not need to be discussed here.[59] However, there is one aspect that is relevant to this study, since it provides insight to the emerging moods and broader questions that, as we will see, preoccupy Auzout at the time. This disagreement involves one of Saint-Ange's assertions: that the universe is made up of a quantifiable amount of "*masse corporelle*." Further, given that all substance is finite, and that all substance comes from the earth, and that there are and have been a quantifiable number of humans on Earth, a mathematical relationship could therefore be deduced between that mass and the souls that constitute human beings. "He says," explained Pascal, "that a geometrician could speculate about the number of men who existed from the beginning of the world till the end."[60] Therefore, argued Saint-Ange, one need not expect the end of the world until the physical mass of the earth had been entirely exhausted in providing the substance necessary for the formation of human bodies.

[59] Known to historians as the "Saint-Ange Affaire," this episode in Auzout's life has, until now, been told only in accounts of the life of Blaise Pascal. I try here to build a case that it was Auzout who took the lead in this inquisition, given both his prior and later actions.

[60] Pascal, *Oeuvres complètes*. "Il dit donc ensuite de cela que un géomètre pourrait supputer à peu près le nombre des hommes qui devaient être depuis le commencement du monde jusques à la fin." 2:382. Can also be found in Julich, "Pascal, Devout Savant," 192.

Pascal recorded that after hearing this proposition, the three incredulous interviewers "turned away in laughter, as much as civility would permit."[61] Saint-Ange was unrelenting in defending his rationale and claimed to have changed the minds of many skeptics among the world of savants, including a "M. Petit."[62] To prove the absurdity of his theory, the three decided to turn the problem around the proposition of sacred time. They took as their point of departure the calculation of how long it would take to exhaust the physical mass of the earth in the production of human bodies. Monflaines, Pascal, and Auzout claimed to be generous with their assumed values as they set up their calculations. First, they allowed that there were never more people on the earth than there were at that moment. Second, they allowed what they considered an inflated amount of earth necessary for the transubstantiation of each body—"trente pieds de terre." Next, their calculations would assume a fifteen-year turn-around for any recently departed souls. Using their knowledge of mathematics and astronomy, they then calculated the volume of the earth in cubic feet, based on the earth's known circumference.

After analyzing their calculations, they concluded that it would take approximately four billion years for the earth to be entirely consumed by the production of human bodies. That would mean, among other things, that Christ would have been born into an earthly world that was already two billion years old. The savants confronted Saint-Ange with conclusions drawn in a recent historical survey of all sacred sources, which had established the age of Earth to be

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[61] Huygens, *Oeuvres complètes*, 2:382. "Tournant en risée, autant que la civilité le pouvait permettre, cette proposition, on lui fit quelques doutes sur cela."

[62] This troubled the three friends. Pierre Petit was a close acquaintance of all three, having been involved in the vacuum experiments and astronomical observations. Julich discusses this point, and the various disagreements as to whether "M. Petit" was their friend Pierre Petit or another Petit who was a theologian of the times. Julich comes down on the side that Saint-Ange referred to Pierre. "Pascal, Devout Savant," 193.

no more than "sept ou huit mille ans." The disparity between seven or eight thousand years and two billion years was enough to make Saint-Ange's suggestions not only completely absurd but heretical, and when he was brought before the archbishop and the facts of the matter were disclosed, Saint-Ange agreed to recant his positions.

Between 1647, when Auzout was in Rouen, and 1664, he became a well-known Parisian astronomer, but details of his personal life are scarce. In 1647, he was likely sharing time between Rouen and Paris. He was communicating with philosopher Pierre Gassendi, who was in Paris and wanted to know about the experiments that Pascal was conducting on the vacuum in Rouen. Auzout would certainly have been familiar with these experiments, either assisting or, more likely, collaborating with Pascal and Pecquet in them.[63] During this time, he likely met with Descartes—at least he had the opportunity and motive—related to Pascal's vacuum experiments. McKeon suggests that he may have briefed Descartes prior to his meetings with Pascal on the subject in September 1647.[64] The experiments continued through the year. The exact role he played in the vacuum experiments is not clear, but he does write about two experiments conducted at the time that attempted to confirm the speculation of Torricelli: the first was carried out for Pascal by Perrier on the Puy de Dome.[65] The second was an experiment that Auzout himself conducted when he also tried to recreate the Puy de Dome experiment.[66]

[63] McKeon, "Etablissement de l'astronomie," 291.

[64] Ibid.

[65] This is the famous "vacuum in a vacuum" experiment.

[66] Auzout took the experimental vacuum with him on a trip to Italy. Details of that journey will be discussed in Chapter 6.

By 1650, Auzout had probably fully relocated to Paris and adopted the life of a savant. At that time, he was credited for an entry in the *Dictionnaire étymologique ∂e la langue françoiʂe* by author Gilles Ménage.[67] Auzout, "homme de grande érudition," provided Ménage with a translation of an inscription written in Arabic on the bottom of a chess set believed to have belonged to Charlemagne. Although there is little that remains of Auzout's erudition during this time, it must have been considerable because, in May 1652, he and his publications were granted a Privilège du Roi.[68] His interests also included anatomy. He became friends with the well-regarded anatomist Jean Pecquet during the 1650s, and the letters they exchanged indicate that both were involved with dissections. Pecquet kept a letter from Auzout in which he called him "amico suo singulari."[69] Pecquet reported that Auzout had written that an anatomist should dissect not only human cadavers but also all sorts of animals to compare the functions of organs and see how they work.[70]

It was also at about this time that Auzout began work in astronomy. He participated in an observation of a solar eclipse in April 1652 at Pierre Petit's house, with another future

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[67] Gilles Ménage et al., *Dictionnaire étymologique ∂e la langue françoiʂe* (Paris: Chez Briasson, 1750), 285.

[68] "Notre tres-cher et bien aimé Adrien Auzout, ayant composé plusieurs Traités de Géométrie et sur toutes les parties de Mathématiques, la Dioptrique, etc, et désirant les faire imprimer, s'il avait nos Lettres sur ce nécessaires." This "Extraict du Privilege du Roy" is reprinted on the final page of his treatise-length letter sent to his friend Abbé Charles. Adrien Auzout, *Lettre à M. l'abbé Charles ʂur le "Ragguaglio ∂i ∂ue nuove oʂʂervationi, etc.," ∂a Giuʂeppe Campani, avec ∂es remarques où il eʂt parlé ∂es nouvelles ∂écouvertes ∂ans Saturne et ∂ans Jupiter et ∂e plusieurs choʂes curieuʂes touchant les grandes lunettes, etc., par Aɔrien Auzout* (Paris: J. Cusson, 1665). That treatise is principle focus of the following section of this chapter. McKeon also mentions it in "Etablissement de l'astronomie," 293.

[69] The Latin version of this passage can be found here: Jean Pecquet, *J. Pecqueti ... Experimenta nova anatomica, quibus incognitum hactenus chyli receptaculum, et ab eo per thoracem in ramos usque ʂubclavios vaʂa lactea ∂eteguntur. Ejuʂ∂em ∂iʂʂertatio anatomica ∂e circulatione ʂanguinis, et chyli motu, etc. Few MS. notes* (Paris, 1651), 103. It was translated from Latin to French by McKeon. See McKeon, "Etablissement de l'astronomie," 293.

[70] Pecquet, *J. Pecqueti ... Experimenta nova anatomica*.

astronomy collaborator, Jacques Buot. Auzout's reputation had by that time spread to Gdańsk where astronomer Johann Hevelius wrote of the results from a Paris observation event that he had seen. He remarked to a friend, "Auzout happened to be present for the observation, an expert in mathematics and the Hebrew language."[71] In a diary of Balthasar de Monconys, McKeon discovered that Auzout was present to witness another eclipse in 1655, again at Petit's house. Monconys wrote, "among those who were at this observation was M. Auzout, my old friend, who Gassendi has spoken in his philosophy with praise."[72]

In the second part of the 1650s, Auzout continued his writing and returned to the debates between the scientific and theological worlds—debates that we will see will preoccupy him for the next decade. Jesuit priest François Xavier Anyscom had published a position paper on the squaring of the circle in 1656, and after reading it, Auzout evidently responded with a counter paper. Although his response is lost, his critique is discussed in a letter between Christiaan Huygens and Gilles Personne de Roberval.[73] Anyscom included in his publication the summary of a refutation to his main thesis in nine points, which he called "A.A. Tractatus de Rationibus in quo quaecumque tum Euclides in quinto Elementorum libro." The refutation implies that Auzout as his intended audience. It is clear that Auzout had not given up on his mathematical interests. In a letter dated a little later from Mylon to Huygens, we see that

[71] "Auzotius etaim qui observationi adfuit, vir et linguae Hebreae et rerum mathematicarum peritus est." Cited in Latin by McKeon, "Etablissement de l'astronomie," 294, my translation. McKeon cites Paris, Bibliothèque nationale de France, mss, n.a.f. 5856, fol. 19.

[72] Balthasar de Monconys, *Journal des voyages de Monsieur de Monconys (...) dans les trois parties du monde* (Lyon: Horace Boissat & George Remevs, 1665), 1:121. First cited by McKeon, "Etablissement de l'astronomie," 294.

[73] Huygens, *Oeuvres complètes*, 1:485.

Auzout was attributed with another mathematics treatise that Mylon called "toutes les espèces de paraboles, spirales, et hyperboles, Cubiques, quarré-quarrées etc."[74]

Through the 1650s, Auzout's professional home ground was in the philosophical conferences being privately sponsored in Paris. For his part, Auzout played an active role in the blossoming science world. He was likely a secretary and assistant to the leaders of the two largest and most prestigious groups in the homes of Mersenne and Montmor.[75] By the early 1660s, he was living on the Île Saint-Louis. In a letter in February 1662, a colleague of Huygens planned to be near where Auzout lived and Huygens asked him to please call on Auzout, who he will find "a man of fine spirit and very alert, and with that, very obliging." Huygens explained that Auzout had been separated from his wife "long ago, and I believe that he has been predicting all of his affairs through astrology."[76] Huygens believed that Auzout was quite skilled in astrology and really believed in it.[77] When Prince Leopold de Medici received his copy of Auzout's *L'éphéméride du comète*, its sender, Henri Sauvalle, a French lawyer and someone known to Leopold, included a note saying, "I will say nothing of Mr. Auzout, because you know that if there is a greater astrologer in the world, this is perhaps the point that he equals or surpasses him."[78]

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[74] Ibid., 2:334.

[75] McKeon mentions Auzout's activities in these cabinets in "Etablissement de l'astronomie," 296–97.

[76] "Il est séparé il y a longtemps d'avec sa femme, et croit qu'il s'est prédit toutes ses aventures par astrologie." Christiaan Huygens to Lodewijk Huygens." Huygens, *Oeuvres complètes*, 4:23.

[77] McKeon, "Etablissement de l'astronomie," 298. At that time there may have been very little difference in Huygens's use of astrologer and astronomer.

[78] "Je ne vous dirai rien de Mr Auzout, car vous savez que si ce n'est pas le plus grand astrologue du monde, il n'y en a peut-être point qu'il n'égale ou qu'il ne surpass." McKeon found this citation in Florence at the Biblioteca nazionale Centrale, mss, fond Galiléen, 277, f 138 r-v., letter dated in Paris, 20 March 1665. McKeon refers to this letter. Ibid. 2:298.

As Auzout's interest grew in making astronomical observations, he realized the need for very high quality lenses. Unable to find appropriate craftsmen, he began making his own. He wrote to Huygens that he was undertaking this project with much seriousness and explained that he had the "curiosity to work because there was not a single worker here who made anything larger than five or six feet."[79] Huygens also began making his own lenses, and he and Auzout shared their methods. By the mid-1660s—just in time for the arrival of the comet—Auzout's skills and interest in astronomy accelerated, and he became "a veritable pioneer in the domain."[80] In July 1662, Auzout identified the shadow of Saturn on its rings for the first time, using his twenty-one- and twenty-seven-foot telescopes.[81] After this discovery, there is a lapse in the records of his work. His slowed performance during that time, explained Auzout, was due to the fact that "for three years, I have always been sick."[82] Later, in a letter to Huygens, he mentioned that the "four-day fever has returned on the first of May."[83] The *fièvre quarte* was associated with many afflictions of the time. McKeon believes that Auzout suffered from tuberculosis, beginning in 1662.[84] Another possibility was that Auzout had malaria. By 1664—the year of the comet—Auzout had constructed a tubeless telescope with a 150-foot focal length, and he began to speculate about all the uses of such an instrument.

[79] "Huygens lui révéla en effet la méthode qu'il employait pour façonner des lunettes et Auzout entreprit sérieusement ses travaux en lunetterie. Il explique qu'il eut "la curiosité de travailler que parce qu'il n'y avait pas ici un seul ouvrier, qui en fit passé cinq ou six pieds." Auzout, *Lettre à M. l'abbé Charles*, 19.

[80] McKeon, "Etablissement de l'astronomie," 298.

[81] Note, Campani in Italy also claimed this first title.

[82] Auzout, *Lettre à M. l'abbé Charles*, 39.

[83] Huygens, *Oeuvres complètes*, 5:364.

[84] McKeon, "Etablissement de l'astronomie," 299.

Thus, by the end of 1664 and the appearance of the comet, Auzout was primed to begin his comet project. He had been making observations for several years and had become acquainted with many colleagues in Paris and abroad. He had experimented with telescopes and knew how to work them well enough to realize that they did not work well enough for his satisfaction. He experimented with both tubed and tubeless telescopes that he set up to enormous focal lengths. Furthermore, he began to take a leading position in the world of the French savants. He became familiar with the key players in that world, including the royalty of France, who were also finding ways to work their way into the world of the new sciences.

He chose to enter the key debates of the day, and he was especially attracted to the seemingly irresolvable disagreements between belief and reason. And in the final days of 1664, he was given the brief opportunity by the comet to experiment with new ways to understand ancient phenomena. He was compelled into action to respond to the fleeting chance to make his ideas public. Lastly, he grew into a role of authorship, publishing not only his scientific texts but other more philosophical texts that also reflected his deeper interests. By 1665, his writings were playing a greater role in his work as he was becoming a more influential natural philosopher. The writings that he produced in that year, beginning with the comet hypothesis modelling, offer us important insights into his worldview.

Auzout in 1665 and the Letter to Abbé Charles

At the beginning of 1665, Auzout began an active writing period. His *L'Ephemeride du Comète,* sent to the printers on the second day of the year, was the first of several publications that year. His writing interests took many forms. He wrote letters, scientific papers, and, of particular interest here, one extended philosophical treatise. As we saw above, his influence was growing, and the subjects that interested him also interested others. Throughout Europe, his visibility and stature grew.

Only weeks after the first comet faded from view, a second comet made an appearance over Paris. Auzout began recording its positions on 2 April 1665, and in the 8 May edition of the *Philosophical Transactions*, Auzout published a second *Ephemeride*, and in it, declared that the second comet was almost entirely contrary to the first.[85] Oldenburg reported it this way: whereas the first comet moved swiftly across the sky, "*this*, pretty slow; *that*, against the Order of the signs from East to West, *this*, following them, from West to East: *that*, from South to North, *this*, from North to South, as far as it hath been hitherto, that we hear of, observed." The second comet also differed from the first in its brightness "as well as its Body, which is far more vivid and distinct." After "three or four Observations,"[86] Auzout again tried to develop a predicted path using the same methods he had with the first.

Because of the second comet's slow pace—or, more to the point, due to the relatively short physical distances between its dated observations—its course was much more difficult to predict. And given Auzout's inaccurate instruments and awkward settings, predicting its future path would prove to be a problem. Apologizing in advance for a study he could not trust, Auzout claimed that his instruments were not exact enough, "and the Comet being in a place, destitute of Stars, and subject to Refractions, he feared to venture too much upon Observations…since in such matters a perfect exactness is necessary."[87] Nevertheless, Auzout's friends apparently persisted and he carried on with the second *Ephemeride*, if for no other reason than to defend his first *Ephemeride*, as Oldenburg put it, "so that it might not be thought a meer hazard."[88] Auzout sent it to press on 6 April, with little confidence in its

[85] Evelyn et al., *Philosophical Transactions*, 1:37.

[86] Ibid.

[87] Ibid.

[88] Ibid.

accuracy. Copies were again sent to members of the Royal Society, including Oldenburg. The path of this slower and short-lived comet was less dramatic and, in the end, the effort of predicting it less rewarding. If nothing else, this less-dramatic comet event only accentuated the sensational and paradigmatic quality of the first.

In his second *Ephemeride*, Auzout addressed the strange coincidence of there being seen two comets in such a short time span. As a matter of fact, wrote Auzout, there were "four, or at least three" comets at the moments of the last great comet of 1618. As Oldenburg concluded his report on Auzout's essay, he summarized that the French astronomer's latest predictions were still to be evaluated, as is whether or not this latest comet had any particular meaning. "What he adds about their signification," concluded Oldenburg, "we leave to the *Astrologers* to dispute it with him."[89]

Auzout's next 1665 writing project provides valuable insights into his thoughts and character. It is a manuscript treatise written in the form of a letter to a friend and colleague named Abbé Charles.[90] In it, Auzout ventures into many of his preoccupations and controversies of the day. The letter apparently attracted much attention among his friends and colleagues, so much so that he was forced to have it published, since it grew too long to be copied by hand. The treatise was printed in early 1665[91] and titled *Lettre à M. l'abbé Charles sur*

[89] Ibid., 40.

[90] The Abbé Charles is an interesting and enigmatic figure. I have found no positive identity. The editors of the Huygens archive and some other historians identify him as Charles de Bryas, the son of the governor of the king of Spain in Mariembourg, Netherlands. Huygens, *Oeuvres complètes*, 4:72n4. In his Auzout biography in the *Dictionary of Scientific Biography*, Robert McKeon discredits that identification by suggesting that "Abbé Charles's horoscope...relates that he was born at Avignon in March 1604 and formerly was employed by Cardinal Mazarin [Bibliotheque Nationale, MSS fonds francais, 13028, fol . 323], rules out their identification" (342).

[91] McKeon dates that around 13 March 1665. "Etablissement de l'astronomie," 300. The *Lettre* has not been reprinted since its original printing and it has never been translated.

le Ragguaglio Di Due Nuove Osservationi, Etc. While it is true that Auzout took as his point of departure a discussion about the status of contemporary lens making, and how that related to his quarrels with Giuseppe Campani in Italy concerning some of his recent observations, its title conceals other relevant themes. The topical discussion of lenses and telescopes and the scientific banter about the various quality of lenses, as well as claims to original observations, need not concern our study. What is more relevant is a more pressing subject that was on Auzout's mind at the time: the status of scientific studies in the aftermath of the Galileo Inquisition thirty-two years earlier. As both a Catholic and a working natural philosopher, Auzout thought he might argue for some opening in Catholic doctrine for the natural philosopher. However, as we saw above in his attempt to recruit collaborators in his comet investigations, he first needed to nurture a broader interest in the problems he addressed.

Auzout began the published version of his letter with a note to the general reader, making it clear that he was not seeking notoriety with his publication, nor had he even originally intend to publish the letter. He had originally written it only for the eyes of his friend Abbé Charles, "who asked of my perception on what was new in the short treatise written by Signor Guiseppe Campani, both on the effect of the large telescopes and what he found new on Saturn and Jupiter."[92] Auzout had earlier published several questions related to a book

[92] McKeon, "Etablissement de l'astronomie," 2:228. His research showed that, "a handwritten copy of this letter is located in Florence in the collection of letters belonging to the Ginori-Venturi family (mss. Magalotti). This copy was sent to Lorenzo Magalotti by Falconieri, Secretary of the Academia del Cimento. Miss ML Borelli and Mr. S. Bendini are in the process of publishing a series correspondence found in the collection that we just mentioned. This series concerns the relationship between Campani, and Divini Auzout. It includes, among others, a handwritten copy of the letter and copies of letters Auzout had written on 13 and 20 October 1664. These copies were made from the copies sent to Paris by Cardinal Barberini in Rome. Miss Bonelli and Mr. Bedini very kindly provided me with proofs of publication, which will be indicated hereon as 'Proofs.' The page number that I give will be that of the Proofs and not of the volume in which they will be published. I thank them warmly for their kind collaboration."

written by the Italian astronomer and lens maker Campani, and after four months of waiting for a reply, Auzout decided that "it would be good to make a few Remarks" on their disagreements, "which perhaps could not disappoint those who are Curious." Auzout learned that many of his colleagues around Europe wanted to know what he thought of Campani's book and they requested their own copies. He finally consented and allowed them to have the letter typeset and printed.

He admitted that there were several deterrents that at first dissuaded him from publishing the letter, or anything else for that matter. The first was his general insecurity that he would have anything worthy to say. He decided that he would be happy "if I end up finding a few small things"[93] that friends might find interesting, but he did not want to take on any of the ordinary responsibilities that go with publishing a book. Another problem that made him dread authorship was that his previous publishing experiences had been abysmal, and in his forward he felt compelled to mention it. Timely publishing was, as we have seen, a critical issue for him and his scientific interests, and as he sent this latest treatise to the publisher, he wanted it known that "if this treatise was delayed, we must blame the printers, who we do not enjoy here as much as we want to, because for more than six weeks I thought everything would be done, and it should have been…if the printers do not change their mood, I do not know when this treatise will be printed."[94]

[93] "J'avais seulement songé qu'il était bon que je fisse quelques Remarques pour y ajouter, qui ne deplairaient peut être pas aux Curieux." Auzout, *Lettre à M. l'abbé Charles*, "Au Lecteur."

[94] Ibid. "Si ceci a retardé jusqu'à cette heure, on ne doit s'en prendre qu'aux Imprimeurs, dont on ne jouit pas ici comme on veut; car il y a plus de six semaines que je croyais que tout serait achevé, & qu'il le devait estre." The fact that it would be the printers who are the focus of his criticism who he would ask to set the type he used to condemn them apparently did not dampen his criticism.

His critique of the Paris printers did not end there: "It is regrettable," he went on, "when one has taken the trouble to put in order and explain his thoughts, that being necessary to have them printed, and we have other things to do in life, that it takes two and three months to wait for printing that should be done in eight or ten days."[95] Auzout could not resist pointing out that the interminable waiting that an insecure or otherwise distracted author must endure to see one's work in print "could be enough to put off a person who is not eager to develop a reputation, and who prefers the rest and tranquility of Mind in all things."[96] Auzout acknowledged the important events of the day, most notably the one that would provide the structure for his future: the comet. "I would not have started this year," wrote Auzout, "were it not for the extraordinary encounter with the comet, having been fortunate enough to make the first *Ephemeride*; I believed that this little novelty was an opportunity to make a presentation to the King,…to excite the curiosity of His Majesty."[97]

It is the contents at the end of his letter that prove to be interesting to us. At that moment, there was a debate in letters underway between Auzout's friend and colleague Christiaan Huygens and a French Jesuit priest living in Rome, Honoré Fabri. Auzout wanted to enter his own point of view, on the side of his friend Huygens. Briefly, a year earlier, Fabri had published a small book in which he articulated a Church position on the question of the motion of Earth. The Protestant Huygens had written a rebuttal to Fabri's paper, where he

[95] Ibid. "Il est fâcheux quand on a bien pris de de la peine à mettre en ordre & à expliquer ses pensées, qu'il faille en avoir tant pour les faire imprimer, & l'on a d'autres choses à faire dans la vie, que de demeurer des deux & trois mois à attendre une impression qui devrait être faite en huit ou dix jours."

[96] Ibid. "Cela pourrait suffire à rebuter une personne qui n'est point avide de réputation, & qui préfère le repos & la tranquillité d'Esprit à toutes les autres choses."

[97] Ibid. "Je n'aurais pas commencé cette année, n'était que dans la rencontre extraordinaire du Comète, ayant été assez heureux pour en faire le premier l'Éphéméride; j'avais crus que cette petite nouveauté était une occasion pour représenter au Roy,…afin d'exciter la Curiosité de sa Majesté."

defended the theory of Earth's motion. The rebuttals were exchanged through the Accademia del Cimento in Florence and conducted by Prince Leopold de Medici.

At issue was a scriptural interpretation that Fabri laid out related to the subject of the movement of the earth—specifically, whether the Sacred Books should be interpreted as representing a literal or a figurative truth. Fabri's position was this: since no one had yet demonstrated the motion of the earth, "nothing hinders that the Church may understand those Scriptural passages that speak to this matter in a literal sense," and the Church is also free to maintain that position "as long as the contrary is not evinced by any demonstration." However, if the earth's motion can be evinced, "which I can hardly believe it will," wrote Fabri, then "the Church will not hesitate to declare that those passages are to be understood in a figurative...sense."[98]

The Fabri position had significant implications for Auzout. His analysis and critique are important and offer some timely insights not only into the thinking and character of the enigmatic Auzout but, even more importantly, into the topics of the time. Before unravelling Auzout's rebuttal and the important grounds for the debate, I should pause to emphasize the rarity of Auzout's letter. After his self-published version in 1665, his letter to Abbé Charles has never been republished—in French, or in translation—and very few authors have even taken notice of it.[99] After quoting Fabri's position, Auzout establishes his point of contention:

> How can one say that there is nothing to prevent the Church from interpreting, and declaring that one must interpret, literally the passages in question if it [the Church] can later declare that one can interpret them otherwise; and how will it declare that

[98] Maurice A. Finocchiaro, *Retrying Galileo, 1633–1992* (Berkeley: University of California Press, 2005), 93.

[99] Ibid., 93–99.

> one can interpret them in a figurative and improper sense if it has previously declared that one must interpret them literally?[100]

For Auzout, the position of the Church as expressed by Fabri was fundamentally and logically untenable, and like the example of Saint-Ange, he could not resist the opportunity to say so. It seemed to Auzout that the very premise of Fabri's position was faulty, for if one accepts it as valid, then it would follow that, at the very least, one must decide that the rejection of the earth's motion is already a conditional, and not absolute, truth. Thus, the effort that Fabri makes to separate the two truths is pointless. As Auzout explains, "if one believed that the question had been decided absolutely, one would be obliged to claim that one could not find a contrary demonstration, and not say that if a demonstration were found, then the Church would declare."[101] The duality of the Church's position was logically unsustainable, "for in truth, these passages must be interpreted either literally or not. If they must be interpreted literally and they teach the earth's immobility, they can never be interpreted in a figurative and improper sense."[102]

Auzout addressed the motivations behind the Church's position. The only reason to pursue this untenable argument would be to defend extenuating conditions. If there is a possibility that at any point a statement could be interpreted as figuratively true, it would not

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[100] Auzout, *Lettre à M. l'abbé Charles*, 49. "Ce passage a paru étrange à tous ceux qui l'ont examiné; car cõment peut-on dire qu'il n'y a rien qui empesche que l'Eglise n'entende, & ne declare qu'il faut entendre les lieux don't il est question à la lettre, si elle peut dans la suite declarer qu'on peut les entẽdre autremẽt, ou cõment declarera t'elle qu'on les peut entendre dans un sens figure & impropre, si elle a declaré auparauãt qu'il faloit les entendre à la lettre."

[101] Ibid., 50. "Si l'on y croyoit la question decidée absolument, il seroit obligé d'asseurer que l'on ne pourroit pas trouver de demonstration contraire, & no pas dire, que si on en trouvoit une, l'Eglise decareroit."

[102] Ibid. "Car dans la verité, ces lieux se doivent entendre à la lettre ou non, s'ils doivent entendus literalement, & qu'ils enseignent l'immobilité de la Terre, ils ne peuvent jaimais étre entendus dans un sens figuré & impropre."

be in defence of an eternal truth but as a "Disciplinary Judgment aimed to prevent the scandal that this doctrine was causing. For it would be impossible to want to decide absolutely something for which one could fear or hope to have a contrary demonstration in the future; truth being eternal, one cannot say that at one time the words must be interpreted literally, and that at another time they can be interpreted figuratively."[103]

Auzout's gracious and well-reasoned arguments were aimed at opening up some space for the modern scientist within the traditional views of the Church. Furthermore, if in Fabri's position can be found the possibility of a provisional truth, Auzout believed that as long as science remains respectful, there should be no reason for him and his colleagues to fear censure. "Given that Father Fabri's argument assures us that the Inquisition has not declared absolutely that these scriptural passages must be interpreted literally...I do not see that one should be afraid to follow the hypothesis of the earth's motion; the only thing with which one should perhaps comply would be to not support it publicly until the prohibitions are removed."[104]

Auzout was aware that scientific works might lead even a well-intended philosopher into areas that might seem to be in conflict with their religious beliefs. Working under the constant worry of the Church's reprisals would constrain important progress. However, the Church need not worry: there is no knowledge that needs to be shared by the two domains of science

[103] Ibid. "Jugement de Discipline, pour empêcher le scandale que cette Doctrine causoit. Car il seroit impossible que l'on eust voulu decider absolument une chose dont l'on pourroit craindre ou espérer d'avoir dans la suite une demonstration contraire, & la verité étant eternelle, on ne peut pas dire que dans un temps, des paroles se doivent entendre à la lettre, & que dans un autre on les peut entendre dans un sens figuré."

[104] Ibid., 50. "Cela étant, & Pere Fabry nous asseurant par son raisonnement, que l'Inquisition n'a pas declaré absolument, qu'il falloit entendre les Passages de l'Ecriture, selon le sens literal,...je ne voy pas qu'on doive craindre de suivre l'hypothese du mouvement de la Terre, & la seule chose qu'il y auroit peut-estre à observer, seroit de ne la pas soûtenir publiquement."

and religion anyway. His interpretation of history has made that certain: "It does not appear at all that God has wanted to teach us anything in particular about Nature," he wrote. "On the contrary, almost all who have wanted to find the principles of their philosophy in Scripture have fallen into untenable errors; in it we should only look for the Maxims of Religion and Morality, and not for the principles of Physics or Astronomy, which are as useless for the other life as they are useful for this one."[105]

Since Fabri was educated in astronomy and a very learned and skilled rhetorician, Auzout hoped that he might become a Church insider with some sympathy for men like Auzout and Huygens, and that he might be able to carry on their argument at the Church's highest levels. Fabri might "testify more effectively than others that this hypothesis is neither absurd nor false in philosophy, as one believed at first; nor is it in any way prejudicial to the Faith, for the most subtle dialectician and the most troublesome sophist could not draw from it any conclusion that conflicts with the least article of our religion."[106] It was the opening that Fabri allows for the Scripture's provisional truth that gave Auzout hope. "When one interpreted these scriptural passages in a figurative sense and in accordance with the appearances," he argued, "one does nothing contrary to Scripture, since one would have to interpret them in

[105] Ibid., 50–51. "Qu'il ne paroisse point que Dieu nous ait rien voulu enseigner du particulier de la Nature; & qu'au contraire presque tous ceux qui ont voulu trouver les principes de leur philosophie dans l'Ecriture, soient tombez dans des erreurs insuportables, puisque nous devons seulement y chercher les Maximes de la Religion, & de la Morale; & non pas les principes de la Physique, ny de l'Astronomie, qui font autre inutiles pour l'autre vie qu'elles sont utiles pour celle-cy."

[106] Ibid., 51. "Il pourroit peut-être témoigner avec plus d'efficace que les autres, que cette hypothese n'est ny absurde ny fausse en Philosophie, comme on le croyoit d'abord, & qu'elle n'est nullement prejudiciable à la foy, puisque le plus subtil Dialecticien, ny le plus embarrassant Sophiste n'en peut tirer aucun argument qui combate le moindre article de nôtre Religion."

that manner if one were to find in the future the demonstration of which Father Fabri does not entirely rule out."[107]

Fabri would understand, suggested Auzout, that given what has been thought about since Galileo, it is no longer unsound philosophically to accept the Copernican model. In fact, Auzout claims that all the principles he is defending were once provisionally posited, but are now rationally and verifiably a matter of mathematics. Convention and belief often combine to shape what is acceptable as knowledge. In fact, as Auzout argues, there are many examples in the Scriptures where conventional belief accepts provisional truth. Many ideas were condemned as "absurd or false" by Scripture not based on verifiable observation but rather on belief: "For there are many places of Scripture that need not be interpreted to the letter; and in matters of physics, astronomy, etc., we know well that it does not speak in order to instruct us, but that it speaks only in accordance with the appearances and ordinary human opinion and not in accordance with the truth of things."[108]

We should not expect, cautioned Auzout, that experience and perception can be trusted to give us a truthful perspective of the world. "For even if the authors of the Sacred Books had known that the earth turns around the sun, like the other planets, we should not be surprised that they spoke as they did,"[109] offered Auzout. He wanted to allow for the historical

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[107] Ibid. "Quand on entendroit les passages de l'Ecriture, dans un sens figuré, & selon les apparences, on ne seroit rien de contraire à l'Ecriture, puis qu'il faudra bien les entendre de la sorte, si on trouve dans la suite une demonstration, dont le P. Fabry ne desespere pas entierement."

[108] Ibid., 53. "Qu'il ya quantité de lieux dans l'Ecriture qu'il n'est pas necessaire d'entrendre à la lettre; parce qu'en matiere de Physique, d'Astronomie, &c. On sçait bien que l'Ecriture n'en parle pas pour nous en instruire, & qu'elle n'en parle que suivant les apparences & instruire, & qu'elle n'en parle que suivant les apparences & l'opinion des hommes, & non pas suivant la verité des choses."

[109] Ibid. "Car quand même les Autheurs des Livres Sacrez auroient sçeu que la Terre tourne autour du soleil, comme les autres Planetes, il ne faudroit pas s'étonner qu'ils n'eussent pas parlé autrement qu'ils ont fait."

expansion and advancement of knowledge, reminding that those ancient authors were writing to a different people, "most of whom are largely ignorant of astronomy and have no need to be instructed in these things; and that is how those who follow that opinion speak in ordinary language insofar as, outside the contexts where they treat professionally of heavenly motions."[110] It was for Auzout, an awakening of the possibility of a theoretical understanding of reality, which, by definition, will never match our experience. One need not be surprised by that. The authors of the Scriptures "speak of sunrise, sunset, its noon elevation, its approaching various stars, etc., as if it were in motion; for that is how it appears, whether it or the earth is in motion, and this suffices as an explanation in ordinary life and whenever one does not want to teach astronomy."[111]

Auzout offered that Fabri is not all together unjustified in his conservative position and that position is particularly understandable in light of the challenges that come with these kinds of shifts in beliefs. Nonetheless, the condemnation itself is still based on a figurative interpretation of the passages in question, just like many other passages that have not yet come into focus. Auzout wanted to give Fabri a responsible way around the argument and to allow for a provisional explanation. He suggested that his reinterpretation of Fabri's position "should persuade us that the decree was only issued provisionally, out of the fear one felt that this hypothesis would have bad consequences by reversing the philosophy that was accepted at that time." That philosophy was naturally based on what was experienced, and the

[110] Ibid. "à sçavoir suivant ce qui nous paroist, & ce que le peuple pense, puis qu'ils parloient à des homes la plusparte ignorans en Astronomie, qu'ils n'avoient pas dessein d'instruire de ces choses."

[111] Ibid. "Ils parlent du Lever & du Coucher du Soleil, de son élevation au Midy, de son approache des Etoiles, &c. Comme s'il se mouvoit, puisque les mesmes effets arrivent en apparence, soit qu'il se meuve, ou que ce soit la Terre; ce qui suffit pour s'expliquer dans l'usage ordinaire; & quand on ne veut pas enseigner l'Astronomie."

corresponding passages were then interpreted "according to what they seemed to mean," even though, Auzout reminded, "there was not a single one that could be interpreted literally in all its parts, and although most of them had to be interpreted figuratively in all their parts."[112]

The comet was a tremendous opportunity and a wonderful exemplar. Once those sorts of celestial events can be accepted in a new light, Auzout thought that studying the comet would also clarify many confusions, particularly the motion of the earth. The conviction to current beliefs would have to take on a new form of belief. Nevertheless, "this would not be a metaphysical or mathematical conviction, which involves the impossible (as one ordinarily says), for one need not expect such a kind," wrote Auzout, "rather it would be a reasonable conviction, like the one that makes us judge that the sun with the other planets do not turn around Jupiter or Saturn, but these planets turn around it."[113]

His point was this: we now are aware that there are some truths that seem impossible to evince, and astronomy will bring those truths consistently into play. No astronomer who posits what they believe to be true about the universe can provide any evidence to that effect. "For if one wanted to search for a demonstration of the first kind," challenged Auzout, "I defy all astronomers in the world to prove to me that the sun and the earth do not turn around

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[112] Ibid., 53–54. "Ce qui nous doit persuader que ce Decret n'a été fait que par Provision, dans la crainte que l'on a euë que cette hypothese [54] these n'eust de mauvaises suites, en renuersant la Philosophie qui était recevë en ce temps là, selon laquelle l'on estoit accoûtumé d'entendre les passages dont il est question, suivant ce qu'ils sembloient signifier, quoy qu'il n'y en ait pas un que l'on suisse entendre en toutes ses parties sans Figure, & que la pluspart soient en toutes leurs parties figurés, comme il seroit facile de le motrere, si je 'avais déja été trop long, & si tant d'autres ne l'avoient déja fait."

[113] Ibid., 54. "Mais il faut attendre, & examiner se le mouvement du dernier Comete ne nous convaincra point du mouvement de la Terre, non pas toutes fois d'une conviction Metaphysique ou Mathematique, qui mene à l'Impossible (comme on dit d'ordinaire) puis qu'il n'en faut peut-être pas attendre de cette sorte; mais d'un conviction aussi raisonnable que celle qui nous fait juger que le Soleil, avec tous les autres Planetes, ne tourne pas autour de Jupiter ou de Saturne; mais plûtost que ces Planetes tournent autour de luy."

Jupiter, Saturn, or even the moon, although they all believe that to be false."[114] "Imagine," suggested Auzout, "there were inhabitants on the moon, they would feel to be motionless as we believe ourselves to be here when we base ourselves only on the appearances." Their actual experience would not be unlike our own, relative to the appearances that make up our own experience.

Nevertheless, "we would mock them if they wanted to claim that the sun with its whole system and the stars were obliged to turn around them, instead of them turning with the earth around the sun."[115] And, when the other planets are considered, the absurdity grows, for "the inhabitants of the other planets, if one supposes there are any, would have the same reason to mock us for wanting to oblige them to turn around us every day together with the sun...rather than wanting to follow with them the motion of the vortex in which we as well as they find ourselves. And certainly Jupiter which has four moons, and Saturn which has one as well as a ring that is a body so prodigious, would have great grounds to dispute that of the earth which does not have an ensemble as beautiful as they do and is perhaps a thousand times smaller."[116]

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[114] Ibid. "puisque se l'on en vouloit chercher une demonstration de la premiere sorte: Je desie tous les Astronomes qui sont au monde de me prouver que le Soleil & la Terre ne tournent pas autour de Jupiter ou de Saturne, ou même autour de la Lune, bien qu'il n'y en ait pas un qui ne se croye assez bien fondé."

[115] Ibid., 54–55. "Ils croiroient être immobiles, comme nous croyons icy, l'estre, quand nous ne nous fondons que sur les apparences, & attribueroient tous les mouvemens qui leur paroitroient aux autres Astres, puis qu'ils ne pourroient pas s'apercevoir de contraire. Comme pourtant nous nous mocquerions ici d'eux, s'ils vouloient s'attribuer, que le Soleil avec tout son Systême & [55] toutes les Etoiles, fussent obligez de tourner autour d'eux, plûtost que de vouloir tourner avec la Terre autour du Soleil."

[116] Ibid., 55. "Ceux des autres Planetes si on y supposoit des Habitans, auroient la même raison de se moquer, que nous voulussions les obliger de tourner tous les jours autour de nous avec le Soleil, qui est le Principe de leur mouvement plûtost que de vouloir suivre avec eux, le mouvement du Tourbillion dans lequel nous sommes aussi bien qu'eux. Et certainement jupiter qui a quatre Lunes, Saturne qui en a une, & son Anneau qui est un Corps si prodigieux, auroient grand sujet de disputer cela à la Terre qui n'a pas une si belle suite qu'eux, & qui est peut-être mille fois plus petite."

After reading Auzout's critique of the Church's position, his sensitivity and caution in light of all that was at stake did not go unnoticed by his friends and colleagues. Jean Chapelain declared that in it, "Mr. Auzoult defends from the decree of the Inquisition the movement of the earth and the immobility of the sun, but with a lot of respect and Christian modesty."[117] Auzout was not trying to rekindle controversy with his arguments and did not expect any when everyone eventually gets comfortable with the new understandings. However, he did have a sense of duty, knowing what he had come to understand about stars and planets. One point that Auzout wanted to make clear, however, was that he did not intend to allow his research to contradict the positions of the Church. "I do not pretend to take sides stubbornly," assured Auzout, "and I am ready to submit to and follow all that the Church might order." Nonetheless,

> I thought it good to show that those who suppose the earth's motion can do it (it seems to me) without being disrespectful and without incurring the censure of those who have never carefully examined what happened; they do not know the intentions underlying the temporary prohibition to support that hypothesis, *quamdiu nulla demonstratione contrarium evincitur,*[118] as Father Fabri has said, or rather until the fear that it might carry along some novelty pernicious to religion has passed; this should have arrived a long time ago.[119]

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[117] "M. Auzoult défend du décret de l'Inquisition le mouvement de la terre et l' immobilité du soleil, mais avec beaucoup de respect et de modestie chrétienne." Jean Chapelain and Philippe Tamizey de Larroque, *Lettres de Jean Chapelain de l'Académie française*, 2 vols. (Paris : Bibliothèque nationale, 1968), 2:395.

[118] Fabri's line translated, "as long as the contrary is not evinced by any demonstration."

[119] Auzout, *Lettre à M. l'abbé Charles,* 55. "Au reste, je ne pretens point en tout cecy prendre opiniâtrement de party, & je suis prest de me soûmettre & de suivre tout ce que l'Eglise en ordonnera; mais J'ai crû qu'il était bon de montrer que ceux qui suposent le mouvement de la Terre, le peuvent faire, ce me semble, sans manquer de respect, & sans meriter la censure de ceux qui n'ont jamais bien examiné ce qui s'estoit passé, & qui n'ont pas sceu les desseins que l'on auoit eus, en deffendant pour un temps de soûteinir cette hypothese, *quamdiu nulla demonstratione contrarium evincitur,* comme dit le P. Fabry; ou plûtost jusqu'à ce que la crainte qu'ille n'entrainast quelque nouveauté pernicieuse à la Religion fust passée; ce qui doit être arrivé il y a longtemps."

"However, one must be content with a reasonable demonstration," suggested Auzout, and take into account that reason will not always suffice in providing all the answers as to how the universe operates. "For it is impossible to advance any reason why the sun with its system should turn around the earth rather than around Saturn, Jupiter, Mars, Venus, or Mercury; and yet everyone feels certain that it does not turn around them."[120]

Auzout summarized his thoughts by suggesting that the future would require recognizing the fallibility of the senses and our unfailing faith in the given world that allows us to then open ourselves to the possibility of other possible explanations. "Since we are certain that if the earth turned we could not perceive it with our senses, and that if the sun, with the earth, turned around another planet we could not perceive that either, one cannot but be satisfied with reasonable evidences and analogies. They agree so well with that hypothesis that there is not any which can be imagined should exist but does not actually exist, and there is no effect that should occur on the assumption of the earth's motion but does not occur."[121]

So far, this chapter has demonstrated that Adrien Auzout was, for a time, a man of scientific and philosophical significance. His letter to Abbé Charles carefully and articulately explores the greatest questions of the day—not just, *do we move?* but the more penetrating question, *what should we expect from our experience of truth?* For Maurice Finocchiaro, Auzout's

[120] Ibid. "Si ce n'est que l'on veüille se contenter d'une demonstration raisonnable, eu égard au sujet, puis qu'il est impossible d'alleguer aucune raison pour laquelle le Soleil avec tout son Systéme, doive tourner plûtost autour de la Terre, qu'autour de Saturne ou de Jupiter, ou de Mars, ou de Venus, ou de Mercure, autour desquels pourant on croit être asseuré qu'il ne tourne point."

[121] Ibid. "Puis donc que nous sommes certains quand la Terre tourneroit, que nous ne pourrions pas nous en apercevoir par nos sens; & quand le Soleil avec la Terre tourneroit autour d'un autre Planete, que nous ne nous en appercevrions pas davantage; ne peut-on pas ce rencontre se contenter de raisons & d'analogies. Elles se recontrent si bien dans cette hypothese, qu'il n'y en a pas une que l'on puisse imaginer devoir étre, que ne soit effectivement, ny aucun effet qui doive arriver, que la Terre se meuve, qui n'arrive."

analysis is "extremely insightful and important," and his arguments are "strikingly original, historically important and influential, and philosophically sophisticated and cogent."[122] Auzout's works on the comets opened up new ways of thinking about millennia-old questions about comets. Answers to such questions may have been imminent but by all accounts Auzout was one of the first to attempt to propose a framework for understanding them.

Auzout's Letter to Louis and the Invention of the Project

Now that we know more about the air of contention at the time, and what was considered to be at stake in the questions about the comet, the degree of radicalness and temerity that Auzout demonstrated with his *Ephemeride* experiment is now clearer, as is a renewed characterization of Auzout as author and cultural critic, and someone willing to address the most relevant and intimidating topics of the time. On the face of it, his *Ephemeride* represents the first time that anyone had dared to claim that they had developed a method for predicting the motion of comets. To claim to know the future paths of comets meant knowing much about them. Knowing their paths mean first taking some sort of stand on what they were and where they existed. Even those were charged assertions.

Knowing the path also meant taking a stand on aspects that could only be conceptually believed and impossible to verify, like, what geometric trajectory was the comet following: Was it a straight line, circle, parabola, ellipse, or some other unknown shape?[123] And once those assumptions could be affirmed, it would be possible to draw larger conclusions by making analogies to that which was believed to be true about other heavenly bodies. It would assert that they understand and could explain comets not as independent entities acting

[122] Finocchiaro, *Retrying Galileo,* 94, 98.

[123] Sturdy discusses these questions in *Science and Social Status*, 73.

outside the laws of the universe, or as omens from an unknown world, but as natural phenomena subject to the same limitations as any known object. We have now seen the theological implications of such an assertion and how intimately Auzout was willing to involve himself in those debates.

With his writings, Auzout brought to the fore, with caution, the question of the movement of the earth, and began to make connections between appearances and beliefs derived through experience, and an entirely abstract and theoretical understanding of the world. To put it another way, he asked us to consider how we might come to tolerate truth whose demonstration it seems impossible to be evinced, "as one ordinarily says." And yet, the boldness that he displayed in challenging the astronomers, theologians, and doomsayers, and then calling on the world's savants to examine the details of his predictions and either confirm or disabuse them, were still not the boldest parts of his publication. There was one more part of Auzout's publication that would have been considered even more audacious. As he rushed the results of his comet experiment to the press, Auzout appended to its cover a three-page open letter to his king.

Auzout addressed and dedicated his *Ephemeride* text to Louis, and he adopted a direct and familiar voice. Undoubtedly, he was hoping to capitalize on the sensation of the comet that was at that moment captivating all of Paris. His *Ephemeride* was the perfect vehicle with which to communicate to the man in power the current state of astronomy in his kingdom, and he would use it to present his king with a complaint, a proposal, and an invitation. He introduced his project by accentuating its rarity; in fact, he has undertaken a task that most reasonable people would consider so implausible as to be disrespectful to even attempt it. "SIRE," begins Auzout's letter,

> I present to Your Majesty a project that has never been undertaken by any astronomer and most of whom would judge it to be foolhardy, if I can be happy enough as to be successful in my own conjectures. Everybody until now has been convinced that Comets are so irregular and cannot be placed under the Laws; and we have been satisfied to observe the exact places through which they did pass; but no one, that I know, has been so bold as to venture to foretell the places through which they should pass, and where they should cease to appear.[124] However SIRE, I have made here an Ephemeride, wherein I determine day by day where this comet in the sky that we have for some time been looking at and admiring, will be seen; at which hour it will be at the Meridian, and at what point in time it will set when its remoteness is too great, or when its nearness to the Sun will cause us to lose sight of it.[125]

Auzout and Louis both were aware that comets like the one that they had been watching, have always been considered beyond human understanding, at least, that is, before Auzout had tried to explain them. Perhaps the daring nature of Auzout's experiment was exactly the element that matched the image that the young French king had in mind for France. In any case, Auzout had no intention of letting the opportunity slip. He began by describing for the king all the unnecessary encumbrances and primitive working conditions that he faced in conducting his experiment. He lamented the lack of proper astronomical facilities in France

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[124] The following passages are taken from Auzout's dedicatory letter to Louis XIV that was appended to his *L'Ephemeride du Comete*. To the best of my knowledge, a full English translation of Auzout's letter to Louis does not exist. For that reason, and for its general importance to this study, the English translation of the 650-word letter is provided here in its entirety. Auzout's original French text can be found in the accompanying notes.

"SIRE. Je presente à Vostre Majesté un dessein qui n'a esté encore entrepris par aucun Astronome, & qui la pluspart jugeront temeraire, si je ne suis pas assez heureux pour reussir dans mes conjectures. tout le Monde s'est persuadé jusques à present que les Mouvemens des Comètes sont si irreguliers que l'on n'a pas cru les pouvoir ranger sous des Loix; & l'on s'est contenté d'observer exactement les lieux par où ils ont passé, mais personne que je sçache n'a osé encore se hazarder de predire par où ils devoient passer, & où ils devoient cesser de paroitre."

[125] "Cependant, SIRE, j'en fay icy une Ephemeride, & je determine jour par jour en quel endroit du Ciel celuy que nous regardons avec admiration depuis quelque temps, se rencontrera, à quelle heure il sera au Meridien, & à quelle heure il se couchera jusques à ce que son trop grand éloignement, ou l'approche du Soleil le derobe à nos yeux."

with which he could obtain the most elemental scientific information, and he appealed to Louis for better support and treatment.

If the king were indeed impressed with Auzout's *Ephemeride*, he should know that it was attained under unnecessary hardships that he was forced to overcome—hardships brought on by the poor working conditions for any savant working in France:

> The Curiosity SIRE, that everyone knows that Your Majesty demonstrates in seeing the comet and understanding its movement, made me work to find out, and even though my observations were made only with nets, rulers, set squares and sticks, I was forced to be satisfied. If I had had a more suitable place, and the great instruments necessary for the making of exact observations, I should have made them, and I do not doubt that they would have aided me to succeed better than I have. But, SIRE, it is a misfortune that there is not one in Paris, nor so far as I know in all your Kingdom to which I would trust myself to measure precisely [even] the height of the pole. And this is maybe the cause for why there is no kingdom in Europe of which the geographical maps are so faulty and the localization of places so uncertain. There is not a Frenchman who could not read with a kind of confusion about the complaints that have come from a very learned Italian, and not desire what private citizens in other countries possess so magnificently, and that is lacking to the most powerful monarch in Europe, so that if there should be at another time new things to observe in the heavens, the French should not yield to men of other nations, since your Majesty does not intend them to yield in any other thing, and that they may contribute like the other nations, the most accurate observations that could be desired, to determine the laws long sought by the curiosity of learned men.[126]

[126] "La curiosité SIRE, que tout le monde sçait que Vostre Majesté à tesmoignée pour le voir & pour sçavoir son mouvement m'a fait trauvailler à le découvrir, & quoy que mes Observations n'ayent esté faites qu'avec des filets, des regles, des equeres, & des bastons, j'ay esté contraint de m'en contenter. Si j'avois eu un lieu plus propre & les grands instrumens necessaires pour faire des Observations tres-exactes, je'n aurois fait & je ne doute pas qu'elles ne m'eussent aidée à rencontrer mieux que je ne seray. Mais Sire, c'est un mal-heur qu'il n'y en a pas un à Paris, ny que je sçache dans tout votre Royaume auquel je voulusse m'asseurer pour prendre precisement la hauteur de Pole & c'est puet-estre la cause pour laquelle il n'y a pas un Royaume dans l'Europe dont les Cartes Geographiques soient si fautiues, & ou la situation des lieux soit si incertaine. Il n'y a pas un François, qui ne doive lire

Auzout also wanted his king to remember the primitive conditions with which he and his colleagues had been forced to make do. His work was not as good as it could have been, due entirely on to the poor working conditions. Offering insights that could only come from someone speaking from experience, he explained that the consequences of those poor facilities and their flawed results were not only academic. They were suffered by everyone in the kingdom, every day, to their national embarrassment, and Auzout offered his king an brief vision of the practical benefits of making precise observations. The poor facilities and equipment may have been humiliation to France, but Auzout had a proposal to offer:

> It is a matter, SIRE, of Your Majesty's own fame, and of the reputation of France, and that is what makes us hope that your Majesty will command some place for making all sorts of celestial observations, and cause it be furnished with all the instruments necessary for this end.[127]

And with that, Auzout made the first official appeal for a new, fully equipped, royally sponsored astronomical observatory. Auzout wanted Louis to realize that the observatory would be glorious, not only for the French but specifically for the king himself, who will derive much fame and notoriety from being the king of such a noble venture. Henceforth, Auzout, Louis, and every Frenchman would no longer be obliged to stand behind the neighbouring countries when similar opportunities occurred in the future. With his

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avec quelque sorte de confusion les plaintes qu'en a fait depuis peu un tres-sçavant Italien, & souhaiter que ce que des particuliers ont avec magnificence en d'autres Pays, ne manque pas au plus puissant Monarque de l'Europe, afin que s'à arrive d'autres sois des choses nouvelles à observer dans le Ciel, les François ne cedent pas en cela aux Estrangers, puisque Vostre Majesté n'entend pas qu'ils leurs cedent en toute autre chose. & qu'ils puissent contribuer comme les autres Nations par des Observations les plus exactes qu'o puisse souhaiter, à determiner ce que la curiosité des sçavans leur fait rechercher depuis si long temps."

[127] "Il y va SIRE, de la Gloire de Vostre Majesté, & de la reputation de la France, & c'est ce qui nous fait esperer qu'elle ordonnera quelque lieu pour faire à l'avenir toutes sortes d'Observations Celestes, & qu'elle ls sera garnir de tous les Instrumens neessaires pour cet effet."

involvement, Louis and France could take the lead in these affairs. It would be the first major observatory in Europe since Tycho Brahe's Uraniborg Castle on the Danish island of Hven, and the first major observatory since the arrival of the new astronomical instruments such as the telescope[128] and pendulum clock.[129]

However, it was not just a new astronomical observatory that Auzout had in mind. There was an image of a larger project that he wanted Louis to support. Auzout was aware that there had been plans floating around Paris for at least a few months that sketched outlines for a new research organization made up of savants and scholars, and he also knew that Louis had seen them. Auzout's idea was to combine the two ideas—the idea of the observatory with the idea of the research organization—into one large project. No doubt that making astronomical observations would be so much improved at the new observatory, but that is not all that could be accomplished there. Auzout wanted Louis to know that although creating an observatory for the purposes of making astronomical observations is a worthy and rewarding project, "that is [only] one of the chief purposes of the Compagnie DES SCIENCES ET DES ARTS, which awaits only the protection of Your Majesty to work mightily for the perfection of all the sciences and all the useful arts." The Compagnie to which Auzout referred was one that he knew that Louis had seen. Auzout reminded Louis that

> Its Aims are so great, and could be so glorious for the state, and so useful for the public, if it is executed in all its details, that it is impossible not to be persuaded that Your Majesty, who has designs so vast and so splendid, should not approve and favour it. And I can assure you that all the neighbouring nations have been waiting for some

[128] A patent was filed for a telescope in the Netherlands in 1608, and telescopes had been in many private hands through the century. As we saw above, by the time of Auzout's letter, he had several telescopes and was working at ways to expand their focal lengths.

[129] The pendulum clock was invented by Christiaan Huygens seven years earlier. He was still perfecting it at the time of Auzout's letter. Huygens will become a key figure in this study.

time in an incredible expectation for such a beautiful establishment. If I am happy enough to learn that this small work is not disagreeable with Your Majesty, I am then ready to quickly make a presentation to you using the large telescope that I have invented, and demonstrate the way it can be used without a tube, where I will help you understand how kings can use it as easily as astronomers. I believed it was my duty to work on it after having had the honour to show to the Majesty the Moon with the beautiful lens, of which the King of England has made a gift to your Brother and in order that we can know that the greatest lenses are made firstly in your Kingdom and that we can, I venture, make them as large as we may want, up to two or three hundred feet if we can, because the difficulties with tubes is not going to prevent their use, and I will continue to consecrate my works to Public Utility and to the Glory of Your Majesty since I am with all the ardent affection and all the respect possible.

SIRE,

for Your Majesty,

the very humble, very obedient and very-

faithful Servant and Subject, Auzout[130]

With that, Auzout had officially proposed the full entire scope of the observatory project: both the facility structure and its occupancy. By expanding presenting the idea of an

[130] "C'est un des principaux desseins de la Compagnie DES SCIENCES ET DES ARTS, qui n'atend plus que la protection de Vostre Majesté pour travailler puissamment à la perfection de toutes les Sciences & tous le Arts utiles. Son Projet est se grand & pourra estre si glorieux à l Estat, & si utile au Public, s'il est executé dans toute son etenduë, qu'il est impossible de n'estre pas persuadé que Vostre Majesté qui a des desseins se vastes & se magnifique ne l'approuve & ne le favorise. & je la puis asseurer que toutes les Nations voisines sont depuis quelque temps dans une attente incroyable d'un si bel établissement. Si je suis assez heureux que ce petit travail ne soit pas desagreable à Vostre Majesté, je luy presenteray dans peu de temps un discours de l'Utilé des grands Lunetes, & de la Maniere de s'en servir sans Tuiau que jay inventée, où je marqueray des usages qui meritent que les rois s'en servent aussi bien que les Astronomes. J'ay crû qu'il estoit de mon devoir d'y travailler apres avoir eû l'honneur de faire voir à Vostre Majesté la Lune avec la belle Lunette, dont le roy d'Angleterre a fait present à Monsieur Frere unique de Vostre Majesté, & afin que l'on sçache que les plus grandes Lunetes qui ayent esté faites jusques à present, ont esté faites premierement dans vostre Royaume, & que l'on se hazarde d'en faire de si grandes qu'on voudra, jusques à deux & trois cens pieds si l'on peut, puisque la dificulté des Tuiaux n'emplschera plus de s'en servir, & le continueray de consacrer mes travaux à l'Utilté Publique & à la Glorie de Vostre Majesté, puisque je suis avec tout le Zele & tout le respect possible, SIRE, De Votre Majesté, Lettres-humble, tres-obeyssant, & tres-fidele Seruiteur, & Sujet, Auzout."

astronomical observatory into as a full polyvalent research centre project, he put into the air the vision of a facility project that he believed would be magnificent. It was a project that would put Paris in the focus of her envious neighbours. If Louis was bold enough to act, France had the opportunity to be the leader in this new scientific venture and become the principal contributor to the larger project of the production of knowledge for the betterment of humankind. On the other hand, inaction by Louis would assuredly result in France falling behind the rest of Europe. And in the plan of the Compagnie, Auzout could see the right people already planning that future: a new facility that housed the proposed Compagnie would provide a workplace to savants whose aspirations were, according to Auzout, no less than those of the young king himself.

When the details of the proposal are considered in the following chapters, we will see that the scope of Auzout's proposal was immense and unprecedented. Its potential rewards of practicality and prestige would be vast—but its scale and required commitment would be just as huge. It was clear that no private individual in the world would have the resources to undertake a project of this magnitude. Only a king or pope would have the strength for such a vast enterprise. The protection and support of the king and the resources at his command were vital to its success.

At the end of his letter, and before he left his king to work his way through the details of his *Ephemeride* that would follow, Auzout closed with some friendly sentiments that betray that he possessed either an unusual forwardness or a genuine familiarity with his king. Auzout makes the king a very clever offer: if the king does find Auzout's idea about the observatory project interesting and would like to talk about it more, Auzout would welcome the chance to discuss it. Moreover, would the king be interested in learning more about Auzout's telescopes? Auzout offered Louis an opportunity to stargaze. Auzout would be honoured to

teach the king how it all works, so that Louis might learn how kings can use astronomical equipment as easily as astronomers.

It was likely a joy for Auzout and his colleagues to share the experiences of astronomy, but further it was a way to bridge across the two different worlds: royal politics and the world of the savants and new sciences. In recent months, Auzout and colleagues Christiaan Huygens, Jean Picard, Melchisedech Thevenot, and others had used the house of Louis's chief minister, Jean-Baptiste Colbert, to hold observation sessions, setting up their telescopes to observe lunar and solar eclipses from his garden.[131] That certainly provided the opportunity to show off their abilities, and to demonstrate firsthand the practical applications of the knowledge that they were retrieving from the stars. This was a strategy that would pay dividends.

No records remain that would tell us how Auzout's proposals were received. We could conclude, however, that the reception was positive, given that his proposals were in one way or another, all acted upon. It is likewise unknown whether or not Louis took up the offer to work, hands-on, with Auzout's telescopes. Yet how could he have resisted? With Auzout's new 150-foot tubeless telescope, or his hand-made twenty-seven-foot tube telescope, he could have seen features on the moon for the first time that would have been astounding, or perhaps even Saturn and its rings directly.[132] Although he was rising in stature somewhat in his own circles, Auzout was a not a court insider but rather a mere philosopher and astronomer.

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[131] Colbert had invited Auzout, Huygens, De Carcavi, Roberval, Buot, and Frénicle de Bessy to his Paris house to observe the eclipse of the moon at about this same time. See Sturdy, *Science and Social Status*, 74.

[132] By "directly," I mean to emphasize that these observations predate the reflecting telescope. So, through a refracting telescope like Auzout's, the viewer who looked at Saturn looked directly at the actual planet. This was an important aspect of observation for Auzout, who was critical of Newton's reflecting telescope, which was discussed in a series of *Philosophical Transactions* articles in 1672. Auzout's general critique was that with a reflexive telescope, an astronomer is no longer looking at the heavenly body itself. See Evelyn et al., *Philosophical Transactions*.

Auzout knew that stimulating the enthusiasm of the young king was necessary to get the project moving. Moreover, given what we now know about Auzout, we should not be surprised that he would realize that the most secure way to win over Louis would be to give him the opportunity to experience the telescope himself and see how it works. To give Louis the chance to play out the experiences of an astronomer, of seeing the stars the way an astronomer does, that would be the surest means to gain the king's support. No words could describe the sensation of seeing the moon or the rings of Saturn with his own eyes, even for a king.

In the eyes of his peers, Auzout was the "Atlas of the century." In the judgment of historian Harcourt Brown, he was the key figure among the handful of men leading the movement of the new sciences in seventeenth-century France. And now we see that he audaciously overturned for a time the perception of what was possible in celestial observations, and formally invented the project of the Paris Observatory. His writings were influential and confronted the most conservative positions of the day. We might also suggest that his treatise on the comet inaugurated two scientific journals—both of which are still published 350 years later. Yet today Auzout remains an enigmatic obscurity. Even Brown, whose respect for Auzout is deep and expressly genuine, could only offer his readers a cursory description of him as a person. Nonetheless, despite his present anonymity, Auzout's impulse to act on his ideas about the ephemeral comet and his subsequent letter to Louis calling for the creation of an observatory and company of sciences and arts established a path for important future events that this study intends to make known.

Given the sequence of future events that we will review next, it seems clear that Louis was sold on Auzout's project, and there seems to have been little time spent commanding that it be initiated. He turned the project over to his minister, Jean-Baptiste Colbert, who, we will see,

had been behind the scenes of the project all along. In fact, it will be easy to believe that it was Colbert who encouraged, and more likely requested, that Auzout append his appeal for the observatory and academy to his comet treatise in the first place. Colbert was certainly familiar with the workings of the Paris astronomers, and he was already supporting them in various ways. There is now little doubt that the formal conception of the project of the Paris Observatory—as an observatory structure with a polyvalent occupation—can be attributed to Auzout. What we will see next is that the Observatory project was then put into the hands of perhaps the only man in Europe who could implement it: Jean-Baptiste Colbert.

Chapter 3 — Jean-Baptiste Colbert

> M. Colbert would show favour to the Letters, not only because of his natural inclination, but as wise policy. He knew that the Sciences and Arts alone suffice to render a Reign glorious; that they extend the Language of a Nation perhaps more than do Conquests, and give the reign a control over minds and industriousness which is just as prestigious and useful, and attract a multitude of foreigners to the kingdom who enrich it by their talent, take on its character and become committed to its interests.[1]
>
> Fontenelle (élogue de l'abbé Gallois), 1707

Colbert: The Historical Character

One person who was not surprised by anything in Adrien Auzout's letter was Jean-Baptiste Colbert. This was not the first time that Colbert had encountered the idea of an observatory and company project. We recall that in his letter to Louis, Auzout referred to a plan for a new Compagnie—the Compagnie des sciences et des arts. As the director of finance and the principal sponsor of initiatives related to the sciences and arts, Colbert would have been the intended recipient of the proposal.[2] We will see that Colbert was already familiar with all the key players. He had hosted observation events at his Paris house, attended by Auzout and colleagues such as Jean Picard, Pierre Petit, Melchisédech Thévenot, Pierre Carcavy, Gilles

[1] "M. Colbert favorisait les Lettres, porté non seulement par son inclination naturelle, mais par une sage politique. Il savait que les Sciences & les Arts suffiraient seuls pour rendre un regne glorieux, qu'ils étendent la langue d'une nation peut-être plus que des conquêtes, qu'ils lui donnent l'empire de l'esprit & de l'industrie, également flateur & utile, qu'ils attirent chez elle une multitude d'etrangers, qui l'enrichissent par leur curiosité, prennent ses inclinations, & s'attachent à ses interêts."

[2] Sturdy writes, "Colbert himself saw the 'Project' and doubtless discussed it on the several occasions in 1663 and 1664 when he and Huygens met." *Science and Social Status*, 72.

Personne de Roberval, and Christiaan Huygens.[3] These events gave the savants the chance to demonstrate to Colbert firsthand the practical benefits of a scientifically grounded society.[4] In these encounters, the savants would have had the chance to rehearse their proposal and edit it to satisfy Colbert's wishes. In fact, as we learn more about Colbert's pervasive methods, it becomes easy to believe that he was in the background of the project from the beginning, and likely encouraged, if not ordered, the proposal to be attached to the comet study.

By the time that Colbert received Auzout's formal proposal, he had already been primed for the project. For those who had longed for the Observatory and Compagnie, the comet's timing was opportune, perhaps providential even, and the vision of that future was embodied in the observatory building. Yet Colbert's responsibilities went well beyond seeing the observatory building completed. In this chapter, we will see that the twenty or so founding members of the company—the intended users of the building—were there because Colbert had personally selected each one.

Once their group was formed, it was not uncommon for Colbert to personally join their meetings. He urged them "to do well"[5] and led them on tours of the construction site. Most importantly, it was Colbert who sold the idea of the project to his king and attended to keeping Louis's interests in the project elevated. After receiving Auzout's proposal, Colbert

[3] Ibid., 64–65. At the time, Auzout was probably one of Colbert's main advisors on matters of architecture and the sciences. He, along with the Perrault brothers, assisted Pierre de Carcavy and Chapelain, Colbert's two chief mentors in architecture, science, and related matters. Even further back, Colbert had been meeting with savants since his days with Cardinal Mazarin, reviving schemes for channelling state money to savants and artists to support their work and galvanize their allegiance to the monarchy. Among this specific group of savants, Colbert was using patronage payments to recruit foreign savants such as Huygens. In 1663, Huygen's name appears on the list of royal pensions, receiving 1,200 *livres*.

[4] Ibid., 74. Sturdy discusses these events at Colbert's house.

[5] Justel to Oldenburg, 6 November 1667, in *Correspondence of Henry Oldenburg*, 3:580.

must have acted immediately. As the project unfolds, we will see him emerge as its pre-eminent figure—its titular leader as well as its mechanic behind the scenes. From the very first days of the Observatory project, it was known that "Mr. Colbert is to have charge of the work."[6] Later, as construction got underway, his personal commitment to the project was acknowledged: "If it does not [succeed] it will not be the fault of Mr. Colbert," wrote Henri Justel, a court insider, "who takes great pains and who gives everything anyone could wish."[7] From the perspective of foreign savants, it seemed to be Colbert's observatory.

In this chapter, we will see Colbert's pervasive and instrumental role in the Observatory project. He may not have invented the idea of the Observatory project, but he was there in its background, motivating those who did. He may not have designed the observatory building, but he assembled the teams of designers who did, and required them to alter the ways in which they would work together. We will see that it was Colbert who signed the sales agreement for the property that became the project site. He contracted the stonemasons and visited the project site weekly. And during the construction phase, it was he who reviewed the craftsmen's shop drawings.[8] Colbert did not set all the stones for the building, but he did set the first one. He established the design and construction schedules and raised the necessary capital not only for the costs for construction but also for all the required equipment and instruments, even if it meant some restructuring of the revenues of the kingdom.

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[6] Justel to Oldenburg, 8 February 1667, ibid., *4*:156.

[7] Justel to Oldenburg, 27 June 1668, ibid., *4*:479. Henri Justel's letters will play a large role in this study.

[8] Hentie Louw, "The Windows of Perrault's Observatory in Paris (1667–1683): The Legacy of a Proto-Modern Architectural Inventor," *Construction History* 19 (2003): 22. Louw publishes a copy of a shop drawing from a window fabricator. Handwritten notes can be seen on the drawing, which according to Louw, say, "Dessin de vitres pour les grandes croisees de fer de l'Observatoire" and also "arreste le 25 juin 1679 à St-Germain, Colbert." Louw provides this credit: "Centre Historique des Archives nationales, Paris, Cat. 0/1/169/p.15)."

Like all works of architecture, the Paris Observatory was a product of many different kinds of people acting on their various aspirations. And, while those aspirations fuelled the project's development, it was Colbert's intentions that would have mattered the most, as he deliberately measured his strategy against all possible actions. The Observatory project demanded many different kinds of expertise from him, most of which were not part of his background. Consequently, he created and implemented systems to compensate for his weaknesses.

The intricacies of how and why the project developed was largely the result of his wishes and outlook. When we combine his instrumental importance with his almost complete anonymity in architectural studies, we are led to an inevitable conclusion: some effort must be made here to move him from the margin of architectural history to its centre. Therefore, with a goal to learn about the origin of the Paris Observatory—that is to say, to ponder *from where and through which it is what it is and how it is*—it is imperative that we come to terms with Colbert and his methods and desires. What were his outlook and objectives, and from where did they originate? From what background did his worldview derive? For the architectural researcher, how did someone with Colbert's merchant-class background gain such authority in a work of architecture?

To gain some insight into a historical figure such as Colbert, we might lean on that figure's written treatises or some other introspective writing that had been left behind. But, in Colbert's case, there have never been any such treatises. Colbert left little that reveals his conceptual or theoretical thinking, perhaps because there were never any. "Colbert considered himself, not a thinker, but a doer," decided a principal biographer, Charles Cole.

Although his actions were "imbued with theories, he was no theorist."[9] His ability was instrumentalizing the ideas of others. Someone who knew Colbert, the Abbé de Choisy, thought that he possessed "a solid mind, but cumbersome, born primarily for calculating."[10] The archive he left was organized more bureaucratically than thematically: "Letters, Instructions, and Memoranda." Researchers who look into his correspondence should expect to find it mainly concerning matters of finance, warns Cole.[11]

For Colbert, theoretical thinking was rare. Cole believed that the few lines that are sometimes appended to his instructions to others are as close as Colbert might come to theory or abstract thought. But even then, they were instrumental in nature, defining "the concrete steps to be taken…largely to make clear his intentions, rather than as an exposition of his ideas."[12] There is no record of his personal involvement in the kinds of theological debates in which Auzout seemed so willing to enter. "He was a Catholic of routine devoutness," writes Cole, "and could employ the phrases of piety if need were. But his religion seems to have been more political than personal."[13] For the Marquise de Maintenon,[14] who knew Colbert

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[9] Charles Woolsey Cole, *Colbert and a Century of French Mercantilism*, 2 vols. (Hamden, CT: Archon Books, 1964).

[10] Pierre Clément, *Histoire de la vie et de l'administration de Colbert: Contrôleur général des finances, ministre secrétaire... suivie de pièces justificatives, lettres et documents inédits* (Paris: Guillaumin, 1846), 415. Clément quotes Charles Perrault who repeats a line he had heard from Choisy: "L'abbé de Choisy a dit, de son côté, que c'était "un esprit solide, mais pesant, né principalement pour les calculs." François-Timoléon de Choisy was a French author and contemporary of Colbert.

[11] Cole, *Colbert*, 1:301n43.

[12] Ibid., 1:355.

[13] Ibid., 1:300.

[14] Françoise d'Aubigné, Marquise de Maintenon was a mistress to Louis XIV and his undeclared second wife. Maintenon is sometimes said to be the force behind Louis's turn to a more conservative form of Catholicism.

personally, Colbert's single-mindedness was disconcerting: "Monsieur Colbert thinks only of his finances, and almost never of religion."[15]

Perhaps he thought that his writing absorbed too much of his time. Speaking his commands was undoubtedly the most expeditious way to convey his opinions. Close aide Pierre de Carcavy claimed that he nearly always received his directives from Colbert by word of mouth. Colbert's antipathy to writing may have been due to his educational background. His handwriting was small and cramped and nearly illegible. It read more like the ledger entries of a merchant than the script of a scholar. In the end, documents were almost always prepared by aids who either took direct dictation or submitted drafts to Colbert for his approval.

Through the past two centuries, historians like Clément and Cole, and others like Charles Bourel de La Roncière, Claude-Joseph Gignoux, Georges Mongrédien, and most recently Jacob Soll, have attempted to bring to light Colbert's historical importance. As they tried to peel away the layers that seem to surround him, they gradually divided the history that involves him into their own parallel historiographic channels. Their various studies have to some degree each shaped the identity by which he is now known. Their historical framing has left us with incomplete modern definitions of Colbert: as the proto-modern free-market economist,[16] an inventor of liberal government, a ruthless despot bent on acquiring personal power, a parvenu, or the prototypical governmental bureaucrat. The fact is, however, he was involved simultaneously with so many aspects of French life that any historian, no matter what their agenda, could find examples from Colbert's various worlds that will support their

[15] Clément, *Histoire de la vie et de l'administration de Colbert*, 392. "M. Colbert ne pense qu'à ses finances et presque jamais à la religion."

[16] It is Colbert to whom the free-trade doctrine *laissez-faire* can be traced.

research objectives.

In many of these historiographical realms, and in particular the histories of mercantilism and modern economics and politics, Colbert is a very familiar historical figure. Today, the Bibliothèque nationale de France contains more than one hundred publications that include his name in the title, and there are hundreds of others where he is a primary character. No studies of Louis XIV or the ancien régime can possibly ignore Colbert's political role. Accounts of the history and theories of modern trade, commerce, government, and war almost always include passages about Colbert. Modern historians have shown the most interest in Colbert: more than sixty of those Bibliothèque titles have been published since the beginning of the twentieth century.[17] However, because of his appropriation by particular traditions of modern history, his influence in certain other traditions where he was equally significant—such as the history of architecture—has been nearly entirely ignored. It is no minor objective of this study to rectify that omission and highlight the role of Colbert in the origins of the Paris Observatory and, in so doing, his role in the origins of contemporary architecture.

For the most part, all the Colbert historians have shared the same primary sources on their subject: the archive that has been collected and stored at the Bibliothèque nationale de France. The only author who has ever had full authority over Colbert's archive has been nineteenth-century historian and librarian Pierre Clément. In 1836, Clément was given the responsibility to pull together all remaining documents associated with Colbert. Within a decade, he began publishing monographs he derived from that archive. The first, *Histoire de la*

[17] One recent study is by Jacob Soll. Soll portrays Colbert as having built a central information system by merging two previously unrelated systems: the Republic of Letters and the merchant accounting systems of his forefathers. See Soll, *The Information Master: Jean-Baptiste Colbert's Secret State Intelligence System* (Ann Arbor: University of Michigan Press, 2009.

vie et de l'administration de Colbert, was published in 1846.[18] In 1859, twenty-three years after he began the project, Clément started publishing the archive mentioned above: *Lettres, instructions et mémoires de Colbert*;[19] it includes nine volumes plus an index volume. Clément provided long introductions to each volume. The monumental project eventually outlived him. After he died in 1870, his widow, aided by Auguste Geffroy,[20] republished Clément's introductions from the nine-volume set in a two-volume set titled *Histoire de Colbert et de son administration*.[21] Clément and his publications have been considered the definitive sources for Colbertine materials. Assigned the mandate of collecting every existing text, Clément is generally believed to have exhausted what was available in the nineteenth century. Nevertheless, that prodigious collection is still only a fraction of Colbert's twenty-plus-year production.

For more than a century, Clément's archive stood as the sole collection of primary documents concerning Colbert. But, in 1980, Inès Murat published a Colbert monograph in French and, four years later, an English translation.[22] The majority of her monograph still depends mostly on the Clément collection. However, Murat augmented the Clément archive in an important way. Her family descends from Colbert's eldest daughter, Jeanne-Marie-Thérèse, and the family secured a large portfolio of Colbert's private papers that Clément

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[18] Clément reissued this monograph in 1874, in an expanded, two-volume publication—his definitive work as an historian. Pierre Clément, *Histoire de Colbert et de son administration*, 2 vols. (Paris: Didier et Cie, 1874).

[19] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*.

[20] Geffroy was a nineteenth-century professor of history, director of the École française in Rome, and a member of the Academy of Sciences.

[21] To date, this text has not been translated into English. See Clément, *Histoire de Colbert et de son administration*.

[22] Inès Murat, *Colbert*, trans. Robert Francis Cook and Jeannie Van Asselt (Charlottesville: University Press of Virginia, 1984). Originally published in French: Inès Murat, *Colbert* (Paris: Fayard, 1980).

never saw.[23] Much of it was correspondence and memoranda that highlight the planning and collaboration that occurred between Colbert and Louis at that time related to the Fouquet affair, an important and insightful episode that will be discussed at length below.

There is a secondary author with an expertise in Colbert who has already been mentioned: Charles Woolsey Cole published *Colbert and a Century of French Mercantilism* in 1939. Over many years, Cole consulted the primary documents mentioned above and gradually compiled a picture of Colbert's ambitions and accomplishments in the world of mercantilism. When completed, his research amounted to a definitive perspective of that part of Colbert and his world, to the point that some historians feared that Cole's work would constitute the final words written on Colbert's mercantile theory.[24]

Although Cole's study of Colbert's mercantile policies has no immediate relevance to this study, the way that Cole frames his investigation is helpful. First, he attempts to avoid the temptation to speculate on larger, overarching themes that might be deduced from Colbert's actions. He seems to readily accept that, in the final analysis, Colbert was no more than a man, living in a tradition, and attempting to deal with the given conditions and problems that he both inherited and caused. Second, Cole shares my interest in understanding Colbert's character, acknowledging that "it is not difficult to study Colbert as a minister and a public servant, but it is hard to come to any understanding of him as a man."[25]

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[23] Murat's French edition includes photos of some of Colbert letters that demonstrate his correspondence convention of only using half of the width of the sheet, so that his correspondent (Louis, usually) could write his replies on the same sheet. These images are omitted in the English edition.

[24] For one review that expresses this worry, see Clarence P. Gould, review of *Colbert and a Century of French Mercantilism*, by Charles W. Cole, *Mississippi Valley Historical Review* 26, no. 3 (1939): 404–05.

[25] Cole, *Colbert*, 1:293.

Recognizing his importance in their studies, authors have tried for three centuries to make sense of Colbert. Firsthand accounts have been reduced to characterizations retold to the point of anecdote. Even so, their longevity undoubtedly betrays some degree of truth. Foremost among these anecdotes are Colbert's dedication and extraordinary capacity for work. "Colbert's true love, the mistress of heart and mind, was his work," writes Cole. "He toiled as it is given few men to toil."[26] Cole attributed his authority to the fact that he was "the hardest-working man in the administration, and because he had the persistence of a leech."[27] He was "a demon for work," summarizes another biographer, Pierre Goubert.[28] Jules Mazarin assessed that Colbert "was born for work to an unbelievable degree."[29] Colbert's self-assessment was that he "loved work as if by nature."[30] Colbert's close aid, Charles Perrault, explained, "M. Colbert knew little else than the rest that comes between changing tasks, or in passing from a difficult task to one a little less so."[31] Cole writes that, week after week, Colbert logged workdays of ten, twelve, or sixteen hours "with a zest that less single-minded men can scarcely understand."[32]

Colbert expected that his unnatural dedication to his job would spread to those around him. When it did not, he maligned the wasted effort. He was "the sworn enemy of weakness in any form," writes Goubert. "He harried unmercifully such useless people as rentiers, officers,

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[26] Ibid., 1:299–300.

[27] Ibid., 1:292.

[28] Pierre Goubert, *Louis XIV and Twenty Million Frenchmen* (London: Allen Lane, 1970), 118.

[29] Cole, *Colbert*, 1:281.

[30] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 1:143–44.

[31] Cole quotes "a friend" of Colbert's. According to Clément, that friend was his *commis*, Charles Perrault.

[32] Cole, *Colbert*, 1:299. He cites Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 2:46, and Clément, *Histoire de Colbert et de son administration*, 1:412.

beggars, monks, and tavern-keepers."[33] In one memorandum, Colbert advised Louis that "the two professions that consume one hundred thousand of your subjects uselessly and without contributing to its glory are finance and justice.…Finance alone used up over thirty thousand" better-employed frenchmen.[34] To remedy that inequity, he proposed a plan to shift the workforce into four more productive areas: agriculture, commerce, the army, and the navy: "If Your Majesty can achieve a reduction of all your people to these four kinds of professions, one may say that you can become master of the world, while working at the same time to diminish gradually and insensibly the number of monks of both sexes, which produce people useless in this world, and often devils in the other."[35]

He advocated devotion to any given task and believed that ambition and industry were two of man's highest virtues. His traits created a minister "cold, humorless, hardworking, honest, narrow, devoted, an ideal servant of the king," assesses Cole. After reading thousands of pieces of Colbert's correspondence, Cole confesses to having not found one "in which he showed more than an infinitesimal trace of a sense of humor."[36]

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[33] Goubert, *Louis XIV*, 118.

[34] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 6:3. "Le deux professions qui consommet cent mille de vos sujets inutilement et sans concourir à sa gloire, sont la finance et la justice. La finance en consommoit plus de trente mille."

[35] Ibid. "Si Vostre Majesté peut parvenir à réduire tous ses peuples à ces quatre sortes de professions, l'on peut dire qu'elle peut estre le maistre du monde, en travaillant en mesme temps à diminuer doucement et insensiblement les moines de l'un et de l'autre sexe, qui ne produisent que des gens inutilés dans ce monde, et bien souvent des diables dans l'autre." While it may have been a popular conception at the time, it is interesting to note his phrasing here, and how similar it is to Auzout's words in his letter to Abbé Charles, printed in full in Chapter 2 and repeated in part here: "the principles of physics or astronomy, which are as useless for the other life as they are useful for this one."

[36] *Colbert*, 1:300n40. The closest that Colbert comes to humour, discovered Cole, was an instance when he was compelled to return a gift of a horse that he thought was too small for him, writing that he "had no need for a horse to take a tour around his garden."

Despite becoming one of the richest men in France, Colbert lived abstemiously. In a time when scandal and clandestine affairs where the norm, Colbert famously kept clear of such conduct. "Thanks be to God, I have nothing to reproach myself about," he wrote, "on the score of any debauch, diversion, promenades, or other pleasures."[37] In part, his behaviour can be attributed to the fact that he had no time for a personal life. Except for the formal loyalty and admiration that bound him and his king, there is no record that Colbert had any friendships whatsoever. Some who knew Colbert personally and were writers remembered him with literary caricatures. Guy Patin's letters characterized him as "*Vir Marmoreus*," or the Man of Marble.[38] In the letters of Mme de Sévigné, he was not "Colbert," but *Le Nord*,[39] or elsewhere, "*la glace qui l'attend*" — "the awaiting ice."[40]

Those who could not avoid a meeting with Colbert would be terrified by the prospect: "When one realizes that this is a matter that depends upon Monsieur de Colbert, one trembles," wrote Sévigné.[41] Colbert's overall authority was difficult to bypass for a courtier seeking any favour. Murat quoted a Venetian ambassador: "on the days when he gave audience, the other ministers' offices were like deserts."[42] Those brave enough would quake

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[37] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 1:234. By every account, Colbert lived a life of marital fidelity.

[38] Ibid., 1:lx. See also Clément, *Histoire de Colbert et de son administration*, 1:485.

[39] Marie de Rabutin-Chantal, Marquise de Sévigné, was famed for her letters to her daughter, which were copied and widely circulated and became very popular. She was mentioned earlier here for her commentary describing the comet sensation. Sévigné and Gérard-Gailly, *Lettres de Madame de Sévigné*, 3:277.

[40] Ibid., 5:41.

[41] "Quand on songe que c'est une affaire qui dépend de M. de Colbert, on tremble!" Ibid., 3:568. Biographer Murat repeats this and the previous remark of Sévigné. Murat adds this counter opinion from the ambassador of Savoy, "For my part, in spite of his severe disposition and bearing, I find him very obliging, quick to grant reasonable requests, a man of his word, and prompt." Murat, *Colbert*, 89.

[42] Murat, *Colbert* (English), 89.

before his large form and his stoic and icy reception. Through the door of Colbert's office, an exasperated Mme de Cornuel was heard beseeching, "Monseigneur, at least make some sign that you hear me!"[43] Sévigné dared to spend a few minutes in Colbert's office to deliver a plea for a pension for her son-in-law. She reported to her daughter later, "I will not tire myself if I quote his reply: 'Madame, I shall see to it.' And he walked me to the door, and that was it."[44]

Colbert was aware that he often must act on subjects about which he had no knowledge. When that would happen, he would simply summon the appropriate experts into his office. Cole provides a list of more than a dozen main advisors who Colbert consulted, acknowledging that there were many others. "From every walk of life, Colbert called men to serve the state for a few weeks or for many years."[45] Nineteenth-century historian Pierre-Édouard Lémontey[46] saw in Colbert the same slowness with his advisors that Choisy had witnessed. When discussing complicated matters with his advisors, "he conceived their ideas slowly. But they would eventually emerge cleanly and well expressed." Colbert would take in their advice intently but then act on them "despotically, smashing any opposition with contempt and brutality."[47] He took exactly what he needed from them without finesse or

[43] Sévigné and Gérard-Gailly, *Lettres de Madame de Sévigné*, 5:41. "Monseigneur, faites au moins signe que vous m'entendez!" Anne-Marie Bigot de Cornuel was known for her wit and vivacity and for her aphorisms, and was a correspondent of Mme de Sévigné.

[44] Sévigné and Gérard-Gailly, *Lettres de Madame de Sévigné*, 3:491.

[45] Cole, *Colbert*, 1:326. Colbert does not mention any of the architectural advisors who will become a key part of his operations.

[46] Lémontey was a lawyer, scholar, and historian around the beginning of the nineteenth century. His writings about Colbert can be found in Pierre-Édouard Lemontey, *Oeuvres de P.É. Lemontey, de l'Académie française: Édition revue et préparée par l'auteur* (Paris: A. Sautelet et Cie: Brissot-Thivars: A. Mesnier, 1829).

[47] Ibid., 244–45. "Sa conception tait lente, mais les idées en sortaient nettes et bien exprimées. Si, avant de résoudre, il consultait avec soin et bonne foi, il exécutait ensuite despotiquement, et brisait les oppositions avec outrage et brutalité."

apology. He was "firm to the point of implacability," writes Cole,[48] although Colbert himself claimed to use moderate methods if they would suffice: "My sentiments never go to the extremes," he wrote.[49]

Throughout the decades of his service to Louis, Colbert's commitment to the king was total and unfailing. His style of operating was simple: once one discerned what the king desired, he provided it. He offered his own son this advice on how to live a happy life. One need only "work with great industry, during his whole life to know well what might be agreeable to His Majesty."[50] His letters to Louis were not as obsequious as they now sound: "[Your] campaigns…have about them a quality of overwhelming surprise which grips the mind, and leaves it free only to admire, without the pleasure of being able to find any precedent…We have only to pray God for the preservation of Your Majesty." And a similar praise: "One must, Sire, remain in silent wonder, and thank God every day for having caused us to be born in the reign of a king like Your Majesty."[51] Were Colbert's letters expressing a kind of authentic and profound worship of his king? Was his king capable of miracles? If an insight into Colbert is what we seek, then these rare glimpses into his character might lead us to accept the possibility that Colbert had a genuine reverence for his king.

He bought presents for Louis's mistresses and "did everything save act as midwife" for their illegitimate children.[52] The many stories of Colbert's devotion do not need to be repeated here. It is enough to say that, on the whole, Louis returned Colbert's devotion by offering a

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[48] Cole, *Colbert*, 1:294.

[49] Clément, *Histoire de Colbert et de son administration*, 1:149.

[50] Cole, *Colbert*, 1:291.

[51] Ibid. Note, this citation and translation is by Cole. He traces the original quotation to Clement, *Lettres*, 3:part 2, but I have not found it there.

[52] Ibid., 1:290.

respect that was probably unusual at the time. *I command you to do as you please*, is an anecdote meant to encapsulate the working relationship between the king and his minister that must hold some truth. Certainly, Louis could not have offered kinder words to Colbert. He was giving him permission to continue with the work he was carefully planning. And implied in that command was deeper meaning; Colbert was being authorized to work for France. Colbert's historians do not disagree about one thing: that for his entire service to Louis, the king was the focus of Colbert's loyalty and patriotism. Colbert had immense powers, but as Cole puts it, he never lost sight of the fact that "the king could break him like a twig."[53]

Colbert is misunderstood when historians suggest that he was simply an arrogant bully and anyone who disagreed with him was just wrong. Colbert's abrupt, insensitive style is traceable to a deeper outlook that he apparently never took the time to defend. Colbert's attitude was grounded on the belief that it was not possible for any individual to escape his or her own self-interests. He was in a singular, privileged position in a world of self-interested individuals. In a letter, he warned an assistant, "Especially, I beg you to be on guard against the advice you will get from merchants, because you well know that they always consult only their individual interest without examining what would be for the public good and the advantage of commerce in general." "Merchants," he warned, "nearly always understand merely their own little commerce and not the great forces which make commerce go."[54] Elsewhere, "The little merchants of Marseille, not believing that there is any commerce other than which passes through their shops, would willingly overturn all general commerce in the

[53] Ibid., 1:289.

[54] Ibid., 1:334.

hope of a little immediate profit."[55] From his detached position as minister, Colbert had the well-being of every aspect of the entire nation in his hands, and the individual had only his or her own. Colbert was the only man in France who "understood the significance of developments."[56] He took from his advisors whatever he needed from them, and it was up to him to parse what was worthy from what was merely selfish.[57]

It is certain that Colbert had what appeared to those around him considerable personal flaws, and over the course of his life he developed some visceral enemies. "It is probably his very limitations that enabled Colbert to succeed so far as he did," writes Cole. He believed that it was probably Colbert's weaknesses and simple background and perspectives that may have allowed his success. "A man with more intelligence or vision would have seen both sides of many questions, would have hesitated and temporized, would have bowed before the stubborn inertia of the masses or the opposition of the classes. A man less dogged would have given up in despair," concluded Cole, "or would have become disgusted by a comparison of possible accomplishments with actual achievements."[58] On his death, anonymous authors attacked his memory in numerous publications that, as Cole reminds us, Colbert would have suppressed were he still alive. Cole translates a few:

> Colbert is dead, and that lets you know
> That France is reduced to the lowest state,

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[55] Ibid.

[56] Ibid., 1:336.

[57] Colbert's attitude followed roughly Frances Bacon: "The assertion that the human senses are the measure of things is false; to the contrary, all perceptions, both of sense and mind, are relative to man, not to the universe. The human understanding is like an uneven mirror receiving rays from things and merging its own nature with the nature of things, which thus distorts and corrupts it." Francis Bacon, *The New Organon*, ed. Lisa Jardine and Michael Silverthorne (Cambridge: Cambridge University Press, 2000), 41.

[58] Cole, *Colbert*, 2:549.

For if anything were still left for him to take,
This thief would not have died.

In another:

You have killed him, ignorant doctors,
This famous minister and great man;
You think he had a stone in his kidneys;
He had one in his heart, to the misfortune of France.[59]

Few others have looked more intently at the affairs and methods of Colbert than have Clément and Cole, and no other seems to have taken the same interest in him and his methods. Cole's assessment of Colbert was this: "By any definition of genius, it is hard to apply that word to Colbert. His was the ability not to originate but to apply. He thought along old established lines with dogged tenacity that argues a certain limitation of vision, as his delight in discovering and imparting truisms argues even a limitation of his intellectual capacity. Where he shone was in his devotion to his king, his country, and his economic preconceptions. Considering the times, he was a great administrator, certainly one of the greatest of his century. If he had any genius, it was a genius for unrelenting toil."[60]

The various caricatures of Colbert above provide an overview of the most important personality in the story of the origin of the Paris Observatory. Notice, however, that they follow the general rule of which Cole warned. Colbert is defined as who he was when he was Minister Colbert. In his role as minister, even the descriptions of him that appear to expose core aspects of his personality can be shown to be modes of professional operation. The details

[59] Ibid., 1:330.

[60] Ibid., 2:549.

of his personal history—that is, Colbert's own origins, his life in Reims at the generations-old family business of Long Vestu, his tax farmer father, and his grandmother who as a single mother tried in vain to keep Long Vestu solvent—are of great interest and go a long way to providing definition to the foundation of Colbert's character. Unfortunately, they fall just beyond the purview of this study.[61]

Colbert Becomes Political

In 1654, at age sixteen, Louis assumed the crown of France in a ceremony in Reims, the place of Colbert's own origins. State affairs remained in the hands of his mother, Anne of Austria, and the man who Louis's father had imported from Italy to run his government, Cardinal Jules Raymond Mazarin. Mazarin would rule France's government and accumulate an enormous fortune, with Colbert acting as his chief of staff and principal advisor. To a great extent, Mazarin owed his incredible wealth to Colbert's guidance. In the days before his death, Mazarin offered his fortune to the new king—perhaps fifty million livres. The twenty-two- year-old Louis declined Mazarin's offer, and in so doing sent a message of optimism to his kingdom and elsewhere that, after decades of being ruled by foreigners (Mazarin was Italian and Anne of Austria was Spanish) and years of civil wars (the Frondes were only eight years in the past), France was finally in proper hands. When Louis declined the gift of Mazarin's fortune, the cardinal was greatly relieved. According to Choisy, Colbert liked to boast to his friends that on his deathbed, Mazarin offered the king a repayment: "I owe you everything, Sire, but I believe I acquit myself in some way by giving you Colbert."[62]

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[61] There unfortunately is not the space in this study to discuss Colbert's interesting family foundations in Reims. For an excellent study of this period, see Jean-Louis Bourgeon, *Les Colbert avant Colbert: Destin d'une famille marchande* (Paris: Presses universitaires de France, 1973).

[62] Choisy in Alexandre Petitot and L.-J.-N. Monmerqué, *Collection des mémoires relatif à l'histoire de France*, series 1, vol. 63, *De l'abbé de Choisy* (Paris: Foucault, 1823), 229.

Colbert was already well known to Louis. He had been a loyal operator and facilitator for the royal family's needs in Paris while they were in exile during the Frondes. Colbert and his wife were favourites of Anne of Austria. On Mazarin's death on 9 March 1661, Louis XIV assumed full authority of France. He declared that he would rule without a prime minister—advice received from Mazarin—and all serving ministers would be relieved of their final authority. Louis announced the creation of a transitional advisory council. This group, referred to as the *Conseil d'en haut*, or Supreme Council, was made up of the three highest ministers: Michel Le Tellier, Hugues de Lionne, and Nicolas Fouquet. Colbert was named the administrator of the council. At the time, Le Tellier was the minister of war. Lionne was a familiar character in the Mazarin court and well-known to Louis. He had become the secretary for Louis's mother when Louis was young and was Mazarin's chief foreign affairs advisor—effectively the secretary of state. He negotiated several important treaties while in the service of Mazarin and maintained important foreign contacts.

Fouquet was an important ally and collaborator of Mazarin. He had inherited the enormous fortune of his father, a shipbuilder and marine merchant, and was an important member of the Parlement de Paris. In 1650, he purchased the office of attorney general to the Parlement of Paris, and as such became the monarchy's representative there. Three years later, after the resignation of the superintendent of finance, Abel Servien, he assumed that position. Fouquet had a lot of experience with the financial systems in France. He was a powerful banker and he cultivated many friendships in powerful settings. He was in position to raise and lend large sums of money, which he had been routinely asked to do by Mazarin in

. "On dit même [que Mazarin] ajouta ces mots (et M. Colbert s'en vantoit avec ses amis): "Je vous dois tout, sire; mais je crois m'acquitter en quelque manière en vous donnant Colbert.""

order to fund wars and other schemes created by the cardinal. Through his family backing and shrewd financial dealings, Fouquet became enormously wealthy—second in France only to Mazarin.

When they first met in Libourne in August 1650, Colbert was hugely impressed with Fouquet. Personally, Fouquet was charismatic and highly influential. He made and nurtured many important friends. He exuded confidence and inspired those who entered his world. It may be said that in many ways he was the opposite of the closed and impersonal Colbert. Like Colbert, Fouquet also had openly criticized Mazarin, which also put them on the same side. Like almost all who met him, Colbert was at least initially pulled in by Fouquet's charms. Fouquet may have told Colbert about his father, François, and his stature would have also impressed Colbert. The elder Fouquet had for a time worked closely with Cardinal Richelieu. It was no secret that Colbert was a great admirer of Richelieu, and he would have envied Fouquet's history with *le grand cardinal*.[63]

Fouquet may have known of Colbert's admiration for Richelieu and may have used his background to impress him. In 1626, Fouquet's father was charged by Richelieu to head la Compagnie des Îles d'Amérique and develop the colony of the Antilles to create trade and convert the inhabitants to Catholicism. He also appointed him to the Conseil de Marine. At the young age of eighteen, the son Fouquet began working in his father's company, meaning that at least for a few years he could have worked with the great Cardinal Richelieu. That same year, in 1626, he became a *conseiller* in the Parlement at Metz, a new position that had

[63] Philip P. Boucher, *The Shaping of the French Colonial Empire: A Bio-Bibliography of the Careers of Richelieu, Fouquet, and Colbert* (New York: Garland, 1985). Colbert idolized Richelieu, his original commander, for his entire life. In court, Louis would chide Colbert when he would anticipate that he was about to launch into another éloge of Richelieu: "Colbert, here, is going to say to us again, 'Sire, the great cardinal de Richelieu, etc…'" Cole, *Colbert*, 1:294.

just been created by Richelieu. At age twenty, Fouquet spent the impressive sum of 150,000 ecus for the office of the *maître des requêtes,* a civilian service corps of France's elites that was created by Richelieu.

Colbert may have been impressed by Fouquet, but Le Tellier was not. Fouquet apparently was aware of Le Tellier's opinions, and saw the need to forge a closer association with the powerful minister. He asked Colbert to intervene on his behalf. "Fouquet," wrote Colbert to Le Tellier, "has made it clear to me on three different occasions that he most passionately desires to be counted among your special servants and friends. I found that he spoke as a true man of honour…a man of good birth and special merits, capable of taking on very high office one day." Colbert expressed his admiration, saying that he could not imagine repaying Le Tellier "in coin" for all that he owed him any more completely than recommending Fouquet as a friend.[64] Le Tellier, who was a generation older than Colbert, had more experience with the ostentatious finance minister and was less taken in by his charming style.

Le Tellier had witnessed Fouquet amass enormous personal wealth at the expense of the kingdom as a private financier in Paris. It is important to understand the financial system at the time. The king may have been a monarch of royal descent and a divine ruler, but in the financial world, he was just another partisan player. There was no central state treasury, at least not in the way we would understand it today. As historian Lucien Febvre explains, "the state, from a financial point of view, did not exist. There was the monarch, who was a private individual...who could not obtain credit in any way other than as an individual. It was not France who sought loans...but a prince...who inspired more or less confidence in the

[64] Clément, *Histoire de Colbert et de son administration*, 1:15–16. See also Murat, *Colbert (English)*, 29–30.

lenders."[65] Although the king was encouraged to demonstrate his dominion—usually through initiatives like waging wars or conducting trade—the standard financial practices of the day forced him to borrow funds from the kingdom's private financiers. To fund the huge military campaigns, his only option was to borrow against notes placed on projected tax revenues and other incomes, sometimes pushing debt years into the future.

The private financiers played the role of good Samaritans or honourable royal servants, but, in fact, they held all the financial cards. "Royalty rested in fact on a series of contracts with the groups of which France was composed: provinces, cities, ecclesiastical institutions, classes of society, and even economic groups such as trade guilds," writes Pierre Goubert. "All these contracts allowed each group its freedoms, its privileges, whose coexistence with the notion of submission to the king came as no shock to anyone."[66] And while the king of France was not a wealthy player in his kingdom's financial systems, Fouquet was its richest participant. At one point, the monarchy's debt to him for the military projects of the Spanish War was five million livres, or more than sixty times the king's annual revenues.[67]

This system of finances had been in force since before the era of Richelieu. Although Richelieu confessed ignorance in financial matters, he nonetheless recognized the illness that infected this system. He concluded that the problems were interwoven and systemic, and the financiers, too essential. "The financiers and partisans are a separate class, detrimental to the State, yet nonetheless necessary," wrote Richelieu. "This kind of Officer is an evil which we do not know how to live without, but which must be reduced to manageable terms." In today's

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[65] Lucien Febvre and Marian Rothstein, *Life in Renaissance France* (Cambridge, MA: Harvard University Press, 1977), 111.

[66] Goubert, *Louis XIV*, 52.

[67] Cole claims that the monarchy's income on its miscellaneous properties and tax sources amounted to no more than eighty thousand livres per year.

terms, the financiers were too big to fail. Richelieu saw the dilemma but was overwhelmed with the complexity of a solution to it. "Their excess and the irregularity that has slipped among them has gotten to a point where it is insufferable. We should not let them expand further and let them ruin the State without themselves risking a loss; giving rise to taking possession of their assets based on the mere knowledge of the excessive riches that they have amassed in a short time, and on the verifiable difference between what they had when they began their responsibility, and what they are now found to possess."[68]

Richelieu's exasperation was due to his inability to make any reforms. The financiers had grown too important in the larger economic system to be punished for their misdeeds. Richelieu felt helpless. At one point, he entertained the idea of establishing an independent court of inquiry to investigate fraud and improprieties perpetrated by the financiers, but that idea was apparently abandoned after coming to terms with the scale of such an undertaking and the slim likelihood of success. At the end of 1626, he did create what was called *l'assemblée des notables*, consisting of important churchmen, nobles, and other officials, charged with considering and offering advice on economic reforms and other topics. A second assembly was called in 1652, but, by that time, enthusiasm for reform seems to have died down. The second assembly was never held.[69]

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[68] Armand Jean du Plessis Richelieu, François-Louis-Claude Marin, and Charles Irénée Castel de Saint-Pierre, *Maximes d'état, ou Testament politique d'Armand du Plessis, cardinal duc de Richelieu* (Paris: Impr. de Le Breton, 1764), 221. "Les financiers et partisans sont une classe séparée, préjudiciable à l'Etat, mais pourtant nécessaire. Ce genre d'Officiers est un mal dont on ne sauroit se passer, mais qu'il faut réduire à des termes supportables. Leur excès & le déréglement qui s'est glissé parmi eux, est venu à tel point qu'il ne se peut souffrir. Ils ne sauroient s'agrandir davantage sans ruiner l'Etat & sans se perdre eux-mêmes; donnant lieu de s'emparer de leurs biens sur la simple connoissance des excessives richesses qu'ils auront amassées en peu de tems, & sur la différence qui se vérifiera entre ce qu'ils avoient lorsqu'ils sont entrés en charge, & ce dont ils seront trouvés possesseurs."

[69] Paul Ardier, *L'Assemblée des notables tenue à Paris ès années 1626 et 1627. [...] par les plus notables personnages de l'Assemblée* (Paris: Cardin Besongne, 1652), 7–9.

The more that Colbert worked with Fouquet, the more Fouquet's charms began to wear off. As Colbert began to reconcile the accounts for Louis—a job that he had undertaken in a similar fashion as he had for Mazarin—he became frustrated with their obscurity. Colbert put the blame on Fouquet: "Whenever he can, he prevents me from knowing anything, and mixes the past with the present, so that I cannot tell what is legitimately due from what is not, and so that no one can see clearly into the financial situation but him and his creatures."[70] At the beginning of Louis's reign, Colbert discovered that the state of finances and the political climate of France were in "fantastic disorder," and an attempted reorganization was a colossal project. Colbert and Fouquet shared overlapping responsibilities and it was clear that they were on separate sides. Fouquet had no problem with the fragmented and disconnected systems of the status quo. In fact, he made fortunes manipulating those systems. Colbert, on the other hand, wanted clarity and consolidation. His idea of a sound economy pointed towards a centralized economy. In terms of true inspiration, it was Richelieu from whom Colbert descended. And as Colbert dug deeper into Fouquet's financial dealings and oversaw his actions on the Supreme Council, Colbert became more aggressive.

Fouquet was aware of Colbert's changing mood and feared his influence with Mazarin. Further, Fouquet knew who was really in charge in the offices of Mazarin: "The said lord cardinal was himself governed by Colbert, his domestic servant," wrote Fouquet, "who under the pretext of amassing treasures for his master, had taken possession of his heart and mind, and was leading him to destroy me so as to enjoy my position."[71] Fouquet attempted some

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[70] Murat, *Colbert*, 50.

[71] "Ledit sieur cardinal était gouverné lui-même par Colbert, son domestique, lequel, sous prétexte d'amasser des trésors à son maître, s'était emparé de son cœur et de son esprit et le portait à me détruire, pour profiter de mon emploi." Adolphe Chéruel, *Mémoires sur la vie publique et privée de Fouquet surintendant des finances* (n.p.: Theclassics Us, 2013), 378.

reconciliation. While it is true that by this time Colbert was likely repulsed by the self-promoting Fouquet, it is not enough to claim that he was simply trying to steal his position. Colbert would write later that Fouquet never quite grasped the problems that underpinned their conflicts. Whereas Fouquet assumed that all relationships were fundamentally personal and therefore reparable, for Colbert, their differences were irreconcilably ideological. "I tried to clear up the matter with Colbert and asked him sincerely and frankly why such an unjust process was underway," wrote Fouquet, "and why he had such a cold air about him, contrary to the friendship he had sworn…I tried to rekindle feeling in him as best I could."[72] For Colbert, Fouquet was the embodiment of the financial system that had exasperated Richelieu. It was a condemned system whose reform was inevitable. Colbert was also revolted by the idea of arbitrary private control over public finances.[73] Colbert saw the opportunity to implement Richelieu's vision of reforming the financial systems of France. He wanted a reformed economy where the kingdom's fortunes were held in public coffers. A kingdom's wealth ought to be centralized and royal, rather than the status quo where the bulk of the money was fragmented and in the private control of an upper class of wealthy individuals.

Louis called together his Supreme Council every morning at six o'clock, and each morning Louis would press Fouquet for reports on economic matters. Louis would then meet with Colbert every evening, and Colbert would unravel the distortions and untruths Louis had heard that morning from Fouquet. Then, the next morning, Louis would come prepared with more probing questions fed to him by Colbert. The council attendees witnessed a gradual unwinding of Fouquet by the king as he entangled himself in unaccountable transactions.

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[72] Murat, *Colbert*, 44.

[73] Ibid., 39.

Louis was enjoying the process and, for the first time, under the tutorship of Colbert, he developed an interest in finances. "I have already begun to taste the pleasures to be found in working on finances myself," wrote Louis to his mother, "having, in the little attention I have given it, noted important matters that I could hardly make out at all, but no one should doubt that I will continue."[74] Early in the process, Louis had heard enough to convict Fouquet. Colbert wrote later that he had already decided to relieve Fouquet of the administration of France's financial systems, and he had even chosen the date: 4 May 1661.[75] But given Fouquet's entrenched position, it would not be an easy task. Using the private papers of Colbert to which she had access, Murat builds a scenario where Colbert and Louis co-conspired to arrest and convict Fouquet.[76]

As relationships deteriorated, Fouquet grew more and more insecure. In the defence treatise that he would publish later, he claims that by 1658 he had decided that "a distrustful and jealous" Mazarin was secretly plotting to destroy him.[77] In response to the Mazarin threat, he began hatching a plan of action at his family chateau in Saint-Mandé on the southeast edge of Paris. His "Saint Mandé" plan was a carefully conceived and perhaps delusional plan for actions to be taken following his arrest by Mazarin—an outcome that he considered imminent. The plan described a sequence of responses of civil revolt that he expected to erupt

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[74] Ibid., 69. Murat cites "Letter from King Louis XIV to the Queen Mother," found in the study of the late M. Rose, the king's secretary, Clermont, 1862.

[75] If we look briefly ahead, this date is illuminating because it removes any possibility that it was the Fête de Vaux that induced Fouquet's arrest, since that party was held four months later. Note also that Colbert's and Louis's memory on this date differ by one day, which Colbert will later note. What should matter is not the exact date, but that either date demonstrates that the plan was in place prior to the Fête.

[76] The following descriptions of the affairs involving Fouquet are valuable to the overall objective of this section, and lean heavily on Murat's readings of her private Colbert papers.

[77] Fouquet did not directly accuse Colbert, but the accusation is implied elsewhere.

at the time of his arrest. In their composite, the plan and his subsequent actions established a prejudicial case of sedition and treason against Fouquet. It described strategies for a kidnapping, the takeover of France's navy, the commandeering of a half-dozen port cities, the armament of a private fortress, the seizing of provincial treasuries, the termination of provincial communications with Paris, the privateering of ships on the Seine River, the initiation of relations with foreign states to ask for their assistance in the revolt, and methods for establishing overseas enterprises in the American tropics and Canada. However, it also details what he should expect in the event of his imprisonment: he would request access to his books and to a doctor. Fouquet's plan even provides possible methods for getting bribes to his guards.

Fouquet's plan was dependent upon the immediate mobilization of a vast network of personal friendships with powerful men and women. Some of Fouquet's plan had already been implemented at the time of Mazarin's death. Many loyalties were already committed to Fouquet. The revolution would swell from his home region of Brittany, where he had recruited friends and induced them to sign personal loyalty pledges. Fouquet solidified the support of the French naval officers. Vice-Admiral François Neuchèze, the commander of the navy, had pledged his loyalty by pledging inaction. "Since the principal establishments on which I am relying are maritime—such as Belle-Île, Concarneau, Le Havre, and Calais," went Fouquet's plan, "there is no question that, since the vessels are under his command, he can be of great use to us by not doing anything."[78] Another Fouquet loyalist, Pierre Regnault des Landes, the governor of the port city of Concarneau, signed a promise to "give myself to Monseigneur…and never to belong to another besides him…to serve him generally against all

[78] Murat, *Colbert*, 52.

sorts of people, without exception, and to obey no other person but him…I promise him to sacrifice my life against anyone he pleases, of whatever quality or condition they might be."[79] In Fouquet's Saint-Mandé plan, Regnault could be counted upon to "quietly fortify his command with men and all sorts of munitions, call into port any ships he had at sea, and keep all things in readiness, by horses and other things to be used at the right time."[80]

In the world of local politics, the promises made by the standing president of the Parlement in Brittany, "M. Maridor," were equally potent: "I promise the attorney general to remain at all times totally devoted to his interest, whatever may happen, without any reservation or distinction of persons, whatever rank or condition they may be, being resolved to execute his orders blindly in all matters that may arise and that involve him personally."[81]

As mentioned, Fouquet's background was in the shipping industry. His father was a wealthy shipbuilder and maritime merchant, and Fouquet had begun his professional life in that business. It is no surprise that his Saint-Mandé action plan originated with maritime solutions. Fouquet claimed that the proprietress of Île-Dieu, another port commune south of

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[79] Pierre Clément, *La police sous Louis XIV* (Paris: Librairie Académique Didier et Cie., 1866), 41–42. The entire pledge reads as follows: "Je promets et donne ma soi à Monseigneur le procureur general, surintendant des finances et ministre d'Etat, de n'etre jamais à autre personne qu'à lui, auquel je me donne et m'attache du dernier attachement que je puis avoir, et je lui promets de le servir generalement contre tout personne sans exception et de n'obeir à personne qu'à lui, ni même d'avoir aucun commerce avec ceux qu'il me défendra, et de lui remettre la place de Concarneau qu'il m'a confiée toutes les fois qu'il l'ordonnera. Je lui promets de sacrifier ma vie contre tous ceux qu'il lui plaira, de quelque qualité et condition qu'ils puissent être, sans eu excepter dans le monde un seul. Pour assurance de qui, je donne le présent billet écrit et signé de ma main, de ma propre volonté, sans qu'il l'ait même désire, ayant la bonté de se fier à ma parole qui lui est assurée, comme la doit un bon serviteur à son maître. Fait à Paris, le 2 juin 1658. [signed] Deslandes."

[80] Murat, *Colbert*, 49.

[81] Clément, *La police sous Louis XIV*, 42. "Je promets et donne ma soi à Monseigneur le procureur général, quoi qu'il puisse arriver, de demeurer en tout temps parfaitement attaché à ses intérèts, sans aucune réserve ni distinction de personne, de quelque qualité et condition qu'elles puissent être, étant dans la résolution d'exécuter aveuglément ses ordres dans toutes les affaires qui se présenteront et le concerneront personnellement. Fait ce vingtième octobre 1658. [signed] Maridor."

Belle-Île, was committed to assembling the ships in her port "to lend their aid wherever needed." Fouquet's father-in-law was the governor at Calais. According to plan, his daughter would flee to Calais and assume control of the northern-most port in his plan. The stronghold and centre of the plan would be Belle-Île, an ancient fortified island southwest of Paris, in a sheltered bay off the Brittany coast. In 1658, Fouquet purchased the entire island in his own name and with Mazarin's approval. He immediately began restoring the walls of the medieval citadel there, and commenced other construction projects. At one point, he drew up a list of his allies: Pellisson, Roquelaure, Gourville, Langlade, Vardes, Bouillon, and Marsillac. In his memoirs, Gourville claims to have once encouraged Fouquet to destroy his written plan, pointing out that much of it was now old and superseded to subsequent events, but, for some reason, he never did. To keep it safe, he stored it behind a mirror at his Saint-Mandé chateau.

From his fortification on Belle-Île, it appeared that Fouquet intended to expand his personal enterprise westward. Fouquet bought the office of viceroy of the Americas, paying thirty thousand ecus for it.[82] The Saint-Mandé plan detailed the exploitation of the fishing trades of Newfoundland. Fouquet invested personally in the fur trade of New France. In the American tropics, he bought plantations in Martinique and Guadeloupe. Failing in an attempt to purchase the island of Martinique outright, he instead purchased the nearby island of Saint-Lucie. Two naval officers who claimed to have been made aware of Fouquet's long-range plans later made the following statement: Fouquet was planned to become the "Sole master of Martinique. And to have up to fifteen vessels to support the inhabitants of that island and carry on all its commerce, to the exclusion of all other persons." As the hub for an

[82] Found in "Le Vrai crime du surintendant Fouquet. Discours prononcé à la séance de clôture du 52e congrés des sociétés savantes: par M. Ch. de La Roncière" (Paris: Impr. nationale, 1914), cited by Murat, *Colbert*, 54.

interconnected network of locales, "Belle-Île must be the warehouse for all commerce, in such fashion that all food intended for Martinique would be kept there, such as wine, brandy, vinegar, vegetables, and flour, all of which could very easily serve as provisions for the citadel of Belle-Île itself, for which supplies would need to be replenished continuously."[83]

The officers' confessions made it clear that Fouquet's plans amounted to a significant naval military complex: "All munitions needed to equip his ships will also be stored there, since the same ones are needed for the defence of a fort. And as for the upkeep of the ships, it is thought the proceeds from that [Caribbean] trade will provide for it and in time will even show a profit." The plan established to conduct trade between Belle-Île and Martinique was "well thought out," according to the confessors. "It is a fine pretext and an excellent cover for having both a war fleet and a store of munitions in abundance. And thus the master of Belle-Île and of ten or twelve ships assuredly becomes a great lord."[84]

The officers' confessions were taken by a cousin of Colbert, Colbert de Terron. Through information gathered by operatives, Colbert had become curious about the irregularities in the actions of the navy and, in particular, the peculiar activities underway on Fouquet's Belle-Île, so he asked his cousin Terron to investigate. There was obviously much work going on, yet no outsiders were being allowed access to the island. The two cousins would need to communicate in code, since Colbert was sure that Fouquet had been intercepting Colbert's mail. Working undercover, Terron nonetheless was turned back by the high security at the site. The two conspired: "a confident mason in a boat carrying dressed stone," or else, "three or four casks of wine in a double launch could be sent," thought Terron. The surest means

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[83] Murat, *Colbert*, 63.

[84] Ibid., 69. Cited as "Letter from King Louis XIV to the Queen Mother," found in the study of the late M. Rose, king's secretary, Clermont, 1862.

"would be to house a man at Quiberon, the Brittany port nearest Belle-Île, who, disguised as a sailor or peasant, could often go over to Belle-Île."[85]

Terron reported that more than once, a great deal of gunpowder and ammunition had arrived from Bordeaux and had been taken onto Belle-Île. Better still, Terron found a merchant who travelled often to Belle-Île who would be willing to report on what he saw there. "Things were being done there at a magnificent style," reported the merchant. He estimated a workforce of 1,500 labourers, working both day and night. Terron received another report from him on 10 June that included a map noting work that was already completed on Fouquet's island—"blacksmiths' shop, terraces, esplanades, ditches"—and that work was still underway—"future location of the basin, levees, town, church." These conditions were communicated to Louis and Le Tellier, who, having lived through the Fronde, were highly distressed by Fouquet's concealed operations. The decision was made to proceed with Fouquet's arrest.

Among royal family members, the king's mother, Anne of Austria, was Fouquet's closest ally, and she was left out of the arrest planning. Colbert and Louis decided that a mutual friend of the queen-mother and Fouquet, the Duchesse de Chevreuse, could help break the story to her. Chevreuse at first wanted nothing to do with the scheme. She herself was another admirer of Fouquet, and it was not until Colbert arranged the marriage of his oldest daughter to Chevreuse's grandson, including an addition to the dowry, that she agreed to help. After listening to the evidence of avarice and unscrupulous financial affairs, as well as the charges they had gathered concerning treason and sedition, Anne promised not to oppose the arrest.

[85] Ibid., 61.

Fouquet: The Prototype Affair

Fouquet immediately discovered the details of the meeting and called on the queen-mother the following day to offer a defence.[86] Anne was incensed that Fouquet knew so much about her meeting with Chevreuse. Anne was shocked to hear Fouquet repeat the contents of the meeting "almost word for word…You have spies everywhere," she complained.[87] Next, Fouquet went to Fontainebleau to confess to the king, where he admitted his financial improprieties and promised to reform his practices. But it was too late for Louis. Louis had already decided that Fouquet had to be relieved of his duties as superintendent of finance. In his memoirs, Louis remembers setting the day as 5 September 1661.[88]

I argue that, in a single episode, the Fouquet affair provides a near complete example of Colbert's methods for accomplishing his goals. Further, I contend that those methods are transferable to his other projects. According to Murat's documents, Colbert and Louis were close conspirators in the overthrow of the ostentatious financier, and they realized that the risks they faced were enormous. So far we have seen evidence that Fouquet was a skilled political operator with well-developed ability to secure his personal interests. He took great care in maintaining his many personal and professional relationships. There is also evidence that he was warned of the deteriorating conditions that were enveloping him and his relationships with Louis, Colbert, Le Tellier, and the queen-mother.

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[86] Murat believes that Fouquet's spy many have been Chevreuse.

[87] Murat, *Colbert*, 62.

[88] Colbert's and Louis's memories vary by one day. Colbert's memoirs say that Louis had decided on 4 September. As mentioned earlier, as a descendant of Colbert's oldest daughter—the one we now know was married to the Duchesse Chevreuse's grandson—Murat bases her accounts on extraordinary access she had to some of Colbert's private papers. Many of those papers concerned the so-called Fouquet affair.

It is therefore puzzling that he accepted the request made by Colbert to host a grand fête at the massive new chateau project that he had just completed. Known as the Vaux-le-Vicomte, his new estate on the road between Paris and Fontainebleau was by all descriptions the most spectacular private structure in France, including the royal palaces. Fouquet had expanded a chateau into a complex estate of house and gardens, which required the demolition of three nearby villages, among other extremes. And it is not as if Fouquet were insensitive to the sensation brought on by his excesses, having found it necessary to close all access to the site and conceal the work from anyone interested.

The stories that came from the fête of the display of opulence were extreme. Six thousand invitations were sent out across Europe. Reports were that, by early afternoon of 17 August 1661, the day of the fête, the roads leading to Vaux were already crowded with carriages. Given the relative impoverished state of the king, Louis undoubtedly would have been embarrassed before the many guests, and exasperated when he could see firsthand the imbalance of the kingdom's wealth. Colbert and Le Tellier may have drawn great personal satisfaction from the widely displayed ignorance to their scheme by Fouquet. The aphorism that follows goes something like this: "before the fête, Fouquet was the intendant of finances. The next day he was nobody." As the story goes, Fouquet had effectively hung himself with his own rope. After the party, his days in Louis's kingdom were numbered. The king's embarrassment undoubtedly drew some wrath, but an explanation that follows those lines too closely is dangerously simple. As we have seen, Fouquet's fate had already been sealed long before the party at Vaux, predicated on much more justifiable charges than bad taste and excesses and his obliviousness to royal stature.

What then was Colbert's point in seducing Fouquet to host the fête? Why would he go through with this part of the plan knowing that Louis had already decided on removing

Fouquet as the finance minister? Why would either Colbert or Louis be willing to suffer through the king's humiliation, which would have been easy to predict? It is sometimes suggested that the party was a ruse by Colbert to force Fouquet to drain his liquid assets, thus making a quick recovery from his impending arrest more difficult. That is possible, but this was only a tactic in a larger scheme. Eliminating the private office of superintendent of finance and shifting his responsibilities to the monarchy had broad implications for the structure of everyday financial practices. Great care and preparation had to be taken.

The result would be that a centuries-old system of overlapping, fragmented, feudal economies was being replaced. Conceptually, with the monarchy as the chief financial officer, the reformed economy would become centralized and the money of the kingdom would be thought of as public and paid directly to the king. The king would then be the one in position to redistribute it. As we might imagine, there were many affected stakeholders in this proposed reform, and the opposition from certain powerful individuals would be fierce. Ancient offices with ancient revenue streams for some would be eliminated. Many of the most affected were friends of Fouquet, and they all benefitted from his financial schemes. A civil war had just been suppressed and certain political powers had been redefined. For Colbert and Louis, the risks were very high. This was either a perfect time or the worst time to attempt a reform of this magnitude.

Colbert created a plan for Fouquet's arrest in acute detail, and he was convinced that its execution must be flawlessly conducted.[89] His plan spelled out a precise sequence of events, so detailed that it included the names of the doctor and valet who would accompany Fouquet to

[89] Murat lays out Colbert's arrest plan and execution. She writes that "the breadth of his plan, the attention to detail, the many erasures in his rough drafts, all show how high the stakes were." See Colbert's planning in what Murat calls "The Coup d'État." Murat, *Colbert*, 65.

jail, what clothes should be brought for him, and even the linens he would require. Immediately following the arrest, many simultaneous events needed to be initiated. First, officials would arrive at Fouquet's properties and dismiss all staff and workers. Couriers would be dispatched to the queen-mother and Pierre Séquier, the chancellor of France, to inform them that the arrest plan had been executed. At Belle-Île, two royal regiments would be ready to land and take over all operations. Investigation committees would enter all of Fouquet's properties and conduct searches for incriminating documents.

The Count d'Artagnan, one of the king's most loyal musketeers, would be entrusted with the physical arrest of Fouquet.[90] When his orders were handed down by Louis only hours before the arrest, d'Artagnan "could scarcely hide his astonishment…He had never felt so moved."[91] On 5 September 1661, at the close of his daily meeting with his Supreme Council, Louis dismissed the committee but asked Fouquet to stay a few minutes to exchange a few final words. After a brief chat, Fouquet left the room alone, believing, as he said later, that he "stood first in the king's esteem."[92]

As he emerged from the meeting room, d'Artagnan and his men put him under arrest. Fouquet was not the only one who was shocked by the arrest. One onlooker, Hugues de Lionne, a very good friend and closest ally of Fouquet's, was described by Brienne as "pale and drawn like a man half dead."[93] Another witness to the arrest, the Marquis de Coislin, recalled later that Louis showed some sympathy to those confused by what they saw: "His

[90] Charles Ogier de Batz de Castelmore, Comte d'Artagnan.

[91] Murat, *Colbert*, 68.

[92] Ibid.

[93] Brienne, cited by Murat, ibid. Note, Lionne was the man who arranged for the marriage of Louis XIV and Maria Theresa of Spain.

Majesty told us that we ought to be surprised by what he had just done, which he had been forced to do by very pressing reasons that he would make known in his own time; meanwhile, he wanted us to know that he had formed the plan more than four months ago, on the basis of information he had received concerning the superintendent's conduct, which was completely contrary to his duty."[94]

Five royal companies were sent to recapture Belle-Île, where they met no resistance. The governors and proprietresses of the port cities who had pledged their commitment to Fouquet and his revolution all confessed their roles and surrendered their commands. The naval commanders were slower to renounce their allegiance to Fouquet. Neuchéze was in Brouage with ten ships. As he had promised Fouquet, he made no moves. After a month, Colbert wrote a letter to Neuchéze that was meant to diffuse the situation; Louis would not be that upset with him: "I don't think it so desperate that you could not still patch it up."[95] Neuchéze made his confession to Terron, and Louis accepted it. Dusquesne seems to have been the most loyal of Fouquet's agents. After several months of recalcitrance, he was called before the navy's general fleet, confessed, and was summarily pardoned.[96]

Colbert orchestrated the events that followed the arrest in careful detail, including Louis's personal schedule and the content and timing of his remarks. And in the following weeks, he drew up an arduous set of new regulations with which he began a massive reformation of the

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[94] "Elle (sa Majesté) nous a dit que nous devions être surprise de ce qu'Elle venait de faire, à quoi Elle avait été contrainte par des raisons très pressantes qu'Elle ferait conaître en son temps, voulant cependant que nous sussions qu'il y avait plus de quatre mois qu'Elle avait formé ce dessein sur l'information qu'Elle avait eue des department du surintendant, qui étaient tout à fait contraires à son devoir." Georges Mongrédien, *L'affaire Foucquet* (Paris, 1956), 79–80.

[95] Murat, *Colbert*, 71.

[96] Colbert used a light hand with these naval officers because he knew he would need them for the navy he would soon rebuild.

financial system of France, and Louis authorized those regulations at Fontainebleau on 15 September.[97] Murat, who examined Colbert's earliest drafts, reports that they show heavy editing and many revisions. First on their agenda was the important act to formally abolish the private office of the superintendent of finance: "As soon as the first matter is completed and orders given for the entire plan to proceed," planned Colbert, "the king must proclaim the total abolition of the office, its title, and all its duties: because His Majesty's will is to reserve the entire and absolute authority for distribution of finances to himself; because he has resolved to establish near his person a council of limited numbers, which he will call the Royal Council of Finances, in which His Majesty will determine said distribution, after which said council will carry out all the other functions of the department."[98] As the new regulations made clear, the money was to flow through Louis. From that point forward, the king "reserves to himself alone the right of signature on all orders of payment concerning expenditures whether on account or in cash, including both secret outlays, rebates, interest payments, and others of whatever nature."[99]

Colbert added to the edicts another important provision, dictating a role for himself while laying out the methods for accountability: "The intendant of finances" (that being Colbert), "who will have the honour of appointment to said royal council, will have the treasury account

[97] Colbert's final version of his regulations are published in Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 2:749.

[98] Murat, *Colbert (French)*, 66; See also, Mongrédien, *L'affaire Foucquet*, 76. The"first matter" was the physical arrest of Fouquet. "Aussitôt que la première affaire sera faite et les ordres donnés pour l'entière exécution, il faut que le roi se déclare de la suppression de la charge, du nom et de toute la fonction; que Sa Majesté se veut réserver la distribution entière et absolue de toutes ses finances; qu'elle a résolu d'établir près de sa personne un conseil composé de peu de personnes qu'elle appellera le conseil royal des finances, dans lequel Sa Majesté fera ladite distribution, et ensuite ledit conseil fera toutes les autres fonctions des finances."

[99] Murat, *Colbert*, 70.

as part of his department, and consequently he will keep accounts of all revenue and expenditures to be shown to no other person except on His Majesty's express order."[100] Thus, Colbert gave himself Fouquet's vacated position on the Supreme Council, as well as that of the controller with the power to watch over the treasury. He would report directly and only to the king. Colbert wanted to consolidate the fragmented tax collections into a unified *ferme générale*. Therefore, the regulations called for all independent tax farmers to relinquish their accounts and relate pro forma to "M. Colbert, intendant of finances." Colbert's intentions were clear: to shift the control of the treasury to the king, with himself in control. IThis would simplify the related reforms. "There can be no doubt that the results of the chamber of justice will depend entirely upon the information we get from the treasury, that is to say, from the books kept by the treasurers," he wrote. "Having seals place on their offices, and those of their bookkeepers would be a brilliant move. It is much more appropriate to force them to produce their books by royal proclamation."[101]

Those who could recognize what was happening undoubtedly understood the significance of Colbert's new regulations. It was no less than an internal coup d'état—a taking over of an economy by a king and his administrator. By then, the investigation into Fouquet's sedition charges was in high gear. Likely acting on a tip, on 19 September, Colbert made a surprise visit to Saint-Mandé to join the search committee. And if the records are true, it was Colbert himself who discovered Fouquet's Saint-Mandé plan, still hidden behind the mirror. He grabbed the incriminating document and left immediately to Fontainebleau, where he handed it over to Louis. At that time, the judicial system dictated that since Fouquet was the attorney

[100] Ibid.

[101] Ibid., 102.

general of France, he would be tried in the Parlement de Paris; however, Colbert and Louis had no confidence in that body. After all, Fouquet was a longstanding member of the Parlement and he had many friends there who would be his judges. Moreover, there was undoubtedly an inexorable link between the members of Parlement and the financial world.

Louis and Colbert realized that the best solution would be to get Fouquet to relinquish his office of attorney. So, in advance of the execution of the arrest plan, Louis persuaded Fouquet to sell his office.[102] Yet Colbert also realized that having Fouquet subjugated by a purely royal inquiry and condemnation would appear to privilege the royal court. A new judicial mechanism was needed. Along with the reform of the financial systems of France, reform of her judicial system was also necessary. In November 1661, Louis installed by royal edict a separate judicial council known as the Chambre de justice, which was to act under his aegis. Made up of judges of Colbert's choosing, there were *maîtres des requêtes*, lawyers, and *conseillers d'état*. Louis appointed Lamoignon, the standing president of the Parlement, as the chamber's acting head. To some surprise, there formed within the jurists a spirit of legality and jurisprudence. In the first year, they insisted on instituting certain civil rights and legal protocols—aspects of a trial that we now take for granted. They ruled that Fouquet should be appointed a lawyer, that he should have access to all evidence that was being held against him, and so on. After three years of trial, it was clear that Louis had grown impatient and perhaps worried that the process had slipped off course, so he replaced Lamoignon.

[102] Before his arrest, Fouquet had been convinced by Louis (at Colbert's urging) to sell his office of attorney general on the pretext of facilitating a royal desire to clarify the Parlement's multifarious roles. Fouquet sold his office in August for 1.4 millon livres, thus clearing the way for the trial to be held elsewhere. Ibid., 63–64. Murat further speculates that this result amounted to more than Fouquet wanting to please his king. Louis may have enticed Fouquet with a higher office, perhaps the chancellor of France.

Despite the seriousness of the charges, Fouquet found ways to successfully defend his Saint-Mandé plan. He explained it as a hastily created folly he sketched up years earlier as a defence plan against a jealous and unstable Mazarin. He used his lifelong background in shipping, plus his appointment by Mazarin as the superintendent of finance with the mandate to increase foreign trade, to explain his involvement with the navy and his overseas property acquisitions.[103] Fouquet's primary strategy seems to have been to draw attention away from the very serious sedition charges by focusing the discussion on the specific charges related to his financial misdeeds.

Fouquet pleaded that it was all a huge misunderstanding. His actions were honourable and well-intended. All along, he understood his charge to be to create a new official trading company and promote France's trading interests. He would be expected to finance the enterprise—as his father had decades before—with the goal of expanding French mercantile trade into the Americas. Other than bad timing, there is no explanation of why he had not yet created the company, considering how much work he had already completed. He just had not had enough time to get all the parts in place. Fouquet's testimony attracted sympathizers among the jurists.

In the long run, that turn in events might have been in Colbert's best interests, too. Fouquet realized how abstract and contentious Colbert's charges really were. Fouquet wanted to debate to turn not to the charges but to the premises of those charges. Fouquet's defence was effectively the defence of a tradition of background practices that would have been much

[103] An interesting explanation of how Fouquet's maritime background might have defended him against the sedition charges can be seen in Philip P. Boucher's essay, "Reflections on the 'Crime' of Nicholas Foucquet: The Fouquets and the French Colonial Empire, 1626–1661," *Revue française d'histoire d'outre-mer* 72, no. 266 (1985), 5-20.

more familiar and graspable to the judges than Colbert's and Louis's more conceptual positions. Fouquet's argument took a perspective that would have been very familiar to the financiers: the only way to encourage capital into France would be to allow for free speculation by private financiers. Colbert's plan, on the other hand, would overturn that theory. In his plan, Colbert wanted to centralize and redistribute the wealth.

In Fouquet's view, the money should be in the hands of those people who have shown that they know how to use it. He grew frustrated with the opposing argument and plead, "cease speaking of taxes on financiers. Show them favour, and instead of contesting their legitimate interests and profits, give them gratuities and indemnities as a sign of good faith, when their support has been important. The principal secret, in a word, is to give them incentives, that being the only reason why anyone would be willing to run some risks."[104] The Fouquet trial was far more than the conviction of a traitor, unscrupulous money lord, or naïve socialite blind to his own excesses. It was a modern agon where the merits of an entirely new system of governing were contested. Fouquet's positions were familiar, conservative, and real. Colbert's position was progressive, unusual, and required a conception of nationhood.

In the background of the trial, Colbert continued to introduce significant financial and judicial reforms as a part of a larger reform enterprise. He announced that public interests should not have to borrow back their money from private financiers for their public expenses. The state should draw the first benefit from its own money. In this decision, Colbert took direct aim at anyone who was a creditor to the state, including the tax farmers.[105] Colbert also set out to abolish *rentiers* and those business people who raised their incomes from *rentes*.

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[104] Murat, *Colbert*, (English), 100. Murat quotes from Fouquet's defence treatise.

[105] Among his several business enterprises, Colbert's father was a tax farmer.

Rentes were any interest earned from bonds on state debt. Rentes were often created to support expenditures for things such as wars. Colbert got confident: he simply cancelled one million livres worth of rentes, six hundred thousand livres of salt taxes, and any rentes placed on Paris city revenues as far back as 1656. Thousands of meaningless offices that had been created just to be sold were abolished by Colbert. Their simple elimination saved millions of livres per year. But it goes without saying that, by way of the proclamations he issued during this time, Colbert made some deep and permanent enemies from some very powerful individuals. Pro-Fouquet and anti-Colbert cabals formed. D'Artagnan warned Colbert that he needed to take extra precautions as he moved about Paris.

"It was necessary," Colbert wrote, "to disentangle a machine that the cleverest men in the kingdom, who had been working at it for forty years, had muddled so as to make it into a science that only they understood so that they might be essential."[106] Colbert again would have to pour himself into the work of untangling accounting systems meant to confuse. As he progressed, his economic reforms continued to be rolled out. He knew already that the *taille*, the tax placed on peasants, was particularly cruel and arbitrary. Anyone who had an official position could collect the taille. And in the end, only a portion of it would make it to the public coffers. As a result of his reforms, Colbert assumed the position of receivership for the taille. In the years of Colbert's tenure, the taille burden dropped "spectacularly" from fifty-three million livres in 1657 to less than thirty-five million in 1680.[107] Colbert also radically altered the structure of public debt. As finance superintendent for the state, Fouquet had borrowed

[106] Clément, *Histoire de la vie et de l'administration de Colbert*, 438. "Il falloit desbrouiller une machine que les plus habiles gens du royaume qui s'en estoient meslés depuis 40 ans avoient embrouillée pour en faire une science qu'eux seuls connussent pour se rendre par ce moyen nécessaires."

[107] Murat, *Colbert* (English). 20.

171 million livres at an effective rate of 15 to 18 per cent per year over the previous six years. Colbert decided that those agreements were simply fraudulent and, at first, refused to pay. Later, he agreed with the creditors on a rate of 5.5 per cent.

In December 1664, the verdict from the Chamber of Justice was believed to be imminent. The Vicomte de Turenne[108] coarsely captured the general mood: "I think that Colbert greatly hopes that he will be hanged, and that Le Tellier greatly fears that he will not be."[109] On 20 December, the verdict was announced. On the charges of financial improprieties, thirteen judges had voted for banishment and nine for hanging. No charges of treason and sedition had been considered. Louis immediately commuted the banishment sentence to life in prison.

A major hurdle was behind Colbert, and Fouquet was immediately escorted by d'Artagnan to the prison of Pignerol. Colbert would not have been disappointed with the verdict. The initial steps taken to move away from a feudal economy and towards a central economy had been successful. As Colbert said later, for him, at least, it was never a personal conflict. Would he really have wanted to see Fouquet hung? That now seems unlikely. Colbert's objective was not personal. He never needed more than to overthrow not Fouquet the man, but Fouquet the paradigm of a flawed and deleterious ideology. Hanging Fouquet would have been more than what was necessary to succeed. As we have seen, Colbert did not see reason to push beyond what was necessary.

No other historical accounts of the Fouquet affair mention a fascinating coincidence: on 20 December 1664, the day of Fouquet's condemnation and his first night at Pignerol, the comet of 1664 had just made its appearance in the Paris sky, and it must have been nearing its peak

[108] Henri de la Tour d'Auvergne, Vicomte de Turenne, Marshal of France. Turenne was a military leader, for a time a *Frondeur*, and later a royalist general.

[109] This line is often quoted by historians. For one, see Murat, *Colbert*, 101.

in popularity. The city's many "rooftop theatres" must have been fully occupied. We might wonder if the two overlapping events were not coincidental. Did Colbert stage Fouquet's condemnation at a time when the population was otherwise preoccupied with a once-in-a-lifetime sensation? One related story was told at the time: once imprisoned, Fouquet reportedly was most offended that he was unable to see the comet from his cell. As the story goes, his jailer, d'Artangan, reportedly sympathized and allowed Fouquet to view the comet.

At the end of the Fouquet trial, the Chamber's campaign for financial reform was not yet complete. Louis empowered them to expand their investigations into other corruption and financial improprieties in his kingdom. When it was realized that the Chamber had been commanded to investigate any and all financial abuses, a panic went through the noble and aristocratic classes of France. With their examination of Fouquet and his many elicit enterprises in the background, the judges of the Chamber were determined to expose and recover the gains made by anyone who may have profited at the loss of the state. They began investigating improprieties as far back as 1635 and initiated what would become a veritable reign of terror in France's financial community. Almost immediately, the Chamber began sentencing well-known financiers as well as minor offenders. All those convicted were required to make good their improper gains and were often levied a fine. Many fled France to escape prosecution.

After three years of inquiries, the Chamber had convicted five hundred financiers, from whom the state recovered seventy million livres. In 1669, after convicting more than four thousand offenders, the Chamber determined that their mission to recover the public's assets was complete. Through its sessions, it brought to the Treasury of France the extraordinary sum of more than one hundred million livres.

Perhaps a result even more valuable than the recovered capital was that each financier who was brought before the Chamber was asked to open their books, which let light into what were, until that point, entirely private activities. Thus, the Chamber's investigations and the continued reform of the financial system after Fouquet's conviction show that what was most at stake in Fouquet's arrest were ideological and political gains: that is, with the arrest and the events that quickly followed, Colbert, Louis, and their collaborators were instituting a massive reform of the financial and political structure, and in so doing, creating a new centralized, royal system of government.

Recognizing Colbert's Styles of Acting

Aside from the remarkable coincidence between the appearance of the comet and the day of Fouquet's condemnation, there would appear to be no other obvious connection between the origin of the Paris Observatory and the Fouquet affair. Why then should this study dedicate so much attention to it? In what way is this episode in Colbert's life pertinent or helpful to this investigation? The Fouquet affair occurred at a critical time in Colbert's life—the focusing event of the comet notwithstanding. The affair spanned two important periods. It was rooted in the time he spent under Mazarin, where he was introduced to the corrupted financial systems of the private interests that held economic and political sway in France. Equally important, it was also the time when he realized the potential to reshape society's structures through reforming public policy. Colbert's Mazarin experiences led him to begin to imagine broader goals and intentions for himself and his interest in France. These goals were shaped into plans of action after he was empowered by a sympathetic and co-conspiring monarch.

We saw that, as the Fouquet affair unfolded, Colbert found himself in an auspicious situation. Recent civil wars and struggles for authority had been resolved overwhelmingly in the favour of the monarchy. The consensus and political power had been centralized like

never before. What is more, for the first time since Louis's father had died more than two decades earlier, a true Frenchman was leading France.[110] The young, handsome, and learned Louis XIV was indisputably royal in every way. Unlike his father, he was also indisputably a Catholic. He was someone with ambitions for France, something that the *Frondeurs* had never been able to offer. Colbert's involvement in the Fouquet affair was his first major initiative as Louis's principal policy maker. Given its breadth, magnitude, and timing, the Fouquet affair provides us with a comprehensive demonstration of Colbert methods for acting on his intentions in nearly all of his principal ways. Who he was, what he did and was trying to do, and what he was planning to do next should be of great interest, as those aims and ambitions underpin his understanding of his world as it is related to the Observatory project as well.

Thus, recognizing what might have mattered to Colbert at that time could not be of greater concern for this study. I suggest that analyzing his actions through the Fouquet affair provides us with an outline of what I will call his "styles of acting." The timing is just right: at the conclusion of the Fouquet affair and the coincidental arrival of the comet, a series of events began that led a few weeks into the future, when Colbert was presented with the idea of the Observatory project.

Recognizing Colbert's styles of acting offers us a structure by which we can make his methods coherent and intelligible. His styles of acting reveal some of his ways of being in his world—how his behaviours reflect pervasive and transparent background practices; how he recognizes his situations and copes with what they offer; how he sets and pursues his goals; and how he meets and overcomes obstacles. Throughout the Fouquet affair, we can see a

[110] Louis's father died in 1643. Between that time and his own ascension, France was lead jointly by Mazarin, who was Italian, and Louis's mother Anne of Austria, who was born in Spain.

consistency in the way that situations seemed to show up to him. We also see patterns in his responses that we may now begin to anticipate. Thus, the Fouquet affair is more than just a historical or political episode. When we look back through that project and focus on the ways that Colbert engaged his situations, We can see at least six distinct styles of acting.

First, as we saw at the beginning of this chapter, Colbert was unfailingly persistent. In whatever field he worked, his involvement was pervasive. He invested effort into projects at what was considered an unnatural rate and imposed himself as widely and finitely as possible. We saw this throughout the Fouquet affair, as he arranged everything from the minute capture of evidence to the restructuring of the judicial system. A parallel example is his establishment of the navy: after lobbying to overcome a pro-army bias, Colbert effectively created a navy from the bottom up, building French shipyards and supplying them with the necessary materials. He created means for training the shipbuilders and educating the sailors and naval officers. He even weighed in on the most effective diets for the ships' crew members. This style was seen again as the Observatory project opened, where he worked with astronomers and savants in the background, setting up and organizing the appropriate participants and focusing their various interests. In the final analysis, Colbert could be counted on for this style of intense engagement in all his projects—which is to say in nearly all of the undertakings of the state of France during his tenure as chief minister for Louis XIV.[111]

A second part of Colbert's methods was to adopt and implement a carefully conceived plan. He rarely acted on impulse. Throughout his Fouquet affair, Colbert followed a master plan of actions at every stage of the process. Beginning with the clandestine investigations that

[111] Cole, *Colbert*, 1:278. Cole asserts that in his twenty-two years of official service Colbert was "the dominant force in every department of the government save only those of war and foreign affairs."

he orchestrated during the Mazarin era, we see his desire to establish a carefully deliberated plan, and then work with an unrelenting intensity to implement it. Next, from the beginning to the end of the Fouquet affair, Colbert conscientiously implemented calculated and detailed plans. He gradually shone a light on Fouquet and eventually toppled the most powerful individual in France. Colbert was responsible for having Fouquet imprisoned, but he also identified who Fouquet's doctor should be and who would be his valet, and what linens he should have with him on the way to prison.

The third of Colbert's styles of acting may at first propose an enigma: although he was an intense and disciplined follower of plans, he was himself not a visionary. The plans he implemented were almost always conceived by others. As Cole puts it, "his was the ability not to originate but to apply."[112] He recognized that he needed creative thinkers to provide him with a structure for his future acting. When Colbert needed directions for his economic reform packages, he turned to established plans that he believed had finally come of age, arriving finally into the right hands—that is, his hands. According to Cole, his path was set by "obeying the inherited behests of a long line of French mercantilist thinkers, stretching back through Eon and Richelieu to Montchrétien, Laffemas, and Bodin."[113] As Cole puts it, "To the body of French mercantilist thought, Colbert added nothing of importance. He was no innovator in theory or practice. Almost every one of his acts had a precedent behind it."[114] This style of acting—consulting with people he considered experts to solicit their plans—will become very visible as we follow Colbert into his other enterprises.

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[112] Ibid., 2:549.

[113] Cole, *Colbert*, 2:549.

[114] Ibid., 1:336.

The fourth of Colbert's styles is equally enigmatic: even though he laboured intensely to implement the most minute aspect of his plans, he proved time and again that he could abandon what seemed to be fundamental objectives in order to accommodate short-term exigencies. In a minor sense, we saw this in his toleration of the three-year Fouquet trial and then his satisfaction with what seemed to everyone else to be a partial victory. What first appears as gross impatience in the proces is actually extraordinary patience and optimism in the ultimate success of the plan. Part of his pragmatism surely was a result of knowing that he was never the final judge of his works. It would be his king who would decide if he were successful. As Cole followed Colbert and his work through his economic reforms, he continually saw moments when Colbert would compromise his plans: "Again and again he sacrificed his ideas to the exigencies of the moment, and counteracted his own reforms to raise money for immediate necessities," writes Cole. "He was often forced, though unwillingly, to abandon his long-term plans to secure the fulfillment of some momentary need. Though he strove to give up as few as possible of his ultimate objectives, his first thought was always to meet the king's demands as best he could."[115]

For Colbert, France's problems were by nature structural and systemic, and as such manifested in the background practices in everyday life. Colbert may not necessarily have seen himself as a tactical repairman, although he demonstrated often that he could perform that role. For Colbert, the times called for a strategic reformer of the systems, which then exposes a fifth style of acting: his way of recognizing that daily problems were being concealed in larger, systemic structures; and it was those structures that required massive reform. Colbert recognized that to achieve the France he had in mind, certain systems of

[115] Ibid., 1:335.

French culture needed to be reformed, replaced, or invented. The inherent problem with reforming those systems was that, as cultural systems, they were so deeply embedded in the background practices of the culture that they were invisible to that culture. The financial system was one such embedded set of practices. The system that was the status quo when Louis took power was a system of feudal economics where there was no "state"—at least in financial terms—and thus no state treasury. These traditional practices constituted a complicated system for exchanging goods and services. Even those who had recognized its weaknesses and corruption, such as Richelieu, could not grasp it in complete enough terms to reform it. That would be Colbert's task.

The last of his six styles of acting show up this way: precisely because the dysfunctional systems were operating in the background of daily practices, they were invisible to the people who were using them. Because of their latency and usefulness, their domination over daily practices was mostly concealed. Before they could be reformed, they needed to be brought to light. The final style to discuss here is how Colbert initiated or took advantage of particular extraordinary events to foreground the dysfunctional system. To reform specific cultural systems, Colbert first needed to draw them out and make them visible. Once visible, their domination could be made coherent. Once coherent, they could then be condemned and repaired. Colbert may not have always sought ways to move those dysfunctional systems from the margins to the centre, but he capitalized on phenomenal events as they presented themselves to him. This will become a very familiar style in Colbert's affairs.

There can be no doubt that Colbert would have suffered to see his king humiliated before the nobility and aristocracy at Fouquet's grand fête. However, it is also now impossible to believe that he did not anticipate it. So then, if the decision to arrest Fouquet and remove him from his offices had been made months earlier and the plans for its execution had been

underway for months, why did he cause the fête to occur? Once he saw its full implications, why did he go through with it? What possibly gain could there have been for Colbert?

I suggest that the conditions point to a more serious objective. As it now appears, the king's humiliation was a predictable element of Colbert's style of accomplishing his goals. He used the fête as a focal event—not unlike the sensation that erupted from the appearance of the comet, which made visible conflicting viewpoints and inadequate explanations based in scientific and religious scholarship. The Fouquet fête brought a latent economic world out of the background to make its inherent impropriety coherent and recognizable as the dysfunctional and disloyal system that he believed it to be. As the defunct system's exemplar figure, Fouquet, "who was assuredly the most difficult and the most terrible, because he understood its conditions,"[116] was made by Colbert to stand for a broken system that was transparently working in opposition to the goodness of a humbled king and therefore a humbled France.

Reconsidering the day of the fête at Vaux-le-Vicomte, we can imagine that Colbert's risk was immense. The traditional financial systems holding sway at that moment were so pervasive and yet veiled by the everyday practices that not many could have considered them. Colbert needed to begin to move those traditional but flawed systems and their effects from the margins of French life into the centre. By contrast, Fouquet, not unlike Colbert's grandfather, had built his world on personal relationships, not on a structure of abstract economic or political theory. Many of the guests were personal friends and admirers of Fouquet. Many were his own political creatures with debts to honour. Likewise, there were

[116] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 6:3. In a memo to Louis, Colbert writes, referring to Fouquet, "Vous avez desjà détruit ce monstre, qui estoit assurément le plus difficile et le plus terrible, parce qu'il comprenoit toutes les autres conditions."

former *Frondeurs* at Vaux whose loyalties may not have been completely resolved, nor their love of king and kingdom entirely settled.

At the end of the day, would it be Fouquet or Louis who would prevail? Would Fouquet's guests admire the display of his enormous wealth? Or would they be repulsed by the decadent scene and empathize with their noble but humbled king and share his embarrassment? Would this demonstration of the status quo, carefully orchestrated by Colbert and his conspirators, nudge them to begin imagining the possibility of something new, of a centralized nation, in the hands of Louis and the loyal minister Colbert? The outcome could not have been certain. Characteristically deliberate and determined, Colbert designed the event and accepted this risk because of a vision he had been developing of the future of France. That vision depended first upon reuniting the people of France—and their fortunes—with their undisputed French king.

Reorganizing Colbert's various actions into these styles allows for a new framework for re-examining the Fouquet affair. I will later draw out these styles of acting to show how they clarify other important Colbert events. The Fouquet affair wove together many interrelated reforms that affected many of France's everyday life, but this was only one of Colbert's major reforms. Another, the reform of the production of knowledge in France, is the subject of the next chapter.

Chapter 4 — Establishing the Compagnie of Savants

> Although we have little experience with these men, we know the reason why, but people [like us] who are very busy in public affairs cannot know that secret.
>
> Jean Chapelain to Jean-Baptise Colbert, 1665

> It would be interesting to have [the hermaphrodite] come to London so that the Society could examine it very carefully. One can see from this case that the story of Tiresias is false, unless there can be different ways of sharing the two sexes. I should very much like to know if there is a prepuce on the penis, for I have been told that it was not pierced; and if there were one, what would happen if one pierced it.
>
> Adrien Auzout to Henry Oldenburg, 1667

Considering Two Plans for a Compagnie of Savants

As we have read, the Observatory project was conceived and understood as a single project of two parts: the observatory building and the team of savants (henceforth the "Compagnie") who would occupy it.[1] The observatory first made sense to people as the home and workplace of the Compagnie. Likewise, after decades of failed attempts in various private settings, a centralized, state-owned research Compagnie finally gained validity and momentum once it could be visualized as existing within a dedicated workplace. Seen another way, in a culture bending more and more towards an appreciation for the usefulness of things, it was the Compagnie that gave the observatory its commodity, and, in return, the observatory provided a real place for the Compagnie. Moreover, we will see that the observatory established for the

[1] Although there may be occasional confusion between the terms "Compagnie'" "assembly," and "Académie," it is clear that in the beginning, the savants themselves thought of their group as a "compagnie." Furthermore, it seems that Colbert imposed no rules to govern their naming. It was not until 1699, after the deaths of most of the founding members, that the term "Académie" was formally adopted. For those reasons, when given the choice I shall use the term "Compagnie."

savants—and we might say, for the movement of modern science more generally—something more than mere place. The observatory established for the new science a fixed station point, a coordinate from which it could operate. As the needs and wishes of the Compagnie were expressed by its members, the observatory was shaped by its designers. As we learn more about the men at work at the foundation of the Compagnie, we will learn of their overlapping roles in creating the observatory itself. In that light, the original position that the Compagnie shared with the observatory makes its own genesis a vital element of this study.

The origin of the Compagnie—by Voltaire's time renamed the Académie des sciences—could be described with far less effort than will be invested here. In fact, Voltaire could summarize it all in a single paragraph:

> In 1666, M. Colbert, jealous of this new kind of glory, was desirous that the French should partake of it; and, at the entreaty of some learned men, prevailed on Louis XIV to consent to an academy of sciences…[2] Colbert attracted Cassini from Italy and Huygens from Holland and Roëmer from Denmark with large pensions. Roëmer determined the speed of the sun's rays; Huygens discovered the rings and some satellites of Saturn, and Cassini four others.[3]

Voltaire can be admired for his concision, but he also skips "too easily over the period of groping and private endeavor," as historian Harcourt Brown explains.[4] Voltaire's reduction ignores the network of inspired and determined people who recognized the potential of the Compagnie, and its observatory as a focal point in a changing world. Voltaire did identify one important aspect: that the idea of the Compagnie was not that of a king or wealthy patron, but

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[2] Voltaire's point of view comes after the Compagnie had been formalized and renamed. He is referring to the formation of the Royal Society in London.

[3] Voltaire, *The Works of Voltaire: A Contemporary Version*, 21 vols., critique and biography John Morley, notes Tobias Smollett, trans. William F. Fleming, intro. Oliver Herbrand Gordon Leigh (New York: Dingwall-Roch, 1927), 12:281.

[4] Brown, "History and the Learned Journal," 118.

rather from the aspirations of a relatively small group of men who conceived and promoted it. Thus, we see that by Voltaire's era, the general character of the Paris Observatory had been set essentially as a site for scientific discoveries, predominately astronomical. With that emphasis, the story of its origin is stripped of most of its intrigue, and the tangle of interlocking events that led up to its foundation are re-concealed.

In the months prior to the comet, Colbert had heard numerous ideas for creating a state-owned research compagnie, and it is no surprise that Auzout referred to one in his *Ephemeride* publication by name: the "Compagnie des sciences et des arts." We will see that Auzout was likely one of the co-authors of that plan. However, another prominent proposal, credited to Colbert's influential commis, Charles Perrault, was also circulating. Perrault's proposal called for no less than a government-owned, centralized research organization that if instituted as designed, would result in a radical restructuring of the production of knowledge in France. Perrault's plan must have seemed highly idealistic if not iconoclastic, and likely disturbed the Paris establishment. In comparison, the Compagnie plan provided more substance and functionality, and was probably more politically acceptable. That does not mean, however, that it sacrificed much ambition. If followed to its ends, it still meant a radical transformation of the status quo.

Of course, the idea of the project did not come to Auzout overnight. This chapter will show that its development was lengthy and involved many people. Likewise, neither was Auzout's proposed project a revelation for Colbert. In fact, Colbert had likely solicited the proposal and read earlier versions of it before it was officially submitted. He had been reviewing various schemes for a state-sponsored assembly for several years. As we have seen, adopting and implementing the plans of advisors was a reliable mode of operation for Colbert, and the men associated with these schemes were among his closest advisors. Auzout and his

co-authors proposed their plan as a possible model for a new philosophical assembly. Fontenelle referred to the Perrault plan as Colbert's "first draft." Thus, my examination of the origin of the Compagnie compares these two plans as its point of departure.[5]

The Perrault plan was concise but implied a considerable reorganization.[6] Consisting of barely one hundred words and in two short passages, its objective would have meant a restructuring of the traditional systems of the production of knowledge. The first paragraph describes the structure of his proposed academy and the second describes the nature of the savants who would staff it. Perrault's image of an academy would be separated into be four kinds of expertise or "talents" of knowledge and research. Each general talent is subdivided into more specific sub-talents.[7] Perrault's plan begins thusly:

> The academy would be composed of people from four different talents, namely: literature, history, philosophy, mathematics.
> The people of literature, or in grammar, rhetoric, poetry;
> The historians, or in history, chronology, geography;
> The philosophers, or in chemistry, simples, anatomy, experimental physics;
> The mathematicians, or in geometry, astronomy, algebra.[8]

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[5] Surprisingly, there appears to be no study that directly compares these two plans. The plan for the Compagnie is no more than two thousand words; however, it has never been republished or translated, and only a few passages have been published in English.

[6] The unsigned and undated Perrault plan was included by Clément in his Colbert archive where he dates it to 1666 and attributes it to Charles Perrault. "Note de Charles Perrault à Colbert pour l'établissement d'une Académie générale," in Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:512–13.

[7] On a related note, among others, Nicholas Dew and D.S. Lux each provide some help in understanding the phenomenon of pansophic colleges in the seventeenth century. See Nicholas Dew, *Orientalism in Louis XIV's France* (Oxford: Oxford University Press, 2009), 52; D.S. Lux, "Colbert's Plan for the Grande Académie: Royal Policy Toward Science, 1663–1667," *Seventeenth-Century French Studies* 12 (1990): 177–88.

[8] "L'académie pourrait etre composée de personnes de quatre talens différens, sçavoir : des belles-lettres, histoire, philosophie, mathématiques. Les gens des belles-lettres excelleroient, ou en grammaire, éloquence, poésie; Les historiens, ou en histoire, chronologie, géographie ; Les philosophes, ou en chimie, simples, anatomie, physique expérimentale; Les mathématiciens, ou en

The second passage of the Perrault plan describes the characteristics of the savants who would fill the ranks of the academy. Each would be eclectic in their interests yet versed in a particular expertise: "It would be wished that each understands all parts of the science which he makes his profession; but that he must excel and make a special study of that which he had chosen, which he would be obliged to do all the research that will be required of him, and to address the problems that will be proposed."[9]

In spite of the controversies that a plan of this magnitude must surely have generated, at least for a time it seems to have gained some traction, to the point that a daily schedule for it was proposed. According to Fontenelle, the membership comprising the natural history division were to have met on Mondays and Thursdays; belles-lettres on Tuesdays and Fridays; and mathematicians and physicists on Wednesdays and Saturdays. The first Thursday of the month was to be reserved for a meeting of the entire assembly to consider shared interests.[10] For both Fontenelle and Clément, the most enlightening aspect of the Perrault plan is that it shows that, in its original form, the academy was imagined, in Fontenelle's words, "not merely as a science academy, but as a general and universal academy,

géométrie, astronomie, algèbre." Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:512.

[9] Ibid., 5:513. "Il seroit à souhaiter que chacun scust toutes les parties de la science dont il ferait profession; mais il seroit nécessaire qu'il excellast et qu'il fist une estude particulière de celle qu'il auroit choisie, de laquelle il seroit obligé de faire toutes les recherches qui luy seroient demandées et répondre aux difficultés qui seroient proposées."

[10] Academie Royale des Sciences (Francia), Gabriel Martin, Jean-Baptiste, hijos de Coignard, and Hippolyte-Louis Guerin. 1733. *Histoire de l'Academie Royale des Sciences: tome I : depuis son établissement en 1666 jusqu'à 1686*, 6. Fontenelle writes, "Ceux qui s'appliquoient à l'Histoire s'y devoient assembler les Lundis & les Jeudis ; ceux qui étoient dans les belles Lettres , les Mardis & les Vendredis ; les Mathematiciens & les Phisiciens , les Mercredis & les Samedis. Ainsi aucun jour des la semaine ne demeuroit oisis & afin qu'il y eût quelque chose de commun qui liat ces differentes Compagnies, on avoit resolu d'en faire tous les premiers Jeudis du mois une assemblées particulieres, & où chacun auroit pû demander l'éclaircissement de ses difficultés."

[consisting] entirely of the cleverest people from all sorts of erudition." The Perrault plan, wrote Fontenelle, sought to identify all the "scholars in history, the grammarians, mathematicians, philosophers, poets, and orators" and to bring them together in a new organization "which gathers together and reconciles all the contrasting talents."[11]

At the same time, Colbert had in his hands another plan from another source: the plan that Auzout mentioned in his *Ephemerides* letter to Louis. We recall that Auzout referred to the proposed project by the name "Compagnie des sciences et des arts." As Auzout inferred, by the time he had submitted his *Ephemeride*, a manuscript had been drawn up and was being circulated through Parisian savant circles. Auzout makes clear that Colbert had seen a copy. A copy of the plan has since been published in a volume of the collected works of Christiaan Huygens,[12] and a copy of the original manuscript of the Compagnie plan can be found in the Christiaan Huygens's collected works in Leiden.[13] Its authors titled it the "Project of the

[11] Ibid., 5-6. "[Colbert] porté de lui-même favoriser les Lettres , & propre à concevoir de grands desseins , forma d'abord le projet d'une Académie composée de tout ce qu'il y auroit de gens les plus habiles en toutes sortes de litterature. Les savans en Histoire , les Grammairiens , les Mathematiciens , les Philosophes , les Poëtes , les Orateurs , devoient être également de ce grand Corps , où se réünissoient & se concilioient tous les talens les plus opposés."

[12] Huygens, *Œuvres complètes*, 4:325–29.

[13] This manuscript has been associated with Huygens for two reasons. First, his name, "Hugens," is signed in pencil at the bottom of manuscript. Second, in a letter to his father, Huygens forwarded a copy of a plan for an assembly from Paris at about this time. The plan is not included in Clément's Colbert archive.

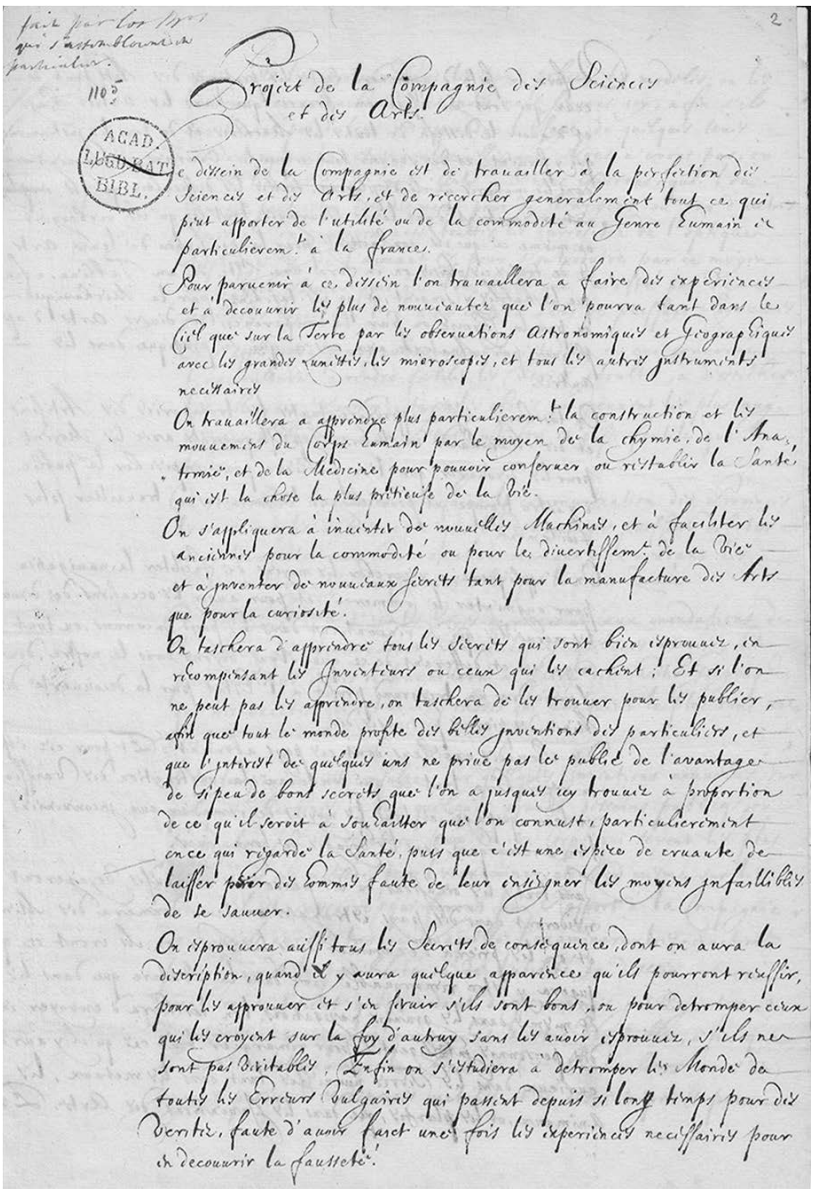

Figure 17. Title page of the manuscript "Project de la Compagnie des Sciences et des Arts," courtesy of the Special Collections of the library of the University of Leiden, Leiden, Netherlands.

Compagnie of the sciences and of the arts," (Figure 17),[14] and with it put forward the design for a Compagnie whose mission would be the "perfection of the Sciences and of the [practical] Arts," and to discover all that would be "useful or of commodity for mankind, and in

[14] Huygens, *Œuvres complètes*, 4:325–29. In the opinion of Harcourt Brown, "Thevenot Petit, and Auzout [are] the three who seem to have hatched the scheme for the Compagnie des Sciences et des Arts." Brown, *Scientific Organizations*, 164.

particular, for France." Fundamental to their methods would be linking the production of knowledge to experience: "To achieve this intent we will work to make experiments, and to discover the newest things that can be both in the Heavens and on the Earth, by Astronomical and Geographical observations with large telescopes, microscopes, and other necessary instruments."[15] In the first part of the century, inventions such as the telescope and microscope, and then their continuous improvements, had changed the ways that knowledge was acquired, piquing interest in experimentation and observation.[16] Consequently, much of the Compagnie plan concerns itself with recognizing the value of newness and invention and how best to promote and integrate inventions into everyday life: "We will apply ourselves to invent new Machines, and to facilitate the older ones for commodity or for the entertainment of life, and invent new secrets for both the manufacture of the Arts and for curiosity."[17]

The authors show a keen interest in the craftsmen of France, particularly in those who have applied themselves to inventing new methods for doing their work, "so that everyone benefits from the beautiful inventions of individuals." They promised to find and reward not

[15] Huygens, *Œuvres complètes*, 4:325–29. "Project de la Compagnie des Sciences et des Arts. Le dessein de la Compagnie est de travailler à la perfection des Sciences et des Arts, et de recercher generalement tout ce qui peut apporter de l'utilité ou de la commodité au Genre humain et particulièrement a la france. Pour parvenir à ce dessein l'on travaillera a faire des experiences et à decovurir les plus de nouveautez que l'on pourra tant dans le Ciel que fur la Terre par les observations Astronomiques et Geographiques avec les grandes Lunettes, les microscopes, et cous les autres instrumens necessaires." The plan has been transcribed and published in French in Huygens, *Oeuvres complètes*, 4:325–29. It is dated cautiously to 1663. Except for minor phrases in various accounts, an English translation has not been published. All following quotations are my translations from the French in this Huygens publication in this page range. A copy of the manuscript can be found in the Christiaan Huygens's collected works in Leiden, a copy of which I have also examined.

[16] The working telescope had been in existence for about sixty years; the microscope's history is less definitely known but probably dates to the end of the sixteenth century in Holland. Anton van Leeuwenhoek (1632–1723) perfected earlier microscope designs, and it then became a scientific instrument.

[17] "on s'appliquera à inventer de nouvelles Machines, et à faciliter les anciennes pour la commodité ou pour le divertissement de la vie et à inventer de nouveaux secrets tant pour la manufacture des Arts que pour la curiosité."

only the inventors but also those who all along had been willing to sponsor inventors and publish their works. The Compagnie proposed to record a historical status quo knowledge of all the practical arts. Moreover, when they learned about an important invention, the Compagnie planned to "deputize one from its Body, who would be the most versed in the appropriate matter" and have that member travel to the specific location so that he could examine the invention. The deputy would then provide a full report for the Compagnie. And since one wish that man has had, "or may ever have," was to learn about all the forgotten inventions of the past, the Compagnie would begin a historical study of all inventions; the study would not only identify the inventions but also test them to determine their validity and continued utility.[18]

The Compagnie would strive to uncover and test the secrets hidden by men, "and use them if they are good, or to disabuse those who have put their faith of others without having tested themselves." They aimed to expose all traditional deceptions that stalled progress for too long, those concealed not only by the guilds but also the superstitions of astrology, alchemy, and religious zealotry. Furthermore, they intended to uproot the flawed rational philosophies that have perpetuated the misuses of logic: the truths of Nature that have been accepted without question. They vowed to "disabuse the world of all the Common Errors that have passed for so long as truths, having not been tested once with the necessary experiments to discover their falsehood."

[18] "Afin que tout les monde profite des belles inventions des particuliers....Si la Compagnie est consultée sur quelques Inventions nouvelles, sur quelques Machines ou sur quelques grands desseins publicqs ou particuliers, Elle deputera Ceux ds don Corps qui feront les plus versez dans ces matieres pour les examiner, et aller mesme sur les Lieux s'il est necessaire, qui feront leur Raport aà la Compagnie, de ce qu'ils auront trouvé."

They would be a repository for the knowledge of machines, and obtain "the design of all the machines and all the instruments that serve it, and understand everything that the workers realize in the materials that they use, and all difficulties that they face in their crafts, all that they research, or even what they might desire for the perfection of their crafts."[19] This vast survey of the craftsmen and their skills would result in two things: a record of everything that can be known and shared with all the workers in France, and an opportunity to uncover "all the deceptions of Artisans and Merchants and Sophists" so that they might "prevent the public from being deceived, and to compel the workers to work more honestly."

The Compagnie would also strive to develop an understanding of nature's water systems so as to better utilize them—a proposal perhaps aimed to garner Colbert's personal sympathies. The authors promised to learn all there is to know about navigation in order to open up and multiply the benefits for France. They sought to discover "ways to facilitate navigation to increase Commerce and for having opportunities to discover the wonders that are found in unknown countries, or all that is new and different from what we see in ours,

[19] "On esprouvera aussi tous les Secrets de consequence, dont on aura la description, quand il y aura quelque apparence qu'ils pourront reussir, pour les approuver et s'en survir s'ils son bons, ou pour detromper ceux qui les croyent sur la foy d'autruy sans les avoir esprouvez, s'ils ne sont pas veritables....Enfin on s'estudiera à detromper le Monde de toutes les Erreurs Vulgaires qui passient depuis se long temps pour des veritez, faute d'avoir faict une fois les experiences necessaires pour en decouvrir la fausseté....On fera en sorte d'apprendre toutes les pratiques des Arts tant de ceux qui sont en usage en france que dans les autres Pays et d'avoir le dessein de toutes les Machines, et de tous les instruments qui y servent, et de seavoir tout ce que les Ouvriers remarquent dans les matieres qu'ils employent, touttes les difficultez qu'ils rencontrent dans leurs Ouvrages, tout ce qu'ils rechergent ou mesme ce qu'ils souhaittent pour la perfection de leurs arts." Note: the publication of one stage of this work was attributed to Claude Perrault. Charles Perrault and Jean Le Laboureur, *Recueil de divers ouvrages en prose et en vers: Dédié à son altesse Monseigneur le Prince de Conti* (Paris: de l'impr. de Jean Baptiste Coignard, 1675).

whose return a large profit to the very State by the discovery of Mines, precious stones…and excellent Remedies of which these countries abound."[20]

This also meant acquiring the knowledge of shipbuilding and sailing, including the overcoming the "inconveniences that we notice in the voyages of long duration." Since voyagers and explorers were generally well-educated, when Frenchmen travelled to foreign lands or lived abroad, the Compagnie intended to ask them to submit memoirs to the Compagnie, urging them "to examine locations for what they will deem as being remarkable both in Nature and in the crafts…[For] the major sailings we will strive to send especially intelligent people to record anything curious that there will be in the new lands in both metals, animals, and plants, and in the inventions arts…[and to] search all ways to remedy the flooding of the Seine that has inconvenienced Paris for several years."[21]

We will recall that one of the direst complaints in Auzout assessed that the accuracy of the maps of France was nothing short of an embarrassment for the average Frenchman. The Compagnie promised to "work to make highly accurate Geographic Maps, of all things considered, the one thing most lacking in this State." They also pledged to make France's

[20] "On taschera aussi d'apprendre toutes les tromperies des Artisans et des Marchands et leurs Sophistiqueries avec les Moyens pour les decouvrir, que l'on publiera pour empescher le public d'y estre trompé et pour obliger les ouvriers a travailler plus fidelement....On s'appliquera à recercher les moyens de faciliter la navigation pour augmenter le Commerce et pour avoir les occasions de decouvrir les merueilles qui se rencontrent dans les pays inconnus, ou tout est nouveau et different de ce que Nous voyons dans le nostre, dont il reviendra un tres grand profit a l'Estat par la decouverte des Mines, des pierres pretieuses des [animaux?] et des Remedes excellens dont ces pays abondent."

[21] "Et tous les moyens de remedier aux inconveniens que l'on a remarquez dans les voyages de long Cours....Donnera des Mémoires et on les priera d'examiner les Lieux ou ils iront ce qu'on jugera y estre remarquable tant dans la Nature que dans les arts, et mesmes dans les grandes navigations l'on taschera d'evoyer exprès des personnes intelligentes pour remarquer tout ce qu'il y aura de curieux dans les Terres nouvelles, tant dans les metaux, les animaux, et les plantes, que dans les Inventions des arts...On chergera aussi toutes les voyes de remedier aux inondations de la Seine qui incommodent Paris, depuis quelque années."

farming industry far more functional: "We will apply ourselves in particular to study that concerns agriculture, to render fertile the wastelands, and to drain marshlands."[22]

The plan attempted to open up a vision of what might be possible once the structures of French society were reorganized and brought under control. They would be able to create a system for exchange throughout France with Paris at its centre, and develop "ways to trade with other Provinces so that food can be bought and shipped to locations, or for those locations not already connected, to make the rivers navigable, or to join with those as we desire." They also promised to nurture and develop new forms of correspondence with the foreign academies, "with all the scholars of all countries, in order to learn in reciprocity with them, in particular in the subjects of nature and in the trades, and of new things made in Books and in related sciences."

Having collaborators and contacts in the remote places on Earth would allow the Compagnie to expand their studies and projects and to explore many things about which they had been curious. With foreign contacts and remote facilities, they could "observe in all Places, the seasons and winds, the hottest, and the coldest, the declination of the magnet, the ebb and flow of the Seas, the Eclipses, the Comets, the meteors, and other phenomena of Heaven and Earth by means of mercury Thermometers, clocks, and all other necessary instruments, so that we then can make a history of Nature the most universal that is possible." By observing the workings of Nature in this multi-faceted, multi-perspective way, they could

[22] "Et pour toutes ces choses on travaillera à faire des Cartes Geographiques tres-exactes, qui est une des choses qui manquent le plus dans cet Estat....On s'appliquera particulièrement à estudier ce qui concerne l'agriculture, à rendre fertiles les Terres incultes, à desseicher les Marais etc. comm'estant les choses qui peuvent les plus augmenter le bonheur d'un Estat, aussi bon et aussi fertile que le Nostre."

most confidently promise “to build a Natural Philosophy on as solid of foundations” as possible.[23]

Like in the Perrault plan, the authors of the Compagnie plan felt it important to define the ideal characteristics of the kind of men who should be employed in the new Compagnie. “We shall appeal to those who particularly apply themselves to some science or some craft," reads the plan, "or have the curiosity to apply themselves to work in various ways to perfect all that they know, and [then] share it with the Compagnie," proposes the plan. Therefore, "this way everyone can enjoy the work of the others. And we will stimulate each other to contribute in all kinds of ways towards the happiness of life, something to be wished around the world, and applied more seriously in the future than we have in the past.”[24]

The emphasis on fellowship and cooperation are echoes of Montaigne, a few generations earlier. There is a sense that something special happens during conversation between enlightened and collaborative individuals. Furthermore, such conversations are enhanced when they occur between people from the most distinguished backgrounds and persuasions. The planners hoped for “the most learned in all verifiable sciences that will be possible to find,

[23] "On recerchera les moyens de faire la communication des Provinces les unes avec les autres, afin que les denrées se puissent debiter et se transporter aux Lieux ou il en manque, en rendant les Rivieres navigables, ou joignant celles qui le sont desià....La Compagnie entretiendra commerce avec toutes les autres Academies, et avec tout les scavants de tout les Pays. pour s'instruire reciproquement de ce qu'il y a de particulier dans la Nature et dans les arts, et de ce qui se sera de nouveau touchant les Livres et les sciences....Et pour observer par ce moyen en tous les Lieux, les Saisons, les vents, le plus grand chaud, les plus grand froid, la declinaison de l'Aimant, les flux es reflux des Mers, les Eclipses, les Cometes, les meteores, et les autres fenomenes du Ciel et de la Terre par le moyen des Thermometres du vif argent, je pendules, et de tous les autres instruments necessaires possibles, sur la quelle comme sur de solides fondemens on suisse travailler à bastir possible."

[24] “L'on priera ceux, qui se sont particulièrement appliquez à quelque sciences ou a quelque art, ou qui ont la curiosité de s'y appliquer de travailler par toutes sortes de voyes pour les perfectionner et de donner communication à la Compagnie de tout ce qu'ils en scavent. Et ainsy tout le monde jouira des travaux les uns des autres. Et on s'excitera mutuellement à contribuer de toutes sortes de matieres au bonheur de la vie. à quoy il est a souhaiter que tout le monde s'appliquè à l'avenir plus seriusement que l'on [n'a] pas faict par le passé."

as in Geometry, in Mechanics, Optics, Astronomy, Geography, etc., and in Physics, Medicine, chemistry, Anatomy, etc., or the practical Arts, like Architecture, fortifications, Sculpture, painting, and design, Channelling and the elevation of Water, Metals, Agriculture, navigation, etc."[25]

The overarching aim of the Compagnie plan was to discover ways to make things useful. The plan emphasized invention and valorized the making of new things. The Compagnie would welcome inventors, "those who have informed the Compagnie of some secret or some considerable invention they have found, who could stimulate everyone to invent something of some kind, because there is nothing new that from which over time we cannot draw some significant use."[26]

The planners also did not want to rule out knowledge that might only be available in foreign lands or antique languages. This realization might explain their interest in languages and translations as research instruments. They vowed to recruit "those who hear common languages so to translate all the good books that deal with science and the arts that we do not have in our language, in order to publish them if the Compagnie deems them to be useful to the public, and for reading all those that are printed in these languages so that we will be informed of everything that is written so as to find new things: and others who write well in

[25] "La Compagnie sera composée des plus scavantes dans toutes les veritables Sciences que l'on pourra trouver, Comme en Geometrie, en Mechanique, optique, Astronomie, Geographie, &c. en Physique, Medecine, Chymie, Anatomie, &c. ou dans la pratique des Arts, Comme l'Architecture, les fortifications, la Sculpture, la peinture, et le dessein, la Conduite, et l'elevation des Eaux, la Metallique, l'Agriculture, la navigation &c."

[26] "On de ceux qui auront faict part à la Compagnie de quelque secret, ou de quelque Invention considerable qu'ils auront trouvée, pour exciter tout le monde à intenter quelque chose de quelque nature que ce soit, puis qu'il n'y a rien de nouveau dont avec le temps on ne puisse tirer quelque utilité considerable."

Latin, for translating the Works of that language which the Compagnie may ask to be printed, and which they could have translated to French."[27]

They recommended that membership should not be extended to anyone who "does not excel in some of the above things," or to those judged "incapable of contributing" to the collaborative methods the Compagnie intended to employ. The assembly would completely avoid discussions that they knew had no plausible resolution—namely, "the mysteries of religion or of the affairs of the State." And if their conversations sometimes drifted into other unverifiable topics, such as "Metaphysics, Morals, history or grammar, etc., it would be only in passing," and would be pursued only "in so far as it will relate to physics, or the commerce of men." Implied here is the difficulty that they were having, and the warnings they were receiving, about questions that involved both science and God, between their interests and the interests of the statesmen, and between knowledge that is verifiable and that which is mere theory.[28]

The plan concludes with ideas on the Compagnie's organizational structure, operations, and the specific employment of its membership. According to their plan, the savants would elect a leader from their membership who would conduct all meetings and be entrusted with a

[27] "Et de quelques une qui entendent les Langues vulgaires pour traduire tous les bons livres qui traitent des sciences, et des Arts, que nous n'avons point en notre langue, afin de les faire imprimer, si la Compagnie juge qu'ils soyent utiles au public, et pour lire tous ceux qui s'imprimeront en ces Langues, afin qu'elle soit avertie de tout ce qui s'escrit et se trouve de nouveau: Et de quelques autres qui escrivent bien en latin, pour traduire in cette Langue les Ouvrages que la Compagnie pourroit permettre que ceux des siens qui les auroient faicts imprimassent, et qu'ils auroient composez en francois."

[28] "Et l'on ne recevra personne qui n'excelle au moins en quelqu'une des choses susdictes, et que l'on ne juge capable de pouvoir contribuer à l'avancement des desseins de la Compagnie....On ne parlera jamais dans les Assemblées des misteres de la Religion ny des affaires de l'Estat: Et si l'on parle quelque fois de Metaphisique, de Morale, d'Histoire ou de Grammaire etc. Ce ne sera qu'en passant, et autant que cela aura du rapport à la Physique, ou au commerce des hommes."

critical responsibility: to "guard the decorum and the silence" of the group. Each member would "defer without opposition" to this leader and await his permission before speaking. A recording secretary, who would create a meeting *regiſtre* available to every member, would also be elected. All Compagnie works would be confidential unless the consent of the entire Compagnie was granted. However, the *regiſtre* would be available to visiting scholars "for maintaining the exchanges with other Academies." Furthermore, the Compagnie would name one or two others who would be employed in the laboratories, and "six or eight more of us" would be chosen to care for general operations and to remedy any problems that might be discovered while undertaking various works.[29]

We can now understand that the two conceptual plans for the new assembly had much in common and rose from many of the same aspirations. Both voiced an optimism that emerged from a mood of change that was in the air. That mood stimulated imaginations and motivated these authors to discount the past and present in favour of a new kind of future, for which they were not afraid to make promises. They anticipated acting in collaboration to reform old methods in order to correct misunderstandings in the world. Through experimentation and physical observation, they intended to test everything and, if necessary, "disabuse" the deceptions that had endured for too long only because no one had ever doubted them enough to verify them.

[29] "Il y en aura une pour conduire les assemblées et y faire garder la bienseance et le silence, à laquelle on deferera sans aucune opposition, et sans la permission de la quelle on ne pourra rien faire ny parler d'aucune chose....Il y aura une personne ou deux dependantes de la Compagnie, pour avoir le soin de tenir prest et de faire executer tout ce qui concernera les experiences....On elira six ou huict des plus zelez pour s'appliquer particulièrement à l'avancement de la Compagnie, et pour remedier aux inconveniens qui se pourroient decouvrir, qui pourront s'assembler quand ils le jugeront à propos."

However, there are also some important variations between the plans. The first is that the domains of the belles-lettres from the Perrault plan are not part of the Compagnie plan. There is no obvious explanation for this omission, but perhaps pressures mounted by powerful and established institutions persuaded Colbert that aggregating their domains in one central, royal institute was a bad idea.[30] Looking back at a time when the systems of specialized knowledge that we now take for granted were still an open question, a nineteenth-century French physiologist and member of the Académie française offered this explanation of how his predecessors had already solved the dilemma: "We decided on separate academies. We probably understood that even for academies, the first law of work is division. Our current Institute resolved the problem that Colbert had offered of uniting all the academies in a common place."[31]

The Académie française was only one of the existing institutes that undoubtedly felt threatened by Perrault's proposal at the time. And if, as Fontenelle claimed, the Perrault plan—a universal academy uniting all other academies—was Colbert's original desire, then it would appear that the Compagnie plan endorsed by Auzout served Colbert as a kind of compromise. We will see this kind of pragmatic acquiescence, or Colbert's willingness to

[30] Historian David Lux makes this point, believing that it was that institutions "as diverse as artisan guilds, the Jesuits, the Académie Française, and university faculties of Theology, Medicine, and Law," likely opposed such a merger. See Lux, "Colbert's Plan," 5.

[31] Flourens, P. 1847. *Fontenelle ou, De la philosophie moderne relativement aux sciences physiques.* Paris: Paulin. http://books.google.com/books?id=7SNIAAAAMAAJ, 39. "Ce projet n'eut point d'exécution. On s'en tint aux académies distinctes. On comprit sans doute que, mme pour les académies, la première loi du travail est la *division*." Flourens (1794–1867), was a physiologist and founder of experimental brain science. He is accredited with the hypothesis that the mind is located in the brain and not the heart. "Ce projet n'eut point d'exécution. On s'en tint aux académies distinctes. On comprit sans doute que, même pour les académies, la première loi du travail est la division. G. Cuvier appelle l'époque moderne des sciences, c'est-à-dire leur grande époque, t'époque de la division du travail. Notre Institut actuel a résolu le problème que s'était proposé Colbert toutes les académies réunies par un lien commun d'émulation et de gloire; et, pour ses travaux particuliers, chacune indépendante et libre."

sacrifice long-term objectives for immediate gains, reappear from time to time. The belles-lettres was replaced with an emphasis on everyday crafts and craftsmanship, particularly as they would relate to the invention of new things.

It is interesting to consider that these two teams of authors—on the one hand, Charles Perrault, and on the other, Auzout, Huygens, and their collaborators—by all accounts revolved around Colbert in their two independent circles. Later evidence will suggest that, although they both were called on by Colbert at various times to supply and supplement his plans, there seem to be few connections between them outside the formation of the Compagnie. We see here several things worth noting. First, it demonstrates again that Colbert sought counsel from independent perspectives—in this case, the courtesan world of Perrault and Chapelain, and the savant world of Auzout and Huygens.[32] Colbert situated himself at the nexus of the most current and diverse opinion from diversified intellectual positions. Second, even though the plans may have originated in relatively independent groups of advisors, that they had so much in common confirms a common spirit that held sway at the time. Here, we see that the mood of reform was both broadly shared and solidly established among the people best positioned to influence Colbert. And as the nexus between both vision and power, Colbert had the necessary credentials to influence Louis.

Colbert and the Savants

Colbert's methods for forming the Compagnie still needed to be worked out. The scope of the Observatory project surpassed even the Fouquet affair, and in typically deliberate fashion, Colbert took deliberate pains to consider the options. He had two viable plans, and perhaps

[32] For recent insights into the Perrault family and their status in Paris, see Oded Rabinovitch, "Anatomy of a Family of Letters: The Perraults, 1640–1705" (PhD diss., Brown University, 2011).

others not known to us, and they needed to be evaluated and reconciled.[33] Possible outcomes needed to be examined and weighed. Mechanisms for financing the project needed to be invented; discussions with key negotiators had to be initiated; and the concerns of powerful people needed to be assuaged, as they worried that a new academy would call into question the existence of their own institutions. Of course, Louis was to be kept abreast, and his approvals had to be gained at every step. His overall support for the project could never be allowed to slip. The advice he received from one set of advisors must be tested by other advisors, and their differences reconciled. Perhaps most importantly, the savants—those who would be the centre of the enterprise—were to be evaluated and vetted. Unsurprisingly, then, Colbert did not fully establish his philosophical assembly until the end of 1666, almost two years after Auzout's public appeal.

When Colbert could finally take up the plans, he characteristically received the opinions of advisors. Clément attributed one to Jean Chapelain, calling it "Autre note à Colbert."[34] Chapelain's letter offers insights into the mood and motivation behind the plans. He begins,

> We want to make an academy for the sciences and the arts. This enterprise is worthy of the magnificence of the King and the care of Lord Colbert. And if caution had wanted that we began the noble intention of a universal reform of the things which concern the livelihood and tranquility of the State, reason wants that we achieve those

[33] Sturdy, *Science and Social Status*, 76–77. Sturdy provides a summary of the various historical interpretations of this reconciliation, comparing the opinions of Fontenelle, Taton, and Brown. In my opinion, Sturdy arrives at the most reasonable conclusion: that Colbert took a middle road between the two plans, taking parts from each to create a hybridized starting plan. He then and let the savants themselves choose their final organizational structure.

[34] "Autre note à Colbert: Sur l'Etablissement de L'Académie des Beaux-arts et de L'Académie des sciences." Clément publishes the two documents consecutively under the same section (XXVII) and they share one footnote frame. His opinion is clear that he believes the two documents belong together. He also provides this reference footnote: "Voir dans les Lettres de Chapelain, page 687, le rapport adressé à Colbert pour la fondation d'une académie des inscriptions et belles-lettres." Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:513.

> which can maintain abundance and virtue. All those who cultivate the sciences and the arts should make their effort for the advancement of such a beautiful plan.[35]

Chapelain encouraged Colbert to consider a founding principle: "we ought not to form the royal academy on simple ideas."[36] We must take into consideration the experiences of all previous similar attempts, no matter how incidental: "Although it must be incomparably above all others of this beautiful genre, it nevertheless is certain that there is always a proportion between the humble and the great things when they are made of the same nature, that we must strongly consider what has been practiced in other academies, if we want to judge what it is that we should do."[37] Asking Colbert to take into account prior experience was a mere formality, it would seem, because by now we can think of no course of action more predictable for Colbert. Consider the moment: Colbert's Fouquet project had just been completed, where no detail bearing on his failure or success could have escaped Colbert's analysis.

Chapelain reminded Colbert that all plans change over time, and any chosen plan should remain malleable, since "we can always easily add whatever is needed to elevate it above all others and give it advantages." In fact, encouraging periodic intervention from interested parties might even be in Colbert's best interest because it would remind everyone "from

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[35] Ibid. "On veut faire une académie pour les sciences et pour les arts. Cette entreprise est digne de la magnificence du Roy et des soins de Mgr Colbert ; et si la prudence a voulu qu'on ayt commencé le généreux dessein d'une réformation universelle par les choses qui regardent la subsistance et la tranquillité de l'Etat, la raison veut qu'on achève par celles qui peuvent y maintenir l'abondance et la vertu. Tous ceux qui cultivent les sciences et les arts doivent faire leur effort pour l'avancement d'un si beau dessein."

[36] Ibid. The letter reads, "sur de simples idées." It is not clear to me what Chapelain means: lowly or uncomplicated ambitions, without conditions, or if he is referring to the philosophical phrase of "simples," or "elemental or fundamental," used at the time.

[37] Ibid. "qu'on fera plus surement de se proposer les exemples de toutes celles qui se sont faites jusqu'à présent; car, encore que celle-ci doive etre incomparablement au-dessus de tout ce qu'on a jamais vu de beau en ce genre, néanmoins il est certain que cette proportion qu'il y a toujours entre les petites et les grandes choses qui sont de meme nature fait qu'on doit fort considérer ce qui s'est pratiqué dans les autres académies, si l'on veut bien juger de ce qu'on doit faire en celle-ci."

whose hand it is sustained." Chapelain advised that it would be wise to learn directly from people associated with similar enterprises, "to offer their own academies as a model."[38] No doubt Chaplain had in mind the Royal Society and the Accademia del Cimento. The enormity of what was at stake was obvious. Colbert was aware that his observatory and Compagnie would be judged by a wide and critical audience. It would be known as his project, but it would be associated with the reputation of Louis, and therefore, France. It must have been clear that the project would take its place in a tradition of many similar past ventures.

Chapelain warned Colbert that the men who would make up his new academy were from a different world than their own political world. "Although we have little experience with these men, we know the reason why," he wrote. The savants have gained different insights from their own set of experiences. Consequently, men like Colbert and Chapelain, "who are very busy in public affairs cannot know that secret."[39] It would be up to Colbert and his senior advisors to engage the savants to the degree that they could, and then parse and reorganize their knowledge production and put it to use in the political realm—the world where they are the experts.

A central element of Chapelain's advice was the value he placed on collaboration. He warned Colbert that he would be faced with two kinds of savants from which to choose. One would be very easy to find but must be avoided at all cost. The other is by nature more difficult to identify but invaluable. This second group consists of the selfless men of the sciences who work not for fame but

[38] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:513–14.

[39] Ibid, 5:513. "Pour peu d'habitude qu'on ait avec les savants, on en sçait la raison; mais les personnes qui sont fort occupées aux affaires publiques ne peuvent pas sçavoir ce secret." By "secret," Chapelain was probably following this contemporary definition: "A means known to a few people to do certain things, to produce certain effects.

> because it delights them; they are content with all the fruits of their labours of the knowledge that they acquire, without the urges for publicity, and if they gain renown, it is only among those with whom they converse, without ambition and for mutual learning. Such are the savants of good faith and people we cannot do without, given the intentions as great as that of the royal academy.[40]

For these men, it is not their reputations that matter so much as their desires to nurture and grow the sciences, with a desire to join forces with others like themselves. What mattered foremost for these men was a love of learning and fellowship.

By contrast, the other scholars represented a threat to the great academy. These men "do not cultivate the sciences as a field that must be nourished," advised Chapelain, "and since they see from experience that large rewards are only given out to those who make the most noise in the world, they work primarily not to make new discoveries, because up to now that has not been rewarded, but to all the things that makes it seem so."[41] Unlike the virtuous scholars, whose esteem exists only by the admiration of their peers, these other specious scholars "try especially to be known in the court." They do this by creating cabals and conspiracies, spreading rumours, and undermining the reputations of others with very subtle innuendo, warned Chapelain. He advised Colbert to take care to not fall victim to the persuasions spun by those skilled at self-promotion, who will inevitably attempt to make themselves seem worthy through words and not deeds. Colbert must see through their

[40] Ibid., 5:514. "Les uns s'adonnent àux sciences, parce qu'elles leur plaisent; ils se contentent pour tout fruit de leurs travaux des connoissances qu'ils acquièrent, sans affecter de les publier, et s'ils sont connus, ce n'est que des personnes avec qui ils conversent sans ambition et pour s'instruire mutuellement. Ceux-là sont des savants de bonne foi et des gens dont on ne saurait se passer dans un dessein aussi grand que celui de l'académie royale."

[41] Ibid., 5:514. "Il y en a d'autres qui ne cultivent les sciences que comme un champ qui les doit nourrir; et comme ils voient par expérience que les grandes rétributions ne se donnent qu'à ceux qui font le plus de bruit dans le monde, ils s'appliquent particulièrement, non pas à faire de nouvelles découvertes, car jusqu'ici cela n'a pas esté récompensé, mais à tout ce qui les peut faire paraître."

rhetoric and keep in mind "that those who have the greatest reputation in the court are not always the best subjects." These men "have no part in these ambitious societies."[42]

Not surprisingly, because these scholars put their own interests first, they are naturally the ones who stand out. "These are the savants and the beautiful people of the world who we know most well,"[43] who, as history has shown, speak endlessly about things they do not really understand, and express their opinions without having actually done anything. They theorize because they know of nothing through experience. We must be vigilant, warned Chapelain, because it is these kinds of scholars to whom the rewards have always flowed in the past, not to those who selflessly collaborate on shared ventures, with no desire for personal fame.[44] Those will be the men, wished Chapelain, to be honoured in the future.

Chapelain believed that if care is taken, Colbert was on the threshold of creating something special, an "enterprise which must glow in the world." The stakes, however, were high. He would be committing the honour of France. To fail would be unfortunate, thought Chapelain, and failure is a possibility, given that "it does not take but petty interests and petty vanities of knowledge to prevent those that belong in this assembly from being called." The best that Colbert could do now would be to remain "above all the foibles" and get to know the eminent men to whom he referred. Colbert must be clever, and dig "deep enough to be able to

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[42] Ibid., 5:514. "ceux qui ont le plus de réputation à la cour ne sont pas toujours les meilleurs sujets…et qui n'ont point de part à ces sociétés ambitieuses."

[43] "Ceux-là sont les savans du beau monde et ceux que l'on connoist le plus."

[44] Ibid., 5:514. "ils affectent surtout d'être connus à la cour; ils font des cabales pour cela, dans lesquelles on est de complot de ne dire que du bien de certaines gens, et de parler toujours mal ou du moins froidement de tous ceux qui n'ont point de part à ces sociétés ambitieuses. Ceux-là sont les savants du beau monde et ceux que l'on connaît le plus; c'est à eux qu'on se rapporte du jugement qu'on doit faire des ouvrages et des auteurs, et, en cela, on fait le mieux qu'il est possible; mais cependant on ne doit pas attendre qu'ayant souvent intention d'avancer les moins capables, ils nomment toujours les plus excellens."

distinguish the different spirits of those who can make a proper experiment, or those who can wisely draw out all its utilities, those who have enough clarity of mind to meditate well, and…all those who have different talents whose diversity could make the Royal Academy as beautiful as it is useful."[45]

Colbert certainly followed Chapelain's advice to take the experience of the savants and combine it with all other possible experiences, present and past, successful and failed, grand and incidental. However, the details of his methods may never be known. Much of the necessary planning in 1665 and 1666 was done in the discreet atmosphere of Colbert's routines. "Certainly Colbert never put into writing his reasons for the shape of the Académie of 1666 (or if he did, the text has not survived)," writes David Sturdy."[46] But curiosity, rumours, and insider leaks kept the speculative savant world informed and on edge. Their conversations offer the most insight into the intentions and moods of the time. Colbert's process for building his Compagnie may have never lent itself to a theoretical or principle-based analysis in the first place, because it was never thought of as an ideologically driven enterprise. It may have always been personal and founded on each particular savant—one man at a time—gradually built by its creators into a configuration with mounting capacities and ever-expanding interests and goals: "The early Académie des Sciences was founded less on abstract scientific and philosophical principles," writes Sturdy, "than on the individual

[45] Ibid., 5:514. "assez profond pour pouvoir bien distinguer les différens génies de ceux qui sont propres à faire une expérience ou de ceux qui en sçavent tirer toutes les utilités, de ceux qui ont assez de netteté d'esprit pour les bien recueillir et enfin de tous ceux qui ont les différens talens dont l'assortiment pourroit rendre l'académie royale aussy belle qu'utile."

[46] Sturdy, *Science and Social Status*, 76.

savants who were nominated. It was the savants themselves who were the depository of Colbert's intentions; hence the necessity to examine them as closely as possible."[47]

The savants' many appeals, therefore, can be understood as invaluable advice from those with the most experience in the production of knowledge about the natural world. Moreover, theirs was a diversified base of knowledge that had been analyzed, questioned, and actively debated for half a century. In other words, through his contacts with the working savants, Colbert was able to gather together all the available firsthand practical knowledge that he could find. Therefore, the plan for the Compagnie of sciences and arts was a kind of summary and reiteration of that expert knowledge, put into a form for its potential implementation. We should accept that Colbert followed Chapelain's advice to take the experience of the savants and combine it with all other possible experiences.

With the practical knowledge of the savants in hand, Colbert would have needed to advance it to a higher level of counsel for evaluation and find ways to organize the knowledge so that it could be formally implemented. We might say that the Perrault plan, produced by an inner circle of Colbert advisors, was an example of that higher level of counsel. Compared to the Auzout plan, the Perrault plan was abstract and axiomatic, and pointed at the relevant policy-level structures. As such, it was a step removed from everyday functionality but a step closer to implementation. Its concerns were of the historical and scholastic context in which a new academy would find itself; it made no attempt to bridge to the particulars of the savants' world.

As Colbert put together the membership of the new assembly, he methodically worked his way through various combinations of expertise and personalities. Undoubtedly, he tapped all

[47] Ibid., *77*.

of his advisors for their ideas and then sent them out to investigate and substantiate their opinions. Huygens was particularly helpful during this time in constructing a vision of the final structure of the assembly.[48] Brown believes that Huygens was brought into an inner circle of advisors, and was a favourite source of ideas for Colbert.[49] It is well documented that Huygens was a widely admired personality in Paris (and London), and his opinions and expertise were promoted by Colbert's chief strategists.[50]

But, according to the insider Perrault, throughout the selection of savants for the new assembly, Colbert leaned most heavily on three close advisors: Carcavi, Chapelain, and Abbé Amable de Bourzéis.[51] Of these three advisors, Bourzéis would be the least familiar now. He was an Jansenist ecclesiastic from a generation earlier than Colbert and his contemporaries. He was a classics scholar, a friend of Colbert, and "a prodigy in science and literature."[52] In the *gratifications* section of the *Comptes*, he is referred to as a "grand théologien et bien versé dans les belles-lettres" ("a great theologian and well versed in fine literature").[53] Bourzéis received a relatively high annual pension of three thousand livres for his services to Louis. He was born in Auvergne, in central France, and as a youth his father sent him to Rome to study theology. In Rome, he was educated in Greek and Latin poetry. Returning to Paris, he became acquainted with Louis's father, Louis XIII. His expertise was the origins of languages,

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[48] Sturdy claims that Huygens was involved in many meetings with Chapelain during this period. "The two men spent many hours discussing broad issues of scientific activity and organization." Ibid., 71.

[49] Brown, *Scientific Organizations*, 135–60.

[50] Sturdy, *Science and Social Status*, 72.

[51] Charles Perrault, *Charles Perrault: Memoirs of My Life*, ed. and trans. Jeanne Morgan Zarucchi (Columbia: University of Missouri Press, 1989), 48.

[52] Ibid., 42.

[53] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:468.

and in 1635, Richelieu named him as one of the founding members of the Académie française. In 1664, he was asked by Colbert to oversee the drafting of the *Traité des droits de la Reine*.[54] The publications he left address theological questions from a Jansenist stance. Through their literary connections, he and Chapelain were obviously familiar with each other, but Bourzéis also knew and admired Carcavi, and it was Carcavi who recommended Bourzéis for the job of director of Colbert's library.[55]

These three key advisors differed from each other in notable ways. Although Chapelain and Bourzéis were in a broad sense representing the world of letters, they were really from two different realms and likely would not have often crossed paths had Colbert not brought them together. Chapelain, as we have seen, was a poet and social critic. Bourzéis, on the other hand, was an abbé and a Christian theologian—more of a philosopher of religion than an *homme de lettres*. And Carcavi was not from the world of letters at all, but was a mathematician.

Not surprisingly, they also shared a few important characteristics. First, they were all of a generation older than Colbert and his other advisors; in fact, they were older than most of the other protagonists in this history.[56] Thus, they ought to be thought of as Colbert's "senior advisors." We remember Colbert's enduring admiration for Richelieu. Among other things, these three men provided Colbert a direct connection to his idol and the era of Louis XIII.

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[54] The treatise was composed to state France's position in giving Louis a legal standing to claim the Spanish Netherlands.

[55] The principal resource on Bourzéis is a nineteenth-century biography by Oscar Honoré, named appropriately *Un académicien oublié, le premier XXXVe fauteuil (l'abbé Amable de Bourzéis)* (Paris, 1879). More recently, a thesis was written on Bourzéis in Auvergne: Yasushi Noro, "Un littérateur face aux événements du 17e siècle: Amable Bourzeis et les événements dans sa biographie" (PhD diss., Université Blaise Pascal (Clermont-Ferrand), 2006). Bourzéis is also mentioned in Sturdy, *Science and Social Status*, 97. In Dew, *Orientalism in Louis XIV's France*, Bourzéis is given a section, "Colbert, Bourzéis, and the Academy of Oriental Languages," 52–61.

[56] They were two generations older the Charles Perrault and Louis XIV.

Each of the three had years of personal contact with the cardinal, and Colbert could borrow from their experiences.

Furthermore, all three—and we can now include Perrault among this group—shared another service for Colbert. All were active in the workings of the Petite Académie—later renamed L'Académie royale des inscriptions et médailles—a subcommittee of the Académie française that Colbert assembled several years earlier with a charge to commemorate and add glory to the actions of the king.[57] More will be said about this committee in Chapter 5, but right now, Colbert's apparent recognition of a connection between the charge given to the Petite Académie and his aims for the new assembly is interesting, especially as we remember its bond with the home conceived for it: the observatory. Colbert told the Petite Académie that he wanted from them "a sort of small committee that he could consult on all kinds of things that relate to buildings and where it can be brought to mind and erudition."[58]

The practical task of the Petite Académie was to compose the inscriptions that would be engraved on any of the new monuments constructed or medals struck in honour of Louis and France. But more broadly, its mission was to work to establish the arts, letters, and sciences in the political realm of the kingdom. When the group was introduced to their king, Perrault remembers Louis expressing the importance of their roles, assuring them that "you may judge,

[57] The original founding members of the Petite Académie are usually said to be Chapelain, Bourzéis, Jacques Cassagnes (another priest and classicist), and a renowned translator of ancient texts, François Charpentier. See Perrault, *Charles Perrault*, 41–43. Perrault was assigned as the recording secretary. However, Taton also places Carcavi in the group. See René Taton, *Les origines de l'Académie royale des sciences conférence donnée au Palais de la Découverte le 15 mai 1965*, (Paris: Palais de la Découverte, 1966), 30. Taton's assertion is more believeable when we accept that these advisory groups were less structured than we generally hold them to be.

[58] Charles Perrault, ed. Paul Bonnefon, *Mémoires de ma vie* (Paris: Renouard, 1909), 37. "une espèce de petit conseil qu'il peut consulter sur toutes les choses qui regardent les bâtiments et où il peut entrer de l'esprit et de l'érudition."

Messieurs, of the esteem that I have for you, since I am entrusting you with the one thing in the world which is for me most precious, which is my reputation [*gloire*]. I am sure that you will work wonders; for my part, I strive to furnish you with material worthy of use by men as skilled as you."[59]

In the Petite Académie's work to glorify and illustrate the progress of Louis and France, the immediacy of architecture is important. For Colbert, and no doubt for those to whom he was speaking, there was no significant distinction between the inscriptions on buildings and the buildings themselves. The buildings were to be the vehicle of communication. Second, recalling the education and backgrounds of the men involved, positions on the Petite Académie were assigned to those with an expertise in the ancient texts of Greece and Rome. Finally, we should not forget that these were the same men in whom Colbert and Louis trusted the selection of the membership of his new Compagnie.

Why Colbert assembled and charged these three individuals with the vetting and nomination of his Compagnie membership is a question to consider. To begin, we might observe that even at the highest levels of consultation and decision making, Colbert seemed most comfortable with advice that came from men from independent backgrounds and perspectives. Second, for an administrator like Colbert, the real challenge of building a successful Compagnie was not so much in identifying those with an expertise of a particular science, but finding those with an overall admiration and enjoyment for the sciences in general, a curiousness, and a willingness to collaborate and nurture learning for its own sake.

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[59] My translation follows closely that of Zarucchi's in Perrault, *Charles Perrault*, 46. Perrault's French version can be found here: Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 41. "Vous pouvez, Messieurs, juger de l'estime, que je fais de vous, puisque je vous confie la chose du monde qui m'est la plus précieuse, qui est ma gloire. Je suis sûr que vous ferez des merveilles; je tâcherai de ma part de vous fournir de la matière qui mérite d'être mise en œuvre par des gens aussi habiles que vous êtes."

In short, Colbert's placement of Carcavi, Bourzéis, and especially Chapelain as leading voices in the selection process indicates a privilege given to personal character over all other attributes.

1665, the Compagnie Is Selected

In a 1665 letter to his friend Pierre Daniel Huet,[60] Chapelain compared the progress being made in Paris with that of the Royal Society in London. "The English have taken physical matters more to heart," wrote Chapelain. "They work at such things in a body; they have the support and the purse of the king, and there is a fine emulation among them."[61] Unfortunately, Chapelain could not see much progress in Paris: "We have not reached that point. What we do can only be called good intentions, and shows what we can achieve when the right wind blows. Other things, more urgent, occupy the prudence of our prince, and this will have its season."[62] Chapelain was also aware that the Royal Society was advancing in a more obvious way. After only four years of organization, its membership already had grown to more than 190 savants and would add another 24 that year. And, the Society had opened its ranks to foreign savants: Sorbière and Huygens had already been inducted as fellows, as part of a large class of 116 in 1663.

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[60] Huet was close friend of Chapelain and educated in the Jesuit college in Caen. He was a scholar, editor, translator, and a bishop.

[61] Taton writes, "Le 29 juillet 1665, alors que Carcavy a déjà transmis une invitation officielle à Huygens; Chapelain donne à Huet un tableau moins optimiste, mais certainement plus réaliste de la situation." He then quotes Pellissier: "Les Anglais ont pris la matière physique plus à cœur. Ils y travaillent en corps. Ils ont l'appui et la bourse du Roi, et il y a une belle émulation entre eux. Nous n'en sommes pas encore là. Ce que nous faisons ne se peut appeler que comme intentions et démontre ce que nous pourrons faire quand le bon vent soufflera. D'autres choses plus urgentes occupent la prudence du Prince, et celle-ci aura sa saison." Taton, "Les origines de l'Académie royale des sciences," 53n114.

[62] The entire passage can be found in Jean Chapelain, *Lettres inédites de Jean Chapelain à P.D. Huet, 1658–1673*, ed. Léon-Gabriel Pélissier (n.p.: Léon G. Pélissier, 1894), 34. Taton's quotation was again used here.

It seems that Chapelain was not telling Huet all that he knew at that moment. The good intentions to which he referred were the methodical progress that Colbert and his advisors were making towards the establishment of the Compagnie. Once again, there are no records documenting these events; however, based on the outcome and a few letters that have survived, we can surmise that it must have been in the weeks soon after the publication of Auzout's appeal for an observatory and Compagnie that Louis had given Colbert approval to proceed with the project.

One sign that revealed Colbert's intentions was that, sometime before mid-June 1665, he had instructed Carcavi to begin negotiations with the Huygens family to allow Christiaan to move to Paris to become one of the Compagnie's founding members. The correspondence between Carcavi and Huygens has been lost, but in a letter dated 15 June 1665, Huygens mentioned the negotiations to his brother Lodewijk.[63] Colbert gave this important role of recruiter and a Huygens intermediary to Carcavi. Chapelain was certainly an early admirer of Huygens, and it is easy to agree with science historian René Taton that it may have been he who first alerted Colbert to the congenial, brilliant, Dutch francophone. But Carcavi had been in communication with Huygens for ten years, and a professional and personal rapport had undoubtedly been established between the two men. Carcavi was impressed with the Dutch scientist—even by comparison to the other great men he knew. By February 1666, the negotiations were complete and Colbert had agreed to terms set by Huygens and his father.[64]

[63] C. Huygens to Lodewijk Huygens, 15 June 1665 in Huygens, *Oeuvres complètes*, 5:375.

[64] Ibid., 5:16–19.

Christiaan would come to Paris on a pension of six thousand livres per year,[65] and his lodgings would be provided in a building adjoining Carcavi's own house.

In April 1665, the apartments were ready and Huygens permanently established himself in Paris. Auzout realized that Colbert's commitment to Huygens was some kind of a turning point, and informed a curious Henry Oldenburg in London, "If they give us facilities for working here, we shall endeavor to do something in chemistry as well as in mechanics. Now that they have got Mr. Huygens we shall see what they mean to do."[66] Through the spring and summer of 1665, there was no news from Paris about what Colbert meant to do with Huygens, and no rumours about the new academy were being circulated. But the communication lines between the savants and Oldenburg were active on other political and scientific works. Auzout's *Ephemeride*, in circulation for three months, was still stimulating conversations and was mentioned often in letters to and from Oldenburg. In several letters, Auzout showed a mixture of flattery and suspicion when he learned how closely Cassini's calculations in Bologna concurred with his own. Perhaps Auzout was offended when he was told that Cassini could "easily" see how Auzout solved it. The numbers were almost identical, and Cassini too professed astonishment at the coincidence. Cassini confessed, "I cannot stop wondering at the complete agreement between the thought of this very acute Frenchman about a hypothesis of the comet's motion [and my own]."[67] In related conversations, Auzout was also politely puzzled when it became clear that the observations of the Danzig astronomer Hevelius varied significantly from Auzout's and his colleagues. Auzout felt obliged to point

[65] Ibid., 5:389, 7:88.

[66] Auzout to Oldenburg, 25 April 1666, in *Correspondence of Henry Oldenburg*, 2:100–04. Taton asserts that Huygens's arrival in Paris was the first concrete sign of the origin of the Compagnie. Taton, "Les origines de l'Académie royale des sciences," 35.

[67] Cassini to Oldenburg, 4 February 1665, letter 369, in *Correspondence of Henry Oldenburg*, 2:359–67.

out the disparities to Oldenburg and the Royal Society, which made the perceived errors a public issue. The ensuing dilemma proved an embarrassment for Hevelius and the Royal Society that took years to resolve.[68]

By midsummer 1665, Auzout was engaged in several scientific controversies with Robert Hooke in England. Hooke's machine for turning lenses was a lively topic in several letters to Oldenburg. After reading Auzout's critique of the design of his machine, Hooke had replied with a suggestion that if Auzout doubted its effectiveness, he ought to simply try building one himself. "I do not see why he wanted me to waste my time," responded Auzout, "and incur expense for the sake of a machine of whose success I doubted, in order to prove to its inventor that it was no good." Even more detrimental, thought Auzout, was that through this sort of groundless speculation, the credibility of the new sciences was at risk. He used the example of Hooke's promotion of his theoretical machine to lay out his thoughts about how to proceed when someone has an idea for a new invention. "The maxim I thought proper," wrote Auzout, "that unless one has had time and opportunity to test a machine I thought it wrong to claim it as workable without trial, or at least one ought to give a warning to that effect to prevent workmen from losing time and money and also to stop them from making fun of theorists when they perceive that their machines do not work."[69]

In an even larger sense, experience has taught him that there was always some gap between what ought to work and what was really possible to do. He admitted some skepticism in the blind expectations in the quality of *any* machined work: "I shall always be doubtful

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[68] Steven Shapin provides an excellent analysis of the implications of this social dilemma. See "Manners, Mundanity, and Moral Uncertainty in Cometary Astronomy," in his *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994), 266–91.

[69] Auzout to Oldenburg, 22 June 1665, in *Correspondence of Henry Oldenburg*, 2:410–27.

(until I have seen evidence to the contrary) that a lathe can be more accurate than the hand. I realize that the hand requires a machine to guide it, but when it has one, for example a well-made form, I believe it does better than when a machine is also required, but experience will decide."[70] That did not mean that Auzout was closed to the possibility of the future for a mechanized process; nor did he desire that Hooke fail. For Auzout, only seeing is believing: "If it happens that most of the lenses worked by his method succeed, there will be nothing left to wish for in the business of lenses. For although a good workman…may make more good lenses than bad ones, he rarely makes excellent ones."[71]

With Oldenburg acting as their intermediary, Auzout worked on other differences that came up between him and Hooke. "I do not understand Mr. Hooke's new method of making a telescope of 300, 400, even 1,000 feet out of a lens of 20 or 40 feet," wrote Auzout to Oldenburg in June. "Unless he does this by means of another concave lens, or unless he makes the flat side of the lens concave to produce what Kepler calls a meniscus, I have to admit that his method baffles me." If Auzout were missing something, and there was really was a way that Hooke's ideas would work, then that would be both original and good. But, "on the other hand, if it is done by one of these two methods, the theory is not new." With what can be considered a general summary of all of his disagreements with Hooke, Auzout wrote, "It is to be feared that Mr. Hooke may have relied too much on pure theory without having sufficiently consulted experience."[72]

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[70] Ibid.

[71] Ibid.

[72] Meniscus is a lens that is concave on one side and convex on the other.

In the same letter, Auzout took aim at another assertion made by Hooke, as Auzout describes it: "that it might be possible to detect living creatures on the moon or the other planets."[73] To form his rebuttal, Auzout described a series of mathematical analogies based on making physical experiments that could easily be conducted on Earth. Hooke ought to set up a telescope and make a comparative analysis, he thought, "to prove that one could not see animals or plants on the moon if it were sixty leagues distant, judging by what we see of these things on earth at a distance of ten or twelve leagues." Like the lens grinding machine, Auzout suggested that Oldenburg should ask Hooke to first test his theoretical assertions before publishing them: "I must beg Mr. Hooke to take the trouble to try whether he can distinguish animals one foot tall at a distance of 60,000 feet…and whether he thinks after this that he should hope to see living creatures even on the moon, at least if they are not incomparably bigger than ours, or whether he can see…a gnat at 416 feet." As his thinking about Hooke and his assertions went on, Auzout began to grow amused with Hooke's insistence that theoretically something the size of an animal might be visible on the moon. "I see your Mr. Hooke wants to discover Animals on the Moon at any price whatsoever; but I believe that he ought to be content if he can discover there some town or some Château," offered Auzout, "because after that, we will be assured that there are animals there, too."[74]

In other matters at this time, Auzout, with Thévenot, Petit, and Auzout's long-time friend the Abbé Charles, were also occupied with entertaining Christopher Wren, who had travelled to France to learn about architecture and to meet the Italian artist and architect Gian-Lorenzo

[73] Auzout quotes here from the preface to Hooke's *Micrographia*, xxiv.

[74] Ibid.

Bernini, who had himself travelled to Paris as part of the Louvre design project.[75] "We took him to Mr. Bourdelot's," reported Justel to Oldenburg. "He much approved what was said, but wished that they made experiments…[We] also took him to the house of the great architect, Chevalier Bernini."[76] Wren recalled a few weeks later that it was Abbé Charles who introduced him to Bernini.[77] At the same time, the Hevelius controversy still occupied many conversations. Moray wrote to Oldenburg about what he thought. "Brouncker,"[78] Moray believed, "inclines to think Hevelius not mistaken, but as it usually falls out & was known to Solomon when one hears but one side, I am and you know it already, not a little affrayed Auzout is in the right."[79] In November, Oldenburg reported that Auzout had grown considerably more suspicious of the concordance of Cassini's comet calculations and his own.[80] And the machinations underway behind Colbert's doors had been suppressed until November, when the following news leaked out: "Colbert intends to sett up a Society lyke ours & make Hugens Director of the designe. Mr Sydesorfs Intelligence to friends, is not to be printed."[81]

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[75] Wren was "well receaved at Paris…and made acquainted with Mrs Auzout, Petit and Thevenot." Oldenburg to Boyle, 24 August 1665, letter 397, in ibid., 2:480–82. The connection between Auzout, Wren, and Bernini will become more important in the next chapter.

[76] Justel is quoted in a letter from Oldenburg to Boyle, 24 August 1665, ibid., 2:480-82n2.

[77] Christopher Wren, *Parentalia: Or, Memoirs of the Family of the Wrens [...] Compiled, by His Son Christopher; Now Published by His Grandson, Stephen Wren,* (1750), 261. Note, Bernini's stay in Paris is discussed in Chapter 5.

[78] William Brouncker, 2nd Viscount Brouncker, a mathematician, was at that time the president of the Royal Society.

[79] Moray to Oldenburg, 29 October 1665, in *Correspondence of Henry Oldenburg*, 2:582–83.

[80] Oldenburg to Hevelius, 24 November 1665, ibid., 2:621–23.

[81] Moray to Oldenburg, 27 November 1665, ibid., 2:624–25. Who "Mr Sydesorfs" might be is a mystery. Hall and Boas Hall suggest that it may be Thomas Sydserff, who was a Scottish minister. But I have discovered that Sydserff died two years earlier. There was an Archibald Sydserff alive at the time, but there is no indication that he was the source of this important news leak.

During this time, the savants continued their trade of ideas and observations, and as usual, Oldenburg was the hub of those communications. In a letter to Huygens, Oldenburg wrote that Hooke believed that his clock design will be better than Huygens's pendulum clock. Oldenburg was unconvinced: "I doubt this very much." And, as for Hooke's idea for a machine for grinding lenses, he still had high hopes, thought Oldenburg; nonetheless, "he has done nothing more about it."[82] Auzout learned of Cassini's discoveries of Jupiter's spot and bands, and his speculations about its rotation, and thought they were "splendid."[83]

At about this time, Auzout's attentions seemed to have shifted somewhat to Italy, in particular to the lenses being made there. We recall that it is also about this time that he was struggling with his printers to get his letter to Abbé Charles in circulation. He also wrote of his personal concerns of a war between France and England: "It will be annoying if the war hinders the commerce of sciences, there being so many excellent things we have cause to expect from your illustrious Society."[84]

Wren had returned from Paris by March, and Oldenburg reported to Boyle that he was "well satisfied wth ye civilities, he has received in France, and commends particularly Mr Auzout; and so, I think, will every ingenious and learned man."[85] Oldenburg often promoted his French savant friend. He was constructing a plan to invite Auzout and Hevelius to

[82] Oldenburg to Huygens, 15 January 1665, ibid., 3:16. Oldenburg sent this letter to The Hague, and it never reached Huygens, who was in Paris by that time.

[83] Auzout to Justel, 17 January 1666, ibid., 3:25–28. A copy of this letter was sent to Oldenburg. In another letter, Oldenburg would remind his correspondent that his discovery had already been made in England.

[84] Auzout to Oldenburg, 2 February 1666, letter 488, ibid., 3:34–39. This translation was made by Oldenburg, presumably to be read at a Royal Society meeting.

[85] Oldenburg to Boyle, 6 March 1666, ibid., 3:48–51.

England for an international observation event.[86] Oldenburg seems to have held great hopes for Auzout and, in April, submitted his name in candidacy at the Royal Society. In reply to news of the nomination, Auzout wrote to Oldenburg, "I shall do all that my ill-health will allow to discover something that may serve towards the elucidation of the true philosophy, and to be worthy (for my part) of your Fellows' splendid discoveries, all of which I value enormously."[87] Writing to Auzout the following month, Oldenburg described the day of Auzout's election. Noting that once his opportunity finally arrived, "I did not fail to seize it, with a measure of success entirely proportionate to your merits and my expectations. This illustrious assembly yesterday chose you as a member with an applause that was as general as your knowledge and honesty (known to all who know you) deserved."[88]

Auzout's election seemed to hold some special significance for Oldenburg. It symbolized his aspirations for the new sciences, and for how knowledge would flow across borders, even given the political instability of the time. With Auzout's election to the Royal Society, thought Oldenburg, everyone could certainly see "that this Compagnie holds the opinion that political and national differences ought not to impede the philosophical exchange nor shut the door upon the appreciation of the sciences and of virtue. Moreover you will judge that these gentlemen are convinced that you will not fail to use your splendid talents to contribute a very

[86] Oldenburg was clearly also trying to bring some harmony to the controversy of the 1665 comet that was still boiling. Oldenburg mentions the plan of the event to Boyle in letter on the 13th, and the controversy to Hevelius on the 30th.

[87] Auzout to Oldenburg, 25 April 1666, in *Correspondence of Henry Oldenburg*, 3:100–05. As we have seen, Auzout had complained of this illness since the 1640s.

[88] Oldenburg to Auzout, 24 May 1666, letter 530, ibid., 3:140–44.

considerable amount to the progress of their design, which is none other than the search for truth and the welfare of humanity."[89]

Oldenburg wanted Auzout to know how pleased the fellows of the Royal Society were when they heard the rumours that "the French people, so rich in great men and fine intellects, will at last establish a similar society under the auspices and beneficence of so great a king as Louis XIV." He was then moved to rearticulate the themes that he first rehearsed in his earlier letter to Sorbière. Oldenburg saw that the possibilities for profound achievements were rich in Paris, due primarily to the people who were in charge, especially Louis. One passage provides a useful articulation of the mood of the time and is worth repeating at length.

> For however great, wise, and magnificent, he cannot count himself a complete Prince until he has founded a truly philosophical Academy, that is, one which will study Nature rather than Aristotle and will strive to join with others the power of its intelligence and industry in order to restore men to their primitive condition through a sound knowledge of the works of the Almighty Creator, that is to say, to restore to men that splendid dominance over created beings from which they fell. I am constantly inclined to believe that something of this kind will be accomplished in your kingdom and even during the reign of the present king, when I think of his wisdom, generosity, and power. If my conjectures prove to be correct (as I wish with all my heart) I have no doubt that all other nations, however little civilized, will be diligent in following so good an example and in making a philosophical alliance with France and England in order to achieve by their joint efforts the objects of a design as noble and useful as that is.[90]

We can sense in Oldenburg's words that he and his world of savants believed that they were at the opening of something monumental—a movement that would soon envelop them. Things

[89] Ibid.

[90] Ibid.

were beginning to fall into place, and Oldenburg's comments amount to a manifesto that lays out the objectives of the new sciences. Moreover, this letter directly connects two of this study's primary protagonists: Oldenburg, who was the most in touch with and nurturing of the mood of reform that was gaining sway; and Auzout, who was at the ground floor of every aspect of the origin of the academy, including, as we shall soon see, the observatory structure itself. For Oldenburg, he, Auzout, Huygens, and the rest were part of a massive undertaking that would realistically involve every nation. Their project was an exposing and undoing of an ancient and fallacious understanding of the world, in exchange for the restoration of an even older, and even more truthful, prelapsarian relation to it. And he expressed his hope that the French, with their immense potential and young king, would also see all that could be gained by setting politics aside and accept their position in the noble project of reforming the production of knowledge.

Oldenburg's letter was crossed in the mail by a letter from Justel in Paris. Justel had news for his London friends that must have seemed providential. In May, he wrote, "They are laboring here on the establishment of an Academy to be composed of members chosen from all kinds of professions.[91] No one yet knows the details because it is only sketched out. If the matter is taken to heart a considerable establishment will be created and there is good hope of success. Don't speak of it in any more positive terms until it is more advanced. Mr. Huygens will be a member and Mr. Auzout as well, as with other very competent men."[92]

Although Justel was close to the action, he was reluctant to spread any news of the Compagnie too far. Within days, Oldenburg probed another source in Paris, Pierre Petit,

[91] "toutes sortes de professions."

[92] Justel to Oldenburg, 16 May 1666, in *Correspondence of Henry Oldenburg*, 3:133–35.

hoping to give some shape to the rumour that the Paris assembly might be a reality: "For the rest," wrote Oldenburg to Petit, "I am delighted to learn that Paris is making an effort to establish a philosophical assembly which, eschewing the vanity of words, promises to apply itself to the study and investigation of nature. That in truth is a most noble design, and a most fitting occupation for men, deserving the encouragement of so great a king as yours is."[93] Oldenburg would have trusted Petit as a reliable resource. Petit and Oldenburg had corresponded for years, and at that time Petit was a prominent figure in the scientific activities in Paris. Yet, apparently, Petit could offer no news, owing perhaps to the fact that he was never let in on Colbert's plans. As we will see, he was not chosen as one of the savants for the new Compagnie.

A few days later, Oldenburg had obtained more details from Paris, likely from Justel, and he shared them with Boyle. He reaffirms the involvement of Huygens and Auzout and is able to add a few more names: "[Auzout,] I find by my last [letter] from Paris, is nominated for one of those choyce persons, yt are to constitue their Academy," wrote Oldenburg, "some of ye rest, yt are pitcht upon, being Mr Robervall, M. Carchavy, M. Frenicle, M. Picard, M. Hugens; all very able Men, appointed to meet and to consider of ye best way of framing a Philosopicall Society, and ye best method of carrying on its dessein. I perceave," continued Oldenburg, "they will chiefly poursue Mechanicall and Chymicall Experiments, they having already in their Eye a Couple of good Chymists, and some able Mechanitians, yt shall worke by their directions."[94] Oldenburg then quotes in French his Paris spy: "They will do everything necessary for useful accomplishment. They have already begun to meet together to

[93] Oldenburg to Petit, 2 June 1666, ibid., 3:150–52.

[94] Oldenburg to Boyle, 8 June 1666, letter 537, ibid., 3:153–57.

frame some rules. It is a fine and noble plan, which cannot fail to be useful and glorious for France."[95]

Between May and June of 1666, Colbert unceremoniously notified seven men of their appointments to the new organization. Adrien Auzout, Christiaan Huygens, Pierre de Carcavi, Gilles Personne de Roberval, Abbé Jean Picard, Bernard Frénicle de Bessy, and Jacques Buot all received word. There is no explanation as to why Oldenburg did not mention Buot in the above letter to Boyle, since there is general agreement that he was one of the original appointees. Of the seven, there were no surprises. All had participated in the Mersenne, Montmor, and Thévenot assemblies and were otherwise visible savants. They aligned generally with the philosophies of Gassendi, and were known for their backgrounds in mathematics and astronomy.[96]

The presence of Auzout, Huygens, Buot, and especially Roberval demonstrates a preference for observational science over theoretical speculation. Sturdy suggests that this group was nominated by Carcavi and Chapelain, and Taton believed that the four men constituted roughly the mathematics division of the Perrault plan.[97] Before the end of June, Huygens had written to Prince Leopold in Tuscany to announce that the Paris Compagnie was born and Louis was on board: "The obligation that we have to His Highness, and what excites the Illustrious [chosen] to work incessantly is that the King seems also to want that, for the benefit of the sciences. Since having come by his order, we have already begun some

[95] Ibid. The English translation is provided by Hall and Boas Hall.

[96] Sturdy's *Science and Social Status* provides biographies of all these men. Less can be said here about the styles of Picard and Frénicle de Bessy. However, both were known to have been accepted by Thévenot in his assembly, along with the other Montmor dissidents.

[97] Ibid., *77*.

work. That there is as yet nothing fixed, which you can imagine. I say nothing related to my works, which I hope to have published here."[98]

Auzout was also enthusiastic about what he could see beginning to happen in Paris, but he also was restrained in offering too many specifics. "But we now all have reason to hope that France will apply itself to the advancement of the sciences and the arts as [has] England if the published plan is put into practice," wrote Auzout to Oldenburg. "I shall not yet give any details because things go very slowly; but there is reason to hope that if anything is wanting it will only be able enough men to work on such a vast and difficult design."[99]

In August, Thévenot also wrote to Leopold with his opinions, noting that the new Compagnie in Paris would be "reduced to practical work and experiments, as we wished,"[100] meaning that, at least in Thévenot's understanding, theoretical speculation had been eliminated from the Compagnie methodology. Thévenot recognized that the roster of Compagnie membership consisted of "several classes of academicians," and he believed Colbert and Louis enjoyed that aspect.[101] Referring to the above seven inductees, Thévenot

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[98] Huygens to Leopold, 22 June 1666, in *Ccorrespondence of Henry Oldenburg*, 4:53–55.

[99] Auzout to Oldenburg, 16 July 1666, ibid., 3:174–78. There is no record of what published plan Auzout may have been referring, and there is no space here to pursue a related question: where it becomes possible that Adrien Auzout was a source for some of the curiosity at the time regarding colour harmony. Henry Oldenburg wrote to Robert Boyle in 1668 telling him about Auzout's ideas in general terms, but there is nothing in the Oldenburg collection or anywhere else about it from Auzout. Oldenburg told Boyle that Auzout believed that advantages would derive for painting if men could learn to recognize ratios expressed in color as easily as those expressed in pitch. Oldenburg reported that there was disagreement in France about whether this was possible. A week later, Oldenburg quoted similar remarks from Nicolas Poisson's commentary on Descartes's compendium on music theory and the advantage of the ear over the eye in music compositions. For more, see ibid., 4:235.

[100] From a letter dated 2 August 1666, Thévenot to Leopold. The citations in this paragraph are from this letter found by Middleton in the massive corpus of the *Collezione Galileiana* in the Biblioteca Nazionale Central in Florence. He locates this Thévenot letter in G. 315, 1038v-39r. The translation is Middleton's. W.E. Knowles Middleton, *The Experimenters: A Study of the Accademia del cimento* (Baltimore: Johns Hopkins Press, 1971), 306–07.

[101] Ibid.

informed Leopold that Colbert "has already begun to form that of the geometers, with the intention of forming another of physicists, and still others as time goes on. They are already discussing instruments for astronomical observations, and a building in which to put them, and calling in very gifted people. They have begun with Signor Huygens."

A month later, Leopold had replied: "I cannot adequately express to you how glad I am to hear of your Academy being honoured by the high and powerful protection of such a King. Nor will anyone have room to doubt that both in this respect, and by it being really composed of the most scrupulous and erudite talents, there can come from it anything but works deserving of eternal praise, and of singular benefit to the Republic of Letters."[102] Leopold seemed sincerely impressed and, in a way, thankful. His expectation was the same as Oldenburg's: the new Compagnie of savants would not be France's alone. Their calling and benefits would extend beyond her borders. Leopold saw the Paris Compagnie as an emerging partner in the larger project of the reformation in the methods for the production of knowledge, with a full commitment to experimental, rather than speculative, sciences.

For the next four months, Colbert's confidentiality concealed methodical progress. Finally, in October, the insider Justel was able to relay news to Oldenburg that "Several members of the Academy have been named, among others M. de la Chambre et M. Pereau, un Apoticaire, et M. Gayen pour l'A[natomi]e. In time there will be others; nevertheless, they do not yet work as they should. M. Huygens is ill; you know that he lives with M. Carcavi, the royal librarian, the former royal librarian having been transferred."[103] Justel's phonetic spelling of

[102] Ibid., 307.

[103] "On a nomme quelques personnes pour estre de l'Academie, entre autres Monsieur de la Chambre et M. Pereau; un Apoticaire, Monsieur du Clos et Mr Gayen pour l'Anatomie. Avec le temps il y en aura dautres: neantmoins on ne travaille pas encore comme il faudroit. Monsieur Huggens est malade, vous scavez qu'il est loge avec Monsieur Carcavi bibliothecaire du Roy, la bibliothecaire

the names of Claude Perrault and the anatomist Louis Gayant might mean that he heard, not read, this news and that neither were well known to him.[104] We now know that the "few others" and the others yet named are those who filled out the ranks of the founding members: Claude Bourdelin, Nicolas Marchant, and Jean Pecquet.[105] Jean-Baptiste du Hamel was appointed and named secretary of the group. Also during that time, the names of several student assistants were added: Couplet, Niquet, Pivert, and De la Voye-Mignot, and Richer.[106] Jean Richer, who assisted Auzout and Picard in their projects, would become the most visible student with an interest in astronomy.[107]

December 1666, the Compagnie Develops

After the last group of names of the chosen savants was released in October, expectations for the next announcements were naturally high. However, through the fall of 1666, almost nothing related to the observatory or the Compagnie came out of Colbert's office. Correspondents pressed Oldenburg for news and he did what he could to keep them informed

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royale avant ayant este transferee." Justel to Oldenburg, 3 October 1666, in *Correspondence of Henry Oldenburg*, 3:240–43.

[104] In this particular case, it is interesting to see that Claude Perrault may have been more familiar as an apothecary than as a medical doctor, as he was later known.

[105] Pecquet was Auzout's longtime friend and collaborator in anatomy experiments and the doctor who accompanied Fouquet to prison. Colbert's selection of a close confident of his arch rival, Fouquet, demonstrates his pragmatism and appreciation of strength of character.

[106] Sturdy provides brief biographies for each of these *élèves*.

[107] Almost nothing is known about Richer outside of his work in the Compagnie, most notably scientific expeditions to Cayenne and, most notoriously, Madagascar. Very early on, Auzout "had discerned with remarkable insight the great scientific possibilities of such a voyage. Moreover, the ends of the expedition as he conceived them were exclusively scientific. In the memoir [of the voyage] there is no naïveté, no crudely economic motivation. A considerable gulf separates these lucid proposals from the confused ideas about scientific voyaging current in scientific circles in Paris and in London at the time." J.J. O'Connor and E.F. Robertson, "Jean Richer," *Biographies*, School of Mathematics and Statistics, University of St. Andrew's, Scotland, accessed 13 September 2016, http://www-groups.dcs.st-and.ac.uk/history/Biographies/Richer.html. For more, see John W. Olmsted, "The Scientific Expedition of Jean Richer to Cayenne, 1672–1673," *Isis* 34 (1942): 117–28.

by probing his contacts in Paris. A return letter in November from Justel reported that "our Academy has drawn up a memorandum of what needs to be done this year so as to fix upon the most important matters. The King will give them what they need for work."[108] The Compagnie membership learned that Colbert would authorize them to pursue their individual curiosities with virtually no constraints; the only requisites were that their work lead not only towards useful ends but also to the glorification of Louis and France. Colbert's only initial requirement from each member was to submit a personal plan of the projects that he intended to conduct.

Oldenburg recycled some old news: the most interesting of which was that the planners of the new Paris Compagnie were aiming for a different character for their assembly than the Royal Society. Oldenburg had reported to Boyle that "the new Parisian Academy goes on, but will consist only of a few, intending to sett upon Mechanicks, Chymistry, and Anatomy, and chusing persons fitt for the ordering and executing of things necessary to improve those parts."[109] He and Boyle were accustomed to the structure of the Royal Society, which at that time had more than two hundred members, all self-elected, and with at least some element of class and honorary status. The Paris Compagnie, on the other hand, would be one-tenth the size of the Royal Society.[110] It would be a Compagnie in the tradition of a century of French companies, staffed by professionals with specific expertise. And whereas the Royal Society fellows were basically self-funded, the Paris Compagnie members would be hired and serve at the pleasure of the king. Each would be royally funded by a lifetime stipend.

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[108] Justel to Oldenburg, 6 November 1667, in *Correspondence of Henry Oldenburg*, 3:580.

[109] Oldenburg to Boyle, 23 October 1666, ibid., 3:274.

[110] The Company maintained a relatively small number of members. Through the end of the century, only thirty-seven more were added, matching roughly the number lost through attrition.

At the end of December 1666, it had been exactly two years since Auzout had first made his appeal to Louis for an observatory and Compagnie, and there was a growing sense that things still had not quite gotten off the ground. Oldenburg continued to quiz the insider Auzout for any news, but the new member of the Compagnie could only disappoint his London friend. Colbert was keeping a lid on whatever he was planning and Auzout was showing some frustration with the inaction. "Although I had the honour to be appointed by the King as mathematician and physicist," he replied to Oldenburg in letter dated 18 December, "I can't give you any more details than are known to everybody, because we have not been kept fully informed and things have not reached the point we were led to hope for."[111]

Auzout was eager to get started in earnest, and he saw the negative effects of unresolved anticipation as the specific operations of the Compagnie remained somewhat unsettled: "It is to be hoped that before the summer is over most of these things will have been begun," wrote Auzout. "But as these matters have not yet been settled, we did nothing of importance this summer." Auzout lamented that the false, or at least premature, expectations among the new membership had led to stagnation, "and while we lacked instruments and everything else that was necessary, the constant hope of getting them, resulted in individuals failing to undertake what they would normally have done."[112]

Auzout was apparently unaware that Colbert was about to raise the curtain on the future of the Compagnie. Four days after Auzout dated his letter to Oldenburg, Colbert convened the first meeting of the Compagnie. At a time when formal protocol and ceremony were the

[111] Auzout to Oldenburg, 18 December 1666, in *Correspondence of Henry Oldenburg*, 4:291–99.

[112] Ibid.

norm, the founding of the new Compagnie is distinguished by a curious lack of pomp. Despite years of speculation, rumours, and deliberate buildup, the Compagnie's inauguration was utterly inconspicuous. If there were any royal proclamations, or medals pressed, or engravings or tapestries made, or even any incorporation papers filed, they are all now lost. There is not even a record of an official founders roster.[113] The only knowledge we have of the Compagnie's inauguration requires tying together notes buried in governmental records. First, the name of each savant begins to appear in Colbert's accounting records, which indicate that each man had been put on the government payroll.[114] In December, the Compagnie also began keeping track of the meeting minutes.

Colbert summoned his savants to the king's library, where they met as a full assembly for the first time. Charles Perrault was there, and in a memorandum filed a few months later, he documented some of what was said. From his perspective, the stakes were high and the opportunities for success were wide open: "The first thing that M. Colbert made clear to those who were chosen from within France and from foreign countries, was that it was solely up to them to make their Compagnie the most knowledgeable and famous that there has ever been in this world, because for his part the King will be furnishing all the assistance that they might desire."[115] Perrault provided more details about the facilities that were planned or were already in place. "We had started setting up in the King's library, where nothing could be lacking by way of books and manuscripts, and that orders were going to be given to build

[113] Given his care, Sturdy's list is undoubtedly most accurate.

[114] It is mentioned in Sturdy, and the *comptes* appear in Clément, *Lettres*.

[115] "La première chose que M. Colbert fit entendre à ceux qui furent choisis et dans la France et dans les pays estrangers pour composer cette académie, fut qu'il ne tiendroit qu'à eux que leur Compagnie ne se rendist la plus savante et la plus célèbre qu'il y 'eust au monde, parce que le Roy eur fourniroit de son costé tous les secours qu'ils pourroient désirer."

there a laboratory with all the accompaniments and amenities that they might wish," recorded Perrault. Regarding the Compagnie's proposed working facility, the observatory, the new membership "had nothing more to do than chose a site that they might judge appropriate for making observations, and readily in that place would be built an edifice that would not only surpass in grandeur, in beauty and in commodity the observatories of England, Denmark and China, but which, it goes without saying, would respond in a specific way to the magnificence of the prince that was having it built."[116] It seems that, at last, the observatory building that Auzout had called for two years earlier seemed about to become a reality. Colbert was turning over the site selection to trusted advisors who could find the proper location.

According to Charles Perrault, Colbert established for the Compagnie only a few basic guidelines. Principally, the purview of the Compagnie should be very broad and deep: "All the sciences will be carefully cultivated and advanced, if possible to their final perfection, in particular astronomy, geography, geometry and all other parts of mathematics, physics, botany and chemistry." The Compagnie would not take up questions in politics and theology, because "the universities and societies are in place" to teach those topics, and besides, "it is difficult to say much about them without causing disputes and perilous consequences."[117] Given the outcome of the Mersenne and Montmor assemblies, dispute was something that

[116] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:515. "Qu'on avoit commencé à les establir dans la bibliothèque du roy, où rien ne leur pouvoit manquer du costé des livres et des manuscrits, et que les ordres ali oient est re donnés pour construire dans le mesme lieu un laboratoire, avec tous les accompagnemens et les commodités qu'ils pourroient souhaiter. Que pour un observatoire, dont l'astronomie ne pouvoit se passer, ils n'avoient qu'à choisir un lieu qu'ils jugeassent propre pour y bien observer, et qu'aussytost il y seroit construit un édifice qui non seulement surpasseroit en grandeur, en beauté et en commodité les observatoires d'Angleterre, de Danemark et de la Chine, mais, ce qui estoit tôut dire, qui répondroit en quelque sorte à la magnificence du prince qui le faisoit bas tir."

[117] Ibid., 5:515.

Colbert had intentionally designed against. There would also be no discussions about the Philosopher's Stone, wrote Perrault, even though it may be agreed that there is some similarity between its speculative relation with chemistry and observation and the speculative world of astronomy.

The Compagnie's first official business is recorded in the *Procès-verbaux*, under the heading of 22 December 1666, a Wednesday. Their first official act was to develop their operating agenda. The minutes show that in their inaugural meeting, they agreed on three resolutions:

> (1) "It was decided in the Compagnie that it will assemble twice a week, on Wednesdays and Saturdays";
> (2) "That on one of these two days, that is, Wednesday, la Mathematiques will be treated; on Saturday, we will work on la Physique";[118]
> (3) "As there is a great connection between these sciences we judge it appropriate that the Compagnie will not be divided and all are found at the meeting on the same days."[119]

Notably, the Compagnie worked fast to set up the structure of their processes in order to best utilize their greatest asset—their various expertise. From the start, they acknowledged the separation between the verifiable and the speculative sciences. However, they did not intend to let those realms divide them. They devised their methods so that every individual savant would be a part of every discussion, no matter what the topic.

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[118] "Physiques." Sturdy substitutes "Experimental Sciences." It could also be understood as "Verifiable Sciences," or Natural Philosophy. "Mathematiques" would include all unverifiable or speculative sciences.

[119] Procès-verbaux de la première séance de l'Académie royale des sciences, 22 décembre 1666.

"Il a été arresté dans la Compagnie qu'elle s'assemblera deux fois la semaine, le mercredy et le samedy. 2. que l'on de ces deux jours, sçavoir Le mercredy, on traitera des mathématiques; le samedy, on travaillera à la physique. 3. Comme il y a une grande liaison entre ces sciences, on à jugé à propos que la Compagnie ne se partage point et que tous se trouvent à l'assemblée des mêmes jours."

With no official roster of members, historians have tried to piece together a list of the Colbert's final selections. Sturdy's list is the most carefully considered, not only because his list absorbs those of previous historians, but also because of his particular interest in the individual men themselves. Sturdy identifies twenty-one founding members, divides them into the two main divisions—Mathematics or Experimental Sciences—and lists the expertise for which each inductee was known at the time.[120] Sturdy includes these men:

Mathematics	
Auzout	Astronomy
Picard	Astronomy
Richer	Astronomy
Buot	Geometry
Carcavi	Geometry
Frénicle de Bessy	Geometry
Huygens	Geometry
La Voye-Mignot	Geometry
Niquet	Geometry
Roberval	Geometry

Experimental Sciences	
Bourdelin	Chemistry
Duclos	Chemistry
Couplet	Physics
Du Hamel	Anatomy
Gayant	Anatomy
Pecquet	Anatomy
La Chambre	Medicine
Mariotte	Medicine
Perrault	Medicine
Marchant	Unknown
Pivert	Unknown

[120] The Procès-verbaux has historically been divided into two books: Mathématiques and Physiques.

Noteworthy in Colbert's selection of this handful of savants was their diverse backgrounds. As historian Martha Ornstein observes, they were all from "different stations in life, physicians, engineers, parliamentarians, all with pronounced interest in science."[1] If that was originally an element in Colbert's selection criteria, we may never know, since any knowledge of that criteria is now lost. Nevertheless, Du Hamel's record of these moments does happen to align with Chapelain's early advice to Colbert: what qualified these twenty-one men seems to have been their well-roundedness and mutual compatibility. They were each able to offer their colleagues a high level of expertise in one particular area, but they also had passion for their colleagues' work. "If there was any philosophical trend of which Colbert was suspicious and which he was determined to keep in check within the Académie," argues Sturdy, "it was Cartesianism."[2] And we might imagine that Colbert was influenced again by Chapelain, who was wary foremost of assembly stalemates and internal bickering over unsolvable questions. He warned Colbert away from the most ardent "speechmakers" of the Montmor Academy, as well as the Jesuits and Cartesians.[3]

Neither Colbert nor Louis even demanded a name for the group, apparently leaving that responsibility to the savants themselves. With its structure of specialists and internal divisions,

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[1] Martha Ornstein Bronfenbrenner, *The Rôle of the Scientific Societies in the Seventeenth Century* (New York: s.n., 1913), 145–46. Also, Sturdy's book amounts to a detailed exploration of each individual savant, including their backgrounds and influences.

[2] Sturdy, *Science and Social Status*, 140. Sturdy elaborates: "Although Le Chambre was a committed Cartesian, Du Hamel and Roberval were equally resolute adversaries; but these three academicians were exceptional in the extremity of their views. Most were fully conversant with the works of Descartes, but while they respected his status as a mathematician they were usually sceptical towards his system of philosophy. Huygens was typical of this attitude," concludes Sturdy (140).

[3] Taton, "Les origines de l'Académie royale des sciences," 36. "On peut penser en particulier que son influence n'est pas étrangère à l'exclusion de leur liste des plus ardents 'discoureurs' de l'Académie de Montmor, ainsi que celle des Jésuites et celle des représentants les plus actifs de l'école cartésienne."

the new Paris assembly looked like an "academy" to most outsiders. But Colbert's savants rejected that title, preferring instead "La Compagnie" or "L'Assemblée."[4] We can believe that the savants' foundation and point of departure had always been the image that they had conceived for themselves several years earlier, in the plan of *La Compagnie des sciences et des arts*. They saw their reason for being as less in line with the universities of Europe and more in line with commercial enterprises such as the Compagnie française pour le commerce des Indes orientales, established by Colbert in 1664, or the Compagnie de la Nouvelle-France, the colonization Compagnie established in 1627 by Richelieu, which made possible enterprises like those of Marie de l'Incarnation's Ursuline monastery in Québec. As a "Compagnie," they saw themselves less involved in traditional book-based learning and more in experiments, observation, and other active projects—that is to say, "learning by doing." By resisting the designation of academy, they sent the message that their mission would be to pursue and confirm knowledge in a professional way, and not to follow the standard academic regime.

According to Du Hamel's historical account, Colbert first planned for them to divide and meet in three separated assemblies per week: mathematics and physics on Wednesdays and Saturdays; historians on Mondays and Thursdays; literary men on Tuesdays and Fridays; and on one Sunday per month there would be a meeting of the entire group.[5] But due to perceived rivalries with the Académie française (and other established assemblies), and perhaps a change in strategy, this plan was abandoned. Colbert quickly revised the structure and that news circulated quickly.

[4] The title "Académie des sciences" grew in use over time but was not formally adopted until the end of the century. Sturdy, *Science and Social Status*, 77–78.

[5] This again according to Du Hamel. His history is in Latin. Cited in Ornstein, "The Rôle of the Scientific Societies," 144–45.

The Royal Society in London was also meeting on Wednesdays. The new Paris Compagnie would continue to meet on Wednesdays and Saturdays throughout its history. But that its inaugural meeting was the 22nd of December is worth noting. That date had at least a symbolic significance. Although the 22nd was not the exact day of the solstice, and these men would have known that, the date of the Compagnie's first meeting was not arbitrary either. In 1666, the winter solstice was the day before, on the 21st, a few minutes before noon, at 11:47:52, to be exact. Certainly, these astronomers did not let the 1666 winter solstice pass without notice. By all accounts, the 22nd may have been thought of as even more appropriate and perhaps more symbolic than the solstice itself. As the first full day after the winter solstice, Wednesday the 22nd marked the returning of the sun to Paris and a moment of optimism. On par with the upswing of the clock,[6] it was a most auspicious day to begin such a glorious enterprise.[7]

During their first meeting, then, the grand project of observatory and Compagnie was finalized. If any more rules of conduct, bylaws, or statutes were ever drawn up by this body, they have never been found, or even mentioned. Referring to the accounting records kept by Colbert, we can derive this picture of the Compagnie upon its inauguration: first, the record shows that Pierre Carcavi "presided" over the first meeting, Du Hamel was named its permanent secretary, and Huygens would be referred to later as the body's "director of design," or, in today's terms, its research director. It was also decided that the savants would initially have two individual obligations: each Compagnie member would submit an individual

[6] In the traditions of many cultures worldwide, for ventures meant to be long-lived, it is considered auspicious to begin them on the upswing of the clock.

[7] In Chapter 5, we will see that by the next solstice—the summer solstice of 1667—the new Compagnie was fully operational, and the summer solstice proved to be a highly significant day.

work plan of the projects he intended to pursue in the coming year, and that would, in the long run, serve to valorize Louis and France.[8]

Each of the individual work programs submitted by the Compagnie members betrays a pent up curiosity and a wide natural philosophy. One anonymous program, thought by historian Joseph Bertrand to have been proposed by Du Hamel, proposed to study the "communication of movement" by spinning water in the centre of a pond at various speeds and then observing a floating body in various locations, unequal to its distance from the centre. Its author believed that this experiment, when pursued, would begin to shed some light on the movements of the planets.[9]

Auzout's proposed work plan revealed his primary interest at the moment: to provide a detailed study of the kingdom's craftsmen. "Auzout," wrote Bertrand, "more inspired than the others, asked that a few from the Compagnie might be commissioned to observe the craftsmen, their tools and instruments, and their manner of use, learn from them what they need and learn their secrets and sophistries."[10]

A characteristic of Auzout's study proposal that may seem peculiar to the historian of astronomy now seems entirely reasonable. For us, though, that his primary interest in the

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[8] Jules Guiffrey, *Comptes des bâtiments du roi sous le régne de Louis XIV,* 5 vols. (Paris: Imprimerie nationale, 1881-1901). Volume 1 includes the annual expense records for the years 1664 to 1680.

[9] Joseph Bertrand, *L'académie des sciences et les académiciens de 1666 à 1793* (Amsterdam: B.M. IsraÎl, 1969), 8. "Chaque académien était invité à proposer son programme, et il en résulta une grande variété de projets. Un membre de la Compagnie, dont le procès- verbal ne donne pas le nom et qui, pour cette raison, est peut-être Duhamel qui l'a rédigé, propose de "choisir un étang pour faire tourner l'eau en son milieu, laquelle communiquera le mouvement au reste de l'eau par différents degrés de vitesse, pour y examiner le mouvement des divers corps flottants en divers endroits et inégalement éloignés du milieu, pour faire quelque comparaison des planètes dans le monde."

[10] Ibid. "Auzout, mieux inspiré, demandait que quelquesuns de la Compagnie eussent commission de voir les ouvriers, leurs outils et leurs instruments, la manière de les employer, savoir ce qui leur manque et apprendre leurs secrets et leurs sophisteries."

Compagnie was to learn from the craftsmanship in the kingdom only follows what we now know about him. His proposed research ventures bring to mind his letter to Oldenburg about the making of glass lenses for his telescopes, in which he wrote that he would always trust the quality of the skilled hand over the machine, until proven otherwise. His interest in extracting and utilizing the secrets concealed in the everyday workmanship of France might also suggest that he authored the clause in the plan for the Compagnie two years earlier that addressed the same issue. Bertrand writes that Jean-Antoine Couplet, a student, was given this project to carry forth, which he worked on for his entire lifetime.[11] Bertrand also draws a line from Auzout's idea for the project identifying the crafts of France that would eventually be realized in Diderot's *Encyclopédie, ou Dictionnaire raisonné des sciences, des arts et des métiers*, published by the Compagnie a century later.[12]

In his original projects proposal, Claude Perrault proposed a research agenda of anatomical research in part to develop descriptions of the organs, looking specifically for their function and the workings of their purpose. He realized that some well-known organs perform functions that are quite hidden but nonetheless have real and observable effects. Perrault offered the example of the "generation of milk, which is dependent on some undiscovered organ." Anyone working as an anatomist, thought Claude, must use both their eyes and their reason, "retaining always whatever advantage the eyes have over reason."[13] Over the years,

[11] Sturdy, *Science and Social Status*, 135–36. Sturdy also writes that Couplet spent his entire life devoted to the work of the Academy, and much of that in close contact with tradesmen. In fact, he often nearly went broke because he would pay the craftsmen for their services from his own account, when reimbursement was highly irregular.

[12] Bertrand, *L'académie des sciences*, 8. "Couplet fut chargé de suivre cette idée, qui devait produire la belle collection des Arts et métiers publiée un siècle plus tard par l'Académie."

[13] Ibid., 6–7. "Le plan d'études tracé par Perrault pour l'anatomie et la botanique fait paraître au contraire beaucoup de savoir et de sens. Les recherches anatomiques doivent comprendre, suivant lui, en même temps que la description des organes, la recherche de leur usage et le mécanisme de leur

Claude Perrault's project proposals would acquire a reputation as being advanced and quite sophisticated. In fact, within a few years, he was charged with much of the Compagnie's overall annual planning.

Claude also had many questions concerning plants that he wanted to study, which he saw as possibly analogous to his anatomy questions. He proposed two kinds of studies, grounded on his belief that the ancient texts on nature were highly suspect and ought to be questioned and corrected. He proposed instead a more philosophical study of the genesis and growth of plants. Is it true, he asked, that a plant can reproduce from the salts of its ashes?[14] And does the soil reproduce plants of its own fecundity, without seeds? Do plants have a soul, like animals, which cause movement? And if they do have souls, are they in their roots? What should we think of the ancients' beliefs in sympathies and antipathies among plants? "If the fir tree is considered a friend to the other trees, isn't that only because its root, straight and plunging, does not at all bother the plants planted in its vicinity?" wondered Claude. "If the olive tree passes for an unsociable tree, is that not contrary to reason?"[15]

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action. Quelques organes bien connus remplissent des fonctions encore très-cachées et des effets véritables et manifestes, tels par exemple que la génération du lait, dépendent de quelque organe qu'on n'a pas pu découvrir. Un anatomiste doit donc employer à la fois les yeux et la raison, en conservant toutefois quelque avantage aux yeux sur la raison même."

[14] Ibid., *7*. "Perrault distingue également de l'histoire et de la description des plantes l'étude plus philosophique de leur naissance et de leur accroissement. Beaucoup d'auteurs anciens ont écrit sur ce sujet; leurs assertions sont douteuses, il serait utile de les vérifier. Est-il vrai, par exemple, qu'une plante puisse se reproduire par les sels tirés de sa cendre?"

[15] Ibid. "La terre qui nourrit la plante peut-elle la produire par sa propre fécondité sans avoir reçu de semence? Existe-t-il dans la plante, comme dans les animaux, une partie principale qui donne l'âme et le mouvement à toutes les autres, et cette partie n'est-elle pas la racine? Que faut-il penser enfin de ce qu'on a nommé les sympathies et les antipathies des plantes? Si le sapin est considéré comme l'ami des autres arbres, cela ne tient-il pas seulement à ce que sa racine, droite et plongeante, ne gêne en rien les plantes placées dans son voisinage? Si l'olivier passe pour un arbre peu sociable, n'est-ce pas pour une raison contraire?"

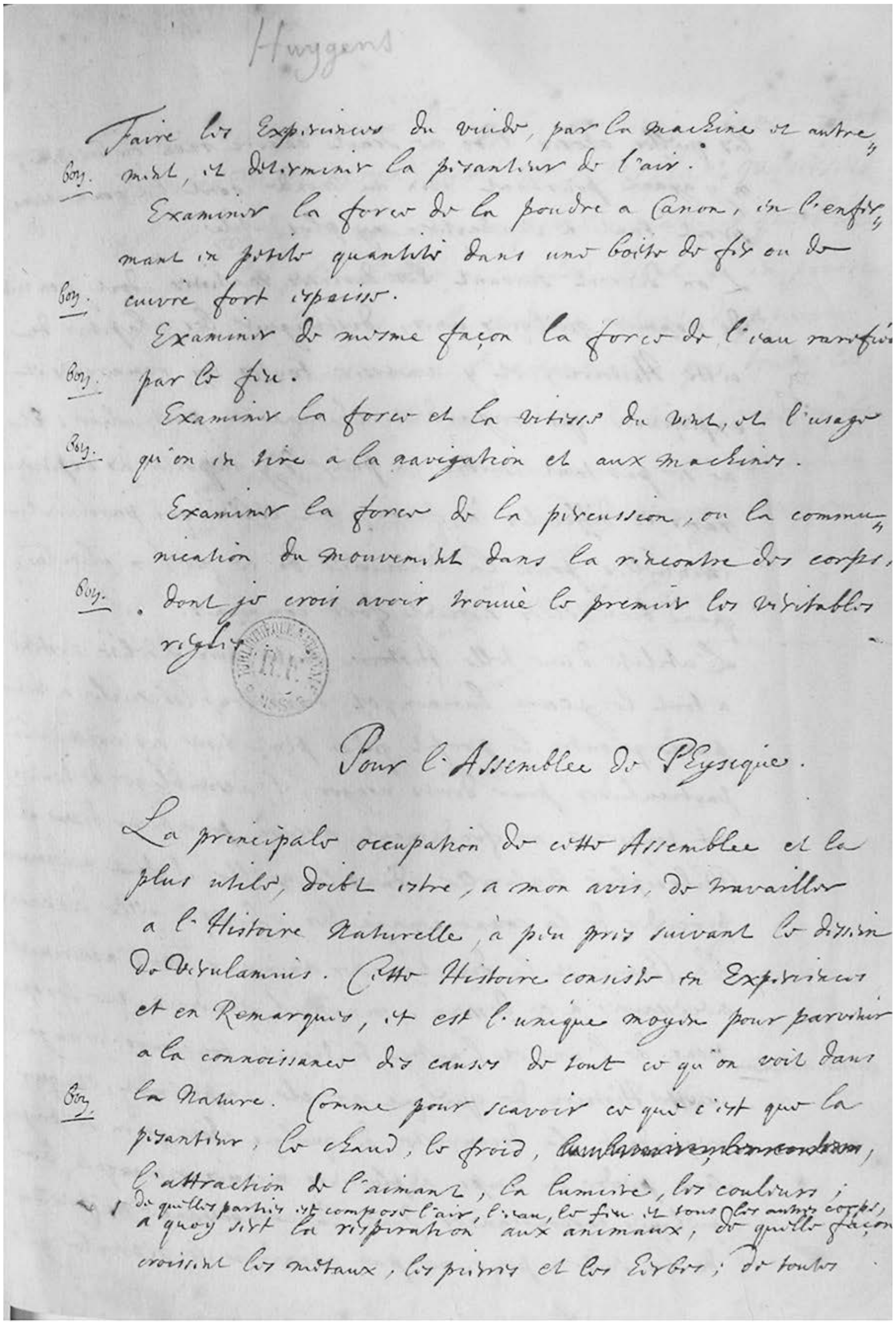
These kinds of questions bring to mind Francis Bacon's, *Sylva sylvarum, or a Natural History in Ten Centuries* (1627). In it, Bacon called into question the ancients' belief in sympathies and antipathies between plants. In a chapter titled "Experiments in Consort Touching the Sympathy and Antipathy of Plants," Bacon wrote, "For as to plants, neither is there any such secret friendship or hatred as they imagine;…for it is thus; Wheresoever one plant draweth such a particular juice out of the earth, as it qualifieth the earth, so as that juice which remaineth is fit for the other plant; there the neighbourhood doth good, because the nourishments are contrary or several: but where two plants draw much the same juice, there the neighbourhood hurteth, for the one deceiveth the other."[16] We may wonder if Claude had in mind similar arguments made forty years earlier by Francis Bacon. *Sylva sylvarum*, first published in Latin, was the most widely published of Bacon's texts in the seventeenth century.

Of the project proposals generated by the savants, the one most carefully composed was that of Christiaan Huygens (Figure 18). In Huygens's proposal, we can see several emerging interests that come to constitute his body of study over the next several years. Most notably, Huygens was fascinated by finding ways to extract the power from nature in order to make it useful to man. In all, he divides his proposed projects into five areas:

> Make experiments on the vacuum mechanically and otherwise to determine the weight of air.
>
> Examine the force of gunpowder enclosed in small quantities in an iron box or a very strong copper one.
>
> Examine in the same fashion the force of steam.

[16] Francis Bacon and William Rawley, *Sylva sylvarum, or, A Natural History in Ten Centuries* (London: Printed for W. Lee, 1626), 101.

Examine the force and the speed of wind and the uses that we can draw from it for navigation and machinery.



Huygens

Faire les Experiences du vuide, par la machine ou autrement, et determiner la pesanteur de l'air.
bon.

Examiner la force de la poudre a Canon, en l'enfermant en petite quantité dans une boite de fer ou de cuivre fort espaisse.
bon.

Examiner de mesme façon la force de l'eau rarefiée par le feu.
bon.

Examiner la force et la vitesse du vent, et l'usage qu'on en tire a la navigation et aux machines.
bon.

Examiner la force de la percussion, ou la communication du mouvement dans la rencontre des corps, dont je crois avoir trouvé le premier les veritables regles.
bon.

Pour l'Assemblee de Physique.

La principale occupation de cette Assemblee et la plus utile, doibt estre, a mon avis, de travailler a l'Histoire Naturelle, a peu pres suivant le dessein de Verulamius. Cette Histoire consiste en Experiences et en Remarques, et est l'unique moyen pour parvenir a la connoissance des causes de tout ce qu'on voit dans la Nature. Comme pour scavoir ce que c'est que la pesanteur, le chaud, le froid, [illegible], l'attraction de l'aimant, la lumiere, les couleurs; de quelles parties est composé l'air, l'eau, le feu et tous les autres corps, a quoy sert la respiration aux animaux, de quelle façon croissent les metaux, les pierres et les herbes; de toutes
bon

Figure 18. Christiaan Huygens, work proposals for himself and the Compagnie. Note Colbert's endorsements, "bon" in the left margin. Courtesy of the Bibliothèque nationale de France.

> Examine the force of percussion, or the communication of motion when bodies collide, which I believe to have demonstrated the first true rules.[17]

Although both Auzout and Huygens entered the Compagnie in the division of mathematics and astronomy, neither mentioned an interest in pursuing any astronomical projects. We might draw two conclusions: first, perhaps their future astronomy projects were simply taken for granted; second, perhaps they may have been trying to sustain and capitalize on a polyvalent character of the Compagnie they hoped to establish. In either case, their original work plans suggest that they saw the lines between the verifiable and the theoretical sciences were blurred from the beginning. While the Compagnie was conceptually divided into two groups, effort was made to guarantee that the two groups would never be isolated. Colbert brought together men from a variety of backgrounds, perspectives, and expertise who were each encouraged to pursue an independent agenda and were willing to work incessantly for the sake of advancing their science. They would discuss all subjects with a deep structure that would keep the speculative and the experiential subjects from competing but would also facilitate a steady progress in both domains. And in each discussion, no matter what the subject, there would always be one advocate with an appropriate expertise, and twenty other interested parties, all with a distinct but relevant point of view.

As noted above, Huygens was the Compagnie's director of research. It is no surprise then to learn that attached to his initial personal research agenda proposal was an overall plan meant to guide the work of the entire Compagnie. "The principal occupation of this

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[17] Bertrand, *L'académie des sciences*, 8–9. "Faire des experiences du vuide par la machine et autrement et determiner la pesanteur de l'air. Examiner la force de la poudre à canon en l'enfermant en petite quantitè dans une boiste de fer ou de cuivre fort espoisse. Examiner de mesme facon la force de l'eau rarefiè par le feu. Examiner la force et la vistesse du vent et l'usage qu'on en tire à la navigation et aux machines. Examiner la force de la percussion ou la communication du mouvement dans la rencontre des corps, dont je crois avoir donnè le premier les veritables regles."

Assembly," proposed Huygens in his memorandum to Colbert, "and the most useful ought to be, in my opinion, to work on a natural history following fairly closely the plan of Verulamius."[18] Huygens refers here to a Latinized version Francis Bacon's acquired title, "Lord Verulam." In his Compagnie work plan, Huygens provided what his proposed methods might mean in terms of Compagnie processes and objectives. What he describes is an inductive process with distinct dependence upon experimentation. He explains that "natural history," "consists of experiments and of observations and is the unique means of reaching the knowledge of the causes of all that we see in nature." [19]

Huygens provides a starting point for the Compagnie's mission, but his personal list grows into an extensive network of phenomena: "what is the heaviness, hotness, coldness, the attraction of magnet, light, colour the composition of air, water, fire, and all other bodies, to what serves animal respiration, in what fashion metals, stones, and plants grow; of all these matters little or nothing is yet known, and yet nothing in the world of knowledge is more desired or useful."[20] Huygens's work proposals are bound in a book housed in the Bibliothèque nationale de France. In the margin of Huygen's proposals, Colbert's endorsement can be seen on the reviewed original: in the margins where he scrawls "bon" next

[18] Huygens, *Œuvres complètes* 6:95. "La principale occupation de cette Assemblée et la plus utile doibt estre, à mon avis, de travailler à l'histoire naturelle à peu pres suivant le dessein de Verulamius. Bertrand, ibid, 9, repeats these lines.

[19] Bertrand, *L'académie des sciences*, 8–9.

[20] Ibid. "Cette histoire consiste en experiences et en remarques et est l'unique moyen pour parvenir à la connoissance des causes de tout ce qu'on voit dans la nature. Comme pour sçavoir ce que c'est que la pesanteur, le chaud, le froid, l'attraction de l'aimant, la lumiere, les couleurs, de quelles parties est composè l'air, l'eau, le feu et tous les autres corps, à quoy sert la respiration des animaux, des quelle façon croissent les metaux, les pierres et les herbes, de toutes lesquelles choses on ne sçait encore rien ou tres peu, n'y ayant pourtant rien au monde dont la connoissance seroit tant à souhaiter et plus utile."

to each paragraph. Colbert writes: "C'est mon sentiment" adjacent to a statement lauding the benefits of avoiding wasting time on superfluous pursuits (Figure 19).[21]

The image of Colbert that emerges here may not match the contemporary version of him as a top-down, autocratic administrator, but it does align with the alternative characterization that arose in Chapter 3. In particular, the value Colbert placed on soliciting expert advice is

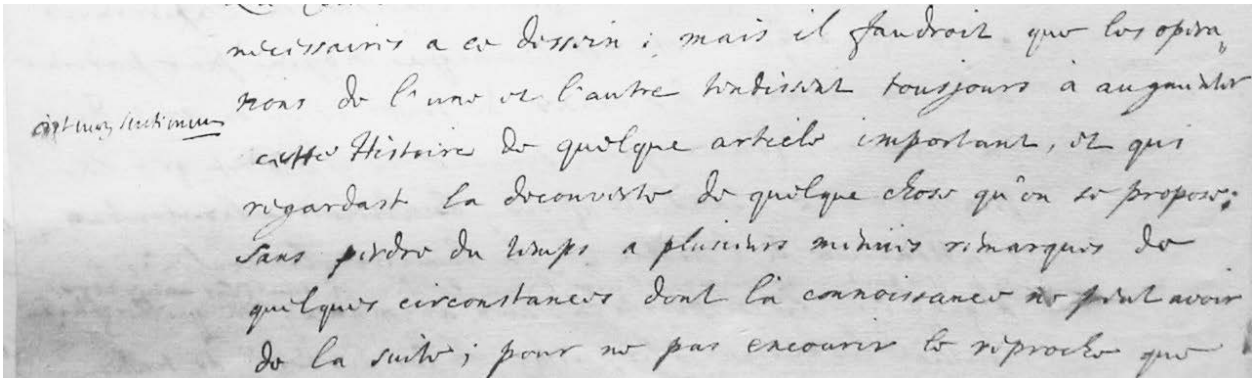

Figure 19. Christiaan Huygens, work proposal. Note Colbert's annotation, "C'est mon sentiment."

clear here. It seems to me that Colbert is more than deferential to the expertise of the savants. He acknowledges that the savants know more about their needs and objectives than he does. He seems to have given each member a degree of freedom in discovering their path, and more broadly, he empowered the group to set their methods and personality. We recall his confidence in the group, and his high expectations: it would be up to them if they would become the most famous and knowledgeable group who had been in the world.

[21] The assertion that we have Huygens's and Colbert's hand is made here not without some controversy. The manuscript appears to be signed by Huygens, but it is neither dated nor addressed, which casts doubt on it being the document meant for Colbert. It is bound with many other letters in a single book that came from the *cabinet* of the astronomer Ismaël Boulliau, to whom it was at one time addressed and mailed. However, I can attest to seeing this letter firsthand, and given the qualities of its paper and ink, there is no doubt that it does not belong with any of the other letters in Boulliau's collection. Furthermore, given that it fits the profile of the document that Colbert requested from Huygens, and that Clément, the only author to have verified its authenticity, attributes the individual handwritings to both Huygens and Colbert, I would argue that this is indeed Huygens's proposal and Colbert's endorsement notes.

Sturdy draws a similar conclusion, believing that, given the care that he took in vetting the potential membership, Colbert was confident that the men he had in place shared his expectations, and thus "he felt no need to impose a rigid structure at the outset; he was content to let the academicians run their own affairs to a large extent."[22] To understand Colbert's intentions—of which we know, there is no record—we only need to look at the membership itself. As Sturdy decides, "it was the savants themselves who were the depository of Colbert's intentions."[23]

In this chapter, I have emphasized Colbert's central role in the development of the Observatory project. The first step in the project's development was to form the group of its users. But, in typical Colbertine fashion, that meant a questioning and a redesign of the traditional systems underpinning the everyday practices of the production of knowledge. Colbert's careful and deliberate membership vetting and selection reaped for him two benefits: first, he could be confident that he had selected the most capable and compatible men available for the job; second, his new Compagnie was also the newest group of advisors whom he could consult in the next stage of the Observatory project development, to construct their home and work place—the work of architecture of the Observatory itself. However, as we will see in the next chapter, designing and building that structure predictably meant first reforming the practices of its world as well.

[22] Sturdy, *Science and Social Status*, 77.

[23] Ibid.

Chapter 5 — The Reform of the Production of Architecture

L'ARCHITECTURE
En des palais délicieux
Dignes de la grandeur des Dieux
J'ay changé des Mortels les demeures sauvages,
Je Joins les ornemens à la solidité:
Et la beauté de mes ouvrages
Augmente encor des Rois l'august majesté.

ARCHITECTURE
Into delectable palaces
Worthy of the grandeur of the Gods
I changed the primitive dwellings of Mortals,
I Join ornaments to solidity:
And the beauty of my works
Enhances further the august majesty of Kings."

Charles Perrault, 1690

Recap: Colbert in 1664

The previous chapters have demonstrated that during the months leading up to the appearance of the comet, Colbert was in the middle of several projects aimed at reforming significant aspects of his culture. It is now timely to recount that 1664 work.

Through his reform projects, Colbert was led to intervene in many of the worlds that made up everyday French life, and to analyze, gain control, and then reform the practices around which those worlds were organized. His interventions often saw him involved to a minute degree. While his ambitions led him to engage with many diverse worlds, once committed to that world, he proceeded, I have suggested, in a certain constant style. Although there was undoubtedly some hierarchy in his reform objectives, he also appears to have been relatively opportunistic, letting the conditions around him shape his methods and style. Take, for example, the Fouquet fête and the unanticipated arrival of the comet. He accepted both as events to be exploited, and he used them as mechanisms to expose the defunct cultural systems that he intended to replace. In turn, Colbert was able to usher in his new reform projects.

Most modern historians—such as Cole, Brown, and the others on whom this study has leaned—have appropriated various portions of this era as the subjects of their own studies. As a consequence, the continuity of this rich and complex period has been fragmented. With their specific interests, these historical accounts accept that they must overlook the interdependence of events and cross-motivations that I maintain actually prompted events to unfold in the ways that they did. Overlooking the interconnectedness of events is particularly distorting in the case of Colbert, whose own interests, as we have seen, were diversified, eclectic, and radical. However, if we recognize works of architecture as cultural elements that, by their nature, overlap into many cultural worlds, and consider the Observatory project one particular focus of the historical moment that shaped its origins, we will discern a more complete and, at least for the purposes of this study, relevant world picture of the era.

We can begin this brief review by confirming one earlier characterization: that Colbert was certainly an unrelenting and ambitious reformer with an extraordinary capacity for work. This was particularly true in 1664. It was by all measures an extraordinary year. By December, Fouquet's three-year trial had finally come to a close and he was being sent to Pignerol. Throughout the year, the trial proceedings demanded much of Colbert's time and effort and required his constant intervention. For Colbert, much hung on the outcome of the trial, which was a test of the popular mood of the time. In the turbulence of the upper-class uprising of the Fronde, putting Fouquet, a member of that class, on trial, was clearly risky. Of the two possible outcomes, a conviction would set the stage for subsequent reform plans. Yet, if Fouquet went free and the old systems of finance and justice were thereby endorsed, Colbert's reform objectives would likely be ruined and any momentum lost. In hindsight, the temerity that Colbert and his young king showed by challenging Fouquet may have been

enough to tilt the balance in popular sentiment, but as it happened, Fouquet's conviction provided significant momentum for Colbert, which he exploited.

The Fouquet affair exposed an antiquated system for administering justice. The Fouquet prosecution provided Colbert with an opportunity to expose some of those abuses, and by 1664, while in the depths of the trial, the reform of the judicial system had become a mandate.[1] Colbert was already preparing proposals in the background of the trial for many overarching legal reforms. Colbert started at the very foundations of the judicial system, beginning with a systematic examination of all existing judicial procedures, which included filing a compendium tracking all past royal ordinances and operations of all royal councils. Colbert involved himself with all issues of judicial administration, including how judges acquired their positions and how they then passed them on.

Colbert's investigations probed areas that would today seem far afield from the daily workings of the courts around the kingdom; not only the daily operation of the courts, but also "ecclesiastical affairs, the policing of the towns, and 'matters concerning the aristocracy' fell within Colbert's expansive definition of justice."[2] These plans and projects were a part of Colbert's year of reform, 1664; he then put his systematic proposals into motion the following May, when he proposed to Louis the formation of a Council of Justice to take up the implementation of his reforms. The Fouquet trial allowed Colbert to expose not only the dysfunctional judicial systems but the corrupted financial systems as well. He had been

[1] In fact, historian Albert Hamscher argues that Colbert was the source of every judicial reform of the time, and in 1664 he set out on a reform agenda that was "breathtaking in scope." Albert N. Hamscher, *The Royal Financial Administration and the Prosecution of Crime in France, 1670–1789* (Newark: University of Delaware Press; Lanham, MD: Rowman and Littlefield, 2012).

[2] Ibid., 51. Hamscher cites Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 6:5–12, 6:15–17, 6:247–49.

methodically unscrambling the financial accounting of the Mazarin administration since 1661. By 1664, Colbert added the Fouquet financial morass to the reconciliation of France's finances. However, unravelling those chaotic schemes was only the starting point of an even larger reform project: a near-total restructuring of the French financial system.

Throughout 1664, Colbert was preparing various proposals intended to restructure all aspects of the French economy. The motivations behind Colbert's reform initiatives are usually owed to a compulsion for efficiency, or to gain personal power. However, examined in another way, a deeper and more relevant theme emerges. Generally speaking, Colbert's motivations can be interpreted as being restorative in nature. The aims of his reform efforts were more to correct a wrong than any other goal. With his compulsion to reform the ways in which life was being conducted, he strove to put France on a course towards its proper destiny, by first re-establishing the ancient relationship between king and kingdom. According to Hamscher, Colbert's actions show a central desire to "reconstitute the domain, to 'reunite' to its elements that had been alienated in the past," to reconstitute "*droits* that had formed the incorporeal domain."[3]

In 1664, much of France had forgotten what it was like to exist under the rule of a true French king, having lived for more than twenty years in a state ruled by foreign nationals and, before that, a king whose Catholicism was never uncontested.[4] Colbert had the authority to

[3] Hamscher, *The Royal Financial Administration*, 56. Hamscher writes that a royal edict in April 1667 "announced a 'general reunion' of the domain, 'as the condition of the king's affairs and finances will permit it.'"

[4] Mazarin was Italian, and Anne of Austria, Louis's mother, was Spanish and Portuguese. Henri IV was born Catholic but raised by his mother in the Protestant faith. He inherited the crown after the deaths of his mother and two male relatives. Henri fought against the Catholic League, who protested that as a Calvinist he had no rightful authority to rule France. After four years of fighting, Henri capitulated and converted to Catholicism, but neither the French Catholics or Huguenots ever fully accepted his sincerity.

put things back in order. In the last century, the central power of kingdom had been lost, diluted among a syndicate of self-interested individuals. Here we can understand all of Colbert's reforms in a single way: as a kind of obligation he felt to "reunite" the French people with their ancient royalty. In his detached and disinterested role, he committed himself towards fulfilling that reunion.[5]

Acting under that justification, Colbert proposed many new financial reforms, including new tax systems, a new regulatory structure on French industry,[6] and new tariffs on foreign merchants and trades.[7] This was the beginning of what amounted to years of acts, edicts, resolutions, and policy proposals too numerous to name. Besides restoring the historic dominion of the king, the reforms Colbert proposed would inevitably lead to a self-sufficient prosperity for France. Towards those ends, in 1664 Colbert's efforts to construct a network of support for France's manufacturing industries was gaining momentum. Manufacturers of products such as textiles,[8] lace, tapestries, mirrors,[9] and many other domestic goods were at that time being fostered by Colbert.[10] The objectives of his internal reform projects, which can

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[5] Many of Colbert's reform initiatives were officially referred to as "reunions."

[6] Colbert believed that it was only in quality that manufactured goods could gain in an existing market, and that separating individual encouragement from central regulation was pointless. "Colbert felt that (regulation) must be maintained by the government, since the business men were a shortsighted, selfish, grasping lot, ever ready to sacrifice national interests and ultimate benefits for immediate individual profits." Cole, *Colbert*, 1:361. For more, see Cole's section "XII, The Regulation of Industry," ibid., 2:361–457. Colbert also believed that all regulation was, by nature, local. Therefore, he required local agencies to maintain their own particular rules, each of which, by default, he oversaw. Ibid., 2:369–77.

[7] Ibid., 2:422–28.

[8] The production of wool stockings was a significant matter. See Cole's Chapter 10, "Manufactures: Textiles and Stockings," ibid., 2:132–237. See also ibid., 2:107.

[9] Ibid., 2:238–362.

[10] There were many other smaller domestic industries that Colbert was also supporting, including soap, leather, paper, sugar, and, of course, salt. Cole writes that, given the lack of statistics, "it is impossible to estimate with any accuracy the effect of all Colbert's efforts in behalf of French industries, great and small. It is certain that the total domestic production and the export trade of

be summarized as everything from establishing methods for overcoming "a plague of idleness" in the workers of France to restructuring the entire banking and taxing authority,[11] were both tactical and comprehensive, and cut across all tiers of French culture. All these efforts and proposals constituted a part of his 1664 agenda.

In addition to judicial and fiscal reform projects, part of Colbert's agenda included spearheading projects aimed at resuscitating France's foreign commerce ventures. Motivated by the Dutch and their hugely profitable East India Company, Colbert hoped to create a great French colonial and commercial empire in a new world.[12] France's existing foreign ventures, including companies such as the Compagnie de Nouvelle France (the group that facilitated Marie de l'Incarnation's expedition) and various other ventures in East India and Madagascar, had at best met uneven success, and most were exhausted and nearly defunct. As he gained authority, Colbert began purchasing and consolidating the assets of weak companies and merging them into a larger project throughout 1664. In May, he reorganized the commercial and colonization Compagnie de la Nouvelle-France (or, Compagnie des cent-associés) to charter the Compagnie française des Indes occidentales. Three months later, he merged three floundering commercial companies into a new Compagnie française des Indes orientales.[13] The investors of the two companies had important formal meetings throughout

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France was much increased under Colbert. But such statements do not give an adequate idea of his tremendous accomplishment, especially since there leap to mind a dozen particular instances in which he met with partial or complete failure." Ibid., 2:362.

[11] Both Cole and Hamscher claim that nearly all of Colbert's proposals mention the objective of occupying an underused French workforce.

[12] Cole, *Colbert*, 1:476.

[13] According to Cole, these companies were a large part of Colbert's overall enterprise. Cole documents many events in the summer of that year that required Colbert's involvement—from initial stock holders meetings to presentations made to the Parlement de Paris, which registered the company in September. Ibid., 1:478. For more on the consolidation, Cole cites "Nouvelles Acquisitions françaises," no. 9342, fols. 59–60.

1664 and, unsurprisingly, Colbert was noted as a regular attendee.

The Compagnie française des Indes occidentales (French West Indies Company) grew from Colbert's admiration for the powerful Dutch East India Company, which he estimated brought the Dutch economy tens of millions of livres per year. He lamented that French bullion was leaving France and going directly to Dutch shipping syndicates, and he could see that the Dutch's commercial strength was due largely to their overwhelming superiority on the seas.[14] Throughout 1664, Colbert initiated and oversaw the construction of new shipyards and new ships; he imported shipbuilders from Holland, England, and Italy, and personally aggregated the necessary materials. He was also overseeing the creation of canon factories and foundries, establishing programs to recruit and train domestic and foreign workers, and creating schools to educate his future sailors.

Of course, it was not only France's maritime fleet or her antiquated financial and judicial systems that concerned Colbert in 1664. As we saw above, at the same time Colbert was directing a project run by Jean Chapelain and Charles Perrault to identify illustrious men who might have earned royal sponsorship. That study was the preliminary step in a much larger project: a careful search for the right men to staff a "Grande Académie" of sciences and arts, and undertaking that occupied the previous chapter. Related to that project, Colbert was simultaneously soliciting plans for possible organizational structures for such an academy. We know of two being developed at the time, both of which aimed to redefine the basic structure

[14] Cole repeats the estimate of Eon, who claimed that although France had four hundred leagues of coast, it had barely six hundred ships. On the other hand, the Dutch had more than ten thousand, nearly all of which were acquired in the previous forty years (Cole, *Colbert*, 1:211–12). Colbert wrote at the time that "it is certain that the fleets arriving in Holland each year, bring back goods to the value of ten million to twelve million livres, which they then distribute to all the kingdoms of Europe and get money from them, which causes their power" (Ibid., 1:477). For more on the context on Colbert's efforts to develop a French maritime industry, see Cole, "Sea Power," in *Colbert*, 1:450–68.

of the production of knowledge in France. In fact, Perrault's vision for the future of France called for the establishment of a centralized academy in a single, royal facility, combining all branches of learning for the production of knowledge. In short, 1664 marked the threshold of a massive restructuring of the largest and deepest structures in French society.

It is easy to be awed by Colbert's willingness to take on these enormous reformation projects, but we should not forget that he was also directing other less visible long-term projects during the same period. For example, he was also recruiting mining operations for France's precious metals; initiating detailed social and population analyses; conducting inventories of and reforming the hospitals of France; establishing investigations concerning various maladies and plagues; creating programs to invent new medicines; investigating a formal policy for the state's relationship with the poor and indigent; and initiating farming policies meant to insure adequate food sources for France.[15] We can also add his oversight for the operations of all of France's seaports as well as nine fortifications.[16]

We have yet to mention his daily responsibilities as Louis's aide and chief minister, which included the management of the king's household, the Île de France, the district of Orléans; the general affairs of the clergy, the galleys, consulates, and the raising of horses.[17] Closest to Colbert were his personal quotidian tasks, like attending to his many secretaries, scribes, courtiers, favour-seekers, and his voluminous correspondence obligations, and we should not

[15] Famines had troubled France for decades, most recently in 1663, when Colbert was forced to purchase and import grain from Poland to offset the inflated prices being charged by the French merchants—a momentarily unavoidable necessity that he would have for many reasons abhorred. Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 2:52–53.

[16] At one point, Colbert agreed to divide the responsibilities for the fortifications with Louvois, the war minister. The fortifications under his command were Picardy, Champagne, Metz, Toul, Verdun, Burgundy, Dauphiné, Provence, and Languedoc. Cole, *Colbert*, 1:288.

[17] Ibid.

forget Colbert's daily subservience to his king, a relationship that could place unplanned demands on him, and behind which all other responsibilities would be relegated.

Now, given this nearly inconceivable workload of Colbert's 1664 enterprises, it is difficult to imagine that there was another reform project that—it may be fair to claim—exceeded all others in magnitude and significance. At least it can be claimed that it was the reform that had primary importance to Colbert. On 1 January 1664, he acquired full control of the royal works of architecture. Of all his many official titles, offices, and responsibilities, the office of superintendent of the Bâtiments du Roi was the first official position that he personally pursued and acquired.[18]

Throughout 1664, while occupied by the dozens of other significant reform projects and strategic plans, he was also creating and implementing policies intended to reform the current practices of the production of architecture. At year's end, Colbert and his staff were well into several important architectural projects, not the least of which was the completion of the Louvre Palace and its celebrated east wing, which was at the time one of the most significant architectural projects in Europe. In fact, we will see that at the moments when the rest of Paris was mesmerized by the appearance of the comet, Colbert was awaiting word from his emissary in Rome, whom he had dispatched there to persuade Gian-Lorenzo Bernini—the most famous artist and architect in the world—to revise a design scheme that Bernini had submitted a few months earlier, and which Colbert had once already rejected.

Thus, in his 1664 enterprises, we see a highly prolific and empowered Colbert. His ambitions drew him into many diverse worlds, and, once committed, his methods maintained a

[18] Colbert's control over the kingdom's architecture even predated his official takeover of the finances. He was not named the general controller of finances for another year, on 12 December 1665.

stylistic constancy. Colbert's methods of production of knowledge did not change from one domain to another. He seemed committed to a belief that once the conditions of knowledge are recognized and grasped, knowledge can be manipulated using a constant methodology. In 1664, Colbert was in a mood to reform what he believed to be defunct systems. Particularly germane to this study, we see that, at this historical moment, Colbert adopted the reform of the production of architecture. The following section examines Colbert's takeover of the Bâtiments du Roi, and begins the study of his project to reform the practices of architecture.

Colbert and the Bâtiments du Roi

Not surprisingly, Colbert's approach to gaining control of the position of superintendent of architecture was careful and deliberate.[19] According to Charles Perrault, Colbert had confided in him about plans to acquire control of the royal building works two years earlier, and in fact had been gradually assuming its duties for several years prior to taking official charge.[20] The sale was made official in the first days of January 1664, when the then current superintendent, Antoine de Ratabon, had, according to Colbert's records, "put in our hands his resignation, voluntarily made, of the position of superintendent and general controller of architecture, arts, tapestries, and manufacturing of France."[21] He would keep the office for his entire life.

[19] The official title was the *surintendant et ordonnateur général des bâtiments, arts, tapisseries et manufactures de France*.

[20] Perrault, *Charles Perrault*, 34.

[21] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:449. "la démission qu'a volontairement faite en nos mains le sieur Ratabon de la charge de surintendant et ordonnateur général des bastimens, arts, tapisseries et manufactures de France , et de celle de surintendant et ordonnateur général des chasteaux et bastimens, parcs , jardins, canaux et fontaines de Fontainebleau."

Ratabon had been an unlikely superintendent. He had first acquired the directorship of the Royal Academy of Painting and Sculpture in 1655 and then, a year later, the general superintendent of architecture.[22] It seems that he did not add much to either position. He governed under Mazarin's administration, and worked with Mazarin and the royal architect, Louis Le Vau, on various projects, including a rather expansive master plan for the Louvre Palace that eventually amounted to very little.[23] Henri Testelin (1616–1695),[24] the Paris painter and author of the early history of the Academy of Painting and Sculpture, suggested that Ratabon was ill-prepared for the job, being "limited in the understanding of the arts much more than is permitted" for anyone in his position.[25]

Criticism like Testelin's could have been levelled at Colbert as well. As we have seen, Colbert's background did not include classical studies, nor had anyone in his family since his great-grandfather, had been involved in building practices.[26] He was born in Reims, France, the family home of Long Vestu, a house that was for many generations the home of merchant families. All evidence shows that he followed the path of his father, grandfather, and all other Colbert merchant relatives. Courses in art, literature, and classical languages would have been irrelevant for a boy destined for the shops and warehouses, or negotiating the price of a bolt of

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[22] Clément notes that the surintendance des Bâtiments and the jardins de Fountainebleau had been separated under Charles IX from the Bâtiments de France, but were combined in June 1661. Given the dates, it is reasonable to assume that it was Colbert who foresaw the need to reunite these separate agencies into their former whole.

[23] Alexandre Cojannot, "Mazarin et le 'grand dessein' du Louvre projets et réalisations de 1652 à 1664," *Bibliothèque de l'École des chartes* 161, no. 1 (2003): 133–219.

[24] Henri Testelin and Anatole de Montaiglon, *Mémoires pour servir à l'histoire de l'Académie royale de peinture et de sculpture, depuis 1648 jusqu'en 1664* (Paris: P. Jannet, 1853).

[25] Louis Hautecoeur, *Histoire de l'architecture classique en France*, 2 vols. (Paris: A. Picard, 1943), 1:413.

[26] I again refer the reader to the very fine study of the heritage of the Colbert family by Bourgeon, *Les Colbert avant Colbert*.

muslin. Later, his apprenticeships were spent not with authors, artists, or natural philosophers in the great libraries but in the companies of bankers and lawyers in the commercial centre of Lyon. Nor is it easy to imagine him working with stonemasons on their building sites.

When he entered the professional world, Colbert established himself as a functionary in state employ, and there is no record from his time in the war department or in Prime Minister Mazarin's office that might infer his personal appreciation for the arts or literature.[27] His association with the arts during that time seems to have been primarily with assessing their values for his employers. Thus, in the years building up to acquiring full control of the production of architecture, he had been gradually acquiring positions in the arts world through his own methodical means. In 1661, he was appointed vice-protector of the Academy of Painting and Sculpture with its new sponsor, Pierre Séguier, chancellor of France, who had taken it away from Ratabon. A year later, Colbert purchased the works of La manufacture de meubles et de tapisseries des Gobelins, the enterprise known for their quality manufacturing of carpets, tapestries, and furniture.

When Colbert took control of the Bâtiments du Roi, it was operating within a structure rooted in the sixteenth century. It consisted of a tripartite structure of three divisions of administrators. First there were the *intendants*, who acted as the overall managers of each project. The *contrôleurs* were more or less the inspectors and jobsite representatives of the Bâtiments. Their job was to supervise and report on works in progress. The final officials were the *trésoriers*, who managed the payments to the artists and tradesmen. Each group was

[27] In his work with Mazarin, Colbert undoubtedly was involved with the Italian's acquisitions of Italian luxuries. However, that seemed to raise Colbert's ire rather than endear him to them. There is no record that Colbert ever acquired a taste for those luxuries. An exception may be the devotion he showed for his library, but most of his books were acquired by assistants, en masse, where entire libraries were purchased only on the basis of their titles. Given his education, he could not read many of the books in his library.

led by three officers, and to complicate matters, the three rotated their positions every three years.[28] This structure obviously appeared to Colbert's critical eye as far too layered for a superintendent who expected to have control of every detail of every project at any given moment. Reforming that antiquated organization was Colbert's first charge, and he did not wait for official authority to begin. In his tried and true style, he began by setting up committees to provide him with their advice.

In Chapter 4, we saw that Colbert conceived of a committee of erudite scholars through whom he could shape the character of his future architecture projects. Calling themselves the Petite Académie,[29] the committee consisted of Abbé Jacques Cassagne,[30] Abbé Amable de Bourzéis, and Charles Perrault, who were nominated by Chapelain. Bourzeis was a founding member of the Académie française with Chapelain and was very familiar to Colbert. Cassagne and Perrault, on the other hand, were almost certainly new faces in the court and were there because they had impressed Chapelain at some point.[31] This committee's assignment was to invent and propose projects and compose panegyrics that would serve to disseminate visions of glory for the king.[32] There was much at stake in that charge. Perrault recalled that, during the inaugural meeting, Louis told him and his colleagues how much he trusted these three

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[28] For more, see, Roger Guillemet, "Essai sur la surintendance des bâtiments du roi sous le règne personnel de Louis XIV 1662–1715" (A. Rousseau, 1912).

[29] The name would later be changed to L'Académie Royale des Inscriptions et Belles Lettres, as the scope and purpose of the work was better defined.

[30] Jacques Cassagne (1636–1679) was a clergyman and poet and member of the Académie Française.

[31] In 1663, Bourzeis was fifty-seven and roughly in the generation between Chapelain and Colbert. However, Perrault and Cassagne were much younger, thirty-five and thirty, respectively.

[32] Where it can be seen that this committee fit in the larger structure of the Bâtiments du Roi is in the area of the *tapisseries,* which were usually of scenes depicting Louis and his royal exploits. How these kinds of glorifying *communiques* lend themselves to Colbert's understanding of the powers of architecture will be discussed below.

men, as his reputation and fame were in their hands. He then promised to try to live up to the qualities of their words.

Perrault explained that his elite position in the Bâtiments was owed to the quality and industriousness of his committee work.[33] He also claimed that Colbert was impressed with the stories he had heard about some success that Charles had shown in managing a remodelling project on his family's house in Viry.[34] Indications are that Colbert did not believe that training in architecture or the construction trades was necessary when dealing with architectural situations. As we will see, in his view, other qualities were more valuable. Thus, by the time Colbert's control of the Bâtiments was official, Perrault was his *premier commis* in the department.[35]

But the title of *premier commis* does not do full justice to the role that Colbert laid out for Perrault.[36] After taking over the Bâtiments, Colbert assumed authority over all aspects of the works, and he placed Perrault in an office in his own house, where they conferred daily.[37] Colbert had faith in Charles's abilities to deal with architectural problems, as illustrated by story retold by Wolfgang Herrmann. In 1669, when Charles was well-situated as Colbert's principal *commis* in the Bâtiments, word arrived in Paris of a serious failure on a construction project underway in Bordeaux. Colbert was reminded, perhaps by Charles, that Charles's

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[33] Perrault, *Charles Perrault*, 40. Perrault humbly asserts that he was the standout member of the Petite Académie.

[34] Ibid., 34.

[35] Guiffrey, *Comptes des bâtiments du roi*, 1:433.

[36] Veronica Vaillancourt, "The Role of Charles Perrault in the Bâtiments du roi" (MA thesis, McGill University,1981).

[37] Archives nationales, *Documents du Minutier central concernant l'histoire littéraire (1650–1700)* (Paris: Presses universitaires de France, 1960), 305. This obscure legal notice was discovered and reprinted by Vaillancourt. See Vaillancourt, "The Role of Charles Perrault," 86n54.

brother, Claude, happened to be in Bordeaux at that very moment, on a tour with their older brother, Jean, and a few other colleagues.[38] Colbert contacted the local manager and told him to get in contact with Claude, make him aware of the problem, and discuss with him what should be done. Colbert expressed confidence in Claude, but not for the reasons that we might think. "You have at that moment in Bordeaux Monsieur Perrault," wrote Colbert, "who knows as much about architecture and good constructions as his brother, my clerk." Colbert advised that Claude should be shown the work and then consulted concerning resolution. "I do not know how to express how important it is that we bring all possible remedies to repair an accident so expensive, and to take precautions so that such a thing does not happen in the future."[39] Apparently Colbert's letter did not arrive before Claude departed Bordeaux; however, Claude had already visited the project. Claude's field report notes that the pilings were "too short and not driven home properly," an assessment that at least demonstrated a practical understanding of the construction process.[40]

Colbert used Charles Perrault to create a new, more direct and instrumental organizational structure for the Bâtiments. In his position, Perrault was empowered to slice through the layers of the Bâtiments and across multiple projects. His official title was

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[38] This journey was cut short with the unexpected death of Jean. Claude kept a diary of the trip, and it was bound at the end of Charles's memoirs and published by Bonnefon. See appendix in Perrault, Bonnefon, and Perrault, *Mémoires de ma vie,* 139-218.

[39] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 22. "Vous avez à présent à Bordeaux M. Perrault, qui ne s'entend pas moins en architecture et en bonnes constructions que son frère, mon commis. Ne manquez pas de luy faire voir l'etat auquel sont tous ces travaux, et de conférer ensuite avec luy sur tout ce que vous avez à résoudre. Je ne vous sçavrois pas assez exprimer combien il importe et à vous et à moy d'apporter tous les remèdes possibles pour réparer solidement un accident si fastueux, et pour prendre de telles précautions qu'à l'avenir il ne nous arrive rien de semblable." Wolfgang Herrmann brings this story to light in *The Theory of Claude Perrault* (London: A. Zwemmer, 1973), 27–28. Hermann concludes that "obviously Colbert did not think of [Claude] as an architect."

[40] Herrmann, *The Theory of Claude Perrault*, 28.

intendant, but he assumed the responsibilities of the *contrôleurs* as well, supervising the various projects underway. He met directly with project *entrepreneurs* (building contractors) and architects, where he discussed the designs, suggested revisions, negotiated prices, and even signed contracts. He also acted in the role of a *trésorier* by processing payment requests and facilitating the issuance of treasury funds, which he personally delivered to its receivers.[41] In many cases, he seems to have acted in his superior's stead when the time was right. In fact, he later admitted that his powers were such that at times his ideas were accepted without question because those with whom he dealt believed that they must actually be Colbert's own, "or at least had approved them."[42] Perrault's reports went directly to Colbert, which in turn gave the superintendent direct access and control over each particular project.

The position of superintendent of the royal architecture came with some significant inheritances. One was the services of the king's premier architect, Louis Le Vau, and his atelier of architects and draftsmen.[43] Given his projects, it was undoubtedly the most prolific architectural staff in France. Colbert was already very familiar with Le Vau and probably members of his staff, including Le Vau's primary draftsman and project architect, François d'Orbay. Le Vau had worked closely with Mazarin on significant projects, and Colbert would have certainly encountered him then. The two would also have had other personal

[41] Guillemet, Roger. 1912. *Essai sur la surintendance des bâtiments du roi sous le règne personnel de Louis XIV 1662-1715*. Paris: A. Rousseau, 79.

[42] Perrault, *Charles Perrault*, 65.

[43] There are two useful works on Le Vau. The first is Hilary Ballon, *Louis Le Vau: Mazarin's Collège, Colbert's Revenge* (Princeton: Princeton University Press, 2000). A second more recent work is Alexandre Cojannot, *Louis Le Vau et les nouvelles ambitions de l'architecture française 1612–1654* (Paris: Picard Editions, 2012).

connections since at least 1654, when Le Vau worked on the young Louis's private apartments.[44]

Colbert also found himself responsible for a large inventory of ongoing construction projects. Checking the expense records of the Bâtiments du Roi, we see that there were numerous major and minor design and construction activities being funded by France's treasury at that time.[45] The larger projects, such as the king's palaces at Versailles, Saint-Germain, Vincennes, and Fontainebleau, were a constant drain on the Bâtiments' time, money, and attention. But, at that moment, no project could be more significant for Colbert than the completion of the royal palace in Paris. The Louvre Palace was the primary residence and ancestral home of the king. As important as that inherited grandeur was to Colbert, the Louvre Palace was also the locus of the state of France and the symbolic and operational site of traditional royal governance. The part of the palace left to complete was its eastern wing, which had sat unfinished for decades.[46]

The stakes of the east wing project were high. Because the Louvre Palace was situated on the western end of the city, its eastern end would face not only Paris proper but symbolically the rest of Europe and its tradition of great architecture. As the front of the palace, the east facade would be the countenance of king and kingdom. Perhaps due to these highly charged

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[44] Hautecoeur, *Histoire de l'architecture classique en France*, 48. Le Vau was Fouquet's architect on the Vaux le-Vicomte project. In a later instance, Colbert purchased a Paris house built by Le Vau (Hotel Bautru) and was forced to renovate it when its foundations began to fail. D'Orbay was also a familiar figure in the Mazarin regime.

[45] Guiffrey, *Comptes des bâtiments du roi*. 1666.

[46] For a concise, well-illustrated overview of the projects proposed for the east wing of the Louvre in the years before 1664, see Robert W. Berger, *The Palace of the Sun: The Louvre of Louis XIV* (University Park: Pennsylvania State University Press, 1993). For a detailed study of these projects, see, for example, Louis Hautecoeur, *Histoire du Louvre: le château, le palais, le musée: des origines nos jours: 1200–1928* (Paris: L'Illustration, 1928).

conditions, or perhaps due to years of administrative incompetence—something that Colbert was confident he could rectify—all previous attempts to complete the east wing had been frustrated.

Over the previous decade, multiple design schemes for the project had been proposed and had either been rejected or died from lack of enthusiasm. However, in 1660, one design scheme had been approved for construction. It was a large master plan put together by Mazarin and Le Vau[47] known as the "Grand Dessein" of the Louvre.[48] The Grand Dessein proposed completing the Louvre's east facade, as well as expanding the palace westward to connect with the Tuileries Palace. But the design also integrated a project planned for the opposite side of the river: Le Vau's design of Mazarin's Collège des Quatre Nations.[49] In 1660, Mazarin gave official approval to Le Vau's design, and the project went into a drawing development phase in Le Vau's atelier. Upon Mazarin's death a year later, Colbert took the position as personal representative to the king.

Colbert's project oversight was conservative in nature, and due not only to his frugal disposition, but also to the high esteem he proclaimed for the Louvre and its inherent powers as France's ancestral royal house: "the most superb palace that is in the world and the most worthy of the grandeur" of the king of France.[50] Colbert recognized the symbolic nature of Louvre, and in the court discussions he argued against revisions that would erode in any way

[47] Ratabon's involvement is never mentioned.

[48] For a detailed study of Mazarin's project, see Cojannot, "Mazarin et le 'grand dessein,'" 133–219.

[49] The Collège des Quatre Nations was a bequest of Mazarin. On his death in 1661, Colbert was charged with fulfilling the bequest. He appointed Le Vau to complete the project. It sits directly across the Seine River from the Louvre.

[50] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:268.

its historic significance and presence. The Louvre's grandeur could at best only be augmented by new work. In the past, failure to augment the beauty of the Louvre had been something of a norm.

In fact, Colbert had complained for decades that the current state of the Louvre as the home of the king did not measure up to what was required. As early as 1654, Colbert already was defending the Louvre as a special work of architecture. After seeing the renovations to the royal chambers, he complained to Mazarin that the workers had left the royal chambers "no more than pits...unworthy of the majesty of the king and of the greatness and beauty of the design of the Louvre," and lamented that not more could be done.[51] Colbert defended the ancient Louvre later again in 1665, situating ancient architecture between the king's interests in wars and his country home at Versailles. Colbert wrote, "Your Majesty knows that save the radiant actions of war, nothing is more emblematic of the greatness and minds of princes than buildings; and all of posterity measures [the princes] in terms of these superb houses they had built during their life. Oh, what a pity, that the greatest and most virtuous king, of the true virtue which makes the greatest princes, was measured against Versailles!"[52]

As Colbert continued to follow the design and construction work through 1663, he was also planning his takeover of the Bâtiments du Roi. Almost immediately after gaining official control of the works, he aborted all construction and design work underway at the Louvre. In

[51] Ibid., 1:221. "On travaille autant qu'il se peut à la chambre du Roy. Messieurs les surintendans n'ont encore rien donné pour cela, et je fournis incessamment ce qu'il faut, des deniers de Vostre Éminence, afin que l'ouvrage ne retarde point. Elle ne doit pas s'attendre de voir ni la chambre ni le cabinet peints et dorés avant l'hyver. Tous les ornemens de menuiserie seront seulement posés et peints de blanc. Pour dire la vérité à Vostre Éminence, ce ne seront jamais que des trous, que cette chambre et cabinet, indignes de la majesté du Roy et de la grandeur et beauté du dessin du Louvre; et je m'étonne que l'on n'ayt pas pris résolution de faire autre chose que ce que l'on fait."

[52] Murat, *Colbert*, 111.

the weeks approaching the first day of 1664, when Colbert assumed the title of *Surintendant des Bâtiments du Roi*, or, as Perrault described, "at least people began publicly offering him their complements," the construction site had been active with stonemasons and labourers. They had already completed the foundations for Le Vau's east facade and had raised a part of that wall to a level of eight to ten feet. There is no record of the reaction to Colbert's command, but it is easy to imagine that many were not pleased. Many people had invested much time and effort in the project, and it must have seemed that, in those years of trying, all other reasonable options had been considered and rejected. Yet Colbert believed otherwise. The Louvre Palace east wing project was of course a large and prestigious commission. Moreover, its design was integrated as a part of a larger master plan, being coupled with other former and present Le Vau projects.

The relationship between Colbert and Le Vau is usually thought to have been acrimonious. If true, that might explain this apparent insult to the architect.[53] After all, Le Vau had been a favourite of Mazarin and Fouquet, which would seem to have put him on the wrong side of Colbert. Furthermore, Colbert had purchased a house built by Le Vau that he discovered required considerable work to shore up its failing foundations. However, the explanation that the demotion was entirely personal is less than satisfactory when we consider the importance of the Louvre Palace project to Colbert and weigh that against his pragmatism and demonstrated willingness to bend personal principles if it might provide a gain for France. It should also be noted that serious objections to Colbert's decisions have never been discovered.

[53] Hautecoeur, *Histoire de l'architecture classique en France*, 2:263.

While historian Nicole Felkay concludes that the arrival of Colbert at the superintendence of the Bâtiments meant the end of the pre-eminence of the position of the premier architect,[54] Le Vau continued to be heavily involved in the architectural works in France. In fact, we will see that he figured prominently in Colbert's plans to reform how architecture would be produced in France, and he continued in the role as premier architect until his death. Given the atmosphere of change in the worlds under Colbert's control in 1664, it seems much easier to believe that Colbert was bent on a comprehensive reform of the system of making architecture, not simply replacing its personnel. Furthermore, it appears that Le Vau was, at least to some degree, willing to accept this reform.

After halting progress on the Louvre project's design drawings and clearing the construction site of its workers, Colbert's next actions must certainly have come as a surprise to observers. To begin, he commanded that the Le Vau's drawings and wooden model of the current project be put on public display in the Louvre library. Next, he invited all Paris architects and architectural connoisseurs to review the work and offer their individual critiques. This undoubtedly was viewed as an extraordinary move, turning a key part of the closed processes of the Bâtiments du Roi into a public spectacle. Architects and amateurs did indeed view the work, and according to Perrault, nearly everyone who saw it condemned it and provided Colbert with their opinions.[55] Colbert took advantage of the interest he raised and suggested that those who might be willing to do so should submit their own design schemes. In effect, Colbert turned the Louvre project into an open architectural design

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[54] Nicole Felkay, "La Surintendance des Bâtiments," in *Colbert, 1619–1683*, ed. Georges Mongrédien (Paris: Hachette, 1963), 281. "L'arrivée de Colbert à la Surintendance des Bâtiments le 1er janvier 1664 met fin à la prééminence du Premier Architecte."

[55] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 53. "Presque tous les architectes blamérent le dessein de M. Le Vau, et en firent la critique dans des mémoires qu'ils donnèrent."

competition. In the following few months, his call for schemes apparently attracted many submissions, even from unknown amateurs.[56] To add legitimacy and incentive, Colbert promised to execute the scheme that was deemed most appropriate, and "which the King found to his taste."[57]

If we pause to take into account the Louvre project at this precise point in time, we realize that as Colbert added the designs from Paris architects to Le Vau's designs and to the other design proposals that had been submitted in the decades leading up to 1664, he and his Bâtiments staff had collected many ideas for the east wing. Moreover, these ideas had come from the widest range of designers, each with their own perspectives. At that point, there must have been some confidence that no more could be done to tap the potential in France.

That, it seems, was not yet enough for Colbert. In March or April, Colbert ordered that Le Vau's drawings be copied and sent to Nicolas Poussin, the greatest living French painter, who was living in Rome, and asked him to conduct a similar design competition among Italian architects. Perrault composed a letter for Colbert, a copy of which Perrault included in his memoirs.[58] In the letter, Poussin was told to use the drawings "to obtain the opinions and thoughts of [Rome's] most famous architects." These would all be men with whom Poussin was surely friendly. The aim was to acquire even more design ideas from new points of view. Of course, Perrault and Colbert first wanted to hear the ideas of the most celebrated architects in Rome: "You should not forget those with great reputations, like the signori Pietro

[56] For one, Perrault claims that his brother Claude, a Parisian medical doctor, submitted a scheme for which Charles provided the key design element, a peristyle of coupled columns, and that the scheme received positive judgment. See ibid., 53–54. This aspect of Charles's memory of the events is very doubtful. Berger evaluates the credibility of Perrault's version in *The Palace of the Sun*, 26–27, 83–86.

[57] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 53.

[58] Perrault, Zarucchi, *Charles Perrault*, 55.

de Cortone, Reynaldi Areveti, the cavalier Bernini, and others of more fame."[59] However, Perrault makes it clear that Poussin should not limit his interviews to only those men: "I do not limit how many you consult. Just do not let matters drag too long." Perrault asked for the architects' opinions in writing, substantiated with "*raisons d'architecture*," or "*d'exemples considérables*."[60]

Perrault and Colbert could be confident about two things. First, it seemed certain that Poussin would find many architects in Rome who would be willing to do as they were asked, "since it is unlikely that they would be indifferent to the glory that they will receive to have made the designs for the most beautiful and most superb palace in the world." Second, because the solicitation of designs was so broad and deep, no more could be done to assure that the most perfect ideas could be conceived. Once the architects realized that their design might be chosen for the final design, and "their advice followed above all the most famous architects of their century," no architect, thought Perrault, could possibly resist the temptation to be known as the architect of the Louvre. After several pages of detailed instructions on how to carry out the Rome search, Perrault allowed that Poussin may in fact know best how to deal with the Romans. "I entrust everything to your judgment," wrote Perrault, "and I leave to you the choice of arrangements to follow in this business, which is without a doubt extremely important, since it concerns perfecting the most beautiful edifice in the world."

After laying out the Rome project for Poussin, in the second half of the letter, Perrault informed the expatriated artist of the new mood in Paris being promoted by a new king and

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[59] Ibid. Pietro Berrettini da Cortona (1596–1669) was a Baroque-style painter who worked mainly in Rome and his native Tuscany. He was also a key figure in architecture, and had just completed the church of Santi Luca e Marina and a villa for the Marchese Sacchetti. Perrault may have been trying to remember the name of Domenico Rainaldi (1619–1698), another well-known painter and architect.

[60] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 55.

minister. In the background of the Louvre Palace were many ambitions that Poussin would value. First, Perrault describes the glorious possibilities inherent in completing the Louvre Palace. That emphasis and initiative "clearly reveals the love which His Majesty has for all the fine arts," which will be elevated "to the highest degree of perfection ever attained." The king's vision included celebrations not only for his personal deeds but also for the deeds of "the infinite number of famous men in all sorts of professions, who have equalled or surpassed those of antiquity." There will be respect and gratitude paid to those with vision and ambition. "His Majesty forgets nothing which may naturally encourage virtue in the hearts of those who have some inclination toward great things," writes Perrault.[61]

The letter meant for Poussin let it be known that there was already progress being made to reward those with interests in the sciences. Monetary awards were being given out to "all the men of letters who have exceptional reputations and where merit shines, not only in France but in all of Europe, there have been tokens of his royal generosity." In an attempt to spark Poussin's personal interests and French pride, Perrault mentions painting and sculpture, "which His Majesty loves particularly, and which he views as two arts with particular powers to glorify him and transmit his name to posterity."[62]

Perrault assures Poussin that the new regime "intends to omit nothing which may bring them to the last degree of perfection." In Poussin's absence, Louis has instituted new ways to valorize painting and sculpture in France, "establishing in Paris a few years ago, a Royal Academy of Painting and Sculpture."[63] The Academy has been given "all the privileges it

[61] Ibid., 56.

[62] Ibid.

[63] The point being that although the Academy of Painting and Sculpture had been around since the 1640s, it was transformed for the better when Colbert became its sponsor in 1663.

could ever wish to have." Perrault wrote of the optimistic future of art in France, symbolized by the Academy's recent investments in educating its young artists. On behalf of the Academy, the king has engaged many teachers "for the instruction of young people, offering prizes for the students." The future of art in France, Perrault claimed, has never looked so bright: "Young people are being trained there who are very promising and who will one day become excellent masters."[64]

Perrault wrote that the education of a young French painter could not be considered complete if it did not include a Roman experience. Speaking for Colbert—someone with great admiration for the traditions of Rome—Perrault wrote that in Rome, aspiring French artists could "acquire the taste and manner of the originals and models of the greatest masters both of antiquity and of recent times." Those apprenticeships would be "very useful for the advancement and progress of these young people if they could be directed by some excellent master, who would lead them in their studies, teach them the good taste and manner of the ancients, and make them perceive in the works which they would copy, the secret and almost inimitable beauties which escape the eyes of most onlookers, and which are only discerned by the most clever."[65] Poussin would be that "illustrious master, who would have the care and direction of the students whom His Majesty will send there.

For reasons unknown to Perrault, Colbert never sent the letter to Poussin. Thus, his and Colbert's plan to involve the great French painter as France's representative and main point of

[64] Perrault, Zarucchi, *Charles Perrault*, 57.

[65] Ibid. In the second part of his letter, Perrault describes the outline of what would become the French Academy in Rome. Poussin did not live to see it happen, as he died a year before it was finally founded in 1666 by Colbert and royal first painter Charles Le Brun.

contact in the world of Roman arts was never implemented.[66] Nevertheless, the plan to solicit design ideas from Rome was carried out, but by another set of Italian collaborators. Colbert turned to a group led by Elpidio Benedetti, an Italian cleric and amateur architect, who had been known to him when Benedetti acted in a similar capacity for Mazarin.[67] He and several others worked in Rome to distribute Le Vau's drawings among local studios.[68]

Perrault reflected later that due either to Benedetti's predisposition towards his friend Gian-Lorenzo Bernini, "or because the Cavaliere ingratiated himself by means unknown to me,"[69] Bernini was seen as the favourite from the start. Perrault did not bother to mention another reason that Bernini became an early favourite among the group of Romans: his pre-eminent reputation. At age sixty-six, Bernini was at the peak of his career and was arguably the premier artist and architect of his time. In the past year he had completed the redesign of St. Peter's Square in Rome, the other great European commission of that era. We do not know how many Italian architects Benedetti and his associates actually contacted, but according to Perrault, the list included "all of the famous architects of the time." All were

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[66] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 57. "Cette lettre, qui devoit étre signée de M. Colbert, ne fut point envoyée, et je n'en sçai point la raison." Although Perrault claimed to not know why the letter was never sent, it was almost certainly due to the painter's failing health. Poussin died in November 1665.

[67] Benedetti had already attempted to import Bernini to France for Mazarin, but that effort failed. In Italy, Benedetti acquired the commission for the chapel in S. Luigi dei Francesi in Rome and created the architectural scheme for it, and shared in an aborted design for a stairway below Sta Trintà dei Monti. For more on Benedetti, see *Madeleine Laurain-Portemer, Mazarin, Benedetti et l'escalier de la Trinité des Monts* (Paris: Gazette des beaux-arts, 1968).

[68] Perrault, *Charles Perrault*, 57–59. Perrault mentions that Créqui and Barberini, and also Bernardin Guigualt, Marquis de Bellefonds, who was a marshal of France and master of the king's household, were the insiders promoting Bernini. Créqui was the French ambassador in Rome at the time. Cardinal Antonio Barberini was the nephew of Pope Urban VIII and had worked as an intermediary for Richelieu in negotiations with Bernini for a portrait bust of Richelieu. He was an early patron of Poussin.

[69] Ibid., 57–58. Perrault may be referring to the possibility that Bernini had already made contact directly with Colbert or Louis.

apparently ready to participate in the search, remembered Perrault, because "all sent their own designs." Perrault also recalled his opinion of the designs, all of which were "quite strange."[70]

The value of Charles Perrault's letter to Poussin is not diminished by the fact that it was never sent. It offers insights into the mood of the day and the moods of people whose moods greatly mattered. Moreover, the letter provides us with the only real evidence of Colbert's plotting of the expansion into Italy of his search for fresh ideas for the Louvre design. The letter is also significant because of what Perrault chose to include in the second half. If Perrault's letter can be taken at face value, and it does represent the sentiments of those who were in position to make decisions, then we see in it an abbreviated manifesto of the future of France.[71]

Colbert's Bernini Affair

Colbert had not given up on his Italian project. He composed a letter to Bernini in March 1664,[72] and it was delivered by Benedetti in Rome on 20 April. The letter read,

> Signor Cavaliere, the exceptional creations of your spirit, which earn for you the admiration of the entire world and of which my master, the King, has perfect knowledge, are such that he could not allow himself to finish construction of his superb and magnificent palace of the Louvre, without submitting the designs for

[70] Ibid., 57. Perrault's memory differs here from others who maintain that Borromini refused the invitation, claiming that he would not provide any design work without being paid in advance—a condition to which Colbert apparently would not agree.

[71] Although Poussin would seem to be an ideal candidate for the tasks envisioned for him, a probable explanation for the letter not being sent could be that Poussin was seventy years old at the time and in the final months of his life. It seems likely that either Poussin or Colbert decided that the mission might have been too much for the painter. Fréart de Chantelou confirms this view, writing that, "on avait d'abord pensé à charger Poussin de cette mission délicate; mais son état maladif la lui aurait probablement rendue fort difficile." Paul Fréart de Chantelou, *Journal de voyage du Cavalier Bernin en France* (Paris: Macula-Insulaire, 2001), 2.

[72] It is amazing when we consider the pace at which Colbert was working. Less than three months had passed since the day that Colbert had taken charge of the Bâtiments.

> examination by the eyes of so excellent a man as yourself and thereof receive your opinion.[73] Accordingly he commanded that I write you these lines in order to entreat you most earnestly on his behalf to spare some of the time you are devoting, with so great glory, to the embellishment of the premier city of the world, and examine the plans that will be delivered to you by Signor Abate Elpidio Benedetti. His Majesty hopes that not only will you make your sentiments on these plans known, but that you will put on paper some of these wonderful thoughts that are so familiar to you, and of which you have given so many proofs.[74]

While Colbert's letter opens with a request for Bernini's expert opinion of Le Vau's design, he soon addresses the real issue: he wants Bernini to provide a scheme of his own. Colbert writes,

> Regarding the latter plans, His Majesty would desire that you not only communicate your opinion of them, but that you would also be willing to set down on paper some of those admirable conceptions that spring so readily from you and of which you have given so much demonstration. His Majesty also desires that you give full credence to all that which the aforementioned Signor Abate will communicate to you on behalf of the king regarding this matter; hence, if it please you, I entrust the remainder of this

[73] It can be assumed similar letters were being sent to the other invitees. It would undoubtedly been an affront to the Cavalier Bernini that he was being placed into a competition, particularly when he realized that he was being grouped with men whom he would consider his inferior. When discovered, Bernini was reportedly not pleased. Colbert seems to have not drawn such a distinction.

[74] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:245. "Les rares productions de vostre esprit, qui vous font admirer du monde entier, et desquelles le Roy, mon maistre, a une parfaite connoissance, ne sçauroient luy permettre de terminer son superbe et magnifique palais du Louvre sans en avoir mis les dessins sous les yeux d'un homme aussy excellent que vous l'estes, afin d'en avoir vostre avis. C'est ce qui l'a porté à me commander de vous écrire ces lignes, pour vous prier instamment, de sa part, de donner quelques heures de celles que vous employez avec tant de glorie à embellir la première ville du mond, à voir les plans qui vous seront présentés par M. l'abbé Elipidio Beneditti. Sa Majesté espère que non seulement vous luy férez connoistre vos sentimens sur ces plans, mais encore que vous voudrez bien mettre sur le papier quelques-unes de ces admirables pensées qui vous sont si familières, et desquelles vous avez donné tant de preuves. Comme Sa Majesté désire que vous accordiez une entière créance à tout ce que ledit abbé vous dira de sa part à ce sujet, trouvez bon, s'il vous plaist, que je m'en remette, pour le surplus, à c qu'il vous expliquera de vive voix."

communication to him. And please rest assured, through these few lines, that I am truly Your most Humble and Most Observant Servant, Colbert.[75]

Several parts of Colbert's letter warrant further discussion. The first is the significance of the Louvre's east facade project. Colbert makes clear that it would be a huge commission for any architect—great enough to arouse the desires of every architect in the world. Colbert certainly expected Bernini to be flattered to be considered for such an enormous gratuity from the French king, and he also expected Bernini to want the job. Second, his praise of Bernini's city was genuine. For Colbert, Rome was nothing less than the greatest city in the world.

However, there is a subtler message in Colbert's letter that also deserves mention. As the new director of architecture, Colbert was not from the elite world that produced the likes of Ratabon, Fouquet, or Mazarin—all with whom Bernini had been previously affiliated. The point must have been made that a new kind of leadership had taken control of the way that architecture was going to be produced in France. Even the greatest architect in the world—a personal acquaintance of the Pope—should recognize that fact. There was a fundamental drive beginning in Paris to change the way architecture was conducted and Colbert was personally leading it. Bernini must have been cognizant that the work of the king's premier architect, and thus any architect, could not only be questioned, doubted, and then terminated, but also that his work could be pulled from the drafting boards and subject to critique by every interested architect.

Perhaps most important in Colbert's letter was that the quality of art and architecture could now be critically interrogated by someone with the practical education and training of a merchant, someone who was not weaned on the ancient authorities. Colbert could demand

[75] Franco Mormando, *Bernini: His Life and His Rome* (Chicago: University of Chicago Press, 2011), 252–53, Mormando's translation.

that the design drawings of the leading architect in France be pulled from the draughtsmen's tables and made subject to public scrutiny. He could have them wrapped and shipped to critics not only of Bernini's artist rank but to any architect who might have something useful to say about them. With his polite letter, Colbert was communicating more than his king's desire to involve Bernini in the Louvre project. He was also letting Bernini know that the traditional process of making of architecture in Paris was being reformed.

Bernini barely hesitated in responding to Colbert's solicitations. After receiving permission to do so, with his letter of 4 May 1664, Bernini notified Colbert of his eagerness to take on the task being offered. Bernini began his work on the Louvre immediately, and within five or six weeks he had produced a design. He forwarded his drawings to Paris, where they arrived on 25 July. Bernini's drawings depicted a flowing Italian baroque facade for the palace of their monarchy. Its many curves and its overall sculptural qualities must have been nearly unimaginable for them. It seems that Colbert and in particular, Louis, were impressed Bernini's sculpturesque design. Speaking for himself and his king, Colbert's letter back to Bernini in Rome overflowed with admiration. "It is certain," wrote Colbert, "that there is nothing more beautiful, more grand, more magnificent than this design. One could even truly say that the ancient Greeks and Romans never invented anything which showed more taste for fine architecture and which at the same time had more grandeur and majesty."[76]

A letter soon arrived by the king's courier, inviting Bernini to Paris to continue working on his scheme in situ. In Louis's personal hand, the note read,

[76] Colbert, *Lettres*, 5:xxxiii. "Il est certain, disait-il, qu'il n'y a rien de plus beau, de plus grand, de plus magnifique que ce dessin, et qui ayt plus de rapport à la grandeur des rois pour qui il est destiné... Jamais les anciens Gecs et Romains n'ont rien inventé qui eust plus de goust de la belle architecture et qui eust en mesme temps plus de grandeur et de majesté."

> Seigneur Cavaliere Bernini, I have such esteem for your talent that I have a great desire to see and know such an illustrious person, provided that my wishes may accord with your services to Our Holy Father the Pope, and with your personal convenience. I have therefore sent this courier, by whom I beg you to grant me this satisfaction, and undertake the journey to France. A favorable occasion has presented itself with the return of my cousin and Special Ambassador the Duke de Créqui, who will inform you more precisely of the reason why I wish to see you and to discuss the beautiful designs which you have sent me for the Louvre. For the rest, I shall rely upon my cousin to convey to you my good wishes. I pray God that he keeps you in his holy care, Seigneur Cavalier Bernini. Signed, Louis.[77]

Bernini accepted the offer, and in late April he and an entourage, including his son Domenico and his chief staff architect, Mattia de Rossi, set off on the journey to Paris over the Alps. Bernini's celebrity status was monumental. As Perrault wrote, Bernini's expedition received honours that were "something incredible." Upon departing Rome, "the whole city was in a state of great anxiety, for fear that the King would keep him in France forever."[78] As his caravan made its way through France, the officials of every arrival city rallied to demonstrate their respects. "Even Lyon, which never grants that honour to anyone but princes of the blood," wrote Charles Perrault, "acquitted itself like all the rest."[79] He was no less a celebrity in northern Italy, where he was also treated like royalty.[80]

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[77] Perrault, Zarucchi, *Charles Perrault*, 58.

[78] Ibid., 60.

[79] Ibid., 60n20. Zarucchi learned that the city of Lyon spent 278 livres to furnish an apartment.

[80] Mormando adds, "In Italy, the local lords, including the Grand Duck of Tuscany, Ferdinand II; and Due of Savoy, Carlo Emanuele II—came out to personally greet Bernini and offer the hospitality of their homes and coaches. People of lesser statue—including an extraordinary number of nobility in Turin—lined the streets and squares in order to catch a glimpse of the superstar. 'It was as if an elephant were traveling around,' Bernini quipped about the excited response of the curious crowds in his passage through Italy." Mormando, *Bernini*, 260–61.

As Bernini approached Paris, Colbert sent his emissary, Paul Fréart de Chantelou, to meet the group in Juvisy, just south of Paris. Chantelou would then accompany Bernini and act as his host and translator through the length of his stay. Chantelou was a perfect match for the job. He was a friend, correspondent, and sponsor of Poussin, and the brother of Rowland Fréart de Chambray, a celebrated Parisian author on the subjects of art and architecture. By every account, the relation between Bernini and Chantelou was of trust and affection. Chantelou kept a detailed journal of his experiences with Bernini. A great boon for historians, his journal provides nearly all of what we know about Bernini's time in France. The often intimate insights into the life of Bernini gives Chantelou's record of Bernini added credibility.

Chantelou recorded that Colbert rushed to Bernini's residence as soon as he was informed of his arrival in Paris, and he caught Bernini napping. Since Colbert's arrival was unannounced, he would not expect Bernini to leave his bed on his behalf. So, respectfully, Colbert delivered his welcome to Bernini while allowing the Cavalier to remain in his bed. Colbert told Bernini that Louis was excitedly waiting to meet him at his convenience at his Saint-Germain residence. Two days later, the meeting occurred, this time, in Louis's bedroom. The occasion was formal, and the room was crowded with courtiers and the inner royal circle. Bernini's son Domenico provided a firsthand account of the excitement of the moment and the mutual awe and respect that was shared by these two men—aware of each other's greatness and anticipating seeing each other in the flesh. Domenico wrote,

> Unable to endure the delay in seeing him, the king simply peeked his head out from behind a doorway; curious to see where Bernini was and what he looked like, his eyes scanned the room searching for the artist amidst that multitude of knights. Bernini, for his part, having noticed that bit of movement from behind the aforementioned doorway, turned his eyes in that direction and immediately remarked, "That's the king." The Maréchal de Turenne expressed his amazement that Bernini was able to

> recognize Louis since he had never seen him before that moment; to which the Cavaliere replied that he "had recognized in that face, at his very first glance of it, a greatness and a majesty that could belong to no one else but a great king."[81]

When the two finally were introduced, flattery was ebullient. Bernini "had heard on all sides that the King was a great prince with a great heart and a great intelligence, as well as the greatest gentleman in his kingdom." In turn, Louis proclaimed, "Yes, indeed, I well now know that this is fully the man that I had imagined for myself." Louis was disarming and very soon "spoke and jested with Bernini in a very familiar manner, as if he were his best friend." After making a few perfunctory remarks about the project for which he had been summoned to Paris, Bernini is said to have risen and announced to the court, "Speak to me of nothing small!"[82] With that, he left the thoroughly impressed crowd and became the next Paris sensation.

Soon after arriving, in early June, Bernini, Mattai de Rossi, and Bernini's design entourage began work in his Paris studio. The plan was for him to finish his initial scheme and respond to the critique that Colbert and his own advisors were beginning to find in Bernini's scheme. Word of Bernini's sojourn to Paris and his commission with Louis spread through the continent and beyond. In England, the image of the Roman in Paris designing the new baroque facade of the famous Louvre was the topic of the day. Bernini was adopted as yet another Parisian sensation. "The leading knights and most eminent ladies of Paris were running to him at every hour," Bernini's son recalled, "and throughout that city, they spoke of nothing else but the Cavaliere." Bernini recognized the adoration, and "wrote in a spirit of amusement to his great friend, Cardinal Pallavicino, that 'there was no other fashion in Paris

[81] Ibid., 265.

[82] Ibid., 267.

than the Cavalier Bernini.'"[83] Bernini could not walk down a Paris street without attracting a crowd of Parisians.

Many wanted to get a glimpse of his design, but access was not easy. The young Christopher Wren, soon to be one of the most famous architects in the world, travelled to Paris harbouring the hope of seeing the scheme of the master of traditional architecture. Wren somehow gained access into Bernini's studio, and his letter to a friend reports his partial success: "Bernini's design of the Louvre I would have given my Skin for," wrote Wren, "but the old reserv'd Italian gave me but a few Minutes View." The young Wren was surprised and envious at Bernini's celebrity status and his power to command design respect. What Wren got to see were "five little Designs in Paper, for which he hath received as many thousands Pistoles; I had only time to copy it in my Fancy and Memory."[84]

It was not long before the relationship between Bernini and Paris began to sour, however. Rather than receiving admiration and unconditional faith in his ability to deliver an exquisite work, Bernini was asked to provide justifications for his ideas. The deliberate Colbert called out the most basic flaws in Bernini's design. For one, although Bernini's undulating facade might be beautiful, it also created alcoves and hiding places for assassins, a fatal flaw that Colbert believed the artistic Bernini had not considered. Colbert tediously pointed out details to Bernini, such as the wrong widths for doorways, street noise, sun orientation, and the size of the king's bedroom. For Colbert, these practical issues were fundamental to a good design and they could not be overlooked, no matter the artist's greater intentions. It is likely that Colbert's critiques were so embarrassingly mundane that it may not have even registered on

[83] Domenico Bernini, Gian Lorenzo Bernini, trans., Franco Mormando. 2011. *The life of Gian Lorenzo Bernini.* University Park, Pa: Pennsylvania State University Press, 196.

[84] Wren, *Parentalia*, 262.

Bernini's list of issues that ought to matter, especially when judged against his higher callings.[85] The implication that these were design matters that Bernini not only *did not understand*, but *could not understand* because he was not French, would have been particularly cutting. These were French issues—or more specifically, Parisian issues—and it was clear that Bernini's innate knowledge of architecture did not include the basic knowledge that any Frenchman would have.

Colbert could not seriously be as dense as he pretended to be, suggested Bernini. Perhaps he was only being difficult because he felt slighted and jealous over the affectionate friendship that Bernini and Louis shared. Perhaps, voiced Bernini, Colbert was smarter than he was acting, but he was just playing the fool.[86] Bernini suspected that Colbert's niggling and sensitivity towards incidental issues was a calculated attempt to undermine his position and distract him with detail that simply did not matter at that moment.[87] All things considered, the Louvre had become Colbert's project, and his evaluative methods did not mesh at all with Bernini's explanations of inherited artistic sense and divine guidance. The design could not be beautiful if it did not work well. In truth, there was just very little shared language in which the two men could negotiate their different worldviews.

In a design review meeting attended by Colbert and Fréart de Chambray, and witnessed by Charles Perrault and Fréart's brother, Chantelou, Bernini was asked to show Colbert the revised plans that would address a series of problems he had earlier identified in Bernini's design—most notably the size of the king's bedroom, which he thought was too small by at

[85] Mormando, *Bernini*, 279.

[86] Ibid.

[87] Ibid.

least half. Bernini had earlier promised to consider the options. Charles Perrault tells the story of this meeting, and the outcome discloses the distance between Bernini and his French clients—especially Colbert. Perrault writes,

> He brought a design which he held pressed against his stomach, and addressing Monsieur Colbert, he said that he was convinced that the angel which presides over the happiness of France had inspired him, and that he sincerely knew himself to be incapable of discovering on his own a thing so beautiful, so great, and so fortuitous as the idea which has come to his thoughts. "*Io ѕono entrato*," he pursued, "*in penѕiero profonɗo*." ["I went deep into thought."] He said these words with as much gravity as if he had descended to the depths of hell. Finally, after a long speech that would have tried the patience of the most self-restrained of men, he showed his design with the same respect with which one would reveal *il vero ritratto ɗe vero crucifixo* [the true image of the true crucifix]. This profound thought was nothing more than a bit of paper glued on to another drawing of the pavilion of the Louvre, on which he had marked four windows in yellow, instead of the three that were in the former design and already in the building.[88]

Perrault thought that Colbert was enormously patient as he sat through Bernini's presentation. In the end, Colbert praised Bernini for his very strong idea. Perrault, however, was astonished by Bernini's arrogance and upon Colbert's praise, could not stifle a whisper of disbelief. Bernini demanded to know what Perrault had said, and when he was told, he dismissed Perrault's critique as being utterly worthless—given that it came from someone as low as Perrault, who could not begin to understand anything that Bernini was trying to explain. Colbert agreed with Bernini and told Perrault that his opinions should be kept to himself. Privately afterwards, Colbert was furious with Perrault. "'Do you think,' he told me

[88] Perrault, *Charles Perrault*, 67.

angrily, full of indignation, 'that I don't see it as well as you do? A plague take that bastard, who thinks he can pull his tricks on us.'"[89]

Charles Perrault's inability to reserve his opinion raised the ire of Bernini on other occasions, and the final time proved significant. From Perrault's memoirs we learn that in an October presentation made by Bernini, Perrault again discreetly express doubt. "The Cavaliere," wrote Perrault, "became suddenly furious, and said to me the most outrageous things imaginable, including among other things that I wasn't worthy of scraping off the soles of his shoes." When Perrault and others tried to calm Bernini, it became clear that he was inconsolable, and his indignation at being forced to continually explain and defend his work to the unworthy was finally at a boiling point. According to both Perrault and Chantelou, Bernini exploded. Perrault recalled the scene: "'A man such as I?' he shouted, 'Whom the Pope treats graciously, and for whom he had great regard, that I should be treated thus! I will complain to the King, even if it should cost me my life: I want to leave tomorrow and be gone. I don't know why I don't take a hammer to this bust[90] after being so scorned. I will go to Monsieur the papal nuncio.'"[91]

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[89] Ibid., 68. In his text, Perrault does not write "bâtard" but rather, "b.....," perhaps owing to the fact that he was writing his memoirs to his family.

[90] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 72. "Le cavalier, qui m'entendit faire cette demande, entra tout-à-coup en fureur, et me dit les choses du monde les plus outrageantes, et, entre autres choses, que je n'étois pas digne de décroter la semelle de ses souliers." The stone bust of Louis XIV that Bernini was working on was also in his studio sitting to one side of the drawings. As Perrault describes it, Bernini must have been presenting his drawings in the workspace where his sculpture work that was also underway.

[91] Ibid., 74. These memories are Perrault's, and these portrayals critial of Bernini are common. However, Fréart de Chantelou was also in attendance for this Bernini outburst, and he records it in similar detail. See, Chantelou, Paul Fréart de. 1885. *Journal du voyage du Cavalier Bernin en France,* Paris: [s.n.], 206-7.

Bernini's threat to give up and return home to Rome turned out to be no mere threat. Within a few days, he and his French hosts decided that they had all had about enough of each other, and that the Cavalier's personal work was as complete as it needed to be. The architecture and sculpture work that remained to be done could be completed by assistants, and, consequently, there was little other reason for Bernini to remain in Paris. Unlike the earlier ceremonies with well-wishes, this time neither side spoke of seeing one another again. One of Bernini's biographers summarized Bernini's last days in Paris thusly: "Colbert just loaded him up with gold coins and the promise of an annual royal pension, no strings attached, and sent him home."[92] By the end of his visit, relationships had deteriorated so much that Bernini had his kitchen guarded for fear of being poisoned.[93]

Bernini and his entourage departed Paris for Rome in late October 1665, leaving his project in a preliminary stage of construction, and its future in the hands of the French. No doubt Bernini was aware that not all was well with it. Although he had not been told officially that his project would be cancelled, Bernini was certainly recognized the mood of acrimony he left in Paris and the cabals and campaigns that were being readied to discredit him and his works. Departing Paris, Bernini left his assistant, Mattai, behind to develop the project and oversee some preliminary construction—design development work that was most likely staged only for the sake of appearance. Without Bernini's presence and his quasi-mystical narratives

[92] Mormando, *Bernini*, 283. In fact, according to the Comptes des Bâtiments du Roi of 4 June 1666, Bernini was paid a total of 33,000 livres, and his assistants were given nearly 3,000 livres in addition. Guiffrey, *Comptes des bâtiments du roi*, 1:105.

[93] Mormando, *Bernini*, 278. Mormando quotes Mattia de Rossi, who wrote to Monsignor Pietro Bernini, "For meals, Cosimo (Bernini's majordomo) supervises the kitchen at all times, morning and night, so that it is impossible for a living soul to enter and thus Your Lordship can rest absolutely assured on this account."

to sustain his designs, their remaining value quickly evaporated. Bernini's final proposal for the Louvre was likely dead upon his personal exit.

Historians have often described how Bernini and Colbert failed to agree on what mattered most in Bernini's Louvre schemes, attributing it to cultural divides. But we can see now that Colbert's full intention was to expose, through Bernini, the bankrupt traditions of the scholastic practices of architecture. Colbert eroded the very premises of Bernini's methods by patiently but persistently raising concerns over the most fundamental aspects of his plans. Through months of enormous effort, Colbert gradually undermining the standing of the traditional practice of architecture by first testing it at all levels, and eventually discrediting it at its highest ranks. Leaving no possibility untried, he methodically demonstrated to himself and his circle of associates—including his king—its inadequacies when forced to directly address contemporary thought. Through several years of patient trials, he systematically evaluated and rejected every level of practice, eventually culminating in the dismissal of its brightest and most celebrated representative, Gian-Lorenzo Bernini. By challenging Bernini's design proposals at their simplest and most reasonable levels, he demonstrated to everyone that any design advanced without some verifiable foundation will appear disingenuous and weak. Once he was able to demonstrate the fallacies borne by the fables that underpinned Bernini's designs, the transfer was complete: he assumed full authority over the processes for making architecture.

The East Facade of the Louvre: The Prototype Project

Given what we now know about Colbert and his methods, it will be no surprise to learn that during the time that Bernini was working in Paris, Colbert had been quietly reorganizing and setting up new methods for how the Louvre project would eventually be produced. Likely for the entire duration of Bernini's stay, Colbert had been directing another team of design

consultants behind the scenes. By September, this select team of designers was no longer a secret; even Bernini was aware of their existence. On 1 September 1665, a dinner party was attended by many of the primary protagonists in the Louvre project, including Colbert, Charles Perrault, and Chantelou. A chief topic of conversation was the status and fate of Bernini's designs.

After dinner, Chantelou struck up a conversation with the Abbé Francesco Butti, an Italian cleric living in Paris and an admirer and insider in Bernini's entourage. Butti told Chantelou about something he had learned the day before. "After the dinner, we talked, the abbé and I, on the various discussions that have occurred concerning the designs of the Louvre, and the widespread rumours that they will not be executed," recalled Chatelou. "He told me that yesterday the Nuncio came to tell the Cavalier that it is certain that Le Vau, Le Brun and Mansart had gathered to make a design."[94] Chantelou was familiar with those three men: "I told him that the three were by no means friends. He quoted the passage: *'facti amici sunt in illo die, Herodes and Pilatus,'* but that the Cavalier's design being as beautiful as it is, he only had to take the motto of Tassoni, an inkwell and a quill, and the word, 'fate.'"[95]

The Latin phrase that Butti quoted was from the Book of Luke, 23:12: "That same day Herod and Pilate became friends with each other, before this they had been enemies."[96] Luke told the story about another collaboration of natural adversaries. The hatred that Herod and

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[94] Chantelou, *Journal de voyage du Cavalier Bernin*, 129. "A l'issue du dîner, nous avons discouru, l'abbé et moi, sur les divers discours faits touchant les dessins du Louvre, et le bruit qui s'est répandu qu'on ne les exécuterait pas. Il m'a dit que le Nonce était le jour d'hier venu le dire au Cavalier; que l'on avait assuré que Le Vau, le Brun et Mansart s'étaient assemblés pour fair un dessin."

[95] Ibid. "Je lui dis que les uns et les autres n'étaient point amis. Il cita la passage: Et facti sunt amici in illo die, Herodes et Pilatus, mais que, le dessin du Cavalier étant de la beauté qu'il est, il n'avait qu'à prendre la devise du Tassoni, une écritoire et une plume, avec le mot de 'fate.'"

[96] "Et facti sunt amici Herodes et Pilatus in ipsa die: nam antea inimici erant ad invicem." Luke 23:12.

Pilate shared for Jesus at least momentarily created a convenient liaison between the two men. Each could benefit by joining forces temporarily. Le Vau and Le Brun had shared projects in the past, often with the garden designer Andre Le Nôtre, but given their high-powered positions and competing roles in the Court, it would be easy to see the parallel. Certainly, Mansart, with his famously irritable and stubborn nature, was not added to the group to be its arbiter. The collaboration of Le Brun, Mansart, and Le Vau—the king's first artist bracketed by his kingdom's two most powerful and imperious architects—was undoubtedly a forceful but forced one. To induce these three to collaborate on a single design demanded someone with serious influence and strong intentions. Certainly, that could only have been Colbert, acting with the authority of the king.

It seems likely that this trio had been in some kind of collaboration on the Louvre project for the entire time that Bernini was in Paris, or perhaps even longer. Evidently, a scheme produced by this group was being circulated for some time. On 4 August, a month before the dinner party, Le Nôtre told Chantelou that he had seen Le Vau delivering a Louvre design to Louis, and it had been completed in some detail. It was a scheme that Le Nôtre and Chantelou had already seen: "the one about which we had [already] spoken." Le Nôtre liked the scheme that he saw, telling Chantelou that "it seems quite beautiful."[97] He then provided Chantelou with more detail: the design that Le Vau delivered seemed fresh and practical, and it proposed some good ideas for a reorientation of the facade and a reuse of parts of the existing structure.[98]

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[97] Chantelou, *Journal de voyage du Cavalier Bernin*, 82. "Le même jour, M. Le Nôtre est venu me voir et m'a dit que Levau avait été porter au Roi un dessin qui est celui duquel l'on avait parlé, où il laisse le Louvre d'à-présent pour servir seulement d'avant-cour, et fait le bâtimen au droit de la rue Saint-Thomas-du-Louvre, et m'a dit, qu'à lui, il lui avai paru assez beau."

[98] Ibid.

That Le Nôtre was able to speak about Le Vau's design in such advanced details, and that it already had some prior fame, suggests that this design must have been in the works for a while—since July at least, and perhaps before.[99] Given that Bernini had arrived in Paris only a month before, we can conclude that Colbert was either hedging his bets against Bernini from the beginning, or that Bernini's work never really had a place in Colbert's long-term schemes, other than as just another architect's scheme—albeit from a celebrated talent—to add to the design ideas for the Louvre that he had been collecting. The fate of the design that Le Nôtre saw is unknown, but it would have been added to the many other schemes that Colbert had been gathering. The life of the unlikely collaboration of Le Vau, Le Brun, and Mansart is also unknown, other than to say that it did not extend beyond the following September, when Mansart died. At that moment, France was without one of her greatest architects and Colbert was without a key advisor in his design team.

As a result, the Louvre project was again stalled for another seven months. It was revived again the following April, when Colbert launched his new mode of architectural production. That began when he promoted this background design group to become a design consulting committee within the reformed structure of the Bâtimens du Roi. The team was referred to as the Petit Conseil, and he assigned Charles Perrault to be the group's administrator and recording secretary. In his memoirs, Perrault takes full credit for giving this idea to Colbert, and for nominating Le Vau and Le Brun as two of its members.[100] As unlikely as that might

[99] It is possible that the design that Le Vau was carrying that day was his own; however, we can safely speculate that due to the advanced state of design development that Le Notre described, it is most plausible that the two schemes—the one that Le Notre saw the one that Butti had reported—were the same.

[100] He does not mention the fact that it was no secret that at that time Le Vau and Le Brun, with Mansart, had already been collaborating in a similar group. It is also possible that after thirty years,

now seem, perhaps Charles can also be credited for encouraging one of Colbert's important decisions: to have Charles's brother, Claude, replace Mansart on the committee. Thus, with a team consisting of Le Vau, Le Brun, and now his brother, and with Colbert in the lead, thought Charles, it "would be impossible for it not to succeed."[101]

We can conlude that after two years in pursuit of a qualified architect for the Louvre project, there was realistically not a single person in the world of architecture in France or Italy with whom Colbert and his Bâtiments staff were not familiar. Colbert's authority was such that he could have promoted any one of scores of architects to fill Mansart's seat. It was therefore a peculiar move for Colbert to choose a medical doctor to replace Mansart. Until that moment, Claude was an anonymous Parisian medical doctor and apothecary who had just as surprisingly been recently appointed to Colbert's new company of savants.[102]

Claude Perrault was trained at the University of Paris, and after receiving a degree of doctor of medicine in 1652, he seems to have gone directly into a quiet medical practice where he treated mainly friends and family members.[103] He was accomplished in Latin, and it would also follow that he would have learned other languages as well. However, by all accounts, his circle of colleagues was surprisingly small. It is believed that at age fifty-four, Claude likely had never even travelled outside of his hometown of Paris, except to his family's country

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Perrault's memory was fading, or that the idea had come to him much earlier, when Mansart was still a participant.

[101] Perrault, *Charles Perrault*, 81. Cf. Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 87.

[102] The timing of his appointment to the Petit Conseil is unclear. Some believe that Claude was appointed at Mansart's death. See Perrault, *Charles Perrault*, 81n74. On this point, Zarucchi adds a reference to a second source: Louis Louis Hautecoeur, *L'histoire des chateaux du Louvre et des Tuileries, tels qu'ils furent nouvellement construits,... de régaler les dames de sa cour* (Paris: Se vend chez G. Van Oest, libraire, 1927), 106.

[103] This particular characature of Claude comes from Oded Rabinovitch and Antoine Picon. See Rabinovitch, "Anatomy of a Family of Letters,"and Picon, *Claude Perrault, 1613–1688, ou, La curiosité d'un classique* (Paris: Picard, 1988).

estate in Vimy, the one that his brother Charles had remodelled a decade earlier. Nor can it be claimed that he was known as a theorist or a historian then, along the lines of Chantelou's brother, Roland Fréart de Chambray. In 1667, Claude had yet to publish any papers or treatises on architecture or nearly anything else.[104] It also seems pertinent that in his entire life Claude never publicly took credit for any of the architectural works that his brother later attributed to him after his death.

Unlike Mansart and Le Vau, and to some extent, Le Brun, Claude had no experience in the practice of architecture. Before this assignment to the Petit Conseil, there were no architectural designs, drawings, structures, or treatises that can be accredited directly to him. To be fair, there was supposedly an anonymous Louvre scheme whose existence is known only by way of Charles. Charles later attributed it to his brother Claude. Charles remembered that it was "quite similar to the one…that was executed."[105] Charles asserted that Colbert was "charmed" enough by the design that he was persuaded to select Claude for the Petit Conseil promotion. However, even in Charles's memory, the drawing was neither signed nor dated, and Claude never claimed its authorship. Given that it also does not match the description given by J.F. Blondel of the Louvre drawing that he found in a Perrault collection a century later, the credibility of Charles's version further declines.

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[104] There are two points to add. First, there is no reason to doubt that at this time Claude was being inundated with architecture work commissioned by Colbert. Along with being appointed to the Petit Conseil, he is said to have submitted a design competition entry for a monumental obelisk. Herrmann dates the obelisk work "a few days after" Claude was appointed to the Company, which was near the end of December. Herrmann, *The Theory of Claude Perrault*, 18. He also began the commission for that which he would gain his fame; a translation into French of Vitruvius. Ibid., 19. Second, he and his brothers published a burlesque "Aeneid," a veiled critique of the Mazarin administration. See *Les murs de Troyes, ou L'origine du burlesque* (Paris: L. Chamhoudry, 1653). See Rabinovitch, "Anatomy of a Family of Letters," 8–9 for a discussion of Les Murs.

[105] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 53; Berger, *The Palace of the Sun*, 21.

It therefore becomes easier to believe the popular sentiment of the day; that is, at the time of the formation of the Petit Conseil, Claude was no architect. Charles acknowledges the "spiteful jokes" that emerged from the "envy of the Parisian masters" after word was spread that his brother the doctor would collaborate with the kingdom's premier architect and premier artist. Charles apparently could not resist committing one to print: "Architecture must indeed be ailing, since it was being placed in the hands of the doctors."[106] This bit of whim is valuable for several reasons—first of all for leaving no doubt that in the popular belief of the day, Claude Perrault was considered primarily to be a medical doctor. In fact, imagining him in the role of an architect was so incongruent that it apparently provoked comedic reactions. Behind Perrault's appointment was another point that must have drawn attention: it again is apparent that Colbert's powers in the world of architecture must be extensive, in order to place a medical doctor in such a high position among the professions' elite.[107]

Colbert assigned Charles Perrault to keep a full record of the Conseil's actions, which he did, recording "every resolution that was passed."[108] That document became known officially as the *Registre ou Journal des délibérations et résolutions touchant les Bâtimens du Roi.* "We met twice a week. This register, which I surrendered with all other documents regarding the buildings, is full of very curious things which would be very useful to those who like architecture."[109]

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[106] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 86. "L'envie des maîtres du métier, à Paris, ne manqua pas de s'élever contre cette résolution et à faire de méchantes plaisanteries, en disant que l'architecture devoit étre bien malade, puisqu'on la mettoit entre les mains des médecins."

[107] To add, the often-suggested explanation of Charles's influence and Colbert's penchance for nepotism that might at first seem plausible is now easier to discount, owing to our better understanding Colbert's highly deliberate and exacting methods and resistance to compromise.

[108] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 97.

[109] Ibid., 87. "Je tins un registre où j'écrivois toutes les résolutions que l'on y prenoit. Il s'assembloit deux fois la semaine. Ce registre que j'ai rendu avec tous les autres papiers des bâtimens, est plein de choses trés-curieuses et qui seroient très-utiles à ceux qui aiment l'architecture."

Indeed, it would be useful. However, like most other primary documents in this study, the original Registre has been lost. Our only link to it is by way of an eighteenth-century author and royal historiographer, Jean-Aimar Piganiol de la Force, who quoted from it as part of a tourism journal he published in 1765.[110] Piganiol's editor for that project, Étienne La Font de Saint-Yenne, confirmed that Piganiol did indeed have in his hands the Registre, noting that in its margin he could read a postmark in Colbert's own hand.[111]

Reading Piganiol's abstract of the Registre we see that Colbert had initiated the process of the Petit Conseil after he had concluded that none of the architects of France and Italy had shown him that they could meet the requirements of the Louvre project. In his assessment, the work could realistically only be accomplished if it were attempted by "several people joining together their different talents to stimulate and aid each other."[112] Colbert then staffed the design team with Le Vau, Le Brun, and Claude Perrault, and summoned them for their first meeting in April 1667. Once there, the trio of designers learned from Colbert that he had specific mandates for how they were to work. As Perrault recorded,

> After having explained his intentions, he wanted them to hear that they would work jointly and in unanimity on all designs that they would have to do for the completion of the Louvre Palace, so that these designs would be regarded as the work of the three of them equally, and that to preserve the union and harmony, none could be said to be the particular author to the detriment of the others. He ordered them to work

[110] Jean-Aimar Piganiol de La Force, "La Quartier du Louvre," in *Description historique de la ville de Paris et de ses environs*, ed. Étienne La Font de Saint-Yenne (Paris: Chez les Libraires associés, 1765).

[111] La Font attests in Piganiol's text, "C'est un acte authentique à la marge duquel on lit cette apostille de la main de M. Colbert, vu & approuvé au camp de Charleroy le 7 juin 1667." Registre ou Journal des délibérations & résolutions touchant les Bâtimens du Roi, ibid., 261.

[112] Ibid.

incessantly to form a joint plan and elevation of the front of the entrance to St. Germain.[113]

Attention must be brought to this important passage from the Conseil's Registre. After two years of methodically analyzing the routine practices of architecture and gradually undermining its authority, Colbert made his reformed structure clear, and the passage above introduces the core of its policies. With the formation of the Petit Conseil, he had established a new system of practices that would only allow work that arose from unanimous agreement and collaboration. Colbert's policies went so far as to prohibit any signs of individual authorship, but it was more than the results he expected to reform. Mirroring his reforms in the legal and financial worlds, it was the practices themselves that he intended to change. He was explicit: they were to work "joined together" and arrive at decisions "unanimously." They were to work so that their designs would be understood as the product of all three "equally." He did not intend this to be a mere affectation; Colbert wanted the very spirit of the group modified: it must be absent of any of the arrogance and self-aggrandizing that had infected the intellectual communities of France for decades.

It is also interesting now to reconsider the composition of the group that Colbert put together. We recall that the first generation of this design team included the two most dominant architects in France, and the king's premier painter. That certainly created a potentially explosive dynamic. How did the presence of Claude Perrault, someone with absolutely no experience in architecture or public life, alter that scene? Charles describes his

[113] Ibid., 253–54. "Après leur avoir expliqué son intention, & fait entendre qu'il désirait qu'ils travaillassent unanimement & conjointement à tous les desseins qu'ils y auroit à faire pour l'achevement du Palais du Louvre, en sorte que ces desseins seraient regardés comme l'ouvrage d'eux trois également, & que pour conserver l'union & bonne intelligence, aucun ne pourrait s'en dire l'auteur particulierement au préjudice des autres. Il leur ordonna de travailler incessament en commun à former un plan & une élévation de la façade de l'entrée vers saint Germain." The Registre is also discussed in depth by Berger in *The Palace of the Sun*, 123.

brother as the outlier that we might expect him to have been: "My brother, being nearly always contradicted by Monsieur Le Vau and Monsieur Le Brun, was constantly obliged to prepare dissertations, or rather lessons of architecture, which he would present in writing at the following meeting."[114]

Nonetheless, what matters most is seeing Colbert's hand in the final composition of the group. The Petit Conseil was made up of three experts from three different professions: architecture, art, and medicine. If it is true that his objective was to create a rich collaboration of "different talents," then it would follow that the more diverse the talents, the richer the results. Thus, it can be argued that it was perhaps Claude's naïveté in the subjects he was being asked to weigh in on that was his most valuable characteristic. Colbert had set up the membership specifically to include three independent viewpoints from men each with his own set of talents: there was an architect, a painter, and now with Claude, a scientifically trained medical doctor. And within the harmonic interchange that Colbert attempted to instil in this group, each member would be allowed to contribute his own expertise and provide a unique supplement to the design work being carried out. It may have been believed that conversations and debates that involve three independent points of view would have an inherent benefit: the possibility for interminable debating is more difficult to sustain when arguing in the expertise of another.

As the premier architect of France, Le Vau's position on the Petit Conseil must have come easily. He had been the lead figure in the major architecture projects for decades. Le Brun

[114] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 87. If Charles is to be believed, premier architect Le Vau and premier painter Le Brun may have found themselves being schooled by the scholastic and academic Perrault brother on subjects which none in France would have known better than they.

was the premier painter and a favourite not only of Colbert but of Louis and Anne of Austria as well. Le Brun's role, among other things, was to "keep an eye on the sculpture of the Louvre" and maintain an overview of the design work.[115] And what about Perrault? To his intellectual freshness it might also be added the possibility that he was the erudite champion and promoter of Colbert's program of harmony and cooperation. Charles explains that he and Claude tried whenever possible to foster cooperation among the team members; "and I say this in all truth," remembered Charles, that "my brother and I had such a love of peace and harmony, that there was nothing we would not have done to maintain the natural order of affairs."[116] Perhaps after having heard too many committee reports of a contentious and uncooperative Mansart and the resulting stultified operations, Colbert commanded Claude to instil his new cooperative ethos and draw production from the two art giants.

After being brought together, Le Vau, Le Brun, and Claude Perrault must have taken seriously Colbert's urging to "work incessantly" together on the design issues, and quite quickly they discovered several possible solutions. Much of their work had already been done for them, given the years of earlier schemes at their disposal. Of the available options, they decided to advance two separate schemes. One was unadorned with unified surfaces and without an order of columns, along the lines of some of the earliest Louvre schemes such as Jacques Lemercier's scheme a decade or so earlier.[117] The alternative scheme was an earlier version of the now-famous colonnade facade, traceable to a design scheme that was submitted

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[115] Colbert admired Le Brun's organizational skills, and it might have been for those reasons alone that in 1660 Colbert thought that he would be the right person to rule over the newly formed tapestry workshop known as the Manufacture des Gobelins, and then a year later to reorganize the Academy of Painting and Sculpture. Berger, *The Palace of the Sun*, 86.

[116] Perrault, *Vie*, 88. "Je le dis en verité, mon frère et moi avions un tel amour pour la paix et pour la concorde, qu'il n'y avoit rien que nous n'eussions fait pour maintenir l'order naturel."

[117] Berger, *The Palace of the Sun*. See figure 22 in Berger.

around the end of 1664, evidently by Le Vau's younger brother François, ornamented with row of coupled columns forming a peristyle at the second level. This scheme was an iteration of an idea that had been in the air since at least the late 1650s, and was one of the many schemes that the Petit Conseil had available in their design archive since 1664.[118]

Colbert saw the two schemes and requested that the designers have models made for each. As the king's premier architect, Le Vau already had a wooden model of the building stored in his atelier, so he was directed to have facades of the two new designs made to fit it. Colbert told the team to continue working on their designs "until they are satisfied, and be prepared to present their work to the King when he demanded it." On 13 May, the word arrived that the king was ready to see their designs, so Colbert and the team took the models and drawings to the royal chateau Saint-Germain where the king was in residence. Colbert presented them to Louis the next day, "explaining to His Majesty all the benefits of both schemes." After looking at the models and thinking it over, Louis preferred the peristyle scheme.[119]

Back in Paris five days later, Colbert called together the principal officers in the Bâtiments to serve as yet another advisory committee. He asked them to discuss the designs with the design team and offer their opinions. Besides airing out even more design opinions, the meeting also gave Colbert the chance to indoctrinate the Bâtiments functionaries into his new methods for developing projects. To assure the group that his new process had official

[118] Berger makes the dateline of this explanation plausible and the progress of the scheme easy to follow. See ibid., 14.

[119] Piganiol de La Force, "La Quartier du Louvre," 254–55. “Ensuite de quoi Sa Magesté se détermina, & chosit celui qui est orné d’un Order de colonnes formant un perystile. Sa Majesté vit aussi quelques autres desseins de Plans & Elevations du rest du livre qu’elle remit à resoudre pour une autre fois.”

endorsement, he also told the group of Louis's role and satisfaction with the results. Again, quoting Piganiol, who quotes from the Registre:

> Having summoned the Officers of the Bâtiments to his conference room, including the gentlemen Varin, le Nostre, le Menestrel, Petit, and Messieurs Le Vau, Le Brun & Perrault, [Colbert] said that according to the intention of His Majesty, the design of the facade of the Louvre where there is a peristyle which he showed to the whole company, would be executed, and that for this purpose the Plans & elevations would be enlarged and sent to him and presented to the King & then signed & approved by my said Lord.[120]

With the Petit Conseil members present in the meeting with the Bâtiments, surely there was an active dialogue about the project between the designers and the building officials. The Registre shows that a list of future tasks and studies came out of the meeting: more models were to be built and measured drawings made. There were questions about integrating art works, design revisions based on proportions, and other broader design issues.

By 24 May, drawings had been made adequate enough to begin preliminary construction, and within a few days, the foundation work for the new scheme was already underway.[121] The labourers were instructed by Colbert to work incessantly. A second model—this one made of plaster—was commissioned. With it, some other design modifications—namely, a reduction in the height of the foundation—were tested and evaluated by the group. Other questions that came up through the design conferences were addressed. To respond to these design issues,

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[120] Ibid., 255. "Monseigneur ayant mandé les Officiers des bâtimens dans son anticabinet où se trouverent Messieurs Varin, le Nostre, le Menestrel, & Petit, Messieurs le Vau, le Brun & Perrault, il dit que suivant l'intention de Sa Majesté, le dessein de la façade du Louvre où il y a un perystile lequel il fit voir à toute la compagnie, seroit exécuté, & que pour cet effet les Plans & les élévations en seroient faits en grand pour lui être envoyés & présentés au Roi & ensuite signés & arrêtés par mondit Seigneur."

[121] These drawing could have easily been generated in Le Vau's atelier and perhaps involved François d'Orbay. D'Orbay was an architect often associated with Le Vau's atelier, and made many of the drawings for the project.

the Petit Conseil set a schedule to meet on Wednesdays and Saturdays, "to confer and work together on that which concerns the buildings."[122] They agreed to continue meeting at Colbert's house, where the other team conferences had been held. With the endorsements of Colbert and the king, input from the Bâtiments officials, scale models fabricated and carefully examined, and several weeks of fine-tuning of proportions, all parties were highly satisfied with the design. Finally, after years of indecision and second-guessing, there was much confidence in the design, and it must have seemed to all that the Louvre project was on a secure path towards being constructed.

However, Colbert decided that the three designers must evaluate the design one more time. Le Vau was asked to take the approved design back to his atelier and have two copies of it made—one for Le Brun and one for Perrault—and have them ready for the meeting the following Saturday. That way, each of the three design team members would have their own personal copy of the approved design "so that they can each make a version broadly consistent with the one approved, pursuing the measurements and proportions which to them seemed the most beautiful."[123] In other words, although the design had already been carefully critiqued by many sets of eyes in many situations and from many points of view, Colbert and his designers wanted one last chance to use their individual perception and judgment to perfect the design. And then, once they each had one final chance to perfect the design, they

[122] Piganiol de La Force, "La Quartier du Louvre," 4:256. "Le 24 May, Messieurs le Vau, le Brun & Perrault s'étant assemblés au logis de Monsiegneur resolurent, suivant l'intention de Monseigneur, de s'assembler tous les mercredies & Samedis, depuis six heures du soir jusqu'à à huit, pour conferer & travailler ensemble à ce qui regarde les bâtimens."

[123] Ibid., 257. "Qu'il fera faire deux copies du dessein de la facade approuvée par le Roi, un pour M. le Brun, l'autre pour M. Perrault, afin que chacun d'eux fasse un dessein conforme en gros à celui-la, suivant les mesures & proportions qui lui sembleront les plus belles."

would meet again, "so that the three versions can be made into a single design, choosing that which will be judged the best from all three."[124]

Thus, the gradual ascent to a final Louvre design was a process that had taken decades to fully unfold. Its ultimate phase—by then entirely in Colbert's hands—had taken two years. It began with a continent-wide solicitation of designs and ended with a gradually developed aggregate of the best possible ideas from a variety of sources and perspectives, put together by a union of collaborators and their advisors, all hand-selected and given a mandate to cooperate by Colbert. Yet, even then, the evolution of the design could not be considered complete. Colbert then required each of his team members to look at the design privately a final time, each confirming to their individual satisfaction that the design was as good as it could be. At last, those final individual refinements would be harmonized to find a *via-media* between the all previous judgments.

The three members of the Petit Conseil began by reviewing the collection of designs that was already at their disposal, and parsed the collection for its best ideas. With that collection of work, Colbert must have been confident that he had provided his committee with every opportunity to produce the most perfected scheme. This was a system that far exceeded the potential of any single man—even one as talented as Bernini. From those schemes, the Petit Conseil had collaborated and methodically arrived at the optimum possibility—or at least, as close as they could humanly come to it. The collaborative design process unfolded to show itself as a structure of overlapping analyses and iterative design. In the end, the design was validated through the abundant clarity that only a king's wisdom could provide, as he was left

[124] Ibid. "Pour de ces trois desseins en être fait un seul, en choisissant ce qui sera jugé le meilleur de tous les trois."

to choose between the two final schemes.[125] There is no doubt that to some extent Louis was attuned to Colbert's objectives and methods and he was no doubt kept abreast of the progress of the Petit Conseil and their products. His interest in architecture, it would seem, was sincere, as his other obligations would allow.[126]

Moreover, once conceived, the chosen scheme had been analyzed in detail by still more experts—men who could assure and advise Colbert from still more diverse points of view. First exposing the invalidity of Bernini and his worldview and then implementing his new plans of collaboration and hierarchical decision making, Colbert succeeded in decentring the act of authorship by spreading it across the skills and sensibilities of many intelligent individuals, all primed by Colbert to maintain a cooperative spirit that evoked distinct and iterative ideas and commentary. Each individual step was conceived to gradually add value to a perfected end product.

By the end, Colbert must have felt confident that in the two years that he had been in control of the production of architecture, he had successfully reformed its practices and redefined how in his mind, it ought to be approached and appreciated. His reforms in the world of architecture were no less dramatic than those of finance, law, and natural philosophy. In architecture, he gradually devalued the theorizing of the scholars and replaced

[125] Consider this in relation to Francis Bacon: the only possible end of the knowledge structure like this is either "a king or Pope." There is a religious aspect to this. Full causal knowledge is not possible except by God. Pursuit of knowledge, and, in this case, the world through natural philosophy, is always only an approximation or an approaching of the true cause. The king or pope is highest on that scale.

[126] It is easy to imagine that Louis would have been keenly interested in the work of the Petit Conseil. His personal interest in architecture is well documented. See Robert W. Berger, *A Royal Passion: Louis XIV as Patron of Architecture* (Cambridge: Cambridge University Press, 1994). "This book is about a king who loved to build," writes Berger in his Preface.

it with a kind of architecture that was achieved through deliberate and justifiable means, passing through many hands, and leaving no single author to claim its creation.

Some Speculation on the Scope of Work of the Petit Conseil

Piganiol's transcription of the Registre reads as if the Petit Conseil was established solely to create a design for the Louvre project. Indeed, it does appear that the Louvre commanded the team's full attention from March to August of 1667. Further, we learn from Piganiol's text that later in 1668 their design services were needed as the design was subsequently developed. However, there is no other record of the Petit Conseil's productive life. Robert Berger suggests that, although there is no record of committee work after 1668, "the group surely had disbanded before September 12, 1669, when Claude Perrault left Paris for his trip through France."[127] Historian John C. Rule, however, suggests that the group continued to meet for several years beyond that. In fact, according to Rule, the group was still operating periodically at the time of Louis Le Vau's death in 1670, and continued thereafter with Jules Hardouin-Mansart taking Le Vau's place.[128] Of course, the truth here is a matter of degree. Although this committee may have had a long life—perhaps, as Rule suggests, meeting for years afterward—knowing what we know about Colbert, the committee existed at his pleasure and for as long as he believed it to be useful to him.

A passage from his extract of the Registre that I quoted earlier leads us into the final point to be established in this chapter. Charles Perrault had noted that Colbert instructed the Petit Conseil to "conferer & travailler ensemble à ce qui regarde les bâtimens"—to confer and work

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[127] Berger, *The Palace of the Sun*, 45.

[128] Rule writes, "This 'Triade' dominated the arts as surely as the 'Triade' of ministers dominated the government. When Le Vau died, his place was filled by Jules Hardouin-Mansart, the grand-nephew of the great architect Francois Mansart and in his own right a superior technician and able adapter of his predecessors' ideas." John C. Rule, *Louis XIV and the Craft of Kingship* (Columbus: Ohio State University Press, 1970), 38–39.

together on that which concerns the buildings. Although it is hinted at in several instances—this being one in particular—Piganiol's version of the Registre makes no mention of any architecture projects other than the Louvre that were developed by the Petit Conseil at that time.

Had Piganiol known that the Registre he saw would be lost, and his transcription would be the only one to remain for historians, he may have written about it more inclusively. Nevertheless, once the context of Piganiol's work is understood, his limited borrowing from the Registre is easy to understand. Mentioned briefly earlier, Piganiol's version of Perrault's Registre appears in volume two of his ten-volume set of travel journals, *Description historique de la ville de Paris et de ses environs,*[129] which he began publishing in 1742. Piganiol's volumes were written for people touring Paris who were interested in the history of the places they visit, or conversely, those who had an interest in the architecture in the particular neighbourhoods of Paris.

His ten journals were organized by neighbourhood boundaries. After volume one, which provides general background on the history of the governments and other civil institutions and academies of Paris, the following nine volumes all describe structures within the limits of particular Paris neighbourhoods, or *quartiers*. The boundaries of his quartiers are quite specific, and in fact follow very closely the boundaries of the *arrondissements* of contemporary Paris. Volume two begins with the chapter "Quartier de la Cité," which includes a few pages describing certain edifices within those confines: Le Palais, La Sainte-Chapelle, Le Pont-Neuf, and so on. Other chapters in volume two include the "Quartier de Saint-Jacques-de-la-Boucherie," and the "Quartier du Palais-Royal." Pertinent to this study, there is one section

[129] Piganiol de La Force, "La Quartier du Louvre."

on the structures in the "Quartier du Louvre." As one might imagine, the description of the Louvre Palace is long; Piganiol is allowed to go into great detail, beginning with the Louvre's founding and the various etymologies of its name, and ending at the present—that is, eighteenth-century—day.[130]

A popular topic at that time was the question of the design authorship of the Louvre's by then celebrated east facade. It seems that Piganiol saw this as a topic that would be interesting to his touring readers and decided to contribute his opinions. To provide his readers with fresh insights, he discovered Perrault's unabridged Registre, and he extracted from it all the information about the Louvre that he could, and then quoted it in his Louvre chapter. He then provided a few pages of his own interpretation of the century-old events. An example: "Le Vau was the most skilled Architect that there was in Paris, but let me explain," wrote Piganiol, "he is one of the Architects of tradition, like almost all the others.…Le Brun was a great painter, and dabbled in architecture in so much as sometimes placing it in composition of his paintings…Perrault was born an architect, and had fortified this natural talent with the study he had made of *Vitruvius*, by which he gave to the Public an excellent translation."[131]

Piganiol clearly was a writer in his time, influenced by the popular opinions at the time of Claude in the years following the Louvre project.[132] Piganiol leaves no question about his personal point of view: he had narrowed his journalistic focus on the Louvre controversy with the objective of attributing the design to Claude Perrault. It would follow that since he had

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[130] According to Piganiol, the name is either a corruption of *l'Œuvre*, or *l'Ouvrage*, or a simple appropriation of the Saxon word *Louvre* that signifies *Château*.

[131] Piganiol de La Force, "La Quartier du Louvre," 259.

[132] Six years after his duty as a member of the Petite Conseil, Claude published a French translation of Vitruvius's ten books of architecture (1673), with a revised edition in 1684. His grand treatise on architecture, *Ordonnance des cinq especes de colonnes selon la methode des anciens*, was published in 1683, five years before his death.

already limited geographically the scope of his article, he had no motive to include any other projects that were documented in the original Registre—namely, the Observatory and the Arch de Triumph at Trône. Consequently, except for the one mention of "buildings," Piganiol's abridgement of Perrault's Registre leans exclusively towards the work related to the Louvre project.

In his memoirs, Charles Perrault also allows for the possibility that the Petit Conseil was created not exclusively for the Louvre project, but for all of Colbert's future projects. In fact he consistently refers to the Petit Conseil as the "conseil des bâtimens,"[133] at least implying that the committee's purview extended beyond a single building. Elsewhere, when recalling his role as the recording secretary of the Conseil, he refers again to "buildings," plural: "Ce registre que j'ai rendu avec tous les autres papiers des bâtimens, est plein de choses très-curieuses," wrote Charles. ("This register, which I surrendered with all other documents related to the buildings, was full of curious things.")[134]

Keeping in mind what we now know about Colbert's deliberate, years-long reform of the production of architecture, it defies reason to believe that he undertook that massive reform for the sake of a single building. When all things are considered, it becomes easier to believe that his aims were much greater than that. The plan he was following, I suggest, was to set an entirely new course for architecture—in line with the other reform projects he was undertaking at the same moment. His paradigm projects were these three royal projects—the Louvre, the Observatory, and the Arc de Triomphe de Trône.

[133] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 86.

[134] Ibid., 87.

Two additional pieces of evidence support this assertion, and demonstrate that Colbert considered these projects as a group. A year later, in his own hand, Colbert scribbled a note listing his architecture projects and their status on that particular day (Figure 20):

> Water at Versailles—research—consequences.
> Water for St. Germain—10 or 12 inches at Marly: great difficulties for the piping.
> grand terrace to finish.
> gardens, *idem*.
> The Louvre to continue—great number of houses to buy.
> planting everywhere to continue.
> arc de triomphe[135] for the conquests on land.
> observatory for the heavens.
> Pyramid, difficulty in the execution.
> grandeur and magnificence.[136]

The list appears in the Clément collection, but surprisingly not among the other architecture papers in volume five. Instead, it is found in volume seven, with Colbert's private

[135] Arc de Triomphe du Trône.

[136] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 7:289–90. Original is held in the Archives national (Paris), K 899, item 19, f. 3v.

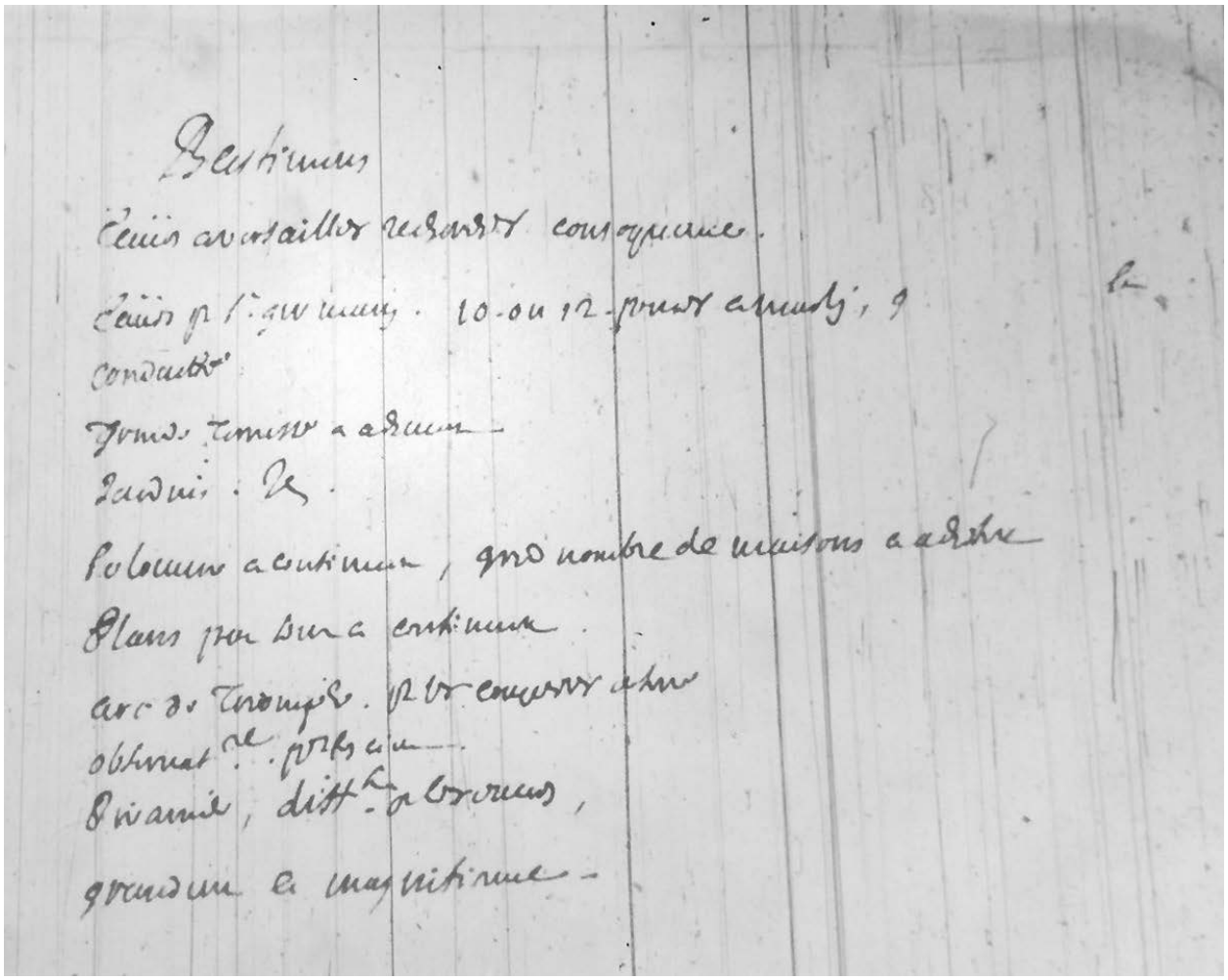


Figure 20. Jean-Baptiste Colbert, presentation notes showing a list of current architecture projects. Original kept in the Archives nationales in Paris, AN, K 899, item 19, f. 3v. This copy is courtesy of Nicholas Dew.

letters. According to Nicholas Dew, who has seen a copy of this list at the Archives nationales in Paris, it appears in an *Item* of other documents, on the verso of one of several leaves. The *Item* begins "au Roy," which would lead us to believe that rather than being a casual reminder of his daily responsibilities, this list was likely the notes for a presentation he made to his king, updating him on the status of the works.[137]

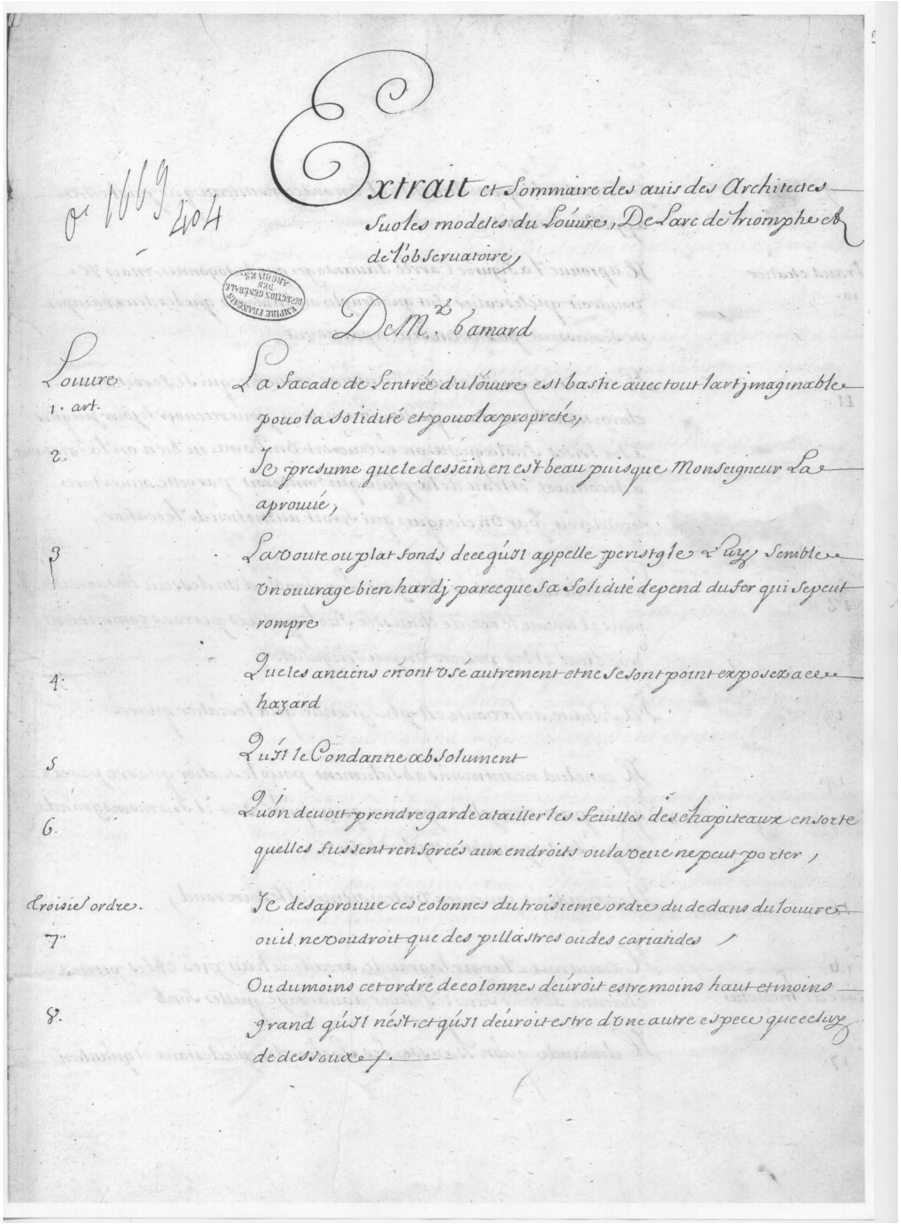
[137] I am indebted to Nicholas Dew, who also appreciates the significance of this list, and who has taken the time and trouble to investigate it at the Archives nationales on my behalf. It was Nick who brought to my attention that the list was addressed to Louis XIV, which changed my view of it, enriching it even more.

In the centre of Colbert's list appear his three Paris projects. At that time, all three were in about the same phases of construction, having all begun at about the same time. The list is not dated, but by the nature of the work described—for example, buying houses around the Louvre—it seems that it must have been fairly early in the construction. With sentiment that is rare for Colbert, he uses near-poetic terms: "Arc de triomphe pour les conquestes de terre. Observatoire pour les cieux." But it is his last note, "Grandeur et magnificence," that is particularly interesting. This final line appears to be a reminder to himself to re-emphasize to Louis why the reforms and intense interest that Colbert had shown in architecture is all worthwhile.

Later in Colbert's design development process, the three projects were again grouped. This time, their designs were subjects of a review by yet another committee of consultants that was assembled by Colbert. Those consultants were asked to examine three wooden design models that had been constructed for the projects, and then submit their opinions in writing.[138]

[138] These three models no longer exist and are believed to have been destroyed in the Tuileries fire.

Those reviews were then compiled in an eleven-page manuscript titled "Extrait et sommaire des avis des architectes sur les modèles du Louvre, de l'Arc de triomphe, et l'Observatoire" (Figure 21).[139] Originally undated, the reviews are believed to date to 1669.[140] At the time, the


Extrait et Sommaire des avis des Architectes sur les modeles du Louvre, De l'arc de triomphe et de l'Observatoire,

De M.r Bamard

Louvre
1. art. La facade de l'entrée du louvre est bastie avec tout l'art jmaginable pour la solidité et pour la propreté,

2. Je presume que le dessein en est beau puisque Monseigneur l'a approuvé,

3 La voute ou plat fonds de ce qu'il appelle peristyle et qui semble un ouvrage bien hardj parceque sa solidité depend du fer qui se peut rompre

4. Que les anciens en ont osé autrement et ne se sont point exposez a ce hazard

5 Qu'il le condanne absolument

6. Qu'on devoit prendre garde a tailler les feuilles des chapiteaux en sorte qu'elles fussent renforcés aux endroits ou la veue ne peut porter,

Troisiesme ordre.
7. Je desaprouve ces colonnes du troisieme ordre du dedans du louvre ou il ne voudroit que des pillastres ou des cariatides /

8. Ou du moins cet ordre de colonnes devroit estre moins haut et moins grand qu'il n'est, et qu'il devroit estre d'une autre espece que celuy de dessous /.

Figure 21. Title page of the manuscript, "Extrait et sommaire des avis des architectes sur les modèles du Louvre, de l'Arc de triomphe, et l'Observatoire," Archives nationales (Paris), (1669?).

[139] "Extrait et sommaire des avis des architectes sur les modèles du Louvre, de l'Arc de triomphe, et l'Observatoire" [author unknown] (1669?), Archives nationales (Paris) O/1/1669.

[140] The document is dated "1669" in pencil, on the cover sheet. Historian Anne Lecanu dates it 1667 and there is reason to agree: an external review of the designs would have been most useful in

construction on all three of these projects was well underway. At the observatory construction site, the site and foundation work was complete and the stone walls had already reached the first floor.

It seems that there would have been little instrumental gain in the design opinions expressed in these reviews, some two years into the construction sequence. What, then, might have been Colbert's objective in arranging this review? At the least, it may have gained him some support among the professional world of architecture as he promoted his reform enterprise and showcased his work in progress. However, for this study, it provides some important evidence that two years after the construction had begun on the three projects, they are still joined as a group of three projects.[141]

Regarding the members of the Petit Conseil, at that time, as the premier architect of the king, Le Vau was also directing work on many royal projects.[142] Le Brun was another Petit Conseil member who had a busy atelier at his disposal, with artists, painters, and sculptors.

1667. However, the reviewers' comments, which are directed to advanced states of construction at the time, rules that out. Anne Lecanu, "Observatoire de Paris, 1667–1793" (Master's thesis, Université de Paris-Sorbonne IV [S.I. : s.n., s.d.], 9–11.

[141] Regarding the contents of the "Extrait et sommaire," Robert Berger and Michael Petzet write extensively about the resulting manuscript, and not much more needs to be added to their analyses. From the comments, it seems that the committee members had been able to comment on construction techniques. From the Extrait et sommaire, we read that M. Gamard's believed that, "Il aimeroit mieux qu'on fit les voutes d'en haut de pierres de moliere ainsi qu'on le propose"; and "Qu'on fit le corroy entre la voute et le pavé de la platte forme de sable et non pas de Ciment parceque le Ciment se tourmente et pousse le pavé." This, however, does not deter from the two important and essential points: first, that Colbert routinely grouped these three projects together; and second, he was establishing and formalizing a structure of collaboration as well as redundant levels of review.

[142] Despite the rearranging of authorities by Colbert, Le Vau never lost his title as premiere architect of the king. His atelier was certainly highly productive during this time, with major works on the other royal chateaus, not the least demanding being the projects just getting underway at Versailles. For further discussions of Le Vau's work during this time, see Jean Autin, *Louis XIV architecte* (Paris: F. Lanore, 1981); Ballon, *Louis Le Vau*; and Cojannot, *Louis Le Vau*.

Not surprisingly, the medical doctor Perrault had no drafting employees.[143] So it is most likely that the design drawings and required construction documentation were produced in one or both of the two principals' ateliers.[144] Some historians who concentrate their research on Perrault believe that he produced some presentation drawings related to the Observatory and Louvre at around this time.[145] Furthermore, Wolfgang Herrmann made a specific search of this question and concluded that none of the drawings traceable to Claude date earlier than 1667, that is, after his enrolment in the Petit Conseil.[146]

***

Like all chapters in this study, this chapter began as the comet of 1664 was focusing the attention of the population in Paris. It was also the moment when Colbert's Fouquet project had reached a conclusion. The end of the Fouquet affair did not, however, mean a reduction in Colbert's intense workload. In the year that followed, he was immersed in several other major reform projects. Having already taken control of the Bâtiments du Roi, a leadership position that he had sought for years and the very first office that he acquired personally, he was, as we have seen, set to reform the production of architecture. At the moments that the rest of Paris was mesmerized by the comet, Colbert was in the midst of many reform projects

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[143] Berger writes that Perrault had no known assistants during this time. Berger, *The Palace of the Sun*, 34n23.

[144] Berger, *A Royal Passion*, 30. Berger's explanation of the process is most plausible: "Le Vau's atelier, with d'Orbay as chief draftsman, was where the presentation drawings were actually produced; creative architectural ideas, however—whether generated by Le Vau, Le Brun, or Perrault—could have emerged in oral discussions and rough sketches, now lost." Berger, 30.

[145] Most notable is Michael Petzet. See Michael Petzet, *Claude Perrault und die Architektur des Sonnenkönigs: Der Louvre König Ludwigs XIV. und das Werk Claude Perraults* (München: Deutscher Kunstverlag, 2000). See also an earlier analysis by Petzet: "Claude Perrault als Architekt des Pariser Observatoriums," *Zeitschrift Für Kunstgeschichte* 30, no. 1 (1967): 1–54.

[146] Herrmann, *The Theory of Claude Perrault*, 17.

and awaiting word from his emissary in Rome, who would soon tell him that he had convinced the most famous architect in Europe, Gian-Lorenzo Bernini, to travel to Paris to work on a design scheme for the Louvre and demonstrate his divine talents.

Not surprisingly, for several months in the summer of 1665, Bernini was a Paris sensation, which, when seen in conjunction with the Fouquet affair and the comet, was the third of three popular focal events on which Colbert took action. In all three, he was able to draw out and make visible the tired and defunct practices of three worlds: the financial and judicial systems, the world of natural philosophy and science, and finally, the traditional practice of architecture. Once the ungrounded and sophistic practices of each of these worlds were made obvious, and the inadequacies of the status quo were brought to light, the ground was then readied for Colbert to implement his reform of those practices.

In the world of architecture, Colbert methodically worked to supplant the tradition of visionary but specious artist, with an organization of layers of peers selected for their intelligence and personal skills, as well as for their varied backgrounds and unique perspectives. By Colbert's requirement, these teams of peers must work together in harmony—not coincidently an identical ethic and methodology that Colbert used to structure the membership of the Compagnie. In an attempt to shed some light on the centuries-old controversy of the attribution of the design of the Observatory, I have situated the Observatory project in what I believe to be its original context, showing how it fit into the broader plans that Colbert was trying to implement at that very moment, drawing upon evidence to show the most plausible available explanation: that the Observatory was treated as one of three important royal projects being made ready through Colbert's reinvented methods, as a collaborative design product of the Petit Conseil.

In the end, the question of the attribution of its design—the one question that would probably be most pursued by a modern historian—is plainly an irresolvable one, as it was the very thing that was regulated. Authorship and individual attribution were elements to be eradicated in Colbert's plans of reform—and as we have seen, a key principle in all his knowledge production reforms—and made indistinguishable from the work of various committees on the whole. In the end, the reason that Claude Perrault never claimed authorship for the Observatory design is that he could not. Nor could anyone else.[147]

Before moving to the final chapter of this study, I would like to summarize briefly. In the previous chapter, I described the prolonged and deliberate process that Colbert undertook to form his Compagnie—a variation of the ideas he received from Charles Perrault, Adrien Auzout, and their collaborators. In their first meeting in December 1666, Colbert had promised his new Compagnie the other half of the project that Auzout had proposed: an observatory where they could all do their work. But as we have just discussed, he first needed to reform the practices by which that observatory could be conceived and built—in the end, a two-year project. Once the new production process was in place, Colbert began the development of the Observatory building. The next chapter demonstrates how I believe the Observatory was conceived and developed.

[147] In a related note, the famous debates about design authorship of any of the buildings under consideration here did not get underway until near the end of the century, after the deaths of Colbert in 1683 and Claude in 1687.

Chapter 6 — The Genesis of the Plan of the Observatory

> The most skillful architect, if he has not practiced astronomy, will never build a good Observatory. Only an astronomer can foresee all the needs and fulfill all the conditions required by the various operations of the observer, and the various instruments that he can use.[1]
>
> Jean-Dominique Cassini III, 1810

Introduction[2]

As earlier chapters demonstrated, the Observatory was first made intelligible as a composite project of two parts: that the Observatory was first conceived and made intelligible as a composite project of two parts: an observatory and a company—a structure and its use as a centre for research. Each part of the project had a distinct organization of intentions, histories, and practices. The idea of the project first took form in a proposal published by Adrien Auzout. At that time, Parisians were preoccupied by several events. The most auspicious was the unexpected apparition of a sensational comet that hung in the sky for several weeks. Its appearance and ephemeral nature inspired immediate actions—most importantly, Auzout's proposal. For several weeks, the comet mesmerized not only Parisians but, it seems, every person on Earth. For most who witnessed it—Marie de l'Incarnation was an extraordinary example—the comet was humbling, miraculous, and meaningful. For Auzout and a handful of

[1] « Le plus habile architecte, s'il n'a point pratiqué l'astronomie, ne saura jamais construire un bon Observatoire. Il n'y a qu'un astronome qui puisse prévoir tous les besoins et remplir toutes les conditions qu'exigent les diverses opérations de l'observateur, et les différens instrumens dont il peut faire usage. »

[2] Parts of this chapter have been published as "The Origins of the Paris Observatory," in *Chora 7*, eds. Alberto Pérez-Gómez and Stephen Parcell, (Montreal and Kingston: McGill-Queen's University Press, 2015), 118. –140.

colleagues, it was that and more. For them, it was an opportunity, an object of study that could hold truths about the universe—truths that, if understood, could help to realign man with God and His intentions.

Auzout's proposal was bold and audacious. Once unfolded, it was sensational in its own way. It called for a kind of facility and a version of an assembly of savants that had no real precedent, other than that which had appeared in fables, or the imagination natural philosophers. Auzout's proposal opened the possibility of an almost total restructuring of the traditional modes of production of knowledge. The moment must have seemed providential: after decades of well-intended but failed attempts, the possibility of a centralized, government-funded research agency seemed achievable. There was a new, powerful, Catholic king, keenly educated and sympathetic to the new sciences, with a unique confidence that constantly reinforced a pursue for a more perfect world.

Perhaps most of all, there was a man in charge of the development of the project who was determined to make it successful. Colbert was powerful, operationally effective by style, with an even stronger will to succeed than his king. He was a seeker and implementer of the visions of those most capable of creating visions. Strategic and accomplished, he had skill and experience in raising capital for his enormous projects. Despite impossible distractions, he maintained a monocular vision focused on the welfare of France, with a compulsion to restructure, as necessary, every system in his kingdom. And then there was, of course, the comet, unanticipated, heaven-sent, a wonder, even for Colbert, who, as we have seen, accepted it as an opportunity for change.

Colbert began the Observatory project by establishing the composition of membership. By now, we have come to expect that prior to undertaking a project of this magnitude, he would first concentrate on assembling teams of experts to advise him in carrying it out. In this case,

that team included not only personal advisors such as Chapelain, Carcavy, and Perrault, but also the individuals most in touch with the project's spirit and destiny: the Compagnie membership themselves. They could also be most helpful in providing expert advice on the facility's anticipated functional requirements. In the two years following Auzout's proposal, it appears that, except for addressing the occasional inquiry from curious foreign savants echoing rumours about the Observatory project, all emphasis was placed on assembling the Compagnie's membership. Consequently, no substantive conversations about the Observatory building itself have been found, and it seems certain that no official action whatsoever was taken towards its design and development. In fact, I have found no details of the Observatory's progress in any correspondence or memoranda between Auzout's January 1664 letter and the first formal meeting of the Compagnie in December 1666.

We may surmise that information about the progress on the Observatory design was suppressed, although curiosity about it was still high. Not even the new Compagnie members themselves had any news. In a response posted by Auzout to an inquiry from Oldenburg about the status of the project, Auzout wrote, "Although I had the honour to be appointed by the King as mathematician and physicist, I cannot give you any more details than are known to everybody, because we have not been kept fully informed."[3] Auzout could only be vague and conceptual. In his letter, he described aspirations he held for several experiments. However, since he and the others had no facility in which to work, he confessed to some general discouragement and even lethargy: "If the laboratory we have reason to hope for had

[3] Auzout to Oldenburg, 18 December 1666, in *Correspondence of Henry Oldenburg*, 3:296.

existed, I would have tested most of these experiments…But as these matters have not yet been settled, we did nothing of importance."[4]

Oldenburg pressed for news about the facility itself, and Auzout told him what he knew, which was at that point, not much: "Since I have mentioned the laboratory I must say a word about the plan we have here, since you express a desire to hear something about it…We have been promised a fine observatory, furnished with all kinds of large instruments and a laboratory where all kinds of experiments can be performed; we are to do all sorts of anatomical dissections and, in general, all kinds of observations, both celestial and terrestrial."[5]

He was obviously unaware that in only a few days Colbert would make the announcement that would end the delays and anticipation. The promise Auzout had apparently received was of a complex, scientific centre, and we can see that Auzout's original image of the Observatory had not changed since he helped define its mission. For him, it was still a facility with more ambition than solely to make astronomical observations. For him, "observation" maintained a more universal meaning. It represented a witnessing of all the curious phenomenon of the world. His impatience indicates that he had not considered that deliberate delays in Colbert's processes were inevitable. Following his predictable path, Colbert could not initiate any design work on the Observatory—even after reforming the entire tradition and making architecture—until weighing the advice from the specific men who would use the facility. We can recall the first meeting of the Compagnie: Colbert told the assembled Compagnie that now that they were an established entity, the observatory structure would be next on the schedule,

[4] Ibid.

[5] Ibid. Auzout leaves no doubt that the Observatory was conceived as a polyvalent facility that would contain a laboratory for a variety of experiments.

but it could move forward only with their involvement. First, they needed to choose a location. After that, the building that would be built for them would be simply incomparable: "For an observatory…they had nothing more to do than to choose a site…and readily in that place would be built an edifice that would not only surpass in grandeur, beauty, and commodity the observatories of England, Denmark, and China but which, it goes without saying, would respond in a specific way to the magnificence of the prince that was having it built."[6]

As we have seen, Colbert had no intention of moving on any of his architecture projects until he first gained control of the practice of architecture and reformed it. He did this by putting in place a now-standard structure of consultants and layers of advisory committees—a methodology that he had used in the past to aid him in developing his reform ventures in other worlds. Using the Louvre expansion as the prototypical project, he went to enormous lengths to expose and discredit the conventional practices of architecture by methodically demonstrating to his circle the inherent inadequacies in it, particularly given the demands of modern culture, which he aptly foresaw. Over several years, he had systematically evaluated and rejected all conceivable aspects of the traditional practice of architecture, culminating in the dismissal of its brightest star, Gian Lorenzo Bernini.

By challenging Bernini's design proposals at their simplest and most reasonable levels, he and his supporters gradually demonstrated to Louis and others that any architectural design

[6] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:515. « Que pour un observatoire, dont l'astronomie ne pouvoit se passer, ils n'avoient qu'à choisir un lieu qu'ils jugeassent propre pour y bien observer, et qu'aussytost il y seroit construit un édifice qui non-seulement surpasseroit en grandeur, en beauté et en commodité les observatoires d'Angleterre, de Danemark et de la Chine, mais, ce qui estoit tôut dire, qui répondroit en quelque sorte à la magnificence du prince qui le faisoit bastir. »

founded on unverifiable claims was disingenuous and deceitful, and it would be impossible that such designs could ever achieve architecture's potential. Once he was able to demonstrate the fallacies borne by the fables that constituted Bernini's design solutions, Colbert could claim full authority over a restructured and perfected process.

What followed was the creation of the Petit Conseil in April 1667. As a formal entity within the Bâtiments du Roi, the Petit Conseil was the centrepiece of the revised methodology for producing architecture. Perrault's official memo on the Observatory building does not mention that Colbert shared his plans about how the design would be created—only that, with the membership's assistance, the Observatory would be built. Perrault's brother, Claude, a Compagnie member and the figure most often called the architect of the Observatory, was undoubtedly among those in Colbert's audience. Given Claude's presence in the room, if he were indeed destined to be the Observatory's designer, it might seem odd that Colbert did not mention this at the time.[7] Further, it would be even more surprising had he mentioned it and brother Charles failed to include it in the official log of the meeting.

Regardless, what Perrault did record was that Colbert discussed the first pressing matter for the new facility: the choice of a site. As far back as pagan times, various high points around Paris had been used for celestial observations, and astronomers had been carrying their instruments to the tops of many local hills.[8] Most commonly, they trekked to the top of

[7] Two of Claude Perrault's most recent biographers think his authorship is beyond question. For example, see Picon, who writes, "Le nom de Claude Perrault s'impose tout naturellement à Colbert pour donner le dessin de l'Observatoire" (*Claude Perrault*, p. 197) In *Claude Perrault und die Architektur des Sonnenkönigs*, Michael Petzet writes, "Scheint er von vornherein für die Planung des Observatoriums bestimmt" (p. 4).

[8] In Paris, various places had been used for centuries to observe the heavens: Belleville (NE, 128 m above sea level) ; Ménilmontant (NE, 108 m) ; Des Buttes Chaumont (Chauve-mont, 80 m) ; Passy, 71 m ; Chaillot, 67 m ; Montagne Sainte-Geneviève, 61 m ; Butte-aux-Cailles, 62 m ; and Montparnasse, 66 m.

Montmartre, which offered many benefits. It was the highest and nearest geographical point, and Montmartre was also already semi-developed. Roads led all the way to the top where there were farms and windmills. A church—in legend founded by St. Denis—had existed there for at least fifteen hundred years. Earlier than that, there was a Roman temple dedicated to Mars on the site, from which the name Montmartre was derived. In the twelfth century, a Benedictine abbey was attached to the church. In 1667, the church and abbey were centres of much symbolism and activity.[9] However, the astronomers were also aware of the flaws of the Montmartre site, one of which proved fatal. Since Montmartre was situated north of Paris, views to southern sky and horizon—the most critical for astronomers—were distorted.[10] "We first thought of placing the Observatory on the mound of Montmartre," recalled Charles Perrault, "since it was the closest to Paris that was high enough to fully survey the horizon. But we found that the fumes that rise continuously from Paris, which is situated south of Montmartre, would be a perpetual obstacle to all sorts of observations."[11]

Consequently, alternative sites around Paris were examined, with emphasis towards high points on the south side of Paris: "So a decision was made to choose a place that was entirely opposite [Montmartre], where Paris would be to its north, with access to the east, day and night entirely free and uninterrupted by all the fumes and vapours that rises continuously in

[9] We might imagine the attraction of the Montmartre location in the way it would reflect memories of older civilizations (like Athens, for example). The image of a new modern "temple" of knowledge and discovery mounted directly above Paris, aligned precisely with the Louvre, must have been appealing to someone with Colbert's admiration for ancient cultures.

[10] In astronomers' parlance, "the Southern Hemisphere holds all the good stuff." This popular phrase first coined by twentieth-century astronomer Bart Bok.

[11] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:515. « On pensa d'abord à placer l'Observatoire sur le tertre de Montmartre, comme le plus proche de Paris qui fust assez élevé pour bien découvrir tout l'horizon. Mais on trouva que les fumées qui s'élèvent continuellement de Paris, situé au midy de Montmartre, estoient un obstacle perpétuel à toutes sortes d'observations. »

the city."[12] The alternative site they found was for many reasons a fortuitous discovery. First, it was a site south of Paris, in the faubourg Saint-Jacques, where "two of the grandest streets in Paris" crossed: Rue Saint-Jacques and the Rue de la Harpe. They came together near a raised mound whose natural grade had been raised even higher by ancient city walls. Like Montmartre, there was another abbey in the area. The region was predominantly covered with farms and mill sites. From the top of the site, one could easily see the four horizons. Further, the site was determined to be large enough to be adequate for their purposes.

However, the planners soon found that the Saint-Jacques site had its own serious problem: beneath their feet was a centuries-old stone quarry. "No sooner was the decision made [to consider the Saint-Jacques site] than we found a great difficulty in its execution," recalled Perrault. "The ground below was hollowed with large quarry caverns, so that it was in no condition to bear the weight of the large building that we purposed to be built there."[13] Since the Middle Ages, stone used to build Paris had been mined from tunnels that cut through the stone mound below the site. Everyone had heard of building failures as the cavernous earth below them gave way. As Perrault explained, everyone realized that there was no way that the undercut earth below would support a building like the new Observatory. Needless to say, the problem was compounded by the fact that as a facility meant to house delicate instruments and experiments, a completely stable foundation would be imperative. But just as quickly, the problem was solved. All it would take would be to refill

[12] Ibid. « De sorte qu'il fut conclu qu'il fallait choisir une situation tout opposée à celle-là et qui eust Paris à son nord, pour avoir le levant, le mid y et le couchant entièrement libres et dégagés de toutes les fumées et de toutes les vapeurs qui s'élèvent continuellement de la ville. »

[13] Ibid. « La résolution ne fut pas plutost prise qu'il se trouva une grande difficulté à son exécution. Le terrain estoit creux par-dessous par de grandes carrières, en sorte qu'il n'estoit pas en estat de porter le fardeau du grand édifice qu'on proposoit d'y construire. »

the hollow caves. They could leave it to Colbert to find the money for it. As Perrault put it, "as there was only going to be the expense of filling these quarries with masonry at the places where the building would be embedded, we pressed on."[14]

In other words, it was decided that masons would enter the tunnels and fill in the voids with new stone walls, directly beneath and in line with the structural walls of the new building above. That way, the weight of the building would be discharged down through the masons' new walls and distributed directly into the earth below. This construction solution had other interesting implications. First, the Observatory could not have been connected to the earth in a more secured fashion. The interweaving of its stone walls through the tunnels allowed the structure to be knitted into the crust of the earth. Soon, the stonemasons' joints between the stones would calcify and the stones would fuse into one. The stone structure would fuse with the solid stone of the mound at points as deep as ninety feet below the surface. The Observatory, effectively, became a sculpted piece of the earth's crust.

There was a second resultant benefit, and Perrault wrote about this unanticipated profit: "We even found [the problem of the caves] to be a happy coincidence, because it would offer underground places where we might do many experiments in physics and mathematics."[15] As the walls pass through the caves, they divided them into isolated chambers, creating rooms inside the perimeters of the building and deep into the earth. Some of the underground caves were already hundreds of years old. With their absolute stillness and constant climate, these underground rooms would become very useful.

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[14] Ibid. « Cependant, comme il n'y alloit que de faire la dépense de remplir ces carrières de maçonnerie aux endroits où l'édifice seroit planté, on passa outre. »

[15] Ibid. « On trouva mesme que cette rencontre estoit heureuse, parce que cela donneroit des lieux souterrains où l'on pourroit faire plusieurs expériences pour la physique et les mathématiques. »

On 7 March 1667, Colbert took the next step forward by completing the purchase of the Saint-Jacques site. A real estate sales agreement was reached "to sell to the King by the Sieur de Valles a site for the Observatory."[16] Antoine de Valles, described in the document as a squire living in Paris, agreed to sell his site, which included a windmill and a tile-roofed mill where the miller lived. There was also a pond on the site that held run-off water. The site was measured at approximately seven acres, six of which were farmable, probably an orchard site. According to the agreement, the Sieur de Valles was granted the profits stemming from the demolition and salvage of the mill operations. A map of the site showed it to be roughly a pentagon shape. The agreement called for Colbert to give Valles 6,604 livres in exchange for the site, in the name of the king. The 7 March transaction was witnessed by Jean Varin, the royal advisor and the general intendant of the Bâtiments du Roi.

A Plan Emerges at the Compagnie Meeting of 2 April 1667

By March 1667, the site was purchased and demolition had begun. Next on the agenda was the creation of the Compagnie's official home and workplace, the first of its kind in the world. What had been an ideal and then a promise was to become a reality. The next recording of any progress being made on the Observatory plan occurred the following month. Historian Charles Wolf marks the event in his 1793 history of the Observatory. Wolf refers to an entry discovered in the Procès-verbaux—the official meeting minutes of the Compagnie. It was the first mention of the status of the new Observatory project. The Procès-verbaux records, "Monsieur Auzout a donner à Monsieur Perrault un plan pour l'observatoire." ("Mr. Auzout

[16] Wolf transcribes the sales agreement in near-full form and Petzet reprints a majority. C. Wolf, *Histoire de l'Observatoire de Paris de sa fondation à 1793* (Paris : Gauthier-Villars, 1902), 8–9. See also, Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 358.

has given to Mr. Perrault a plan for the Observatory.")[17] As Wolf explains, this is all that is left of that discussion and the plan that was exchanged is now lost.

Wolf's portrayal of the event induced an explanation that has been accepted since his history was published: that the "Mr. Perrault" was Claude, was simply completing a kind of architect's "due-diligence." For Wolf in 1793, there were compelling reasons to maintain that Claude Perrault was the Observatory's architect. We saw this popular bias earlier with Piganiol. In that vein, Claude would have desired practical information from Adrien Auzout, the premier astronomer of France.

But now, with knowledge developed throughout this study, much about this speculation requires significant suspension of disbelief. To his credit, Wolf acknowledges the ambiguity of the note, admitting that there is little certain about Claude's role: "there is a question about the plans of the Observatory," as he admits.[18] Nonetheless, Wolf sets aside any doubts about Claude being the Observatory's architect. Surprisingly, he also admits that he never actually saw the entry in the Procès-verbaux, but was only told of it by a friend and fellow eighteenth-century historian, Ludovic Lalanne. Wolf claimed that Lalanne alerted him to the line and enigmatic exchange, which Lalanne said occurred in a meeting on 22 April 1667. Wolf quotes Lalanne this way: "(Procès-verbaux, Tome II, p. 205)," and leaves it at that.[19]

Wolf likely tried to confirm Lalanne's citation of the Auzout-to-Perrault exchange, but his attempts were certainly thwarted, for in fact, page 205 of Tome II of the Procès-verbaux is famously missing from its binding. That volume ends abruptly on page 203, interrupting a

[17] Wolf, *Histoire de l'Observatoire*, 21.

[18] Ibid., 20–21.

[19] Ibid., 21.

multi-paged essay, written in Latin, titled, *Propositiones*. This enigmatic passage and Wolf's ambiguous documentation have befuddled any of the modern historians who have tried in vain to cite Wolf and verify this important assertion. They choose one of two compromised paths: either to avoid the controversy and simply quote Wolf (and his incorrect citation), or worse yet, to ignore Wolf and cite right through him to a page in the Procès-verbaux that does not exist.

Through all this, no historian has raised an obvious suspicion: the claim made by Lalanne and Wolf that the meeting occurred on 22 April 1667. Certainly, both Lalanne and Wolf—and all later interested historians—should have doubted that a meeting would have been held on that day. All Compagnie meetings were famously convened on Wednesdays and Saturdays. The date in the Wolf citation—22 April 1667—was a Friday.[20] Investigating this suspicion led to the discovery that this important exchange between Auzout and Perrault did in fact occur, and it was indeed documented in the meeting minutes of the Compagnie. Those meeting minutes are bound in Tome I of the Procès-verbaux, not Tome II, and the exchange occurred in a meeting that was held on Wednesday, 2 April, not on 22 April (Figure 22).[21]

[20] Monday in the Julian calendar.

[21] To complicate conditions for modern historians, Tome I is the only volume of the Compagnie's Procès-verbaux that has to date not been digitized and made available online. As far as I know, the only available copy is in the Reading Room of the Académie des Sciences, Paris. I am indebted to Mme Florence Greffe, the Conservateur des archives, for her benevolence and assistance in helping me discover this volume in the Academy's archives.

In the broad context of Wolf's definitive history of the Observatory—from its beginnings to 1902—this would be a relatively minor oversight. By not verifying the entry, Wolf, and those who have followed him, did not see the correct meeting minutes and the Auzout-to-Perrault entry, and by not seeing those minutes, they also missed another entry that

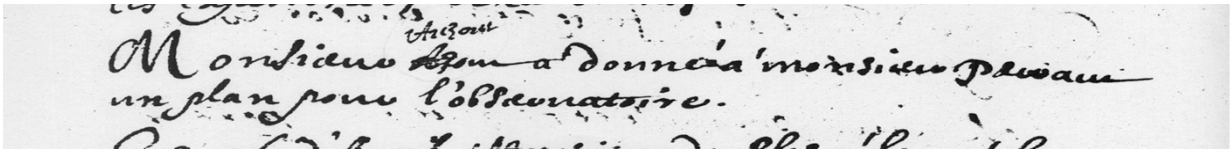
Monsieur Auzout a donné à monsieur Perrault un plan pour l'observatoire.

Figure 22. Procès-verbaux des séances de l'Académie (Académie des sciences), Académie des sciences," Tome 1, page 205. "Monsieur Auzout a donné à monsieur Perrault un plan pour l'observatoire."

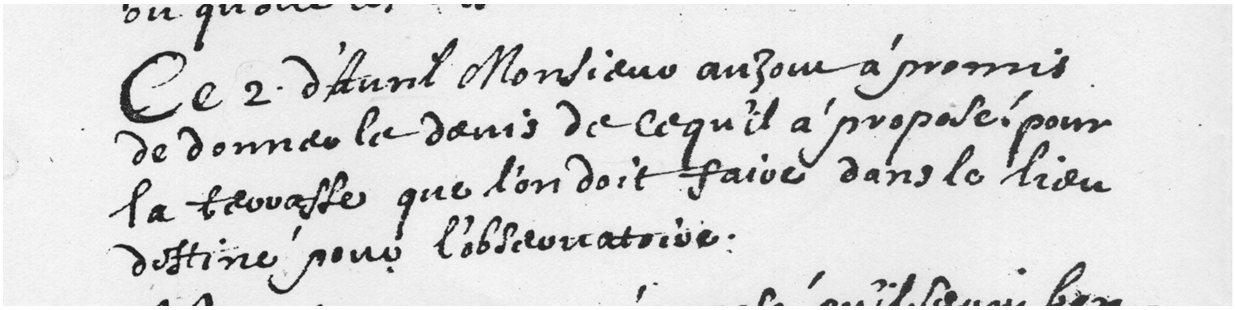
Ce 2. d'Avril Monsieur auzout a promis de donner le devis de ce qu'il a proposé pour la terrasse que l'on doit faire dans le lieu destiné pour l'observatoire.

Figure 23. Procès-verbaux des séances de l'Académie (Académie des sciences), Académie des sciences," Tome 1, page 204. "Ce 2 d'Avril Monsieur auzout a promis de donner le devis de ce qu'il a proposé pour la terrasse que l'on doit faire dans le lieu destiné pour l'observatoire."

documented another important action related to the Observatory project. That note—in fact, the first note recorded—reads, "This 2 of April, Mr. Auzout has promised to give the devis of what he has proposed for the terrace that must be built in the place destined for the observatory." (Figure 23).[22]

Thus, the Compagnie's meeting minutes record that Auzout not only submitting a plan for the Observatory but also promising a "devis" for the work he proposed at the 2 April meeting. A devis would have been no small matter. In seventeenth-century construction parlance, a

[22] Académie des sciences, Procès-verbaux, 1:204. I have found that only Robert McKeon, in his dissertation, cited this correct passage, although he makes no mention of Wolf's error. However, in transcribing the Procès-verbaux extract, he himself created a minor transcription error, reading "travail" instead of "terrasse. " See McKeon, "Établissement de l'astronomie," 2:303. I am grateful to Nicholas Dew for his paleographic assistance in reading this passage.

devis was a set of detailed descriptions for an architectural project. A devis usually included items such as the labour and materials needed for construction, and perhaps even a cost estimate.[23] The information comprising a devis would have been in the hands of only someone very close to the project. The reports from the 2 April meeting now give us a sense of what might have been transpiring in March 1667, following the purchase of the site. Evidently, Auzout, Perrault, and the rest of the Compagnie were finally advancing the work on their new home, the Observatory.

Another longstanding misinterpretation in Wolf's citation can also be put right. To begin, given what we know about the background of the inception of the Observatory project, it makes sense that it would be Auzout who would submit an Observatory plan to his colleagues. After all, it was he—and, as we have been led to believe, some collaborators—who conceived the project and attempted to promote its vision. It was also he who seems to have been most involved in it over the past two years. Furthermore, as the premier astronomer of the group, he would have undoubtedly been a key source of the kind of professional knowledge and expertise necessary to advance the project. Nevertheless, what reason is there to believe that it was Claude Perrault who was on the receiving end of Auzout's plan? Of course, if, like Wolf, Piganiol, and the many historians who followed them, we are predisposed to believe that Claude was the architect of the Observatory, then the "Monsieur Perrault" would indeed seem to be Claude, who, we can surmise, was exercising a kind of

[23] In today's terms, a *devis* might be comparable to a set of project specifications. A dictionary at the time offers these definitions: "Un mémoire contenant le détail de certaines sortes d'ouvrage, & principalement d'Architecture & de la dispense qu'il y faut faire. Devis exact. Faire un devis. Donner le devis d'une maison. Le devis de l'Architecte ou du Maçon. " *Le dictionnaire de l'Académie française*, 1 st ed., « devis. »

architect's due diligence, as a part of his design work. At this point in the study, what evidence has been revealed that would qualify Claude to be the Observatory's architect?

After all, in the world of the savants—those who had a keen interest in the development of the Observatory project—there has been nothing that might connect Claude to the project. As we saw earlier, the Observatory project had been rumoured for several years. During that time, Claude's name never once appeared in any of the correspondence between those with an interest in the project's progress or development. In fact, in the days prior to the Compagnie's formation, Claude seems to have been the most enigmatic of the new Compagnie members. To some court insiders, he was evidently a complete unknown, with no qualifications other than his younger brother's endorsement.[24]

Moreover, what should we think of Claude's qualifications in the world of architecture at that time? Based on primary sources referred to earlier, we have only the claims made later about him by his brother, Charles. As we saw in Chapter 5, Charles wrote in his memoirs that Claude submitted a design scheme for the Louvre Palace—a design, we recall, that was based on an idea that Charles claimed was his own, and one that Claude chose to submit anonymously.[25] Next, to that design are often added to Claude's portfolio two other projects: a design for a monumental obelisk,[26] and a design for an arc de triomphe for the faubourg Saint-Antoine.[27] If we accept Charles's claims that the Louvre scheme was indeed Claude's,

[24] Justel, as we saw above, identified him as an apothecary and could not spell his name.

[25] Berger, *The Palace of the Sun*, 21. Berger builds a solid case that the scheme in question was actually submitted by François Le Vau, the younger brother of Louis.

[26] Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 335–53. See also Picon, *Claude Perrault*, 230–32.

[27] Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 399–442. See also Picon, *Claude Perrault*, 223–30.

and that Claude was in fact responsible for the obelisk and arc designs, and that those two works did precede the Observatory project, then we might accept that Claude appeared to Colbert to be qualified enough to offer him the Observatory commission.

However, we must weigh all those claims against the fact that Claude never publicly associated himself with that Louvre design. In fact, he never once publicly claimed authorship for any of the Louvre schemes attributed to him.[28] In a related note, nearly a century later, Jean-François Blondel claims to have reviewed two bound volumes of Claude's drawings. These volumes were assembled not by Claude but by Charles, around 1700,[29] more than a decade after Claude's death.

Blondel does describe seeing a scheme of the Louvre in the collection, but it differed entirely from the one that Charles described in his memoirs.[30] Finally, if dates correspond, at the time of the 2 April meeting, the obelisk design and Arc de Triomphe competition entry would have been much more a part of Claude's future, and not his past. The competition for the Arc de Triomphe du Trône was conducted in 1669, two years after the 2 April 1667 Compagnie meeting. Furthermore, according to Wolfgang Herrmann, the engravings made of the drawings of the obelisk were not paid for until 1668. He has found that none of Claude's

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[28] Writing for a German news journal in 1676, Wolfgang Leibniz reported on a conversation he had with his friend Claude, who apparently told him in private that it was he who was the source of the executed scheme of the Louvre. Claude never confirmed Leibniz's claim, and never made any similar claim in print. Even so, I can find no reason to contest that by 1676 Claude was involved in the world of Parisian architecture. For more on the Leibniz connection, see Berger, *The Palace of the Sun*, 27 and Apendix, "Sources II,", #19.

[29] Ibid., 27 and "Sources II, #19.

[30] Charles claims that the anonymous scheme that his brother submitted was "more or less identical to the one that he later submitted and that was executed." Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 53. In contrast, Blondel described that scheme he saw as "Corinthian, but the columns are not coupled; the center is terminated by a dome." The Blondel quote found in Berger, *The Palace of the Sun*, 21.

drawings related to the obelisk "can be dated before 1667, and some as late as 1672."[31] Picon speculates the obelisk drawing was created at a date that we see was approximately concurrent with the 2 April Compagnie meeting. It was received by Colbert and dated 30 August 1667.[32]

Thus, with valid reason to question the authorship of the 1664 Louvre design work that his brother attributed to him, at the moment of the exchange of observatory plan—2 April 1667—Claude had no other designs attributed to him; no background in construction; no record of any executed works; no time spent in an architectural atelier; no experience making construction drawings; no affiliation with tradesmen or their techniques; nor even any theoretical or historical writing on any subject related to architecture. Moreover, there is no record that he personally took credit for any of the projects attributed to him. In fact, it is most reasonable to conclude that as the Observatory project was emerging, the world of architectural practice was even more alien to Claude than the savant world he was entering.

Why, then, would Auzout submit a plan of the Observatory to Claude? I assert that the "Monsieur Perrault" mentioned in the Procès-verbaux refers not to Claude, but to Charles Perrault. As we've seen, Charles was a very visible and involved personality in the context of that specific group, and he would have been more widely known as the "Monsieur Perrault." Whenever confusion between the two brothers was possible, authors would often append modifiers to Claude's name, such as *"le médecin"* or "*le frère"* to his *nom de famille*. At that time and in that context, Charles was closely attached to Colbert and consequently held deferred respect. In fact, some of the Compagnie members who owed him for their appointments,

[31] Herrmann, *The Theory of Claude Perrault*, 18–19.

[32] Picon, *Claude Perrault*, 274–75 n57.

including his brother. Moreover, it would make sense that any project under the command of the Bâtiments du Roi—which, as a royal work of architecture, the Observatory would be—would have gone through Charles. At the time, Charles was employed as a *contrôleur* in the Bâtiments and oversaw projects. Between the two brothers, it was Charles who was involved in architectural matters. The story of his involvement in the Bernini affair and Bernini's unravelling would have been familiar to those in attendance.

But there is additional rationale as why Auzout would have been transferring Observatory design work to Charles. The 2 April meeting, and the exchange of the Observatory plan, occurred simultaneously with the formation of a special design committee—the Petit Conseil—and Charles was appointed its *commis*. I suggest that Auzout was not giving the plan to Claude, but turning it over to Charles and the Petit Conseil, the entry point of Colbert's reformed methods. Consider the background of that meeting: in April 1667, Colbert had recently completed a three-year evaluation of the status of the production of architecture, putting him in touch with essentially every worthy architectural practice in France and Italy. The result of that evaluation was the creation of an entirely new methodology for the production of architecture. The reforms he was just beginning to implement were not original. In fact, they were based on structural models with which Colbert and his associates had been experimenting for years in other parts of his vast administrative domain. Within the previous six months, he had revitalized the Louvre project based strictly on those reforms.

The Petit Conseil was, like all of Colbert's advisory committees, ad hoc in that it was formed for a purpose, but its purpose was more inclusive than the narrow mandate of resolving design problems on the Louvre Palace project. I maintain that, in predictable Colbertine style, the Petit Conseil was put in place to be an important part of a massive reform of the methods by which architecture would henceforth be produced. Colbert had too much

invested in his reforming project to so dramatically limit its potential value, particularly when we realize that he had positioned two other royal Paris projects—the Arc de Triomphe and the Observatory—to be in positions simultaneous to the Louvre. Seen in that light, when Auzout turned over the plan for the Observatory to Charles Perrault (the administrator of the Petit Conseil), he was most likely entering his and his colleagues' design ideas for the Observatory into Colbert's newly created production system to be advanced and developed by the layers of collaborators in place exactly for that purpose, in a similar manner that we saw documented for the Louvre project.

The Development of the Plan

Thus, by April of 1667, Colbert and the Bâtiments du Roi had three major Paris architecture projects in various stages of readiness. The Louvre Palace had been on hold for many months, and, as we have just seen, the Observatory planners had found a site and were circulating a plan. Colbert had plans for a third major Paris project: a triumphal arch, an Arc de Triomphe, in Place du Trône. The Place du Trône was an important and symbolic site. On the eastern side of Paris, it had come to be the ceremonial entrance for travellers entering the city from the rest of Europe, and was most recently given added celebrity when it was staged to be the city's welcoming site when Louis and Maria-Theresa returned from their wedding in the south of France.[33]

The triumphal arch would herald the grandeur and majesty of the new king, and represent a lineage between his contemporary France and the great empires of ancient Rome. It can be

[33] The Place du Trône got its name in 1660 when a throne was created there in anticipation of the arrival of Louis XIV and his new bride, Maria-Theresa following their marriage in Saint-Jean-de-Luz on the Spanish border. The arc was started but never finished and later demolished. For the history of this project, see Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 399–442. Picon refers to the project as the Arc de Triomphe du faubourg Saint-Antoine. See Picon, *Claude Perrault*, 223.

imagined that the Arc de Triomphe at Trône would be the eastern portal for a new generation of Paris, defined foremost by its architecture. With it, Colbert was establishing France's relationship with both the past and future of Europe. Viewed as a group, these three royal projects—the greatest palace in Europe, a visionary scientific research institute, and a new and emblematic triumphal arch that evoked both past and future—would be a powerful statement about France's cultural and political prominence and ambition.

With the records of the Bâtiments du Roi presumed lost, the world of architectural history offers little explanation of what happened next in the development of these projects.[34] That gap of information is made wider by a lack of records of correspondence remaining between the major players in the world of architecture at that time. Fortunately, Piganiol's extraction of Charles Perrault's Registre, or journal, provides us with some framework to understand the operations at the time, and it is reasonable to believe that the methods did not vary greatly from project to project. After all, their process was mandated by Colbert. It was largely the process itself that was at stake. It might be said that the methodology was itself as much the "project" as the projects themselves.

However, without initial design plans and correspondence between designers either lost or never existing, how can this part of the study advance? Like most great works of architecture, the Paris Observatory straddled many worlds. Besides being a key piece in a triumvirate of Parisian architecture works in Colbert's scheme, the Observatory also was the realization of a long-anticipated idea in world of the savants. Thoughts of such a project had been in the air

[34] There are only a few remaining design or construction drawings of the Observatory. None are dated or signed, and none can be traced to before 1667. For a near-complete collection of all remaining drawings, see Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 355–97.

for four decades or more.[35] Even earlier, in the first years of the seventeenth century, Francis Bacon's *New Atlantis* gave some shape to such a vision. In various ways, all of these thinkers imagined a day when a renewed production of knowledge could be made central to European culture.

Indeed, savants from all over Europe hoped for a successful Observatory project. Through their network of correspondence and reporting, the savants followed with considerable curiosity the Observatory's progress as a real architectural project. They exchanged news and rumours throughout the genesis of the project—the same period that is otherwise left obscure in architectural history. With the Observatory's two cognate but separated histories in mind, I will sort through the savants' correspondence that was being traded in the background of early modern science in order to augment one history with the other. Between the two, I will assemble the most probable explanation of the Observatory's origin.

Various records show that, in April 1667, foundation work was already in place at the Louvre, and stonemasons were called back to the site to make revisions to the work that had already begun for the Bernini scheme.[36] Across Paris, the construction work on the Saint-Jacques site was also about to get underway.[37] That work would have included the demolition of Valles's mill and home, as mentioned in the sales agreement, and excavation for the

[35] Many earlier savant circle sponsors, like Montmor, Mersenne, and the brothers Dupuy, all fostered the dream of a project similar to the Observatory.

[36] At the time, as a way to fast-track a construction period, it was routine to begin the foundation work of a project before the entire design was resolved. This often caused some redundancy and rework. The foundation work for Bernini's project was begun and then halted. One of the first construction assignments that came from the Petit Conseil was to rebuild those foundations.

[37] Fontenelle's claim that foundation work at the Observatory site began in 1667 seems reasonable. See, Académie royale des sciences, *Histoire de l'Académie royale des sciences*, tome I, *depuis son établissement en 1666 jusqu'à 1686* (Paris : Chez Gabriel Martin, Chez Jean-Baptiste Coignard, fils, Chez Hippolyte-Louis Guerin, 1733), 1:43.

foundations of the huge terrace on which the Observatory building would eventually be situated.[38] According the Compagnie's records, Colbert's first concern was to enclose his new Observatory site with a high wall, and that work could have begun early, since it would be incidental to the building itself.[39] Colbert instructed his two masonry entrepreneurs, Andres Mazières and Antoine Bergeron—the same entrepreneurs with whom he contracted for the Louvre project—to begin that wall work.[40] Sections of the quarry caverns were likely being filled as well.

We can surmise that the Compagnie membership was pleased with the plan exchanged at the 2 April meeting, at least to the degree that Auzout was given the task of developing it further in his devis. He likely began that work immediately, while simultaneously joining his new colleagues as they began their work at temporary laboratories set up adjacent to Colbert's home on rue Vivienne.[41] The Compagnie apparently got off to a slow start there: "our philosophers will soon produce something which is not very important. New discoveries are difficult to make,"[42] observed Henri Justel. In fact, many letters will arrive from Justel. He was a wealthy Huguenot scholar and Paris insider, and a personal secretary to Louis XIV. He had a fascination and curiosity for everything about the new sciences. Consequently, he was the patron of many of the Parisian savants, and for a time sponsored their meetings at his

[38] The large, level terrace would be where the oversized instruments could be set up and utilized. Conceptually, it must have been imagined that the new Observatory structure would also sit on that levelled terrace.

[39] Wolf, *Histoire de l'Observatoire*, 9.

[40] Ibid. Wolf based this on an 18,000 livres payment recorded to that debt in the Comptes des Bâtiments du Roi. See Guiffrey, *Comptes des bâtiments du roi*. Volume 2.

[41] Guy Meynell, *The Académie des sciences at the rue Vivienne, 1666–1699* ([Wiesbaden]: Académie internationale d'histoire des sciences, 1994), 22–37.

[42] Justel to Oldenburg, 20 March 1667, in *Correspondence of Henry Oldenburg*, 3:369.

home. He was the most prolific Paris contact for Oldenburg, and Oldenburg's archives are filled with letters to and from Justel. It is Oldenburg's persistent probing and Justel's apparent zeal for providing the world with news from Paris that provides the best understanding of the critical events surrounding the origination and development of the plans of the observatory. Justel clearly did not know everything that was happening behind the scenes, but we will soon see that what he does learn, he does not delay in telling his friend in unguarded and believable terms.

The next recorded event related to the Observatory project happened two months later, on 21 June 1667, and again Auzout was a central figure. On that date, he and four other mathematician-astronomers from the new Compagnie met on the construction site to take astronomical observations. In the official history of the founding of the Compagnie, Fontenelle describes the event as something between a land survey and a benediction: "If a kind of pomp and ceremony can be counted for something in these matters," began Fontenelle, "nothing was more solemn than the observations that were made the 21 of June, the day of the Solstice."[43] According to the official records of the Compagnie, Auzout and four of his Compagnie colleagues, Jean Picard, Bernard Frénicle de Bessy, Jacques Buot, and Jean Richer,[44] met on the site of the new Observatory and took measurements of the sun and stars.

[43] Académie royale des sciences, *Histoire de l'Académie royale des sciences*, 1:43. "Mais si une espèce de pompe & de cérémonie peut être comptée pour quelque chose en ces matières, rien ne fut plus solennel que les observations qui se firent le 21 juin, jour du Solstice."

[44] Sturdy, *Science and Social Status*, 98–99. All five had experience and interest in astronomical observations and/or surveying. Picard was perhaps Auzout's closest colleague in the Compagnie. Auzout collaborated with Buot in their study of the comet. Little is known of Frénicle de Bessy. He corresponded with the major mathematicians of the era, but his training was in law, which made him similar to Carcavy. Richer may have been an apprentice.

Fontenelle republished portions of the notes from their observations. They included the precise angles that Auzout and his colleagues deduced and engraved on a flat stone that had been placed there for them by another of their Compagnie colleagues, Claude-Antoine Couplet.[45] "They found the meridian height of the Sun at 64° 41' at least, which sets the height of the Pole at the Observatory at 48° 49' 30" assuming that the true declination of the Sun was 23° 30' and the refraction of that height was only a half minute," quoted Fontenelle. Obviously, only sixty years after the event, the precision of the astronomers' work still deserved emphasis. "It was found that the declination of the magnetic needle was 15' to the West," relayed Fontenelle.[46] More details of the methods used by the astronomers for taking their observations were later found by Wolf in a publication by Joseph-Nicolas Delisle.[47] According to those notes, prior to the event, a six-foot radius iron and copper sextant was carried to the site. Picard also brought his own sextant, "apparently the one he used in the observation of the solar eclipse [of 1652]."[48] The two sextants were used to identify the high point of the sun. From that, they drew a north/south meridian line by tracing the shadow cast

[45] Wolf, *Histoire de l'Observatoire*, 11.

[46] Académie royale des sciences, *Histoire de l'Académie royale des Sciences*, 1:43–44. "lls trouvèrent la hauteur méridienne du Soleil de 64° 41' au moins, ce qui donne pour l'a hauteur du Pole a l'Observatoire 48° 49' 30" en supposant que la vraye déclinaison du Soleil fût de 23° 30', & la réfraction a cette hauteur d'une demie minute seulement. On trouva que la déclinaison de l'Eguille aimantée étoit de 15' à l'Occident."

[47] Wolf cites this document: "Notice manuscrite sur Picard (Arch. de l'Observatoire, A. 1.1-10)," of which I can find no trace. Delisle (1688–1768) was a Parisian astronomer and cartographer, who, for a time, ran a school of astronomy in St. Petersburg. Wolf, *Histoire de l'Observatoire*, 11.

[48] Ibid., 12.

by a lead thread that they had stretched above the stone.[49] Various other observations and calculations then enabled them to trace off the desired angles of the azimuths.

While there were astronomical and geographical reasons for these men to find and make real these celestial lines, for our purposes one reason matters: conceptually, the Observatory would be an embodiment of the geometry of the universe—that which it would be charged to unlock. It would be a physical re-creation of that geometry, making it in itself a kind of astronomical instrument: "As this building was wanted to be *tout savant*,[50] and that it was destined primarily for astronomical observations, we wanted it to be situated on a meridian line, and that all its angles respond to certain Azimuths…The mathematicians thus made their way to the site and transcribed a Meridian and eight Azimuths with all the care that could inspire divinations so particular."[51]

It is tempting for a historian of science to catalogue this event as merely a data-collecting exercise, and a means to an end. That, however, underplays the significance of the moment. For the five savants who met on that site, this event was about more than instruments, mechanics, optics, and mathematics. Bringing the celestial measurements down from the heavens and onto the site must have been an experience saturated with meaning. The axiomatic transfer of geometry was more than science. Being in that exact place at that precise

[49] Ibid., 12n2. Wolf added that the sextants used that day had traditional (lensless) sighting mechanisms. That was rectified later that summer when another colleague, Roberval, replaced the sextants' old sights with telescopic sights.

[50] My emphasis. Literally, "all knowing." However, I choose to leave this phrase in its original French form.

[51] Académie royale des sciences, *Histoire de l'Academie Royale des Sciences*, 1:43. "Comme ce bâtiment devoit être tout savant, & qu'il étoit principalement destiné aux Observations Astronomiques, on voulut qu'il fut posé sur une ligne Meridienne, & que tous ses angles répondissent à certains Alimuths… Les Mathematiciens se transportèrent donc sur le lieu le 21 juin, lls tirèrent une Méridienne & huit Alimuths, avec tout le soin que leur pouvoient inspirer des conjectures si particulieres."

moment, with the "Earth pushing upwards, sky pushing down,"[52] the savants surely felt prodigious expectations. As Fontenelle summarized, for the astronomers and the others in the new Compagnie, "all these observations were the consecration of the site."[53]

Recording those observations in a way that they could then be reconstituted in the plan of their new Observatory was meaningful and established the fundamental organization of the overall design. A note written in the margins of one of the later project drawings summarized the earlier design strategy. By translating the geometry of the observations into the order of the structure, the building itself becomes, symbolically and functionally, an astronomical instrument. As the note describes, those observations that were eventually melded into the geometry of the design

> give a meridian line in the highest story, from its middle window that looks at noon all the way to the one that looks at the north, measuring of 17 *toises* long, in the most accurate way it can be done. The two octagonal pavilions are cut in a way that one of their walls indicates the sunrise at the winter solstice, and the other the sunset at the same solstice; that another indicates the sunrise at the equinox and the other the sunset

[52] This is a fragment from Xenophanes. It is meant here to emphasize the mood of surface where the Observatory will become. Philosopher Jeff Malpus writes, "The strife between earth and world that Heidegger describes seems akin to that which…Xenophanes seems to have envisaged…It is the strife between earth and sky that established the open plain that is the dwelling place for mortals, and the cosmology in which the fragment seems to be embedded suggests a dual axis—that which obtains between the up/down axis given in the upward press of the earth and the downward press of the sky, and which thereby also opens up the crosswise axis (north and south, east and west) of the plain on which humans act." In this case, the plain, which is being called open by the astronomers' acts, will be held open for centuries by the Observatory. Jeff Malpas, *Heidegger's Topology: Being, Place, World* (Cambridge, MA : MIT Press, 2006), 199.

[53] Académie royale des sciences, *Histoire de l'Academie Royale des Sciences*, 1:44. "Toutes ces Observations furent la consecration du lieu." Note, Jean Picard was not only a mathematician but is also believed to have been an abbé, and in that regard, he was undoubtedly able to offer more to the event than his scientific curiosity."

at the same equinox; that two other walls indicate one the summer sunrise and the other the sunset of the same sun.[54]

Some background is necessary to understand the establishing of the meridian. Meridian lines are ancient astronomical instruments: a precisely north–south (i.e., longitudinal) line that conceptually ran from pole to pole. Meridian lines provided a relatively simple means for making a critical determination: the amount of time it takes the sun to cycle through its apparent motion. Grasping this phenomenon put aspects of daily existence in sync with the order of the universe. That was a necessary parameter for calculating the date of Easter, and for that reason, meridian lines were often created in churches and cathedrals.[55] Typically, a north–south line would be drawn on the wall or floor surface inside a church, and a hole would be created through the body of the church to constrain the sun's rays into a small disk. As the sun's rays streamed through the hole, the sun's image could be timed as it moved across the surface to see how long it took to return to the same spot on the line. On the days of the solstices, the sun's image appears to stand still on the line as it switches its assent and descent. These calculations were based on right angles, so their accuracy was a direct result of the accuracy of the real-world conditions: the true orientation and alignment of the line and hole, the levelness of the floor, and whether or not the wall was plumb.

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[54] Colbert, Clément, and Brotonne, *Lettres, instructions et mémoires de Colbert*, 5:516. "(La situation) donne une ligne méridienne dans l'étage haut, depuis sa fenêtre du milieu qui regarde le midi jusqu'à celle qui regarde le septentrion, de 17 toises de longueur, le plus juste qui se puisse faire. Les deux pavillons octogones sont coupés de manière qu'un de leurs pans donne le lever du soleil au solstice d'hiver, et l'autre son coucher au même solstice ; qu'un autre donne le lever du soleil à l'équinoxe et l'autre le coucher au même équinoxe ; que deux autres pans donnent l'un le lever du soleil d'este et l'autre le coucher du même soleil." This passage was submitted by commissioner Charles Perrault into the records of the Bâtiments de Roi.

[55] J.L. Heilbron, *The Sun in the Church: Cathedrals as Solar Observatories* (Cambridge, MA : Harvard University Press, 1999).

Obviously, functional meridian lines could be created anywhere on an appropriate surface where there is access to the sun's rays. However, the meridian line identified by the Auzout, Picard, and the other savants was not just another meridian line. It was located on a unique longitudinal line with enormous implications. In 1634, Louis's father and Cardinal Richelieu decided that the positions for all things ought to be measured eastward from a unique longitude. The longitude they chose as the "zero" longitude crossed the westernmost tip of Ferro Island, the westernmost island of the Canary Island chain, which was believed to be the westernmost point land of the known world. Not coincidently, this prime meridian was declared and marked precisely twenty degrees west of Paris, a symbolic conceit that would also simplify the mathematical calculations of the French astronomers.[56] As it happened, this "Paris Meridian"—twenty degrees east of the prime meridian—crossed Paris through the heart of the Louvre Palace grounds.[57] Followed slightly south from the Louvre, it also crossed the Saint-Jacques site. That was another condition that qualified it as an ideal site, a quality that, oddly, has been entirely overlooked by historians.

The Observatory planners conceived of a bilateral plan for the building with the newly located Paris Meridian as its central axis. Once that concept became established, the planners turned their attention to marking a universal latitude line. A line was laid out precisely perpendicular to the Paris Meridian. That east–west line would mark the Paris Latitude—an abstract line from which all things could be measured in the north–south direction. It would

[56] Later, it was decided that the Paris longitude is actually 23' 9" (or roughly 0.33 degrees) farther east than it was believed in 1667. However, given the instruments of the time, the measurement was admirably accurate.

[57] Today, the Paris Meridian passes through the Cour Carrée, within a foot of the northeast corner of the Pyramid entry structure. The Paris Meridian would be the world's prime meridian until the nineteenth century, when a conference in Washington, DC, resolved the conflict between the Paris and Greenwich Meridians.

also be on that precise line that the southern face of the future Observatory building would be situated. The crossing of these two lines—the Paris Meridian and Paris Latitude—became not only a conceptual but a real and precise point on the face of the earth, which meant all things on Earth could be understood as having a position in relation to the Observatory. Symmetrically straddling the Meridian and its face aligned with Latitude, the Paris Observatory would embody that point and position. With the stone structure embedded deep into the earth's crust, and its dimensions precisely aligned with not only a tradition of the earth's measuring systems but with the sun and stars themselves, the Paris Observatory is, I would argue, the most deliberately positioned work of architecture on the face of the earth.

1668: Following the Plan through the World of the Savants

After the well-documented solstice event—an event that was as much scientific and religious as it was architectural—there are no records of other events that help us understand the next stages of the architectural project of the Observatory. The journal that was intended to accurately document all the activities and processes of the Petit Conseil, and therefore all the design development work being done in the Bâtiments du Roi at the time, is lost. All indications are that Charles kept a detailed account of the Petit Conseil's work, and consulting that journal now would undoubtedly answer most of the questions being asked by this investigation.

Accepting that loss and turning instead to the correspondence between the savants, we find that there is much interest in what was happening with the Observatory project, and the savants exchanged many rumours and opinions. In their correspondence, we discover that less than a year after the solstice event, in February 1668, the Observatory plan was real, and the insider Justel had seen it. Others wanted to see it too. Oldenburg was certainly one, as was a young Englishman, Mr. Jeffreys, who had called on Justel in Paris, inquiring about the

Observatory. "I will see to it that he has the plan, which I will send you," Justel wrote to Oldenburg.[58] Through the following month, Justel worked to get a copy of the plan of the Observatory, and in the meantime little else was said about the progress of the Observatory project. The savants spent their days on the various questions that interested them.

In the first few months of 1668, records of the activities related to the development of the Observatory are few. Its main protagonists did, however, remain in communication, discussing their various interests. Auzout raised a question related to the Observatory and astronomy, and emphasized the blurring of the lines between the Compagnie's many interests. It concerned a puzzle about the senses, and in March it attracted attention from his colleagues in England. A discussion arose that was mediated by Oldenburg, and involved Robert Boyle. For Boyle's benefit, Oldenburg passed along Auzout's question: "Can one judge how many degrees a light is stronger than another, as one can judge by how many tones a note is sharper than another?"[59] This wonder—that there may be some undiscovered continuity between the senses—is representative of Auzout's "what if…" scientific sensibility and worldview. Oldenburg reported that Auzout found it curious and attractive that hearing seemed to be a privileged sense, "that it can judge not only the difference, but the quality and ratio of its object, for the ear not only knows that one sound is sharper than another, but also how many tones sharper it is."[60] Vision, Auzout pointed out, seems to lack that extra subtlety: "although the eye perceives one light to be stronger than another, it cannot determine how much

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[58] Justel to Oldenburg, 8 February 1668, in *Correspondence of Henry Oldenburg*, 4:155. If these dates are correct, this establishes some knowledge of the plan in the background, two months before Auzout submitted it to Charles and the Compagnie on 2 April.

[59] Oldenburg to Boyle, 20 March 1668, ibid., 4:235. (My translation from the original French: "Si l'on eut juger de combien de degrez une lumiere est plus grande qu'une autre, comme l'on Juge de combien de tons un son est plus aigu qu'un autre.")

[60] Ibid.

stronger." This, of course, was an instrumental weakness in astronomical observations, but more, it needed to be considered: "we ought to try to discover this latter proposition, because it would bring great advantages to perspective-drawing and painting [pour la perspective et pour la peinture]."[61]

In April, a public ceremony provided evidence that the Observatory was indeed becoming real. From a letter dated 15 April, Oldenburg learned from Justel that Colbert had "placed the first stone on the Paris Observatory, which will be magnificent. We are going to work there in earnest."[62] A medal was pressed to commemorate the occasion and laid with the stone. Charles Wolf wrote that the medal was marked with these words: *"Sic itur ad astra"* ("Thus one goes to the stars").[63] That ceremony must surely mean that by then, April 1668, the design of the Observatory—evidently the one in the drawings mentioned above—was fixed and moving forward. Through the remainder of the spring, Justel provided Oldenburg with continuous project updates. It was clearly an exciting time and expectations were high: "The Observatory gets on well," wrote Justel. "It will be magnificent and there is nothing so fine in Europe."[64] Justel still had not gotten his hands on the plan, though: "I shall try to get a plan of it which I shall send you as soon as possible."[65]

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[61] Ibid.

[62] Ibid. "Monsieur Colbert a mis la premiere pierre à l'observatoire de Paris qui sera magnifique. On y va travailler tout de bon." This occurred sometime just prior to 15 April 1668.

[63] Wolf, *Histoire de l'Observatoire*, 11. Wolf cites Duhamel's official Latin history of the Académie royale des sciences this way: Jean-Baptiste Duhamel. 1700. Regiæ scientiarum Academiæ historia, …, p. 43. He shortened the inscription from Duhamel's records: "Sic itur ad astra: turris siderum speculatoria anno MDCLXVII," or "Thus one goes to the Stars: the Tower from which the stars are investigated, 1667." This phrase is rooted in Virgil and the Aeneid.

[64] Justel to Oldenburg, 20 May 1668, in *Correspondence of Henry Oldenburg*, 4:417.

[65] Justel to Oldenburg, 20 May, 1668, ibid.

In a month, Justel was able to fulfill his pledge. His letter of early June 1668 begins with these auspicious lines: "I send you the plan of the Observatory, of which Auzout makes you a

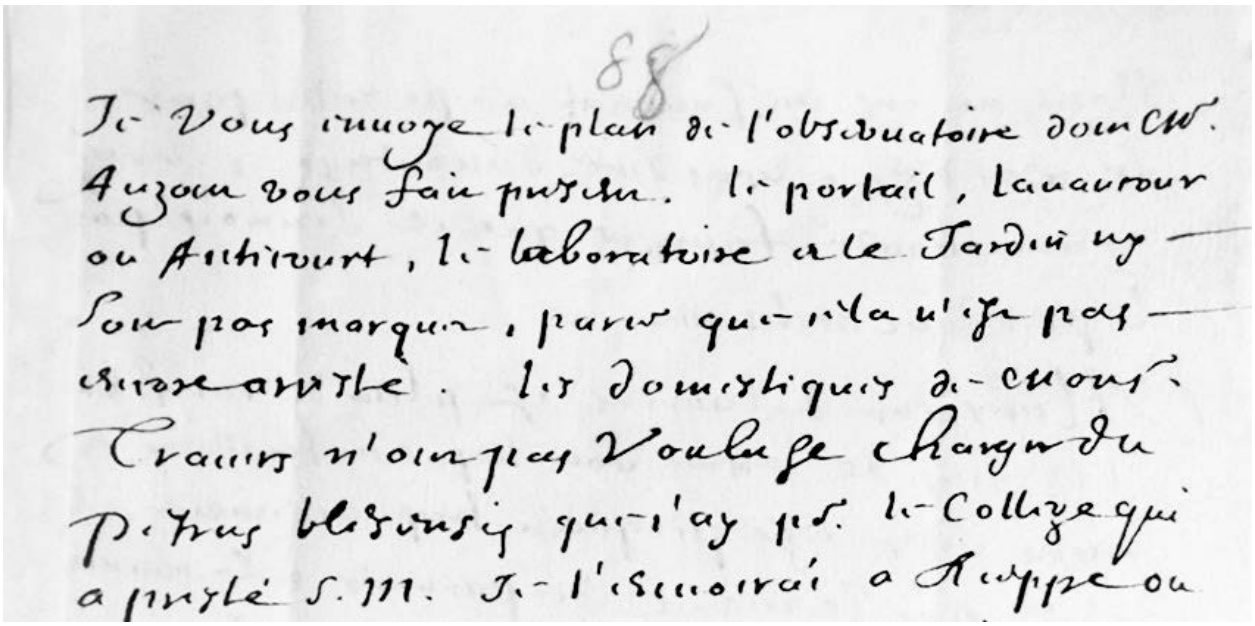

Figure 24. Letter from Henri Justel to Henry Oldenburg, 20 May 1668, "I send you the plan of the observatory, of which Auzout makes you present." Manuscript copy courtesy of the Archives of the Royal Society, London.

present" (Figure 24).[66] By Justel's own account, it was a rough, preliminary drawing. "The doorway, forecourt or antecourt, the laboratory, and garden are not marked, because that has not yet been decided upon." He adds, "I beg you to show Mr. Jeffreys the plan of the Observatory, since he has asked me for it. It will be easy for him to get it copied."[67] Justel's original letter is in the archives of the Royal Society, but the plan has been lost. His letter adds critical dimensions to my investigation. Had he not mentioned Auzout at all and taken all the credit himself for obtaining a copy of the plan, or had Auzout sent Oldenburg the plan directly, then its source could have been made more ambiguous. Referring to the plan as a gift from Auzout and characterizing himself as only its intermediary adds considerable insight to

[66] Justel to Oldenburg, c. 10 June 1668, ibid., 4:461.

[67] Ibid.

the question of its source. In fact, in some ways, it may remind us of a similar transaction a few months earlier in the Compagnie meeting. Certainly, there can be little doubt that Auzout was again the original provider of the plan. With this plan now missing, the written description that Justel provides for it is important, as it is the only description of the early plan that we have.

Moreover, Justel's letter offers another valuable insight into the general mood of the Observatory project. In the same letter, Justel again mentions Edward Jeffreys. Jeffreys, the Englishman to whom Justel referred in an earlier letter, was the visitor who was eager to see the Observatory plan. It is Jeffreys's obscurity that makes his mention noteworthy. At the time, he was a twenty-two-year-old medical student in England and a relative unknown among Oldenburg's correspondents. He became a fellow of the Royal Society but not for another few years.[68] His desire to see the Observatory plan illustrates the breadth and depth of interest in the project among Europe's scientific community.

Another interesting mood of the time is represented by Justel's words. Given the general political antagonism of the times, Justel's casual willingness to see the Observatory plan copied and distributed in England is striking. The Paris Observatory was certainly a progressive venture that was well ahead of its time. After all, it would not be until 1675—almost eight years later—that the planners of the Royal Observatory in England would get authority to proceed.[69] Justel's letter exposes the other underside of the world of international

[68] Jeffreys becomes fairly active in the Oldenburg correspondence beginning in early 1667. He was proposed as a candidate of the Royal Society by the Lord Bishop of Chester on 28 October 1669 and elected 4 November. Jeffreys also appears in the correspondence of Flamstead. John Flamsteed, Eric G. Forbes, Lesley Murdin, and Frances Willmoth, *The Correspondence of John Flamsteed, The First Astronomer Royal*, vol. 1 (Bristol, UK : Institute of Physics Publishing, 1995), 1:37n10.

[69] Adrian Tinniswood and Nigel Graham, *His Invention So Fertile: A Life of Christopher Wren* (London : Royal National Institute of the Blind, 2005), 233.

relations. With his willingness to share the good fortunes of the Observatory project with foreign colleagues, he was promoting a collective, stateless republic of the new sciences that was a reoccurring theme at the time.

As an example, in a letter to Auzout a year earlier, Oldenburg waxed on for several pages on the theme of "searching for the truth and the welfare of humanity." Oldenburg pledged that the pursuit of science can cure the political ills between their two countries and beyond: "I have no doubt that all other nations, however little civilized, will be diligent in following so good an example and in making a philosophical alliance with France and England in order to achieve by their joint efforts the objects of a design as noble and useful as that is. That, Sir, is the conviction of Your very humble and affectionate servant, H.O."[70]

As we will see, Justel was willing to take some risks in his home kingdom to promote that vision. It seems clear that at the moments of the origin of the Observatory, his primary allegiances were with the scientific communities of Europe. If we add this last June 1668 incident to the others that have connected Auzout to the development of the Observatory, a compelling story becomes apparent. The evidence leaves little room for doubt that Auzout was the primary figure in the story of the Observatory's origin. Evidence of Auzout's involvement mounted throughout the Observatory project's most critical period: from its very inception to ground breaking and construction. By the time of Justel's June 1668 letter and transmittal of the Observatory plan, it had been two and a half years since Auzout called for the realization of the Observatory project in his 1665 Ephemeride and fourteen months since the Compagnie meeting where he submitted the Observatory plan to Charles Perrault and promised his colleagues a project devis; a year later, he and his fellow mathematicians calculated and

[70] Oldenburg to Auzout, 24 May 1666, in *Correspondence of Henry Oldenburg*, 4:140.

surveyed the geometry on the site; and three months later, Colbert had placed the ceremonial first stone at the construction site. Through these important times and events, we see in this June 1668 letter that project insiders continued to affiliate Auzout with the plan.

Through the spring of 1668, Oldenburg exchanged letters with many European savants. In June alone he engaged in conversations on various subjects with savants such as Hevelius, Sluse,[71] Comenius,[72] Magalotti, Travagino, Evelyn, Boyle, and Wren.[73] Several letters are introductory greetings, which suggests that there may have been a spike of interest in the scientific community that circled Oldenburg, notably in medical experiments.[74]

Justel, however, remained his most recurrent correspondent. In mid-June, along with a dozen other news bits, Justel provided this confirmation: "As for the plan of the Observatory, I sent it to you by the post."[75] In another letter at about the same time, Oldenburg learns that "Mr. Auzout is going to Rome."[76] This is the first mention of Auzout's voyage to Italy, and it was undoubtedly news for Oldenburg. A few weeks later, a letter from Auzout confirmed the voyage. "I learn from Mr. Justel that he has taken the trouble to inform you that I was on the point of making a little trip to Italy," wrote Auzout apologetically on 16 June. "I intended to

[71] René-François de Sluse (1622–1685) was an Ecclesiastic and savant mathematician and chancellor of Liege.

[72] Oldenburg to Comenius, 5 June 1668, in *Correspondence of Henry Oldenburg*, 4:450. Oldenburg and Comenius traded introductory salutations.

[73] Wren to Oldenburg, 7 June 1668, ibid., 4:454–55. Wren described the drawings he was making for buildings for the Royal Society

[74] Denis to Oldenburg, 5 May 1668, ibid., 4:373–87. See, for example this letter, where mathematician and medical doctor Jean Denis submitted to Oldenburg a pamphlet on the subject of blood transfusions

[75] Justel to Oldenburg, c. 16 June 1668, ibid., 4:467.

[76] Justel to Oldenburg, 3 June 1668, ibid., 4:442.

be the first to tell you but I have been so busy."[77] Auzout left Paris later that month,[78] and, as will become clear later in this study, his departure had an enormous impact on the story of the origin of the Paris Observatory.

In July, the project was well under construction and Oldenburg was curious to hear how the Compagnie intended to occupy the Observatory when it was complete. He asked Justel for his views. Since Justel's reply represents the only account that can be found of the Observatory's planned program this late in the project's development—that is, after it was no longer merely conceptual, but a real work of architecture—it deserves extended quotation here. We see that the program of the project had not changed much through the genesis of the Observatory plan:

> It is true that the Observatory will have many uses. There will be winter gardens, a laboratory, and many other things conducive for making all kinds of experiments. Work continues every day. It may be finished in two years. Mr. Bosse,[79] who is a good engraver, is engraving the plants of which you saw drawings in the King's collection, done from nature. Someone else is engraving the medals…If work continues as appears to be the intention, there will be nothing more handsome and more useful, because everyone may have a copy of these fine originals and of everything interesting in the King's collection, for this work is only being done to serve the public.[80]

[77] Auzout to Oldenburg, 16 June 1668, ibid., 4:465.

[78] Auzout to Oldenburg, 17 June 1668, ibid., 4:453n3.

[79] Abraham Bosse (ca. 1662–1676) was a French artist and engraver known for the famous frontispiece for Hobbes's Leviathan. He had recently finished *Des ordres des colonnes* (1664).

[80] Justel to Oldenburg, 7 July 1668, in *Correspondence of Henry Oldenburg*, 4:479. Justel's optimism at the least gives us some sense of the rate of progress that seemed apparent to him at the time. The Observatory would not be occupied for another eight years. The prints that Justel mentioned here would be published by Compagnie member Denis Dodart in *Mémoires pour servir à l'histoire des plantes* (1676).

From Justel's account, it is clear that the program for the Observatory facility had continued along the lines of the "general and universal academy" that was proposed three years earlier. With astronomy apparently unnecessary to mention here, Justel's inclusion of a laboratory and gardens, and the production of botanical art prints, indicates that the Observatory's uses had not substantially narrowed. His descriptions of the uses that were planned for the Observatory further enhance its image as a centre dedicated to general research and learning. Justel continues, "There are four or five people who are working on languages. There is one who translates from English, another who arranges the Greek books, another for the Arabic and Hebrew ones. There is also a German who is translating good books from German into French. Besides this, the Academy will do something in time. At least it ought to do so, and if it does not it will not be the fault of Mr. Colbert, who takes great pains and who gives everything anyone could wish."[81] In Justel's account, the work of the Compagnie was well underway, even while its members await their official workplace to be finished. And if there was anyone who deserved praise for it all, it was Colbert.

Progress on the Observatory continued with no signs of delays throughout the summer of 1668. The correspondence between Justel and Oldenburg continued into the fall. Their letters include routine Observatory construction updates. The two men also tried to stay afoot with Auzout and his activities in Italy. The routine seemed to be that Auzout would correspond with Justel, who would then relay the news to Oldenburg, who would then either read the news aloud to the assembled Royal Society, or pass it along to other curious correspondents.[82] In one letter near the end of July, Oldenburg informed Hevelius of Auzout's trip to Italy. "He

[81] Ibid.

[82] The letters between Auzout and Justel have not been found. Auzout did write a few letters from Italy directly to Oldenburg.

will inquire into everything that is going on there in astronomy and optics," wrote Oldenburg, "and on his return will communicate the results to us."[83] Auzout's trip to Italy was meant to make contact with savants and craftsmen, in particular lens makers, who were considered by many to be the best in the world.

Throughout the summer of 1668, Justel kept everyone abreast of the progress of the Observatory project, fitting in short status reports about the Observatory and its characters, in between scientific and political interests. In August, he reported to Oldenburg that he heard from Auzout, who wrote him from Lyons. From there, Auzout would move on to Italy. He intended to delay in the Alps long enough to conduct vacuum experiments. "His trip will be interesting," assessed Justel. "He greets you respectfully."[84]

A few weeks later, Justel sent a particularly noteworthy letter to Oldenburg. Mixed with news about the Europe-wide instability in the political world was news about the status of the Observatory project. Left in that context, the letter gives us a sense of the interconnected worldviews at the time. In part, Justel wrote, "We eagerly await the secret of Mr. Colbert's negotiation in England,[85] and what will happen in Poland, in Crete, and in Switzerland. The King's claim to Condé and the counterscarp at Nieuwpoort might well disturb the public peace. It makes the Dutch anxious." And then, he thinks to mention the Observatory project: "The observatory makes good progress. A wooden model of it has been made. Mr. Carcavy is to send its plan to England. Please do not let on that I have [already] sent it to you."[86] The

[83] Oldenburg to Hevelius, 30 July 1668, in *Correspondence of Henry Oldenburg*, 4:481.

[84] Justel to Oldenburg, 5 August 1668, ibid., 5:7.

[85] This was Jean-Baptiste Colbert's younger brother, Charles, the Marquis de Croissy, a diplomat and Louis's ambassador to London.

[86] Justel to Oldenburg, 21 August 1668, in *Correspondence of Henry Oldenburg*, 4:447. Until now, this model has been associated with a design authored by Claude Perrault. We see through this study that

reference to Pierre Carcavy makes this letter from Justel especially important. We recall Pierre Carcavy: at sixty-seven and a generation older the most of the protagonists in this story, he was one of Colbert's senior advisors. He was a highly respected mathematician and one of the first seven Compagnie appointees, and would be elected by the membership as its president. During this time, Colbert personally trusted Carcavy with many important projects, including the negotiations that secured the services of Christiaan Huygens and his assistance on the final selection of the Compagnie membership. Colbert also appointed Carcavy to found and administer his most valued possession, the Colbertine library.

Thus, a plan sent by someone as high-ranking as Carcavy to an institution as respected as the Royal Society would have undeniable authority, authority it would not have had had it been in Justel's hands only.[87] Knowing about Carcavy's potential involvement in promoting the design of the new Observatory is still very important. In Justel's plea for discretion, we can read that he believed that the two plans—the one he had sent to Oldenburg ten weeks earlier as a gift from Auzout, and the plan coming from Carcavy—would be recognized as essentially the same plan. This letter therefore links the Observatory plan that has been associated with Auzout to one that the inner circle Carcavy evidently believed to be current.

Justel's letter contains one last noteworthy reference: his mention of the wooden model of the Observatory plan. Many historians have known about this model, tracing it from the time of its creation to its likely destruction in the Tuileries fire.[88] Until now, the model has been

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at this time, Claude was in no obvious way connected to the design. This model was certainly following the design heretofore associated with Auzout.

[87] There is no such plan in the archive of the Royal Society, nor is there any remaining correspondence between Oldenburg and Carcavy himself that mentions the Observatory.

[88] An entry in the Comptes attributes the fabrication of the model to the carpenter and woodworker Jean d'Anglebert, who was paid 610 livres to build to a wooden model of the

talked about in connection to the design work of Claude Perrault. However, this study leads to a more reasonable suggestion: if any one person is behind this particular plan and therefore this particular model, it is Auzout.

In September, Justel learned that Auzout had travelled to Milan, probably to meet the cleric and collector Manfred Settala. Auzout certainly knew about Settala's celebrated natural museum and his collection of scientific instruments. Lenses and lens making were primary interests of both men, and Auzout probably expected that Settala would be a good source for the latest information. Justel reports, "Mr. Auzout has seen Mr. Settala in Milan; he is having a seven-foot mirror made. He claims to be able to burn things at a distance of fifty palms, valuing mirrors that burn at a distance more than those that burn close to."[89] Auzout had many interests beyond astronomy and optics, however. Justel wrote that Auzout forwarded the news that "Milan is 3,800 yards in diameter and about 13,000 yards in circumference."[90] Writing about Auzout may have reminded Justel of the Observatory project, as an update on the project follows shortly in this letter to Oldenburg: "The observatory gets on well; work goes on continuously."[91]

In October, Justel reported that Auzout expects next to travel to Bologna, "where he will stay for some time, because he will see Mr. Cassini, Montalbani, Montanari, and some other skilful mathematicians."[92] A few weeks later, Justel reported that Auzout had met some Bolognese savants and he forwarded the news to the always-curious Oldenburg: "I have

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Observatory at this time. Guiffrey, *Comptes des bâtiments du roi,* Volume 2, 1 col. p. 276. Petzet mentions this Comptes entry. Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 360.

[89] Justel to Oldenburg, 23 September 1668, in *Correspondence of Henry Oldenburg*, 5:64.

[90] Ibid. Hall and Boas Hall equate "toises" to yards.

[91] Ibid.

[92] Justel to Oldenburg, 3 October 1668, ibid., 5:76.

received news of Mr. Auzout, who is very satisfied with Italy. He has seen at Bologna two famous anatomists, Malpighi and Fracassati, and as for mathematics, Montanari, who he calls very ingenious. He works at telescopes, and his wife too."[93] Geminiano Montanari was a Bolognese astronomer. Ovid Montalbani was a savant of the ilk of Claude Perrault, a doctor and botanist. Both men would have interested Auzout, Justel, and Oldenburg, and Auzout's firsthand account would be valuable. However, it was the first savant Justel mentioned, Giovanni Domenico Cassini,[94] who would have been most interesting to the Frenchmen, and the possibility that Auzout would find him in his hometown would have been very newsworthy. In 1668, Cassini was the most celebrated mathematician and astronomer in Italy. It was he who had authored a theoretical paper on the 1664 comet that he submitted following Auzout's Ephemerides. We might recall that Cassini's results were curiously nearly identical to Auzout's, despite Auzout's highly original methods.[95]

Justel's speculation that Auzout and Cassini would meet in Bologna was premature. In mid-October, by Cassini's account, he was not in Bologna, but rather about to leave Rome, where he had enjoyed the hospitality of the Pope. According to his memoirs, he left Rome on the 15th, "heaped with honours and blessings from Pope Clement IX,"[96] and made his way to Florence in the company of the Madame ambassador of Bologna. Upon arrival in Florence on

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[93] Justel to Oldenburg, 24 October 1668, ibid., 5:101.

[94] Cassini would later adopt the French spelling: Jean-Dominique Cassini.

[95] For this discussion, see this study, Chapter 2.

[96] Jean-Dominique Cassini, *Mémoires pour servir à l'histoire des sciences et à celle de l'Observatoire royal de Paris : Suivis de la vie de J.-D. Cassini, Écrite par lui-même, et des Éloges de plusieurs académiciens morts pendant la révolution* (Paris : Bleuet, 1810), 286. Cassini writes, "Je partis de Rome le 15 octobre 1668, comblé d'honneurs et de grâces par le Pape Clément IX, et je pris le chemin de Florence avec Madame l'ambassadrice de Bologne. " This book was produced by Cassini's grandson, who appended his grandfather's memoirs to back of his own. The epigraph for this chapter comes from this book, and is attributible to the grandson Cassini.

the morning of 20 October, Cassini went directly to the Medici palace to pay his respects to the Grand Duke, Ferdinand II. According to Cassini, as soon as he arrived at the palace, Ferdinand called in two people: Vincenzo Viviani and Adrien Auzout. Viviani was a Florentine mathematician and astronomer and a student of Torricelli's. He had taken his teacher's position at the Accademia dell'Arte del Disegno on his death.[97] Viviani was already well known by the Medici family. He was a founding member of the Accademia del Cimento, the circle of Italian savants organized and supported by Leopold, Ferdinand's youngest brother. Ferdinand and Leopold were strong advocates for the new sciences in Italy and known to be obsessed with new inventions and instruments. They had several large telescopes and, for those and other reasons, were part of Auzout's world. As Cassini noted, the presence of a new member of the Paris Compagnie warranted some honour. Why Ferdinand pulled together this group of men is an interesting question that has not received any attention by historians. It can certainly be suggested that since both Viviani and, as we will soon see, Cassini received invitations to join the new Compagnie in Paris, Ferdinand could have been facilitating a *réunion officielle,* for the Paris envoy Auzout.[98]

Except for Cassini's notes, no records seemed to have been kept of the meeting. Cassini does not say anything about Viviani's role, but he does write of Auzout. Cassini claimed that Auzout brought a letter from France addressed to Cassini.[99] Cassini had already heard of the

[97] Gillispie and American Council of Learned Societies, *Dictionary of Scientific Biography*, 14:48.

[98] Sturdy, *Science and Social Status*, 164. It is believed that Viviani was offered a position in the Paris Compagnie in 1666 (for example, see Gillispie and American Council of Learned Socieites, *Dictionary of Scientific Biography*, 14:48.), but for some reason he did not go. Viviani was eventually admitted into the Academy Royale des Sciences in 1699.

[99] Cassini, *Mémoires pour servir à l'histoire des sciences*, 286.

attempts to attract him to Paris.[100] Thus, if Auzout were acting as a kind of official envoy for his Paris employers, the letter he brought may have been a kind of official offer. Perhaps he indeed had something similar that day for Viviani. As a Florentine, Viviani was in the Medici's domain. That could then mean that Auzout was there to negotiate with Ferdinand for Viviani's release. A final possibility might be that Auzout's visit could have been simply for the purpose of heralding the triumphs in Paris: the founding of the new Compagnie and its new facility. The two savants and the Medici family would have been interested to hear about it all firsthand from a founding member.

Besides the mail from France, Cassini confirmed that Auzout also had in his possession another important document: "the plan of the Royal Observatory that the King of France was building for astronomical observations."[101] The plan of the new Observatory must have been a matter of considerable interest to those in Ferdinand's palace at that moment. There could have been no savant in Italy who would not have wanted to catch a glimpse of the significant scientific undertaking in Paris. And, as we have seen, Auzout had already shared the plan with colleagues in England; it seems likely that if he had a plan in hand, he would have been displaying it. Surely there would have been interest from Ferdinand and Leopold. In order for Viviani to accept the Paris offer, he would have needed the permission of Ferdinand, his patron. That did not happen, and Ferdinand retained his star scientist.[102]

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[100] In his memoirs he wrote, "well before my departure from Rome, I learned of a pleasant surprise from M. Vaillant, a doctor and celebrated antiquarian, that S.M. Louis XIV desired that I come to France." Ibid., 287.

[101] Ibid., 286. "M. Auzout… m'avait apporté des lettres de France et le plan de l'Observatoire royal que le Roi de France faisait construire pour les observations astronomiques."

[102] Colbert had been sending Viviani a stipend since 1664. Ferdinand reacted to Colbert's interests by appointing Viviani as his premier mathematician, which included a large stipend and a promise to let him retire. At the same time, Viviani was appointed as the astronomer for King John II of Poland. Of added interest, in 1677, Viviani dedicated a mathematics publication to Jean Chapelain, who had

The celebrated astronomer Cassini needed the permission of the Pope to leave Italy and join the Paris Compagnie, and negotiations for his release had been underway for a while. When Cassini returned to Bologna, he learned that "the Pope had consented to my trip to France. His Holiness was kind enough to order the payment of my expenses during my absence, which was to be initially a few years."[103] The details of the negotiations between Paris and Rome are not available, but historians suggest that Cassini's successful transfer was perhaps part of the political fallout from the duchess of Crequi affair. The duke of Crequi was the French ambassador to Rome and his relationship to the Romans was contentious. When armed Roman guards killed two of the attendants accompanying the carriage of the duchess, it caused a scandal for which Louis would exact much compensation. The painstaking negotiations and back and forth between Paris and Rome were taking too much time, thought Justel, and he worried about how the lack of production appeared to the impatient French. In an October letter, he observed that "our philosophers are doing nothing of importance."[104] In another letter two weeks later he wrote, "our Academy does nothing. Observations were made of the last eclipse, which wasn't much."[105]

Auzout had lamented in December that early optimism followed by sluggish progress tended to undermine the momentum generated by the comet that he was attempting to seize.

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already died. Viviani would eventually join the Académie royale des sciences in 1699. See Richard S. Westfall, *The Galileo Project* (1995), accessed 15 April 2016, http://galileo.rice.edu/Catalog/NewFiles/viviani.html.

[103] Cassini, *Mémoires pour servir à l'histoire des sciences*, 287. "De retour à Bologne, j'appris que le Pape avait consenti à mon voyage en France. Sa Sainteté même eut la bonté d'ordonner que les émolumens de mes charges me fassent conservées pendant mon absence, qui ne devait être d'abord que de quelques années."

[104] Justel to Oldenburg, 14 October 1668, in *Correspondence of Henry Oldenburg*, 5:87.

[105] Justel to Oldenburg, 31 October 1668, ibid., 5:124.

Justel also feared a general loss of public interest in the entire project: "There is only one time for doing things in France," wrote Justel, "and there will soon be a dislike of science because some surprising and useful result was looked for at the beginning, after all the outpouring of money there is and has been."[106] On hearing about the agreement to bring Cassini to Paris and join the Compagnie, Justel found renewed excitement in the Observatory project: "the observatory needs someone as skillful as he is," he thought.[107] However, even that rush of interest was short-lived. In a December letter, Justel lamented, "Mr. Cassini is not talked of so much as he was. Our Society still meets, but has still produced nothing, which causes talk among those people who think that great discoveries are made in dreams and without thought. However the temperature of our nation is so hasty[108] that we easily become discouraged if we don't see the result we hope for."[109]

By November, Cassini's transfer was imminent. Justel passed along rumours that must have seemed incredible: he had heard that in order to entice Cassini to make the move to the Compagnie, Colbert agreed to pay his moving expenses and give him an annual pension of two thousand *écus*.[110] At four or five livres per one *écu*, Cassini's annual stipend would have more than doubled the stipend of any other Compagnie member. As outrageous as it may have sounded, Justel's sources were not wrong. Cassini confirmed the offer he had received: "M. de Colbert, minister and secretary of State, is excitedly insistent for my departure, and has sent me the sum of a thousand *écus* for my trip, and an annual pension of 9,000 livres after I

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[106] Justel to Oldenburg, 24 October 1668, ibid., 5:101.

[107] Justel to Oldenburg, 14 November 1668, ibid., 5:130.

[108] This is Hall and Boas Hall's translation of "l'humeur de nostre nation est si prompte. " I prefer, "the spirit of our nation is so insistent."

[109] Justel to Oldenburg, 8 December 1668, in *Correspondence of Henry Oldenburg*, 5:208.

[110] Justel to Oldenburg, 4 November 1668, ibid., 5:130.

arrive in France."[111] In a word, Cassini's compensation was astronomical. By comparison, Huygens, the director of the Compagnie and its real celebrity, had previously been promised the top pension of 4,000 livres per year—doubled the next highest paid savant.[112] Cassini's travel stipend alone was that much, four times more than the average annual pension in the Compagnie.[113] On hearing the news about Cassini and his agreement, Huygen's father wrote to Colbert, suggesting that his son's salary should be brought into line, noting that "it bore no relationship to his capacities."[114] Colbert said no. From Cassini's point of view, what mattered was that his demands had been met: "I leave Bologna the 25 of February 1669," he wrote.[115]

As for Auzout, he spent the end of 1668 researching Italian equipment and meeting savants and working with their equipment. "He tells me that he has seen Jupiter better than ever," wrote Justel in November. "He has observed five bands at least, and (in the widest) an inequality that moved across. He has seen the shadows of the satellites with a thirty-five-foot telescope. He is carrying some quicksilver in order to try the barometric experiment on the seashore."[116] Justel confirms that it was Auzout's own seventeen-foot telescope that he had taken with him to Italy.[117] He had been comparing it to the famous lenses of Campani, "which he found a little clearer," wrote Justel. "But those of Divini are not as good as Mr.

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[111] Cassini, *Mémoires pour servir à l'histoire des sciences,* 288. "M. de Colbert, ministre et secrétaire d'État, pressant vivement mon départ, et m'ayant envoyé une somme de mille écus pour mon voyage, avec l'assurance d'un pension annuelle de 9000 livres pendant mon séjour en France."

[112] Thus, Cassini was being given roughly 4,500 livres for travel expenses, or more than double the average annual pension of any of the other Compagnie savants.

[113] A typical *gratification* for the membership was 1,200 livres/annum.

[114] Huygens, *Œuvres complètes*, 6:303.

[115] Cassini, *Mémoires pour servir à l'histoire des sciences*, 288.

[116] Justel to Oldenburg, 4 November 1668, in *Correspondence of Henry Oldenburg*, 5:130.

[117] Ibid. This is the only instance that I know of that claims this point, and this suggests why his trip over the Alps was so arduous.

Auzout's."[118] Auzout admits that he had not been able to see the things that Cassini had seen with his telescopes.

Auzout returned to Rome from Florence somewhat disappointed. Justel told Oldenburg, "He tells me that he has come across nothing wonderful as yet."[119] It is difficult to assess what this might have meant. Was Auzout unimpressed with Florence and the world of the Medicis? Or, if this were the first time he had met Cassini and Viviani, which is certainly possible, did they not measure up with his expectations? Or rather, was Auzout really in Florence strictly on scientific business, looking for the highest quality instruments to stock the new Paris Observatory, and did the instruments he found not measure up to his high hopes? In that case, were the meetings of Cassini and Viviani merely by chance? There is nothing to tell us for sure. One thing that we can believe is that any disappointment was not mutual. Justel wrote, "[Auzout] is much respected at Florence, and Messrs. Redi,[120] Viviani, and the others make much of him, according to one of my friends."[121]

By early December, Auzout returned to Florence where he had again fallen ill. Justel was concerned for his friend but expected that he would recover: "I am very sorry for his illness, which will make his journey uncomfortable and prevent him from doing what he intended."[122] One near-contemporary historical account summarized Auzout's health problems by claiming

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[118] Ibid.

[119] Ibid., 5:180. "Il me mande qu'il n'a encore rien admiré." At the time, "admirer" was used to mean "surprising," "astonishing," or "extraordinary" (*Dictionnaire de l'Académie française*, 1 st ed. [1694]). Hall and Boas Hall's translation as "wonderful" is perhaps insufficient.

[120] Francesco Redi (1626–1697) was a physician, biologist, and naturalist savant who worked in Pisa.

[121] Justel to Oldenburg, 4 November 1668, in *Correspondence of Henry Oldenburg*, 5:130.

[122] Justel to Oldenburg, 8 December 1668, ibid., 5:208.

that he did not enjoy a single day of even tolerable health.[123] In January 1669, Auzout received a letter from Oldenburg, who wrote with the expectation of Auzout's eventual return to Paris.[124] A few months later, Oldenburg can only hope for Auzout's return.[125] Obviously, even Auzout's closest colleagues were unaware that he would not return to his savant life in Paris. At the time of Oldenburg's letters, Auzout was making residence in Rome, where he would remain almost continuously for the rest of his life.[126] Cassini would replace him as the premier astronomer in France. He would no longer be considered a Compagnie member and Colbert would suspend his lifelong pension. Thus, four years after his call for the Observatory project and the Compagnie, two years after being appointed as one of the first members of the Paris Compagnie of savants, and twenty months after submitting plans for it to his colleagues, Auzout became a Roman citizen, and was never again mentioned in any of the remaining Oldenburg correspondence—or any other archive, by my search—in association with the Paris Observatory or its origin.

Postscript to the Final Chapter: Cassini Comes to Paris

On 4 April 1669—nearly two years to the day that Auzout turned over the plan of the Observatory to Charles Perrault and the Petit Conseil—Cassini arrived in Paris and initiated a new phase of the Paris Observatory. Cassini went first to meet his sponsor, the king. It was

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[123] Society for the Diffusion of Useful Knowledge, *Penny Cyclopaedia of the Society for the Diffusion of Useful Knowledge Supplement,* 1851, 161.

[124] Oldenburg to Auzout, 2 January 1669, in *Correspondence of Henry Oldenburg*, 5:299. Oldenburg expresses some jealousy when writing about Auzout's various Italian exploits over the past six months. "I am certain that you will not return without having gathered everything new that is discussed and accomplished in philosophy...nor without bringing back curious and important observations about all the natural and artificial products of that fine country."

[125] Oldenburg to Huygens, 8 March 1669, ibid., 5:437. "I hope that Mr. Auzout will soon be back in Paris."

[126] Auzout made one trip to Paris in 1676 for a short stay. Later, he returned for a few days in 1683.

then that he likely also met his Paris host, Charles Perrault.[127] Colbert had made Charles responsible for Cassini's hospitality. Charles had prepared Cassini's lodgings in the Louvre galleries, and gave him a tour of "everything that was most interesting in Paris." Cassini considered Charles a very genial host: "I am indebted to the obliging manner in which he discharged himself of these orders," wrote Cassini.[128] Cassini said that he also met Claude, "his brother, a doctor and architect, who had worked on the plan of the Observatory which he continued in the construction."[129] Cassini found Claude to be another amicable Parisian, who "made great demonstrations of friendship and invited me to physics experiments that he had made and presented to the Academy."[130]

However, when Cassini travelled to the Saint-Jacques site to see the Observatory under construction, the congenial atmosphere quickly deteriorated. According to Cassini, the thick stone walls were already raised to the level of the second floor. Through the scaffolding, Cassini could make out the basic skeleton of the rectangular structure that he was expecting to see, defined by "four principal walls that had been drawn up exactly facing the four principal regions of the world."[131] However, he also saw things that greatly disturbed him. It seems that the design being built was unlike the design that Auzout had shown him the

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[127] Cassini, *Mémoires pour servir à l'histoire des sciences*, 289.

[128] Ibid., 290. "M. Perrault, contrôleur des bâtimens, fut chargé par M. de Colbert de m'apprêter un logement aux galeries du Louvre jusqu'à ce que l'Observatoire fût en état d'être habité, de me procurer tout ce qui me serait nécessaire, et de me faire voir tout ce qu'il y avait de plus curieux à Paris. Je lui suis redevable de la manière obligeante dont il s'acquitta de ces ordres."

[129] We see that Cassini was made aware of Claude's role on the Petit Conseil in the Bâtiments du Roi.

[130] Cassini, *Mémoires pour servir à l'histoire des sciences*, 289. "Son frère, médecin et architecte, qui avait travaillé au plan de l'Observatoire dont il suivait la construction, me faisait de grandes démonstrations d'amitié et m'invitait aux expériences physiques qu'il faisait pour les communiquer à l'Académie."

[131] Ibid., 293. "Les quatre murailles principales avaient été dressées exactement aux quatre principales régions du monde."

previous October. There were now stone towers being integrated into walls, and they would cause Cassini a real problem: "The three partially completed towers that were added to the east and west corners of the south side, and at the middle of the northern face, it seemed to me, prevented the important use we could have made of these walls."[132] After seeing the preliminary plan in Florence, Cassini apparently expected to mount quadrants—the large astronomical instruments used to make celestial measurements—on the surface of the Observatory walls.[133] In Cassini's vision, if he could use the exterior walls to brace his quadrants, they could be very, very large, and "due to their large size, could be accurately marked in minutes and even seconds."[134]

Cassini surely had in mind the famous quadrant that the Danish astronomer Tycho Brahe installed on a wall in his castle/observatory of Uraniborg on the island of Hven.[135] Tycho asked artists to integrate his quadrant into a wall mural painting. The quadrant was undoubtedly well known among astronomers in the seventeenth century. It, and the entire castle, had been demolished long before Cassini's era, but an engraving depicting Tycho at

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[132] Ibid. "Mais les trois tours avancées que l'on ajoutait à l'angle oriental et occidental du côté du midi et au milieu de la face septentrionale, me parurent empêcher l'usage important qu'on aurait pu faire de ces murailles."

[133] We recall the use of the portable quadrants that were brought the site on the day of the solstice. Free-standing quadrants was undoubtedly the method that the Observatory designers had in mind.

[134] Cassini, *Mémoires pour servir à l'histoire des sciences*, 293. "En y appliquant quatre grands quarts de cercle capables par leur grandeur de marquer distinctement, non-seulement les minutes, mais même les secondes."

[135] J.R. Christianson, *On Tycho's Island: Tycho Brahe and His Assistants, 1570–1601* (Cambridge : Cambridge University Press, 2000), 118–19. Tycho's quadrant was a quarter-circle with a six and a half foot radius, fabricated and installed around 1582. Tycho commissioned three painters to paint three separate parts of the mural painting. The mural included his own likeness, pointing towards the top sight of the quadrant.

Figure 25. Tycho Brahe, Title page from *Astronomiæ instauratæ mechanica* (1598), illustrating Brahe's quadrant. Note the multiple portrayals of Brahe.

work at his quadrant appeared in his 1598 publication *Astronomiæ instauratæ mechanica*, which made the idea of Tycho's quadrant very familiar to Cassini and the others (Figure 25).[136]

With towers and windows interrupting the wall surfaces, such a quadrant would be impossible on the Observatory structure. "These towers," complained Cassini, "as such, being

[136] Tycho Brahe, *Tychonis Brahe Astronomiæ instauratæ mechanica* (Noribergae: Apud L. Hvlsivm, 1602). See pages 220–24 for Tycho's description of his frontispiece.

octagons, have only small flanks cut by doors and windows."[137] There would be no suitable wall onto which a quadrant could be attached. Cassini let his hosts know that he was not happy, and he offered his own solution. Since the towers were only completed up to the second floor line, Cassini suggested that they simply stop them there.[138] As described, his idea would result in roof terraces on each tower. That way, he could install the quadrants above them. However, "those who had worked on the design of the Observatory," recalled Cassini, "maintained that it should be executed according to the first plan that had been proposed; and it was in vain that I made my representations in this case." Cassini later claimed that Colbert had endorsed the compromise, saying that he "came futilely to the Observatory to support my project, to no avail."[139]

The new towers were not the only design modification that Cassini did not like. He apparently expected the design to include a large, open room dedicated to astronomical work on the Observatory's uppermost floor. Instead, the top floor would be laid out identically to the other two floors below it—that is, divided into a series of individual laboratory-sized spaces connected by corridors (Figure 26). We might imagine Cassini's surprise. For him, it would be "a great inconvenience to not have in the Observatory a single large room from

[137] Cassini, *Mémoires pour servir à l'histoire des sciences*, 293–94. "Ce que l'on ne peut pas faire à cause de ces tours qui, d'ailleurs, étant octogones, n'ont que de petit flancs coupés de portes et de fenêtres."

[138] Ibid., 294. "C'est pourquoi je proposai d'abord qu'on n'élevat ces tours que jusqu'au second étage."

[139] Ibid. "Mais ceux qui avaient travaillé au dessin de l'Observatoire opinaient de l'exécuter conformément au premier plan qui en avait été proposé ; et ce fut en vain que je fis mes représentations à cet égard et bien d'autres encore. Mr de Colbert vint même inutilement à l'Observatoire pour appuyer mon projet." If Cassini can be believed, the only possible adjudicator could have been Louis XIV, who apparently sided with the designers.

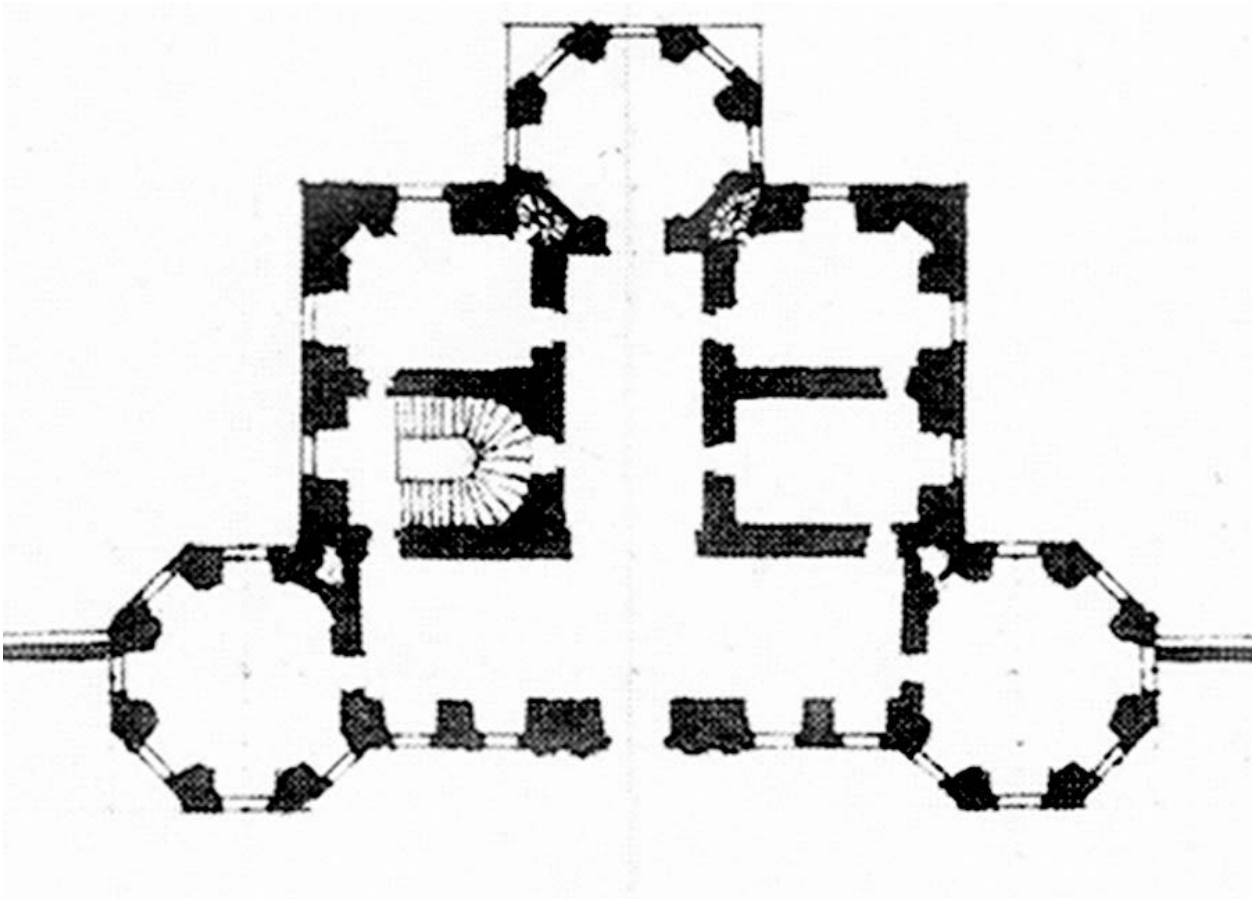

Figure 26. Draftsman unknown, plan drawing of the Observatory showing the original plan design (1667?). Image has been flipped vertically from original. Note the octagonal north tower. The original design called for three identical floors with corridors connecting towers. Plan courtesy of the Bibliothéque nationale de France.

where one could see the sky all around."[140] Speaking as an experienced astronomer, Cassini questioned the rationale behind creating an astronomy facility in which the astronomer "could not follow from one place the path of the Sun and other stars, from east to west nor to observe them with the same instrument without moving it from one tower to the other."[141] Where could he follow the path of the sun across the meridian—the Paris Meridian—that the

[140] Ibid. "C'était une grande incommodité de n'avoir pas dans l'Observatoire une seule grande sale d'où l'on pût voir le ciel de tous côtés."

[141] Ibid. "De sorte qu'on n'y pouvait pas suivre d'un même lieu le cours entire du soleil et des autres astres, d'orient en occident, ni les observer avec le même instrument sans le transporter d'une tour à l'autre."

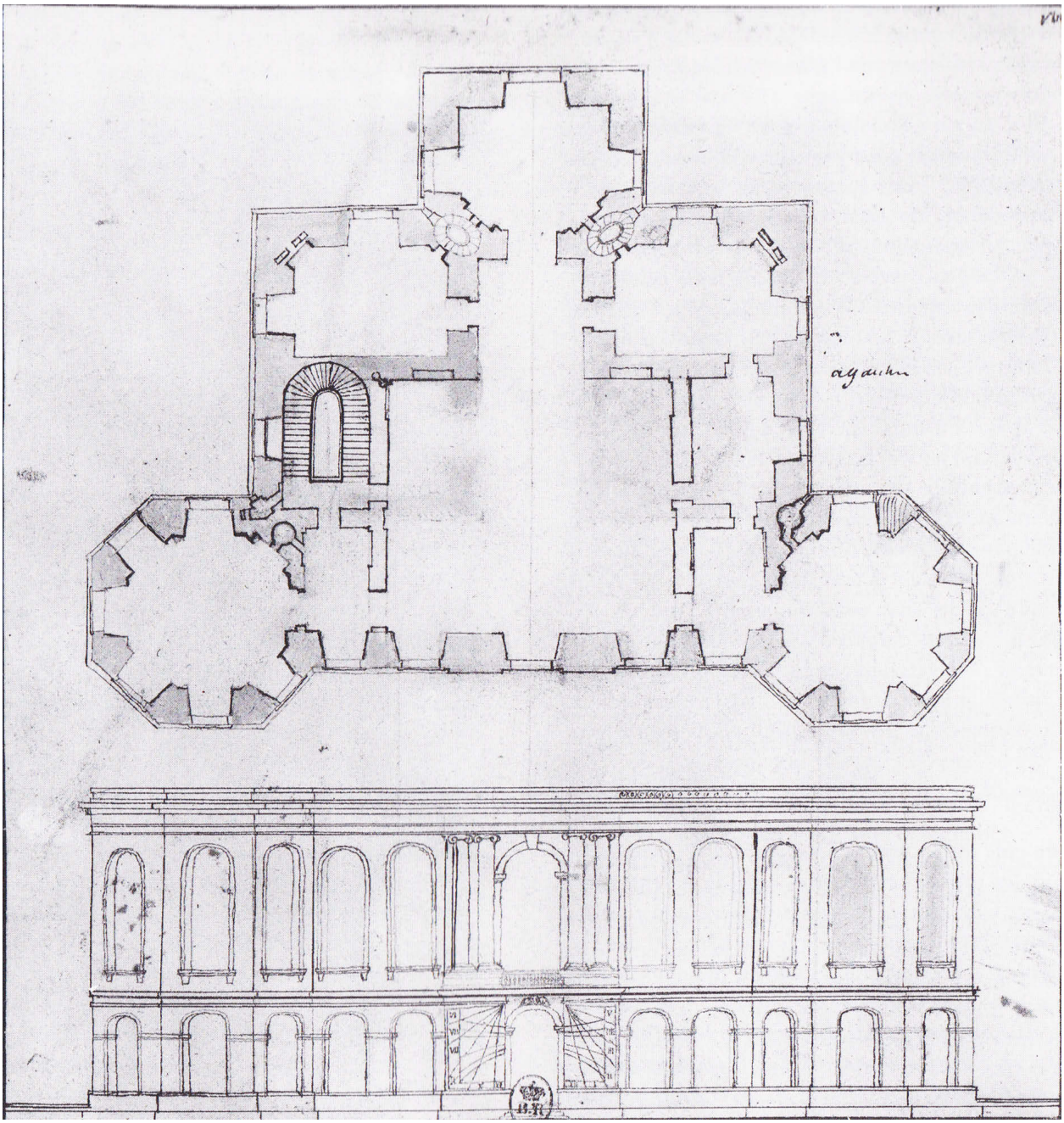

Figure 27. Draftsman unknown. Plan and south elevation of the Observatory showing the revised top floor plan. Note that the walls of the original plan can be seen though the erasure. Courtesy of the Bibliothèque nationale de France.

Compagnie astronomers had so precisely located two years earlier? Since the upper floor was still to be constructed, Cassini demanded that, instead of building the smaller rooms, they

should create "a square room with a covered corridor all the way around it" (Figure 27).[142] Therefore, in Cassini's proposed layout, the tower roof terraces would be accessible from the large room. Cassini understood the motives of the designers and perhaps was sympathetic to their challenge of making the changes that he was demanding. However, given its critical astronomical importance, "a large room seemed to me still necessary."[143]

Using debutant French,[144] he made the men currently in charge of the project aware of his complaints. Later, Cassini's grandson repeated the story he had been told about his grandfather's negotiations:

> The eloquent Perrault defended with quite pretty phrases his plan and his architecture; my grandfather who but barely knew the French language, grated the ears of the King, Mr Colbert, and Perrault, in wanting to advocate on behalf of Astronomy, and it came to the point where Perrault, in the heat of the debate said to the King, "Sire, this yammering man does not know what he is talking about." My grandfather remained mute and did well; the King gave the argument to Perrault and did badly.[145]

As far as Cassini was concerned, those in charge of the project were squandering an opportunity to build a serious astronomical observatory, and instead allowed themselves, in

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[142] Ibid. "Je proposai d'abord qu'on n'élevât ces tours que jusqu'au second étage, et qu'au-dessus on bâtît une grande salle carrée, avec un corridor découvert tout à l'entour, pour l'usage dont je vien de parler."

[143] Ibid. "Une grande salle me paraissait encore nécessaire pour avoir la commodité d'y faire entrer le soleil par un trou et pouvoir faire sur le plancher la description du chemin journalier de l'image du soleil."

[144] When Cassini arrived in Paris he knew very little French. He was apparently surprised to learn that the language of the Compagnie would not be Latin, but the membership was apparently inflexible on this point.

[145] Wolf, *Histoire de l'Observatoire*, 23. "L'éloquent Perrault défendit en fort jolies phrases son plan et son architecture ; mon grand-père, qui ne s'avait que fort mal le français, écorchait les oreilles du Roy, de M. Colbert et de Perrault en voulant plaider la cause de l'Astronomie, et ce fut au point que Perrault dans la vivacité de la dispute dit au Roy : 'Sire, ce Baragouineur-la ne sçait ce qu'il dit.' Mon bisaÏeul se tut et fit bien ; le Roy donna raison à Perrault et fit mal." It is usually held that it was Claude with whom Cassini was debating. Now it seems more plausible that it was actually Charles.

their inexperience and zeal, to emphasize the wrong things. "It seems to me," thought Cassini, "that with the plan of the royal Observatory that the King of France was *constructing for astronomical observations,* there was at least as much respect paid to its magnificence as to its usefulness for making observations."[146]

Hearing Cassini argue in opposition to the Observatory's "magnificence" is particularly revealing, and reminds us that he was not involved in the roots of the project and its gradual development over the past four years. He could not have been attuned to the original desires of its many collaborators and the diverse occupations that the building was envisioned to house. Whether he was aware of this or not, his criticism was directed towards the very aspect of the plan that the French designers—as well as Colbert—likely considered its most important characteristic: that it should strive to achieve glory for Louis and France. Is it possible that the Italian Cassini could not grasp the potency of those kinds of parameters placed on the project's designers? Three points now matter: Cassini's interests were strictly of astronomy; he operated under the belief that Louis was building the observatory for that purpose; and that it did not seem to matter that the other savants intended to use the facility for other pursuits.

Pausing to reflect, we can now suggest what might have happened to the plan Auzout turned over to the Petit Conseil in April 1667, as well as the azimuth and meridian geometry that he and his colleagues collected the following June. It seems that in the value-added system of design created by Colbert, the designers decided to integrate the solstice geometry

[146] Cassini, *Mémoires pour servir à l'histoire des sciences*, 286–87, my emphasis. "Le plan de l'Observatoire royal que le Roi de France faisait construire pour les observations astronomiques, et dans lequel il me parut que l'on avait eu pour le moins autant d'égards à la magnificence qu'à la commodité pour les observations."

by generating octagonal towers from the eight angles of the solstices and affixing them to the rectangular body of the building. Furthermore, we now can conclude that it is most likely that the design work was completed by the Petit Conseil design team. That design strategy was articulated sometime after the building was built in a note scrawled on the margin of a plan drawing:

> The building of the Observatory is built in such a way that it can, all by itself, be a replacement for all the principal astronomical instruments that are used for observations. The order produces a meridian line in the highest story, from its middle window that looks at noon all the way to the one that looks at the north, measuring of 17 toises long, in the most accurate way it can be done. The two octagonal pavilions are cut in a way that one of their walls aligns with the sunrise at the winter solstice, and the other the sunset at the same solstice; that another indicates the sunrise at the equinox and the other the sunset at the same equinox; that two other walls indicate one the summer sunrise and the other the sunset of the same sun.[147]

The designers apparently acted on a design impulse to integrate the geometry abstractly into the plan, thereby making the architecture into a kind of symbolic representation of the order of the universe. It should be said that, as a design scheme, adding the octagonal towers was a powerful gesture. Not only did it take into account the Observatory's emblematic status as an astronomical instrument whose core geometric order was organized by the very stars in

[147] Petzet, *Claude Perrault und die Architektur des Sonnenkönigs*, 362n1411. "Le batiment de l'Observatoire est bati de telle sorte qu'il peut suppléer tout seul à tous les principaux instruments d'astronomie dont on se sert pour les observations. La situation donne une ligne méridienne dans l'étage haut, depuis sa fenêtre du milieu qui regarde le midi jusqu'à celle qui regarde le septentrion, de 17 toises de longueur, le plus juste qui se puisse faire. Les deux pavillons octogones sont coupés de manière qu'un de leurs pans donne le lever du soleil au solstice d'hiver, et l'autre son coucher au même solstice ; qu'un autre donne le lever du soleil à l'équinoxe et l'autre le coucher au même équinoxe ; que deux autres pans donnent l'un le lever du soleil d'este et l'autre le coucher du même soleil." This passage was published by Michael Petzet. It was a note in the margin of an observatory drawing. He traces its authorship to Claude Perrault, but Petzet does not provide a reproduction of that note or particular drawing.

a highly original and site-specific way, but it also was a clever reinterpretation of the Paris Observatory's two antecedents, the Rundetårn observatory in Copenhagen,[148] and Tycho

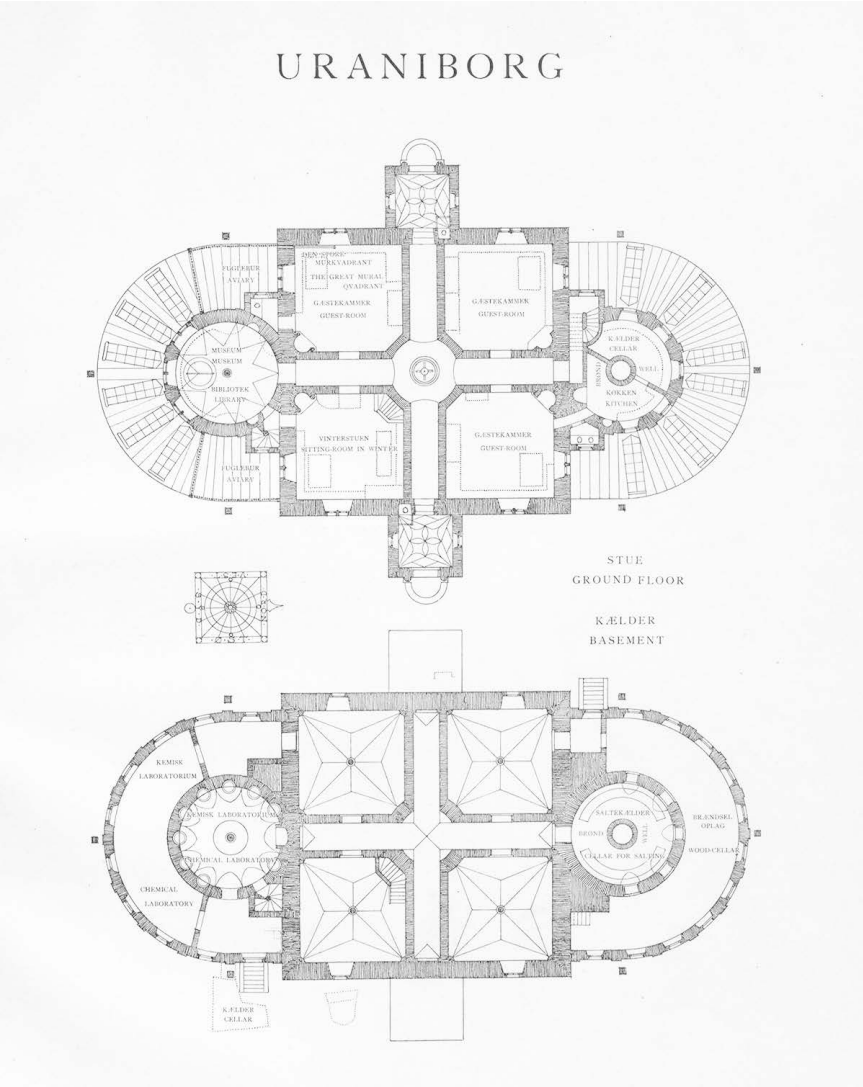

Figure 28. Basement and ground floor plans of Tycho Brahe's Uraniborg. Drawings from *Tycho Brahe's Uraniborg and Stjerneborg on the Island of Hveen*, drawings by Charles Christensen, text by Francis Beckett.

Brahe's Uraniborg castle (Figure 28). Cassini, however, relegated the abstract, geometrical

[148] The Rundetårn was a round tower structure built by King Christian IV in 1642 as an extension to the Trintiatius University chapel and library as a celestial observatory. It may be best remembered for its equestrian ramp to the top. See "Round Tower – Copenhagen," accessed 20 August 2016, http://www.copenhagenet.dk/CPH-RoundTower.htm.

thinking behind the practical application of the work the Observatory would be expected to perform.

Cassini apparently understood the designers' argument, but criticized the way they chose to implement it. "I would have also wanted that the building of the Observatory had been a large instrument," countered Cassini, "but this we cannot do because of these towers."[149] There was a divide between the two debating parties regarding what it meant to be instrumental. As far as Cassini was concerned, the Observatory designers entirely missed the important point. By pursuing their abstract notions, they had failed to take into account their most basic responsibility: to address the real needs of the professional astronomer. His terms were not uncertain: as far as he was concerned, he was being invited to Paris predicated on the belief that the Paris Observatory was being constructed by the king of France for the purpose of *making astronomical observations*—a proposition he reiterated so often that his position seems incontrovertible.[150] If the Observatory did not meet those fundamental standards, the design could only be considered a failure. The designers and the astronomer were attracted to the same possibility—architecture as instrument—but were seeing it from two utterly different worlds: the theoretical and the practical.

Cassini's suggestions did not end there. He pleaded with Charles, the project's manager, that if he was expected to climb to the roof terrace to make his observations, the designers should open one of the towers directly to the roof terrace. Cassini recalled, "as we were working on raising the Observatory, I pleaded with Mr. Perrault, who was in charge,[151] to

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[149] Cassini, *Mémoires pour servir à l'histoire des sciences*, 293. "J'aurais voulu que le bâtiment même de l'Observatoire eût été un grand instrument : ce que l'on ne peut pas faire à cause de ces tours."

[150] In his memoirs, as if to leave no misunderstanding, Cassini does not mention the Observatory without including this parameter.

[151] Once again, Cassini undoubtedly was referring to Charles.

leave the south-eastern tower uncovered. With no roof on that tower, that would allow for meridional observations of bodies that pass near the Zenith." He also demanded that the designers leave "two large slits in the northern and southern walls of the same tower where I placed, from the beginning, the large tubeless telescope that I use to observe the stars that cannot be seen with ordinary telescopes."[152]

With the construction so far along, making the kinds of revisions that Cassini demanded amounted to a monumental redirection of the project and structure. Charles tried to make everyone realize that the structural systems had been carefully conceived and were already in place, and some of Cassini's demands would not be easy. Readjusting the building loads of the massive stone structure, and relocating the bearing lines and stretching the spans of the roof to accommodate the large room was dangerous, if not impossible. It was just too big of a modification of the direction already taken. Extending the overall span of the roof vault "could not be done without either raising the height of the building," argued Charles, "which was impossible since the large cornice was already in place, or greatly flattening the vaulted ceiling in the large room." Furthermore, "it would be very unacceptable that it would reduce by half the well of the great staircase, changing it from being very beautiful and magnificent to being severe and unpleasing. Besides, a large room seemed completely unnecessary, for the room originally planned was more than sufficient."[153]

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[152] Wolf, *Histoire de l'Observatoire*, 24–25. "Comme l'on travaillait à élever l'Observatoire je priay Mr Perrault qui en avoit la conduite de laisser la tour orientale découverte pour y pouvoir faire des observations méridiennes des astres qui passent proche du Zénit, et de laisser deux grandes fentes dans la muraille septentrionale et méridionale de la mesme tour où je plaçai du commencement les grands objectifs dont je me sers sans tuyau dans les observations des astres qui ne peuvent se voir par des lunettes ordinaires." Wolf does not say from where he has taken this quote of Cassini. This passage does not exist in Cassini's published memoirs.

[153] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 50–51. "Que cela ne pouvoit se faire sans hausser le batiment, ce qui étoit impossible, la grande corniche étant posée, à moins que de surbaisser extraordinairement la voute de cette grande pièce, chose où il y avoit beaucoup d'inconvenient, que

From Perrault's perspective, a large room on the top floor of the Observatory would be unnecessary, because he knew that the design was conceived in such a way that the various terraces—on the roof and on the massive terrace to the south of the structure—would be where the astronomical observations would be conducted. All the astronomy work could be done outside. Given the size of astronomical equipment at the time, it was probably never a consideration of them being used indoors until Cassini's arrival. Moreover, certainly the astronomers would continue to utilize their large, portable quadrants, and install them on the terraces as well.[154] And the central corridor on the Observatory's upper floor would have been sufficiently spacious to lay down a meridian line and track the path of the sun. To the project's designers, Cassini's demands must have seemed, at best, capricious. Nonetheless, as we shall see, most of Cassini's design revisions were accommodated.

Elsewhere, Oldenburg was very eager to get information about Cassini's Parisian affairs and he queried his contacts there for any news. He wrote to Huygens, "We shall be very glad to hear news of what Mr. Cassini is doing; we have a great idea of his merits here, and we are very glad that he is now in our neighbourhood."[155] I have discovered nothing that explains a gap in the correspondence between Oldenburg and Justel during this time. After the note in February about Cassini's enormous salary, the next letter exchanged between the two is not until the following January. The news then is of a visiting Englishman, Francis Vernon, who

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cela appetissoit de la moitié la cage du grand escalier et le rendoit fort rude et peu agréable, de très-beau et très-magnifique qu'il étoit, et que d'ailleurs cette grande piece ne paroissoit point necessaire et celle qu'ils faisoient etoit plus que suffisante."

[154] A standard, tube refracting telescope would be anywhere from fifteen to thirty feet long. In the tubeless refracting telescopes, astronomers were experimenting with very long focal lengths of hundreds of feet. The reflecting telescope was only at that very moment becoming a reality. Newton built the first functional reflecting telescope a few months earlier. Even then, because it reflected the image instead of viewing it directly, its legitimacy was not fully accepted.

[155] Oldenburg to Huygens, 10 May 1669, in *Correspondence of Henry Oldenburg*, 5:461–62.

had recently arrived in Paris and also had a great interest in what was happening on the Observatory project. Francis Vernon was by occupation an explorer who started travelling while a student at Oxford.[156] It comes as no surprise that a well-educated vagabond like Vernon would represent an enormous opportunity for someone like Oldenburg, and consequently they had already corresponded. At the time that Cassini was being established in Paris, Vernon was also arriving there as a British ambassador, and Oldenburg encouraged Vernon to investigate Cassini and his undertakings.

One of the conversations that Vernon had with Cassini is helpful in understanding Cassini's objectives regarding the design of the Observatory, and ties up a few loose ends concerning the advancement of the Observatory plan that had been earlier attributed to Auzout. Vernon met with Cassini a few weeks after his arrival and quizzed him about various things, including his status in the Compagnie and the progress he was making in implementing his reforms. After one chat, Vernon reported to Oldenburg: "He says," quoted Vernon of Cassini, that "he is directing the new observatory, and he gives guidance to what he believes to be convenient (or Mr. Huygens, who is his great friend and intimate and for whom I perceive he has complete respect) to the first model and design which it seems, was Mr. Auzout's, and the King tells them to not spare any expense, for he will cover all costs, and he said that it will cost about 100,000 livres" (Figure 29).[157]

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[156] Ibid. See biographical note on Vernon provided by Hall and Boas Hall, *Correspondence of Henry Oldenburg*, 5:462. He apparently sought a daring life that included being captured by pirates and sold as a slave, and during his final voyage, he was reportedly murdered in a quarrel over a penknife.

[157] Francis Vernon to Oldenburg, 24 April 1669, ibid., 5:497. Vernon's text reads: "Hee saith, the new observatory, hee orders, & adviseth what hee judgeth convenient (or Monsr. Huygens, who is his great Friend & Intimate and For whom I perceive he hath a very entire Respect) to the first Modell & designe wch it seemes was Monsieur Auzouts, & the King biddes them not spare as to charge For hee will bee wanting in noe expense, & hee saith it will cost about a 100000 Livres." By "adviseth" Vernon

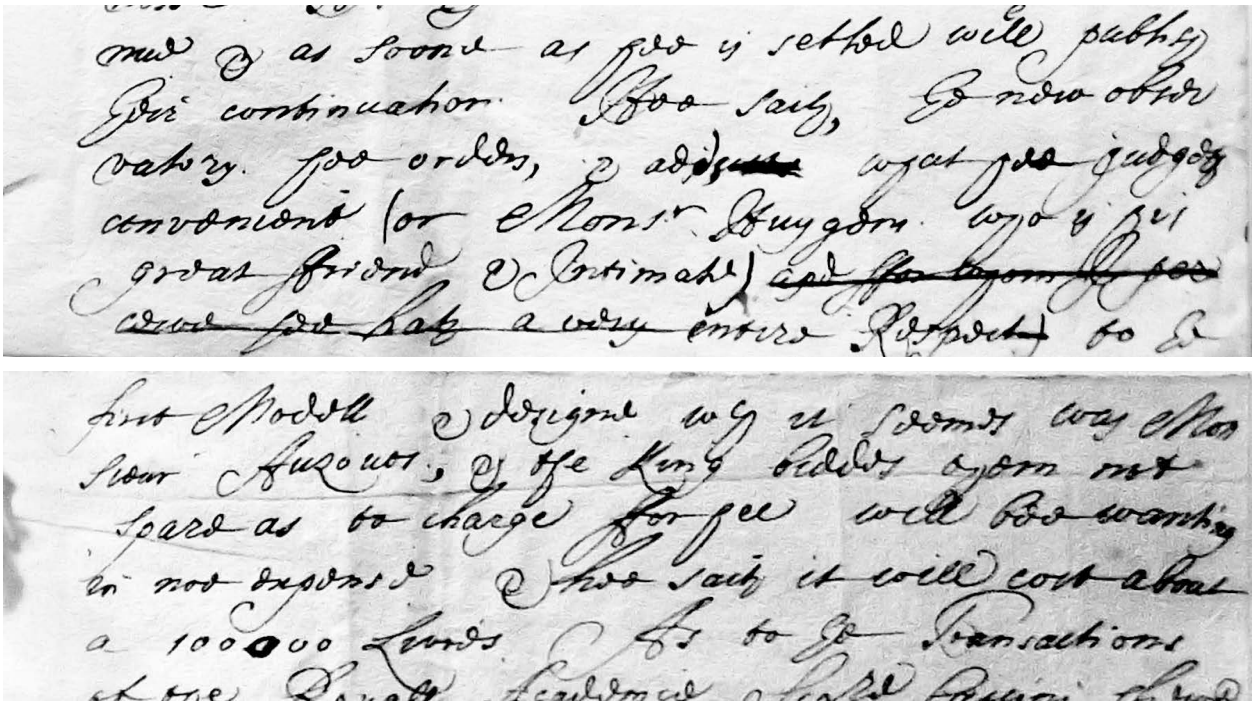

Figure 29. Letter from Francis Vernon to Henry Oldenburg, 24 April 1669, reporting on Vernon's conversation with Cassini. Manuscript courtesy of the Archives of the Royal Society, London.

At least in part, this letter clears up some of the questions about the motives of Cassini's many demands. We can conclude that when he arrived in Paris, he expected to see another design scheme under construction, and he tried to return the design under construction to match the one that he saw earlier. As we now understand, that scheme was the same scheme that was affiliated with Auzout a year earlier: the same one that Justel had sent to Oldenburg and Jeffreys in June; the one that Carcavy had apparently considered sending to London in August. Undoubtedly now, it was the same one that had been frozen in time by the wooden model, and the scheme that Cassini was expecting to find under construction. It therefore follows that he committed to come to Paris on the basis of that scheme. Cassini's demanding demeanor is now easier to justify.

likely meant, "To give guidance or suggestions, or state one's opinion, to (a person, etc.) as to the best course of action." *Oxford English Dictionary*, 1933 ed., s.v. "adviseth."

Oldenburg had received several other letters from Vernon during this time. Most provided him with the kinds of news that he had previously received from Justel—news of political unrest, of books being published, etc. In one letter, Vernon tells of meeting with Carcavy and Huygens, who explained to him the operations and research methods of the new Compagnie: "at ye royall Academie they did not make inquiries into any one subject in particular," reported Vernon of his meeting with the two leaders of the Compagnie, "butt every one took unto his examination what suited best with his owne Fancy & genius; the next conference proposed it & then it was debated."[158] Vernon also had a real curiosity about the construction work going on at the Observatory site. In early June, Vernon learned that "Monsr Colbert, Cassini, Huygens, Carcavy, Picard, and most of the Royall Academie went to Fauxbourg St Jaques to View the observatory, whc They are very eager to have carried on."[159]

Vernon recorded that, around that time, Cassini answered a few of his questions about the physical size of the Observatory: "Cassini tells mee it will bee 80 foot high, on one side, & 60. on another."[160] Given the layout of the Observatory and the broad, levelled surfaces that would be necessary, there would be high retaining walls and abrupt changes of levels. There would eventually be a full level change from the north side to the south, with the south side being twenty feet higher than the north side.[161]

The bit of information about the project that he got from Cassini apparently whetted Vernon's interest. A month later he had gained access to the construction site, and there made

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[158] Vernon to Oldenburg, 24 April 1669, in *Correspondence of Henry Oldenburg*, 5:498.

[159] Vernon to Oldenburg, 2 June 1669, ibid., 6:6.

[160] Ibid.

[161] The effect was to situate the Observatory's south face and its south terrace on the highest part of the site. The building then steps down the hill to the north, towards the river.

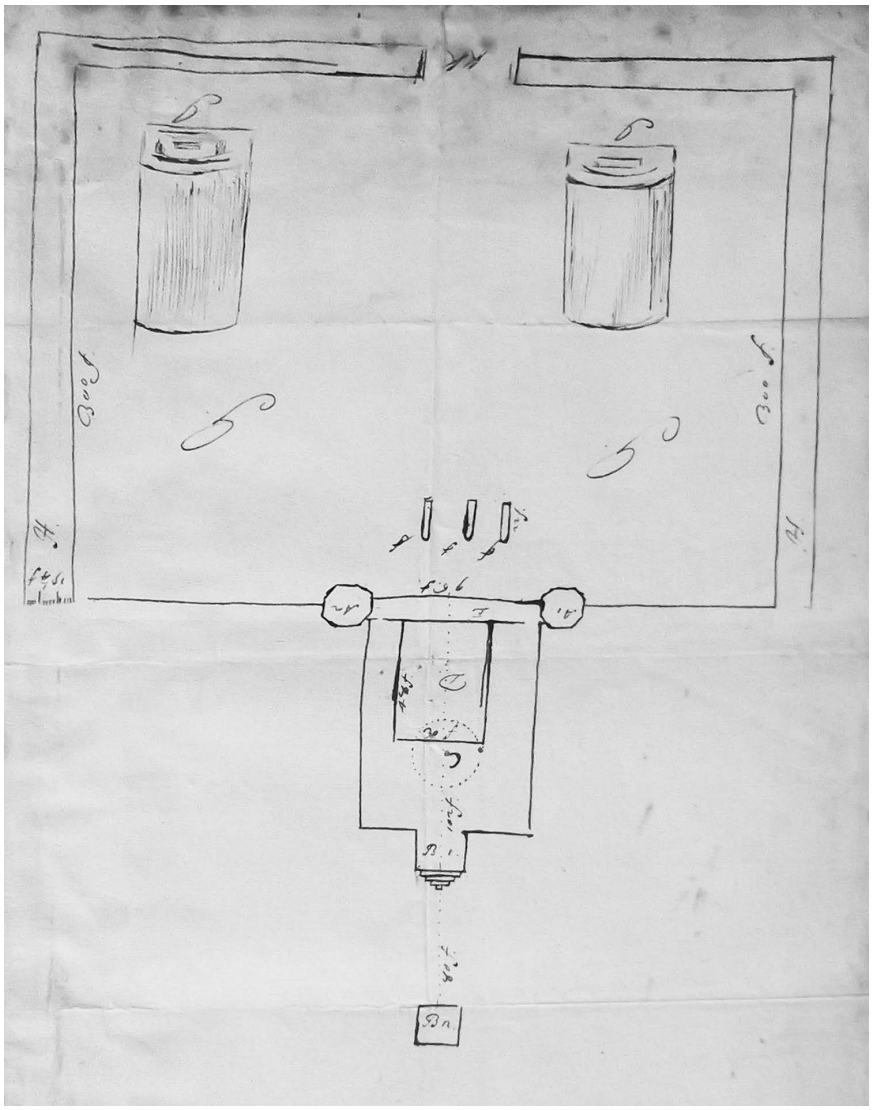

Figure 30. From a letter from Vernon to Oldenburg, July(?) 1669. Vernon included this sketch of the Observatory project in progress.

a measured sketch of the structure under construction. He annotated it with a description of the design elements that he keyed to the drawing (Figure 30). Vernon sketched the outline of the Observatory: a roughly squared box in the lower half of the page. He refers Oldenburg to the two forms he has drawn, "A1 and A2." These are "two octagone towers 80 foot high above…the plane of the Terrasse," which is on the south (in Vernon's sketch, the top) side of the Observatory, which itself is nineteen feet below the north side of the building. The two

towers are separated by a ninety-six foot long "curtaine"[162] wall, that is, the principal southern wall.

In his sketch, Vernon also documents two other towers, B1 and B2, on the north end of the building (the bottom of his sketch). They were as tall as the other towers, "and are distant from one another by a line of 80 feet."[163] Next, Vernon describes what he annotates as "C," a central vertical stone-lined shaft that went down into the ground from the lowest floor of the Observatory to "a depth about a 100 foot to the bottome of which they goe downe by a winding staire." Vernon explained that the stone stairs wound down along the wall of the well, leaving an open centre. He must have been allowed to view the stairs and the caverns to which it connected at the bottom because he describes "an outlet or doore at the bottome. It is used," explained Vernon, "to observe stars by day" (Figure 31).[164]

[162] *Oxford English Dictionary*, 1933 ed., s.v. "curtaine. " Vernon uses this word to describe the wall between the towers. "Curtaine" could mean "the wall of a fortified place which connects two bastions, towers, gates, or similar structure." It is further interesting that Vernon would draw a reference to a fortification here.

[163] The north tower that is attached to the building was part of the construction. However, the tower that he has drawn extended eighty feet from the building is a puzzle. Vernon is the only one to document that tower and it is not clear exactly to what he was referring.

[164] This well experiment was an idea that was being tested with the Observatory structure. Circular openings were created in the floors and roof vaults directly in line with the deep stairwell, with the belief that stars could be seen during the daytime from the depths of a well. The experiment was unsuccessful.

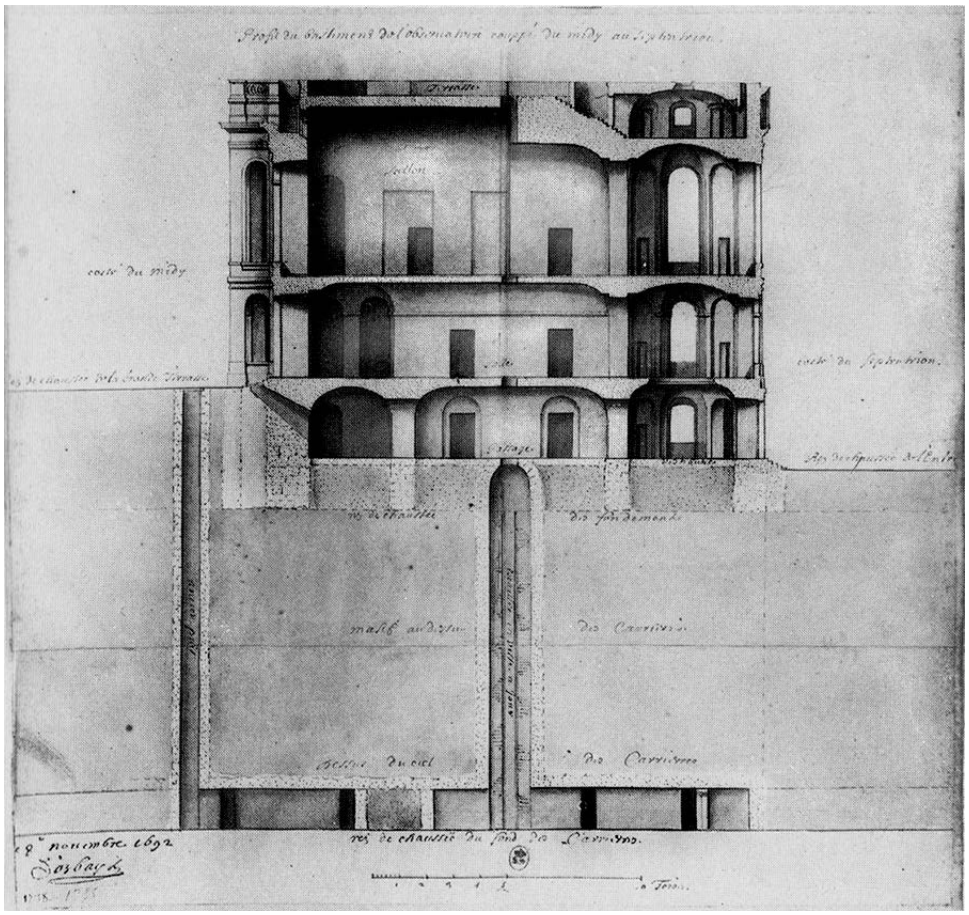

Figure 31. François d'Orbay, Section through stairwell and viewing shaft (1692).

Vernon measured the structure "from the curtaine…to the outermost side of the square tower" to be 102 feet. "The whole breadth from ye outermost side of tower A1 to outermost A2 is 150 whereof the curtaine betweene the insides of the two towers A, A2 is 96." The south or "front" side of the structure "is made by those 2 octagone towers & the curtaine or galery wch joynes them together. This galery is 96 feet long, and the windows in it f.f.f. 22 foot high." After describing the gallery room behind the south wall, Vernon continues with information about the interior of the plan and the room behind the gallery: "Behind the galerie by the

advice of Sigre Cassini is a great chamber made of 48 foot in lengthe & 30 in breath which is called la grande sala made to take obser vations of the sun. This is markt with Letter D."[165]

Vernon is again confusing here. If he is describing the large room for which Cassini had been pressing—which seems to be the case, since he referred to it as the "Grande Salon"—then he was describing the top floor plan, on which construction had not yet begun. He offers us no explanation of that discrepancy. Vernon next describes the large south terrace: "GG is the great terrasse which is before the front of the building which is of 300 foot square & some 20 deep.[166] This is to make the horizon levell with a hill, which is called Mont rouge that soe the view may bee even."[167]

The "HH" on Vernon's sketch was a part of the construction that wrapped around the main terrace that he referred to it as a "girdle or walke without the Terrasse lower than the Terrasse." That girdle platform was thirty-six feet wide and five feet below the main terrace, and thus fifteen feet above the natural grade. Vernon points out that gardens would be established on these lower terraces and planted with "all such plants as have sympathy with the heavens, & observe the motions of the sun or stars."[168]

Interestingly, Vernon saw a military analogy in the architecture, comparing these lower terraces to "something in the nature of a *fausse bray* in fortification." In a footnote, A. Rupert Hall and Marie Boas Hall supply a clarification: a *fausse braie* was a defensive mound or wall erected in advance of the main ramparts of the fortification.[169] Both the terrace and this walk

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[165] Vernon to Oldenburg, 2 June 1669, ibid., 6:6.

[166] By deep, he must mean "above grade" on its highest side. It would make sense that a level terrace of that length built on a hillside would require a tall retaining wall at the toe of the slope.

[167] Ibid., 6:6.Mont Rouge is to the south of the Observatory site.

[168] Vernon to Oldenburg, 23 July 1669, in *Correspondence of Henry Oldenburg*, 6:149n1.

[169] Ibid.

are, according to Vernon, paved with stone pavers. The walls are also stone, and are eight feet thick, except where the stresses are high, where the walls were widened to twelve feet thick: "Likewise the walls of the Building are very massive and everywhere 8 foot thick. wch is therefore contrived substantiall. because of the heigth."[170]

Vernon continues his explanation of his drawing: The KK in his sketch marks the Entrance gate, and he reiterates that "of this fabrique there is only finished the first story." It is, however, the two large rectangles drawn in the middle of the southern terrace that are the most curious for the contemporary historian. Those two rectangles, "I I," are "grottas under the Terrasse." Vernon claimed that beneath the stone-covered terrace the project designers had installed two large vaulted caverns, with "Ledges of stone some 2 foot broad to Lay fire on." The designers were imagining ways to artificially heat the surface of the terrace. The fires "render these grottas like ovens or stones whose heat they intend to governe as the please, for the artificiall Ripening of fruits and plants which they intend to plant in beds over those ovens." There is no history of this architectural experiment ever working, or even being tested, and its presence in the design remains a mystery.[171]

Although not discussed in depth by other historians, there was one other design modification that Cassini expected that seems to me to have represented the most profound alteration and disruption to the original conception of the Observatory. For Cassini, it was a change that seems to have been non-negotiable. When he and his family arrived in Paris, it is clear that he expected the Observatory to be their family residence.

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[170] Vernon to Oldenburg, undated, ibid., 6:147.

[171] Ibid. There have been several major renovations through the history of the Observatory. At some point, the large southern terrace was replaced with a tree-lined park.

As mentioned above, Cassini wrote that Charles Perrault was charged by Colbert to establish a home for him in the Louvre galleries, but Cassini also made it clear that he considered those accommodations to be temporary. He and his family would live at the Louvre "until the Observatory was made ready to be inhabited."[172] There is no record of any earlier discussion where this proposition had ever been considered. Nonetheless, after Cassini's arrival, it seems to have been a foregone conclusion, yet it had never been mentioned as a condition of the design at the time that the Observatory and Compagnie project was conceived. That scheme, presented by Auzout and rooted in the collaborative involvement of a variety of different agents, was a plan that evolved from a resolutely polyvalent mood.

If we consider the moment, it would have been impossible to suggest that one savant could be elevated to such exclusivity. This is particularly difficult to fathom when we consider how, when added to Cassini's other demands, this last requirement changed not only the function of the Observatory building but its symbolic essence as well. How big of a transformation was it for Cassini to privately occupy a part of the Observatory building? Consider first the plan as conceived by the Petit Conseil and under construction in the spring of 1669. Given the generalist and egalitarian nature of its occupancy as originally conceived, it is not surprising that each of the three floors were designed as effectively identical layouts, each divided into laboratory-sized spaces separated by bearing stone walls. Those rooms would communicate by way of wide corridors that terminated at the three towers. The three levels of floor plans were connected by a wide, stone staircase that would wind upward from the lowest floor to the top.

[172] Cassini, *Mémoires pour servir à l'histoire des sciences*, 290. "M. Perrault contrôleur des bàtimens, fut chargé par M. de Colbert de m'apprêter un logement aux galeries du Louvre jusqu'à ce que l'Observatoire fùt en état d'être habité."

However, when Cassini announced his expectation that the Observatory would also be his private residence—a use that, I maintain, had never been contemplated until Cassini's arrival in Paris—and then demanded the conversion of the Compagnie's workspaces on the upper floor into one grand room dedicated to astronomical works, the effect was that two-thirds of the Compagnie's laboratory spaces were co-opted by Cassini (Figures 32 and 33).

In the final analysis, the Compagnie membership could not have ignored the fact that with the arrival of Cassini and the broad accommodation of his demands, it would be only the lowest (northern) level that could be identified as the Compagnie's shared workspace, whereas Cassini and the astronomers would be granted the top two floors as well as the roof terrace. The result of those decisions was that a large portion of the Observatory would be dedicated to a single scientific enterprise: astronomy. These events must have been interpreted as a great departure from the Observatory as originally conceived two years earlier. Most of Cassini's wishes were granted and the approvals could have only come from either Colbert or Louis. Whatever the case, the project designers were forced to accommodate Cassini's design changes.

Problems caused by Cassini's last-minute revisions came quickly to the surface. Having not been figured into the structural analysis and the construction scheme from the beginning, the large room's retrofit status caused very difficult structural problems. The designers were left with only one option: to extend the span and flattened the arch of the vaults. Charles recalled later the catastrophic effects that resulted over time from this particular modification

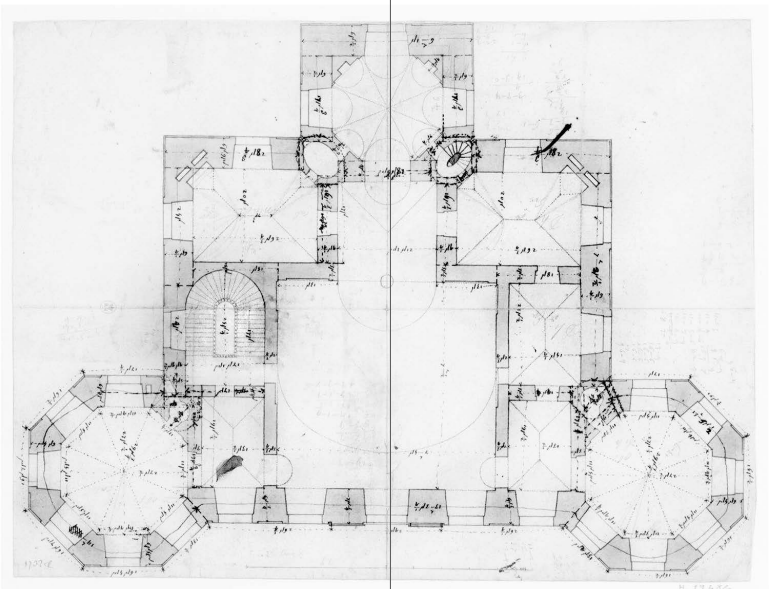

Figure 32. François d'Orbay, As-constructed plan drawing of the Observatory top floor showing the Grande Salon requested by Cassini. Note the revised stair plan.

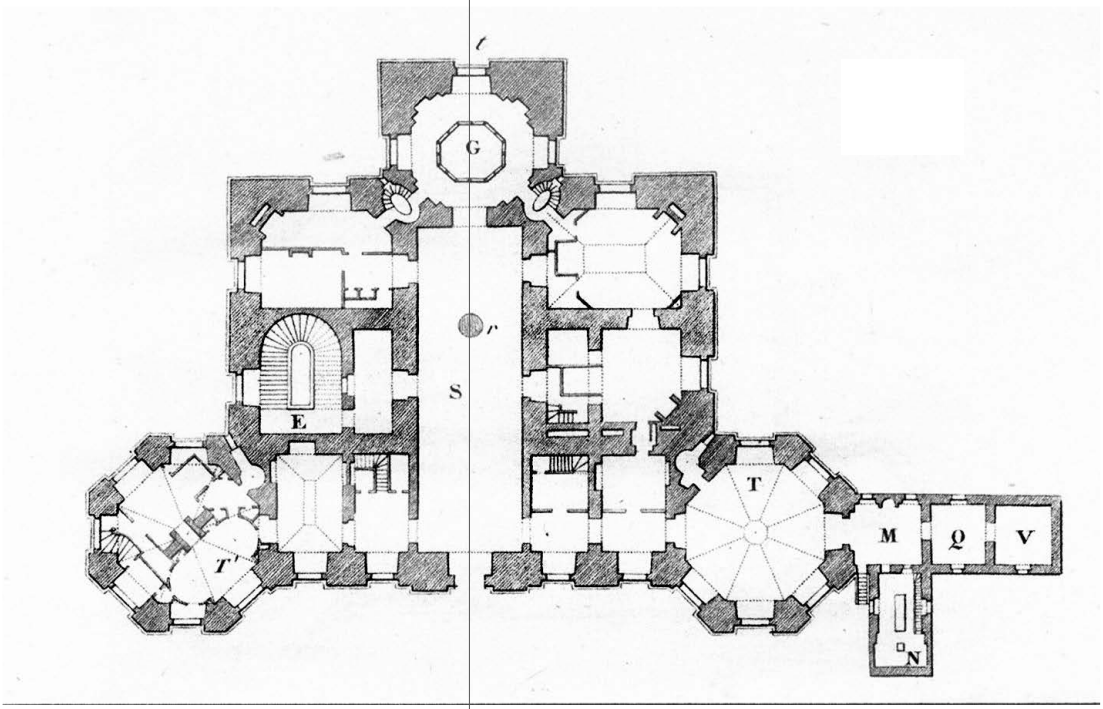

Figure 33. Draftsman unknown, Middle floor plan showing the revisions made to accommodate the Cassini family's private apartments.

and the consequences in not accepting his advice over Cassini's: "As it happened, because that room was made too large, the vaulting crumbled," Charles later reported, "as did the main structure itself, and they had to rebuild both the vault and the cap of cement above. It seems

that there will always be something which has to be done to that vault. This was a huge error, and one with which your uncle [i.e., Claude] never agreed."[173]

Earlier, I pointed out a correlation that seemed obvious to me: Cassini's demand to equip the Paris Observatory with wall-mounted quadrants was in fact an attempt to re-establish the famous installation of Tycho Brahe's mural quadrant at his castle of Uraniborg. Comparisons between Cassini and Tycho need not end there, however. In fact, they offer some insight into motivations that may have influenced Cassini and consequently the status of the Observatory project. Both Cassini and Tycho acquired much personal influence and authority, and in both cases, they acquired that power by drawing close to those with ultimate power. Like Cassini, Tycho was the direct client of a king. In Tycho's case, that was the Danish King Frederick II, who, like Louis XIV, was regal and athletic and a patron to artisans and savants in his kingdom.[174]

Did Cassini see himself as a "modern" Tycho, and the Paris Observatory as a "modern" Uraniborg? That could explain his adamant claim on the Observatory structure as his personal residence. Uraniborg was fundamentally that: there were private apartments not only for Tycho himself and the family that lived with him, but also those for Frederick and the queen when they visited. There were lodgings at Uraniborg for Tycho's assistants, scholars,

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[173] Perrault, Bonnefon, and Perrault, *Mémoires de ma vie*, 51. "Est même arrive que, pour avoir fait cette piece trop grande, la voute s'est fendue, de même que le massif, et qu'il a fallu raccommoder la voute et la chappe de ciment au-dessus et qu'il y aura apparemment toujours quel que chose a faire à cette voute. Ce fut une grande faute à laquelle votre oncle ne consentit jamais."

[174] After a few years of royal service, Frederick offered Tycho his choice of many different castles and feifs. However, wanting a completely fresh beginning, Tycho instead chose the rights to a Danish island—Hven—and the fortune required to design and construct a castle—Uraniborg—for the purpose of studying astronomy. Frederick's debt to Tycho came in part to the fact that Tycho's father had once saved Frederick from drowning, which eventually led to the father's death.

and students.[175] We know about the oversized quadrant at Uraniborg, an instrument from which Tycho Brahe logged many years of celestial positions. Other observations were made from roof terraces connected by catwalks, a situation not unlike the tower terraces and walkway that the Paris Observatory would have had if Cassini got his way and stopped the towers short one story. For Tycho, Uraniborg was a facility for the study and understanding of the rational and divine force that gave structure to the universe.[176] Astronomy was the primary vehicle for that study, but other experimental projects other astronomy were also conducted there. Tycho had a large chemical and alchemical laboratory with sixteen furnaces for different purposes in the basement of his castle, which might have been all the precedent that Cassini needed to enforce the same condition at the Observatory. Beyond Uraniborg's windows, there were orchards and gardens, with fruit and nut trees. Uraniborg was from the same vision as the Paris Observatory.[177]

When the other Compagnie members became aware of the radical modifications to the Observatory building and Cassini's elevated savant status and his hyper-inflated salary, they must have suspected a distinct shift in priorities by its management and patrons. It is not difficult to imagine that it had an undermining effect on the fellowship and vision that had been focused by the Observatory project. It took no time for those Compagnie members not affiliated with astronomy to avoid the prolonged journey south to the Observatory facility. Almost overnight, its countenance had been redefined, and it would have been impossible for

[175] In parallel, Jean Picard, Auzout's chief collaborator and the second astronomer of the Paris Observatory, was also invited to live in the second level of the Observatory with the Cassini family.

[176] Christianson, *On Tycho's Island*, 103.

[177] Francis Beckett, Tycho Brahe, and Charles Christensen, *Tycho Brahe's Uraniborg and Stjerneborg on the Island of Hveen* (London : Oxford University Press; Copenhagen: A. Marcus, 1921).

the structure itself to hold onto its symbolic status as the home for the Compagnie when its function had been so resolutely tilted towards one science and one man. Consequently, the Compagnie membership on the whole stayed away from the Observatory and it never became the polyvalent research centre that it was originally imagined to be. The savants satisfied themselves with the temporary rooms that had been created for them in the King's Library and in Colbert's properties on rue Vivienne, which became their permanent homes.

At the end of this study, I submit that the conditions and character of the origins of the Paris Observatory has been made more clear. Through this effort, the latent framework of relationships, intentions, operational structures, and possible actions are now more accessible. This additional clarity and access makes, I believe, much of what is currently believed about the origins of the Paris Observatory more difficult to believe. However, we are left some unanswered questions. Foremost among them is this: How can we account for Colbert's acquiescence towards Cassini? Why did he consent to Cassini's demands for elite status in the Compagnie? Is it possible that Colbert could not have forecasted the corrosive effects of giving Cassini such authority, exclusivity, and individual power? The facts are that the Compagnie members never really adopted the Observatory as a home, the way that Le Clerc and the original conceivers had envisioned. Huygens, Roberval, and the others were content to stay on the other side of the Seine, in the city, in functional quarters with which they had grown comfortable.

Or was Colbert acting in his predictable style of abnegating long-term gains on long-range plans for short-term exigencies he was confident in securing? That is to ask, was it simply a matter of replacing one lost astronomer—Auzout—with another—Cassini—as the director of a king's Observatory? Was he commanded to accommodate the demanding Italian by a king who saw glory in astronomy and a potential victory over a pope? Did Louis grow impatient

with Colbert's deliberate methods, along with the rest of Paris, and simply want the Observatory to move ahead? Or perhaps at that moment, these concerns did not really matter much to Colbert.

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— Quamdiu nulla demonstratione contrarium evincitur. —

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