

The contours of disease and hunger in Carolingian and early Ottonian Europe  
(*c.*750-*c.*950 CE)

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## Abstract

This thesis is the first systematic examination of the textual and material evidence for disease and hunger in Carolingian and early Ottonian Europe, *c.*750 to *c.*950 CE. It draws upon medieval textual records including annals, capitularies, chronicles, *concilia*, correspondence, histories, *gesta*, poetry, polyptychs, secular biographies, and *vitae*, as well as numerous modern archaeological, palaeobotanical, palaeoclimatic, palaeomicrobiological and palaeopathological reports in order to comment on epidemics, epizootics, food shortages and the baseline or current of non-pestilential disease and chronic hunger underlying them. It first surveys the historical and scientific scholarship on these phenomena and the methodologies intrinsic to their study. The evidence for non-pestilential and chronic hunger is then addressed, before pestilences and food shortages are identified in time and space. We can discern roughly thirty-two peacetime epidemics, ten epizootics, ten famines and twelve lesser shortages. A short investigation of the impact of, and response to, disease and hunger in Carolingian and early Ottonian Europe is presented in conclusion.

The thesis demonstrates that disease and hunger, in both endemic and epidemic forms, were common realities for mid eighth- through mid tenth-century continental European populations, and argues that epidemics, epizootics and subsistence crises had major, short-lived but possibly cumulative, repercussions for Carolingian and early Ottonian demographic and, consequently, economic growth, in addition to intensifying the impact of the silent toll of the baseline of non-pestilential disease and chronic hunger. The textual evidence addressed in the thesis is presented in Latin and English in three appendices.

## Résumé

Cette thèse est le premier examen systématique des sources textuelles et matérielles concernant la maladie et la faim en Europe carolingienne et ottonienne, entre le milieu du VIII<sup>e</sup> et le milieu du X<sup>e</sup> siècle. Elle s'appuie sur des sources textuelles, comprenant des annales, capitulaires, chroniques, actes de conciles, la littérature épistolaire, les œuvres historiques, les *gesta*, la poésie, les polyptyques, biographies laïques et vies de saints, ainsi que de nombreux rapports archéologiques, paléobotaniques, paléoclimatiques, paléomicrobiologiques et paléopathologiques récents afin d'expliquer les épidémies, épizooties et pénuries alimentaires, de même que le problème fondamental de la faim, qu'elle soit la conséquence de maladies non-pestilentiennes ou de maladies chroniques sous-jacentes. Elle passe en revue l'historiographie et l'état des recherches scientifiques sur ces phénomènes ainsi que la méthodologie qui sert à leur étude. Les indications concernant la faim non pestilentielle et chronique sont alors analysées, ensuite celles concernant les pestes et les pénuries alimentaires, qui sont identifiées dans le temps et l'espace. Nous pouvons discerner assez bien trente-deux épidémies en temps de paix, une dizaine d'épizooties, dix famines et dix à douze pénuries moindres. La conclusion présente une enquête bref sur l'impact de la maladie et de la faim et la réponse qu'elles ont suscitées en Europe carolingienne et ottonienne.

La thèse démontre que la maladie et la faim, dans ses formes endémique autant qu'épidémique, étaient des réalités courantes pour les populations européennes continentales entre le milieu du VIII<sup>e</sup> et le milieu du X<sup>e</sup> siècle et défend l'idée selon laquelle les épidémies, les épizooties et les crises de subsistance ont été majeures, de courte durée mais dont l'effet a pu être cumulatif. Leurs répercussions sur la démographie de l'Europe carolingienne et ottonienne et,

par conséquent, sur la croissance économique ont intensifié l'impact déjà dévastateur des maladies non pestilentielles et de la faim chronique. Les indications tirées des sources écrites utilisées dans la thèse sont présentées en latin et en traduction anglaise dans trois annexes.

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# Table of Contents

## Introduction ... 1

### 0.1 Design and overarching methodologies ... 6

#### 0.1.1 Preconceptions ... 6

#### 0.1.2 A Blueprint of the thesis ... 7

##### 0.1.2.1 The appendices and catalogues

#### 0.1.3 Why disease and hunger? ... 10

##### 0.1.3.1 Antiquarians and catalogues of disease, hunger and extreme weather

#### 0.1.4 Why Carolingian and early Ottonian Europe? ... 15

##### 0.1.4.1 The population context

###### 0.1.4.1.1 Early medieval agriculture

###### 0.1.4.1.2 The Early Medieval Pandemic

###### 0.1.4.1.3 Polyptychs

###### 0.1.4.1.4 The Carolingian and early Ottonian climate

#### 0.1.5 Written evidence and the reconstruction of pestilences and food shortages ... 41

##### 0.1.5.1 The incorporation of material evidence

#### 0.1.6 Gauging the impact of disease and hunger in Carolingian and early Ottonian Europe ... 46

##### 0.1.6.1 Contextualizing disease and hunger

##### 0.1.6.2 Analogies to disease and hunger

##### 0.1.6.3 Working diagnoses

### 0.2 Definitions ... 50

## Part 1: The contours of disease ... 54

### 1.1 The historiography of Carolingian and early Ottonian Europe disease ... 54

#### 1.1.1 Epidemics ... 56

#### 1.1.2 Non-pestilential disease in humans ... 66

#### 1.1.3 Epizootics and non-pestilential disease in livestock ... 69

### 1.2 Methodologies ... 72

#### 1.2.1 The existence of modern diseases in Carolingian and early Ottonian-era Europe ... 73

#### 1.2.2 The retrospective diagnosing of pre-modern disease: problems and implications ... 86

#### 1.2.3 Palaeomicrobiology and Carolingian and early Ottonian disease ... 95

#### 1.2.4 Palaeopathology and Carolingian and early Ottonian disease ... 102

#### 1.2.5 The elusive pathocoenosis ... 106

### 1.3 The underlying current of disease ... 110

#### 1.3.1 Malaria ... 143

### 1.4 Carolingian and early Ottonian pestilences ... 146

#### 1.4.1 The nature of the written evidence ... 146

##### 1.4.1.1 Epidemics

##### 1.4.1.2 Epizootics

##### 1.4.1.3 Summary and implications

#### 1.4.2 Carolingian and early Ottonian pestilences in time and space ... 163

##### 1.4.2.1 Epidemics

###### 1.4.2.1.1 Diagnoses for heuristic purposes

##### 1.4.2.2 Epizootics

1.4.2.2.1 Diagnoses for heuristic purposes	
1.4.3 The frequency of epidemics and epizootics ...	213
1.5 Summary ...	217
 Part 2: The contours of hunger ...	219
2.1 The historiography of Carolingian and early Ottonian hunger ...	220
2.1.1 Food shortages ...	222
2.1.1.1 Food shortage causation	
2.1.1.2 The repercussions and responses to shortage	
2.1.2 Chronic hunger and endemic malnutrition ...	239
2.2 Methodologies ...	245
2.2.1 Definitions and the measurement of subsistence crises ...	246
2.2.1.1 Famine and lesser food shortages: historians, theorists and a general definition of famine and lesser food shortages	
2.2.1.1.1 A shortage of food	
2.2.1.1.2 Demographic impact	
2.2.1.1.3 Spatial parameters	
2.2.1.1.4 Temporal parameters	
2.2.1.1.5 Lesser food shortages	
2.2.1.2 The frequency of famines and lesser subsistence crises	
2.2.1.3 Diagnosing Carolingian and early Ottonian food shortages	
2.2.2 The causation and perpetuation of subsistence crises ...	271
2.2.2.1 Malthusianism, neo-Malthusianism and Boserup	
2.2.2.2 Sen, entitlements, and FAD vs. FED	
2.2.2.3 Food shortage as agricultural catastrophe	
2.2.2.4 Market failures, war, labor inputs, response failures, underlying vulnerability, and multi-faceted explanations of shortage causation	
2.3 Chronic hunger ...	286
2.4 Carolingian and early Ottonian food shortages ...	292
2.4.1 The nature of the written evidence ...	292
2.4.1.1 Food shortages	
2.4.2 Carolingian and early Ottonian famines and lesser food shortages in time and space ...	302
2.4.3 The frequency of famines and lesser shortages ...	343
2.4.4 The causation and perpetuation of food shortages ...	346
2.5 Summary ...	360

## Part 3: Disease and hunger in Carolingian and early Ottonian Europe: Towards a history of impact and response ... 362

3.1 Human disease ...	363
3.2 Livestock disease ...	374
3.3 Food shortages ...	385

3.4 Disease and hunger in Carolingian and early Ottonian Europe: synergy, aggregate impact and steps forward ... 406

## 4 Appendices ... 414

4.1 Introduction ... 414

4.2 Catalogue 1: Pestilence, food shortages and extreme weather in Carolingian and early Ottonian Europe ... 418

4.3 Catalogue 2: Chronic illnesses of elites ... 485

4.4 Catalogue 3: Pestilences, food shortages and extreme weather in non-Carolingian and early Ottonian Europe, *c.*750-*c.*950 ... 500

4.5 Brief notes on the composition of the principal Carolingian texts used in this study ... 513

## Bibliography ... 518

Primary sources ... 518

Secondary sources ... 528

## Introduction

In his *De grandine et tonitruis*, written around 815 CE, Bishop Agobard of Lyons (c.769-840) describes what he refers to as the ‘superstitions’ of a contemporary rural population in the locale of Lyons. The people ‘foolishly believe,’ Agobard writes, that the mortality of cattle then occurring was a direct result of the actions of Duke Grimald IV of Benevento. According to the cleric, the rustics blamed the duke for spreading a ‘certain dust’ that caused domestic bovines to die en masse across fields and mountains, through valleys and in streams. This mortality, or pestilence, that Agobard refers to was likely that which several authors across much of Europe documented under the years 809 or 810. In the latter year, the *Annales Laurissenses minores* reports ‘a very great mortality of oxen almost in all Europe’ and in 809 the *Chronicon Moissiacense* writes that a great mortality of animals ‘came from the East and crossed over to the West.’ Several other Carolingian texts, including the *Annales regni Francorum* and the Poeta Saxo’s *Annales de gestis Caroli magni imperatoris*, underscore the ‘greatness’ of this panzootic. They describe cattle perishing on an ‘unheard of’ scale in and beyond Carolingian Europe and the disruption the pestilence caused Charlemagne’s 810 campaign. They document emaciated animals succumbing rapidly and producing a vile stench, and, among other things, farmers culling the sick and cleansing their stalls. To the north, the *Annales Cambriae*, composed contemporaneously at St. Davids, succinctly reports ‘a mortality of cattle across Britain’ in 810.

This cattle pestilence was one of several large outbreaks of disease in Carolingian and early Ottonian Europe. Though one of the better documented pestilences of this period, the available written evidence leaves many questions unanswered. The temporal and spatial contours of outbreak, let alone its impact, are vaguely visible. Whether textual references to the pestilence are more connected to events on the ground or their literary environment is also in many cases uncertain. Like all mid eighth- through mid tenth-century pestilences and food shortages, we must assess the descriptions of this panzootic in their contemporary and pre-existing literary context in order to discern how representative the glimpses we have of it are of the past realities. How much of what we know about this early ninth-century bovine mortality is literary convention? How can we



attempt to reconstruct the pestilence's extent, dissemination and impact? Can the panzootic's mortality be grasped or even estimated? Can we identify the disease-causing microorganism and what use is a retrospective diagnosis? Was the pathogen contagious and spread between like animals or vector- or soil-borne? Did the pestilence reoccur, become enzootic and continually eat away at herds? Did the pathogen only infect cattle? Was the outbreak zoonotic? What precipitated the disease's irruption and dissemination across a large swathe of Europe? Do descriptions of the pestilence illuminate contemporary medical practice or conceptions of contagion? How do we assess the human impact of the epidemic, notably on hunger and hence human vulnerability to disease? What should we make of the 'dust'?

This thesis is the first systematic examination of the textual and material evidence for disease and hunger in Carolingian and early Ottonian Europe, *c.*750 to *c.*950 CE. It has six intentions and three overarching arguments. It seeks first to survey the historical and scientific scholarship on mid eighth- through mid tenth-century disease and hunger as distinct, yet frequently interconnecting forms of material and social distress, rooted in the radical dependence of medieval people on their natural environment; second, to establish and investigate the methodologies at the heart of the study of early medieval disease and hunger; third, to collect the written evidence for Carolingian and early Ottonian non-epidemic disease, pestilences and subsistence crises and make it available in Latin and English translation; fourth, to assess the written and material evidence for the baseline of non-pestilential disease and chronic hunger underlying and episodic pestilences and food shortages; fifth, to identify the spatial and temporal contours, and frequency, of human epidemics/pandemics and livestock epizootics/panzootics, as well as the contours, frequency and causation of subsistence crises, both lesser food shortages and famines; and sixth, to provide a preliminary investigation into the demographic and economic impact of disease and hunger in mid eighth- through mid tenth-century Europe, and propose lines of further inquiry.

The thesis argues first that disease, hunger and, to a lesser extent, extreme weather were common realities for mid eighth- through mid tenth-century continental

populations.<sup>1</sup> This may seem obvious, but it has yet to be demonstrated that the burden of persistent, non-pestilential diseases and chronic hunger was an everyday concern, and large outbreaks of disease among human and/or livestock populations, as well as major geographically expansive and prolonged subsistence crises, were not infrequent. Second, that epidemics, epizootics and subsistence crises had major, short-lived but possibly cumulative, repercussions for Carolingian and early Ottonian demographic and, consequently, economic growth, in addition to intensifying the impact of the silent toll of the baseline of non-pestilential disease and chronic hunger. The thesis therefore calls into question the very idea, popular today and expounded in much scholarship, that the second half of the eighth and ninth centuries witnessed a considerable population expansion.<sup>2</sup> The examination of several outbreaks of disease and food shortages, and their probable impact, indicates that Carolingian and early Ottonian populations were likely regularly eroded and that comparatively large (by early medieval standards) increases in populations, if they ever existed in the mid eighth through mid tenth centuries, were not sustained. Third, that the approaches hitherto taken to evaluate the existence, contours and impact of disease and hunger in early medieval Europe have been marked (until very recently in relation to some particular disease and short-term climatic events<sup>3</sup>) by a considerable lack of sophistication. Most of the oft-repeated ‘facts’ of Carolingian and early Ottonian disease and hunger, as well as extreme weather, are deeply rooted in unexamined assumptions that stem almost universally from perceptions of Carolingian and early Ottonian demographic and economic history, and to a lesser

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<sup>1</sup> Crop diseases (such as blights, ergots and rusts) and pests of crops (from birds to insects to rodents) should be regarded as no less important, though due to the near dearth of any direct evidence for them in Carolingian and early Ottonian sources, they are not considered at length here. The major exception is the locust swarm of 873. Through modelling of better documented, pre-modern societies one undoubtedly could advance more thorough educated guesses on the extent, regularity and impact of crop diseases in Carolingian and early Ottonian Europe. Soil scientist Shiel stresses the importance of crop diseases and pests in pre-modern agriculture: (2006), pp. 225-26, 232-33. On bird pests of agriculture see Jones (1972). Of early medieval historians, Duby astutely noted that we must pay attention to rodent predation and the ability of rodents to eat away at food supplies over the course of a year. He also drew attention, though briefly, to molds and diseases of grain that could have exhausted harvests and reduced the aggregate food supply: (1974), p. 29.

<sup>2</sup> The Carolingian period in particular has now for several decades been considered a period of demographic and economic growth. Growth is believed to have been more or less common in France, Germany, Italy, Belgium and the Netherlands. In addition to authors discussed below in 0.1.4.1 see Fleckenstein (1978), pp. 35-6; Reuter (1991), p. 94; Wickham (2002), p. 128; McCormick (2002), pp. 23-4.

<sup>3</sup> Notable recent scholarship discussed below includes Dutton (1995), Horden (2000, 2005), McCormick, Dutton, Mayewski (2007), and Cheyette (2008).

degree out-dated eighteenth-, nineteenth- and early twentieth-century ‘catalogues’ of disease, hunger and extreme weather events.<sup>4</sup> Throughout this thesis, an attempt is made to reevaluate prevailing notions of mid eighth- through mid tenth-century disease and hunger, and attention is given to how these conceptions have been assembled and woven into our understanding of mid eighth- through mid tenth-century demographic and economic history. As demonstrated in 1.1 and 2.1, though some historians and scientists have commented on the history of these phenomena in our period, the primary evidence, paradoxically, is very much unexplored.

The first two of these overarching arguments suggest that the economic and cultural revivals of Carolingian and early Ottonian Europe were not rooted in a new environment of disease and hunger that encouraged or facilitated the expansion of human population.<sup>5</sup> In other words, the thesis proposes that better human (and livestock) health did not account for the economic efflorescence or cultural renaissance that are thought to have occurred in mid eighth- through mid tenth-century Europe.<sup>6</sup> Humans and livestock did not fare remarkably better in the second half of the eighth, ninth or early tenth

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<sup>4</sup> See 0.1.3.1.

<sup>5</sup> Human population is the primary base of pre-modern economies. Discussions on demography very often inform examinations of the early medieval economy. Duby (1974) and Verhulst (2002) demonstrate this point well; also see the comments of Bachrach (2007), pp. 29-31, and Nelson (1982), p. 22. Scholarship focusing on earlier and later periods also intertwines economic and population growth. For instance, Scheidel, argues that economic growth around the ancient Mediterranean required demographic growth: (2004), p. 743; and van Zanden sees the economic and population boom of the European Middle Ages commencing together *c.*950/1000 on account of their codependence: (2009), pp. 32-3, 64-5. On the association of population levels to agrarian economic activity across pre-industrial periods see Smil (1994), p. 29. The thorough interconnection between pre-modern population and economy is due foremost to the fact that economic activity in pre-modern periods was by and large agrarian and dependent on human labor. Roughly 90 per cent of early medieval peoples were occupied in the agrarian economy, principally the production and processing of food stuffs: White (1962), p. 39; Devroey (2001), p. 97; Verhulst (2002), p. 126; Butt (2002), pp. 77-9; Cheyette (2008), p. 128. cf. Wickham (2008), p. 19. In ‘economy’ we are not here referring to long distance trade in luxury goods, such as slaves and spices, which has occupied the attention of several scholars but which was undoubtedly of less importance to the majority of early medieval Europeans: Grierson (1959), Henning (2003, 2008), McCormick (2001, 2002, 2003), Misbach (1972) and Morrison (1963).

<sup>6</sup> The Carolingian and early Ottonian centuries have long been held to have been a period of cultural rebirth, and this cultural rebirth has been associated, like the economic growth envisioned for the period, to demographic growth: see, for example, Verhulst (1995), p. 98. On the associations made by modern scholars between economic, cultural and demographic growth in pre-modern societies generally, see Scheidel (2004). Scheidel does well (p. 746) to observe that historians tend to think that when population levels were high, standards of living were high, and, correspondingly, that low population levels equate to low standards of living. Several early medievalists have clearly thought that one could trace demographic trends, crests and troughs, over economic and cultural trends, and that Europe’s ‘emergence’ from a ‘primitive culture’ and ‘barbarism’ was accompanied, if not propelled, by population growth: Duby (1974), p. 3; Lopez (1976), p. 1; O Neill (1993), p. 270; cf. Pleket (1997), p. 328-29; Fleckenstein (1978), p. 36.

centuries than they had before 750, nor are there significant grounds to state that disease was less common, hunger less acute or weather more stable and benign. Rather it is implied that the health of the people who populated Carolingian and early Ottonian rural and urban landscapes may have differed little, if at all, from those who lived in the Merovingian or late Ottonian periods. These arguments may also, subsequently, undermine the notion that the demographic expansion of the high Middle Ages had mid eighth- through mid tenth-century roots. The intention is not to replace a unique Carolingian and early Ottonian disease and hunger experience with continuity over the early Middle Ages, but simply to point out what can be known from the evidence available. Indeed, written and material evidence indicates that the disease and hunger experience of mid eighth- through mid tenth-century Europeans may have been quite like that of the early medieval peoples generally.

The thesis draws upon medieval textual records including annals, capitularies, chronicles, *concilia*, correspondence, histories, *gesta*, poetry, polyptychs, secular biographies, and *vitae*, as well as numerous modern archaeological, palaeobotanical, palaeoclimatic, palaeomicrobiological and palaeopathological reports in order to comment on some of the major determinants of the health of millions of early medieval Europeans over a two hundred year period.<sup>7</sup> Carolingians and early Ottonians ruled a large expanse of continental Europe, spanning, at the greatest extent, the North Sea to the Mediterranean, and the Pyrenees to the Elbe River, and encompassing most of modern day Belgium, France, Germany, Italy, the Netherlands and northern Spain. As such, the thesis touches upon the health of people living in a myriad of agricultures, climates, economies and environments. But it does so from a macro perspective, necessarily so considering the brief and ambiguous nature of the majority of written evidence and the focus of the mass of the available palaeoscientific evidence. Though the thesis brings much clarity to the history of Carolingian and early Ottonian disease and hunger, and sets the stage for the integration of pestilences, subsistence crises and non-pestilential illness and endemic malnutrition into Carolingian and early Ottonian cultural, demographic, economic, medical, political, religious and social history, much about mid eighth- through mid tenth-century disease and hunger remains unknown. Indeed, the scantiness

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<sup>7</sup> In this thesis, health specifically refers to physical health, not mental, emotional or spiritual health.

and ambiguous nature of the evidence allow us only to articulate the contours of these phenomena.

## **0.1 Design and overarching methodologies**

### **0.1.1 Preconceptions governing previous studies**

Most studies addressing the pre-modern history of disease and hunger operate under problematic assumptions or preconceptions. Foremost here is the idea that these phenomena were important in the area considered and that the endemic and epidemic disease and hunger in pre-modern periods can be articulated and judged to have been important or not. Until recently it was assumed that pre-modern texts revealed material world realities, and that we could reconstruct in detail the disease and hunger of distant eras from these sources without difficulty. These preconceptions mar several of the studies considered in the scholarship reviews (1.1 and 2.1) and are, consequently, avoided in this thesis. This study likewise does not operate under the preconceived (and possibly pre-modern) notion that Carolingian and early Ottonian Europe, and the early Middle Ages in general, was a bleak period in European history racked by penury, endemic scarcity and malnutrition, when ‘death and disaster’ had to be overcome on a daily basis.<sup>8</sup> Nor does this study operate under the more recent notion that the mid eighth- through mid tenth-century was a period of prosperity – relative to earlier and later early medieval centuries. This study seeks neither to prove nor disprove these notions, but to survey the evidence available in order to grasp what can be known of Carolingian and early Ottonian disease and hunger. It is also neither assumed that texts provide clear and direct reflections of the real experience of food shortages and non-pestilential disease, nor that there are ‘no means of moving beyond the literary impressions’ of our authors.<sup>9</sup> While mid eighth- through mid tenth-century written accounts of pestilences, subsistence crises and non-pestilential disease are generally homogeneous in form and content, some understanding of the persistent underlying current of disease, as well as

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<sup>8</sup> As, for example, Smith (2005), p. 72.

<sup>9</sup> Again, Smith (2005), p. 62.

many irruptive episodes of shortages and pestilences, is attainable. In some instances, material evidence can be employed to test and corroborate textual evidence and it is often possible to move beyond the impressions of any one author when a particular event, whether a locust swarm or epizootic, attracted the attention of multiple contemporary authors.

A major preconception of this study is that health matters. While few may deny this claim, the thesis does assume that an understanding of Carolingian and early Ottonian periods is incomplete without attention to the study of the health of the people that populated mid eighth- through mid tenth-century Europe.<sup>10</sup> The story of Carolingian and early Ottonian disease and hunger is one worth telling because disease and hunger were major determinants individual and population health and, consequently, political stability, and social investment in culture. Indeed, many historians of pre-modern Europe have long considered population, and consequently health, a basis of economy, regardless of their neglect of health and its determinants.<sup>11</sup> Most pre-modern economies were upwards of 90 per cent rural, greatly dependent on the success of the annual harvest(s) and the health of animals, both humans and livestock, for labor.<sup>12</sup> Naturally then, it is also presupposed that livestock health matters. Though the health of non-human animals of early medieval Europe has been widely overlooked, few would dispute that most human populations over the last several thousand years were highly dependent on the wellbeing of domesticates. In classical, medieval and early modern Europe, stock were the trucks and tractors of agriculture and economy, a chief form of capital and an essential source of food and raw materials. The production of grain, on which millions of humans depended, relied heavily on the traction and manure livestock provided.

### 0.1.2 A blueprint of the thesis

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<sup>10</sup> That health matters is, for example, the operating basis of Skinner's study of ninth- and tenth-century Italian disease and medicine: (1997), p. 5. It may, in fact, be said that an understanding of a society is wholly incomplete without an appreciation of the health of the people that make up that society. As Bloch wrote, 'it is very naïve to claim to understand men without knowing what sort of health they enjoyed.' Bloch (1961), p. 72.

<sup>11</sup> This is not, however, universally true. Neither Pirenne nor the vast majority who have engaged his thesis since the 1920s, for instance, have devoted any attention to health or its determinants. Many other formative histories of Carolingian economy and urbanism have also neglected these matters, as noted in 0.1.3.1.

<sup>12</sup> See n. 6.

The thesis has two primary parts. Part 1 addresses disease and Part 2 hunger.<sup>13</sup> These are preceded by this introduction and succeeded by a preliminary inquiry into the impact of disease and hunger in mid eighth- through mid tenth-century Europe. The two primary parts follow the same design, each being comprised of four chapters and a summary, which are subdivided into multiple subchapters. The first chapter of both Parts 1 and 2 shifts through the scholarship relevant to the topic at hand in focused subchapters. The literature review in Part 1, for instance, addresses what has been said on epidemics and non-pestilential disease in humans and livestock. These reviews, which survey what scholars have said about the disease and hunger and the methodologies they have employed, are not exhaustive but representative of existing work. The second chapter of Parts 1 and 2 details the methodologies pertinent to the study of pre-modern disease and hunger. Discussion here is thorough as most scholarship on mid eighth- through mid tenth-century disease and hunger is methodologically deficient. Few historians of the period have attempted to gauge what the palaeosciences offer, to critically engage the practice of retrospective diagnosing, or the issue of distinguishing between different degrees of food shortages. Few have examined Carolingian food shortages in light of modern famine theory or early Ottonian livestock pestilences in light of veterinary medicine.

The third chapter of Parts 1 and 2 respectively address non-pestilential disease and chronic hunger respectively. These two important issues are especially hard to grasp considering the scantiness and ambiguous nature of the written evidence for the former and the near dearth of textual evidence for the latter. Direct material evidence for either in our period is also largely lacking (see 0.1.5). The fourth chapter of Parts 1 and 2 first surveys what the evidence collected in Catalogues 1 and 2 reveal and how Carolingian and early Ottonian authors wrote about disease and hunger. Following this, human and livestock pestilences and food shortages are identified in time and space. Attention is also

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<sup>13</sup> While there is a risk of over-compartmentalizing the past in addressing disease and hunger separately, and while compartmentalization can threaten to disengage phenomena from their dynamic and interactive setting, little is lost and much is gained by tackling these phenomena individually here. Only in this way can we clearly assess what the textual and material evidence does and does not reveal, and not muddle or overlook the distinct methodologies employed to illuminate disease and hunger. Certainly, to consider these phenomena simultaneously would be to complicate the discussion of each as well as to potentially lose the intricacies of the methods required. Moreover, the interdependencies of disease and hunger are rarely revealed in the textual or material evidence. Most studies of pre-modern European disease and hunger have addressed these phenomena in isolation. See, for example, Stathakopoulos (2004).

given to the frequency of pestilences and shortages, and in 1.4 working diagnoses of Carolingian and early Ottonian pestilences are considered and in 2.4 the causation of famines and lesser shortages. Both Parts 1 and 2 then end with a summary.

Naturally, the introduction sets the stage for the thesis. Most important in this setup is the discussion in 0.1.4.1 of the Carolingian and early Ottonian population context of the phenomena addressed in this study. Consideration of scholarly ideas about mid eighth- through mid tenth-century agriculture, the extent and repercussions of the Early Medieval Pandemic (EMP), the ability of Carolingian polyptychs to illuminate demographic trends, and the scope and ramifications of the Early Medieval Climatic Anomaly (EMCA) is pertinent as ideas about these matters have significantly conditioned scholarly interpretations of Carolingian and early Ottonian disease and hunger. The ability of these issues to reveal demographic trends must be assessed before we read the evidence for disease and hunger amassed here against ideas about mid eighth- through mid tenth-century demography that are rooted in particular perceptions of early medieval agrarian output or the severity of the Early Medieval Pandemic (EMP). The fourth and final part of the thesis presents a preliminary investigation into the demographic and economic impact of, and human response to, disease and hunger in Carolingian and early Ottonian Europe. How we may attempt to grasp the impact of disease and hunger in the mid eighth through mid tenth centuries, and human responses to disease and hunger, is assessed in 0.1.6.<sup>14</sup>

#### 0.1.2.1 The appendices and catalogues

The study is followed by a series of appendices, including three catalogues in which is collected the primary mid eighth- through mid tenth-century textual evidence assessed in the thesis. The first catalogue is a collection of the written evidence pertaining to outbreaks of disease, food shortages and extreme weather events that were uncovered following a survey of a wide array of Carolingian and early Ottonian sources. The second

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<sup>14</sup> ‘Impact’ refers to the demographic, economic and social consequences disease and hunger had on Carolingian and early Ottonian populations. ‘Response’ refers to the measures mid eighth- through mid tenth-century Europeans took, or could have taken, to prevent disease and hunger, lessen the severity of the impact of disease and hunger, and absorb the impact of disease and hunger once epidemics or shortages, for example, had taken place.



is a collection of all accounts of non-pestilential illnesses Carolingian and early Ottonian elites sustained that are found in major sources, such as the *Annales regni Francorum*, *Annales Bertiniani*, Flodoard of Rheims' *Historia Remensis ecclesiae*, and Widukind of Corvey's *Res gestae Saxonicae*. The third catalogue is a collection of all reports of European outbreaks of disease, food shortages and extreme weather events found in sources contemporary with, but from outside of, Carolingian and early Ottonian Europe. These catalogues were created to ease the flow of the thesis and to serve as a resource for others interested in these phenomena. Though other catalogues of pre-modern disease, subsistence crises and extreme weather have been prepared, those assembled for this study are the first of their kind. They are the first to deal specifically with Carolingian and early Ottonian Europe, they are far more comprehensive than other catalogues, and they are accompanied by a thorough analysis of their contents in Parts 1 and 2. Each entry contains the original Latin and an English translation, as well as any necessary notes about the authorship of the passage or its contents. Catalogue entries are referred to in the thesis as C.1.49 or C.3.12. More discussion on the form and use of the catalogues can be found in the introduction to the appendices (4.1).

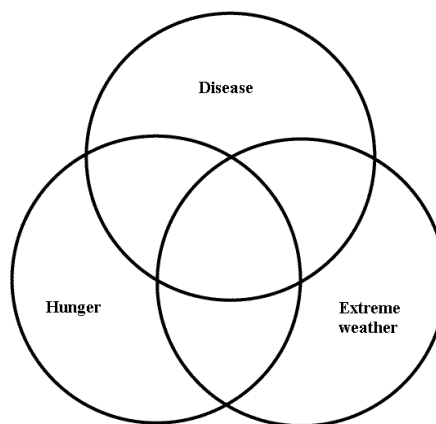
### 0.1.3 Why disease and hunger?

Disease and hunger have been selected for study on four grounds. First, as indicated, disease and hunger are two of the major determinants of human health capable of exercising considerable agency over human demography and economy, especially in societies where sophisticated and effective health care and food aid are not a factor. Moreover, because quantifiable data that pertains to the size and evolution of early medieval populations are scarce and unevenly distributed in time and space, and as our ability to discern population trends indirectly from ideas about agricultural productivity, the history of the EMP, polypyths or the history of the Early Medieval Climatic Anomaly (EMCA) is contentious and uncertain (see 0.1.4.1), an understanding of the environmental and biological shocks that an early medieval population suffered (or did not suffer) greatly affects our conception of that population's demographic history and by extension its economic, political and cultural resilience. Though numerous endogenous

and exogenous variables influenced pre-modern population levels, disease and hunger, and principally through them extreme weather, may be regarded as among the most significant as they hold the ability to dramatically impact population levels, nutrition and human function.<sup>15</sup>

Second, disease and hunger, along with extreme weather, are interconnected to some degree in terms of cause and effect. While associations of these phenomena to one another cannot be reliably established via written or material evidence alone, they can be ascertained via analogy and consideration of the experience of later and better-documented periods. Modern scientific observation and the experience of post-medieval peoples inform us that the occurrence and severity of disease cannot always be understood without an appreciation of hunger, and to a lesser extent extreme weather, and that hunger cannot always be understood without disease and extreme weather. Likewise, the impact of extreme weather often cannot be understood without consideration of hunger and disease. On occasion, extreme weather may lead to hunger, and hunger to disease, though these causal links are neither inevitable nor exclusive. The following Venn diagram helps illustrate these points.

Fig. 1: The associations of disease, hunger and extreme weather



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<sup>15</sup> This is the stance that several early modernists pushed in the late 1970s and early '80s: see, for instance, Appleby (1977, 1980), Post (1976, 1980) and Flinn (1981). Also see the recent debate in *Social History of Medicine* on the role of infectious disease in the transition from the pre-modern to the modern demographic system: Noymer and Jarsoz (2008).

For purposes of example, nutritional status, and thus hunger but not weather, significantly condition the outcome of some diseases, such as those belonging to the *Mycobacterium* complex. Other diseases, particularly those caused by soil- and vector-borne pathogens, including anthrax, bluetongue and malaria, flourish in particular weather, and others, like rinderpest and measles, are not significantly conditioned by endemic malnutrition or extreme weather. Similarly, subsistence crises can be provoked by human agency, mortalities of humans or livestock, locust invasions or crop-damaging extreme weather. Extreme weather primarily affects human and animal health indirectly, through hunger and to a lesser extent disease (either in the form of opportunistic infections or of non-infectious diseases of malnutrition, such as rickets), though Carolingian and early Ottonian authors documented multiple human and stock mortalities in the wake of especially cold winters, floods and storms.<sup>16</sup> The synergy between the disease, hunger and extreme weather cannot be denied. As this thesis makes clear in Parts 1 and 2, but especially in the conclusion, disease, hunger and extreme weather coalesced more than once in the Carolingian and early Ottonian periods in what were very likely serious demographic shocks.

Third, the disease and hunger of mid eighth- through mid tenth-century Europe have yet to receive much critical or detailed attention.<sup>17</sup> Volumes have been written on Carolingian and early Ottonian architecture, art and literature, not to mention economic,

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<sup>16</sup> Many extreme weather-related deaths may have been unrecorded. It is not impossible, for instance, that mortal heat waves like those that hit France in 2003 and 2006, and Russia in 2010, took place: Fouillet et al (2008).

<sup>17</sup> Many surveys of the early Middle Ages neglect disease and hunger altogether, even the EMP: for example, Collins (1991); Wood (1994); Innis (2007). Carolingian and early Ottonian disease and hunger have made little to no impact on general surveys of the Middle Ages: for instance, Strayer (1955); Peters (1997); Rosenwein (2004). Major works on the economic history of the early Middle Ages also neglect or skim over disease and hunger: Pirenne (1939), Jellema (1955), Grierson (1959), Morrison (1963), Wickham (1992, 1995, 2002, 2008), Verhulst (1995, 1997, 2000), Coupland (2002) and Henning (2008). Also see Nelson (1992) in her assessment of the Carolingian economy (ch. 2) overlooks disease (excusing p. 39; though also note pp. 99, 103, 136, 152); and Riché (1993) ignores disease altogether. Scholarship spawned by Wickham's 2004 magisterial *Framing the Early Middle Ages*, including those that address the Carolingian and early Ottonian periods specifically (such as, Banaji (2009), Innis (2009), Sarris (2006, 2009) and Wood (2006)), also tread lightly on disease and hunger, mentioning, if anything relevant to these topics, the initial irruption of the EMP of the mid sixth century. In *Framing* Wickham even hastily pushes aside the EMP and the mid sixth-century climatic event: (2004), pp. 548-49. In his stimulating work which integrated archaeology into discussions of the early medieval economy, Hodges also overlooks health and demography: (1982, 1989, 2000); Hodges and Whitehorse (1983); Hodges and Hobley (1988). Hodges even discusses Charlemagne's currency reforms of 793/94 without reference to their famine context: (2000), pp. 97-8. Nelson in her assessment of the Carolingian economy also skirts disease and hunger: (1992), ch. 2; and Riché (1993) ignores them altogether.

military, political and social history, but very few studies have emerged that focus directly on the phenomena considered here, despite the large body of extant evidence. Fourth, though mid eighth- through mid tenth-century disease and hunger have yet to receive their due, they have nonetheless been prominently invoked in some modern histories of mid eighth- through mid tenth-century Europe. As demonstrated in 1.1 and 2.1, what are best regarded as assumptions about the existence, contours and impact of several mid eighth- through mid tenth-century pestilences and food shortages have long conditioned interpretations of Carolingian and early Ottonian demography and economy. Consequently, our assessment of disease and hunger serves to affirm, correct or dismiss the demographic and economic roles they have been attributed. Fifth, disease and hunger, like extreme weather, are each, at least partially, exogenous to human society. Disease, hunger and extreme weather – particularly the former and the latter – are to a degree independent of human existence. While a disease could not exist without a pathogen infiltrating a human (or other animal or plant) body, and while the extent and scale of an epidemic or epizootic may be determined by population density, distribution and interconnection, not to mention medical intervention, it is important to observe the fact that most pathogens do ultimately exist outside of human bodies and that most pathogens go through life cycles outside of human populations. Likewise, extreme weather, which, as argued in 2.2.2, was the primary trigger of food shortages, is the result of phenomena that were independent from the actions of early medieval Europeans.

#### 0.1.3.1 Antiquarians and the catalogues of disease, hunger and extreme weather

Several eighteenth- through mid twentieth-century antiquarians, many of whom were medical/ veterinary doctors or natural scientists, as well as some late twentieth and twenty-first-century historians and natural scientists, have produced ‘catalogues’ of written evidence pertaining to pre-industrial occurrences of disease, hunger and/or extreme weather.<sup>18</sup> Some of these catalogues focus on specific areas or periods, such as

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<sup>18</sup> Older catalogues pertaining to food shortages include Farr (1846), pp. 159-63; Walford (1878, 1879); and Curschmann (1900). The latter of these is, of all the catalogues that touch upon pre-modern European disease, hunger or weather, the most useful. Though Curschmann’s work, which surveys evidence for continental food shortages in eighth- through early fourteenth-century texts, does not pay much attention to

early modern England or Byzantium, and some address specific types of phenomena, such as food shortages, livestock disease or flooding. Others attempt to address all of these issues and more. These catalogues have been book-length, article-length, chapters, and shorter sections of a few pages in larger works. Though some of these catalogues are relevant to this thesis and provide direction to primary sources, they are not exploited or relied upon in the following pages. I have neither based the analyses of Parts 1 and 2 nor the construction of my own catalogues on these works.<sup>19</sup> The reasons for my dismissal of existing catalogues are simple: the vast majority relies on secondary or tertiary scholarship and rarely makes use of primary texts, and when they do they pay little or no attention to their date of composition, place of composition, or the reliability (or literariness) of passages. Existing catalogues also make and perpetuate numerous unsupported claims regarding the diagnoses of pestilences, and, for instance, the extent and impact of food shortages, pestilences and extreme weather events. Further, these works are rarely fully representative of the extant evidence available for a particular period and they rarely contain the passages they refer to, or more commonly paraphrase, in the original language.<sup>20</sup> These catalogues could undoubtedly mislead our appreciation of the frequency, severity, and spatial and temporal parameters of early medieval pestilences and subsistence crises, and, consequently, misguide our understanding of the place of disease and hunger in Carolingian and early Ottonian Europe.<sup>21</sup>

The catalogues created for this study following a fresh and comprehensive survey of the written evidence available serve as the basis for Parts 1 and 2, but they also check

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the contemporariness or reliability of his sources, he does provide Latin passages in full. William Wilde's nineteenth-century 'Table of Irish Famines' is surveyed in Crawford (1989), pp. 1-30. Lyons' collection of Irish evidence that addresses tenth- through sixteenth-century food shortages is a good example of a modern catalogue: (1989), pp. 52-73. Older catalogues of livestock disease are surprisingly numerous. They include Paulet (1775); Dieckerhoff (1890); Fleming (1871) and Curasson (1932). Modern equivalents include Scott (1996), Blancou (2003), and Spinage (2003), pp. 81-101. One of the earliest catalogue of disease, hunger and extreme weather that I am aware of is Short (1749).

<sup>19</sup> Though four of the 304 passages collected in Catalogue 1 have been borrowed from Curschmann's *Hungersnote im Mittelalter*.

<sup>20</sup> Some are mere lists of events.

<sup>21</sup> Bell and Ogilvie (1978) have already advanced some staunch criticisms of those who have used late nineteenth- and early twentieth-century catalogues of weather events in order to reconstruct short-term climatic anomalies and long-term climatic patterns; also Brázdil et al (2005), pp. 374-75. No similar criticisms have yet been made in regard to catalogues of pre-modern disease and hunger. Stathakopoulos drew upon catalogues pertaining to late antique and early Byzantine pestilences and food shortages in his analysis of these phenomena. He appears to treat pre-existing catalogues as reliable: for example, (2004), p. 9.

and rewrite claims about mid eighth- through mid tenth-century disease, hunger and extreme weather made in existing catalogues. On many levels the catalogues created here, particularly Catalogue 1, supersede those already available. Catalogue 1 presents a full review of the evidence available and, when used in tandem with this study, allows for a more grounded and reliable understanding of the disease, hunger and extreme weather of mid eighth- through mid tenth-century continental Europe than any existing collection of evidence.

#### 0.1.4 Why Carolingian and early Ottonian Europe?

It is necessary to consider why the Carolingian and early Ottonian periods have been selected as the time and area of concern.<sup>22</sup> It may seem odd to attach political parameters to phenomena seemingly unrelated to political events. As this study demonstrates, it certainly cannot be said with much confidence that disease or hunger have a distinctively Carolingian or early Ottonian history. While the Carolingian renaissance of classical learning may have seen to the greater transmission and diffusion of ancient authors, such

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<sup>22</sup> The dates modern scholars apply to the Carolingian period vary. The rule of the first Carolingian king of the Franks, Pepin III, commenced in 751. The last ruler of a European territory that could be considered Carolingian, Louis V, died in 987. His dominion in northwest Francia, however, was a mere shadow of that of Charlemagne or Charles the Bald. The last Carolingian ruler of east Francia, Louis the Child, died in 911 to be replaced by a local duke, Conrad I of Franconia. For some, such as Verhulst (2002), the Carolingian period proper is thought to come to a close in 877 with the death of Charles the Bald. Indeed, some see a long history of expansion and continuity from the onset of Pepin III's reign to the death of Charles the Bald. Others who have focused on the reign of Charles the Fat or Charles the Simple, such as MacLean (2009), would clearly not agree. Most often the Carolingian period is thought to span 750 to 900, as it is here. The early Ottonian period, thus, is considered in this study to span 900 to 950. The Saxon duke Henry the Fowler, who succeeded Conrad I, was succeeded by his son Otto I in 936. In 963, Otto I was given the imperial title, marking what might be referred to as the onset of the Ottonian period proper (though some would favour a starting date corresponding to the rise of Henry the Fowler in 919). It is worth noting that some, such as McCormick, Dutton and Mayewski (2007), consider the whole period under consideration here, from 750 to 950, as being Carolingian. However, from 900 to roughly 950, much of continental Europe was ruled by both Carolingians and Ottonians. Moreover, while the date of 950 does not adhere as well to a particular political event as that of 750, the written evidence available for 900 to 950 is certainly more Ottonian than Carolingian: the chief texts used to reconstruct the disease, hunger and extreme weather history of the period 900 to 950, for instance, are Adalbert of Magdeberg's *Chronicon*, which extends to 967, Flodoard of Rheims' *Historia remensis ecclesiae*, which extends to 966, and Widukind of Corvey's *Res gestae saxonicae*, which extends to 973. Furthermore, most of the prime late mid and late ninth-century sources for Carolingian disease, hunger and extreme weather come to an end around 900: the *Annales Xantenses* continue to 873, the *Annales Bertiniani* extend to 881, the *Annales Vedastini* extend to 900, the *Annales Fuldenses* in its Bavarian continuation extend to 901, and Regino of Prüm's *Chronicon* ends in the early tenth century. While the temporal limits of this study do generally adhere to political timelines, they are clearly somewhat abstract, corresponding neither to strict political timelines, bodies of source material, nor specific episodes, or trends, in disease, hunger and extreme weather.

as Columella and, perhaps, Vegetius who provided practical and theoretically effective recommendations on how to curb outbreaks of livestock disease (see 3.2), that classical authors were more visibly transmitted in the Carolingian period neither means that classical theories were then put into effect, nor that the knowledge contained in ancient texts was not regularly employed before 750. The frequency and severity of extreme weather does not appear to have been particularly Carolingian or early Ottonian, and that the cessation of the reoccurrences of the EMP *c.*750 brought on a new era of better health generally unmarred by disease is poorly supported (see 0.1.4.1.2). Similarly, it cannot be presumed that because the onset of the Carolingian period may have coincided with the end of the Early Medieval Climatic Anomaly (EMCA), and possibly the early beginnings of the Medieval Warm Period (MWP), that a healthier, more fertile Europe emerged in 750 (see 0.1.4.1.4).

It is naturally difficult to assess how unusual Carolingian and early Ottonian disease and hunger were at present considering that histories of these phenomena in preceding and succeeding medieval periods have yet to be written. Further complicating attempts to compare periods, or place the Carolingian and early Ottonian disease and hunger experience into a wider temporal or spatial context, is the fact that the source material available for mid eighth- through mid tenth-century Europe far outweighs that available for periods immediately before and after.<sup>23</sup> While disease and hunger did not adhere to political boundaries in the early Middle Ages (and it cannot be said with much certainty that the reverse was the case), there are some advantages of sticking to Carolingian and early Ottonian political limits. First, observing the temporal limits of 750/950 emphasizes that there is, in fact, little, if anything, particularly Carolingian or early Ottonian in the history of European disease, hunger and extreme weather (at least as far as we can tell from the available written evidence), and that the periodization of pre-modern Europe via political timelines is not applicable to the history of environmental

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<sup>23</sup> It may be difficult to assess the history of these phenomena in Merovingian or Visigothic Europe, let alone compare the Carolingian and early Ottonian experience to the Merovingian or Visigothic, due to the comparative dearth of evidence in the latter periods. A similar study of the disease, hunger and extreme weather in Anglo-Saxon England, or of disease, hunger and extreme weather in the writings of Gregory of Tours and Paul the Deacon, are needed, but even still the outcome of such a study would not present a picture as full as that possible following an assessment of extant Carolingian and early Ottonian sources. The evidence is simply not there. Fouracre stresses the dearth of historical sources in general for pre-Carolingian early medieval Europe in his assessment of the importance of Merovingian hagiography: (1990), pp. 3-4, 37.

phenomena that are predominantly, or partially, exogenous to human societies. Second, by adhering to the temporal limits of 750/950, the thesis engages an already existing body of scholarship that focuses specifically on mid eighth- through mid tenth-century continental Europe. Third, and related to this point, because scholars have long been drawn to Carolingian, and to a lesser extent early Ottonian, demography, economy and society, a relatively detailed picture of Carolingian and early Ottonian Europe exists on to which a detailed analysis of disease, hunger and extreme weather can be overlaid, though this must be done carefully as noted in 0.1.4.1. Fourth, the comparative abundance of textual documentation for this period (compared with the periods before and subsequent) makes it the best laboratory to study disease and hunger in an early medieval society.

#### 0.1.4.1 The population context

It is essential to assess the historiography of early medieval population trends for two reasons. First, an understanding of population is pivotal to our interpretation of mid eighth- through mid tenth-century disease and hunger: it is the backdrop on which we may examine the impact of these population-controlling phenomena in Part 3. Second, ideas about early medieval population trends have been central to the vast majority of existing interpretations of Carolingian and early Ottonian disease and hunger. Positions on extent and impact of mid eighth- through mid tenth-century disease and hunger are unanimously founded not on any detailed or remotely exhaustive analysis of the written or material evidence for disease and hunger but on ideas about population, specifically ideas about when Europe's population began to crawl out of its 'dark-age' nadir and how pronounced and prolonged population growth was once it began. The stress scholars have put on the prevalence of chronic hunger, the impact of major food shortages and the frequency with which they occurred, or, for instance, the emphasis that has been applied to the severity or absence of major outbreaks of disease, has depended on underlying perceptions of early medieval demography. More disquieting is that opinions on the rise, fall or stagnation of early medieval populations, are heavily based on presumptions about early medieval agricultural productivity, the impact of the EMP, what polyptychs can tell us about population density and distribution, and the impact of the EMCA. As such, ideas



about Carolingian and early Ottonian population history have been advanced, debated and perpetuated without any thorough consideration of the written evidence for disease and hunger, two phenomena that could significantly impact population trends, and the importance of mid eighth- through mid tenth-century disease and hunger has been determined via estimations of population trends which are themselves fallible as they do not take into consideration direct evidence for disease and hunger.

Positions on the demographic history of Carolingian and early Ottonian Europe can be categorized as either ‘pessimistic’ or ‘optimistic,’ though the period is often thought to contain multiple population trends, some thought to have commenced prior to 750 and others to extend beyond 950.<sup>24</sup> For pessimists Duby, Fossier, Herlihy, Lopez, and Slitcher van Bath notable population growth was a high medieval phenomenon.<sup>25</sup> For optimists Bachrach, Doehaerd, Devroey Fleckenstein, Holister, McCormick, Nelson, Reuter, Rosenwein, Smith, Toubert, Verhulst and Wickham population growth began in the Carolingian period.<sup>26</sup> These scholars believe that population growth set in *c.* 750/800 with the wider diffusion of better agricultural technology, and the end of the EMP.<sup>27</sup> For Butzer, it was on account of a dearth of agrarian technology and recurrent outbreaks of the EMP that pre-Carolingian populations were confronted with an ‘economic malaise’ and stagnant population growth.<sup>28</sup> Likewise, for Verhulst, who thought Carolingian demographic growth was ‘moderate to considerable,’ medieval populations may have begun to rebound from a dark-age low in the seventh century, though the real take-off

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<sup>24</sup> Pessimistic views of the demographic history of the period have deeper roots, and though one can still find such views in recent publications, they have lost popularity over the last three decades. Verhulst refers to pessimistic stances as ‘minimalist’ and ‘negative:’ (2002), pp. 6-7.

<sup>25</sup> On multiple occasions, for instance, Herlihy argued that population growth really only occurred in post-Carolingian Europe: (1974), pp. 16-8; (1982), pp. 139-40.

<sup>26</sup> Bachrach (2002), p. 356; Doehaerd (1978), p. 61; Fleckenstein (1978), p. 35-6; Holister (1982), p. 82; Reuter (1991), p. 94; Nelson (1992), pp. 23, 27-8; Rosenwein (2004), pp. 64, 95; Smith (2005), pp. 65, 71; Wickham (2002), p. 128; Verhulst (1989), p. 7; idem (1995), p. 95; idem (1995), p. 481-83; idem (1997), pp. 97-8.

<sup>27</sup> That population rebounded almost immediately following the ebb of the EMP is found in numerous works: for example, Verhulst (1989), p. 7; Reuter (1991), p. 94; Laiou (2002), pp. 48-9; McCormick (2002), p. 42; Rosenwein (2004), pp. 64, 95; Stathakopoulos (2008), pp. 311-12; Fouracre (2009), p. 128; cf. Lopez (1976), p. 28. While the demographic rebound is often seen on the continent after *c.* 750, in England many suggest population began to grow following the supposed last outbreak of the EMP there in the 680s: for example, Russell (1985), p. 76; Clarke (2009), p. 65. In Ireland, the supposed last great plague is often held to have occurred in the 660s (despite the large number of pestilences recorded in similar terms afterwards in the Irish annals), after which the Irish population was supposedly set free to expand: see, for instance, Ó Cróinín (1995), pp. 41, 108-09, 159-60; Ryan (2001), pp. 30-1.

<sup>28</sup> Butzer (1993), pp. 559-60, 681.

occurred post 750.<sup>29</sup> Devroey, who attributed a major role to EMP over the earliest centuries of the early Middle Ages, too believed that demographic growth ‘reawakened’ in the eighth century,<sup>30</sup> and Carolingian and early Ottonian population growth was so great for McCormick that it made possible the expansion of a new slave trade from the mid eighth century onwards. With Europe’s population ‘burgeoning,’ Carolingians could export Europeans to the Muslim world, satisfying the latter’s demand for slave labor.<sup>31</sup>

Many of those who argue for population growth in the Carolingian or early Ottonian period forego any substantial discussion of the forces keeping population down prior to 750.<sup>32</sup> Several, such as Jones and Squatriti, simply accept that population was low and stagnant from the fourth through eighth centuries and choose to assign no cause, whether ‘plague,’ barbarian migrations, warfare, or political instability.<sup>33</sup> And while some of these scholars view the Carolingian period as the early stage of what would become the population explosion of the high Middle Ages, others see in it, particularly the century spanning 750 to 850, a brief population bubble that burst under the pressure of Viking raids and growing internal political insecurity that disrupted production in the mid ninth and tenth centuries. For Butzer and Verhulst, for instance, the upward demographic swing of the Carolingian period more or less came to an end with the intensification of Viking incursions in mid ninth century.<sup>34</sup> Several, including Doehaerd, see growth until 900 but stress its inconsistency and unevenness.<sup>35</sup>

Here we assess the grounds for the now prevalent idea that the Carolingian and early Ottonian periods were ones of demographic growth. We look at what scholars have

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<sup>29</sup> Verhulst (2002), pp. 25-7.

<sup>30</sup> For instance, Devroey (2001), pp. 101, 104-05.

<sup>31</sup> McCormick (2002), pp. 41-4, 52, *passim*; Henning, who adds archaeological evidence (in the form of shackles) to the discussion, agrees with McCormick’s thesis, noting that a ‘slave trade expanded anew’ in the Carolingian period: (2008), p. 48. Unlike McCormick, though, Henning stresses that most of those sold were not western Europeans, but eastern. While slaves are known to have been employed in Merovingian agriculture, slave labor – or ‘plantation slavery’ – in the Carolingian or early Ottonian periods appears to have been quite rare: Devroey (1989b), p. 1; Verhulst (1991), *passim*; *idem* (1995), p. 93; *idem* (2002), pp. 34-5; Goetz (1993), pp. 29-31, 46-9, 51; Sarris (2006), p. 406; Henning (2008), p. 45; Banaji (2009), pp. 72-3. Hammer (2002) has recently argued that slave exploitation in agriculture re-appeared in Bavaria in the Carolingian period.

<sup>32</sup> Many point briefly to the EMP, and some ignore the forces keeping population down prior to 750 altogether. Verhulst ignores the EMP in the majority of his work, but implies that without the agricultural innovations of the Carolingian period, earlier early medieval populations could not grow.

<sup>33</sup> Jones (1964), p. 1040; Squatriti (1998), p. 72.

<sup>34</sup> Butzer (1993), pp. 559-60, 681; Verhulst (2002), pp. 134-35.

<sup>35</sup> Doehaerd (1978), pp. 1-6, 61; Verhulst states that population growth was ‘chaotic and uneven:’ (2002), pp. 25-7.

thought about early medieval agricultural productivity and the EMP, as well as what may be gleaned from polyptychs. Additionally, the waning of the Early Medieval Climatic Anomaly and the onset of the Medieval Warm Period is considered, as more than one scholar has suggested that a better climate too fostered population expansion. It is not argued that these four matters are entirely incapable of supporting the idea that the continental European population began to climb out of its dark-age hole in the Carolingian period, or that the Carolingian and early Ottonian history of population was not unique. Rather, it is argued that the impact these matters may have had on population levels in our period is very uncertain.

#### 0.1.4.1.1 Early medieval agriculture

There is a widely prevalent idea in the historiography of early medieval agriculture, economy and demography that the size of an early medieval population and its trajectory were very much tied to the amount of grain that population produced. Large populations could have only existed in the early Middle Ages if large quantities of grain were generated and an early medieval population could only grow if it produced more grain. And so less grain has meant fewer people, and a decline in the amount of grain produced a decline in the number of people.<sup>36</sup> Thus, ‘forest-clad lands’ have been interpreted as ‘virtually empty,’ and predominantly arable regions as ‘densely inhabited.’<sup>37</sup> Similarly, populations largely dependent on animal husbandry or the sea, coastal marshes and/or wetlands, have been thought both unable to be large and unable to become large, without grain coming in from a neighboring arable areas.<sup>38</sup> Ideas about early medieval arable productivity have focused on the use of arable fields (crop rotations mainly), the

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<sup>36</sup> One might question which comes first, the egg (or people who eat and produce the grain), or the chicken (the grain, or production capabilities, that facilitate a growth in population). White suggested that the growth in agricultural productivity in the Carolingian and early Ottonian periods not only permitted an upward demographic trend but better nutrition: (1962), pp. 69-76.

<sup>37</sup> For the quotations see Duby (1974), p. 13. On the reverse, it is often stressed that northern Italy and northern France, two areas where much land was given to arable in ninth century, were densely populated in the Carolingian period.

<sup>38</sup> For grain-population connections see, for instance, White (1962), p. 54; Bloch (1966), p. 4; Duby (1968), p. 122; Verhulst (1990), p. 18; idem (1995), p. 481; idem (1997), p. 97; Reuter (1991), p. 94; Nelson (1992), p. 28; Pleket (1993), pp. 328-29; Comet (1997), p. 11; Devroey (2001), p. 123; McCormick (2002), pp. 23-4; Durand and Leveau (2004), p. 240.

expansion of arable land, and arable technology.<sup>39</sup> These issues are discussed here in brief in order to demonstrate how uncertain it is that far more grain was being grown post 750 than before. The discussion here, as such, relates directly to whether the European population of the two centuries studied here was dramatically larger than that of earlier early medieval centuries. This, in turn, affects our assessment of a variety of topics in the following pages, from Malthusian explanations of subsistence crises, to the prevalence of non-pestilential disease, to the aggregate impact of endemic and epidemic hunger and disease.

The amount of grain a pre-modern society could produce was to a great extent relative to the ways in which that society used its arable fields. This refers to when grain was sown and harvested, how many crop rotations were (or could be) put into place, and how many successive years a field is exploited. Crop rotations, of course, are largely determined by what one is attempting to grow and where one is attempting to grow it: climate and environment very much condition what can be grown where. Generally speaking, two crops per calendar year were feasible in northern Europe and one in southern Europe.<sup>40</sup> Before the Middle Ages, a wide area of continental Europe, from the Alps to the North Sea, is thought to have practiced a simple, or 'primitive,' fallow system, where a single grain species was grown on the same field for a number of years before that field was left fallow for a period of time. The intervals of fallow, however, appear to have been irregular. In late antiquity, or around the dawn of the Middle Ages, a more regular system of crop and fallow is thought to have been put into place. In this system, one crop was grown for successive years before the field on which it was grown was left fallow for regular intervals of three or so years. At some point thereafter a development occurred that saw two crops being planted in succession on one field, one in

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<sup>39</sup> Most scholars consider these the primary determinants of the aggregate quantity of grain an early medieval population could produce. They are rarely held to have significantly altered yields, but simply to have conditioned how much early medieval people could draw from the land. It cannot be said that yields were greater in the Carolingian or early Ottonian centuries, or the early Middle Ages in general, than they were before, or that they differed substantially with those of high medieval Europe: Smil (1994), pp. 39-40, 56; Comet (1997), p. 18; Verhulst (1995), p. 487; idem (2002), p. 64; Pleket (1993), pp. 323, 326; Sathakopoulos (2004), p. 167. Naturally, systems of exploitation that better maintained soil nutrition produced better yields; the rotation of crops that saw to the growing of different species of grain could thus produce better yields.

<sup>40</sup> Though there is some evidence to indicate that millet, which is relatively drought resistant, was grown as a spring crop throughout antiquity and the early Middle Ages in Italy, see n. 48 below.

winter, which was harvested in spring, and the other in spring, which was harvested in autumn. Every third year, the field on which these winter and spring grains were sown was left fallow. This more ‘sophisticated’ system of field usage is referred to as the three-course rotation.<sup>41</sup> Most attention devoted to Carolingian and early Ottonian agriculture has centered on this growing system.

The three-course crop rotation permitted the cultivation of new grains that could be harvested at different times throughout the year. Grains generally geared toward human consumption, such as rye, spelt and wheat, and grains generally geared toward animal consumption, such as barley and oats, could be planted in succession, one in winter and another in spring, which, as Verhulst notes, distributed field work more evenly than earlier systems and lessened the risk of harvest failure.<sup>42</sup> If extreme weather destroyed the winter crop, for instance, one could count on the spring crop; moreover, different species of grains react differently to different types of weather, some sustaining particular temperatures and environments better than others.<sup>43</sup> Soil scientist Shiel adds that the growing of multiple species of grain on one field in succession, would have reduced pest, weed and plant disease occurrence and slowed nutrient depletion.<sup>44</sup> The time given to fallow was also less in this rotation, increasing the period given to arable by 16 per cent.<sup>45</sup> For these reasons, the advent of this rotation would have clearly increased the aggregate production of grain.<sup>46</sup>

Verhulst, and several others including White, have forcefully argued that the three-course rotation was adopted first in Carolingian Europe in the mid eighth century, and that its implementation was fairly wide in the ninth.<sup>47</sup> Not all, however, have agreed.

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<sup>41</sup> Verhulst (1995), pp. 483-84; idem (2002), pp. 61-2; Doehaerd (1978), p. 9; Herlihy (1974), pp. 17-8. Evidence for field usage is found foremost in the polyptychs. The practice of this rotation is what allowed Verhulst (1966) to rewrite the history of the Carolingian manor, transforming it from a ‘stale’ and ‘decrepit’ Roman artefact to a productive engine of the early medieval economy. Note that the proposition that the three-field system was widely adopted in the ninth century is false. As Verhulst points out, several scholars have confused the three-course rotation with the later three-field system: for recent examples Butt (2002), pp. 82-3; Shiel (2006), p. 226.

<sup>42</sup> Verhulst (1990), p. 20; idem (1995), p. 484; idem (2002), p. 61.

<sup>43</sup> Butzer (1993), p. 564; Comet (1997), pp. 16-7, 29; Devroey (2001), p. 115; Shiel (2006), pp. 217-18, 224.

<sup>44</sup> Shiel (2006), pp. 226, 232; also Smil (1994), pp. 40, 56.

<sup>45</sup> Prior to the three-course rotation, arable and fallow were split 50:50, with the induction of the rotation this shifted, in favor of the arable, to 66:33.

<sup>46</sup> Verhulst (2002), pp. 61-2; also Shiel (2006), p. 224.

<sup>47</sup> Verhulst (2002), pp. 61-3; White (1962), pp. 69-76, 78.

Cipolla placed its gestation in the eighth century, for instance, while Duby argued that the rotation had ninth-century roots he stressed it was then not widespread.<sup>48</sup> Others have stressed that a three-course rotation was known, and practiced, in antiquity north and south of the Alps.<sup>49</sup> While few have attempted to deny that this rotation was more widely practiced in the Carolingian and early Ottonian periods than before, it is clear, as Verhulst and Morimoto have demonstrated, that it did not evolve evenly across time or space in our period, even in those areas where it is certain that it did evolve. In different areas, different emphasis was placed on the winter or spring crop, as well as, or so it appears, the duration of the period of fallow.<sup>50</sup> While the rotation was likely more widely practiced in the Carolingian period than before, it is certain that it had not evolved, or was not widely practiced, across most of Carolingian or early Ottonian Europe. Duby and Doehaerd in particular have emphasized that a variety of growing systems would have co-existed in our period,<sup>51</sup> and the three-course rotation is known to have been associated with, or limited to, large manorial estates owned by the king, church and aristocracy, which came to exist in the Carolingian period between the Loire and Rhine, and to a lesser extent in northern Italy and between the Rhine, Elbe and Alps. Such estates did not come about in southern *Francia* or Carolingian Spain and it is uncertain whether the three-course rotation would have been practiced in Verhulst's so-called 'non-classical manorial systems' of Brittany, northwestern and eastern *Francia* for example, or, for that matter, whether the rotation was implemented on lesser aristocratic holdings anywhere.<sup>52</sup> Moreover, whether it was practiced at all by free, independent peasants, in systems dependent on slave labor, or, more importantly,<sup>53</sup> on the tenant fields of the dependents

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<sup>48</sup> Cipolla (1994), p. 138; Duby (1968), pp. 24, 294; idem (1974), pp. 189-90.

<sup>49</sup> Pleket (1993), pp. 323-24; Doehaerd (1978), pp. 9-10; Devroey (2001), p. 116; Durand and Leveau (2004), p. 212; Comet (1997), p. 29.

<sup>50</sup> Morimoto (1994), pp. 91-125; Verhulst (2002), p. 62.

<sup>51</sup> Duby (1968), p. 24; Doehaerd (1978), pp. 16, 61.

<sup>52</sup> Verhulst (1997), pp. 94-5; idem (2002), pp. 33-4; Devroey (2001), p. 120; Herlihy (1974), p. 18; McCormick (2008b), p. 14; Faith (2010), p. 176. Unlike others, Doehaerd is adamant about the fact that we do not know how widely the three-course rotation was practiced off of these manors: (1978), p. 16.

<sup>53</sup> 'More importantly' as the population of tenant farmers is supposed to have been very large in our period. The number of free, independent peasants is thought to have shrunk considerably over the eighth century. Indeed, the so-called 'golden age of the peasant' had, to a large extent, come to an end in the continental west by 800 with the expansion of a strong, militaristic aristocratic class and their large agrarian estates, or as Verhulst writes, 'big landownership:' (2002), p. 31. On the pre-Carolingian golden age, which has been recently re-popularized by Wickham (2004), see Sarris (2006), pp. 408-09. Early ideas about such a golden age are also apparent in Wickham's earlier work: (1992), pp. 245-46. For critiques of its existence and

of those estates on which it was practiced, is also uncertain. The rotation may have been solely practiced on the demesne land of large estates limited to northern *Francia*.<sup>54</sup> Further yet, if the rotation was deeply associated to the rise of the bi-partite manor, and if the origins of this early medieval manorial system lie in the early eighth, seventh, or even, as some have suggested, the fifth century, is it possible that the benefits the field system afforded were not new on the estates on which it was practiced in our period.<sup>55</sup> Thus, not only was this more productive system of field usage almost certainly not systematically implemented across Europe from the onset of our period, let alone throughout our period, but it appears, even after it was well known in some regions, that the majority of the Carolingian and early Ottonian population would not have reaped the benefits of its implementation, and, furthermore, that those who did enjoy its benefits had possibly been doing so long before 750.

From rotations we move on to clearances. It is well known that in the high Middle Ages, Europe underwent extensive cerealization, until, it seems, the mid thirteenth century or, in some areas, the early fourteenth.<sup>56</sup> This cerealization was in essence the expansion of arable land, the clearing of forest and scrub, the draining of wetlands, the occupation of waste and marginal lands, and the decline of predominantly pastoral agricultures. Though several historians throughout the twentieth century had located the roots of this high medieval cerealization in the eleventh and twelfth centuries,<sup>57</sup>

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duration, see, in particular, Banaji (2009), pp. 66, 71-8. For further comment: Wood (2007), pp. 227-28, 233-36.

<sup>54</sup> Though some have proposed that the three-course rotation developed on demesne fields, it is possible, as Verhulst himself has pointed out, that the system appeared first on tenant fields. While dependent peasants would have obviously known of the three-course rotation, at least on manors where the system was employed, Verhulst notes that the regularity and precision the three-course rotation called for may have been difficult to achieve on dependent fields, as all tenants using a given field would have had to agree on (not to mention keep up) the implementation of the system. Moreover, tenant fields were not often kept in the same field complex but 'intermingled' with each other: Verhulst (2002), pp. 62-3. Duby stresses that there is no evidence for the implementation of the rotation on peasant fields: (1974), p. 190.

<sup>55</sup> Bi-partite estates clearly began their rise to prominence in some regions of continental Europe in the mid seventh century or earlier: for instance, Devroey (1989b), pp. 3-5; idem (2001), p. 120. Sarris argues forcefully that this system of agrarian exploitation had late antique origins: (2004), pp. 280, 310-11; (2006), p. 411. While his theory is established on new evidence, it has nineteenth-century origins, see Devroey (1989b), p. 3. Some in the palaeobotanical sciences have suggested, on the grounds of crops unearthed in archaeological digs, that the three-course rotation was implemented in northern France and the southern Netherlands as early as the sixth century: Bakels (2005), p. 399.

<sup>56</sup> Campbell (2005), pp. 3-4.

<sup>57</sup> As noted by Raepsaet (1997), p. 41. Duby was one main proponent of this idea: for instance, (1993), p. 43.

increasingly scholars have placed its origins in Carolingian and early Ottonian periods. For some, in fact, the onset of widespread assarting – the clearing of forests and the ripping out of tree stumps to create permanent arable – is thought to correspond to the onset of the Carolingian period.<sup>58</sup> For Verhulst, for instance, it was only in the Carolingian period that grain production superseded stock raising, dominated mixed farming, and became ‘more important’ than cattle raising; and it was only in the Carolingian period that widespread clearances took place.<sup>59</sup> Banaji, however, argued for an ‘agrarian watershed,’ characterized by widespread clearances and the expansion of arable, in the seventh century, and Durand and Leveau have asserted that clearances in southern Europe began on a large scale in the eighth century and that these came out of an already existing tradition of clearancing.<sup>60</sup> For Doehaerd, on the other hand, large clearances in Carolingian Europe were limited to the areas known for large-scale exploitation, north of the Loire and east of the Rhine.<sup>61</sup> Comet, conversely, suggests clearing really became common on a general scale in the tenth century.<sup>62</sup> How widespread clearing was before, during or after our period is uncertain, though it is clear that large-scale clearing began before our period, that progress was not uniform across Europe and that many regions, in the south and north, were still heavily forested in and after our period.<sup>63</sup>

From clearances we move on to agrarian technology. When we speak of agrarian technology in the early Middle Ages, we are generally speaking about technologies that could control, and increase, agricultural productivity.<sup>64</sup> These include animal management (livestock breeding), the animals used for traction, the development of draft harnesses and the horse shoe, plows, watermills, the use of iron in agricultural implements and fertilization methods.<sup>65</sup> Essential to our understanding of the ability of

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<sup>58</sup> For example, Butt (2002), p. 67.

<sup>59</sup> Verhulst (2002), pp. 64, 66. Still large-scale cattle raising was common in Frisia and massive numbers of sheep were raised along the North Sea coast.

<sup>60</sup> Banaji (2009), pp. 66-71; also see Raepsaet (1997), p. 55.

<sup>61</sup> Doehaerd (1978), p. 61.

<sup>62</sup> Comet (1997), p. 15.

<sup>63</sup> For example, Durand and Leveau (2004), p. 201.

<sup>64</sup> For instance, the heavy plow with mould-board plowed deeper and turned the soil to one side, aerating it thoroughly, cutting and burying weeds and leaving a clean furrow for sowing: White (1962), p. 43; Smil (1994), pp. 30-1.

<sup>65</sup> Agricultural equipment for harvesting and techniques of sowing have received far less attention than these technologies: Doehaerd (1978), p. 11; Raepsaet (1997), p. 52. Also, that more productive and



these technologies to increase production in our period is evidence of their presence and their diffusion. Over the last fifty years, major technological advances have been said to have coincided with the Carolingian period. It is clear now, however, that many technologies did not appear at the onset of our period or that they were widely implemented before 950.<sup>66</sup> That iron was ‘extremely limited’ as some have suggested,<sup>67</sup> or that it became common only in the Carolingian period,<sup>68</sup> have both been proven incorrect: an ever growing body of archaeological data demonstrates that it was fairly widely implemented in agriculture before our period.<sup>69</sup> That the heavy asymmetrical plow and mould-board were introduced to Europe in the late eighth and early ninth century is also now known to be false:<sup>70</sup> neither the heavy plow nor the mould-board were Carolingian innovations but were known since antiquity.<sup>71</sup> That the horse came to dominate traction over the course of the early and high Middle Ages is too no longer accepted.<sup>72</sup> Though horses did begin to replace oxen as the primary draught animal in northwestern Europe the transition was slow, localized and a phenomenon of the high and late Middle Ages.<sup>73</sup> The associated appearance and diffusion of the horseshoe and the

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specialized animal management in the Carolingian and early Ottonian periods furnished a real basis for demographic and economic growth is occasionally implied, but rarely discussed at any length: Butzer (1993), p. 578; Verhulst (1997), p. 486; idem (2002), pp. 66-8; Doehaerd (1978), pp. 16-20.

<sup>66</sup> Cf. James (1982), p. 75; Smith (2005), p. 65.

<sup>67</sup> Duby (1974), pp. 15, 194; Doehaerd (1978), p. 14. For Duby, iron plow shares were a high medieval development.

<sup>68</sup> For example, White (1962), pp. 40.

<sup>69</sup> Verhulst (1995), p. 486. Iron is now known to have been plentiful in southern and northern Europe in our period: Durand and Leveau (2004), pp. 194-95.

<sup>70</sup> White (1962), pp. 41-57, 78. White was long followed by many leading medievalists, including Herlihy (1974), p. 17. Recently, Butt referred to the heavy plow as a ‘new’ technology in the Carolingian period: (2002), p. 80. Many, however, have drawn attention to the lack of evidence for White’s claim: Verhulst (1990), pp. 19-20; idem (1995), p. 485; idem (2002), p. 67; McCormick (2008b), pp. 14-5. In northern Europe, this plow replaced the swing plow which opened up the soil and created a furrow but did not turn the soil to one side, plow as deeply, or cut weeds. Cipolla assigned the appearance of the heavy plow to the seventh century: (1994), p. 138.

<sup>71</sup> Both were known in Europe in antiquity, since the second century CE if not before: Butzer (1993), pp. 565-66; Doehaerd (1978), pp. 9-10, 13; Comet (1997), pp. 21-4; Raepsaet (1997), p. 44; Devroey (2001), p. 116.

<sup>72</sup> This was one of the chief components of White’s idea that an agricultural revolution took place in the early Middle Ages: (1962), pp. 61-9; idem (1982), p. 93. Still one occasionally finds claims about the use of the horse in Carolingian agriculture: for instance, Butzer (1993), p. 565.

<sup>73</sup> Oxen were undoubtedly the primary draught animal throughout early medieval Europe: Duby (1974), p. 194; Comet (1997), pp. 20-1; Raepsaet (1997), pp. 54, 56, 58; Verhulst (1990), p. 22; idem (2002), p. 68; Smil (1994), p. 66; Butt (2002), p. 80. The ox continued to dominate land transport until the high Middle Ages as well: Raepsaet (1997), pp. 48, 56.

padded horse harness in the Carolingian and early Ottonian periods too have been demonstrated to be myths: both were known in antiquity.<sup>74</sup>

Less is known for certain about fertilization. It is known, however, that the adoption of winter and spring planting would have decreased the nitrogen levels in the soil; with 66 per cent of a field been given to crops instead of 50, the demand on soil nutrients would have invariably increased. In such rotations, some soil scientists have noted that yields may have declined on account of nutrient depletion within a generation.<sup>75</sup> This indicates that the three-course rotation could have only been implemented successfully on very fertile soils, and perhaps for a limited period of time, if a more regular and regimented fertilization of crops was not put into place. Fertilizer could come via livestock (notably cattle and sheep) and the planting or spreading of nitrogen-fixing legumes.<sup>76</sup> It is possible that the three-course rotation, with its growing of the summer grains of barley and oats, would have allowed the keeping of more cattle and sheep, and, thus, the production of the more livestock and more manure.<sup>77</sup> This, however, would have cancelled any gains in aggregate production that the rotation afforded.<sup>78</sup> How common the planting or spreading of legumes and vetches were in the Carolingian or early Ottonian periods is entirely unknown.<sup>79</sup>

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<sup>74</sup> On the early medieval origins of horse show and new padded harness: White (1962), pp. 57-61, 78; idem (1982), p. 93; Doehaerd (1978), p. 22; Smil (1994), p. 46; Cipolla (1994), p. 138. Raepsaet notes that it has yet to be proved that the horseshoe was abandoned in late antiquity or the first centuries of the early Middle Ages: (1997), p. 57. He also notes that the wider diffusion of the horse in the high Middle Ages is a clear sign of the greater use of the horse in traction and transportation after the eleventh century. The idea that the ancient horse harness, which may have increased traction power ten-fold, more or less strangled traction animals and prevented the use of equines for draught is also no longer accepted: Verhulst (1990), pp. 18-9, 22; Devroey (2001), p. 116. Herlihy labelled the use of such a harness 'surprising': (1974), p. 17. The idea was popularized by the work of Lefebvre des Noettes in the late 1930s. On the ancient roots of the harness see Comet (1997), p. 21; Raepsaet (1997), p. 55; Verhulst (2002), p. 67.

<sup>75</sup> Smil (1994), p. 55.

<sup>76</sup> On the use of legumes for fertilizer see Smil (1994), p. 56.

<sup>77</sup> Verhulst (2002), pp. 66, 68.

<sup>78</sup> That is, was more grain being produced simply to sustain more animals, which in turn provided fertilizer to maintain the growing of more grain?

<sup>79</sup> White suggested that legumes were commonly used as fertilizer in three-course rotations: (1962), pp. 71, 75; Verhulst (1990), pp. 20-1. Several others have also thought that legumes and vetches would have been grown for food and fertilizer throughout our period: Comet (1997), p. 19; Herlihy (1974), p. 17; Butzer (1993), p. 563; Butt (2002), p. 83; Doehaerd (1978), p. 20. Romans appear to have widely grown legumes: Pleket (1993), p. 325. Comet and Doehaerd have also implied that 'age-old practices' of marling, burning and liming were utilized throughout our period (regardless of the lack of evidence), and Doehaerd has asserted that bird manure (from cranes, storks and rooks) was gathered and spread on fields: Comet (1997), p. 26; Doehaerd (1978), pp. 11, 16. Verhulst, however, notes nothing of legumes in our period, let alone these other practices, and assigns the planting of legumes for fertilization to the second half of the thirteenth

Though associated with grain processing and not production, some attention to the place of the watermill in our period is needed, as it was capable of significantly reducing the heavy and time-consuming labor involved in the milling of grain in order to produce flour.<sup>80</sup> Opinion has varied on the appearance and diffusion of the watermill over the early and high Middle Ages, and while watermills are known to have been an ancient invention, how widespread they were in mid eighth- through mid tenth-century Europe has been the subject of some debate.<sup>81</sup> While Verhulst thought that the watermill was common in our period and the main technology used for the grinding of grain, Cipolla and Doehaerd thought it fairly widely adopted by the sixth century, and others, like Butt, have proposed that it spread gradually between the fifth and ninth century.<sup>82</sup> Many others, like Duby, have suggested that watermills were only common after our period.<sup>83</sup> Lohrmann and Champion have argued that watermills were quite numerous in some areas of Carolingian Europe, notably around large estates.<sup>84</sup> How widespread they were outside of those few areas in which they are now known to have been common is uncertain. That the diffusion of the watermill was precipitated by the diffusion of the three-course rotation and an increase in the aggregate production of grain, as some have suggested, is problematic. It ignores the fact that in Carolingian northern France, southern Belgium and, at least, southwest Germany, spelt made up between 50 to 80 per cent of the grain grown,<sup>85</sup> and spelt (unlike wheat, rye, barley and oats) is a hulled wheat species that required hand milling for husking. We may suspect, thus, that watermills did

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century, asserting that Carolingian agriculture was plagued by a 'fundamental fertilizer problem:' Verhulst (2002), p. 66. Duby too highlights the dearth of written evidence for the deliberate cultivation of nitrogen-fixing crops and has argued that early medieval people were incapable of 'restoring the soil's fertility:' Verhulst (2002), p. 74; Duby (1974), pp. 26-7, 190. Palaeobotanical research has recently shown that various types of legumes, including lentils, peas, and fava beans, were important crops on at least some sites in our period in southern and northern France, and the southern Netherlands. Whether they were grown for food and nitrogen-fixing agents is uncertain: Ruas (2005), pp. 400, 405, 413; Bakels (2005), pp. 394, 398; van Zeist, Woldring and Neef (1994), p. 191. More research of this sort is needed.

<sup>80</sup> Whole grains appear to have been rarely consumed and milling without watermills was done by hand or with the aid of animal-turned mills. Given the supremacy of grains in the early medieval diet, how efficiently early medieval peoples processed grain could possibly have had significant ramifications for early medieval population trends: Smil (1994), pp. 35, 120; Comet (1997), pp. 30-3. Verhulst focuses not the least on animal drawn milling but watermills and hand milling in our period: (1995), p. 488.

<sup>81</sup> Smil (1994), pp. 120-21; Doehaerd (1978), p. 13.

<sup>82</sup> Verhulst (1995), p. 487; idem (2002), p. 68; Cipolla (1994), p. 138; Doehaerd (1978), p. 21.

<sup>83</sup> See the remarks of McCormick (2008b), p. 14; Comet (1997), p. 32.

<sup>84</sup> Lohrmann (1989) pp. 367-404; Champion (1996). McCormick emphasizes that mills were primarily, and possibly only, associated with large estates: (2002), p. 23.

<sup>85</sup> Verhulst (1995), p. 487; idem (2002), p. 65; Devroey (1990), pp. 240-41.

not permeate rural landscapes dominated by spelt, and that the watermill may have spread widely following spelt's sharp decline in popularity after the ninth century, when the naked grains of wheat and rye came to dominate.<sup>86</sup>

How widespread any production-enhancing technologies were in our period is uncertain, though it is clear that like the three-course rotation and widespread cerealization none appeared for the first time in the Carolingian or early Ottonian periods. The appearance of more written evidence in the Carolingian period for the three-course rotation, assarting and several agrarian technologies may have much to do with modern perceptions of the rise of these phenomena in our period. Of course, that more written evidence generally exists on these matters after 750 than before may reflect changes in record keeping and source survival, not field systems, the use of iron or the breadth of cerealization.<sup>87</sup> Nevertheless, the implementation of the technologies discussed would have to some extent expanded during our period, and as more land was undoubtedly cleared, there would have been some progress in the production of the aggregate quantity of grain. But how much? And did this progress, if it did indeed lend itself to a positive demographic trend, outweigh any growth in the human population? Were the peoples of Carolingian and early Ottonian Europe eating more than those of Merovingian Europe, or did the size of the population remain proportionate to the quantity of grain grown? It is true that most of the evidence we have regarding Carolingian and early Ottonian agriculture pertains to what were very likely the most productive and efficient farms of early medieval Europe, and how representative this evidence is of Carolingian and early Ottonian agriculture in general should be questioned.<sup>88</sup> Further, as Doehaerd has stressed,

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<sup>86</sup> Even Verhulst suggests this possibility: (2002), p. 69. Many have commented on the sudden decline of spelt after the Carolingian period: Comet (1997), p. 16; Devroey (2001), p. 115.

<sup>87</sup> Sarris writes, 'the lack of understanding of the agrarian economy in the late Roman west is...a result of the paucity of extant source materials, and, in particular, a marked absence of documentary evidence.' (2004), p. 280; idem (2006), p. 412. Likewise, Henning, an archaeologist, notes, 'writing was in the hands of the mighty. It is not therefore impossible that the eighth century's sharp increase in documents such as polyptychs, donations or capitularies reflects the growing economic power of the Carolingian high nobility rather than a more productive organization of the whole society. In light of the scarce written evidence between 500 and 700 AD, we should be cautious about assuming an economic awakening of the eighth century.' (2008), p. 34. Also White (1962), p. vii; Herlihy (1974), p. 18; Doehaerd (1978), pp. 9, 14-5; McKitterick (1990), p. 297. Butzer, like many others, is well aware of the dearth of evidence before 750, but remains, like most, satisfied to assume that the documentation that exists after 750 for various agricultural technologies reflects the initial appearance or implementation of these technologies in medieval agriculture: for example, (1993), p. 569.

<sup>88</sup> As Duby astutely noted: (1974), p. 14.

advances in agrarian technology may not have stemmed from population growth, but simply the devotion of ‘more work’ to ‘crop-growing.’<sup>89</sup>

#### 0.1.4.1.2 The Early Medieval Pandemic

The idea that the Carolingian period was demographically and economically different from the centuries immediately before it also rests on the idea that the EMP suppressed population growth until 750.<sup>90</sup> The legitimacy of this idea requires serious attention. The EMP, like the ‘great’ pestilences of other pre-modern eras (the Athenian Plague *c.*430 BCE, Antonine Plague *c.*160/*c.*185 CE, Cyprianic Plague *c.*250, and the Black Death of 1346/52), has absorbed nearly all the attention given to early medieval disease in both histories of disease and demographic, economic and social histories of the period.<sup>91</sup> The quantity of attention given to the pandemic and its late sixth- through mid eighth-century reoccurrences have elevated it to the status of a demographic and economic watershed.<sup>92</sup> For many, the EMP and its reoccurrences resulted in a profound demographic and economic contraction and stagnation until 750 when it supposedly subsided and

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<sup>89</sup> In our period, Doehaerd saw population stagnation as well as the widespread use of several agricultural technologies. For Doehaerd, labor scarcity necessitated such developments. Doehaerd (1978), pp. 16, 22, 62; also Raspsaet (1997), pp. 50-1. This emphasizes how cautious we should be when ‘peopling’ supposedly predominantly arable regions. Cf. Christie’s remarks on the difficulty of interpreting population movements (or ‘peopling’ settlements as he notes) from material evidence: (2006), pp. 491-92.

<sup>90</sup> Key works on the EMP include Russell (1968), Biraben and Le Goff (1969), Dols (1974), Allen (1979), Conrad (1981, 1982, 1997), Maddicott (2007), Stathakopoulos (1998, 2000, 2004), Sarris (2002), Horden (2005a), Little (2007b), McCormick (2007) and Sallares (2007). Note that some suggest that the last EMP outbreak took place *c.*767: for example, Biraben and Le Goff (1975), pp. 60, 71, 77. The most popular date of the last outbreak, however, is 750: see Duby (1974), p. 13; Conrad (1981), pp. iv, 307-11; Stathakopoulos (2000), p. 256; idem (2004), pp. 110; idem (2008), p. 310. On the suppression of European population growth until 750 see n. 49 above. I am currently undertaking a full reappraisal of the primary written sources, palaeomicrobiology and historiography of the EMP that focuses on its diagnosis and the popular idea that it reoccurred until the mid eighth century. Citations are here, consequently, kept to a minimum.

<sup>91</sup> They have also absorbed most attention given to pre-modern disease in the palaeosciences: see n. 110 in part 1.

<sup>92</sup> That the EMP was the only pathogenic event worth note in late antiquity and the early Middle Ages is evident in many major works, including Bury (1923) and Jones (1964), as well as more recent scholarship, such as those cited in n. 138 above. Smith (2005), pp. 61-5, 71, for example, seems to think that the early medieval period was marked only by (bubonic) plague. Likewise, McCormick has invested the EMP and its reoccurrences, particularly that *c.*750, with much demographic and economic agency, and in doing so has looked over Carolingian and early Ottonian pestilences, evidently deeming them lesser and insignificant by comparison: (2001, 2002, 2003a, 2003b, 2007, 2008a). As indicated in 1.1, this thinking has a long history.

European populations were free to rebound.<sup>93</sup> Several considerations, however, complicate and potentially uproot the preconceived importance of the EMP and its reoccurrences, and, consequently, the idea that its termination brought on a new demographic (and thus economic) era.

Statistical evidence pertaining to the mortality caused by the initial occurrence *c.*540/45 of the EMP or its reoccurrences is wholly lacking, and archaeologists have been unable to pick up changes in settlement or population that may pertain to the initial outbreak or its reoccurrences.<sup>94</sup> The idea that the EMP was a major historical phenomenon relies entirely on the reading of extant texts. While the first outbreak is certainly well documented by early medieval standards, most others, apart from the outbreak of *c.*747/*c.*750, are not. Some occurrences are found in one source, others in two, and some are referenced in texts composed neither during or immediately after the period in which the outbreak is said to have occurred nor in or near the area said to have been affected. The significance of a past pestilence unaccompanied by any quantifiable indication of mortality will always remain vague, yet several convincing arguments have been made for the importance of at least the initial EMP occurrence. For instance, as Conrad pointed out, several contemporary and independent texts from across the Near East, Mediterranean, and quite possibly England and Ireland, refer to the outbreak and the large human mortality that followed in its wake. These texts were written in a variety of languages (including Greek, Latin, Old Irish and Syriac), and stem from literary contexts quite distinct from one another. That all document consequences of a similar scale, regardless of the cultural divide between the authors, can only serve to validate the reports of each contemporary source.<sup>95</sup>

The belief that the EMP and its reoccurrences were demographically significant has also rested on the idea that they were *Yersinia pestis*, bubonic plague. However, this retrospective diagnosis, advanced by Alexandre Yersin who isolated bubonic plague in

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<sup>93</sup> Naturally, some have not been convinced that the EMP (together with its reoccurrences) was a watershed event. The problem lies in the quantity and ‘quality’ of surviving evidence. And as the debate in the *Journal of Roman Archaeology* (from 1996 to 2003) on the severity of the Antonine Plague illustrates, consensus on the demographic and economic impact of a particular outbreak of disease that occurred in a time plagued by comparatively poor documentation will not likely be reached as long as our interpretations are forced to rely on texts alone: see the overview of Greenberg (2003).

<sup>94</sup> On the ability, or inability, of archaeology to detect short-term changes in settlement occupation see Gunn (2000) and Kennedy (2006).

<sup>95</sup> Conrad (1981).

Hong Kong in 1894, was neither in the first instance nor since supported by a comparative analysis of the symptoms and epidemiology of the EMP (as evident in early medieval texts) and the bubonic plague as expressed in Hong Kong or other modern populations. Sallares' recent attempt to support the diagnosis may be regarded as faulty. Sallares argued that the EMP was bubonic plague because the EMP was, in terms of symptoms and epidemiology (according to him), very similar to the Black Death, which was (according to Sallares) undoubtedly bubonic plague.<sup>96</sup> But drawing upon the properties of one pre-modern, or pre-laboratory, pestilence to demonstrate that another pre-modern pestilence was a particular modern disease is not an unproblematic affair, as the identities of both are not definitively known.<sup>97</sup> Ultimately, to prove that the EMP was *Y. pestis*, its symptoms and epidemiology need to be compared to those of *Y. pestis* as known to modern science, or *Y. pestis* must be harvested from EMP victims.<sup>98</sup> There is no time for details here, but it is worth pointing out that the idea that bubonic plague is a demographically devastating disease because the Black Death was bubonic plague is quite debatable, as the *Y. pestis* diagnosis of the Black Death is anything but certain: both written and material evidence are inconclusive.<sup>99</sup> Indeed, *Y. pestis*, as known to modern science, can hardly be regarded as a rapidly disseminating, highly mortal infection, and its pneumonic variant is so acute that it is self-limiting and incapable of wide distribution.<sup>100</sup> Bubonic plague, as known to laboratory science, is a bad fit with the EMP. While the initial (or possibly only) occurrence of the EMP may have been quite devastating, as a range of contemporary and independent texts verify, and while it seems to have disseminated rapidly across much of Europe and the Middle East (in five years it is thought to have afflicted the eastern Mediterranean and Middle East, North Africa, Italy, southern and central France, parts of Spain and Germany, and possibly England

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<sup>96</sup> Sallares (2007); earlier Stathakopoulos suggested that this approach was viable: (2004), p. 112.

<sup>97</sup> Comparing reported symptoms and epidemiology of two pre-modern pestilences in order to speculate on disease continuity in the pre-modern past is a different matter, see below.

<sup>98</sup> As the only concrete evidence we have about *Y. pestis* is modern: see 1.2.1 and 1.2.2.

<sup>99</sup> The bubonic plague diagnosis of the Black Death has been criticized in earnest since 2002. See Twigg (1984), Bleukx (1995), Scott and Duncan (2001) and Cohn (2002, 2008, 2010). Also see Wood, Ferrell and Dewitte-Avina (2003), Patterson (2002), Christakos and Olea (2005), and Nutton (2008). Bubonic plague diagnoses of some late medieval and early modern epidemics, long thought to be reoccurrences of the Black Death, have been challenged by Christenson (2003), pp. 416-17, Cohn and Alfani (2007), and Cohn (2010). On the palaeomicrobiological 'evidence' for the bubonic plague diagnoses of the EMP and Black Death, and the problems of marrying pathogenic finds with recorded outbreaks of disease, see 1.2.

<sup>100</sup> Benedict (1996); Cohn (2002, 2008); Gamsa (2006); Wu (1926); McCormick (2007).

and Ireland<sup>101</sup>), it cannot be said that it was an acute infectious disease because it was bubonic plague.

Also unconvincing is the idea that the EMP reoccurred and continually ate away at Europe's population for two centuries. That the EMP was recurrent too is based foremost on its bubonic plague diagnosis.<sup>102</sup> Because the EMP, like the Black Death, was bubonic plague, it is thought, like the Black Death, to have reoccurred for centuries until suddenly (and perplexingly) disappearing. Yet the very idea that the EMP was recurrent is hard to sustain, as the sources for supposed reoccurrences are incredibly thin compared to the initial outbreak, problematizing attempts to compare the symptoms and epidemiology of supposed reoccurrences to the 'initial' outbreak.<sup>103</sup> Not surprisingly, considering the scantiness of the extant evidence, claims that the EMP reoccurred have also rested on suggestions of disease continuity made by early medieval authors, such as Bede, Evagrius, Gregory of Tours and Paul the Deacon.<sup>104</sup> This too is not unproblematic, however. Several early medieval authors, including three of the above, state that outbreaks of their own era were like those of prior generations, and on occasion even assign labels adhered to the initial EMP occurrence, such as *lues inguinaria*, to pestilences of their own time. Though several authors do indeed imply continuity in disease when employing the language of the initial EMP outbreak in their descriptions of later pestilences, most cannot claim any familiarity or personal experience with the initial outbreak.<sup>105</sup> Thus, aside from a steadfast belief in the EMP's bubonic plague diagnosis,

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<sup>101</sup> See Biraben and Le Goff (1975); Stathakopoulos (2004), pp. 113-23; Horden (2005); and Little (2007b) for overviews.

<sup>102</sup> And like the EMP's diagnosis, the idea that the EMP was recurrent has yet to be persuasively argued.

<sup>103</sup> Stathakopoulos notes that the textual evidence available for the initial and supposedly last outbreak of the EMP c.750 far exceed the records available for intervening 'reoccurrences:' (2004); this is also clear in Biraben and Le Goff's earlier 1969 survey of the EMP.

<sup>104</sup> See, for instance, Biraben and Le Goff (1975), p. 58; Stathakopoulos (2004), p. 112, *passim*; Little (2007b).

<sup>105</sup> For instance, Paul the Deacon, who wrote in the late eighth century and was born c.720, documents a pestilence c.560 that several scholars hold was a reoccurrence of the devastating disease of c.540/45 (see, for instance, Biraben and LeGoff (1975), p. 74). Paul labels the pestilence *pestis inguinaria*, but the grounds by which he identified this pestilence, which occurred some 140 years before he set penning his *Historia Langobardorum* should be questioned. The same applies to another *pestilencia* in 570 that Paul documented. Neither Gregory of Tours nor any other early medieval author documents these pestilences. However, other authors, including Marius of Avenches, do document another outbreak of disease in this period, which was neither labelled *inguinaria* nor assigned symptoms like those of the 'first' EMP outbreak: see I.I. For Paul's text see: (1878), pp. 74, 117. This is but one example of many. We may also note John of Biclaro's report of an epidemic in Constantinople in the mid 570s: Biraben and Le Goff (1975), p. 74. Though he had travelled to Constantinople as a young adult, John wrote in Girona c.620:



scholars have rooted their assertions that the EMP reoccurred once, twice, fourteen or eighteen times,<sup>106</sup> in their faith that early medieval authors possessed the means to accurately align the disease outbreaks of their own time with those that occurred a half century or more earlier in sometime quite foreign regions.<sup>107</sup> Furthermore, it has been assumed that early medieval authors documented symptoms and applied labels, such as *lues inguinaria*, to the pestilences of their own eras for the purposes of objectively documenting material world events. For all we know, *lues inguinaria* and like terms, were textual artifacts by the late sixth century.<sup>108</sup> For these reasons it is far from certain that later sixth, seventh and early eighth-century pestilences were associated to the ‘initial’ EMP occurrence, and caused by the same pathogen or variant thereof that irrupted on the fringes of Europe c.540. Only with much more palaeomicrobiology will we be able to claim forcefully that supposed reoccurrences of the EMP were indeed reoccurrences of the EMP and that the same disease devastated Europe for two hundred years until the eve of the Carolingian period.<sup>109</sup>

While it is probable, considering the quantity of contemporary and independent witnesses, that the ‘initial occurrence’ of the EMP was a major demographic event, it is less certain that the EMP reoccurred and that supposed EMP reoccurrences were equally

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(1894), p. 213. A more detailed study is in preparation. Note that on some occasions where we may suspect that authors knew much about supposed EMP reoccurrences, the symptoms they list differ from those characteristic of the first outbreak: see Horden’s comments on Evagrius: (2005), p. 142. As argued in 1.3 and 1.4.1, close proximity to a disease occurrence does not necessarily result in a more reliable or objective account of the disease.

<sup>106</sup> Scholarly opinion has varied widely on how many times the EMP revisited Europe and the Near East. For instance, Biraben and Le Goff (1975), pp. 58-9, identify fifteen outbreaks before 767, while Stathakopoulos (2004), pp. 110-24, identifies eighteen before 750. Russell thought reoccurrences were ‘minor’ by 700: (1968), p. 178; and Jones proposed that EMP reoccurrences subsided before 600: (1964), p. 288. Gibbon, on the other hand, was concerned solely with the first occurrence: (1788), p. 777. The temporal dimensions of the EMP have grown considerably over the last two hundred years.

<sup>107</sup> For instance, Stathakopoulos (2004), p. 111.

<sup>108</sup> Without more palaeomicrobiology, and confirmation that ‘reoccurrences’ of the EMP were caused by a disease that caused swellings in the groin, it is impossible to prove or disprove this point. However, that it is unlikely that early medieval authors, who were separated by considerable distances in time and space, could have employed terms like *lues inguinaria* systematically in reference to a particular disease supports the idea that such terms carried textual weight or were somehow culturally symbolic: cf. Christenson’s comments about specific terms for particular diseases in the early modern period: (2003), p. 416.

Otherwise, we may suppose that labels like *lues inguinaria* were ‘umbrella terms’ like *leprosus/leprae*: see 1.3.

<sup>109</sup> Many hurdles, however, have to be overcome in order to identify the EMP with a disease known to modern science and to link a pathogen harvested from early medieval peoples to a pestilence reported in texts: see 1.2.2 and 1.2.3. On existing PCR detections of bubonic plague in pre-modern human remains: see 1.2.3.

significant as the outbreak of *c.*540/45.<sup>110</sup> Mid sixth- through mid eighth-century pestilences commonly labeled as ‘reoccurrences’ of the EMP may have been major demographic determinants, whether actual reoccurrences of the EMP or not. We do not know. That a consistent and severe constraint on demographic growth was suddenly lifted from Europe *c.*750, however, is unsupported, as this thesis demonstrates. There is no reason to believe that supposed reoccurrences of the EMP were any more significant than the epidemics found in Carolingian and early Ottonian texts, or, in fact, that some Carolingian pestilences were not reoccurrences of the EMP.<sup>111</sup> In sum, the idea that Europe’s population was kept low until 750 is rooted in an overly positivistic reading of the surviving texts, an outdated and ill-supported diagnosis, and a century of historical scholarship that has overlooked the Carolingian and early Ottonian pestilences detailed in this thesis for the initial and subsequent reoccurrences of the supposed ‘great’ plague of the early Middle Ages.<sup>112</sup>

#### 0.1.4.1.3 Polyptychs

Many scholars have drawn upon polyptychs to establish some idea of ninth century demography.<sup>113</sup> These estate surveys, which survive from Bobbio, Lobbes, Montierender, Prüm, St. Bertin, St. Germain des Prés, St. Maur-des-Fosses, St. Rémi de Reims and St. Victor de Marseilles, are thought to supply direct and reliable evidence of population trends, or at least static ‘snapshots’ of populations and agrarian economies of manors

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<sup>110</sup> The written evidence available for supposed EMP reoccurrences pales in comparison to that available for the initial outbreak, with the exception of the supposed last outbreak *c.*750: Stathakopoulos (2004).

<sup>111</sup> The thinness and ambiguous nature in which most EMP ‘reoccurrences’ and Carolingian and early Ottonian pestilences were recorded prevents certainty on these matters. Seemingly widespread pestilences like those of 807/08 and 856/58, the latter of which was described in the *Annales Xantenses* as a *plaga magna vesicarum turgentium* (C.1.156), may have, on account of the apparent breadth of their diffusion, high mortality and symptoms, been reoccurrences of ‘the’ disease that afflicted Europe prior to 750. We should not suppose that only pestilences labeled *lues inguinaria* could have been associated to the EMP. For more discussion, see 1.1.1 and for discussion on post 750 epidemics, 1.4.2.

<sup>112</sup> It is certainly peculiar that the EMP apparently fizzled out as the Merovingians and Umayyads did, and the Carolingian and Abbasids rose to prominence, along with historians who sought to break from the past and their predecessors. Perhaps the EMP did not vanish from Europe and the Middle East *c.*750 but from texts: see the comments of Horden (2005b), p. 331. Though the labels of the EMP were not unknown to Carolingian and early Ottonian writers (C.1.128), they were not used. This may reflect a change in disease environment or a change in the recording of disease.

<sup>113</sup> Verhulst (2002), pp. 23-5, 37-40, emphasizes the use of these documents for reconstructing the demographic history of the period.

belonging to some large Carolingian estates. Some scholars who have used these surveys have thought that the populations belonging to some estates could have doubled in a period of fifty or one hundred years.<sup>114</sup> Others have seen population stagnation.<sup>115</sup> Opinion has varied widely because these documents leave many questions unanswered. Indeed, the use of these estate surveys to assess population distribution and density, as well as demographic determinants such as fertility and sex ratios, is problematic on several fronts. In short, polyptychs can speak to the people on the estates from which they survive, not those poorly represented or wholly omitted from the surveys,<sup>116</sup> and certainly not those not a part of estate populations. They also cannot speak to the population history of the people that they do address in years other than those for which they survive. For these reasons, these documents cannot reveal general demographic trends over time, across regions, or on extra-manorial settlements.<sup>117</sup> This, of course, means that polyptychs tell us very little about change in population history.

Not only does the data polyptychs provide not pertain to most of Europe's ninth- or tenth-century population base, making generalization unwise, but several of these estate surveys survive from atypically extreme years and cannot, consequently, be thought to be representative. The survey of St Vincent de Marseilles (813/14), for instance, dates shortly after the great cattle panzootic of *c.*809/10, not to mention the food shortages of the late eighth and early ninth centuries, and the polyptych of St. Germain des Prés (*c.*825/29) dates shortly after another outbreak of disease among cattle, successive hard winters, a major subsistence crisis and human mortality. The survey of Prüm (893) is contemporary with an extremely hard winter, food shortage and another mortality of humans. Estimations of population density and distribution, as well as age and sex ratios, on the manors recorded in these estate surveys, even in the years the surveys cover, are approximate at best. Certainly, the application of these estimations to large areas of mid ninth- through mid tenth-century Europe should be avoided. Naturally, inherent in any projection of population trends developed from polyptychs to the whole of

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<sup>114</sup> See Verhulst (2002), p. 25.

<sup>115</sup> On at least some estates. For instance, Duby (1974), pp. 79-82, thought population would have been static on most if not all manors.

<sup>116</sup> Many groups, notably children and women, are underrepresented or entirely left out of these surveys. Ages are also infrequently recorded (St. Victor de Marselles is a rare case). How representative polyptychs are generally of reality has been questioned: Goetz (1993), p. 44.

<sup>117</sup> With the exception of Bobbio, surveys for a single estate do not survive for multiple years.

the mid eighth- through mid tenth-century continental Europe is the assumption that disease and hunger were either temporally and spatially consistent or non-existent.<sup>118</sup>

#### 0.1.4.1.4 The Carolingian and early Ottonian climate

Arable and demographic growth in the Carolingian and early Ottonian periods has also been said, by some more environmentally-minded historians, to have stemmed from an improvement in Europe's climate. Indeed, the onset of the Carolingian period is now with some regularly held to have coincided with the conclusion of the Early Medieval Climatic Anomaly and the inception of the Medieval Warm Period, two major overarching climatic eras of Europe's pre-industrial past. For Devroey, Europe's climate 'deteriorated steadily' from the third century onwards, becoming 'colder and wetter.' This depression, the EMCA, reached its 'lowest point' in the sixth century and was succeeded in the eighth by a 'progressively warmer' phase, the MWP, which reached a high, according to Devroey, in the eleventh century.<sup>119</sup> For Durant and Leveau, a general drop in temperature likewise commenced in the third century and continued until the eighth century, reaching a low sometime between the fifth and seventh centuries. This depression was followed by a general period of warming that peaked around 1000.<sup>120</sup> Randsborg too identifies a period of cooling corresponding to the late antique period that was followed by a warm period which persisted at least until the eleventh century.<sup>121</sup> That late antiquity was marred by bad weather and poor climate, which contributed to the fall of the Roman Empire (or the transition to the early Middle Ages), has, as Squatriti recently demonstrated, been proposed since the eighteenth century.<sup>122</sup>

The conclusion of the EMCA is held to have brought warmer, dryer summers, and milder winters, as well as a generally more stable climate, which in turn is thought to

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<sup>118</sup> For some estimates about population density derived from polyptychs see 3.1.

<sup>119</sup> Devroey (2001), pp. 100, 104; idem (2003), p. 23; idem (2006), pp. 360-61.

<sup>120</sup> Durant and Leveau (2004), pp. 181, 184.

<sup>121</sup> Randsborg (1991), pp. 23-9. Long before these scholars, Duby and Herlihy drew upon early studies of the Alpine glaciers Fernau and Aletsch in order to propose that a general period of cooling occurred, at least in the Alps, between c.400 and c.700 and that this period of cooling was succeeded by a warming phase c.750 that peaked around 1150 or, for Duby, 1000. In the Carolingian and early Ottonian periods, they suggested, the climate of Europe was like that of the third quarter of the twentieth century. Duby (1974), pp. 6-12; Herlihy (1974), p. 13. Duby also drew upon sediment cores from the Low Countries.

<sup>122</sup> Squatriti (2010), pp. 799-802.

have produced longer growing seasons more favorable for agricultural productivity and the expansion of arable.<sup>123</sup> Devroey estimates that the difference in the mean annual temperature between the EMCA and the MWP was about 1.5°C.<sup>124</sup> Such a numerically minute difference could have considerable repercussions for crops and growing seasons. An increase of 1°C in the annual mean might have lowered the risk of crop failure from one in three years to one in twenty, or so has been estimated for pre-modern northern European agricultures.<sup>125</sup> Yet how significant the impact the transition from the EMCA to the MWP was for Carolingian and early Ottonian agriculture is only vaguely discernible: not only would the repercussions of a difference of 1°C in the annual mean varied between southern and northern Europe (that is, lands under the Mediterranean, the Atlantic/Maritime and continental climatic regimes), but within these regions the repercussions would have been determined by the species of grain grown and the agricultural practices implemented. Establishing any real tangible evidence of the overall impact of the EMCA or MWP on agriculture seems to be out of reach.<sup>126</sup>

Part of the problem lies in the fact that the EMCA and MWP are still being fleshed out. The best evidence for them comes from material proxies for past climate, as the practice of extrapolating weather patterns, let alone overarching climatic eras, from written sources is without doubt methodologically flawed.<sup>127</sup> The palaeoclimatology of

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<sup>123</sup> Cheyette recently argued that the EMCA was detrimental to cultivation. He thought that the EMCA played a considerable role in the decline of cultivation, which he argued was visible in several regions of southern and northern continental Europe from the third to the seventh century: (2008), pp. 155-65.

<sup>124</sup> Durant and Leveau prefer a difference of 1°C.

<sup>125</sup> Cheyette (2008), p. 161; Post (1980). Long ago, Duby stressed the impact that such a change in temperature could have had: (1974), p. 10. Grove observes that the viability of marginal lands, lands of higher altitudes and closely situated to water, for instance, could be severely affected by such 'minute' fluctuations in the mean temperature: (2002), p. 313.

<sup>126</sup> Durand and Leveau (2004), p. 182.

<sup>127</sup> This is because the extant written sources for any pre-modern period or region cannot be held to be fully illustrative of the material world. Individual authors may have chosen to regularly or only document certain events, such as storms or heavy snows, and to omit others, like droughts; they may have colored their texts with allusions and motifs, and been influenced by earlier authors to record particular phenomena a particular way. Certainly, no systematic, day by day, let alone year by year, written record of weather survives from our period; the annalists of the *Annales Bertiniani*, *Annales Fuldenses* or *Annales Xantenses*, for instance, did not document all major weather events that occurred every year for several consecutive decades. We should not therefore presume to be able to reconstruct the Carolingian and early Ottonian climate from the passages collected in the catalogues in the appendices of this thesis. What we have are some subjectively and randomly reported weather events, which are scattered unevenly across time and space, that attracted the attention of our authors, primarily perhaps because of their socio-economic significance. Cf. Randsborg (1991), p. 24; Devroey (2001), p. 100; Duby (1974), p. 8; Ogilvia (1984), p.

the EMCA is, however, ongoing and palaeoclimatologists have yet to construct a high resolution reconstruction of the history of EMCA across Europe with the data already derived from terrestrial and aquatic sediment cores, tree rings, ice cores and, for instance, glaciers. Though Cheyette has recently collated some relevant palaeoclimatic data from southern France, Italy, Germany, Denmark, much material awaits synthesis.<sup>128</sup> The MWP, on the other hand, has received considerable attention in the palaeoclimatological sciences, particularly following the studies of Lamb.<sup>129</sup> From these studies we can glean some important insight about the EMCA. Most palaeoclimatologists now hold that the MWP was experienced unevenly in time and space across Europe, with Northern Europe (namely Scandinavia) and countries boarding the North Atlantic experiencing warmth first *c.* 1000 and southern Europe not experiencing a similar warming until, perhaps, the fourteenth century.<sup>130</sup> Though a similar body of palaeoclimatic data is not yet available for the EMCA, we may speculate that it too was experienced unevenly in time and space. The EMCA was also quite certainly, like the MWP, not homogenous but regularly interrupted by decade- or multidecadal intervals of climate variation.<sup>131</sup> The multi-century MWP was peppered by shorter periods of cold weather and periods of warmth clearly below and above the mean temperature of the period. Lastly, it should also not be presumed that extreme weather events were necessarily less common in the MWP than the EMCA, or that because a period was generally more favorable to agriculture that it was without extremes. Some scholars have already drawn attention to the threat hail

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134; Brázdil et al (2005), pp. 374-74, 376; Dutton (2008), pp. 169-70; Kerr, Swindles and Plunkett (2009), p. 2870-871; also see 2.4.3.

<sup>128</sup> Cheyette (2008), pp. 155-65. Cheyette is currently working on a synthesizing a wider range of palaeoclimatic data pertaining to the EMCA from across Europe: pers. correspond. 15 May 2010. Some data relevant to the Carolingian and early Ottonian periods is synthesized in 2.4.3.

<sup>129</sup> Lamb (1965). Not an early medievalist, Lamb, it should be noted, anachronistically referred to the MWP as the Early Medieval Warm period. As Hughes and Diaz noted, the Medieval Warm Period and the Little Ice Age have absorbed the mass of attention palaeoclimatologists have devoted to the climate of pre-modern Europe: (1994), p. 137; also see the comments of Brázdil et al (2005), pp. 366-67, 390. In their survey of scholarship on pre-modern European climate, Brázdil et al do not refer to the EMCA, only the MWP and Little Ice Age: (2005), pp. 388-90.

<sup>130</sup> There was no European-wide MWP: Hughes and Diaz (1994), p. 109-114.

<sup>131</sup> Hunt (2006), pp. 691-92; Brázdil et al (2005), p. 392; Pfister et al (1998), p. 548; Shabalova and van Engelen (2003), p. 240.

storms, Saharan sands and volcanically-induced extreme winters posed to agriculture throughout our period.<sup>132</sup>

It is undoubtedly premature to claim that the conclusion of a ‘negative’ climatic phase around the onset of our period brought on a new era in European agriculture and demography.<sup>133</sup> The advantages the termination of the EMCA may have been many, but crops certainly did not stop from failing, at least on occasion, *c.*750.<sup>134</sup> More importantly, the temporal and spatial parameters of the transition from the EMCA to the MWP are still debated and remain very much uncertain,<sup>135</sup> and most palaeoclimatologists hold that the MWP did not set in until 900, 950 or 1000.<sup>136</sup> The results of some palaeoclimatological and historical climatological studies directly conflict with the picture present by Devroey and others noted above.<sup>137</sup>

While some scholars have emphasized the inconclusiveness of much of the evidence for early medieval population history,<sup>138</sup> few have really stressed the inability of ideas about agricultural productivity, the EMP or the EMCA, or data gleaned from polyptych, to provide confident answers. The lack of integration of such population-controlling phenomena as disease and hunger into sketches of Carolingian and early Ottonian population history only complicates matters. The very idea that European populations began to crawl out of their ‘dark-age’ nadir in the Carolingian or early Ottonian periods, or that there was a dark-age nadir to crawl out of, might be regarded as a

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<sup>132</sup> Dutton (1995); idem (2008), pp. 171-80; McCormick, Dutton and Mayewski (2007); Pfister et al (1998), pp. 535, 541-42. Of course, whether extreme weather events were more common in Carolingian and early Ottonian Europe than before, is impossible to discern on the basis of written evidence.

<sup>133</sup> As Devroey (2006), pp. 360-61, and Duby (1974), p. 12.

<sup>134</sup> If agrarian productivity did improve, we should not assume, as Duby emphasized, that the threat of severe food shortages ended: (1974), pp. 183, 209.

<sup>135</sup> Hunt (2006), p. 677.

<sup>136</sup> Brázdil et al (2005), p. 391.

<sup>137</sup> Osborn and Briffa (2006), pp. 841-42; Bradley, Hughes and Diaz (2003), pp. 404-05. We might ask, consequently, what the climate of Carolingian and early Ottonian Europe was like, if the EMCA ended *c.*750 and the MWP did not begin until *c.*950. It is noteworthy that the results of Pfister et al’s examination of written texts and construction of winter air temperatures between 750 and 1300 disagree completely with the picture presented by Devroey, Durant and Leveau, Randsborg, Duby and Herlihy. Though their evidence base is rather thin prior to 1000, Pfister et al argue that the ninth century was, like previous centuries, cold: (1998), p. 535.

<sup>138</sup> For instance, Lopez (1976), p. 27; Herlihy (1982), p. 139; Fouracre (2009), p. 128.

historiographical cliché.<sup>139</sup> In any case, whether Europe's population was rising, contracting or stagnating in our period, there is no evidence to indicate that any single demographic trend characterized mid eighth- through mid tenth-century Europe or that any trends that were in place after 750 were unbroken or particular to the Carolingian and early Ottonian periods. We can, as such, do away with interpretations of Carolingian and early Ottonian disease and hunger that have relied extensively on ideas about demography, and free our assessment of the impact of these phenomena from existing ideas about population.

#### 0.1.5 Written evidence and the reconstruction of pestilences and food shortages

As we rely heavily on written evidence to reconstruct Carolingian and early Ottonian disease and hunger, it is essential to consider how we must handle the extant evidence. Surveys of how Carolingians and early Ottonians wrote about disease and hunger are given in 1.4 and 2.4 and an effort is made throughout this study to understand not only how Carolingians and early Ottonians wrote about disease and hunger, but to apply that understanding to our reconstruction of the history of these phenomena. Naturally, our assessment of these phenomena cannot be divorced from the written evidence that informs us of their occurrence and impact. The written record of disease and hunger is a product of human culture and any attempt to reconstruct their history requires the penetration of a human lens, the perception and words of early medieval authors.

Because of this it is helpful to consider all Carolingian and early Ottonian texts literary creations and to drop the traditional division of texts as 'historical' or 'literary.' This prevents us from reading annals and histories at face value and from dismissing poems. As argued in 1.3, 1.4.1 and 2.4.1, the passages collected in Catalogues 1 and 2 cannot be read from a positivist perspective and our sources cannot be treated as straightforward repositories of facts. To do so is to assume that the passages collected here were composed to accurately and objectively reflect the physical past without bias or preconceived notions of what was, and was not, worth recording, or, for that matter,

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<sup>139</sup> van Ossel remarked that statements found in modern scholarship on sixth-, seventh- and eighth-century Europe regarding 'the depopulation of the countryside' or 'the abandonment of rural sites' are nothing more than historiographical clichés: (2006), p. 534; van Ossel and Ouzoulis (2000), p. 134.



how it should be recorded.<sup>140</sup> Passages pertaining to a mortality of sheep or a subsistence crisis must be considered in light of the textual environment in which they were written, for this environment conditioned what was recorded and how. The vocabulary, syntax, sentence structure and imagery and literary and Biblical allusions, intentional or otherwise employed by contemporary and earlier authors significantly conditioned how an author wrote. Attention to this ‘literariness’ affects our reading of individual passages, as well as our interpretations of images, such as a starving mother eating her children, or qualifiers adhered to particular phenomena, such as the description of a particular food shortage as ‘unheard of’ or an epizootic as ‘great.’ Though the passages collected in the catalogues have been plucked from various sources and removed from their textual context, they are considered in light of the source and genre from which they were taken.

The spatial and temporal contours, not to mention the impact, of pestilences and food shortages can only be established reliably when multiple sources survive that document them, or when we may supplement the written record for them with material evidence. Because the interpretation of the written evidence is so complicated, and sources cannot be read in isolation and mined for facts, we must in order to establish the impact of disease and hunger press beyond the written record and consider the context in which pestilences and shortages occurred. Analogies too, as detailed below, are beneficial. By considering contexts and analogies we can, in essence, read beyond motifs and common language and form of passages that clearly owe more to the literary environment in which they were penned than to the physical past. This said, it must be noted that motifs and common qualifiers can serve two purposes. An account of cannibalism or the qualifying of a epidemic/epizootic as ‘great’ or ‘unheard of’ may serve to link a passage with earlier reports of subsistence crises and pestilences but also to reflect material world events. Cannibalism may have indeed occurred and a pestilence may have been unlike anything that generation had witnessed. In essence, texts can be literary creations as well as vehicles of verifiable information. An early medieval author could both experience a disease outbreak and choose to describe it in terms which echo

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<sup>140</sup> Goffart (1988, 2006) has laboured this point unlike other early medievalists. As he stresses, the time of sifting facts from early medieval texts is over: (1996), p. 661. On the importance of the issues addressed here, and for more discussion on how we may attempt to better use medieval writings to reconstruct the history of Middle Ages, see Partner (1986), Otter (2005), Stein (2005), Rubenstein (2005), Foot (2005), Marvin (1998) and Menache (2006).

the Bible. Though factuality cannot be assumed, it may very well be present as there is no hard dichotomy between the reporting of a real experience and intertextual allusions.<sup>141</sup>

#### 0.1.5.1 The incorporation of material evidence

Wherever possible this study incorporates material evidence of Carolingian and early Ottonian disease, hunger and extreme weather. The implementation of both written and material evidence serves two purposes: first, the use of material evidence can act to check or corroborate aspects of textual accounts of disease, hunger and extreme weather; and second, the available body of material evidence often reveals aspects of the disease, hunger and extreme weather experience that the written evidence does not, and vice versa.<sup>142</sup> Palaeopathological and palaeonutritional assessments of human remains dating to the Carolingian and early Ottonian periods can serve to confirm claims found in written sources that crowds of sick and hungry were a common sight in towns and villages. Ice cores, tree rings and other archives of past climate can check claims made in texts regarding hard winters or droughts, and palaeomicrobiological assessments of the pathogens found in pre-modern humans can help us come to terms with both the non-pestilential diseases and pestilences that our Carolingian and early Ottonian authors report. Yet while evidence of chronically ill peasants can crop up in texts and in graves, and evidence of hard winters or droughts in texts and trees, material and written evidence often speak to totally different aspects of the disease, hunger and extreme weather

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<sup>141</sup> As Erkamp notes, while we should adopt a 'healthy skepticism' toward our sources, we should not completely reject what they tell us: (1998), p. 2. Cf. Squatriti's comments on the famous late sixth-century flood: (2010), pp. 825-26; also Stathakopoulos (2004), pp. 86-7. Entries in early medieval annals, like modern newspaper headlines, are often similar in content and form. This does not mean, however, that they do not pertain to the material world. Likewise, that an early medieval author only refers to particular phenomena, such as siege-oriented food shortages, like modern media adheres to agendas, does not mean that that other phenomena, such as peacetime shortages, did not occur. On the flip side, some topoi regularly found in modern media, such as claims about unburied bodies causing epidemics, are undeniably false: [www.paho.org/English/DD/PIN/Number21\\_article01.htm](http://www.paho.org/English/DD/PIN/Number21_article01.htm) (last accessed 1 August 2010).

<sup>142</sup> McCormick (2001; 2002; 2003a; 2003b; 2007; 2008a) has emphasized how much early medievalists stand to gain by incorporating the results of the natural sciences into their assessments of the early medieval past. While medieval historians focusing on the early Middle Ages have for decades been aware of the benefits material evidence has to offer (see, for example, Duby (1974), p. 8, 10, 13, 24, 19, 78, 202, and Herlihy (1974), p. 13), material evidence has really yet to take on a major role in our reconstructions of the early medieval past.

experience. Ultimately, where textual and material evidence coincide greater clarity and certainty is achieved, but rarely are these two different and (largely) independent bodies of evidence easily married, as we see most notably in 1.2.3 and 1.3. Annals or *vitae*, for instance, help us speak to the repercussions of a subsistence crisis, while proxies for past climate help us establish the plausible contours and severity of the phenomena that triggered the shortage.

More often than not written and material evidence do not overlap. The physical remains of Carolingians or early Ottonians tell us little about food shortages or outbreaks of infectious disease, as food shortages and pestilences do not leave stigmata on the skeleton.<sup>143</sup> That said, the ability of palaeomicrobiology to demonstrate the existence of pathogens known to modern science in the DNA or RNA of ancient, medieval and early modern peoples allows us to advance more concrete working diagnoses of Carolingian and early Ottonian pestilences than we could if we did not know ‘modern’ pathogens had a pre-modern past. This, in turn, allows us to speak more to the plausible impact of those mid eighth- through mid tenth-century pestilences. Conversely, while written texts tell us little about non-pestilential disease or endemic malnutrition, material remains can inform us of bone-changing illnesses and the stress caused by chronic hunger. Unfortunately, there is, presently, a rather significant dearth of palaeopathological and palaeonutritional literature on human and livestock remains dating to the Carolingian and early Ottonian periods. A general lack of interest among those working in these sciences in the early Middle Ages, specifically early medieval continental Europe,<sup>144</sup> and the difficulty entailed in dating remains with precision to the Carolingian and early Ottonian periods account for this.<sup>145</sup> It is because of this shortage of palaeopathological and palaeonutritional literature

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<sup>143</sup> On disease: Waldron (2008), pp. 21-3, 83-4; Roberts and Manchester (2005), pp. 167, 179-81, 220. Harris lines, enamel hypoplasia and tibial periostitis can, in theory, reveal specific periods of extreme food shortage in non-adults: see 2.3.

<sup>144</sup> In her recent palaeopathological study of fifth- through eighth-century populations in Britain and Germany, Jakob notes that interest in palaeopathology is predominantly confined to England and North America, that the archaeological study of human health is quite rare in continental European universities, and that palaeopathological studies of early medieval populations are themselves quite rare: (2009), pp. 2, 4-6. Skinner notes that little palaeopathology has been done on early medieval Italian sites: (1997), p. 22; also see Pilsworth (2000), p. 225.

<sup>145</sup> Human and faunal remains can usually only be dated by their contextual association to ceramics and other objects, which are themselves often only vaguely assigned to periods of 50 to 100 years, and most Carolingian and early Ottonian graves (unlike Merovingian graves) are not accompanied by grave goods. Grave sites were also reused, or used continually, through and after our period. As such, a single site could

that comments in 1.3 and 2.3, on non-pestilential disease and chronic hunger respectively, are preliminary.

Three further points about the incorporation of material evidence. First, neither palaeoclimatology nor palaeomicrobiology, for example, provide definitive answers as historians often assume. Not only are the results achieved in the palaeo sciences regularly labeled ‘tentative,’ but the methods employed to diagnose bone lesions or date acid horizons in polar ice cores are regularly revamped and improved. Results attained with older methods are normally called into question and either altered or thrown out.<sup>146</sup> Second, though material evidence is, in principle, independent of the textual record, one must remain aware that scientists have long interpreted material remains in light of historical scholarship. Squatriti’s recent study of an early medieval Italian flood, for instance, demonstrates how eighteenth- and nineteenth-century ideas about a ‘great’ late sixth-century flood of the Tiber have made their way into modern scientific analyses of alluvial deposits and early medieval short-term climatic events, conditioned the reading of the material evidence, and, thus, the results of scientific study. Likewise, I have demonstrated elsewhere how totally unsubstantiated rinderpest diagnoses, advanced in the nineteenth and early twentieth centuries, of late fourth-, late sixth- and early ninth-century cattle pestilences have affected appraisals of the rinderpest virus’ ‘antiquity’ and, consequently, the evolutionary tree of the morbillivirus genus, which, in turn, has conditioned the scientific understanding of canine distemper, measles and peste des petits ruminants.<sup>147</sup> Third, the ability of physical remains to check or corroborate texts is not definitive. Material evidence cannot do away with the fact that texts are literary creations particular to the literary context in which they were composed. That evidence of disease-related ‘lameness’ is widespread in the material record does not mean, for example, that

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contain remains from several centuries. Carbon 14 dates are necessary more often than not to establish the period to which the remains belong, but Carbon dating is relatively expensive; this is particularly so if one must date hundreds (or thousands) of bones in order to simply establish which bones belonged to what period before setting out to assess them for signs of disease and nutritional stress. Henning and McCormick: pers. correspond., 19 March 2010. Some of these points have long been known to historians: see Herlihy (1982), p. 137.

<sup>146</sup> For example, the ice cores from Greenland, first raised in the 1970s, have been reappraised on several occasions. The original dating of acidity signals have been refuted, corrected and reassessed, and now the dating of specific events discernible in the ice is more precise than ever before. See Larsen et al (2008) for an example of the re-dating of one particular early medieval event, the mid sixth-century climatic anomaly.

<sup>147</sup> Newfield and Slavin (in preparation).

textual evidence of lameness does not have more to do with literary borrowing and allusion than with a population suffering a heavy burden of non-pestilential illness. Material evidence does not ‘cancel out’ the potential impact of intertextuality on the written record of disease, hunger and weather.

#### 0.1.6 Gauging the impact of disease and hunger in Carolingian and early Ottonian Europe

The scantiness, ambiguity and complexity of the written evidence necessitate the implementation of a multifold approach in order to gather some idea of the demographic and economic impact of disease and hunger in Carolingian and early Ottonian Europe. What the written evidence does tell us is surveyed first in 3.1, 3.2 and 3.3. For reasons addressed in 0.1.5 however, the written evidence itself reveals a limited quantity of reliable and detailed information. Consequently, the thesis adopts three additional approaches: epidemics/epizootics and food shortages are situated in the contexts in which they occurred and analogies to the pestilential and extreme hunger experiences of better documented pre-modern populations and modern developing countries are drawn. Working diagnoses are also advanced and extrapolated from in 3.1 and 3.2.<sup>148</sup> Though little definitive about the demographic and economic impact of disease in Carolingian and early Ottonian Europe can be acquired through these means, these methods do illuminate possible consequences, emphasize how significant disease could have been in eighth-through tenth-century Europe, and demonstrate the need for the greater inclusion of disease in assessments of mid eighth- through mid tenth-century demography and economy.

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<sup>148</sup> New viable methods may emerge in coming years that permit us to speak to the severity of specific outbreaks of disease. Ruddiman, for example, has suggested that mass mortalities of humans (and we may suppose livestock) leave a mark ice cores: (2003), pp. 280-85; idem (2005a), pp. 117-46. He, like others in the natural sciences, has focused upon the Black Death and its reoccurrences and has argued that plague-driven CO<sub>2</sub> reductions were a ‘significant causal factor in temperature changes during the Little Ice Age:’ (2003), p. 261. However, Ruddiman’s understanding of pre-modern disease is littered with inaccuracies and assumptions about the impact past pestilences had on farming and forest management, which may have marred his interpretation of palaeoclimatic data. He thinks, for instance, that bubonic plague irrupted on a ‘decadal-scale’ from 250 to 590 CE: (2003), p. 281. He also assumes that mortalities would have resulted in the widespread abandonment of farmland (arable and pasture), though it is known that greater quantities of land were given to pasture after the Black Death and that livestock represent a large quantity of biomass: as the FAO demonstrates in its *Livestock’s Long Shadow*, stock rearing has a significant carbon footprint: (2006), pp. 84-99. Still, if Ruddiman’s hypothesis is correct, we may be able eventually to gauge the size of die-offs reported in written texts through natural archives of past climate.

#### 0.1.6.1 Contextualizing disease and hunger

The context in which pestilences and food shortages are situated is made up of several factors pertinent to the spread and potential impact of outbreaks of communicable diseases, the vulnerability of human populations to shortages and the means by which the peoples of Carolingian and early Ottonian Europe could have curbed outbreaks and offset their consequences. Several ‘contexts’ relate directly to the dissemination of disease, for instance: the density and distribution of the affected population in so far as this can be determined; contact between members of the affected population through trade and travel; atypical situations such as environmental shocks (poor weather or concurrent outbreaks of disease in other species), conflict (campaigns or sieges), or subsistence crises; and contemporary medical knowledge and ideas about disease etiology. Contexts of subsistence crises need to consider diet, agricultural production seasons, entitlement to food, reliance on markets, food trade, and storage capabilities. Consideration of Carolingian and early Ottonian agriculture, production and trade help us determine the impact of pestilences and shortages.

Of course, the contextualization undertaken in Part 3 requires a bit of informed invention. The thesis relies heavily on a wide range of scholarship pertaining to Carolingian and early Ottonian demography, economy, medicine, communication, and, for example, travel. Though, as Arrizabalaga notes, the demographic, economic and environmental contexts in which past pestilences occurred cannot be recreated experimentally or easily reconstructed historically,<sup>149</sup> establishing the contexts in which outbreaks occurred is one of the only means by which we can attempt to illuminate the impact of disease in poorly recorded societies. However, on account of the primary sources and secondary scholarship available we cannot suppose to be able to draw terribly unique contexts for individual pestilences and subsistence crises. As such, assessments of individual epidemics, epizootics and food shortages are not very unique. That our analyses of the impact of different epizootics, for instance, are not markedly

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<sup>149</sup> Arrizabalaga (1993), pp. 1029-030.

distinct, does not, however, prevent us from learning something from considering the contexts of individual events.

#### 0.1.6.2 Analogies to Carolingian and early Ottonian disease and hunger

In Part 3, contexts are supplemented with analogies. With respect to disease outbreaks, analogies run the risk of presupposing continuity in demography, disease, economy, environments and medicine between mid eighth- through mid tenth-century Europe and other periods.<sup>150</sup> Because differences can be vast, it is essential to select suitable examples for comparison; pre-modern European cases seem especially well suited. As the impact of particular diseases varies and depends on the disease, an attempt is made when a working diagnosis is advanced to superimpose the modern experiential and laboratory knowledge of the suspected disease onto mid eighth- through mid tenth-century occurrences.<sup>151</sup> In concerning shortages, analogies run the risk of presupposing continuity in agriculture, demography, economy, environment and trade between the Carolingian and the Ottonian periods and earlier and later periods. Because agricultural, commercial, dietary, demographic, economic and environmental differences can be vast between periods, it is essential to select suitable examples for comparison; again pre-modern European-based comparisons seem especially well suited. Analogies, unlike contexts, allow us to discern features common to the pre-modern history of pestilence and shortage. In effect, they allow us to read through motifs found in Carolingian and early Ottonian accounts of pestilence and shortage, and to better establish both the impact of, and responses humans took to absorb, pestilence and shortage. As there undoubtedly are, as Golkin suggests, ‘universal features of famine’ in the pre-modern period,<sup>152</sup> there are also universal features of pre-modern outbreaks of disease.

#### 0.1.6.3 Working diagnoses

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<sup>150</sup> They also run the risk of reinforcing stereotypes about the early Middle Ages. Selecting points of comparison from war-torn Europe and the developing world, for instance, reinforces the idea that early medieval life was brutish and short.

<sup>151</sup> It is important to point out that unlike Grmek (1989) or Scheidel (2001), we are not here looking to later pre-modern periods in order to establish the identity of the diseases of the Carolingian and early Ottonian eras. Cf. nn. 287 and 356.

<sup>152</sup> Golkin (1987), pp. 17, 19, 21-3.

The oft-overlooked complexities inherent in the practice of retrospective diagnosis are surveyed in 1.2.1 and 1.2.2. It is suggested there that Carolingian and early Ottonian disease occurrences should not be retrospectively diagnosed in the traditional sense, and haphazardly and inconsequentially assigned a modern label, but that mid eighth- through mid tenth-century plagues can be diagnosed tentatively for heuristic purposes.<sup>153</sup> These working diagnoses first entail the comparing of the epidemiology and symptoms of mid eighth- through mid tenth-century epidemics/epizootics with diseases known to modern laboratory science in order to establish a plausible, or differential, identification.<sup>154</sup> Second, they require the superimposing of the modern science of the diagnosed disease onto what is known of the Carolingian or early Ottonian pestilence and the contexts constructed for mid eighth- through mid tenth-century outbreaks of disease. The heuristic superimposition of the modern epidemiology of the diagnosed disease onto a historical disease occurrence permits us to read beyond the sources and speculate further on the disease's prevalence, mortality and repercussions. Naturally this, like the consideration of the context of disease outbreaks and the drawing of analogies, generates hypotheses and

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<sup>153</sup> This is to say that there can be more than one 'category' of retrospective diagnosis. In recognizing that diagnosing retrospectively is undoubtedly complicated by a range of problems, Wallis refers to the revisionists as 'purists' when noting that it is not unreasonable to suggest that the practice of diagnosing holds several merits, particularly if identifications are labeled clearly as 'suggestive:' (2005), p. 515. The chief problem with existing retrospective diagnoses of pre-modern pestilences is that they are regularly said, or implied, to be definite. This, however, is implausible, as definitive diagnoses rely on multiple independent positive detections of 'modern' pathogens in aDNA (or aRNA) obtained from a number of individuals that is representative of the disease occurrence one wishes to diagnose. Without such biomolecular assistance, which has yet to be assembled for any pre-modern plague, identifications of diseases reported in texts remain mere suggestions. For similar claims, Drancourt and Raoult (2002), p. 107; Raoult (2003), p. 328. In this sense, Levine et al state that there is no evidence for the existence of cholera before the nineteenth century without aDNA: (1998), p. 265. Mitchell suggests that the archaeology of disease is 'complementary' to the insights obtainable from documentary sources: (2003), p. 171. The reverse is in fact true, see Horden (2000), p. 208; Roberts and Manchester (2005), pp. 1-2; Roberts (2009), p. 156. But if one lays ones cards on the table and plainly draws attention to both the difficulty of establishing definitive diagnoses and to the unknowns inherent in the diagnosis they advance, an identification – a 'working diagnosis' – may serve as a spring board for further research in the historical and natural sciences. Critical 'working' diagnoses, however suggestive or unverified, may serve to provide some direction for those in palaeomicrobiology and, as suggested in Part 1, to reassess the supposed antiquity and epidemiology of many 'modern' pathogens. If retrospective diagnoses are considered carefully and thoroughly, and if existing poorly-founded diagnoses are reconsidered, we can help rewrite the history and science of numerous pathogens known to modern science. Cf. Strauss, Strauss and Levine (1996), p. 141.

<sup>154</sup> It may be noted that few to diagnose retrospectively have considered epidemiology. The focus has rested heavily on symptoms. Uniquely, Cohn, and Scott and Duncan, seem to have favored epidemiology over symptoms when appraising the traditional diagnosis of the Black Death: Scott and Duncan (2001); Cohn (2002a, 2002b, 2008).



not hard facts. Yet, as a tool for model building, it serves to indicate how serious disease occurrences could have been. While the diagnoses advanced in this thesis are all mere suspicions, the superimposition of the rinderpest virus onto the cattle pestilences of 809/10, 868/70 and 939/42, or malaria onto the occurrences of ‘Italian fever’ and other feverish pestilences south of the Alps and along the Rhine, or cholera, dysentery and typhoid onto reports of diarrheas suffered during sieges, tells us much more about the possible impact that disease had in Carolingian and early Ottonian Europe.<sup>155</sup>

## 0.2 Definitions

*Acute infectious disease*: a disease of sudden onset, severe symptoms (e.g. high fever), and rapid course, caused by a pathogen whether spread between like animals or by a vector, exhibiting high morbidity and/or mortality, and potentially epidemic/epizootic (see below). Examples known to modern science include: contagious bovine pleuropneumonia, influenza, measles, smallpox and rinderpest.

*Ancient DNA (aDNA)*: DNA isolated from humans or other animals (or any biological matter) not specifically preserved for DNA analysis. For our purposes, aDNA is DNA derived from pre-modern human and livestock remains. In theory, however, aDNA can be a mere day old.

*Chronic hunger*: A constant, or long-term, state of inadequate food intake.

*Chronic disease*: In contrast to acute diseases, a chronic disease is indolent in onset and course; symptoms are often not severe, or only episodically so, and if it kills, it does so slowly. It may be caused by a microbial pathogen or a parasite; it can also be non-infectious (e.g. diseases of malnutrition, arthritis, vascular disease, degenerative diseases, cancer).

*Climate*: Long-term trends, of regional or interregional scales, in precipitation, temperature, weather and wind.

*Early Medieval Climatic Anomaly (EMCA)*: A period of colder, wetter climate often thought to span the roughly five hundred year period of c.300 to c.800 CE. The anomaly is now established via palaeoclimatic investigations of natural archives of past climate. The EMCA has also been referred to as the ‘Vandal Minimum,’ the ‘Late Roman Cold

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<sup>155</sup> In many ways the approach sketched here to diagnose pre-modern diseases reported in texts is similar to that which Cunningham recently criticized: (2009), pp. 408-09. However, there are some major differences between the approach adopted here and that which Cunningham questions: care is taken here to label diagnoses as provisional and the unknowns inherent in the practice of retrospective diagnosis are clearly demonstrated. Moreover, ‘modern’ pathogens are not purposely sought after in Carolingian or early Ottonian plagues.

Period,’ the ‘Late Roman Little Ice Age,’ the ‘Dark Ages Climate Deterioration,’ and, in relation to Alpine glaciers, ‘Goschenen II.’

*Early Medieval Pandemic (EMP):* A series of pandemics (fourteen for some, eighteen for others) thought by most modern scholars to have commenced *c.* 540 CE and concluded *c.* 750 CE. Traditionally, these pandemics are thought to have been bubonic plague. The EMP is also referred to as the Plague of Justinian, the Justinianic Plague, and the Justinianic Pandemic. EMP, coined by Horden in 2005, is used throughout this study as opposed to its other names as its supposed first and successive outbreaks transcended Justinian’s reign and dominion, the common bubonic plague diagnosis of the event remains uncertain, and the event truly was a pandemic. See 0.1.4.1.2 for more discussion.

*Endemic:* a disease of humans prevalent in, or of, a particular region.

*Endemic malnutrition:* A constant, or long-term, state of malnutrition that is the result of (and synonymous with) chronic hunger. ‘Endemic malnutrition’ is preferable to, or distinct from, the more general ‘malnutrition’ when referring to the constant state of malnutrition a people sustain, as ‘malnutrition’ is also sustained in the wake of food shortages and during famines (though in most instances this form of malnutrition is referred to as ‘epidemic malnutrition’ in this study).

*Enzootic:* a disease of non-human animals prevalent in a particular region (cf. endemic).

*Epidemic:* a widespread outbreak of acute infectious disease among a human population. Used interchangeably with pestilence.

*Epidemic malnutrition:* the state of sudden and severe malnutrition sustained by a community or people of a region, or regions, during a subsistence crisis. As such, epidemic malnutrition is distinct from endemic malnutrition.

*Epidemiology:* the study and patterns of a disease in human populations.

*Epizootic:* a widespread outbreak of acute infectious disease among non-human animals (cf. epidemic). Used interchangeably with pestilence.

*Epizootiology:* the study and patterns of a disease in animal populations.

*Famine:* A food shortage at the extreme of a hunger continuum. Defined in this thesis as a crisis that most often affects a region, multiple regions or a territory, likely lasts multiple successive years, engenders high prices of staple foodstuffs, produces a significant demographic response, and causes migration for food and/or work. See 2.2.1.1 for discussion.

*Food shortage/crisis:* A shortage of food affecting multiple people, most often a locale or region. Used interchangeably in this thesis with ‘dearth,’ ‘subsistence crisis,’ or ‘lesser food shortage,’ etc. A famine is a severe food shortage, but food shortage is not used in this thesis in reference to a famine.

*Historical climatology*: the study of past climate through written records.

*Infectious disease*: a disease caused by a pathogen that can infect a large number of people or livestock, whether spread between like animals or by a vector, but which does not necessarily in itself cause a large number of deaths. Examples known to modern science include: foot-and-mouth disease and malaria. Infectious diseases may be acute or chronic in character, endemic or epidemic.

*Lesser food shortages*: A shortage of food affecting multiple people, most often a locale or region. A food shortage that is less severe than a famine. Used interchangeably in this thesis with ‘food shortage,’ ‘subsistence crisis,’ ‘less-than-famine shortage,’ ‘non-famine shortage,’ or ‘lesser subsistence crisis,’ etc.

*Locale*: The nature of the written evidence prohibits precise definitions of ‘territory,’ ‘region’ and ‘locale.’ As demonstrated on a case by case basis in 1.4.2 and 2.4.2, the extant evidence does not allow us to identify the spatial parameters of pestilences or shortages with much precision. Imprecise definitions of region and locale are, however, needed. ‘Locale’ refers to a settlement/town and its environs, or a province. Examples from Catalogue 1 include Mainz and the province of Worms.

*Malnutrition*: a state of poor or inadequate nutrition. Malnutrition here refers to what in other studies has been described as under-nutrition, malnourishment or ill-nourishment. ‘Malnutrition’ may refer to epidemic malnutrition in the wake of shortages or the underlying current of endemic malnutrition.

*Material evidence*: evidence derived from physical remains or objects, whether humans, other animals, trees or ice.

*Medieval Warm Period (MWP)*: A period of warmer, dryer climate, preceded by the EMCA and succeeded by the early modern Little Ice Age, that is thought to have commenced sometime around 750 and to have concluded in the late thirteenth or early fourteenth century.

*Opportunistic disease*: A disease that is conditioned by the nutritional standing of the person, or animal, it affects. An opportunistic disease has a more severe toll on a person that is malnourished, or whose immune system is impaired. As such, opportunistic diseases are more likely to flare up and take a more significant toll on a population in the midst, or wake, of a subsistence crisis.

*Palaeoclimatology*: the study of past climate through ‘natural archives’ of past climate, such as ice cores, tree rings and varves, not written records.

*Palaeomicrobiology*: the biomolecular study of past disease, not based on written records or palaeopathology but on the examination of ancient DNA (or RNA) extracted from animal remains.

*Palaeopathology*: the study of abnormal variations (caused by disease, trauma, etc.) in physical human and other animal remains, skeletal or soft tissues.

*Panzootic*: a large outbreak of disease that affects non-human animals (cf. pandemic)

*Pestilence*: an outbreak of disease, whether pandemic/panzootic or epidemic/epizootic. See Acute infectious disease.

*Plague*: An outbreak of disease. The term is used sparingly throughout this thesis, however, and primarily in reference to bubonic plague or 'true' plague.

*Region*: The nature of the written evidence prohibits precise definitions of 'territory,' 'region' and 'locale.' As demonstrated on a case by case basis in 1.4.2 and 2.4.2, the extant evidence does not allow us to identify the spatial parameters of pestilences or shortages with much precision. Imprecise definitions of region and locale are, however, needed. 'Region,' on the other hand, refers to larger areas, which encompass several settlements and provinces, such as *Bavaria* and *Gothia*.

*Subsistence crisis*: A shortage of food affecting multiple people, most often a locale or region. Used interchangeably in this thesis with 'food shortage,' 'dearth,' or 'lesser food shortage,' etc. A famine is a subsistence crisis, but 'subsistence crisis' is not used in this study in reference to famine.

*Territory*: The nature of the written evidence prohibits precise definitions of 'territory,' 'region' and 'locale.' As demonstrated on a case by case basis in 1.4.2 and 2.4.2, the extant evidence does not allow us to identify the spatial parameters of pestilences or shortages with much precision. Imprecise definitions of region and locale are, however, needed. 'Territory' is used to refer to *Francia* and *Germania*, the two large areas of Carolingian and early Ottonian Europe that encompass several regions.

*Underlying current of disease*: a range of non-pestilential diseases, including chronic diseases caused by a pathogen, degenerative diseases, conditions that are the result of wear-and-tear, and endemic diseases that were present, perhaps ubiquitous, in some regions. This undercurrent contrasts sharply with epidemics and epizootics. It is more constant, and less pronounced and less episodic.

*Weather*: Short-term trends, on local and possibly regional scales, in precipitation and temperature.

*Written evidence*: evidence derived from written records.

*Zoonose/Zoonotic*: a disease caused by a pathogen that afflicts humans and other animals (adj. zoonotic).

## **Part 1**

### **The contours of disease**

Part 1 seeks both to reconstruct mid eighth- through mid tenth-century outbreaks of disease among human and livestock populations and to speak to the current of disease underlying episodic epidemics and epizootics in human and livestock populations.<sup>156</sup> Attention is also given to zoonotic infections as several written sources refer to large simultaneous mortalities of humans and domestic animals. Existing scholarship on the history of human and livestock disease in the Carolingian and Ottonian eras is surveyed first. Prevailing concepts about the disease history of mid eighth- through mid tenth-century Europe are outlined in 1.1. Subsequently, I consider the methodologies employed throughout Part 1. Here I thoroughly assess the practice of retrospectively diagnosing pre-laboratory occurrences of disease, delineate the pitfalls and benefits of indentifying pre-modern diseases reported in texts in modern medical terms, and introduce the concept of ‘working diagnosis.’ Consideration is also given to what palaeomicrobiology, and the advances made in the biomolecular sciences since *c.*1985, as well as palaeopathology, can tell us about disease in the Carolingian and Ottonian past. Following this, the textual evidence for Carolingian and early Ottonian chronic disease and non-epidemic episodes of acute disease is put forth, relevant palaeoscientific literature is surveyed, and preliminary comments about the nature and prevalence of chronic diseases and non-epidemic episodes of acute illness are given. The thesis then identifies mid eighth- through mid tenth-century disease outbreaks in time and space, and discerns – as best as is currently possible – the frequency of human and livestock pestilences. The demographic and economic impact of outbreaks of disease, together with the underlying current of disease, in Carolingian and early Ottonian Europe is tackled in Part 3.

#### **1.1 The historiography of Carolingian and early Ottonian disease**

Scholars have paid little attention to the human and livestock disease, pestilential and non-pestilential, of Carolingian and early Ottonian Europe. Until relatively recently the

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<sup>156</sup> For definitions of ‘ancient DNA,’ ‘epidemiology,’ ‘epizootiology,’ ‘palaeomicrobiology,’ ‘palaeopathology,’ ‘pestilence,’ ‘underlying current of disease’ and ‘zoonose’ see the Definitions (0.2).

disease history of early medieval Europe, from the fifth through the eleventh century in general, was but a footnote of the larger disease history of the Middle Ages, or rather of the Black Death. The recent but rapid growth in the study of the Early Medieval Pandemic (EMP), however, has in some respects served to fill in this gap. Yet much remains to be done, as EMP studies have occurred in a vacuum. Indeed, outbreaks of disease that modern scholars do not associate with the EMP remain widely neglected. In essence, the disease history of late antique and early medieval Europe has become one of the EMP, and this has served to skew readings of post-EMP outbreaks of disease. Pestilences that transpired after what is believed to have been the last early medieval outbreak of bubonic plague *c.* 750 are explicitly or implicitly thought to be less important, even marginal, in comparison to the damage of ‘true plague’ from the mid sixth through the mid eighth centuries.<sup>157</sup> The problems in this thinking are many, as discussed in 0.1.4.1.2.

This historiographical survey addresses pestilential and non-pestilential human and stock diseases in modern agricultural, cultural, economic, environmental, political and social histories of early medieval Europe as well as histories of disease and the lone article focused specifically on a Carolingian or early Ottonian pestilence: Gillmor’s 2005 study of the 791 equine epizootic. Literature in the natural sciences that touches upon the cattle pestilence of *c.* 809/10, and the supposed ergotism outbreak of 857, is also

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<sup>157</sup> There is one exception: an epidemic, possibly pandemic, reported in the *Libri historiarum* of Gregory of Tours the *Chronica* of Marius of Avenches in the late sixth century: Gregory of Tours (1951), IV.14; Marius of Avenches (1894), p. 238. While most EMP scholars ignore this pestilence altogether or grant it minor significance, some, chiefly medical historians and medical practitioners dabbling in history, have since the mid 1800s considered it a significant Mediterranean-wide epidemic. The pestilence, in fact, has long been aligned with a *variola* virus (primarily, it seems, on account of Marius’ usage of the term *variola*): see, for instance, Baas (1889), pp. 240-41; Broadbent (1934), pp. 4-5; Biraben and Le Goff (1975), pp. 59-60; Hopkins (1983), p. 24; Schreiber and Mathys (1987), p. 118; Bray (1996), p. 118; Crawford (2007), p. 107. Devroey, like many others, asserts that this outbreak marks the initial appearance of smallpox in Europe: (2003), p. 46. Yet opinion on the nature of this pestilence varies considerably. Marks and Beatty (1976), p. 62-5, suggest that the outbreak described was dysentery, Janssens (1983) argues for typhoid, and Blancou (2003), p. 162, claims the disease attacked cattle; cf. Carmichael and Silverstein (1987), pp. 147, 154. Gallagher (1969), pp. 138-39, suggests that the epidemic may have also affected the eastern Mediterranean and the Near East. He writes, ‘a siege of Mecca in 569 was supposedly relieved when large birds scattered showers of pebbles, each no bigger than a pea, over the besiegers. The pebbles adhered to their skin and the following day they were dead...’ Though he notes that there is little in Marius’ passage on which to base a conclusive smallpox diagnosis, and that solid evidence of smallpox in medieval Europe ‘remains circumstantial,’ he states that the disease Marius describes ‘probably was smallpox.’ Many disease historians neglect this pestilence altogether. Notably, Cunha (2004c) passed over this ‘smallpox’ epidemic in his history of smallpox. For pre-EMP pestilences of late antiquity see Todd (1977), Romer (1999) and Stathakopoulos (2004).

considered. The survey is not meant to be exhaustive but to illustrate, through representative examples, the principal positions taken by historians on disease in Carolingian and early Ottonian Europe.

### 1.1.1 Epidemics

General works on the history of disease tend to skip the Carolingian and early Ottonian period. McNeill, in his highly influential *Plagues and Peoples*, addresses no specific mid eighth- through mid tenth-century pestilence but absorbs these centuries into a period spanning 500 BCE to 1200 CE titled ‘The Confluence of Civilized Disease Pools.’<sup>158</sup> In these seventeen centuries, and thus in the Carolingian and Ottonian eras, McNeill visualizes ‘hosts and parasites’ moving toward ‘a more stable, chronic state’ and establishing a ‘fairly stable pattern of co-existence.’ Of late antique or early medieval disease occurrence, McNeill focuses primarily on the Early Medieval Pandemic and judges post-EMP pestilences less prevalent, less communicable and less acute. Pre-750 pestilences were more important it seems because they were bubonic plague and because there is supposedly more extant evidence for them. Likewise the infamous English pestilence of 664 documented at length by Bede (which McNeill does not, as many have, assert was *Yersinia pestis*) is thought more devastating than the other forty-nine pestilences, which he notes are reported in English sources between 526 and 1087.<sup>159</sup> These supposedly lesser pestilences are found in annals and chronicles, and are not described at length like the occurrence of 664.

For McNeill, as so many others, the significance of a pestilence is thought to be directly proportional to how much written data survives for it. Yet, in an period devoid of statistical information and regular record keeping, it is undoubtedly an error to gauge severity on the grounds of the quantity of surviving data alone, particularly when the ‘data’ is purely qualitative and the quantity of it depends heavily on variables that have nothing to do with the pestilence itself, such as the number of interested and literate observers alive at the time of the pestilence and the survival of texts over the centuries.

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<sup>158</sup> The following discussion of McNeill’s 1976 work is based primarily on pp. 113-17. Also see Horden (2000), pp. 204-05.

<sup>159</sup> McNeill got this tally from Bonser (1963): McNeill (1976), p. 292 n. 76.

That Bede, one of the most respected and prolific writers of the early medieval era, took interest in the pestilence of 664 does not in itself mean that that pestilence, or its supposed reappearance in the mid 680s which Bede also documented, was more severe (demographically or socio-economically) than the '*mortalitas magna*' recorded tersely in the *Annales Laureshamenses* in 786 or the '*magna et inmanis pestilentia*' reported in the Bavarian continuation of the *Annales Fuldenses* in the late ninth century, or, for that matter, any pestilence documented in mid eighth- to the mid tenth- century texts.<sup>160</sup>

Much in McNeill's account is inferred from indirect evidence for demographic and economic trends. That the economic and power centers of Europe moved north from the Mediterranean in the early Middle Ages, as Pirenne and many since have emphasized, illustrates, for McNeill, that the pestilences of the sixth and seventh centuries were a) primarily confined to the Mediterranean, b) more prevalent and acute than later early medieval disease outbreaks, c) rat-borne and Mediterranean ship-dependent bubonic plague, and d) that later disease outbreaks were not bubonic plague.<sup>161</sup> On the grounds that Scandinavian raids on continental and insular Europe increased in the ninth century, McNeill argues that Scandinavian populations had not been exposed to devastating outbreaks of disease prior to this period. German and Slav populations are also considered to have been relatively unexposed, based on the indirect evidence for population growth in central Europe; apparently only after 900 did German populations suffer a 'macroparasitic drain' like that experienced around the Mediterranean in the sixth and seventh centuries. Thus, in 'remote areas,' such as northern and central Europe, populations are thought to have grown unchallenged by disease through the earliest of the early medieval centuries.

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<sup>160</sup> On the pestilences documented by Bede see Maddicott (1997; reprinted with slight revisions in 2007); also see Bonser (1963), pp. 63-82, who addresses the relevant work of MacArthur and Strewsbury.

<sup>161</sup> In like fashion, McCormick has used reconstructions of the outbreaks of the EMP to establish early medieval communications and travel routes. In doing so, of course, he presumes that Yersin's diagnosis is correct, that the EMP was rat-borne and thus ship dependent, and that all the supposed EMP outbreaks of mid sixth through mid eighth century were in fact the product of the same disease: (2001), pp. 40-1, 109, 116, 419, 504-5, 512, 518, 589-90, 612, 753; idem, (2003), pp. 1-2, 7-8, 10-13, 25; cf. Horden (2005a), p. 156.



Though McNeill did a great deal of good for historical epidemiology and historians of disease by advocating the importance of pestilence in past societies,<sup>162</sup> his account of early medieval plagues relies on no serious assessment of the primary evidence for disease, but the application of a rather simple, and now dated, assessment of the demographic, economic and political history of the period, as well as what would now be regarded as an overly naïve approach to the diagnosing of historical outbreaks of disease, and to a rather basic knowledge of the extant evidence for disease. In this, however, he is not alone. That exposure to unfamiliar and demographically ‘crippling’ diseases declined dramatically over the early medieval period, and that Carolingian and early Ottonian centuries were unmarked by serious pestilences, is a mainstay of most existing scholarship on the history of disease.<sup>163</sup> Indeed, most histories of disease jump from the EMP to the Black Death, some briefly stopping to mention crusade-era pestilences. For example, though briefly noting the EMP, Watts in his *Disease and Medicine in World History* completely overlooks the Carolingian and early Ottonian periods and indeed all evidence for outbreaks of disease between the supposedly first and second series of bubonic plague pandemics.<sup>164</sup> The massive and authoritative *Cambridge World History of Human Disease* and what might be regarded as the abridged version, *Plague, Pox and Pestilence: Disease in History*, lightly skim over those pestilences that occurred between 767 (the last outbreak of the EMP in the latter volume) and the Black Death.<sup>165</sup> Zinsser in his path-breaking *Rats, Lice and History*, skips from the EMP to the crusade era. The latter, he tells us, was particularly disease-ridden.<sup>166</sup> Cartwright also jumps from the EMP to the crusades and purports that ‘contrary to popular belief, the European Middle Ages must have been a remarkably healthy period, free of killing pandemics which attacked Rome.’ He continues, ‘for nearly a thousand years there was

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<sup>162</sup> He was not, of course, the first to do so. As Cunningham observes, the first great historians of pre-modern disease (Davidson, Hecker, Haeser and Hirsch among others) wrote in the nineteenth century: (2009), pp. 407-08.

<sup>163</sup> This sort of thinking, though rarely explicitly stated and only implied, is found as early as Bertrand (1721), if not before. Gibbon (1788) also ignored non-EMP disease outbreaks, focusing only on the disease occurrences of the mid and late sixth century, which he thought marked one long continuous epidemic.

<sup>164</sup> Watts (2003).

<sup>165</sup> Surveys of world, European and medieval disease, and the historical relationship between famine and disease, as well as the many ‘biographies’ of specific diseases, in the *Cambridge World History of Human Disease* certainly leave the reader to believe that not much transpired between the great medieval ‘plagues:’ see, for instance, Stannard (1993a), Dirk (1993), O Neill (1993) and Ell (1993).

<sup>166</sup> Zinsser (1934).

relative freedom from major epidemics.<sup>167</sup> Karlen likewise notes that from the mid eighth-century ebb of the EMP (which he thinks roughly halved Europe's population) to the turn of the first millennium, Europe was quite healthy and free of disease. In these two and half centuries, in which the Carolingian and early Ottonian eras fall, humanity got, according to him, the 'rest it desperately needed.'<sup>168</sup> Stannard, who overlooks the EMP, thought that outbreaks of disease from 300 to 1300 were 'confined to specific geographical areas' and that few pestilences in this thousand-year stretch were of 'epidemic consequence.'<sup>169</sup> For Hays, after the EMP 'major epidemics were largely (and perhaps fortuitously) absent from the West until plague's return in the fourteenth century.'<sup>170</sup> And in his immensely popular *Guns, Germs and Steel*, Diamond, doubtless following McNeill, claims that Europe, Asia and North Africa developed into 'one giant breeding ground for microbes' before the Roman period thanks to trade and that nothing much happened between the 'first' and 'second' bubonic plague pandemics.<sup>171</sup> These are but a few examples from a large body of scholarship in the history of disease that express in one way or another that the mid eighth through mid fourteenth centuries were comparatively healthy and 'pathogenically calm.'<sup>172</sup> There are few exceptions.<sup>173</sup>

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<sup>167</sup> Cartwright (1983), pp. 274-75.

<sup>168</sup> Karlen (1995), pp. 79-80, 85. For Karlen, 'plagues' were not 'recurrent' in the post-EMP, pre-Black Death, period.

<sup>169</sup> Stannard (1993), pp. 37-8.

<sup>170</sup> Hays (1998), pp. 18-19, 34-5. Hays continues to stress that this was particularly the case during the two centuries leading up to the year 1000.

<sup>171</sup> Diamond (1997), pp. 205-06,

<sup>172</sup> For example, Broadbent (1934); Goodall (1934); Cockburn (1971), pp. 50-1; Biraben (1975); Marks and Beatty (1976); Gottfried (1982a), p. 676; Russell (1985); Schreiber and Mathys (1987); Bray (1996); Nikiforuk (1996); Cartwright and Biddiss (2000); Lee (2002); Snodgrass (2003); Hays (1998, 2005); Kiple (2006); Sherman (2006); Crawford (2007); Stathakopoulos (2008), pp. 311-12; Magner (2009). The articles in the two special issues of *Infectious Disease Clinics of North America* on the history of infectious disease likewise ignore mid eighth- through mid tenth-century disease occurrences: in particular Cunha (2004c), Cunha (2004d), Lim and Wallace (2004), Raoult, Woodward and Dumler (2004).

<sup>173</sup> Most medical historians have overlooked seventh- through thirteenth-century outbreaks of disease. Bray, however, mentions an outbreak of malaria in Louis the Pious' army in the 830s: (1996), p. 100. Sigerist also implies that the medieval period in general was one of 'raging' epidemic diseases, and Ell states that early medieval northern and southern Europe, after the EMP, 'saw its share of disease,' though he provides no examples: Sigerist (1943), p. 121; Ell (1993), p. 511. It should also be noted that it has not always been thought that epidemics became less frequent and pathogens less acute over the early medieval period. In his catalogue of 'natural disasters,' Short surveys the occurrence of disease throughout history and though his work leaves much to be desired by modern standards it is noteworthy that he singles out neither what is now considered the initial outbreak of the EMP nor its reoccurrences as being particularly severe. Nor does he suggest or imply that eighth- through tenth-century pestilences paled in magnitude to an earlier recurrent EMP: Short (1749), vol. I. pp. 66-93; idem (1749), vol. II. pp. 207-8. Though Short does document the

Not surprisingly, Black Death scholars also claim or imply that Carolingian and early Ottonian pestilences, like pre fourteenth-century outbreaks of disease in general, were typically minor and inconsequential. Most Black Death historians completely overlook the mid eighth through mid tenth centuries, not to mention the eleventh, twelfth and thirteenth centuries, on account of their belief that the EMP and the Black Death were *Yersinia pestis* and that this bacillus was absent from Europe between the last EMP occurrence and the mid fourteenth century.<sup>174</sup> Some do dabble in the intervening period, however. In his study on the Black Death, Gottfried writes that ‘from the late eighth through the mid-fourteenth century, Europe was remarkably free from most epidemic diseases’ and that while ‘there were isolated, often severe, infections,’ ‘most epidemics in this period were endemic, or linked closely to famine, malnutrition, or plant diseases.’ Unlike most Black Death scholars, however, Gottfried does draw our attention to a specific pestilence; one which he states took place in 870 but which has not been confirmed from any other source.<sup>175</sup> Benedictow claims that the EMP petered out *c.*750 and that notable outbreaks of disease in post mid eighth-century Europe were infrequent, because the early medieval economy ‘retreated,’ populations shrank, and travel and communications were ‘reduced.’ Similar to McNeill, Benedictow states that the rise of

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emphasis Procopius gave the initial EMP occurrence, the EMP does not even register in his list of major ancient and medieval disease outbreaks: cf. Short (1749), vol. I, p. 66, with Short (1767), p. 45.

<sup>174</sup> See, for example, Ziegler (1969), p. 15. This is also true of histories of the EMP.

<sup>175</sup> It is ultimately unclear what source(s) he was drawing upon. Though Gottfried spoke of a ‘severe’ but ‘unidentifiable’ epidemic in 870 that ‘swept through Western Europe killing perhaps 10 per cent of the populations of England and France,’ I have found no evidence for a human pestilence in 870. There is little indication of an outbreak of disease in this year among human populations (though there is evidence for what may have been a major epizootic, perhaps panzootic, among livestock, cattle likely, in central and perhaps western continental Europe): Gottfried (1983), pp. 10-2. Gottfried makes several errors, some of which have already been indicated. It is perhaps not inappropriate to speculate that Gottfried invented the 870 epidemic. Certainly other errors and assumptions mar his discussion on the history of disease in pre Black Death Europe. For instance, though he draws upon the correspondence of St. Cyprian, Gottfried labels the third-century Cyprianic Plague the Antonine Plague. Of course, the latter occurred while the Antonines ruled in the 160s. Of plant diseases, Gottfried writes only of ‘recurring epidemics of ergotism also called St. Vitus’ disease, which struck from the mid-tenth through the mid-eleventh centuries.’ Presumably, Gottfried mistook ‘St. Vitus’ disease’ for ‘St. Anthony’s Fire.’ St. Vitus disease is often associated instead with chorea, a neurological disorder caused by a variety of conditions (such as epilepsy, Huntington’s disease and rheumatic fever) and characterized by involuntary movements and contractions. These conditions cannot, of course, account for reported outbreaks of St. Vitus disease (or St. Vitus’ dance; see, for example, the *Annals of Ulster* 987.2 on CELT). Ergotism, on the other hand, which often causes seizures, may be indeed suspected as a probable cause of such outbreaks, though scarlet fever should also be considered in a differential diagnosis as it can lead to rheumatic fever. For further errors, see Jenks’ review (1986). Jenks points out that Gottfried’s assessment of the Black Death ‘borrowed’ heavily from pre-existing work. Nutton, in the introduction to *Pestilential Complexities*, too observes that Gottfried plagiarized wholesale from Zeigler: (2008), p. 7 n. 38.

Islam and the collapse of trade between Europe, North Africa and the Middle East broke patterns of disease transmission.<sup>176</sup> In his history of the Black Death, Kelly likewise states that ‘during the Early Middle Ages all forms of infectious illness became uncommon and plague (as far as is known) nonexistent. For this disease-free interim, the collapse of civilization deserves some credit.’ After the fall of Rome, Kelly notes ‘the environment in Europe became unfriendly to epidemic disease’ as ‘low population levels and the decline of urban life resulted in lower concentrations of people’ and, thus, less filthy and rodent-infected streets. Kelly further proposes that the resurgence of forests, restricted trade and travel, and the decline of international relations resulted in isolated populations, which in turn saw less opportunity for outbreaks of disease or reduced the transmission of infectious agents.<sup>177</sup>

For our purposes, one historian of disease has pushed farther than McNeill. In an ambitious attempt to chart all major epidemics in European history from the eighth century BCE through the end of the Middle Ages, Biraben has briefly drawn our attention to two Carolingian and early Ottonian pestilences, those *c.*876 and *c.*927, which he retrospectively diagnoses as influenza.<sup>178</sup> Biraben also attempts, throughout his study, to discern the pathocoenoses of Europe’s pre-modern past, that is, the range of diseases afflicting any one European population at a particular time or over a particular period. And in this regard he offers us more food for thought. He posits that a specific pathocoenosis existed in Europe, from *c.*800 CE to *c.*1100 CE, and, thus, that Carolingian and early Ottonians lived in a disease environment different than that of the late antiquity and high Middle Ages.<sup>179</sup> Biraben states this pathocoenosis was characterized by the retreat of smallpox, the diffusion of malaria from southern to northern Europe, recurrent

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<sup>176</sup> Benedictow (2004), p. 40.

<sup>177</sup> Kelly (2005), pp. 41-4.

<sup>178</sup> As demonstrated in Catalogue 1, Biraben’s first pestilence, like Gottfried’s pestilence of 870, does not appear in any contemporary sources.

<sup>179</sup> Biraben (1998), pp. 344-48. Of course, it was not too original of Biraben to suggest that a new era of disease came into existence in Europe *c.*800, as many hold that the EMP subsided in 750 (or 767) and that bubonic plague was ‘dormant’ or not present in Europe between the last outbreak of the EMP and the Black Death; further that this pathocoenosis ended *c.*1100 is in line with the old suggestion that the crusades marked a new era in European disease. What is unique, however, is Biraben’s application of Grmek’s terminology to already established ‘trends’ in the European history of disease (however representative these trends may, or may not, be). Clearly, McNeill would have extended this pathocoenosis to 1200. Grmek’s concept of pathocoenosis is described in 1.2.5. The cognate ‘pathogenic load’ appeared first, according to Horden (2000), in the work of Landers (1993).

outbreaks of influenza, and a low prevalence of leprosy.<sup>180</sup> Horden, in a study of medicine and disease *c.*1000, has critiqued Biraben's efforts, noting rightly the difficulties inherent in attempting to establish accurate accounts of any pre-modern (or pre-laboratory) epoch or region's pathocoenosis – a subject we shall return to in 1.2.5.<sup>181</sup> While problematizing the very act of diagnosing retrospectively and challenging scholarly attempts to see past biological realities through medieval texts, Horden does note that though disease around the year 1000 may be particularly difficult to grasp, due to the meagre quantity of the extant source material, more may be done for the centuries leading up to the end of the first millennium CE, the Carolingian and early Ottonian periods.<sup>182</sup>

General histories of medicine over the last century also tell us little about mid eighth- through mid tenth-century disease. Many show concern neither for Carolingian and Ottonian pestilences nor for the EMP or what are now thought to be subsequent waves of the EMP.<sup>183</sup> For Major, for instance, no pestilence is worth mentioning between the Athenian Plague *c.*430 BCE and the Black Death.<sup>184</sup> And those that do acknowledge the EMP tend to ignore those outbreaks that followed in its wake. Nutton, for instance, suggests that Europe was 'relatively free from even regional epidemics' between the EMP and the Black Death and that disease occurrences from the mid eighth to the mid

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<sup>180</sup> These suggestions are addressed in detail below. Suffice it to say here that Biraben provides very little support for these observations.

<sup>181</sup> Horden (2000), pp. 205-06; cf. Horden (2008a), p. 685.

<sup>182</sup> How much more is detailed below in 1.3 and 1.4. Horden: (2000), pp. 206-09.

<sup>183</sup> For example, Garrison (1913); Porter (1997); Singer (1962). Osler skims over the period but does write of Pope Gregory the Great 'chanting a seven-fold litany of intercession against the plague' (1921), p. 86. For Seelig, the early Middle Ages, however dark, were 'merely fallow years during which the human mind became fertile soil for the growth of the new learning that was to replace the long period of sterility.' (1931), p. 44. Though much is made of Rhazes' treatise on 'smallpox/*variola*' and 'measles/*morbilli*' (for instance: Hirsch (1883), pp. 123-24; Broadbent (1934), p. 5; Meyerhof (1935); Marks and Beatty (1976), pp. 54-7; Roberts (1978), pp. i, 6; Hopkins (1983), p. 27; it is also noteworthy that the edition of Greenhill – Rhazes (1848) – applies retrospective diagnoses throughout and questions not at all whether Rhazes' 'smallpox' is the same as our modern smallpox) it appears no one has gone so far to state either smallpox or measles actually appeared in mid eighth- through mid tenth-century continental Europe. Oldstone (1998), p. 30, notes that the Islamic expansion of the sixth through eighth centuries introduced smallpox to North Africa and Europe and that by 1000 several epidemics had been documented, though he fails to specify where and when; cf. Bollet (2004), pp. 76-7. Measles is also very hard to discern in extant medieval sources. Hirsch (1883), pp. 154-55, 171, suggests that *morbilli* could have just as often been scarlet fever as measles. As he notes, *morbilli* is rarely assigned specific symptoms.

<sup>184</sup> Though Major likely refers to the EMP when noting that 'even before the Black Death, epidemics of plague were by no means uncommon in Europe:' (1936), p. 8.

fourteenth century were merely ‘sporadic’ and ‘local.’<sup>185</sup> Until relatively recently the early medieval period has been dismissed as a ‘period of depression’ in the history of medicine, an age in which healing retreated to monasteries and when ‘superstitions crept in and medicine deteriorated into a collection of formulae, punctuated by incantations;’ in the early medieval period, it is said, medicine, like all sciences, were ‘paralyzed’ by the fall of Rome and barbarian migrations.<sup>186</sup> The implication in many older histories of medicine, then, is that from the fall of Rome, or for some the death of Galen, until the ‘awakening’ of the west in the Renaissance, disease was rife and unopposed, and that in the Carolingian and Ottonian periods, thus, disease continuously suppressed populations without remission.<sup>187</sup> Still, while generalizations about the regularity and severity of disease have been made, few medical historians have drawn attention to any specific pestilences.<sup>188</sup> Naturally, most histories of medicine, whether focused on the medieval period or not, concentrate on medicine and not disease; but as Wallis has recently stressed, attempts should be made to understand the pathogenic context of any era’s medical history.<sup>189</sup>

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<sup>185</sup> Nutton (1995b), p. 191.

<sup>186</sup> The quotes are from Singer (1962), p. 68-9 and Garrison (1913), p. 130; also see, for example, Osler (1921), pp. 84-5; Wilkinson (1992), p. 18; Porter (1997), pp. 92, 106. Krumbhaar (1958), pp. 288-99 gives a more nuanced take. But now see Amundsen (1971), Contreni (1981), Flint (1989), Paxton (1993, 1995), Skinner (1997, 1998), Wallis (1998, 2000, 2009, forthcoming), Fischer (2000), Horden (2000, 2008b), and Pilsworth (2000, 2009). As these scholars demonstrate, early medieval medicine, like early medieval Latin, is best examined on its own terms and not judged by comparisons to classical or post-medieval medicine. Now see Horden’s defense of early medieval medicine: (forthcoming).

<sup>187</sup> For example, Bonser (1963), p. 51; Talbot (1967), p. 169; Ruben (1974), p. 73; Park (1992), p. 60, 64; also Benedictow (2004), p. 40. Talbot (1967), p. 159, states that during the Middle Ages ‘the people of Europe were subjected to a succession of epidemics such as has never been experienced before or since’ and that ‘for nearly a thousand years the population of Europe was constantly decimated by the recurrence of one or other of these plagues and little could be done.’ This mode of thinking has a long tradition: Baas (1889), p. 238, labels the Middle Ages ‘the age of epidemic diseases,’ though he stresses, like many others, that major outbreaks only occurred at the beginning and end of the period. Many scholars claim that early medieval peoples did nothing in the face of epidemic diseases other than ‘fasting, prayer and penance.’ The implication then is that medicine before and after the early medieval period could neither save lives nor prevent the dissemination of diseases.

<sup>188</sup> Drawing on the mid twelfth-century Annalista Saxo, Fort long ago noted that in early ninth-century Germany ‘mortality was so great that in the convents religious services were abandoned’ and that a pestilence could be traced with ‘unusual discrimination’ to a plague of locusts later in the ninth century (presumably 873): (1883), pp. 349-51.

<sup>189</sup> Wallis (forthcoming). Also see Horden (2000), p. 204. Rosenberg (1989), p. 1, suggests that a survey of a period’s medical and disease history are complementary, and that the latter should precede the former. Notably, the *Cambridge History of Medicine*, ed. Potter, (2006) begins with a brief survey of disease. Yet most histories of medicine do not. Grattan and Singer’s assessment of Anglo-Saxon medicine (1952), for instance, makes no serious attempt to appreciate what early medieval English medicine was up against. Siraisi’s remarks on early medieval medicine are not accompanied by any discussion of the diseases that

Some histories of Carolingian and early Ottonian culture, economy, politics and society have also weighed in on the disease history of the period, though again here little attention has been given to the wealth of extant evidence, written or material, or the contours of individual pestilences.<sup>190</sup> Nelson briefly touches on the ‘Italian’ epidemic of 836 as well as outbreaks of disease among the army of Louis the Pious in 839, and later ‘dysentery’ among a Viking force.<sup>191</sup> Leyser has asserted that disease regularly afflicted human and animal resources on campaign, particularly, he emphasizes, as they traversed unfamiliar areas and ‘lived off unfamiliar food.’ For him, disease was ‘ever-present’ at sieges. Though not large outbreaks of disease, he draws specific attention to an episode of ‘dysentery’ and ‘diarrhea’ among troops in 867.<sup>192</sup> Based on the capitulary of Thoinville, De Jong thought an epidemic racked Europe in 805 and Collins has referred to an epidemic *c.*800.<sup>193</sup> Butt suggested that ninth-century pestilences can be attributable to mild winters, though he mustered no evidence to support his claim, and Verhulst considered, though only briefly, the cattle pestilence of 809/10, which he deemed zoonotic.<sup>194</sup> Others have simply suggested that the Carolingian and Ottonian periods

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marked the period or, for example, the prevalence of disease, or the frequency or severity of epidemics: (1990), pp. 10-13. Contreni (1981), in his short assessment of medicine in the reign of Charles the Bald, also makes no note of the disease context. Horden also touches lightly on disease occurrence in his recent surveys of early medieval disease and healing (2008a, 2008b), as does Amundsen (1971); Ell (1978); Flint (1989); Paxton (1993, 1995); Nutton (1995a); Fischer (2000); and Pilsworth (2000). Park (1992), pp. 60-4, presents a short pathogenic background to her assessment of medieval medicine. While not pointing to any specific Carolingian or early Ottonian pestilence, she notes of ‘grim litanies of epidemics that mark early chronicles.’ Fort also provided some backdrop of disease, however meager, to his account of medieval medicine: (1883), pp. 348-65. Skinner’s work on early medieval southern Italy (1997, 1998) primarily considers material post 950.

<sup>190</sup> For instance, Fichtenau (1957), p. 150, 178-79; Hollister (1982), pp. 213, 224.

<sup>191</sup> Nelson (1992), pp. 99, 103, 136, 152. Duckett (1962), p. 53, also addressed the former and seems to have thought it was caused by bubonic plague. She states, ‘an epidemic of plague was raging.’

<sup>192</sup> Leyser (1994), p. 44. It is fair to say that the military-disease relationship in the early Middle Ages has been understudied. Smallman-Raynor and Cliff’s recent opus on war epidemics briefly considers the Middle Ages but completely overlooks the sixth- through eleventh-century occurrence of wartime disease (though they attempt to associate the dissemination of the initial occurrence of the EMP to Byzantine wars with the Persians and Goths, and state that there is ‘very little evidence’ about disease in association to Viking raids). They also neglect the effects of war-related disease outbreaks among early medieval military, civilian and animal populations in Europe: (2004), pp. 6-7, 73-82. The military-disease relationship in the early Middle Ages certainly requires more attention than it has been given considering that prior to the early twentieth century far more deaths in military and civilian populations during periods of strife resulted from disease and not battle: Smallman-Raynor and Cliff (2004), pp. 32, 34-5.

<sup>193</sup> De Jong (2005), p. 128; Rogers (2005), p. 66.

<sup>194</sup> Butt (2002), p. 53; Verhulst (2002), p. 25. Verhulst states the cattle pestilence started in cattle and ‘sparked over to men.’

were regularly racked by disease.<sup>195</sup> Wallace-Hadrill, for example, states, without explanation, that Charlemagne's heirs inherited a 'plague-ridden' countryside,<sup>196</sup> Weinberger observes that a careful reading of the 'ravages of disease' reported in the *Annales regni Francorum* conveys a sense of the 'hazardous life' of Carolingian peoples,<sup>197</sup> McKitterick notes that famine and its attendant disease were 'often realized',<sup>198</sup> and Duckett writes that 'plague' swept Carolingian lands 'ever and again' and 'sowed death far and wide'.<sup>199</sup>

Socio-economic historians, on the other hand, often point to the mid eighth through mid tenth century as a period of demographic growth, as we have seen in 0.1.4.1. Yet rarely does disease enter their discussions.<sup>200</sup> Few have discussed the overarching history of Carolingian and early Ottonian pestilences in any depth, outlined specific outbreaks among human populations in detail, or even mentioned specific outbreaks of disease, whether local or interregional. Yet very different disease occurrences have been cited: large outbreaks of acute infectious disease capable of disseminating rapidly between humans (influenza pandemics); episodic and locale fungal intoxications stemming from weather and agricultural practice (ergotism); periodic and local, but highly devastating, sicknesses of military marches and sieges (dysentery); and endemic diseases particular to certain regions and spread by an arthropod vector (malaria). Still, little effort has been devoted to examining the prevalence of acute and contagious diseases, both episodic and persistent, the severity and extent of disease over the period,

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<sup>195</sup> For example, Munz (1969), 19; Ell (1993), p. 511; Fichtenau (1978), pp. 135, 150. None of these authors, nor Wallace-Hadrill, McKitterick and Duckett below, support their hypotheses. Their assessments nevertheless seem more in line with the evidence than those of the disease already addressed and economic historians touched upon below.

<sup>196</sup> Wallace-Hadrill (1962), pp. 140-41,

<sup>197</sup> Weinberger (1973), p. 375.

<sup>198</sup> McKitterick (1983), p. 20.

<sup>199</sup> Duckett (1962), pp. 21, 33.

<sup>200</sup> Devroey's 2003 socio-economic history of early medieval France provides one of the few discussions about disease in the Carolingian period, yet his discussion only indirectly touches upon the Carolingian period, is brief, and focuses solely on tuberculosis: pp. 46-7; also see Pearson (1997), p. 31. Drawing upon a study of fifteen early and high medieval grave sites in northern France, Devroey suggests that tuberculosis really became important, at least initially, in northwestern Gaul in the first half of the sixth century and remained so until at least the thirteenth century. A noticeable increase in TB pathology can be discerned, Devroey comments, over three phases within this period. Incidence increased markedly from the first phase (spanning the fourth to the fifth centuries) to the second phase (spanning the sixth to the eighth centuries) and then again to the third phase (spanning the ninth to the thirteenth centuries).



or the ability of contemporary populations to tackle or absorb disease outbreaks. And the temporal and spatial contours of pestilences have been ignored.

Further, no critical attention has been given to the matters of retrospective diagnosis, the reliability of the sources, how well we can reconstruct the temporal and spatial parameters of outbreaks of disease, the conceptual and rhetorical devices used by Carolingian and Ottonian authors when describing disease events, or even the place and time of the composition of the texts that record pestilences. What disease meant culturally to Carolingian and Ottonian authors, that is, how they wrote about and ‘used’ disease in their narratives and writings, too requires consideration. Above all, comment on mid eighth- through mid tenth-century pestilences has been rooted in presumptions about population and, it seems, the idea that the rule of a strong political ruler, Charlemagne, and a re-energized economy (or, for pessimists, a stagnating or failing economy) produced a healthier generation of a healthier population (or, for pessimists, a population as healthy as that which came before it), at least healthier than that which came before, which was weighed down by recurrent outbreaks of bubonic plague. Of course, what impact or repercussions disease may have had in Carolingian and early Ottonian Europe, and how we might attempt to assess that impact, requires comment as well. By and large, mid eighth- through mid tenth-century populations have been considered immune to the impact of forces exogenous or external to rural economy and society. This study aims to change that focus.

### 1.1.2 Non-pestilential disease in humans

While Carolingian and early Ottonian pestilences have yet to receive their due, even less concern has been devoted to the written or material evidence for the less episodic and pronounced current of disease underlying epidemics. Whether chronic and non-epidemic illnesses carried more demographic and economic weight than intermittent outbreaks of communicable diseases is another topic, one which has been much debated for other pre-modern periods.<sup>201</sup> Non-pestilential disease is revealed in a wide array of written sources,

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<sup>201</sup> For instance, Cunningham (2009), p. 407, suggests that chronic diseases were more important, while Grmek (1989) suggests the opposite: Shaw (1991), p. 332.

though we primarily read, at least in annals, chronicles and histories, of the debilitating sicknesses of secular and religious elites. As Horden and several others have stressed, the non-pestilential ailments of early medieval commoners appear most regularly in the hagiography.<sup>202</sup> While no systematic study of non-pestilential illness has been undertaken, Biraben has tentatively inferred the prevalence of several modern diseases in the early Middle Ages,<sup>203</sup> and Kroll and Bachrach have devoted some time to early medieval occurrences of diseases of individuals.<sup>204</sup>

There is a risk always of overlooking the non-pestilential diseases of past eras, as epidemics are quite plausibly disproportionately represented in all pre-modern historical sources.<sup>205</sup> As palaeopathologists Roberts and Manchester suggest, the mundane, common and ‘far from spectacular’ infections are underrepresented in the written (and visual) sources pre-modern peoples have left us. Though we should not assume that the disease history of any epoch was one solely of epidemics, few scholars have surveyed occurrences of disease at the individual level in medieval Europe or pushed beyond the written record to survey some of the material data available for non-pestilential disease in early medieval populations. Horden surveys some palaeopathological data derived from English and Italian remains dating to around 1000,<sup>206</sup> Laiou looks at some chronic disease in Byzantine sources,<sup>207</sup> Crawford surveys some palaeopathological studies of Anglo-Saxon remains and concludes that osteoarthritis was ‘prevalent’ and leprosy not unknown,<sup>208</sup> Fowler asserts that rheumatoid arthritis was ‘common’ and cancer ‘uncommon’ in Anglo-Saxon England,<sup>209</sup> and Karlen suggests that arthritis was common

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<sup>202</sup> Horden (2008b), *passim*; (2008a), p. 685. Also see Flint (1989); Pilsworth (2000).

<sup>203</sup> Biraben surveyed a wide range of ‘commonplace afflictions’ in ancient Greece and hypothesized that the same afflictions would have been common in early medieval Europe, though he did not consult any early medieval evidence: (1998), pp. 326-33, 336. He proposed illnesses of the respiratory and digestive tract, afflictions of bones, joints, skin and the nervous system, gangrenes, jaundices, tuberculosis, and parasitical infections of the digestive system were common. He claimed that these diseases would have been ‘found in every era.’

<sup>204</sup> Kroll and Bachrach (1986).

<sup>205</sup> Cf. Cunningham (2009), p. 407.

<sup>206</sup> Horden also warns of the limits palaeopathology: (2000), pp. 209-10, (2008a), p. 685. This is discussed in more detail in 1.2.4.

<sup>207</sup> For instance, Laiou (2002), p. 55; Horden (2008a), p. 685-86.

<sup>208</sup> Crawford (2009), pp. 179-81. She also notes that tuberculosis was not ‘uncommon.’

<sup>209</sup> Fowler (2002), p. 254.

in Carolingian Europe and then contemporary England.<sup>210</sup> In her construction of a ‘theoretical’ early medieval diet, Pearson draws attention to what were likely, she proposes, the common chronic ailments: anemia, beriberi, osteoporosis, periodontal disease, rickets, and scurvy. Pearson’s discussion, however, is based not so much on written or material evidence for these ailments but on the premise that early medieval peoples suffered malnutrition and that these deficiency diseases, considering the early medieval diet, must have been common.<sup>211</sup>

Few other than Pearson have suggested any overall trends in the early medieval incidence of disease at the individual level. While Pearson has proposed that early medieval populations were generally hampered by chronic diseases, Crawford has proposed that Anglo-Saxons appear to have been ‘relatively healthy’ and Devroey has written that while poliomyelitis, rickets, and other vitamin-deficiency related conditions are not unknown among early medieval skeletal assemblages, human remains ‘seem to indicate everywhere’ a significant decrease in malnutrition and chronic disease beginning in the eighth century.<sup>212</sup> Ó Corráin, on the other hand, reports that multiple pathologies ‘characteristic of deficiency diseases’ were common in Ireland c.800 and Hays thinks that population health only improved, at least markedly, after the turn of the first millennium CE. For Hays, ‘population as a whole was almost certainly “healthier” in 1150 than it had been in 900.’<sup>213</sup>

While written evidence for non-pestilential illnesses in Carolingian and early Ottonian Europe provides some insight, palaeopathological and palaeomicrobiological studies of excavated remains, furnish a better avenue to offset the bias that the majority of the textual sources have for dramatic outbreaks of disease. Interdisciplinary

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<sup>210</sup> Karlen (1995), p. 80. Also see Hollister (1982), p. 172; Hays (1998), p. 18. The latter specifies the presence of rickets and scurvy in the early Middle Ages.

<sup>211</sup> Pearson employs some palaeopathological assessments of early medieval remains excavated in modern Germany, but her position is based mainly on modern nutritional sciences: (1997), pp. 29-31; see n. 783. A general dearth of palaeopathological assessments of early medieval skeletal remains cannot be ignored. More is made of the association between malnutrition and chronic disease in 2.3.

<sup>212</sup> Crawford (2009), p. 179-81; Devroey (2001), pp. 101, 104; idem (1987), p. 88. Crawford considers height a proxy for health and notes that Anglo-Saxons were taller than previous Romano-British peoples. Though he presents some data to support his position, Devroey’s stance appears to owe more to his position on Carolingian demographic trends, and an idea of a ‘healthier’ Carolingian population, than anything else. In his later work, Devroey also comments on the ability of bones to tell us more about the nutrition of early medieval peoples: (2003), pp. 49, 67.

<sup>213</sup> Ó Corráin (2005), p. 579; Hays (1998), p. 19. Neither of these scholars, however, provide much evidence to support their propositions.

assessments of material remains not only reveal more information about chronic illnesses but provide room for tentative identifications of some non-pestilential diseases commonly encountered in texts, though the problems, as demonstrated below, in interpreting and synthesizing the material data are many. Most problematic for us at present is the dearth of palaeopathological and palaeomicrobiological assessments of Carolingian and early Ottonian remains. Still, an attempt is made in 1.3 to survey a wide sample of written evidence and palaeopathological and palaeomicrobiological literature in order to establish a history of non-pestilential disease in mid eighth- through mid tenth-century continental Europe.

### 1.1.3 Epizootics and non-pestilential disease in livestock

The livestock disease of Carolingian and Ottonian Europe has also been widely overlooked. In fact, very little detailed work on European livestock disease before the great cattle panzootics of the eighteenth century has appeared.<sup>214</sup> Several ‘catalogues’ of ancient, medieval and early modern outbreaks of livestock disease do exist, but, like the catalogues of pre-modern outbreaks of disease among human populations (or catalogues of subsistence crises and episodes of extreme weather) they offer little more than references to primary sources.<sup>215</sup> Some surveys of modern veterinary history and livestock disease also suggest, though they rarely actually draw on medieval evidence, that in the pre-modern period livestock, especially cattle, were routinely devastated by

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<sup>214</sup> Curth (2002, 2007, 2010) has drawn attention to the great number of veterinary texts that appeared in early modern England, though she has paid no attention to early modern disease occurrences or whether the growth of such veterinary materials coincided with increased incidence of disease among stock. Of course, an influx of veterinary texts in this period may have been sparked by enclosure, enterprising farming, cheaper books, and expanding literacy, not necessarily a higher incidence of disease. Steger (1986) has briefly addressed some late medieval and early modern pestilences he thought to be rinderpest, and Newfield (2009) has highlighted a major outbreak of disease among cattle in early fourteenth-century central, northern and northwestern Europe. On the eighteenth-century European cattle panzootics see, for example, Mullet (1946); Dorwart (1959); Faber (1962); Jones (1978), pp. 116-18; Broad (1983); Wilkinson (1992), pp. 35-64; Huygelen (1997); Spinage (2003), pp. 103-160; Appuhn (2010). Several of these authors, the latter in particular, hypothesize that major outbreaks of disease among livestock did not occur before the eighteenth century in Europe. In a survey of veterinary medicine from ‘the dark ages to the enlightenment,’ Wilkinson, in contrast, makes no note of any particular early medieval livestock pestilence, but implies that major outbreaks did occur: (1992), pp. 17-34.

<sup>215</sup> Between 750 and 950 CE, Fleming (1871) notes over twenty animal pestilences, mainly of cattle, in various regions of Europe, Ireland in particular. See 0.1.3.1 for more comment on catalogues like Fleming’s.

disease and that ‘infections naturally must have spread without hindrance.’<sup>216</sup> That disease spread uninterrupted among stock in pre-modern Europe is also found in a few agricultural histories.<sup>217</sup> Like medical histories, studies of medieval or pre-modern veterinary history (or pre-modern veterinary medicine) have generally focused on the therapies applied rather than actual disease occurrences.<sup>218</sup> In cultural, economic, political and social histories, however, some attention has been given to Carolingian and early Ottonian stock pestilences, particularly the equine pestilence of 791 and the cattle pestilence of 809/10. Fort, Butt, Collins, and Hyland have cited the former, and Fort, Mombert, Fichtenau, Leyser, Collins, Verhulst and Devroey the latter.<sup>219</sup> Devroey also refers to an animal mortality in the 820s and Doehaerd momentarily draws our attention to outbreaks of disease among cattle in 843 and 942. McCormick, Dutton and Mayewski, in their survey of Carolingian-era hard winters, also suggest that some ninth-century epizootics may have been tied to climatic shocks, though they do not point to any specific occurrences or develop their suggestion.<sup>220</sup>

In general, early medieval livestock disease has been but a footnote in the scholarly enquiry into early medieval socio-economic and agrarian conditions.<sup>221</sup>

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<sup>216</sup> This is seen in, for instance, Barton (1956), p. 505, Baker and Brothwell (1980), p. 8, Schnurrenberger, Sharman and Wise (1987), p. 9, Dunlop and Williams (1996), pp. 208-09. But this thinking has a long history: see Playfair (1866), pp. 7-9.

<sup>217</sup> The quote, for instance, is from Trow-Smith (1957), p. 130. Holmes (1936), pp. 349-50, notes epizootics were always liable to ‘overwhelm’ medieval farmers.

<sup>218</sup> For example, in their medical history of early medieval England, Grattan and Singer (1952), pp. 176-79, note that the *Lacunga* contains charms for sick livestock (specifically cattle, sheep and pigs). The authors do not, though, look at actual evidence for disease among stock or, rather, the disease context of the text. Also see Davidson (1960), 288-89; Bonser (1963), p. 56.

<sup>219</sup> Fort (1888), pp. 350-51; Butt (2002), p. 42; Collins (1998), pp. 94, 170; Hyland (1994), pp. 65, 177 n.83; Mombert (1889), pp. 446-47; Fichtenau (1978), pp. 174, 180; Leyser (1994), p. 45; Verhulst (2002), p. 25; Devroey (2003), pp. 66, 76. Also see Duckett (1962), p. 83, Baker and Brothwell (1980), p. 7.

<sup>220</sup> Devroey (2003), p. 77; Doehaerd (1978), pp. 2-3; McCormick, Dutton and Mayewski (2007), p. 892; Brázdil et al (2005), p. 403. Several scholars of medieval Europe (principally the fourteenth century) have recently sought to tie outbreaks of disease among livestock to specific weather events. However, no one has yet to advance any ‘proof’ of the matter; scholars have simply indicated that a particular outbreak coincided with a weather event. This line of thinking ultimately rests more on coincidence than anything else. See, for example, Epstein (2009), p. 162; cf. Newfield (2009), p. 177 n. 88. As Campbell (2010), recently suggested, any connection was likely subtle and requiring of a more nuanced approach. Major outbreaks of livestock disease, like the fourteenth-century cattle panzootic or the rinderpest panzootics of the eighteenth century, have transcended regional weather episodes and/or irrupted before or persisted after particular weather episodes.

<sup>221</sup> In addition to the scholarship that address Carolingian and early Ottonian livestock pestilences, several other works have quickly touched on non-Carolingian early medieval outbreaks of disease among stock (primarily cattle): for example, Dill (1926), p. 254; Trow-Smith (1957), pp. 49-50; Bonser (1963), p. 58, 83; Doehaerd (1978), p. 2; De Nie (1979), p. 278; Baker and Brothwell (1980), p. 8; Davies (1982), p. 31;

Gillmor's paper on the 791 horse mortality, which represents the only publication to assess any Carolingian or early Ottonian pestilence, is the one exception. Gillmor identifies the years 792, 793 and 794 as representing a sharp contrast to Charlemagne's previous decades of near constant military activity. She ascribes the king's lack of campaigning in these years to the equine epizootic reported in the revised *Annales regni Francorum*. In 793, Charlemagne faced a 'general revolt' of the Saxons, the Saxon defeat of a large contingent of his auxiliaries under the command of Count Theodoric, and Muslim incursions into southern France. And he did nothing about it. As is argued at length below, Gillmor assigns too little explanatory weight for the king's inactivity to the attempt on his life in 792, the actions he undertook to connect the rivers Rezat and Altmühl via a massive ditch, and, perhaps most importantly, the great famine of the early 790s. Nevertheless, this epizootic, which was likely limited to the horses Charlemagne brought as far as Savaria (Szombathely) in northwestern Hungary, likely had significant military repercussions.<sup>222</sup>

The cattle mortality of 809/10 has long been held in the veterinary sciences to be one of the earliest identifiable outbreaks of the rinderpest virus (RPV) in history. Yet the diagnosis of this possible panzootic is not founded on any detailed survey of the evidence available for the outbreak or, puzzlingly (considering the implications of the diagnosis evident in several assessments of the evolution of RPV and other *morbilliviruses*), serious consideration of the diagnosis' validity and origins.<sup>223</sup> Similar attention to non-

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Farmer (1988), p. 720; Edwards (1990), p. 57; Hagen (2002), pp. 28, 61, 75, 322; Fowler (2002), p. 230; Devroey (2003), pp. 26, 44; Stathakopoulos (2004), pp. 162-163; Ó Corráin (2005), pp. 575-76, 581; Smith (2005), pp. 63, 65, 209; Morony (2007), p. 72; Sallares (2007), p. 239. Hagen (2002), p. 61, envisions a major cattle pestilence affecting England c.800. Wickham (1983), in an otherwise very informative survey of early medieval pastoralism (or the absence of 'pure' pastoralism in early medieval Europe), wholly neglects animal disease.

<sup>222</sup> Gillmor (2005). Gillmor tends to accept the sources at face value. This is perhaps most clear in her adoption of the reviser's claim that nine out of ten horses died (pp. 25, 35, 45). Her uncritical adoption of this claim affects her interpretation of the pestilence's identification, impact, and spatial and temporal contours. As discussed in Part 2, historians of the economic history of the period have occasionally attached great agency to the food shortage of the early 790s and ignored this potentially severe equine mortality.

<sup>223</sup> For instance, Spinage (2003), pp. 3, 83, 89; Scott (1996), p. 8; Scott and Provost (1992), p. 1; Fleming (1871), pp. 45-46; Blancou (2003), p. 184; Hutyra and Marek (1926), p. 292; Dunlop and Williams (1996), p. 209; Roeder (2005), p. 1262; Mutch (2005), p. 42. The cattle pestilence of 590, found Gregory of Tours' *Libri historiarum*: (1951), p. 525, has likewise been labeled an early occurrence of rinderpest by veterinary specialists without much consideration of the evidence available. See, for example, Spinage (2003), p. 89; Pastoret et al (2006), p. 88; cf. Fleming (1871), p. 41; Dunlop and Williams (1996), p. 209. The first European outbreak of RPV on record is often thought to have occurred in the late fourth century CE. However, not only has the validity of the diagnosis yet to be addressed but there appears to be little or no

pestilential diseases of livestock in the early Middle Ages, or the medieval period is wholly lacking.<sup>224</sup> Historians and natural scientists alike have neither commented on the prevalence of particular diseases, pestilential or non-pestilential, nor attempted to establish a pathocoenosis of Carolingian or early Ottonian livestock. Whether mid eighth- through mid tenth-century stock were healthier than Merovingian stock, as some economic historians have suggested in regard to the human populations, is entirely unclear. This, no doubt, is due to the near dearth of early medieval evidence for non-pestilential illness of stock, and a lack of interest in palaeopathological and palaeomicrobiological sciences in pre-modern livestock. Nevertheless, there is more written evidence for outbreaks of disease in livestock in the Carolingian and early Ottonian centuries than any earlier period in European history.

## 1.2 Methodologies

In examining the disease history of Carolingian and early Ottonian Europe, it is essential in the first instance to assess what we do and do not know about the existence of ‘modern’ pathogens in the period,<sup>225</sup> and how or if we can diagnose outbreaks of communicable diseases, as well as non-pestilential illnesses, reported in mid eighth- through mid tenth-century texts. What and how palaeomicrobiological and palaeopathological analyses of material remains of pre-modern disease add to our assessment also warrants discussion, as does how we may attempt to discern the

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reliable evidence that a cattle pestilence actually occurred *c.* 376-87 as is often claimed. See, for example, Fleming (1871), pp. 27-32; Spinage (2003), pp. 3, 47, 81, 82, 88; Scott and Provost (1992), pp. 1, 33; Scott (1964), p. 114; *idem*, (1981), pp. 401-02; Barrett (1999), p. 1559; *idem* (2007), p. 20; Blancou (2003), pp. 9, 161-162, 184; Pastoret et al (2006), pp. 87-88; Dunlop and Williams (1996), p. 208; Roeder (2005), p. 1262; Barton (1956), p. 505; Mutch (2005), p. 42; cf. Wilkinson (1992), p. 13.

<sup>224</sup> One agricultural historian of Anglo-Saxon England has suggested that chronic infections, other than those behind the dramatic stock pestilences recorded in the annals, would have been ‘fairly common.’ Fowler (2002), pp. 230-31. Fowler also refers to signs of arthritis in horse and oxen bones at Hamwic: (2002), p. 236. Hyland (1994), p. 63, suggests that losses of horses to disease would have been common and prevented many animals from reaching maturity. Elsewhere, Hyland proposes that coughs, colds, mange, tetanus and parasites would have all ate away at pre-modern equine populations: (1990), p. 55. And Hagen thinks bovine tuberculosis would have been ‘widespread’ in early medieval England on the grounds that it was common until recently: (2002), p. 61. As with chronic illnesses of humans, saints lives’ shed some light on chronic livestock disease, though, as far as I am aware, only in and after the high Middle Ages: see Briony (2009); Jordan (2009).

<sup>225</sup> ‘Modern’ pathogen/disease is used throughout this study to refer to diseases known to modern science that may have existed historically.

demographic and economic impact of disease outbreaks in Carolingian and early Ottonian Europe. Widespread methodological naiveté in regard to the practice of diagnosing retrospectively has plagued most comment hitherto given to early medieval disease. The thorough assessment of retrospective diagnosis presented here, like the discussion given to what the palaeosciences offer, is intended to correct this and set the stage for a more critical reconstruction of the disease history of mid eighth- through mid tenth-century Europe.

### 1.2.1 The existence of ‘modern’ diseases in Carolingian and early Ottonian Europe

Diagnosing retrospectively has long been an essential component of the demographic, economic and medical historian’s toolkit. Few who have touched upon the history of disease have attempted to understand pre-modern pestilences or non-pestilential illnesses without applying modern disease categories and concepts.<sup>226</sup> At the heart of the practice of retrospective diagnosis, however, is the assumption that ‘modern’ diseases, or disease-causing microorganisms known to modern science, have had a static or continuous pre-modern past, that the pathogen one wishes to retrospectively diagnose existed in a similar form, caused a similar disease expression and exhibited similar epidemiology. Relatively few scholars have paid any attention to the problems attending these assumptions.<sup>227</sup> The

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<sup>226</sup> Two exceptional examples that deliberately, and for explicit methodological reasons, do not apply modern categories are Arrizabalaga, Henderson and French (1997) and Arrizabalaga (2005b). Biraben and LeGoff (1975), on the other hand, interpret the EMP in light of the bubonic plague diagnosis they assign it. Biologists and demographers Scott and Duncan (2001), likewise, interpret the demographic impact and pre-modern history of several ‘modern’ diseases by accepting existing retrospective diagnoses (other than the identifications of the Black Death and its reoccurrences) at face value and by overlooking the complications inherent in the practice of diagnosing retrospectively outlined here.

<sup>227</sup> A few historians have explicitly, though in passing, drawn attention to this matter. Salway and Dell state that the diseases of the distant past ‘may now be either extinct or so altered as to be unrecognizable:’ (1955), p. 64; Ó Corráin warns that ‘diseases have their evolutionary history’ and that ‘mutations which can occur rapidly change their nature, symptoms, and virulence:’ Corrain (2005), p. 580; McVaugh observes that ‘diseases can change over time’ and that this is ‘another of the perils of offering retrospective diagnoses:’ (2004), p. 214; and Waldron notes that not much is known for certain about the origins of modern pathogens, which complicates diagnosing: (2008), p. 84 n. 3. Cf. Rosenberg (1989), p. 6; Harley (1999), p. 419; Roberts and Manchester (2005), p. 2; Shaw (1990), p. 332. In this vein, English (1989) suggests that rheumatic fever may not have existed in its nineteenth-century form long before the nineteenth century on account of ‘social change,’ and some have suggested that smallpox only became a virulent killer in the early modern period: for instance, Carmichael and Silverstein (1987). Drancourt and Raoult (2002), p. 107, remark that the descriptions of the Athenian Plague ‘are not consistent with any disease we know,’ applies to many recorded epidemics and this may very well be because the disease-causing microorganism at the root of a pre-modern disease occurrence no longer exists as it did then. Naturally, textual accounts of



early and late medieval existence of *Y. pestis*, for instance, is a precondition for the bubonic plague diagnosis of the EMP and the Black Death: bubonic plague could have only been the EMP if it is assumed that the bacillus existed in the early Middle Ages and behaved in the same way as it does now. Likewise, the c.580 epidemic recorded by Gregory of Tours could only have been smallpox if one of the *variola* viruses (*minor* or *major*) recognized by laboratory science existed then in a form identical to its modern counterpart. In this way, AIDS, BSE, Ebola and SARS can only be considered ‘new’ maladies if their causative agents are considered modern and if there is no pre-modern evidence for their existence.<sup>228</sup>

Whether ‘modern’ viruses and bacilli existed in the same or a similar form historically or not, no pre-modern disease occurrence can be definitely said to have been a ‘modern’ disease unless diagnosed via methods unique to the palaeomicrobiological sciences, and biomolecular identifications of pathogens from ancient DNA are neither simple nor without error, as detailed in 1.2.3. Thus, our modern understanding of smallpox cannot be rooted in knowledge (whether in regard to epidemiology or symptoms) of the supposed mid sixth-century smallpox epidemic or, for that matter, the supposed smallpox epidemics that followed European contact with the New World, because it has not been proven definitively, via palaeomicrobiological investigation, that the *variola* viruses existed in late antique Europe or that smallpox was among the diseases Europeans imported to the Americas. Likewise, our modern understanding of the symptoms and epidemiology of bubonic plague cannot be based on medieval accounts of the Black Death, or the range of symptoms and epidemiological properties of that great pandemic which we can assemble from contemporary late medieval evidence, as bubonic plague is a modern construct and, as far as we know definitively, a modern disease. To conflate the epidemiology and,<sup>229</sup> symptoms of the EMP with modern *Y. pestis* is to assume that the bubonic plague diagnosis of the EMP is accurate, that the

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pestilences may not square well with modern knowledge of disease because of the literariness of the historical text, the pre-modern description’s incompatibility with modern medical terms, or the evolution of the pathogen.

<sup>228</sup> Grmek (1993) has mounted a stern challenge to the idea that AIDS is strictly speaking a modern malady. A similar approach could be advanced for BSE, Ebola and SARS. Palaeomicrobiological investigations for diseases such as these which are widely thought to be modern are, not surprisingly, wanting.

<sup>229</sup> In contrast, Walloe suggests that there is considerable continuity between medieval and nineteenth-century descriptions of ‘the plague’ – in other words, that modern scientists were not exactly practicing retrospective diagnosis: (2008).

existing diagnosis is based on thorough comparative and critical studies of the early medieval and modern evidence, and that the diagnosing retrospectively of pre-modern pestilences is feasible. Such assumptive thinking represents a major pitfall of retrospective diagnosis. It blurs the difficulties, even fallacies, inherent in the practice of diagnosing that could significantly mar our assessment of Carolingian and early Ottonian disease.

The pre-modern existence of ‘modern’ disease-causing pathogens must be determined before any ‘modern’ pathogen can be said to have had a pre-modern, or mid eighth- through mid tenth-century European past.<sup>230</sup> Many ‘modern’ diseases are often said to have existed in ancient, medieval and early modern Europe and, whether entirely valid or not, it has long been a commonplace in historical, and even scientific, scholarship that many diseases of the present laboratory era afflicted people in the distant past.<sup>231</sup> Though some have asserted that diseases known to modern science did occur in Carolingian and early Ottonian centuries, most have preferred to see the major acute infectious diseases – the ‘killing diseases’ – known to modern science, such as influenza, measles, smallpox, typhoid and typhus, in the great outbreaks of antiquity: the Athenian, Antonine and Cyprianic Plagues.<sup>232</sup> Of course, bubonic plague has been central to the history of the EMP and the Black Death since Yersin. Scholars who have aligned

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<sup>230</sup> Whether ‘modern’ strains of particular infections had a pre-modern past too requires attention. Only recently have palaeomicrobiologists begun to examine the histories of particular strains of modern pathogens: Roberts and Manchester (2005), p. 15.

<sup>231</sup> Krebs (2004), p. 85, comments on this. Paradoxically, many scholars in the natural sciences, who so often stress the mutability of disease-causing microorganisms, have long written that diseases of the present afflicted peoples of the distant past. In fact, the practice of retrospectively diagnosing pre-modern disease occurrences seems to have begun in the sciences: Tedebrand (2002), p. 93. Virologists Strauss, Strauss and Levine, for instance, note that modern viruses can be identified in historical accounts of disease symptoms, since the ‘beginnings of recorded human history,’ but they also write that viruses are ‘highly evolved’ and ‘continuing to evolve today.’ (1996), p. 141. Likewise, in his introductions to the special two-volume edition of *Infectious Disease Clinics of North America* on the history of infectious diseases, Cunha stresses that pathogens continually evolve as they interact with the populations that they affect: (2004a), pp. xii-xiii; (2004b), pp. xi-xiii. But most of the essays in these two volumes (many of which are written by doctors and microbiologists, not historians) emphasize the continuity of pathogens over time. Scientists may have led historians to believe that bacilli and viruses are unchanging, and the practice of retrospective diagnosis straightforward and unproblematic. Cohn (2002a), p. 17, notes that early bacteriologists sought to ‘mould a uniform image of epidemic disease between past and present.’ Certainly this continues to be problematic for the history of disease.

<sup>232</sup> Most of these diseases have also been held responsible for the biblical plague of the Philistines, as well as Homeric pestilences. For instance, Greenberg (1917), Neustatter (1942), Bernheim and Zener (1978) and Conrad (1984). Some still align ancient plagues with bubonic plague: Drancourt and Raoult, for instance, state that the Athenian Plague is the first recorded outbreak of an epidemic ‘consistent’ with bubonic plague: (2002), p. 105.

Carolingian or early Ottonian pestilences with ‘modern’ diseases, like most scholars who have applied modern labels to ancient pestilences, have not provided scientifically irrefutable groundwork for their diagnoses. Biraben, Bray, Gillmor, Hyland, Leyser and Nelson’s diagnoses of mid eighth- through mid tenth-century pestilences, for example, are not rooted in systematic assessments of the epidemiology or symptoms of the early medieval disease experience and the modern disease superimposed onto it.

Gillmor’s eastern equine encephalomyelitis (EEE) diagnosis of the 791 equine epizootic is the most firmly rooted pathogenic identification of our period, though its roots do not run deep. An analysis of it here serves to demonstrate the complexity of diagnosing retrospectively. The diagnosis is based first on the supposed similarity in the mortality EEE can cause and the mortality recorded for the 791 epizootic: the revised *Annales regni Francorum* claims that nine out of ten horses died in the pestilence and in extreme modern cases EEE can exhibit a mortality rate of 90 per cent in previously unexposed populations. The diagnosis is secondly based on the assertion that swamps and marshes were ubiquitous between the rivers Danube and Raab, and around Savaria (Szombathely), where Gillmor proposes horses were infected and that the vector of EEE would have, consequently, been plentiful in the region.<sup>233</sup> While Gillmor astutely points out that EEE is not unknown in the watershed of the Danube and its tributaries today, her diagnosis rests on several assumptions. First and foremost, there is, presently, no palaeomicrobiological evidence for the early medieval, let alone pre-modern, existence of EEE in Europe or elsewhere. Second, there is no palaeoscientific evidence, as far as I am aware, for EEE’s mosquito vectors in southeastern Europe or elsewhere. At no other point in Carolingian or early Ottonian sources, moreover, are equines said to have succumbed to an infection in Pannonia, near Savaria, or along the Danube or Raab,<sup>234</sup> and I am unaware of later historical examples of such significant die offs in the region. Third, the reviser’s claim should not perhaps be accepted at face value. The epizootic is said to have occurred in the fall of 791 (possibly October) and the reviser is thought by most modern textual analysts to have written sometime between 801 and 827; most

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<sup>233</sup> Gillmor (2005), p. 27.

<sup>234</sup> It has been suggested that a similarly significant number of Frankish horses was never again present in the region: Gillmor (2005), p. 30. That said, no equine mortalities are reported for the Avar campaign of 796.

suggest c.801 or c.817. The reviser, as such, may not have been, as he implies, on the campaign or a firsthand witness. He would have heard of this outbreak second, third, or fourth hand.<sup>235</sup> He may have worked from a document contemporary, or near contemporary, to the campaign, but it is highly unlikely in any event that the horses lost would have been carefully calculated. Further, there are indications in other texts that horses were regularly lost on all campaigns, not exclusively from conflict but from localized infections, malnutrition, injury or even wasting; so if a post-campaign mortality count was undertaken, we cannot assume that the aggregate loss stemmed from a single outbreak of disease.<sup>236</sup> Further yet, the claim that nine tenths died is not unknown in textual references to stock disease made before or after the reviser's edition of the *Annales regni Francorum*.<sup>237</sup> Rather than an exact or even approximate representation of the mortality produced by a single outbreak of disease, the reviser's comment on mortality should be accepted as an attempt to emphasize the greatness of the loss.<sup>238</sup> A 40 or 50 per cent loss would have been regarded as major mortality of stock, and this statement of emphasis may have been applied to such a loss in order to demonstrate its significance in a manner familiar to contemporary readers.

Fourth, more attention needs to be given to the environmental conditions of the Danube-Raab confluence in the late eighth century, and the locale around Savaria. It should not be assumed they were then as wet as they are now. Fifth, the cycle of the virus that allows it to propagate and remain enzootic in a region is quite complex and relies on several factors not addressed by Gillmor. The virus has arthropod vectors that maintain it in avian populations, which host the disease (*Culiseta melanura* and *Cs. Morsitans*), as well as arthropod vectors that infect mammals (*Coquiletidia perturbans*, *Aedes vexans*, *Ochlerotatus sollicitans* and *Oc. Canadensis*). Whether suitable avian hosts and some of these vectors were prevalent in the region is unknown. Sixth, EEE is a zoonose, exhibiting a mortality rate in infected humans of over 35 per cent in modern scenarios, and no report regarding human mortalities is associated with the 791 horse pestilence. Seventh, in modern occurrences the virus demonstrates an incubation period of one to

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<sup>235</sup> He states that hardly a tenth part 'is said' to have survived (C.1.50).

<sup>236</sup> See Hyland (1994), p. 63.

<sup>237</sup> For instance, see Dill in regard to a Merovingian stock pestilence: (1926), p. 254; and Newfield in regard to an early fourteenth-century panzootic: (2009), p. 162.

<sup>238</sup> The reviser himself may not have accepted his statement matter-of-factly.

three weeks and generally exhibits symptoms and causes mortality some time after animals are infected. Thus, Charlemagne's equines would have had to have been in the Danube/Raab area for some time, unless they were infected on their way to the region. That Charlemagne's auxiliaries, who returned to Francia before Charlemagne proceeded to Savaria, were apparently not infected complicates this scenario further. If Charlemagne's animals were infected en route, however, we might suspect that the disease was enzootic in areas closer to the heart of Carolingian Europe and, consequently, that we would encounter more references to horse mortalities in Carolingian sources than we do.<sup>239</sup> This leads to our eighth and final point: it is uncertain where Charlemagne's animals died, let alone where they were infected. Gillmor assumes that equines fell in Savaria as it was there that Charlemagne stopped his Avar offensive and returned home.<sup>240</sup> Yet Charlemagne may have turned back then as it was late October and he had already pushed the Avars out of central Europe (having met them earlier in the campaign at Cumeoberg and Kamp, north of Vienna). Further, that the campaign was called off strictly because of the horse mortalities is, while possible, not definitely certain. It is also unclear whether only those animals under Charlemagne's command were infected, as the reviser implies, and not those of his auxiliaries, the Avars, or the region generally, as the reviser tended only to speak to the general affairs of Carolingian Europe and to associate the misfortunes he added to the *Annales regni Francorum* directly to the king.<sup>241</sup> Thus, where the animals were infected, and what equines were infected, is ambiguous. Complicating the matter even further, some equines may have already been exposed to the disease and resistant to it.

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<sup>239</sup> We only encounter two references to horse mortalities in Carolingian texts, though most Carolingian and early Ottonian authors, as argued in 1.4.1.2, may have possessed a strong bias for the documenting of cattle epizootics.

<sup>240</sup> Gillmor (2005), pp. 26-7, 29-30.

<sup>241</sup> Many of the reviser's additions to the *Annales regni Francorum* concern military reverses, and discord between Franks and with neighboring peoples (in 760, 775, 778, 782, 785, 789, 792, 793 and 798), and environmental or biological shocks such as this equine pestilence and the heavy rains reported in 793, and the vast majority of them concern, or are directly associated to, the king or ruling elite. For instance, instead of reporting on the subsistence crisis of the early 790s, the reviser writes only of how the heavy rains of the 793, which others relate to failed harvests and famine, ruined Charlemagne's attempts to dig a massive ditch between the rivers Rezat and Altmühl. On the famine see below; on the ditch see Squatriti (2002). Of course, it is possible that the Avars sustained considerable or even greater losses and that this may have partially accounted for their military decline and defeat soon after. Gillmor takes the reviser verbatim and asserts that only the horses under Charlemagne's command were infected.

Diagnosing is no easy business. Most diagnoses of Carolingian and early Ottonian disease occurrences, and disease occurrences reported in early medieval sources in general, are far more unsecure than Gillmor's.<sup>242</sup> Hyland bases her strangles diagnosis of the 791 equine pestilence solely on the fact that this streptococcus infection 'acts rapidly once its incubation period is over' and is 'extremely infectious.'<sup>243</sup> The rinderpest virus (RPV) identification of the 809/10 cattle pestilence and the diagnosis of outbreaks of disease among Louis the Pious' men in the 830s as malaria are also lacking an explanation or support in the form of a systematic comparison of the disease evident in the texts and the disease known to laboratory science. Hypotheses that dysentery was a constant scourge of mid eighth- through mid tenth-century sieges and campaigns are likewise uncertain, and appear to rely more on modern military experience than anything else.<sup>244</sup> Many similar examples exist.<sup>245</sup>

Despite the dearth of definitive evidence of modern pathogens in pre-modern populations, many diseases have been assigned to the centuries we are concerned with. Some scholars suggest that bubonic plague, contrary to common opinion, intermittently afflicted parts of Europe between the 'first' and 'second' supposed *Y. pestis* pandemics of

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<sup>242</sup> Some historians continue to claim that they have the 'right' to diagnose historical pestilences however they please, which totally misses the point. A prominent recent example of this is Stathakopoulos (2004), p. 6, *passim*.

<sup>243</sup> Hyland (1994), pp. 65, 177 n. 83.

<sup>244</sup> In his classic work, Prinzing classified typhus, typhoid, dysentery, cholera, bubonic plague and smallpox as military diseases, that is, as pathogens that routinely devastated armies on campaign: (1916), pp.4-10. While the latter two seem like an odd fit, the first three in particular are often said to have been behind many pre-modern European reports of disease associated with warfare and famine. Of course, Prinzing based his study on the modern military experience with disease. Smallman-Raynor and Cliff add to Prinzing's list of war pestilences malaria and tuberculosis, noting that these diseases, for different reasons, have often taken large tolls on (modern) military populations. In total, Smallman-Raynor and Cliff discern twelve wartime diseases: influenza, malaria, measles, louse-borne relapsing fever, tuberculosis, yellow fever, cholera, dysentery, plague, smallpox, typhoid, and louse-borne typhus fever: (2004), pp. 4, 38-9.

<sup>245</sup> For instance, the epidemic recorded by Gregory of Tours in the late sixth century was smallpox according to Broadbent because Gregory described a 'vesicular eruption which became pustular and which began with a fever, sickness and pains in the back:' (1934), p. 5. Broadbent overlooks other possibilities such as chickenpox, measles and scarlet fever, not to mention how characteristic this list of 'symptoms' is of the many pestilences reported by Gregory and the inability of Gregory to truly know whether one or multiple diseases had were responsible for these symptoms and subsequent mortality. With little hesitation Crawford interprets a reference in an Anglo-Saxon text of a 'dead and blackened body' as evidence of gangrene, and MacArthur diagnoses the infamous sixth-century 'yellow pestilence' (*lues/pestis flava*) of the British Isles as relapsing fever, and the late seventh-century 'mortality of children' (*mortalitas puerorum*) as bubonic plague on virtually no grounds at all: Crawford (2009), pp. 193, 195; MacArthur (1949), pp. 173-74, 179-81. See Horden (2000), pp. 206-07, and Cunningham (2009), pp. 408-09, for critiques of similar examples. The seventh-century *mortalitas puerorum* is said to be bubonic plague as it followed on the heels of the 664 pestilence which is commonly thought to have been bubonic plague, and as the Black Death, which MacArthur believes was bubonic plague, was also followed by a *mortalitas puerorum*.

the sixth and fourteenth centuries.<sup>246</sup> Others hold that influenza first became a real threat in Europe c.800,<sup>247</sup> that dysentery was a chief cause of death on early medieval campaigns and during sieges in general,<sup>248</sup> that tuberculosis became an increasingly serious threat during the Frankish period,<sup>249</sup> and that malaria was a constant burden throughout the pre-modern period, and not only around the Mediterranean but, episodically, around the North Sea.<sup>250</sup> Likewise, anthrax has been claimed to have been common in the early medieval period because some early medieval pestilences are reported to have affected humans and cattle.<sup>251</sup> It is also commonly thought that widespread poisonings of ergotism began to occasionally ‘devastate’ European populations in the Carolingian and early Ottonian periods.<sup>252</sup> On the other hand, it has

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<sup>246</sup> That *Y. pestis*, whether or not the cause of the EMP and/or the Black Death, episodically or regularly afflicted parts of Europe throughout the medieval period causing minor or perhaps significant demographic and economic shocks between those pandemics is an idea that has not gained much currency. Mullet thought that bubonic plague remained endemic in Europe after the EMP until the fourteenth century: (1956), pp. 12-3; and Nohl clearly thought that plague was present on some occasions in Europe after 750 and before 1346: (1925), pp. 24-5. He claims, for example, that Frederick V, Duke of Swabia, in 1191, and Louis the Saint and his son John in 1270, died of (true) plague. As noted, Major also thought bubonic plague persisted between the great pandemics and Hirsch astutely observed that it is impossible to know whether bubonic plague was behind any or many of the reports of *lues*, *pestis* or *pestilentia* between the EMP and Black Death: (1883), p. 496. Also see O'Neill (1993), p. 276. Of course, most generally hold that bubonic plague did not exist in Europe from the mid eighth to the mid fourteenth century. In addition to the Black Death historians addressed in 1.1.1 see Ell (1993), p. 510, Biraben (1998), p. 344, and Horden (2000), p. 212.

<sup>247</sup> Biraben thought influenza was recurrent and devastating in the ninth, tenth, eleventh and twelfth centuries, particularly in 876/77, 927 and 1105: (1998), p. 345. Ó Corráin sees influenza-like pneumonia in Irish epidemics in 783, 786, 806, 814, and 825: (2005), p. 581. Gallagher suggests the first ‘reasonably identifiable’ occurrence of influenza occurred in 1173: (1969), p. 81. O'Neill agrees: (1993), p. 275. These scholars seem to have followed Hirsch, who thought influenza epidemics have occurred throughout history but that the first identifiable epidemic occurred in 1173: (1883), p. 7. Most, however, only see ‘definitive’ written evidence for influenza viruses in the early modern period: for example, Cunha (2004d), pp. 143-44; Crosby (1993), p. 808.

<sup>248</sup> For example, Bonser (1963), p. 59; Nelson (1992), p. 152; Leyser (1994), p. 44; Ó Corráin (2005), p. 578. Infectious diarrhea-causing pathogens, such as dysentery and cholera, are often said to have afflicted humans since ‘preliterate times’: Lim and Wallace (2004).

<sup>249</sup> Devroey (2003), pp. 46-7. On account of the palaeopathological assessments he employed, Devroey limits his comments on TB to northwestern Gaul.

<sup>250</sup> Malaria plasmodia are generally thought to be thousands of years old. See, for instance, Schlagenhauf (2004), pp. 189-91. Though the evolutionary histories of the various plasmodia are thought to have been considerably different, all are thought to have existed in at least parts of the Old World by 500 BCE. Cf. Sallares, Bouwman and Anderung (2004), p. 314.

<sup>251</sup> Hagen (2002), p. 61.

<sup>252</sup> Ergotism appears to be the only disease (though it is not really a disease of humans but a disease of grain poisonous to humans) often said to have appeared first in the Carolingian period: for example, Hirsch (1885), pp. 203-05; Talbot (1967), p. 159; Duby (1974), p. 158; Gottfried (1982a), p. 676; Park (1992), p. 62; Carmichael (1993d), p. 989; Haller (1993), 729; O'Neill (1993), p. 272; Biraben (1998), p. 344; Hays (1998), p. 18; Horden (2000), p. 205. Like many others, Snodgrass (2003), pp. 25-6, suggests that the mortality reported in the *Annales Xantenses* in 857 can be attributed to ergotism. Hagen (2002), p. 28, also

also been said that smallpox retreated from western Europe sometime shortly before the ninth century, not to return until c.1100, but then, apparently, only in the south.<sup>253</sup>

Leprosy too has been said to have become dormant in the Carolingian and Ottonian periods, though it is also often said that it was widespread in the later centuries of the early medieval era and the high Middle Ages.<sup>254</sup> While many hold that the Black Death brought leprosy's European prime to an abrupt end, it is also regularly claimed that an increasing incidence of tuberculosis was responsible for the granulomatous disease's supposed trailing off at the tail end of the high Middle Ages, and thus by implication that TB was not an infection common to Europe in the Carolingian or early Ottonian period.<sup>255</sup> In this sense, it is claimed that tuberculosis could not have been widespread in early medieval Europe on account of low population density and that its medieval zenith coincided with the urbanization and population growth of the high Middle Ages.<sup>256</sup>

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seems to suggest that ergotism was behind some Anglo-Saxon cattle mortalities. That ergotism irrupted in the Carolingian period owes to the idea that rye, along with wheat, became widespread on the continent in the Carolingian period, especially following the decline of spelt: see, for instance, Devroey (2001), p. 115; Verhulst (2002), p. 65. All this said, Hirsch has suggested that Gregory of Tours documented an ergotism outbreak c.590: (1885), p. 204; and the Athenian Plague has also been ascribed to ergotism: Salway and Dell (1955), pp. 67-9.

<sup>253</sup> Biraben (1998), p. 344, 348-49. Ó Corráin (2005), p. 578, 582-83, asserts, problematically for Biraben, that smallpox was a regular scourge of Ireland in the eighth and ninth centuries. Further, Gallagher (1969), p. 139, writes that the Saracens brought smallpox to Europe about the time of Rhazes. Carmichael and Silverstein (1987), pp. 147, 154, suggest that smallpox cannot be distinguished from other diseases in early medieval accounts of epidemics, though they believe Rhazes provides a clear description of it.

<sup>254</sup> Biraben (1998), p. 344, claims leprosy was not typically encountered in the Carolingian period. The high Middle Ages are often regarded as an age of leprosy. For example, Gallagher (1969), p. 64; Cipolla (1976), p. 11; Gottfried (1982a), p. 676; Ell (1993), p. 512; Nutton (1995b), pp. 187-89; Watts (1997), p. 48; Hays (1998), pp. 20-9; Hays (2005), p. 35; Magner (2009), p. 9. Even Waldron, a palaeopathologist, sees the heyday of leprosy as spanning the twelfth to the fourteenth centuries: (2008), p. 97. Though Nikiforuk (1996) stresses that leprosy came in 'waves' and first appeared 'around the 600s' (CE), he clearly thinks leprosy's European heyday was high medieval: (1996), pp. 47, 52. Similar to Biraben, Hirsch (1885), pp. 649, 653, claims on very weak grounds that the incidence of gout increased through the first few centuries AD and declined over late antiquity and the early medieval period. Rather, as argued below, the usage of the terms *podagra* and *chiragra*, like *lepra*, rose and fell (and not necessarily the diseases themselves).

<sup>255</sup> For instance, Gallagher (1969), p. 168; Carmichael (1993c), p. 839; Johnston (1993), p. 1063; Nikiforuk (1996), p. 52; Karlen (1996), pp. 84-5. Karlen notes that tuberculosis, though widespread in late antiquity, waned in the Dark Ages. Thus for Karlen, TB did not disappear altogether with the Roman Empire. Nutton suggests that leper numbers were falling well before the Black Death and that the decline of the disease cannot be entirely attributed to the mid fourteenth-century pandemic: (1995b), pp. 187-89. As tuberculosis and leprosy are different expressions of the same pathogen it is unlikely that TB or leprosy existed entirely in lieu of the other.

<sup>256</sup> For example, O'Neill (1993), p. 273. However, Ell asserts that TB, while certainly present in medieval populations, is not well documented in medieval sources: (1993), 512.



Others, who see demographic growth in our period, disagree.<sup>257</sup> Yet none of these diagnoses rest on any thorough consideration of the written and material evidence available or the assumptions underlying, not to mention the methods by which, one retrospectively diagnoses. Recognizing the dearth of definitive palaeoscientific evidence presently available must prevent us from using the claims of others regarding the existence of particular pathogens in order to reconstruct the Carolingian and early Ottonian disease experience.

Indeed, while it is generally assumed that most acute and/or communicable diseases known to modern science which are held responsible for mass mortalities in modern centuries – including, for instance, anthrax, bubonic plague (and its pneumonic and septicemic variants), contagious bovine pleuropneumonia, diphtheria, dysentery, influenza, malaria, measles, sheep pox, smallpox, typhoid, typhus and the rinderpest virus – existed either throughout or periodically in early modern, medieval and ancient Europe, there is hardly any definitive palaeomicrobiological proof that they actually did.<sup>258</sup> Mid eighth- through mid tenth-century textual evidence provides no definitive

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<sup>257</sup> Lice and other parasites are also often said to have been common in the early medieval period: for instance, Karlen (1996), p. 113.

<sup>258</sup> This despite the many attempts to align ‘modern’ diseases with ancient pestilences. Attempts to diagnose the Athenian Plague (a subject which has absorbed an incredible amount of scholarly attention for over a century) include Salway and Dell (1955), Williams (1962), Littman and Littman (1969), Holladay and Poole (1979, 1982, 1984), Wylie and Stubbs (1983), Cunha (2004e). Cf. Grmek (1993), p. 101. Attempts to diagnose the Antonine Plague include Gilliam (1961), Littman and Littman (1973), Fears (2004). For the EMP see 0.1.4.1.2. Later examples, of course, also exist: efforts to align a modern disease with the Black Death or the so-called Sweating Sickness of the early modern period have not established any definitive diagnosis. On the sweating sickness see Carlson and Hammond (1999), Christiansen (2000) and references therein; on the Black Death see 0.1.4.1.1. Literally thousands of articles and books in the historical and natural sciences assume that most modern pathogens are of considerable antiquity. This is apparent in many of the works addressed in 1.1.1 and throughout the authoritative *Cambridge History of Disease* (1993) edited by Kiple. Even the revisionists addressed below hold that modern diseases, no matter how difficult to see in the past records of disease, have long afflicted humanity: see, for example, Arrizabalaga (1993), p. 1029. Many have suggested, in line with McNeill’s thinking, that all the acute diseases that afflicted Europe arrived in the classical era: for instance, Gottfried (1982a), pp. 673-74. On the assumed antiquity of rinderpest, see Trow-Smith (1957), p. 240 n. 6; Steele (1962), p. 18. Though Contagious Bovine Pleuropneumonia is, like RPV, thought to be ancient, it is not regularly (if at all) assigned to medieval cattle pestilences: ter Laak (1992), p. 105. On the antiquity of sheep pox: Brothwell (1988), p. 274. The foot-and-mouth disease virus is not often thought to have had an ancient or medieval past. The first identifiable outbreak of FMDV in Europe is commonly said to have occurred in the mid sixteenth century (in the writings of Girolamo Fracastoro): see Wilkinson (1992), p. 26; Blancou (2003), p. 53; Suttmoller et al (2003), p. 101; Mahy (2005), p. 2. Bovine Spongiform Encephalopathy, on the other hand, is widely held to be a product of the 1980s and modern animal husbandry: Fisher (1998), p. 216. Yellow fever is often said to have been endemic in western Africa, and other tropical regions of the Old World, before being exported to the Caribbean, yet it is rarely held to have had a medieval European past: Oldstone (1998), p. 45; Bollet

grounds for the presence of any ‘modern’ pathogen in Carolingian or Ottonian Europe, as discussed in 1.3 and 1.4.2, and material evidence, as discussed in 1.2.3 and 1.2.4, presently provides little further definitive insight.

Naturally, the superimposition of modern scientific categories and disease-causing microorganisms onto pre-modern disease occurrences and reports of disease is attractive: it brings clarity (or at least appears to) to what are often vague and hard to interpret texts, and it injects something tangible and familiar into the foreign world we are trying to recreate.<sup>259</sup> To establish (even roughly) whether any specific ‘modern’ pathogen did exist in mid eighth- through mid tenth-century Europe, we can do two things, we can either attempt to retrospectively diagnose disease occurrences from details provided in written evidence or turn to the material evidence of ‘modern’ pathogens in Carolingian and early Ottonian physical remains. Discussion is given to both of these topics in 1.2.2, 1.2.3 and 1.2.4. In short, these two avenues presently fail to provide definitive proof for the existence of any ‘modern’ pathogen in mid eighth- through mid tenth-century Europe. Firm suggestions have been made about the pre-modern existence of several ‘modern’ pathogens, particularly those that cause bone morphology, such as leprosy, yet a variety of methodological problems undermine any hope of attaining a definitive diagnosis of either a Carolingian or early Ottonian disease occurrence reported in a written source, or the remains of disease found ‘in’ or ‘on’ the remains of mid eighth- through mid tenth-century Europeans. Not only is the reliability of existing diagnoses, whether made from written or material remains of the past, uncertain, but the pre-modern history of many ‘modern’ diseases has yet to be investigated biomolecularly: rinderpest, smallpox and typhus are but three examples of ‘modern’ diseases regularly said to have been deadly in the past but which have yet to garner any attention in the palaeomicrobiological sciences.<sup>260</sup> With the exception of the 1918 influenza, viruses in general have been little explored.<sup>261</sup> Livestock diseases too have yet

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(2004), p. 45. Likewise, cholera is frequently held to be ancient but few have assigned it to pre nineteenth-century European outbreaks of disease: Bollet (2004), p. 91-3.

<sup>259</sup> Cf. Christenson (2003), p. 415.

<sup>260</sup> All blood-borne pathogens (viruses and bacteria) that cause septicemia can in theory be isolated in physical remains: Drancourt and Raoult (2002), p. 108.

<sup>261</sup> Palaeomicrobiologists have directed most of their effort to establishing the identity of supposed diagnoses of the Athenian Plague, EMP and the Black Death. That is to say that they tackled the diagnoses of disease outbreaks recorded in written sources that have received the most press in the historical sciences,

to garner much attention.<sup>262</sup> However, the ever increasing number of palaeopathological and palaeomicrobiological assessments of material remains, the creation and adoption of new techniques, the standardization of diagnostic procedures, and the general evolution of the methods of palaeopathology and palaeomicrobiology, ensure that we will eventually know more about the pathological reality of the Carolingian and early Ottonian past than we do today and that the present dearth of definitive proof for the existence of ‘modern’ pathogens in these periods may eventually be, at least partially, alleviated.<sup>263</sup>

That said, it is worth taking a page out of the environmental historian and evolutionary biologist’s handbook and to recognize that disease occurrence, past and present, like all human interactions with the environments in which they are a part, is a product of symbiotic and parasitic interactions which cause changes both in disease-causing microorganisms and the animals they attack: pathogens impact human (and other animal) populations, and vice versa.<sup>264</sup> Since, as some biologists point out, the evolution of disease entities is ongoing and disease entities are ever-changing, historians should perhaps not suspect that all ‘modern’ pathogens will be found in pre-modern remains. Further, even if the DNA of a pathogen is recovered, this may not mean that the disease was the ‘same’ as its modern counterpart. Much about the pre-modern history of disease may never be known as many disease-causing microorganisms of the past may no longer exist.<sup>265</sup>

Before we consider the other pitfalls and implications of the practice of retrospective diagnosis diseases reported in Carolingian and early Ottonian texts, it is necessary to address some a few additional assumptions underpinning the practice. As we

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and they have done so regardless of how well-rooted or critical those diagnoses actually may be. By drawing attention to Carolingian and early Ottonian pestilences we can hope that the physical remains of these periods will as well receive some biomolecular attention: Roberts and Manchester (2005), p. 27. For the palaeomicrobiology of the early twentieth-century influenza pandemic see, for example, Taunbenberger et al (1997); Pennisi (1997); Lederberg (2001); Basler et al (2001); Enserink (2006); Tumpey et al (2005).

<sup>262</sup> Bendrey et al (2008) represents a rare attempt to biomolecularly detect ‘modern’ pathogens in pre-modern livestock (here Iron Age English equines), though the results are anything but conclusive (pp. 1588-589).

<sup>263</sup> Matthew Collins and his team at the Bioarchaeology unit at the University of York, for example, are currently working on a technique that may permit the identification of ‘modern’ cattle diseases in medieval parchment.

<sup>264</sup> See, for example, Cunningham (2009), p. 411; Waldron (2009), p. 83 n. 2.

<sup>265</sup> Cunha (2004a), pp. xii-xiii; Cunha (2004b), p. xi; Ewald (2004), pp. 1-2.

have seen in regard to the eastern equine encephalomyelitis diagnosis of the 791 epizootic, scholars not only are obliged to assume that the pathogen they wish to project into a pre-laboratory period existed in that period, but that the pathogen's non-human vectors, carriers and hosts existed too. For many 'modern' pathogens to have existed in the pre-modern past, for malaria to have irrupted in Louis the Pious' force in 834, an adequate population of suitable hosts and vectors would have had to have been present.<sup>266</sup> Naturally, in order to appreciate how widespread and devastating a vector-borne disease could have been it is necessary to consider how prevalent its vectors were. The environmental, climate or weather context may be equally important, as some diseases, particular arthropod- or vector-borne diseases, such as malaria and yellow fever, break out or adhere closely to certain ecological contexts.<sup>267</sup> Ultimately, to definitively retrospectively diagnose these diseases, it is not only necessary to compare outbreaks—outbreaks recorded and diagnosed by modern means and outbreaks recorded in pre-modern sources that we wish to diagnose – but to establish that the particular host(s) and/or vector(s) 'characteristic' of the modern outbreaks one wishes to use as the basis of a comparison existed at the time of the pre-modern disease occurrence. Otherwise, it is impossible to establish any significant degree of affinity between the modern disease and the pre-modern record of disease and, subsequently, to provide a meaningful diagnosis.<sup>268</sup>

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<sup>266</sup> As some historians have recognized, for instance, Arrizabalaga (1993), p. 1029. Yet, as Harley (1999), p. 419 points out, 'historians often assume that the relationship between humans, animal vectors and the microbiology of [bubonic] plague has remained the same across the centuries.'

<sup>267</sup> Concern of this nature has largely been limited to discussions about bubonic plague and the medieval European existence and prevalence of *Rattus rattus*, the black rat. Several works dedicated to either undermining or supporting the bubonic plague diagnosis of the EMP and the Black Death, recognize that bubonic plague could not have existed in medieval Europe had its host not been present: for example, Davis (1986); Cohn (2002a), pp. 81-2, 133-34; McCormick (2003b). Typhus could not have been widespread without lice, and 'modern' malaria's Carolingian and early Ottonian existence relies on the existence and prevalence of its arthropod vectors, not to mention favorable climates and environments, in addition to the existence of malarial plasmodia.

<sup>268</sup> Further yet, malarial plasmodia have proven capable to be spread by a variety of arthropods and *Y. pestis* has shown itself not to be strictly reliant on the black rat. We should, as such, not just be looking to map the diffusion and prevalence of *R. rattus*. Yet recent scientific attention to the range of possible vectors and hosts of bubonic plague, for example, does not necessarily help us diagnose pre-modern disease outbreaks as the effectiveness (or competence) of vectors and hosts other than those characteristic of modern outbreaks has only been observed artificially in laboratories. Yet as artificially observed vector competence is incomparable with historical disease occurrences we may not want to employ modern knowledge of the ability of vectors other than *Xenopsylla cheopis* and hosts other than *Rattus rattus*, the primary vector and host of plague in modern occurrences, to spread the disease in order to identify past pestilences. We do not know how truly effective they are in a natural setting.

For all these reasons, definitive diagnoses of Carolingian and early Ottonian pestilences are presently out of reach. This does not, however, mean that diagnosing is altogether worthless. As argued below, there can and should be different degrees of diagnosis.

### 1.2.2 The diagnosing retrospectively of pre-modern disease: problems and implications

In 1916, internationally renowned natural scientist Theodore Cockerell sought to compare the scale of losses incurred in the Great War to those incurred in historic outbreaks of disease. For Cockerell, the Black Death presented the only fitting comparison. Most interesting for our purposes, however, is Cockerell's claim that the Black Death was the rat- and flea-borne bubonic plague. Though he drew extensively on the work on Gasquet, who published before Yersin made his discovery and who did not, consequently, diagnose the Black Death as bubonic plague, Cockerell was absolutely sure of the pandemic's diagnosis and, moreover, that the diagnosis meant that the mid fourteenth-century pestilence was a demographic watershed.<sup>269</sup> Upon isolating the bubonic plague bacillus in Hong Kong in 1894, Yersin was the first to claim that what is now known as *Y. pestis* was responsible for the great pestilences of Europe's pre-modern past.<sup>270</sup> Why the EMP and Black Death identifications as bubonic plague better stood the test of time is relatively clear: their characteristic symptoms, as reported by contemporaries, better fit those of modern *Y. pestis*.<sup>271</sup>

The rapid adoption of Yersin's diagnosis in both the natural and historical sciences requires further study. It is simply worth pointing out here how quickly scholars in the natural and historical sciences accepted his identification of ancient pestilences, without any attempt to test or critique it, or ensure its 'fit' with the primary sources. In regard to the Black Death, it is certain that Yersin did not survey the annals, chronicles, histories, medical treatises and wills (or other sources that furnish mortality statistics) of the mid fourteenth-century pandemic. He did not map out the fourteenth-century pandemic's epidemiology or consider the range of symptoms reported by contemporaries. In fact, in

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<sup>269</sup> Cockerell (1916); for a similar assessment see Greenberg (1917).

<sup>270</sup> Yersin (1894); see the remarks of Cohn (2002a), p. 8.

<sup>271</sup> As stressed in 0.1.4.1.2, this does not mean that the diagnosis is correct.

1894 Yersin had yet to appreciate how ‘modern’ plague was transmitted, or that it was a zoonose.<sup>272</sup> However, long before the 1890s and Yersin’s bubonic plague diagnosis of the Black Death, scholars in the historical and natural sciences had already attempted to align ancient and medieval pestilences with diseases of their own eras.<sup>273</sup> Such diagnosing retrospectively became an especially widespread phenomenon in the twentieth century. Throughout the 1900s and into the twenty-first century, the identifying of pre-modern pestilences has formed a regular part of the demographic, economic and medical historian’s practice. Yet most outbreaks of disease and episodes of non-pestilential illness recorded in pre-modern texts have been diagnosed without consideration of the practice or implications of retrospective diagnosis.<sup>274</sup> Reappraisals of existing identifications of pre-modern disease are also exceedingly rare.<sup>275</sup>

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<sup>272</sup> Cohn notes the quick adoption of the diagnosis but does not examine the issue at length: (2002a), pp. 41-2.

<sup>273</sup> The diagnosing of pre-modern European pestilences had by then long been considered plausible, straightforward and worthwhile. In the wake of the 1865-66 ‘rinderpest’ panzootic, for example, Fleming (1871) diagnosed several pre-modern cattle pestilences as rinderpest, though the rinderpest virus was not isolated until the 1950s and few in the mid or late nineteenth-century would have regarded ‘rinderpest’ as a specific term for a specific pathogen. Fleming superimposed what he understood about the cattle pandemic he witnessed onto pre-modern cattle epizootics.

<sup>274</sup> Yersin’s diagnosis of the Black Death is but one example, countless others exist. For instance, Stoclet (2007), p. 146, asserts matter-of-factly that a ‘European-wide’ outbreak of smallpox occurred between 550/80 CE, without considering a) the primary evidence for the outbreak, b) our ability (or inability) to reliably grasp the symptoms or epidemiology of this sixth-century pestilence, or c) whether the symptoms and epidemiology of this pestilence match those of smallpox as known to laboratory science. Stoclet’s remark may be rooted in pre-existing claims of a smallpox epidemic in this period, and his belief that these claims are reliable and worth perpetuating: see n. 2. There are some exceptions: Rail writes that ‘to verify or affirm that an ancient pestilence indeed was an epidemic of microbial plague (i.e. not just called plague), satisfactory evidence that the disease was caused by the bacteria must be provided. Minimum evidence that identifies a plague of ancient times as a true plague epidemic should include contemporary descriptions of clinical aspects pathological of the illness and certain observations exclusive to the cause of the disease as it is presently known today. Unless these requirements are met, the assumption that reported ancient pestilences were true epidemics of plague may not be necessarily correct. In fact, today the disease can be too easily misdiagnosed.’ Shortly following this statement, however, Rail diagnosed the Black Death as bubonic plague without considering any written evidence: (1985), pp. ix, xiv. Strewsbury in his *magnus opus* on the history of bubonic plague advanced a similar statement: ‘the confirmatory evidence that is required to identify a pestilence in olden times as an epidemic of bubonic plague may be either a contemporary description of the clinical picture of the pestilence that is pathognomonic of plague or a conjunction of certain observations that are exclusive to the epidemiology of plague. Unless one – and preferably both – these conditions are fulfilled the assumption that an ancient pestilence was an epidemic of bubonic plague is not justifiable.’ He continues, ‘even a record that an ancient pestilence was accompanied with ulcerating buboes in the inguinal regions does not justify its identification as an epidemic of bubonic plague, because ‘bubonous ulcers’ may develop in the groins in fatal cases of confluent smallpox.’ He proceeds nonetheless to diagnose the EMP as bubonic plague without consideration of the symptoms or epidemiology of the pandemic discernible in contemporary written sources: (1971), pp. 1, 11, 13.

<sup>275</sup> The most notable challenge to an existing diagnosis of a pre-modern pestilence is Cohn (2002a, 2002b).

Over the last two decades, a few scholars have seriously challenged, on a theoretical level, the very idea that ‘modern’ diseases can be superimposed onto pre-modern disease occurrences. While scholars in all historical sub-disciplines continue to diagnose, the practice has begun to lose currency among medical historians. Fergren refers to diagnosing retrospectively as the historian’s ‘besetting sin,’ King a ‘temptation’ to be resisted, Stein an ‘outdated’ practice, and McVaugh suggests it is loaded with difficulty.<sup>276</sup> Several scholars over the last half century have proposed that diagnoses cannot always be carried out because of the lack and/or ambiguity of the extant written evidence<sup>277</sup> and little consensus has been reached regarding the identity of most pre-modern disease occurrences.<sup>278</sup> Yet few have seriously challenged retrospective diagnosis on methodological grounds or drawn attention to the assumptions underpinning the practice. Foremost among those who have are Rosenberg, Cunningham and Arrizabalaga.<sup>279</sup> Horden has championed the work of these scholars, refined their approaches and in doing so further complicated attempts to diagnose diseases recorded in pre-modern written sources.<sup>280</sup> The work of these scholars is briefly surveyed here. It should be said that their points of contention do not revolve around the aforementioned problems of establishing the physical or material existence of ‘modern’ disease-causing microorganisms in the pre-laboratory past. Further, revisionists see diagnosing retrospectively as not just difficult, but fundamentally meaningless for historical analysis.

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<sup>276</sup> Fergren (2002), p. 353; King (1998), p. 269; McVaugh (2004), p. 212.

<sup>277</sup> For example, Murphy (1959), p. 310; Bonser (1963), p. 58; Hare (1967), p. 115; Stannard (1993), p. 37; Hagen (2002), 61.

<sup>278</sup> As the ongoing debates over the diagnoses of the Athenian and Antonine Plagues, the Early Medieval Pandemic, the Black Death, and Sweating Sickness demonstrate. On the rarity of consensus in the identification of pre-modern pestilences see Burnham (2005), pp. 76-7. Identifications of the chronic diseases also typically fail to reach any consensus: see Tedebrand (2002), p. 93; Prioreschi (1991), p. 516; York and Steinberg (2004) and Appelboon, Cogan and Klastersky (2007).

<sup>279</sup> Those who argue that we can only grasp past cultural conceptions of disease, not pathogenic realities, have also been deemed ‘social constructionists’ and ‘cultural relativists.’

<sup>280</sup> As is discussed in 1.2.3 and 1.2.4, Horden has also complicated attempts made by scholars in the palaeomicrobiological and palaeopathological sciences to retrospectively diagnose pre-modern diseases via consultation of material remains. Rosenberg, Cunningham and Arrizabalaga, unlike Horden, have focused solely on written evidence. It needs to be highlighted that though Cunningham and Arrizabalaga concern themselves primarily with medical texts, and not the types of sources used in this study, their observations are very much valid and relevant for the diagnosing of all pre-laboratory disease occurrences, whether of humans, livestock or plants, acute or chronic, communicable or non-communicable.

These revisionists challenge the practice of retrospective diagnosis on two inter-related fronts.<sup>281</sup> First, they point out that disease is always, at any given moment, a biological entity and a socio-cultural construction: disease not only exists in the body and causes pain, disability and death, but is interpreted and dealt with in ways particular to the society and culture in which it occurs, the person it afflicts and the writers who observe or hear of it. Because the disease experience of every culture and society is, as revisionists point out, undeniably unique, as the categories with which disease is interpreted, the socio-cultural constructions of disease, have not been stable over the centuries but are instead unstable, culturally dependent ‘intellectual constructions,’ diseases have not been, and cannot be understood as having been, static over time.<sup>282</sup> ‘Modern’ biological realities, consequently, cannot be found in pre-modern texts.<sup>283</sup> Our modern biological reality is unique to our modern age and thus, in Arrizabalaga’s words, ‘incommensurable’ with pre-modern pathogenic realities. Thus, written records of disease from different cultures should not be thought to be analogous in any way, and attempts to compare modern and pre-modern disease experiences should be considered implausible, difficult at best and pointless at worst.

But if a pre-modern disease occurrence is to be illuminated with modern categories, that is, if one is to attempt a retrospective diagnose regardless of how impossible it may be conceptually, one must seek to understand the frame or the set of constructs that the past society affected by the disease, which we wish to diagnose, employed to describe or interpret the disease experience. Thus, diagnosing the EMP is not simply a matter of matching symptoms mentioned by Procopius with symptoms listed in a modern medical handbook, but interpreting Procopius’ conceptual framework, the language and understanding of disease he possessed, the literariness of his text, as well as the greater classical and late antique roots of his framework.<sup>284</sup> We have already seen this in regard to the reviser’s account of the 791 equine epizootic. While we must

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<sup>281</sup> The following three paragraphs survey Rosenberg (1989), Cunningham (1992, 2002, 2009), Arrizabalaga (1999, 2002, 2007). Also see Tedebrand (2002); Horden (2000), pp. 206-09. Arrizabalaga also briefly engages the problems of diagnosing retrospectively pre-modern disease in (1993), pp. 1029-030; (1994), p. 239; (2005a), pp. 405-06; Arrizabalaga, Henderson and French (1997), pp. 1-3.

<sup>282</sup> Harley (1999), p. 419.

<sup>283</sup> See Slack’s comments on Arrizabalaga: (1996), p. 536.

<sup>284</sup> Acknowledging that diseases are socio-cultural constructions product of the era in which they were written also forbids us from asserting, as some have, that the pre-modern writers were wrong, misguided or ill-informed: cf. Sallares (2007), *passim*.



seek to grasp the framer of the disease event and the frame, revisionists warn that this may not bring us any closer to providing accurate or definite retrospective diagnoses: the symptoms, terms and concepts utilized to describe the disease occurrence in the past may simply not fit any of laboratory medicine.<sup>285</sup>

Second, because modern concepts of disease are particular to laboratory science, revisionists posit that we must recognize a pre- and post bacterial revolution divide *c.*1880, when socio-cultural constructions of disease markedly changed.<sup>286</sup> Diseases as we understand them today in western society were only ‘crystallized’ as stable objects following the laboratory revolution and the rise of germ theory. Consequently, the only tangible knowledge of disease realities available to the modern scholar follows the nineteenth-century bacteriological revolution, from disease episodes identified in the lab and aligned to a pathogen known to modern medicine. These laboratory disease episodes are distinct from pre-laboratory disease occurrences in that the disease-causing entities behind the former can be (and regularly are) isolated and identified. Disease in the laboratory age is thus ‘known’ definitively with a degree of precision not previously possible. With this in mind, diagnosing retrospectively is clearly seen as the superimposition of ‘modern’ disease on to pre-modern disease ‘realities,’ a bridging of conceptual frameworks and a practice which rests heavily on the idea that diseases known to modern science existed for centuries before the laboratory. Acknowledging the pre- and post laboratory divide prevents the use of pre-modern identifications of disease to identify other pre-modern diseases: if we must recognize that all infections as we know them are the product of modern pathogen, isolated and classified in the laboratory, and not before, we cannot attempt to diagnose, for example, the EMP, or the possible pan-Carolingian pestilence of 856/58, by comparing it to the Black Death.<sup>287</sup>

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<sup>285</sup> Revisionists see this investigation of the frame as a worthy subject of inquiry in its own right. Note Nutton, who writes that identifying pre-modern pestilences ‘is not easy’ as ‘modern diagnostic criteria are irrelevant, inapplicable or too specific for the evidence available. The descriptive categories of ancient and modern physicians rarely coincide...’ (1995b), p. 191.

<sup>286</sup> Tedebrand (2002), p. 94; Arrizabalaga (1994), p. 239. Cunningham prefers the 1870s: (2009), p. 409. In terms of European disease history, then, it is most fruitful to discuss ‘pre-laboratory’ disease history and ‘laboratory’ disease history, rather than ‘pre-modern’ and ‘modern,’ or ‘pre-industrial’ and ‘industrial,’ as the lab revolution neither corresponds with the rise of modernity nor industrialization in Europe (*c.*1700/*c.*1800).

<sup>287</sup> As Sallares (2007), pp. 238, 243–44, 258, 264–65, 277–76, 278–82, 284. This ‘borrowing’ of one pre-modern disease experience to elucidate another is not an uncommon practice. Scheidel (2001), for example, borrows heavily from the disease history of the early modern Egypt in order to speculate on the disease

While championing these points, Horden pushes this critique of diagnosing retrospectively pre-laboratory disease further.<sup>288</sup> He posits that the pre- and post bacterial revolution divide envisioned by revisionists is misleading, that disease-causing entities and conceptions of disease continued to evolve after the birth of the laboratory and germ theory, and that laboratory-era diseases, like pre-laboratory diseases, were (and are) not unchanging entities. Certainly, our understanding of disease-causing microorganisms and disease symptoms, he points out, has changed markedly since the 1880s, perhaps more so than in any prior era. On account of this, it is conceptually impossible to acquire an image, or template, of a ‘modern’ disease by observing laboratory-identified occurrences of it from 1880 to the present (or from its isolation to the present). Bubonic plague clearly is not the threat now that it was in the late nineteenth and early twentieth century, nor rinderpest, largely due to medical intervention. The methods by which we diagnose and analyze disease today are also not what they were a century ago. It is not that modern medicine *looks for something different* than pre-modern medicine does when characterizing a disease, but that it looks for the one-and-only pathogen as opposed to a pattern of symptoms, which can, of course, be shared by other diseases. Thus, if constructions and experiences of disease are ever changing, even after the dawn of the laboratory, like disease-causing entities themselves, attempts to retrospectively diagnose disease reported in pre-modern texts must overcome yet another significant methodological hurdle. In essence, to retrospectively diagnose specific occurrences of laboratory and pre-laboratory disease must be compared. The 809/10 cattle pestilence, for instance, must be compared to specific cattle pestilences of the laboratory era, and not the mass of knowledge acquired about any particular disease from a range of modern occurrences.

In addition to the issues revisionists raise, there is another distinct reason for concern over positivist attempts to align pre-laboratory written records of disease with

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experience of Roman Egypt, and Sallares (2002) draws heavily upon the early modern Italian history of malaria to elucidate the repercussions and extent of malaria in Roman *Italia*. Yet the speculations and assumptions only pile up when superimposing pre-modern disease occurrences onto other pre-modern disease occurrences in order to grasp the experience of one or the other. For more comment on the practice of ‘borrowing’ early modern (and modern) data to elucidate ancient disease and demography, a common feature of ancient demographic and economic history since Hopkins, see Woods (2007). While Woods focuses primarily on non-disease demographic determinants (fertility, marriage etc.) his criticism are fully applicable to disease.

<sup>288</sup> Horden (2001), pp. 206-09; Horden (2008), p. 686.

the laboratory disease experience. Attempts to diagnose diseases reported in early medieval texts with modern diseases are compounded by the methods early medieval writers employed to document the diseases their society and culture encountered. The cultural context of the production of textual records in the pre-modern period has been ignored, as it is regularly assumed that early medieval authors documented disease occurrences matter-of-factly (by our modern standards) and not in terms that made sense according to their world-view. To make such an assumption would be to assume that early medieval authors sought merely to describe their present with precision for posterity, not to allude to religious texts and historical events in order to infuse their present with greater meaning for a more immediate early medieval audience.<sup>289</sup>

Symptoms medieval authors report, descriptions of a disease's mortality, its prevalence, its 'newness' or 'familiarity,' even the names they attributed to diseases, need to appraised as textual artifacts, or objects of intertextual play, and not neutral descriptions, or accurate labels, of disease.<sup>290</sup> Of course, whether a symptom an early medieval author reports was an actual witnessed expression or a product of intertextual play, or both, is difficult to discern.<sup>291</sup> Yet it is certain that early medieval authors sought to infuse their present with greater textual (or historical or religious) significance and that the intertextuality of symptoms, descriptions and labels of disease reported in early medieval texts has yet to receive its due attention. We may suspect, for instance, that we regularly encounter blindness in Carolingian and early Ottonian *vitae* and *translationes* not because it was common but because it is one of the primary physical conditions reported in biblical accounts of miraculous cures.<sup>292</sup> That said, blindness may have indeed been common, a result of infection or metabolic disorder perhaps, and reports of it may have served two purposes.

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<sup>289</sup> Horden appears to allude to this (at least in part) when writing, 'we must address the problem of deciding why the written evidence at our disposal was produced and thus of how directly – or how comprehensively – it relates to clinical reality.' Horden (2000), p. 207.

<sup>290</sup> The dearth of attention to this matter among revisionists may owe to their focus on medical texts and individual incidences of disease, not annals and pestilences.

<sup>291</sup> Distinguishing what reports of disease in early medieval texts were or were not loaded with intertextuality is undoubtedly difficult: symptoms which may have become objects of textual borrowing or allusion may have also been common expressions of widely prevalent disease-causing entities.

<sup>292</sup> For example, Genesis 19:11, 27:1; Samuel 3:2; 1 Kings 14:4; 2 Kings 6:18, Luke 4:18-22, 7:21; Isaiah 9:2, 29:18, 35:5, 42:18-21, 43:8, 61: 1-2; Matthew 9: 27-31, 12:22, 20:30-4; Mark 8: 22-5, 10:46-52; John 9:1-41; Romans 11:25.

The superimposition of major acute infectious diseases known to modern science onto specific pre-laboratory outbreaks of disease, for instance, affects how demographically and economically severe we think those disease outbreaks were. Surprisingly, however, many who advance a diagnosis do not attempt to gauge what the diagnosis means for our understanding of the disease outbreak.<sup>293</sup> If the initial occurrence of the EMP was influenza our interpretation of the EMP's possible spatial and temporal parameters, morbidity and mortality would change. The EMP would no longer be a slow moving pandemic spread primarily by boat and confined, due to its reliance on boats and rats, to the Mediterranean coast. If the 809/10 cattle pestilence was rinderpest we can suspect that cattle populations exposed to the infection to have been nearly completely wiped out, if contagious bovine pleuropneumonia the mortality would have been more restricted, if anthrax humans and other animals would have died too and a far more limited area would have been affected. However, the diagnosis one advances affects not only the morbidity and mortality rates we can suspect, but also whether the afflicted population acquired immunity to the infection after being exposed to it, or if the disease affected multiple species, was zoonotic, preyed on the malnourished, and those with underdeveloped or impaired immune function, or thrived in certain environments and climates.

On the other hand, it is also necessary to recognize that poorly founded diagnoses can mar our understanding of 'modern' pathogens and the evolution of disease-causing entities known to modern science. Historians do not, of course, exist in a vacuum and numerous diagnoses advanced by historians, whether loosely or critically, have served as proof (or confirmation) in the sciences for the pre-laboratory existence of modern pathogens. For instance, virologists often draw upon the smallpox diagnosis of the sixth-century epidemic/pandemic described by Gregory of Tours and Marius of Avenches, which historians regularly reiterate, as evidence for the *variola* virus' long history. Likewise, specialists in comparative medicine regularly draw upon the rinderpest diagnosis of cattle pestilences of c.591 and 809/10 to demonstrate that virus's antiquity.

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<sup>293</sup> For example, Stoclet does nothing with his smallpox diagnosis of a late sixth-century pestilence: (2007), p. 146. He advances it solely for the sake of advancing it. Many cultural, economic, political and social historians diagnose outbreaks of disease, or so it seems, for no other reason than to inject something tangible into the past. Campbell (2009), p. 42, provides another example, as do the existing diagnoses of Carolingian and early Ottonian pestilences assessed in 1.1.1.

Kershaw's rinderpest diagnosis of the great fourteenth-century cattle panzootic, which was based on very limited knowledge of the fourteenth-century pestilence and no consideration of the symptoms or epizootiology of the rinderpest virus itself, was employed by the biologist Spinage in his authoritative history of the rinderpest virus, and subsequently several scientific analyses of the virus' evolution, and used alongside other loosely founded RPV diagnoses of later pre-industrial cattle pestilences to illustrate that RPV does indeed have a long history in Europe and that the virus likely existed in Europe before other *morbilliviruses*.<sup>294</sup>

Further, the identification of demographically significant pre-modern outbreaks of disease with pathogens known to modern science may serve to confuse modern scientific judgments of the historical disease's epidemiology and, consequently, gravity for modern medicine and society.<sup>295</sup> If the EMP and Black Death were not thought to be bubonic plague, *Y. pestis* would potentially not receive the scientific (and popular) attention it does today.<sup>296</sup> If rinderpest was not thought to have irrupted in Europe in early medieval Europe, there would be little historical reason to suppose that the virus is 'ancient.' For these reasons, historians must both critically consider the methodologies underpinning the practice of retrospective diagnosis and the ability of their diagnoses to cross fertilize, to impact and mislead the work of other scholars in other disciplines unfamiliar with how complicated and intricate the practice of diagnosing retrospectively disease occurrences reported in pre-modern written texts actually is.<sup>297</sup>

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<sup>294</sup> Kershaw (1971), p. 24; Spinage (2003), pp. 92-4; Pastoret (2008), p. 1; Pastoret et al (2008), p. 86. Ideas about the antiquity of particular pathogens also condition conceptions of the evolutionary history of pathogens biologically related to them. Similarly, scientists have long thought that *Y. pestis* existed in pre-modern Europe on account of the bubonic plague diagnoses of the EMP and the Black Death, which though initially advanced by a scientist have been regularly reiterated in the historical sciences: Achtman (2004); Girard et al (2004); Hinnebusch (1996); Hirst (1953); Pollizter (1954).

<sup>295</sup> Strewesbury's 1971 study of the Black Death is an excellent example of this. His adoption of the popular bubonic plague diagnosis forced him to argue, based on modern knowledge of the epidemiology of *Y. pestis*, that the outbreak was less severe than the sources demonstrate.

<sup>296</sup> That is, the attention it may not deserve, given the limited danger it poses. Cf. Carmichael (2003), p. 266.

<sup>297</sup> As scientists tend to think what historians tell them about pre-modern disease is certain or absolute, it is not surprising that several assessments of the extent, reoccurrence and frequency of disease episodes historians have advanced have served to guide biomolecular scientists' reading of the material data they derive from physical remains, not to mention their research agendas. Drancourt and Raoult (2002), for example, use Biraben and LeGoff's 1975 assessment of the initial and recurrent waves of the EMP to 'diagnose' sixth- through early eighth-century 'plague' outbreaks. Likewise, when Ruddiman 'hit the history books,' he ended up consulting a range of popular books on disease that greatly misled his own

For these reasons, retrospective diagnoses are undertaken very cautiously here. Yet, though the practice may be accurately described as ‘dangerous’ and ‘impermissible,’ if clearly labeled as preliminary or suggestive diagnoses can aid our discussions of the impact of disease as well as provide direction for those seeking to detect ‘modern’ pathogens in pre-modern remains. The major problem with existing retrospective diagnoses is that they are regularly taken and presented as definitive facts, not hypotheses. If undertaken cautiously, and conceptualized carefully, diagnoses can be heuristic. In addition, to our discussion on working diagnoses in 0.1.6.3, it is necessary to consider what the palaeoscientific study of physical remains brings to the table. Certainly, the study of the diseases of any pre-modern period stands to gain from an interdisciplinary approach and the incorporation of the palaeosciences.<sup>298</sup>

### 1.2.3 Palaeomicrobiology and Carolingian and early Ottonian disease

Of course, no scholar, revisionist or not, assumes that no pathogens known to modern science existed before the laboratory or that disease-causing microorganisms known to laboratory science only came into being subsequent to the dawn of the lab and germ theory. A pathogenic reality did exist in the past. Disease was not simply something thought and written about, but something that could and most probably did occur independently of the perception of the event by the authors of our texts.<sup>299</sup> The palaeoscientific study of physical remains can help us grasp what ‘modern’ diseases may have very well existed in the Carolingian and early Ottonian periods, as well as how prevalent they may have been. While this is certainly, at least for our purposes, significant, it is stressed here that the study of lesions left on skeletons and the detection of ‘modern’ pathogens in pre-modern DNA are not ‘fool-proof’ or ‘complete’ sciences which provide hard concrete answers, but rather sciences that are, like the diagnosing of written reports of disease, complicated by a series of methodological problems and concerns.

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interpretation of his material evidence (in Ruddiman’s case CO<sub>2</sub> levels in polar ice): see discussion of Ruddiman’s work in 3.1.

<sup>298</sup> As Grmek noted, material evidence of disease is of particular importance as it allows us to skirt the many interpretative traps assessments of written evidence often fall into: (1989), p. 2.

<sup>299</sup> As Arrizabalaga clearly states: (1993), p. 1029. Cf. Stein (2006), p. 620; Shaw (1990), p. 332.

Until the advent of Polymerase Chain Reaction (PCR) in the mid 1980s, physical human and animal remains revealed little about acute diseases, the ‘killing’ diseases as some archaeologists refer to them.<sup>300</sup> This is because the vast majority of acute diseases leave no mark on the skeletons of the people or animals they afflict: the disease reaction is too quick, the pathogen too virulent, and death too sudden for the skeletal structure to be altered. This is the ‘osteological paradox.’<sup>301</sup> Until PCR, the palaeosciences could speak only to chronic debilitating diseases, such as rickets and leprosy, which left ‘particular’ observable stigmata for posterity.<sup>302</sup> Bubonic plague and its variants, cholera, contagious bovine pleuropneumonia, dysentery, ebola, measles, mumps, rinderpest, typhoid, typhus and whooping cough do not affect the skeletal structure and were, as such, skeletally ‘invisible’ before the recent developments of the biomolecular sciences.<sup>303</sup> Of all the killing diseases, the acute infectious diseases behind epidemics and epizootics, pandemics and panzootics, smallpox may be the only to leave a mark.<sup>304</sup>

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<sup>300</sup> PCR enables one to amplify trace amounts of DNA or RNA. It is regularly used in the microbiological and forensic sciences. For our purposes, PCR allows us to look for chemical signatures of blood-borne pathogens in DNA harvested from physical remains in the form of teeth (dental pulp), bone, soft tissues or hair. For an introduction see Hummel (2003); Herrmann and Hummel (1996); Herrmann and Hummel (1998); Roberts (2009), pp. 208-13; Greenblatt (1998). For a rare example of a palaeomicrobiological assessment of soft tissues see Rollo et al (2006); Hass et al (2000), p. 294. The first biomolecular detection of a human pathogen (*Mycobacterium tuberculosis*) was carried out by Spigelmann and Lemma (1993). Prior to PCR, physical assessments of the extant soft tissues of mummies and bog bodies had been said to furnish evidence of infectious diseases, but no diagnosis gathered much consensus; visible markings are simply too indiscriminate: see, for example, Birkett (1983), pp. 99, 103. The smallpox diagnosis of Ramses V is the most commonly known example: Stathakopoulos (2004), pp. 93-4. It too, however, is anything but definite: Cunha (2004c), pp. 81-2. Mummies are also, of course, rather rare in most parts of the world: Waldron (2009), pp. 1, 220.

<sup>301</sup> As Wood et al (1992) point out, that most exhumed skeletons exhibit no disease pathology does not mean that they were healthy, or healthier than those with diseased bone. The opposite could be true. Diseased bone indicates the individual mounted an effective immune response and survived the acute phase of illness. The person passed into the chronic stage of the pathogen’s attack: Roberts and Manchester (2005), p. 7. Diseased bone could also simply imply that one encountered a ‘less virulent’ disease. If a person’s skeletal remains are unaltered, they may have very well succumbed rapidly to the infection another person managed to defend against, and if they succumbed rapidly, their bone would not have been altered. ‘More virulent’ diseases only affect soft tissues (or, rather, they only have time to affect soft tissues). As discussed below, the osteological paradox thus explains why most non-adult skeletons do not exhibit lesions. Waldron (2009), p. 1, notes that though most skeletons will not exhibit signs of disease they will show nutritional stress, injury and healing.

<sup>302</sup> Cockburn (1971), p. 53; Roberts (2009), p. 155, 158.

<sup>303</sup> Waldron (2009), p. 84; Roberts and Manchester (2005), pp. 2, 12-13. There was therefore no material evidence for the pre-modern existence of infectious diseases prior to the mid ‘80s. Prior to PCR, claims regarding the existence of modern pathogens in ancient, medieval and early modern disease occurrences rested solely on the retrospective diagnoses of diseases reported in pre-modern texts.

<sup>304</sup> It has been suggested that smallpox does leave characteristic marks on the skeletons of those it affects: Ortner (2007), p. 103, writes, ‘smallpox is one of the acute infectious disease caused by a virus that can

Other non-acute or non-infectious diseases that usually cause death as a secondary infection (or when coupled with a secondary infection), including most strains of malaria (though not *Plasmodium falciparum*), also remained unseen in pre-modern bodily remains until the developments of the mid 1980s. Further, many non-pestilential diseases that can cause changes in bone morphology do not always, or even often, actually do so: it has been estimated, for example, that TB expresses itself skeletally in ‘no more than’ 2 per cent of cases.<sup>305</sup> Likewise, not all people with leprosy will undergo changes in bone morphology.<sup>306</sup>

To date, several acute infectious diseases have been identified in pre-modern human and animal aDNA, including bubonic plague, dysentery and typhoid. Malaria, specifically *P. falciparum*, has also been identified in Roman-era remains, and several members of the *Mycobacterium* complex, including *Mycobacterium tuberculosis* (human tuberculosis), *Mycobacterium bovis* (bovine tuberculosis, which affects cattle and humans, as well as other animals), *Mycobacterium Africanum* (a variant of *M. tuberculosis* which affects humans), and *Mycobacterium leprae* (leprosy) have been isolated in pre-historic, ancient, medieval and early modern bodies. That non-pestilential debilitating diseases have also proven to be detectable not only ‘on’ remains but ‘in’ them, that is, palaeopathologically and palaeomicrobiologically, is particularly significant as lesions expressed on bone are more often than not difficult to diagnose definitively, as emphasized in 1.2.4. Biomolecular detections of the bones exhibiting disease lesions thus provide an independent line of evidence to confirm suspected diagnoses.<sup>307</sup> These aDNA

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affect the skeleton, though skeletal involvement is limited to patients who acquire the disease before adulthood.’ He continues, ‘this makes smallpox identifiable in human remains.’ The disease can usually be seen, he states, in the elbow (Waldron specifies it affects the elbow bilaterally: (2008), p. 110-111). Like Waldron here, Roberts and Manchester (2005), p. 27, specify that such pathology occurs very rarely and imply that smallpox causes bone morphology in few of the people it infects. Following a literature review I have come across no palaeopathological diagnoses of smallpox. Moreover, many seem to think the virus does not alter one’s skeletal structure: for example, Cunha (2004c), p. 81; Roberts (2009), p. 155.

<sup>305</sup> Waldron (2009), p. 91.

<sup>306</sup> It is crucial to recognize that all diseases that can cause bone morphology progress through several stages, and only some of these stages affect bone. Consequently, palaeopathologists can only speak to the prevalence of certain stages of a particular disease. We will return to this in 1.2.4.

<sup>307</sup> Our ability to study remains of chronic debilitating diseases, such as leprosy and TB, in these ways is certainly noteworthy. Biomolecular studies can help (possibly) to identify remains exhibiting lesions that have proven difficult to identify. Waldron (2009), p. 101, notes that palaeopathological diagnoses of leprosy are rarely clear-cut and should be confirmed with PCR analyses. Some researchers have already carried out such multidisciplinary examinations of remains: for example, Haas et al (2000); Mays and Taylor (2002); Murphy et al (2009); Waldron (2009), p. 95. However, most palaeomicrobiological assessments of skeletal



finds are synthesized in 1.3 and 1.4.2. Unfortunately for our purposes, no ‘modern’ pathogen has been isolated in aDNA derived from an animal, human or not, dating to the Carolingian or early Ottonian periods. What detections do exist from other historical periods, however, may shed some light on the mid eighth- through mid tenth-century disease experience. That said, aDNA detections of some Carolingian and early Ottonian pestilences may never be achieved as researchers in the biomolecular sciences are armed solely with an arsenal of modern, post bacterial revolution pathogens, and some of the microorganisms behind Carolingian and early Ottonian pestilences may have truly belonged to the mid eighth through mid tenth centuries.

It is worth considering, despite the present absence of biomolecular detections of ‘modern’ pathogens in mid eighth- through mid tenth-century remains, what such ‘finds’ tell us about the disease history of the period the remains date to. Those who have isolated *Y. pestis* in remains dating to sixth-century Bavaria and fourteenth-century southern France have been quick to claim that they have ‘ended the controversy’ and definitively identified the EMP and Black Death as bubonic plague. Some go so far to claim that they have definitively identified not only the initial occurrences of the EMP and Black Death but their reoccurrences as well, that is ‘plague’ outbreaks in the sixth, seventh, eighth, fourteenth, fifteenth, sixteen, seventeenth and eighteenth centuries.<sup>308</sup> This may hardly be surprising as researchers have attempted to detect *Y. pestis* in sixth- and fourteenth-century bodies explicitly with the intention of confirming the popular bubonic plague diagnoses of these two ‘plague’ pandemics.<sup>309</sup> In this light, it is only

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remains exhibiting pathology are conditioned by the diagnoses of the visible pathology – that is, palaeomicrobiologists seem to attempt to detect the pathogens palaeopathologists suggest caused the visible skeletal lesions. That palaeomicrobiological assessments are often said to confirm palaeopathological speculations may be considered too convenient by some and a product of the methodological problems inherent at present in the palaeomicrobiological hunt for ‘modern’ pathogens in aDNA.

<sup>308</sup> For example, Raoult et al (2000); Garrelt and Wiechmann (2003); Drancourt et al (2007). The latter articles tests remains dating to the c.1720 ‘plague’ outbreak in Provence and considers them, though it is not explicitly stated, representative of the Black Death. Further, *Orientalis* has now been ‘identified’ as the *Y. pestis* biotype responsible for ‘the three plague pandemics.’ Drancourt et al (2007), p. 332.

<sup>309</sup> The studies of the French team in particular start their aDNA investigation with the assumption that the old bubonic plague retrospective diagnoses of the EMP and the Black Death are credible. For example, Drancourt et al (2007), p. 332, write that their studies were engendered by the fact that ‘we had historical evidence that 3 mass graves excavated in France were used to bury bubonic plague victims.’ What they really had was hard evidence that the graves were used to bury victims of the Black Death, not bubonic plague. Of course, as discussed in 1.2.1 and 1.2.2, no historical evidence could provide such definitive proof of the cause of death of buried individuals. The most recent biomolecular detections of *Y. pestis* are no different, though the results are far more convincing. Haensch et al use a variety of control measures to

natural that scholars would employ the isolation of *Y. pestis* in dental pulp harvested from a few bodies from a single ‘plague’ outbreak to speak about a series of pestilences that occurred over several centuries, since these pestilences have long thought to have been caused by the same disease.

Yet it is important to call attention to what these researchers have actually done. As Twigg and Horden have both pointed out, these researchers have neither definitively diagnosed the Black Death nor the EMP, or the supposed early and late medieval reoccurrences of those pandemics. Rather, these researchers have simply demonstrated the existence of the *Y. pestis* bacillus in the centuries around the time of the early and late medieval pandemics. Biomolecular detection of a pathogen does not necessarily mean that the detected pathogen expressed itself or was recorded by contemporaries if it did. Nor can the detection of pathogen be thought to be synonymous with the cause of death. It merely represents the presence of the pathogen’s signature in the person’s DNA and a person may have been a carrier of the pathogen and not suffered disease.<sup>310</sup> Moreover, the association of any biomolecular find to a disease occurrence recorded in a written text is near impossible. Human (or animal) remains can rarely be dated to anything shorter than fifty-year intervals and no disease occurrence occurs in a vacuum, that is, many outbreaks of disease are often documented in fifty-year spans.<sup>311</sup> If multiple pestilences are said to have affected a particular area or population within fifty or so years, how can we safely align a specific biomolecular find to any specific textual account of disease? Further, how are we to discern whether the palaeomicrobiological evidence shines light on an epidemic or an endemic pocket?

However, not only must our interpretation of biomolecular finds be more nuanced, but we must bear in mind the many problems that obstruct the obtaining of accurate and reliable pathogenic isolations in aDNA. The methods employed, and the accuracy and reliability of several of existing detections, have come under fire. This is

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identify *Y. pestis* in the aDNA of multiple individuals from several ‘plague’ pits roughly dated to the Black Death or its supposed late medieval and early modern reoccurrences (2010).

<sup>310</sup> Roberts (2009), p. 213.

<sup>311</sup> In fact, medieval remains can rarely be dated with greater precision than a century scale: Roberts (2009), pp. 162, 214-16. Further, establishing whether a burial pit was ‘catastrophic’ or ‘attritional’ is in itself not always a simple matter: Margerison and Knusel (2002).

especially so in regard to the identifications of bubonic plague in pre-modern bodies.<sup>312</sup> A survey of the literature on PCR methods, particularly works dealing with biomolecular detections in aDNA, provides startling results: most pathogenic detections already made should not be accepted at face value or as definitive proof of the existence of a ‘modern’ pathogen in pre-laboratory remains.<sup>313</sup> Discoveries of *Y. pestis* and *Salmonella typhi* in human remains cannot themselves be accepted, for instance, as confirmations of the traditional typhoid and bubonic plague diagnoses of the Athenian Plague, the EMP and the Black Death. Only by detecting *Y. pestis* in a range of ‘plague’ pits datable to the sixth century in areas said by contemporary authors to have been affected may the controversy come to an end.<sup>314</sup> Furthermore, two bodies from a Bavarian grave, which contained only two bodies and was not a plague pit, five bodies from Vienne, and about ten from several French graves, cannot be thought to be representative of truly pan-European disease occurrences, let alone multiple successive waves of disease spanning multiple centuries.

Beyond this, PCR studies, or palaeomicrobiological analyses of aDNA, are a part of a developing science.<sup>315</sup> Methods common to the practice are regularly tweaked, new recommendations are often published, old practices lose favor, and new practices are developed. Naturally, such developments call into question the quality and accuracy of existing detections.<sup>316</sup> Furthermore, as far as I am aware, no existing biomolecular detections of ‘modern’ disease-causing entity in pre-modern remains has been duplicated.<sup>317</sup> Ideally, the material remains that have been employed in aDNA analyses for ‘modern’ pathogens would be tested for the same pathogen by a second independent

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<sup>312</sup> For example, Gilbert et al (2004a); response, Drancourt and Raoult (2004); response returned, Gilbert et al (2004b); Prentice, Gilbert and Cooper (2004); Raoult and Drancourt (2002); Rollo et al (2006), pp. 55-6. Bianucci et al (2008c), as noted, deem their aDNA *Y. pestis* detections ‘preliminary,’ and Haensch et al are also forced to admit that their *Y. pestis* detections ‘probably’ mean that the Black Death was caused ‘largely’ by bubonic plague: (2010), p. 3. The ‘Suicide PCR’ technique employed by Raoult et al (2000) to detect *Y. pestis* in fourteenth-century remains and Garrelt and Wiechmann (2003) in sixth-century remains has been criticized. As have *M. tuberculosis* finds, especially in Egyptian mummies: Rollo et al (2006), p. 56.

<sup>313</sup> This literature is discussed below. Cf. Carmichael (2003), pp. 255-56, who unquestioningly accepts Drancourt and Raoult’s claimed ‘find’ of *Y. pestis* in fourteenth century remains. Cf. Slack (1996), p. 555.

<sup>314</sup> Twigg (2003), p. 11; Horden (2005a), p. 150; Magner (2009), p. 12.

<sup>315</sup> Roberts and Ingham (2008); Caramelli and Lago (2006). For a specific example regarding the detection of a specific disease, here TB, see Donoghue et al (2009).

<sup>316</sup> For example, Bianucci et al (2008c).

<sup>317</sup> Though see Bianucci et al (2008c), p. 366.

team in another lab in order to establish a definitive diagnosis. This appears to be much easier said than done. Further, failed attempts to diagnose are rarely published or addressed in publications.<sup>318</sup> The practice itself is plagued by a range of other difficulties, some of which appear, at present, to be insurmountable: several scholars have noted the difficulty (and expenses) entailed in extracting and maintaining uncontaminated DNA samples, ensuring uncontaminated workstations, and authenticating results. Considering the numerous hurdles that must be overcome in order to achieve an accurate diagnosis, and in particular the threat of false positives and cross-contamination between ‘modern’ and ‘pre-modern’ samples, it may seem incredible that the popular diagnoses of the Athenian Plague, EMP and the Black Death have been ‘proven’ biomolecularly.<sup>319</sup> We might question whether the casual retrospective diagnoses haphazardly applied to these outbreaks in the late nineteenth and early twentieth century were really correct, or if something else is going on.<sup>320</sup>

In a large survey of published papers dealing with pathogenic detections in aDNA, Roberts and Ingham quantitatively illustrate that a vast number of researchers carrying out PCR analyses with hopes of determining the pre-modern existence of ‘modern’ pathogens make no note of the use of ‘even basic contamination controls’ or ‘procedures to validate results independently.’<sup>321</sup> Meanwhile, in 2005, Malmstrom et al asserted that ‘recognized criteria for authenticating aDNA cannot separate contamination from ancient human DNA the way they are presently used.’<sup>322</sup> In 2007, Malmstrom et al stressed that because research into aDNA ‘generates huge scientific and public interest,’ researchers are ‘rarely discouraged by problems concerning the authenticity of such

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<sup>318</sup> One rare exception: tests for *Y. pestis* in the remains of sixty-four people from seven northern European sites dated to ‘plague’ periods were negative. Drancourt et al (2007), p. 332.

<sup>319</sup> Sample contamination and false positives have proven to be very real and hard to avoid. For instance, Malmstrom et al (2005a); Malmstrom (2005b); Malmstrom (2007); Sampietro et al (2006); Yang and Watt (2005); Yang, Eng and Saunders (2003); Roberts and Ingham (2008); Mateiu and Rannala (2008); Gilbert et al (2006); MacHugh et al (2000); Rollo et al (2006); Oppenheim (1998).

<sup>320</sup> After all, contamination cannot be wholly ruled out. Drancourt et al (2007), p. 333. Despite the numerous controls applied by the French team they are forced to admit contamination while ‘unlikely’ is not impossible. Raoult and Drancourt (2002), p. 459, imply that mistakes could have been made in both the obtaining and amplifying of samples.

<sup>321</sup> Roberts and Ingham (2008), p. 600.

<sup>322</sup> Malmstrom et al (2005b), p. 2040.

data.<sup>323</sup> And as Rollo et al have recently noted, despite the popular trend of detecting pathogens in aDNA, the analysis of DNA ‘is still a contentious issue.’<sup>324</sup> Roberts has gone so far as to assert that journal editors may have to be better educated in the methods involved in the pathogenic detection of ‘modern’ pathogens in aDNA in order to ensure that only carefully obtained results are published.<sup>325</sup>

In sum, if it is assumed that the methods and application of existing biomolecular detections of ‘modern’ diseases in pre-modern remains are faultless, published finds would inform our speculations about the identifications of mid eighth- through mid tenth-century disease occurrences. If existing aDNA finds are accurate, we can presume that bubonic plague, dysentery, leprosy, malaria, scurvy, tuberculosis and typhoid did exist in pre-modern Europe, and thus that these diseases could have been the cause of Carolingian and early Ottonian pestilences. While attempted biomolecular detections of modern pathogens in mid eighth- through mid tenth-century bodies are wanting, we may tentatively infer that those disease-causing entities that have been detected in pre-Carolingian would have also existed in Carolingian and early Ottonian Europe.

#### 1.2.4 Palaeopathology and Carolingian and early Ottonian disease

Attempts to diagnose lesions caused by disease that are visible on pre-modern bones long precede attempts to detect ‘modern’ pathogens in aDNA.<sup>326</sup> Though most acute infectious diseases cannot affect bone morphology, many non-pestilential debilitating diseases and some infectious diseases do, including cancers, leprosy, polio, syphilis, tuberculosis and several dental and joint diseases. To date, numerous lesions on the skeletons of ancient, medieval and early modern Europeans have been diagnosed as the result of bone-changing diseases. Of the *Mycobacterium* complex, *M. tuberculosis*, *M. bovis* and *M. leprae* have been diagnosed. Rickets, scurvy, cancers, Paget’s Disease,

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<sup>323</sup> Malmstrom et al (2007), p. 998. Another aDNA researcher has told me, off record, that some labs are simply not trustworthy, that considerable funds are often on the line, and that the pressure to obtain the right results can be intense.

<sup>324</sup> They continue that while the potential of analyses of aDNA for palaeomicrobiological and palaeopathological studies is ‘undisputed’ that the science is ‘limited by a lack of standard protocols.’ Rollo et al (2006), p. 53.

<sup>325</sup> Roberts (2009), p. 213.

<sup>326</sup> Roberts and Manchester (2005), pp. 3-5. The practice also now entails, in addition to visual and macroscopic observation, radiography, microscopy, etc.

gout, and several joint and dental diseases (such as osteoarthritis, rotator cuff disease and rheumatoid arthritis), and even *Treponema pallidum* (syphilis) have been detected in ancient or medieval European remains. These palaeopathological reports are synthesized in 1.3.

While more palaeopathological assessments of pre-modern remains have been carried out than palaeomicrobiological assessments, many periods and areas of pre-modern Europe remain understudied, and many diseases underrepresented. Livestock diseases have received especially little attention from palaeopathologists.<sup>327</sup> The rarity of intact livestock skeletons has undoubtedly complicated attempts to diagnose bone-changing diseases livestock suffered, but attention to disease in all non-human animal remains has nonetheless been slow in coming.<sup>328</sup> As addressed in 0.1.5.1, the Carolingian and early Ottonian periods have also received the slightest attention. What human and livestock diseases have been palaeopathologically detected and what areas and pre-modern periods have received the most attention ultimately owes not to the quality and quantity of available pre-modern physical evidence, or to the number of skeletons that have been unearthed, but to the interests of archaeologists/zooarchaeologists, and the number of practicing palaeopathologists, and indeed palaeopathology departments or programs, in a given region or country. Certainly, the number of palaeopathologists in England and the US greatly exceeds that of other developed countries, and pre-modern remains from England, of all European countries, have received the most attention.<sup>329</sup> The same cannot be said for palaeomicrobiology, a field which seems to be led primarily by German and French researchers.<sup>330</sup>

Palaeopathological assessments of material remains do not regularly result in definitive diagnoses, as palaeopathologists, unlike palaeomicrobiologists, often observe. As Roberts frankly points out, ‘the diagnosis of disease using skeletal remains is not

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<sup>327</sup> This was true in 1976 (Siegel) and it is still, though less so, true in 2006: see Baker and Brothwell (1980) and Vann and Thomas (2006). The ICAZ Animal Palaeopathology Working Group seeks to offset this gap in the literature.

<sup>328</sup> Baker and Brothwell (1980), p. 8, note that whole bodies of animals, not victims of war, are rarely found in archaeological situations, but that whole skeletons, when they are found, may very likely have been animals that succumbed to an acute infection. They assert ‘countless thousands’ of animals must have died in this way ‘during historic times.’ Yet where are the skeletons?

<sup>329</sup> See, for instance, the comments of Jakob (2009), pp. 2, 4-6.

<sup>330</sup> As is made clear from the discussion in 1.2.3.

easy.<sup>331</sup> Waldron adds that ‘grossly diseased bone is easy to recognize by anyone with even the most modest knowledge of bony anatomy’ but that ‘deciding the most probable cause for any lesion found in a skeleton is frequently perplexing and often inconclusive.’<sup>332</sup> Waldron writes that ‘the most one can do is provide a range of possible causes.’ On account of the range of problems one encounters when attempting to diagnose lesions, the identifications of skeletal stigmata addressed in 1.3 must not be considered definite but suggestive, as several leading palaeopathologists suggest they should be.<sup>333</sup> This is due to a range of problems. To begin, a number of diseases cause similar lesions, and lesions cannot always be adequately differentiated in order to establish a reliable diagnosis.<sup>334</sup> This is because bone has a limited number of reactions to disease: it can either undergo generation (‘proliferation’) or destruction.<sup>335</sup> Furthermore, firm diagnoses of many bone-changing diseases require complete or near complete skeletons, and skeletons are often fragmentary.<sup>336</sup> On the other hand, some diseases, in order to be diagnosed, require the survival of specific skeletal elements.<sup>337</sup> For instance, rheumatoid arthritis cannot be diagnosed without the preservation of feet or hands, pulmonary TB cannot often be diagnosed without good preservation of ribs, syphilis requires good preservation of the skull and/or the scapula, and severe cases of leprosy (those that cause rhinomaxillary syndrome) require good preservation of the skull.<sup>338</sup> These diseases, which require the survival of specific skeletal elements or near-complete skeletons, are likely to be underrepresented in burials and, consequently, underreported in the literature.<sup>339</sup>

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<sup>331</sup> Roberts (2009), p. 159; Roberts and Manchester (2005), p. 7.

<sup>332</sup> He continues, that diagnosing is so difficult that ‘the person to be weary of in most cases is not the most cautious but the most confident.’ Waldron (2009), p. 21; also Jakob (2009), p. 171.

<sup>333</sup> It should be noted that diagnoses of diseases via both aDNA analyses and the observation of skeletal lesions should not be held to be more reliable than those diagnosed by one or the other, due to possible contamination in aDNA detections (most often the disease suspected on account of bone lesions is that which is tested biomolecularly).

<sup>334</sup> Roberts and Manchester (2005), p. 8. Rarely, in fact, can skeletal markings – whether disease, injury or work related – be definitively diagnosed or differentiated from one another. This is true of human and livestock remains: for example, Brothwell, Dobney and Ervynck (1998).

<sup>335</sup> Roberts and Manchester (2005), pp. 7-8; Waldron (2009), pp. 4, 46-7.

<sup>336</sup> Roberts and Manchester (2005), pp. 8-10; Waldron (2009), p. 21.

<sup>337</sup> Waldron (2009), pp. 21, 52-3.

<sup>338</sup> Idem (2009), pp. 46-7, 94-5, 100-101, 108.

<sup>339</sup> Waldron (2009), pp. 21, 52-3, 55. Additionally, of course, as only specific stages of a disease can be identified, only specific stages can be discussed.

Many diseases also cause similar lesions on particular areas of the skeleton. For example, leprosy, TB, trauma, scurvy and treponemal disease can all cause very like bone formations on the lower leg.<sup>340</sup> Skeletons can additionally undergo significant post-mortem changes (particularly non-adult skeletons) that appear to be pathological but are not. Damage to the skeletal structure during burial, decomposition and excavation can cause the formation of ‘disease-like’ lesions.<sup>341</sup> Regularly occurring skeletal abnormalities, bone healing and re-growth can also be confused for signs of disease. That people may suffer multiple diseases that affect the skeleton, simultaneously or at different periods in their life, further complicates attempts to provide a reliable diagnosis.

Other limits, similar to those of palaeomicrobiology, also apply. Just as palaeomicrobiologists can only attempt to detect modern pathogens in pre-modern DNA, palaeopathologists can only align skeletal lesions found on pre-modern bone with diseases known to modern science when attempting to provide a diagnosis. Of course, that all disease-related stigmata visible in remains may not have been caused by infections known to modern science can significantly impair attempts to diagnose pre-modern diseased bone today.<sup>342</sup> Despite the fact that it is generally possible to determine whether a lesion was ‘active’ at the time of death, that a lesion was active does not in itself mean that the person actually died from the disease causing the lesion.<sup>343</sup> This, in any case, may be of little importance, as with chronic diseases the real issue is not the death of the individual but his or her inability to work or bear children.

Lastly, as Roberts and Manchester demonstrate, it is essential to recognize that skeleton assemblages represent the ‘dead population’ of the period in which the population lived, meaning that the sample studied cannot be thought to represent the others not excavated, that is, the people that lived in the area or period that were not

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<sup>340</sup> Roberts and Manchester (2005), p. 8.

<sup>341</sup> This is referred to as pseudopathology: Idem (2005), pp. 10, 12, 14; Waldron (2009), pp. 22-3, notes that the reactions bone may have with the soil or sand in which it rests, as well as contact it has with roots, plants and other organic matter, and the gnawing of rodents and other animals, can also cause disease-like lesions. Insects too can cause pseudopathology: Siegel (1976), p. 350.

<sup>342</sup> As Roberts and Manchester (2005), pp. 14-15 state: ‘palaeopathologists rely on knowledge of modern pathology,’ and thus continuity in the skeletal expression of disease.

<sup>343</sup> Roberts (2009), p. 159; Roberts and Manchester (2005), p. 8. Thus, lesions can also often be determined to be healed. Healed lesions, of course, clearly indicate the person did not die of the disease that caused the pathology.



buried at the uncovered archaeological site.<sup>344</sup> As it is very rare for entire cemeteries or burial grounds to be excavated, the sample studied can rarely be said to be representative of even a single burial ground. As such, palaeopathology cannot speak to the general incidence of a particular disease in a population, no matter how restricted the temporal and spatial limits. A diagnosis of leprosy in one individual out of ten exhumed, for instance, tells us little more than that one out of ten people in that particular graveyard had leprosy. The prevalence of a disease identified in a specific dig cannot be generalized for the wider population of the period, as the dead do not represent the living, and the health of individuals unearthed and assessed palaeopathologically cannot stand in for the health of their contemporaries who did not die, and were not buried then and there. We should also suspect that the prevalence of some bone-changing diseases would be particular to specific climatic, demographic, environmental and socio-economic contexts, and be partially determined by previous exposure. The prevalence of even the most commonly investigated diseases – tuberculosis and leprosy – cannot be determined for any period.<sup>345</sup> It is quite probable, as Siegel suggested, that nothing like the ‘true’ picture of disease of any past society will be obtained via palaeopathological analyses of bone morphology.<sup>346</sup> We can only speak to the ‘bare minimum’ occurrence of bone-changing infections.<sup>347</sup>

### 1.2.5 The elusive pathocoenosis

Pathocoenosis refers to the spectrum of diseases that afflict a particular population in a particular place at a particular time over a particular period. Grmek developed the concept in 1969.<sup>348</sup> He argued it was necessary to consider all the diseases that afflicted an area in a given period, and that studies which focus strictly on the history of a single pathogen (the common ‘biography of disease’ approach) were misleading as they suggest

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<sup>344</sup> Roberts and Manchester (2005), pp. 12-14.

<sup>345</sup> In fact, the prevalence of most (if not all) bone-changing diseases in most pre-modern periods is unknown: see, for example, Waldron (2009), pp. 56, 61, 67, 97-8, 120. Waldron’s stance on the rise and fall of leprosy is telling of this. It is based on the hypotheses of historians, not skeletal evidence: (2008), pp. 97-8.

<sup>346</sup> Siegel (1976), p. 376. If thousands upon thousands of skeletons from Carolingian and early Ottonian Europe were exhumed and examined, we would know little still about the prevalence of diseases.

<sup>347</sup> Idem (1976), pp. 355, 376.

<sup>348</sup> Grmek (1989), pp. 2-4; Shaw (1991), pp. 330-31; Horden (2000), p. 205.

that diseases occur in isolation of one another and effect populations in vacuums. He also emphasized that attention needs to be given to infectious disease as well as non-infectious disease. As Grmek stressed, a complex web of infection would have existed in all pre-modern periods, as it has under the eye of the laboratory.

Reconstructing the pathocoenosis of Carolingian and early Ottonian Europe would certainly be ideal. If it were possible, our appreciation of mid eighth- through mid tenth-century demography and economy, not to mention society and culture, would stand to gain immensely. Considering the foregoing discussion on retrospective diagnosis and the palaeosciences, it should be of no surprise that establishing the range of diseases that existed or expressed themselves in a given period and area before the dawn of the laboratory is exceedingly difficult, if at all possible. If establishing the pathocoenosis of a particular pre-modern population relies on pathogens maintaining a considerable degree of continuity over multiple centuries and the establishing of definite diagnoses, the pathocoenosis will remain elusive. Definitive diagnoses of diseases reported in texts, ‘visible’ on and in bones, are thoroughly difficult to establish presently. Many of the palaeopathological and palaeomicrobiological identifications addressed below may indeed be faultless, but they have yet to be confirmed independently. If we accepted some of the diagnoses already advanced, and following analyses of texts and human remains advanced a few others, we could, perhaps, roughly sketch a provisional outline of a Carolingian and early Ottonian pathocoenosis. Yet this sketch could hardly be regarded as definitive considering how little is known about the identities of the pathogens that afflicted mid eighth- through mid tenth-century Europe.

Grmek’s proposition that it is necessary for historians to establish not only what diseases existed or expressed themselves in a given period, but the pathogens that characterized that period, makes the decoding of a pathocoenosis that much more difficult. One should expect, he wrote, that there would be a few common, dominant pathogens and many rarer or weaker ones.<sup>349</sup> Of course, establishing identifications, let alone the regularity of occurrence, or prevalence, of particular diseases, is impossible for the Carolingian and early Ottonian periods. Even if we put aside the plethora of problems that plague retrospective diagnosis, the interpretation of lesions and the execution of PCR

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<sup>349</sup> Shaw (1991), pp. 331, 334.

analyses on aDNA, the evidence is simply not available. Even to suspect that leprosy and tuberculosis were widespread because they are more regularly detected in physical remains than other bone-changing diseases would be misleading: more leprosy and TB detections owe to the interests of palaeopathologists and, quite possibly, the relative ease with which palaeopathologists can detect these diseases. That leprosy and TB exhibit bone morphology in less than 5 per cent of those they afflict does allow us to speculate that more than those whose remains have been exhumed and diagnosed would have suffered the disease. But we can know little more.

Grmek pressed further yet to suggest that historians should attempt to understand the ‘synergistic’ and ‘antagonistic’ interactions that occurred between diseases.<sup>350</sup> Naturally, this too is impossible. Even if we could diagnose all reports of disease recorded in texts and accept all diagnoses advanced in the natural sciences we would not begin to skim the surface of the range of illnesses mid eighth- through mid tenth-century Europeans suffered.<sup>351</sup> Some speculation, however, may not be unwarranted. Certainly, if acute diseases were liable to kill most people before they could reach old age, they could be regarded as antagonistic towards diseases typical of old age, such as cancer and osteoarthritis. Still, without definitive diagnoses, one should avoid spending too much time attempting to interpret interactions between pathogens in a given period, especially when they cannot know definitively what pathogens existed in the period. Whether there was a distinctive Carolingian and early Ottonian pathocenosis also needs to be addressed critically and not assumed. Certainly, one may dispute the idea that there existed a particular Carolingian or early Ottonian disease environment. As stressed in 0.1.4, ‘Carolingian’ and ‘Ottonian’ are political constructs, ones that do not necessarily represent strict temporal limits in Europe’s medieval demographic, economic or environmental history, even if some scholars have suggested that Carolingian rulers took an especially active role in the agricultural production, economy and, possibly in consequence, exercised some influence on the demographic trends of the period.<sup>352</sup>

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<sup>350</sup> Grmek (1989), pp. 4-5. Shaw and Horden pay little attention to this feature of Grmek’s pathocenosis and imply that Grmek meant for us only to highlight the disease history of all infectious at a given point in a population in the past.

<sup>351</sup> That some Carolingian or early Ottonian infections may no longer exist naturally complicates this matter.

<sup>352</sup> Verhulst (1965); idem (1995); idem (2002); also see Squatriti’s 2003 review of Verhulst.

If a pathocoenosis does closely adhere to demographic trends, our discussion on the population history of our period in 0.1.4.1 forces us to question the idea that there could have been a single pathocoenosis across Carolingian and early Ottonian Europe. Presumably, numerous interregional, regional and local pathocoenoses would have existed, some overlaying one another, some coming into being before our period, some during, and some persisting beyond 950 CE. Distinct pathocoenoses may have developed in and around emporia, military zones, heavily populated areas in northern *Francia* and *Italia*, and around riverine settlements for instance. We may only speculate. On all fronts, the evidence is not enough to establish anything resembling a pathocoenosis for any region in mid eighth- through mid tenth-century Europe, let alone changes in that region's pathocoenosis over our period.<sup>353</sup> In fact, one rightly suspect that attempts to establish the pathocoenosis of any region of ancient, medieval or early modern Europe would fall considerably short.<sup>354</sup>

Regardless of how difficult or implausible the reconstruction of a pathocoenosis may be, Grmek's suggestion that we must seek to understand the entire pathogenic load of a period is undoubtedly (if only in principle) very valuable. It forces us to ponder the complexity of the disease experience of all past populations, regardless of how well we can reconstruct them, and to acknowledge the fact that all populations suffer multiple non-pestilential and pestilential diseases simultaneously, and that the disease profile of a population is the product not only of the demographic, economic, environmental and medical contexts but interactions between disease-causing entities.<sup>355</sup> All the same, those who have attempted to reconstruct the total spectrum of a period and region's disease, such as Biraben, Grmek and Scheidel, have only been able to do so by assuming that the diseases that existed in their region of study after the dawn of the laboratory also existed

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<sup>353</sup> As Shaw noted, Grmek had difficulty establishing 'temporal shifts in the disease patterns of the ancient Mediterranean.' Shaw (1991), p. 333.

<sup>354</sup> Shaw observed that pathocoenoses are 'ambitious' but 'rather difficult to accomplish in actual practice:' (1991), p. 331. Horden agrees: pathocoenoses are in general 'exceedingly difficult to establish' and 'even for a restricted period of time, nothing like a full pathocoenosis is possible:' Horden (2000), p. 206; idem (2008), p. 685. Cf. McCormick (2001), pp. 38-40.

<sup>355</sup> In this way, some scholars attempting to make sense of the incredible array of symptoms Agathias, Evagrius, Gregory of Tours and Procopius, among others, document for the initial EMP occurrences have suggested that multiple diseases were behind the EMP: see, for example, Pollitzer (1954), pp. 12-3, 16; Hirsch (1883), p. 496. Carmichael (1993a, 2008) has also suggested that multiple diseases must account for the Black Death and its supposed reoccurrences.

before the modern period, and by being willing to readily align diseases reported in pre-modern texts with ‘modern’ diseases. These authors have also been forced to assume that the environment(s) and climate(s) of their region were remarkably similar in the historical period of their concern and the modern era, and that a modern pathogen’s host and vector population(s) were constant over long stretches of time.<sup>356</sup>

### 1.3 The underlying current of disease in Carolingian and early Ottonian Europe

An attempt is made here to articulate the current of disease underlying episodic outbreaks of disease in Carolingian and early Ottonian Europe. This current is composed of diseases both of individuals and collectivities. Of the former, we refer primarily to chronic diseases and circumscribed episodes of acute disease caused by a pathogen, degenerative diseases the result partially of wear and tear, and metabolic diseases, though these are addressed in greater length in 2.3. Of the latter, we refer to plausibly more common endemic diseases, spread between like species or, for instance, via vectors. The discussion, however, can be nothing but preliminary. The reasons for this are twofold: the written evidence is too scant and ambiguous to permit anything but an approximation of the non-pestilential occurrences of disease Carolingian and early Ottonian peoples sustained, and there is a dearth of palaeopathological and palaeomicrobiological assessments of human remains from mid eighth- through mid tenth-century *Francia* and *Germania*. Here we survey the written and material evidence that is available for the underlying current of illness, attempt to establish some understanding of the prevalence of non-pestilential diseases and suggest some tentative diagnoses.

Reports of the circumscribed episodes of disease at the individual level that elites suffered are primarily found in the major annals, chronicles and histories, and, naturally,

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<sup>356</sup> Shaw comments on this: (1991), pp. 332, 334. Biraben’s survey of ancient and medieval disease, which seeks to establish several unique pathocoenoses, especially the acute infectious diseases that ruled them, and Scheidel’s more focused study on disease in Roman Egypt, both fall into the traps Shaw identified in Grmek’s study of the pathocoenosis of ancient Greece: Biraben (1998); Scheidel (2001); Shaw (1991). Biraben and Scheidel possess no definitive evidence for the pre-laboratory existence of the ‘modern’ disease-causing microorganisms they superimpose onto the periods and regions they consider. Both believe that the existence of ‘modern’ diseases could be established by consulting pre-modern texts. Moreover, both focused on epidemic diseases and neglected the undercurrent of illness (unlike Grmek), which doubtless formed a significant part of the pathocoenosis of all past populations. They also overlook livestock diseases (as does Grmek).

*vitae* of kings and religious officials (considered as subjects and not as agents of healing). Circumscribed episodes of disease at the individual level that commoners sustained are, on the other hand, encountered in the *vitae* of religious officials and saints, and accounts of the *translationes* of relics. While the information gleaned from both ‘groups’ of sources is not enough to allow us to establish much concrete about the material world experience of non-pestilential disease, it does permit us to tentatively infer some features of such disease occurrences in Carolingian and early Ottonian periods. Evidence for elites collected in Catalogue 2 is surveyed first, before we look at evidence for disease in the lower social strata and what the palaeosciences have to offer. Finally, some comments are given to non-pestilential disease in livestock, though these comments are very preliminary on account of the dearth of relevant early medieval written and material evidence. The ramifications of the degenerative diseases, other chronic ailments and endemic diseases tentatively identified here are considered in Part 3.

Seventy-seven contemporary notices of what appear to be isolated occurrences of disease among secular and religious elites have been gathered from the major written sources for disease in the Carolingian and early Ottonian periods.<sup>357</sup> Naturally, a sample of seventy-seven reports of sickness can hardly be held to be representative of the non-pestilential disease that Carolingian and early Ottonian elites sustained over a period of two hundred years, let alone the non-pestilential disease of mid eighth- through mid tenth-century Europe in general. Moreover, the sample speaks to a rather narrow slice of Carolingian and early Ottonian elites. Secular adult males take up most of the attention: 90 per cent of references address seculars, 96 per cent address adults and 98 per cent address males. There are only eleven reports of isolated disease among religious elites (C.2.4, 11, 15, 25, 27, 32, 55, 57, 62, 76, 77), three reports of disease among children

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<sup>357</sup> That is, the *Annales regni francorum*, the revised *Annales regni francorum*, the *Annales Bertiniani*, *Annales Fuldenses*, Nithard’s *Historiarum libri iiii*, the Bavarian continuation of the *Annales Fuldenses*, the *Annales Xantenses*, *Annales Vedastini*, Regino of Prüm’s *Chronicon*, Flodoard of Rheims’ *Annales*, Widukind of Corvey’s *Res gestae Saxonicae*, Adalbert of Magdeburg’s *Chronicon*, and the *vitae* of Charlemagne and Louis the Pious penned by Einhard, Notker Balbulus, Thegan and the Astronomer. Three references collected in Catalogue 2 come from lesser annals and I have included Flodoard’s three reports of disease among commoners in the catalogue as well (C.2.69, 70, 71). Note that six references to chronic disease in major sources which date to the 950s, ‘60s and early ‘70s are collected in Catalogue 2 and considered here in order to help us establish trends in the how our early Ottonian authors documented chronic disease. Lastly, three passages in Catalogue 2 contain references to multiple deaths due to what appear to be isolated cases of disease (C.2.12, 16, 30). On the Astronomer’s reference in one passage to twelve deaths (C.2.16) see discussion on the pestilence of the mid 830s in 1.4.2.1.

(C.2.3, 28, 42), one of which does not explicitly state that the child's death was the result of disease, and two reports of disease in women (C.2.9, 38). Furthermore, the references are not spread evenly over our period: only 29 per cent concern the period 750 to 850, and only 6 per cent concern the last half of the eighth century. Not only do the references collected in Catalogue 2 not speak to general patterns of disease, or the pathocoenosis of the Carolingian and early Ottonian periods, but the manner in which illnesses are reported prohibits us from acquiring much of an understanding of what types of ailments the elites addressed in Catalogue 2 actually suffered. Few illnesses are described in any detail: most of the seventy-seven references – 69 per cent – are incredibly fleeting and no more than a sentence in length. Einhard's account of Charlemagne's illness and death (C.2.7) and the reports in the *Annales Bertiniani*, *Annales Fuldenses* and *Chronicon* of Regino of Prüm of Charles the Bald's illness and death are unmatched in verbosity and detail (C.2.43, 44, 45). Yet even these accounts reveal little about the course or the symptoms the disease exhibited.

It is quite clear that Carolingian and early Ottonian writers were only marginally concerned with the documenting of chronic diseases and non-epidemic episodes of acute illnesses. On fifty-two occasions, or in 64 per cent of these seventy-seven references,<sup>358</sup> the disease is described very generically without any indication of the disease's symptoms or severity: *infirmus/infirmitas* is employed on twenty-five occasions (C.2.1, 4, 11, 20, 22, 23, 30, 33, 34, 35, 46, 47, 49, 51, 53, 55, 56, 60, 61, 63, 72, 78, 80, 82), *aegritudo* on eleven occasions (C.2.2, 5, 9, 21, 27, 36, 40, 45, 75, 76, 80), *morbus* eight times (C.1.17, 18, 19, 23, 24, 39, 54, 66), *valetudo* and *languor* thrice each (C.2.6, 16, 25, 67, 68, 77), and *gravitudo* once (C.2.64).<sup>359</sup> On nine occasions the severity of the illness is qualified, but this is done very non-specifically with *gravis* (C.2. 40, 51, 56, 58, 67, 75, 77) and *magna* (C.2.4, 56). However, in thirty-one of the references, or 40 per cent, the disease is said to have been the cause of death,<sup>360</sup> and twenty-eight, or 36 per cent, of the notices do provide some indication of the symptoms. We encounter fever (*febris*) eleven times (C.2.7, 8, 10, 12, 13, 14, 29, 40, 43, 45, 83), paralysis (*paralysus/paralysis*) seven times

<sup>358</sup> Some passages refer to a disease twice with different generic terms.

<sup>359</sup> Included here are verbs related to *infirmus/infirmitas* and *aegritudo*.

<sup>360</sup> (C.2.1, 2, 5, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 26, 28, 29, 30, 31, 32, 42, 43, 44, 45, 50, 53, 54, 55, 56, 57, 76, 79).

(C.2.38, 48, 50, 59, 65, 74, 81), an indication of a disease of the digestive tract or bowels (*passio collexica, fibre correptus, ventris solutio, dissenteria*) on four occasions (C.2. 31, 32, 37, 44), lameness (*claudus/clauditas*) once (C.2.24), a ‘mild but continuous’ nosebleed once (*fluxus sanguinis...sensim continuus tamen ex naribus*) (C.2.15), and what might be translated as epilepsy (*epeleptica/epelemtica*) twice (C.2.26, 28), what might be translated as gout (*podagricus*), pleurisy (*pleuresin*) and elephantiasis (*elefantiasi*) once each (C.2.7, 62, 79). The more ambiguous ‘bodily sickness’ (*molestia corporalis/infirmum corpus/valitudo corporis/aegritudo corporis*) is encountered four times (C.2.40, 65, 68, 76), and ‘head illness’ (*infirmetas capitis*) once (C.2.58). There are three instances when two symptoms are reported: Charlemagne is said to have suffered fever and *pleuresin*, and Queen Emma and Karlmann are both reported as *paralisa/paralitus* and having lost the use of their voice (C.2.7, 38, 48).

Relatively little attention is given to where and when a person is thought to have contracted his or her illness, or, for that matter, to where and when they recovered, or died, from it.<sup>361</sup> The course of the disease, from the appearance of initial symptoms to recovery or death, is also rarely described, even passingly.<sup>362</sup> King Aistulf is specified to have contracted a disease, which ultimately killed him, after falling from his mount (C.2.2), Einhard tells us that Charlemagne began to exhibit a fever early in mid January 814 and that he developed a pain in his side ‘which the Greeks call *pleuresin*’ before dying seven days later (C.2.7). Charles the Fat, Louis IV of *Francia*, Otto I and Raoul of *Francia* are said to have suffered an illness and then recovered, though Flodoard of Rheims notes that the latter suffered two relapses, the first lasting four weeks and the second an entire summer (C.2.56, 67, 68, 78, 80). Eleven years later Flodoard observes that Raoul was again ill, this time through the autumn (C.2.75). Several times we are simply informed that an illness ‘grew worse.’ Thegan, who appears to have at least partially relied on Einhard’s account, reports that Charlemagne’s sickness grew worse daily (C.2.8), as does the *Annales Fuldenses* annalist of the illness Louis the German

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<sup>361</sup> For instance, we read of people dying in Vienne (C.2.1), Santes (C.2.5), near Mainz (C.2.17, 18, 19), Regensburg (C.2.33), *Bavaria* (C.2.48), Aachen (C.2.36), Tours (C.2.53), *Italia* several times (C.2.10, 14, 16, 29, 30, 44) and possibly *Pannonia* (C.2.10).

<sup>362</sup> 17 per cent of the seventy-seven references provide a remark on the course of infection.



sustained in 876 (C.2.41). The diseases of Louis the Stammerer, Louis the Younger and Odo of *Francia* are said too have ‘gotten worse’ (C.2.49, 54, 63).

Slightly more references, 27 per cent of the seventy-seven, provide some remark on the duration of illness. The remarks given, however, are more often than not very vague. The *Annales regni Francorum* tells us that Carolman languished for ‘many days’ before dying in 755 (C.2.1) and implies that Queen Irmengardis was sick for some time before dying in October 818 (C.2.9). That text also relates that the Duke of Friuli died soon after contracting a fever in either *Italia* or *Pannonia* in 819 (C.2.10) and that Adalbard the Younger succumbed to a fever shortly after taking over the duchy of Spoleto (C.2.12). The Astronomer reveals that Lothar was sick for ‘a very long time’ (*maximo tempore*) (C.2.14), Nithard that Adalbert of Metz was incapacitated by disease for nearly a year (*poene per annum detentus*) (C.2.20), and Hincmar that Prudentius, his predecessor as annalist of the *Annales Bertiniani*, was ‘exhausted by a long illness’ (*diutino langore fatigaretur*) (C.2.25). Charles the Child and Young Charles are both said to have ‘long’ suffered from *epeleptica* (C.2.26, 28) and Louis IV of *Francia* is said to have ‘long’ suffered from *elefantiasi* (C.2.79). Pope Hadrian III is said to have died suddenly from disease in the late summer in northern *Italia* (C.2.55), *podagricus* is said to have taken the life of Boniface VI two weeks after he took office (C.2.62), and Lord Teotolo is said to have died soon after exhibiting a ‘bodily illness’ (C.2.76).

The duration of the illnesses of a few individuals are encountered in multiple texts. In these cases too, however, we can know little about the diseases suffered, as the comments given are again quite vague. For instance, the *Annales Bertinaini* records that Karlmann was ill for a year in 877 (C.2.46), the *Annales Fuldenses* that he became seriously ill, suffered *paralysis*, and lost the ability to speak in 879 (C.2.48), and Regino that he died in 879 after declining into *paralysis* (C.2.50). Similarly, Regino tells us that Arnulf of Carinthia was weakened for a long time by *paralysis* (C.2.59), two lesser annals imply that he slowly ‘grew sick’ (C.2.60, 61), and the Bavarian continuation of the *Annales Fuldenses* indicates he was quite ill through the winter of 899 (C.2.65). Hincmar also tells us that Charles the Bald was detained in Chalons for two weeks in August 876 on account of a bodily illness (C.2.40), that in the early winter of 876 he exhibited a fever

when at *Virziniacum* (C.2.40),<sup>363</sup> and that in October 877 he died of a fever which he began to show after travelling through northern *Italia* (C.2.43). On the other hand, the *Annales Fuldenses* report that Charles died quickly from *dissenteria*, and Regino writes that a *febris* suddenly took his life (C.2.44, 45).<sup>364</sup>

Clearly, the mass of the evidence for elite sicknesses permits us to say little about the non-pestilential illness that elites sustained. Indeed, it allows us to say much more about how Carolingian and early Ottonian authors documented these sorts of illnesses. Most authors made little effort to capture the diseases they described, employing the same terms to document a range of separate episodes of illness. While Prudentius and Hincmar employed a variety of terms for disease in their respective sections of the *Annales Bertiniani*,<sup>365</sup> and though the second annalist of the Bavarian continuation of the *Annales Fuldenses* attempted to capture some of the individuality of each of the ill persons he recorded,<sup>366</sup> others did not: for example, only two of the seven terms used to label disease in the *Annales regni francorum* are symptom-specific (C.2.10, 12); 70 per cent of these illnesses in the *Annales Fuldenses* are labeled either *infirmetas* or *aegritudo*, each of the illnesses that the *Annales Fuldenses* annalists qualify they qualify with *gravis*, and both reports of *paralysis* in the text are affixed ‘*usum loquendi amisit*’ (C.2.33, 38, 48, 51, 67); a third of Regino’s reports of disease refer to *paralysis* and another third *infirmetas* (C.2.30, 34, 50, 59); the first annalist of the Bavarian continuation of the *Annales Fuldenses* writes ambiguously of *infirmetas* in each of his accounts of illness (C.2.55, 56, 58); Widukind employs *morbis* in half of his accounts of disease and *infirmetas* in the other half (C.2.66, 72, 73, 80); Adalbert of Magdeburg only writes of *paralysis* (C.2.74, 81), and Flodoard qualifies 57 per cent of his accounts of chronic disease and non-epidemic episodes of acute illness with *gravis* (C.2.67, 75, 77, 78). Though Hincmar sought more than others to capture the uniqueness of separate episodes of disease, patterns can be discerned in his writing too: three bouts of illness that he reports in close

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<sup>363</sup> Nelson suggests *Virziniacum* may refer to Verzenay near Rheims or Versigny near Laon: (1991), p. 199 n. 41.

<sup>364</sup> Also see the accounts of Louis the Pious’ death in the *Annales Bertiniani*, *Annales Fuldenses* and Regino’s *Chronicon* (C.2.17, 18, 19).

<sup>365</sup> The former writes of *febris*, *morbis*, *aegrotus* and *infirmetas* (C.2.13, 17, 23) and the latter of *claudus*, *epeleptica*, *febris passio collexica*, *fibre correptus*, *ventris solutio*, *molestia corporalis* and *infirmetas* (C.2.24, 25, 26, 28, 29, 31, 32, 37, 40, 42, 43, 46, 47, 49, 52).

<sup>366</sup> He writes of *podagricus*, *gravitudo corporis* and *paralysis* (C.2.62, 64, 65).

succession are said to have been ‘long’ (C.2.25, 26, 28), his two accounts of *epeleptica* appear in back-to-back years (C.2.26, 28), his three accounts of bowel-related ailments also appear in close succession (C.2.31, 32, 37), and five of his last six reports of non-pestilential disease are labeled *infirmitas* (C.2.42, 46, 47, 49, 52). Despite the variety of terms Prudentius used to describe disease, patterns can be observed in his writing as well. He does not, for instance, provide any symptom-specific labels.

The evidence assessed above does, however, allow for speculation. Considering the randomness with which the illnesses of elites are documented, we may propose that elites regularly fell sick, that they often did so in old age, and that illness/lameness was common a cause of death. Closer attention to trends in the documenting of particular ailments allows for two additional, and less obvious, observations. First, though neither generically-labelled illnesses nor symptom-specific illnesses appear to be concentrated in particular sub-periods or regions of Carolingian and early Ottonian Europe, most accounts of *febris* (63 per cent) are tied to *Italia* (C.2.10, 12, 13, 14, 29, 43, 45). Second, there is reason to think that *paralysis*, *epeleptica* and bowel-related sicknesses may have been common, or at least more common than they appear in Catalogue 2, as six of the seven accounts of *paralysis* are found in three texts in groups of two that were recorded in close succession,<sup>367</sup> and as Hincmar penned both accounts of *epeleptica* and three of the four accounts of bowel illnesses over short spans of time (C.2.26, 28, 31, 32, 37). Moreover, the lone account of *claudus* is encountered in the section of Hincmar’s text that is characterized by the use of symptom-specific terms, and the second annalist of the Bavarian continuation of the *Annales Fuldenses*, who avoids, as Hincmar initially does, the use of non-specific terms for disease, authored our sole record of *podagricus* and seventh account of *paralysis* (C.2.62, 65). That these few authors provide us with the vast majority of the symptom-specific terms we encounter may simply be a matter of chance, or it may be an indication that these illnesses were some of the most prevalent. Indeed, we may suspect that when an author sought to report an illness in specific terms that these were the illnesses he most regularly encountered. While the frequent appearance of

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<sup>367</sup> The annalist who picked up the *Annales Fuldenses* c.870 records *paralysis* in 874 and 879 (C.2.38, 48), Regino reports *paralysis* in two successive accounts of disease in his *Chronicon*, which he wrote in the early tenth century (C.2.50, 59), and Adalbert writes of *paralysis* in his only accounts of chronic disease in his continuation of Regino’s text, which he penned in the late 960s (C.2.74, 81).

symptom-specific terms in close succession in individual texts may be said to have more to do with how an author wrote of disease rather than the actual disease occurrence, it seems more likely that these symptom-specific reports of illness are brief windows onto actual trends in the incidence of disease. Our authors would have been more likely to employ a generic disease label than to fallaciously superimpose a symptom-specific label, especially considering that these symptom-specific labels appear to carry no cultural baggage and are not employed formulaically.<sup>368</sup>

Little else may be gleaned from the references gathered in Catalogue 2. Of course, for reasons outlined in 1.2.1 and 1.2.2, what modern conditions *dissenteria*, *epeleptica*, *paralisus* and *podagricus* refer to is uncertain, as is what caused one to be *claudus* or to exhibit *ventris solutio* and what pathogen was behind *febris*.<sup>369</sup> For all we know, the diseases at the root of these reports may have been particular to the Carolingian or early Ottonian eras. Moreover, we should suspect that these labels may have been used unsystematically, particularly considering the inability of early medieval peoples to discern between illnesses microscopically.<sup>370</sup> These labels may best be thought of as ‘umbrella terms’ for an array of biologically distinct diseases. Though notices of symptoms, like details of the duration of illnesses, the location of the sick and course of infection are too few and too ambiguous to allow for meaningful retrospective diagnoses,

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<sup>368</sup> That said, there is some indication that bowel-related illnesses may have occasionally been assigned to individuals an author did not particularly care for: see, for instance, (C.2.32, 44) and (C.1.176, 260). Bowel illnesses are also occasionally attributed to nemeses of early medieval authors outside of *Francia* and *Germania*. See, for instance, the Visigothic *vita* of Desiderius: Fear (1997), p. 12. In his book about the translation of the relics of his monastery, Ermentarius also likened the civil wars of the early 840s to a ‘horrible intestinal disease:’ (2004), p. 470. Cf. Kroll and Bachrach (1986) who argue that early medieval authors only ascribed disease to sin when they possessed a bias against the sick individual.

<sup>369</sup> Apparent continuity in pre-laboratory and laboratory names of disease should not be thought indicative of continuity in disease-causing entities. Arrizabalaga, for instance, observes that to see modern syphilis (*Treponema pallidum*) in the pre-modern terms for syphilis, which include ‘*syphilis*,’ is anachronistic: (1993), p. 1030. Likewise, pre-laboratory dysentery (for instance, *dissenteria* or *desentericus*) cannot be accepted as the dysentery known to modern science often caused by a *Shigella* bacillus or the *Entamoeba histolytica* parasite. Nor should pre-laboratory *lepra* or *leprosus* be aligned with modern ‘leprosy’ or Hansen’s disease. *Leprosus* can be taken to mean nothing more specific than a disease of the skin causing deformity, rashes, scabs or scales, perhaps severe cases of eczema, erysipelas or joint diseases like psoriatic arthropathy and rheumatoid arthritis: Waldron (2008), p. 98; cf. Hirsch (1885), p. 648. It is noteworthy, as Waldron notes however, that roughly 75 per cent of bodies exhumed from the cemeteries of medieval *leprosarii* do in fact show signs of leprosy. Thus, *lepra* may not have been indiscriminately used and medieval observers could, at least in some cases, provide reliable diagnoses and regularly determine who, and who was not, actually suffering from a particular disease.

<sup>370</sup> This may not be as pertinent as the fact that these chroniclers do not even use the full range of nosology found in the medical writings available to them. Cf. Wallis (forthcoming).

the repeated reference to *febres* in *Italia* may be construed as evidence for malaria as suggested below. *Dissenteria*, and the other bowel illnesses in our source base, may have referred to dysentery, or bloody diarrhea, most often caused by a *Shigella* species (bacillary dysentery) or *Entamoeba histolytica* (amoebic dysentery), or perhaps *Vibrio cholerae* (cholera) or one of several gastrointestinal infections caused by bacterial, viral and parasitic organisms.<sup>371</sup> *Epeleptica* may have referred to one of the forty varieties of the neurological disorder epilepsy or another condition characterized by seizures or, perhaps, temporary paralysis. *Epeleptica* could also be an indication of ergotism poisoning.<sup>372</sup> *Podagricus* may refer to gout, acute rheumatoid arthritis centered on the big toe caused by a build up of uric acid in the blood.<sup>373</sup> Cases of paralysis paired with an observation of impaired speech may be an indication of a stroke. We have no way of knowing, however, whether these diagnoses are correct and if they are we can know little about their prevalence or distribution from the written sources.<sup>374</sup> Of course, the incidence of any disease that elites fell to is also not appreciable, nor the distribution of non-pestilential diseases among different elites of different ages, environment or sex. More observations about elite sicknesses, however, emerge when the evidence collected in Catalogue 2 is paired with a survey of evidence for non-pestilential disease among commoners.

The evidence available for disease experience of the lower social strata is vast. While only some of texts that furnish evidence for the illnesses of the lower social strata are surveyed here, the manner in which those texts – *vitae*, *gestae* and *translationes* primarily – which are addressed here document the sicknesses of the lower social strata is representative of how the sicknesses of commoners were generally recorded. The discussion here will focus around Einhard's *Translatio et miracula sanctorum Marcellini et Petri*. Written in the early 830s, the *translatio* is particularly 'disease-dense' by Carolingian and early Ottonian standards. This *translatio* concerns events that took place in 827, 828 and 829 at two churches and three monasteries spread across northeastern

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<sup>371</sup> [www.who.int/topics/dysentery/en](http://www.who.int/topics/dysentery/en); [www.who.int/topics/cholera/en](http://www.who.int/topics/cholera/en); [www.who.int/topics/diarrhoea/en](http://www.who.int/topics/diarrhoea/en).

<sup>372</sup> [www.who.int/mediacentre/factsheets/fs999/en](http://www.who.int/mediacentre/factsheets/fs999/en). Ergotism poisoning can cause seizures.

<sup>373</sup> That all cases uncovered are ascribed to adult males may be a further indication that we are in fact dealing with gout here, as it is known to predominantly affect men. That said, the written evidence is incredibly male-focused.

[www.who.int/social\\_determinants/resources/sex\\_gender\\_vulnerability\\_wgkn\\_2007.pdf](http://www.who.int/social_determinants/resources/sex_gender_vulnerability_wgkn_2007.pdf).

<sup>374</sup> Investigations of *pleuresin* and *elefantiasi* would likewise not produce much meaningful.

*Francia*, as well as at the royal court.<sup>375</sup> The text documents numerous miraculous healings and in doing so draws attention to many commoners and a few elites suffering chronic debilitating diseases.<sup>376</sup>

Einhard claims to have personally witnessed some of the healings that occurred at court and in his own churches at Michelstadt and Seligenstadt, while miracles at the neighboring monasteries of St. Bavo (Ghent), St. Salvius (Valenciennes) and St. Servais (Maastricht) were witnessed there by monks who documented them in ‘little registers’ which were later given to Einhard who inserted them, supposedly verbatim, into his text. Through the *translatio* Einhard may have meant to influence more people to convert and receive baptism, reinvigorate the devotion of the masses,<sup>377</sup> and boost his own socio-cultural standing.<sup>378</sup> Yet his obvious personal investment in the advertising of the healing powers of these relics need not interfere with our interpretation of the illnesses he records.<sup>379</sup> That Einhard focuses on healing, and especially the devotion of the healed, rather than on disease, limits what we can learn about the ailments of commoners. It may also possibly account for his vague, formulaic descriptions of illnesses. For Einhard, detailed descriptions of disease were clearly not necessary, nor, we may suspect, the inclusion of uncommon ailments to which the mass of the population could not relate. What mattered were accounts of God freeing the devoted of sicknesses with which commoners were familiar through the relics.<sup>380</sup>

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<sup>375</sup> Dutton (1998), p. xxiv. Maastricht is roughly 200 km from Valenciennes, which is about 120 km south of Ghent, 220 km west of Aachen, 500 km west of Seligenstadt and nearly 530 km west of Michelstadt. In his *vita* of Louis, the Astronomer also noted that miracles and healings had taken place, and continued to do so, because Einhard had translated the relics to *Francia*. Rudolf of Fulda likewise reported that the sick were regularly healed at Einhard’s church on account of the relics. Dutton (1998a), pp. 7, 9-10.

<sup>376</sup> The mass of the ill are of the lower social strata, though some – clerics, nuns, those said to have travelled long distances for healing and presumably some of those at Louis the Pious’ court – were clearly not.

<sup>377</sup> Cf. Rimbert (2004), p. 429, where he notes that following reports of supposed healings of the sick who received baptism in Dorestad and Hamburg ‘a multitude of people’ converted to the Lord.’ Because Einhard deals almost exclusively with peasants and lower social strata in this text it is highly likely that he meant the text to draw more from this class to the Christian faith.

<sup>378</sup> The Astronomer and Rudolf of Fulda, for example, both noted Einhard’s work in bringing miracles to the people of Francia: Dutton (1998), pp. 7, 9. The importing of relics, however, was not atypical of the era.

<sup>379</sup> In 827, Einhard imported the bones of Marcellinus and Peter, two early fourth-century martyrs, from Rome for the dedication of his own church at Michelstadt. The churches and monasteries that the relics toured in 828 were also all under Einhard’s authority: Dutton (1998), p. xxix.

<sup>380</sup> Indeed, only the faithful are healed: Einhard (1998a), p. 130. That God worked cures through relics of the holy, is, of course, an intrinsic part of most hagiographical texts. See, for example, Dado of Rouen (2001), p. 165; Odilo of Cluny (2001), pp. 270-71. That Einhard’s saints brought cures is clearly the most prominent message of the work and is itself a product of the genre. In a way it would have been impossible for the relics not to have brought on miracles and cures. As hagiographers often note, the holy by default

We hear first of a ‘partially paralyzed nun’ (*paralyssa*) at Ostheim who was restored to health when the relics were en route to *Francia*, and the curing of an eighty-year old woman at Aachen, who had suffered from ‘tightened tendons’ (*contracti nervi*) for fifty years.<sup>381</sup> Many miracles, which Einhard witnessed, then took place in Seligenstadt. A boy ‘about fifteen years old’, who was ‘so bent over that if he did not lay on his back he could not see the sky,’ was healed, his limbs were ‘straightened’ and his muscles ‘strengthened.’<sup>382</sup> Another young man believed to have been suffering kidney failure and who was bent over at the waist and had to use crutches was suddenly cured.<sup>383</sup> Another woman was paralyzed in all limbs and a man, who is said to have been near death, was cured of intense fatigue.<sup>384</sup> Another man, a cleric, who was undertaking a pilgrimage from Britain to Rome, was mute and deaf, and had been since birth.<sup>385</sup> Similarly, a girl from Bourges had also been deaf and mute since birth until put before the relics.<sup>386</sup> A blind man from *Aquitania* is said to have lacked eyes altogether on account of a ‘vile disease of his entire body.’ Einhard writes that he shook so uncontrollably that he could not feed himself. Though the relics did not provide him with eyes, they did stop his ‘vile shaking.’<sup>387</sup> Another man’s limbs trembled constantly forcing him to rely on crutches and a boy ‘around the age of fifteen’ was ‘so miserably deformed that his knees were touching his chin.’ Only the saints’ remains relieved him of the ‘wretched tightening’ of his limbs.<sup>388</sup> An old ‘decrepit’ man from Aarau suffered a ‘similar disease.’ He had been forced to use crutches until the saints relieved him of the ‘tightening of his limbs and tendons.’<sup>389</sup> Another man, this time from Liège, too suffered ‘from a tightening of his tendons.’<sup>390</sup>

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cause healings and the ‘worth and character’ of the person’s life are revealed by their ability to cure. See, for example, the comments of Odilo of Cluny (2001), p. 270, and Alcuin (1954), p. 18. For Einhard (and his contemporaries), it may have been impossible for the relics to not work cures. Of course, that Marcellinus and Peter worked cures also served to validate Einhard’s translation of their relics.

<sup>381</sup> Einhard (1998a), pp. 81-2, 89.

<sup>382</sup> Idem (1998a), p. 82.

<sup>383</sup> Idem (1998a), pp. 92-3.

<sup>384</sup> Idem (1998a), pp. 93-4.

<sup>385</sup> Idem (1998a), p. 94.

<sup>386</sup> Idem (1998a), p. 95.

<sup>387</sup> Idem (1998a), p. 96.

<sup>388</sup> Idem (1998a), pp. 97-8.

<sup>389</sup> Idem (1998a), p. 98.

<sup>390</sup> Idem (1998a), pp. 98-9.

When Einhard was forced to attend court, cures continued unabated. A member of Einhard's household, whom Einhard had sent to Seligenstadt, reported a man who had a 'deformed' back like that of a camel and who had been forced on account of the 'large hump' on his back to use short crutches.<sup>391</sup> Soon after, a nun from Wetterau, who had been 'so cruelly gripped for ten years with a bad case of paralysis,' was cured.<sup>392</sup> In June, following Einhard's return to Seligenstadt, two boys who were deaf and mute were cured.<sup>393</sup> When the relics were brought to court, many other healings are said to have then taken place in the presence of Liou the Pious, and his chief men and courtiers. A young man, a chamberlain, who had been ill for 'many months,' was cured of a fever and recovered 'the strength of his limbs.'<sup>394</sup> Another young man from Rheims who was in Aachen working on the palace, was 'seized by such a powerful and immense tightening of his tendons that his feet were stuck to his rear end and his knees to his chin.'<sup>395</sup> A girl, also from Rheims or thereabouts, was 'afflicted with a similar disease' but was cured.<sup>396</sup> An old man, who had been 'stricken with blindness' three years prior, and a woman from Ripuaria, who had been blind 'for a long time,' were also healed.<sup>397</sup> A man from a royal estate near Aachen, who had for a 'long' time been 'greatly' afflicted by a 'lingering problem with his bowels,' and a seven year-old girl from another nearby royal estate, who had long suffered a severe case of paralysis and been unable to move her limbs too experienced healing in the presence of the saints.<sup>398</sup>

Miracles continued when the relics went on tour. En route to the monastery of St. Salvius, according to a priest there, a man who was 'bent over with a hump' and had 'for a long time' suffered a toothache which caused his jaw to be 'extremely swollen,' approached the deacon, who was carrying the relics outside the town of Vise, and was there healed and able, for the first time in fifteen days, to eat.<sup>399</sup> At St. Salvius, we hear of

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<sup>391</sup> Idem (1998a), p. 101.

<sup>392</sup> When travelling home she was again afflicted with the same 'disease' and forced to return to the church a second time. Idem (1998a), p. 105.

<sup>393</sup> Idem (1998a), pp. 106-07.

<sup>394</sup> Idem (1998a), p. 111.

<sup>395</sup> Idem (1998a), p. 112.

<sup>396</sup> Idem (1998a), pp. 112-13.

<sup>397</sup> Idem (1998a), pp. 113-14.

<sup>398</sup> Idem (1998a), pp. 114-16.

<sup>399</sup> Idem (1998a), pp. 116-18.



a young man ‘plagued for an entire year’ by ‘what the Greeks call “spasms.”’<sup>400</sup> The disease caused his right hand to move ‘in a constant circular motion as if it were turning a mill.’ We also read of an ‘old women’ blind for a year, another ‘old women’ blind for three years, a boy blind since birth, a little girl ‘completely blind’ for three years, a widow blind for four years, another for five, a man ‘blind from infancy,’ a seven year-old ‘little girl’ blind for three years, a women blind for ‘nearly two years,’ and an old man blind for fourteen years.<sup>401</sup> The priest also wrote to Einhard of a deaf and mute man, a man ‘so stooped over for six years that he could not stand up straight and, as a consequence, walked with his head bent down and placed short crutches under his armpits to support himself,’ and a man so paralyzed for a year on the left side of his body that he could not ‘raise his hand to his mouth, wash himself, or put on his shoes.’<sup>402</sup> At St. Bavo other healings took place. We hear of a girl blind for eight years, another who lost her sight soon after birth, a women and two widows who were blind ‘for many years,’ a male servant blind ‘for many years’ and a female servant ‘blind for three years,’ and yet another blind man.<sup>403</sup> The monks also report a girl ‘all bent over,’ a woman ‘so bent over that she almost could not raise herself up to look at the sky,’ a man with a weakness in his left leg and foot, a ‘young man’ deaf and mute and who had a ‘deformed left hand’ because of the ‘tightening of the tendons,’ a woman who had for many years suffered a ‘serious case of paralysis,’ and another woman paralyzed for a decade ‘in the lower part of her body.’<sup>404</sup>

Monks at St. Servais in Maastricht reported yet more miracles to Einhard. Sight was restored to a boy blind since birth and a blind female servant.<sup>405</sup> A man and servant girl, both of whom were deaf and mute, too were cured, the latter was also ‘curled up in a wretched way’ on account of the ‘tightening of her tendons.’ Her knees, it is said, touched her chest. A royal servant from Crecy, who had lost the right side of her body because of ‘tightened tendons,’ and a girl from Maastricht whose right hand was ‘entirely

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<sup>400</sup> Idem (1998a), p. 118.

<sup>401</sup> Idem (1998a), pp. 118-20.

<sup>402</sup> Idem (1998a), pp. 118-19.

<sup>403</sup> Idem (1998a), pp. 120-22.

<sup>404</sup> Idem (1998a), pp. 120-22.

<sup>405</sup> Idem (1998a), pp. 123-24.

useless' on account of tightened tendons, were healed.<sup>406</sup> Another boy is said to have been deaf and another man deaf and mute 'since childhood.'<sup>407</sup> A servant mute girl had lost the use of her feet and hands on account of the 'tightening' of her tendons.<sup>408</sup> A boy had lost the use of his legs and feet on account of 'tightened tendons,' a man from Geneva was said to be afflicted with a 'spasm' that caused 'persistent agitation of the limb,' the right hand and arm of another man moved 'round and round in an amazing way as if he had to turn a mill,' and a nun from a nearby monastery was paralyzed 'throughout her entire body except for her right arm.'<sup>409</sup> Later, Einhard writes of a woman from Cologne who had lost the use of her legs and feet on account of the 'stretching of the tendons.'<sup>410</sup>

In total, Einhard records the illnesses of some sixty-four people.<sup>411</sup> He documents twenty-nine females and thirty-five males, eight 'old' people, five of them female, six 'young adults,' all of them males, and fifteen individuals are said to be young (under the age of ten), nine of them girls. The remaining thirty-five are implied to have been adults.<sup>412</sup> There are twenty-three accounts of blindness, fifteen accounts of 'tightened tendons,' eight people are said to be paralyzed, another eight people deaf and mute, one boy deaf only, three people are said to have 'mill hands,' one a 'hump' on his back, two involuntary shaking, and there is one case each of bowel sickness, fatigue, fever, kidney failure and a toothache.<sup>413</sup>

As such, Einhard's *translatio* sheds light on a wider spectrum of the population than the evidence for disease among elites addressed above. Yet major trends in the incidence of disease based on sex, age or geography are not discernible in his *translatio*. In any case, if they were we would not know if they reflect trends in Einhard's, and the monks of St. Bavo, St. Salvius and St. Servais', documenting of sickness, or the actual incidence of disease in northeastern *Francia*. Additionally, the sample is too small to

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<sup>406</sup> Idem (1998a), pp. 122-23.

<sup>407</sup> Idem (1998a), pp. 124-25.

<sup>408</sup> Idem (1998a), p. 124.

<sup>409</sup> Idem (1998a), pp. 124-26.

<sup>410</sup> Idem (1998a), p. 129.

<sup>411</sup> We also read of a woman with a dislocated jaw and a 'deranged' and 'insane' man from Niedgau: Einhard (1998a), pp. 105-06, 109-10.

<sup>412</sup> These age categories are vague on account of the nature of the evidence.

<sup>413</sup> As multiple symptoms are ascribed to some individuals, the number of symptoms noted here exceeds sixty-four.

make any wider claims about the incidence of disease in this area. Yet it is noteworthy that males and females of all ages are said to have suffered blindness, that many are reported to have been blind from birth and that many others lost their sight in childhood and adulthood, that people of all ages and both sexes are said to have suffered ‘a tightening of the tendons’ and to have been deaf and mute, and that the three individuals with ‘mill hand,’ one ‘camelback’ and both ‘involuntary shakers’ are reported to have been adult males. But again the sample is far too narrow to allow for any generalizations about sex- or gender-specific ailments. More men than women may have suffered blindness, more adults than children tightened tendons and more females than males ‘mill hand,’ regardless of how these ailments appear to be spread across the sexes in the text.<sup>414</sup> Likewise, while Einhard reports that individuals from the primary areas addressed – Seligenstadt, Ghent, Valenciennes and Maastricht – suffered blindness, speechlessness, paralysis and tightened tendons, some of these conditions may have been more common in some areas than others. It certainly would be a mistake to assume that blindness was one of the most familiar and dental disease one of the least familiar ailments of commoners in mid ninth-century northeastern *Francia* based on this text alone. Moreover, while the ailments recorded in Einhard’s *translatio* were very likely not unknown to our period, they may not have been the most common: Einhard may have focused on the most severe conditions in order to demonstrate the relics’ healing power.

Discerning how common these ailments were in Carolingian and early Ottonian Europe by consulting other texts is also no straightforward task. Even if we could establish that these ailments were regularly recorded, we would not be able to gauge with much certainty how prevalent they were nor whether they were the most common illnesses of these two centuries. We would, in fact, know little for certain other than that Carolingian and early Ottonian authors often wrote of them. The mass of the evidence for isolated illnesses among commoners in the Carolingian and early Ottonian periods is also incredibly ambiguous, too much so to allow for much insightful comparison between texts. This said, the prevalence of blind and paralyzed people in many texts, including

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<sup>414</sup> That most diseases are evenly spread across age groups and the sexes may primarily owe to the intended purpose of the text, to draw all people to the church. Einhard himself points out that the relics brought health to people of ‘both sexes’ and ‘all ages’ who were suffering ‘various illnesses’ and ‘every kind of infirmity.’ (1998a), p. 87.

Einhard's *translatio*, probably indicates not only the influence of the New Testament but the real presence and high visibility of blindness and paralysis. Consider, for instance, the *Historia translationis sancti Viti* and Ermentarius' *De translationibus et miraculis sancti Filiberti*, two more particularly disease-dense texts. The first documents five 'blind' women, one blind for three months, another for five years, and another for 'many years.' Another women is said to have been only 'half blind,' while a man is said to have suffered blindness for twelve years, and a young man 'lameness' for eight years. We also read of a 'lame' boy, a man with a 'lame' knee nearly since birth, a woman with a 'hump' on her back, a girl with legs 'contracted' at the knee and a 'hump' on her back, a woman with arms 'contracted' at the elbows, a girl with a similar condition for five years, a woman whose right arm was 'contracted' for nine years, a man with 'contracted' limbs for four years, a woman disabled by 'diseased feet,' another woman disabled for twelve years by 'disease,' a girl with 'withered and contracted' hands, two men with 'withered' hands, two 'lame' men, and a 'mute' boy.<sup>415</sup> The second text records nine blind women, three blind girls, two blind since birth, five blind men, one of whom was blind only in the right eye, a girl 'disabled' on her right side, a woman with a 'withered' arm and hand, two 'lame' men, a man whose leg was 'contracted' at the knee, a women with 'contracted' hands and a 'hump' on her back, a boy with a 'contracted' foot, a 'contracted' woman, two 'contracted' men, a blind girl with a 'disabled' hand, a mute man with a 'disabled' hand, a mute and 'lame' boy, another mute boy, two mute men, a woman with a toothache, a man suffering a 'long sickness,' and a servant of Filibert with '*quartana febris*.'<sup>416</sup>

Equally short and ambiguous descriptions of non-pestilential diseases in commoners crop up in a wide range of other sources.<sup>417</sup> In the *translatio* of St. Liborius, for instance, we encounter a woman suffering from blindness for 'many years,' a man with a 'lame foot,' a mute man, a man suffering from 'contracted' tendons in his lower legs and feet, a boy 'lame' since birth, a woman long suffering from a 'disease,' another

<sup>415</sup> *Historia translationis S. Viti* (1828), pp. 582-84. The text concerns the movement of the relics of Saint Vitus from St. Denis to Corvey in the mid 830s.

<sup>416</sup> Ermentarius (1905), pp. 26-34, 36-8, 44-8, 50-3, 56.

<sup>417</sup> We could address many other texts here, such as Aimoin of St. Germain des Pres' *translatio* of St. Vincent (1879) and Heiric of Auxerre's *De miraculis sancti Germani Episcopi Autissiodorensis* (1879). The intended point is, nevertheless, quite clear.

man with ‘contracted’ thumbs and hands, and a girl who since birth was ‘contorted’ into the shape of a ball.<sup>418</sup> Alcuin’s reports of sick commoners in his *vita* of Willibrod are also exceptionally vague and succinct. He speaks of a ‘sick man,’ twice of ‘sick people,’ of a ‘paralyzed’ woman, who had lost the use of her limbs for seven years, and a paralyzed boy, who trembled in every limb and was unable to raise his head.<sup>419</sup> Likewise, Willibald in his *vita* of Boniface speaks of people troubled by ‘various sicknesses and diseases,’ and in his eighth-century tale of the pilgrimage of Willibald, Huneberc too writes generally of ‘sick people,’ ‘severe bodily sicknesses’ and a ‘severe illness.’<sup>420</sup> In his *vita* of St. Strum, Eigil documents an ‘illness’ and ‘sick people,’<sup>421</sup> and Odo of Cluny, in his *vita* Gerald of Aurillac, writes of two blind boys, one of whom was blind since birth, two blind women, a ‘lame’ boy, a young girl and man with epilepsy, a man ‘stricken’ without the use of his hands, a man with a severe toothache, and four blind men, one of whom had suffered blindness for a ‘year or more’ and another who had been blind for seven years.<sup>422</sup> In a *vita* of Odo of Cluny, we encounter a man ‘falling into a deadly sickness,’ two men with a ‘grave illness,’ another ‘overtaken by disease,’ and Odo himself weighed down by a ‘sharp and continuous fever’ and a ‘pain’ in his limbs.<sup>423</sup>

In his *De miraculis sancti Germani*, Aimoin of St. Germain des Prés documents one person with ‘*dysentiriae morbus*’ and many other ‘sick’ people.<sup>424</sup> In his *translatio* of the relics of three martyrs, however, Aimoin addresses two ‘sick’ men, a ‘contorted’ woman, a ‘paralyzed’ man, a man covered in ulcers, another man covered in ulcers with an ‘elephant disease’ (*elephantini morbus*), three people with ‘contracted kidneys,’ and a man laboring with a fever for three months.<sup>425</sup> In his *vita* of Anskar, Rimbert very non-specifically writes of a man’s ‘great pain’ and ‘sickness,’ and a priest ‘seized with sickness,’ while in Adrevald of Fleury’s *De Miraculis of St. Benedicti* we read of a ‘sick’ man, an ‘intestinal sickness’ and a man with ‘contracted’ tendons,<sup>426</sup> and in Notker’s *Gesta Caroli Magni*, we encounter a man seized by ‘a chill’ before being ‘carried right to

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<sup>418</sup> *Translatio S. Liborii* (1841), pp. 153-56.

<sup>419</sup> Alcuin (1954), pp. 16, 19-21.

<sup>420</sup> Huneberc (1954), pp. 154, 158, 166.

<sup>421</sup> Eigil (1954), pp. 191, 201.

<sup>422</sup> Odo of Cluny (1958), pp. 104, 141-43, 149, 151, 163-64, 173, 178.

<sup>423</sup> John of Salerno (1958), pp. 40, 58, 85, 72.

<sup>424</sup> Aimoin of St. Germain de Pres (1879), pp. 1031, 1034, 1036.

<sup>425</sup> Idem (1881), pp. 942, 947-57.

<sup>426</sup> Adrevald of Fleury (1897), pp. 923, 927, 934.

death by a fever.<sup>427</sup> In his *vita* of St. Leoba, Rudolf of Fulda records a man from Spain ‘so afflicted that he twitched most horribly in all his limbs’ and a monk with ‘an infirmity that prevented him from standing.’<sup>428</sup> And south of the Alps, Erchempert, in his *Historia Langobardorum Beneventanorum*, writes most ambiguously of people with ‘various sicknesses.’<sup>429</sup>

While authors occasionally provide more details, the lack of specificity (by our standards) evident in these texts is characteristic of the majority of the evidence. In his *vita* of St. Strum, Eigil recounts how Strum was ‘seized with sickness’ after returning from Rome at Kitzingen, and that though Strum recovered, the illness appears never to have dissipated, yet such details about the course of illness are infrequently encountered.<sup>430</sup> An author’s proximity to the sick seems not to have mattered or affected how detailed his accounts of an illness were. This applies to reports of elite and commoner illness.<sup>431</sup> For instance, though Einhard, in his extant letters, writes rather unambiguously of the Bishop of Worms being ‘terribly ill’ and suffering from a disease for ‘a long time’ in 825/26, of Count Frumold being troubled by *podagricus* in 833, and of his own ‘feebleness,’ namely ‘a great loosening’ of his bowels, a pain in his kidneys that afflicted him daily, a ‘continual numbness’ in his right thigh and ‘almost intolerable pain’ in his spleen in the early 830s,<sup>432</sup> St. Leoba in a letter to Boniface writes simply of the ‘ill health’ and ‘infirmity’ of her own mother,<sup>433</sup> Flodoard records his own sickness with extreme ambiguity (C.2.82), and Ardo, in his *vita* of Benedict of Aniane, describes Benedict’s infirmities in the vaguest of terms though he worked with Benedict, was

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<sup>427</sup> Rimbart (2004), pp. 418, 438; Notker (2009), pp. 80-1.

<sup>428</sup> Rudolf of Fulda (2004), pp. 289-90.

<sup>429</sup> Erchempert (1878), p. 239.

<sup>430</sup> Eigil (1954), pp. 191, 201. Though the sickness, Eigil notes, was made worse following the administering of a ‘potion.’

<sup>431</sup> Many Carolingian and early Ottonian authors, such as Regino of Prüm, wrote of the illnesses of their contemporaries, and near contemporaries, as they did of peoples who had died centuries earlier. Of course, this is due partially to the source material available to the author, but it demonstrates nevertheless an explicit lack of interest on part of our authors in detailed descriptions of the diseases of mid eighth- through mid tenth-century elites. In the first book of his chronicle, Regino (2009), pp. 94, 126, 116, writes that the court of Chilperic was struck by a ‘plague’ and that the Merovingian king and his two sons became ‘sick.’ Later he notes that ‘disease’ struck down Saracen force and that Pope Stephen fell ‘ill’ in early 750s. Cf. (C.2.19, 30, 34, 39).

<sup>432</sup> Einhard (1998b), pp. 136, 141, 144, 151-52. Dutton notes that Einhard was suffering from a ‘dysentery-like’ disease in the late 820s and that this may have compelled him to seek out the relics: (1998), p. xxv.

<sup>433</sup> Boniface (1954), p. 87.

undoubtedly familiar with his ailments and wrote the *vita* shortly after Benedict's death in 821.<sup>434</sup>

Whether the ailments, which Einhard relates in his *translatio*, were unique to our period or more common in our period than earlier and later periods is also unappreciable. The sicknesses that he repeatedly reports mirror those which earlier medieval authors, such as Gregory of Tours and Gregory the Great, frequently wrote of: blindness, deafness, paralysis and speechlessness.<sup>435</sup> Later writers of the early Middle Ages too concentrated on these ailments,<sup>436</sup> which, with the exception of *contractus nervus*, are in fact biblical standards frequently encountered in late antique and early medieval accounts of sickness.<sup>437</sup> It might be suggested that their prominence in Einhard's text is due to their prominence in earlier writings and that these diseases were part and parcel of hagiographical writing. While Einhard's method of documenting illnesses, his vague terminology and the succinctness of his accounts of individual sickness, was typical not

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<sup>434</sup> Ardo (2004), pp. 197-98.

<sup>435</sup> For instance, Gregory of Tours (1985), pp. 34, 40, 42, 73, 81, 113, 129, 133; Gregory of Tours (1988a), pp. 26-9, 40, 48, 67, 88, 93, 96-8, 101, 103; Gregory of Tours (1988b), pp. 20-1, 24, 36, 64, 95, 109, 113, 116, 124. For blindness in Visigothic vitae see Fear (1997), pp. 28-9, 38, 41.

<sup>436</sup> Blindness, paralysis, muteness and deafness, also regularly crop up in later hagiographical texts. Odilo of Cluny, in his *Epitaph of the August Lady Adelheid*, for instance, reports that many blind and crippled were cured at St. Adelheid's tomb at Selz in Alsace at the close of the tenth century, as were those with fevers and 'different infirmities:' (2001), pp. 270-71. Peter Damian, in his *Life of St. Romuald*, writes that water, which Romuald had touched, cured 'very many sick people' on 'several occasions' in Ravenna in the early eleventh century: (2001), pp. 312-13. Likewise, when the relics of St. Ursmer, of the early eighth-century, toured the Low Countries in the mid eleventh century, we read of many people with an 'infirmity' being cured at Lille, of a monk at Bergues suffering a 'toothache for nearly three years,' and of a boy under five years of age who had been 'blind since he was two' on account of a large tumor covering his eyes. Outside of Ghent, the relics cured all those who 'suffered from fevers, toothaches and illnesses of many kinds.' Meanwhile at Oostburg a rich noble woman who had been 'deprived of her sight for five years' received a healing, though after 'a substance like an egg's albumen ran from her eyes' she was only partially cured. Elsewhere in the north a boy 'scarcely five years old' who had 'suffered from a debilitating fever for three years' and was 'deaf and mute' was cured, as was a knight who suffered a 'club foot' and his sons and wife who had 'taken sick.' At Ghent, we read of a 'girl' whose 'left side had begun to decay so much that its blackness made it seem more like coal than flesh.' The author continues, 'her arm had grown into her side and her hand into her breast, and the arm and the muscle had all joined together, so that the shape of the entire bone looked like a sort of spigot.' At St. Bavo, we hear of a 'very old woman' who was blind in one eye for several years, and at Brussels of a lame woman forced to use crutches and a 'young' boy who had lost his sight for a year: *Miracles of St. Ursmer* (2001), pp. 346, 349-55. In Drogo of Sint-Winoksbergen's life of St. Godelieve who brought cures to all those with 'fevers' and 'other infirmities' who came to the spot where she died at Gistel in the Low Countries. Also, a boy 'crippled from childhood' and a 'crippled' woman were healed: (2001), pp. 370-71.

<sup>437</sup> That is, they are often spoken of in the Bible. On blindness in the Bible see, n. 292 above. The foregoing survey of some mid eighth- through mid tenth-century writings demonstrates clearly that the blind, mute, deaf, and paralyzed were the common fodder of hagiographical texts in our period.

only of contemporary but earlier writings, hagiographical and non-hagiographical,<sup>438</sup> it would be a step too far to assume that the illnesses he records do not in the least reflect what was happening on the ground. The predominance of these conditions in Einhard's *translatio* is quite likely due to their textual and religious value and also to commoners' familiarity with them. After all, why would people care if relics could cure ailments that were uncommon or unheard of?

This implies some continuity in disease occurrence over time. Of course, it is entirely uncertain what diseases we are dealing with here, though there is less uncertainty about symptoms. Like some of those authors who documented the illnesses of Carolingian and early Ottonian elites, Einhard provides fleeting indications of primary symptoms that could tell of a wide array of diseases.<sup>439</sup> Though these conditions may have been linked to malnutrition as addressed in 2.3, blindness could have been caused by cataract, glaucoma, corneal opacities, trachoma, macular degeneration, uveitis, and, in children in particular, vitamin A deficiency;<sup>440</sup> speechlessness by aphonia, apraxia,

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<sup>438</sup> Einhard's vocabulary of disease was not necessarily as limited as it appears in this work. The description of disease that he gives us was certainly in part a product of existing literary paradigms. Many hagiographical texts speak very vaguely of disease. See, for example, the numerous descriptions of the sick in Gregory of Tours' *Liber in gloria confessorum*, *Liber in gloria martyrum* and *Liber vitae patrum*, not to mention in Visigothic *vitae*: Fear (1997), pp. 14, 28-9, 31, 34, 41, 42, 59, 91, 102, 104, 143; Martyn (2008), pp. 168, 196. Insular hagiography also touches upon non-pestilential disease briefly and ambiguously: for instance, Bede (1998a), pp. 64, 66, 82-3, 92; Bede (1998b), pp. 197, 200, 208; Eddius Stephanus (1998), pp. 146, 170, 173, 177, 180; *History of Abbot Ceolfrith* (1998), p. 219. Later hagiographers also relate disease in vague ways. A high medieval account of the miracles preformed by the relics of St. Martin focuses on the 'blind' and 'lame': Jacques de Vitry (1899), p. 12. Odilo of Cluny, in his *Epitaph of the August Lady Adelheid*, reports that many blind and crippled were cured at Adelheid's tomb in Selz in Alsace, as were those with fevers and 'different infirmities:' (2001), pp. 270-71. Peter Damian (2001), pp. 312-14 also speaks ambiguously of 'sick' people, 'severe illnesses' and a 'severe cough.' Reports of the illnesses of earlier Frankish elites in non-hagiographical texts, not to mention Roman histories, were often vague and brief too. For example, the *Liber historiae Francorum* (1987), pp. 174, 179-80, reports that Dagobert I was 'seized by a powerful fever and growing ill he died,' that Pippin II 'grew ill' and was later weakened by a 'strong fever,' and that Dagobert II 'took ill and died.'

<sup>439</sup> For instance, he never addresses the degree to which some were visually impaired. That said, early medieval authors rarely addressed the extent of one's blindness. An exception may be found in the work of Gregory of Tours (1988a), p. 40. Gregory states one man, opposed to others, suffered 'severe blindness.'

<sup>440</sup> [www.who.int/topics/blindness/en](http://www.who.int/topics/blindness/en). Cataract is the leading cause of blindness in the developing world today, responsible for 47 per cent of cases. Glaucoma, the next leading cause of visual impairment, accounts for 12 per cent of blindness in the developing world. Many of these conditions can result from a variety of diseases. For example, corneal opacities, which are produced by a scarring of the eyeball often associated to infection, can be produced by measles, herpes and the bacterial infections *staphylococcus* and *streptococcus*. Uveitis may stem from brucellosis, herpes, lyme disease, syphilis or tuberculosis: [www.who.int/blindness/causes/en](http://www.who.int/blindness/causes/en). Catarch often stems from diabetes, hypertension and advanced age, and may not have been a prime cause of blindness in our period.



dysarthria, a diet low in iodine or, in children especially, being born deaf;<sup>441</sup> and mastoiditis, measles, meningitis, mumps, smallpox and a variety of chronic ear infections may have led to hearing impairment in childhood, but also later in life. Deafness can also be inherited or caused by several factors during pregnancy, including the presence of rubella or syphilis in the mother, or exposure to jaundice.<sup>442</sup> Of course, a very wide range of infections and conditions could have caused paralysis, including Guillain-Barre syndrome, meningitis, severe cases of osteomyelitis, poliomyelitis and acute disseminated encephalomyelitis, and some cases of *paralysis* might have been the result of accident or injury.<sup>443</sup> Kidney pain or ‘failure’ might have resulted from any number of conditions, including diabetes and leptospirosis,<sup>444</sup> and involuntary shaking from Parkinson's disease or Huntington disease, or kidney or liver failure. Reports of involuntary shaking may even refer to epilepsy or, as noted, ergotism poisoning. Of course, these ailments may have also been caused by pathogens or conditions not known to modern science.

A few of the ailments Einhard describes require further attention. Accounts of people with ‘tightened tendons,’ ‘humped backs’ and ‘mill hands’ appear to be rather anomalous to most biblical, late antique and early medieval writings.<sup>445</sup> Whether these conditions were new or more common in the Carolingian period is uncertain and ultimately unknowable, as Einhard may simply be providing us with more detailed accounts of *paralysis* than previously given.<sup>446</sup> It is noteworthy, however, that Flodoard refers to *contractus* and ‘tightened tendons’ in each of his three accounts of the illnesses of commoners, and that many other authors from our period write of ‘contracted’ or ‘tightened’ limbs. In Flodoard’s *Annales*, we encounter three men from the locale of

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<sup>441</sup> Aphonia is caused by a disruption to the inferior laryngeal nerve which supplies function to larynx. Severe cleft palate, ankyloglossia and tumors of the lips, mouth and tongue can cause this disruption. [www.searo.who.int/LinkFiles/List\\_of\\_Guidelines\\_for\\_Health\\_Emergency\\_1Module6FP.pdf](http://www.searo.who.int/LinkFiles/List_of_Guidelines_for_Health_Emergency_1Module6FP.pdf)

<sup>442</sup> [www.who.int/mental\\_health/neurology/chapter\\_3\\_b\\_neuro\\_disorders\\_public\\_h\\_challenges.pdf](http://www.who.int/mental_health/neurology/chapter_3_b_neuro_disorders_public_h_challenges.pdf)

<sup>443</sup> [www.who.int/mediacentre/factsheets/fs300/en/](http://www.who.int/mediacentre/factsheets/fs300/en/); [www.who.int/mediacentre/factsheets/smallpox/en](http://www.who.int/mediacentre/factsheets/smallpox/en).

<sup>444</sup> [www.who.int/topics/poliomyelitis/en](http://www.who.int/topics/poliomyelitis/en); [www.who.int/ihr/polio1996en.pdf](http://www.who.int/ihr/polio1996en.pdf). Polio can cause total paralysis in a number of hours, chiefly in the legs: [www.who.int/mediacentre/factsheets/fs114/en](http://www.who.int/mediacentre/factsheets/fs114/en); on osteomyelitis see Roberts and Manchester (2005), pp. 168-72, 173. Polio is thought to have been common in past European populations.

<sup>445</sup> [www.who.int/diabetes/facts/en](http://www.who.int/diabetes/facts/en).

<sup>446</sup> Note that Merovingian *vitae* record some cases of *contractus nervus*: for instance, *Vita sanctae Balthildis* (1888), p. 504; *Vita sancti Arnulfi* (1888), p. 445; *Vita et virtutes Eparchii Reclusi Ecolismensis* (1896), pp. 561, 563; *Vita Fidoli abbatis Trecensis* (1896), p. 430; *Vita Austrigisli episcopi Biturigi* (1902), p. 199.

<sup>447</sup> He may have even disguised some cases of tightened tendons and humped backs with the more generic *paralysis*.

Rheims with the ailment, one of whom is said to have long suffered from it and another who was struck suddenly by it and then relieved of it on two occasions separated by five years (C.2.69, 70, 71). Of course, whether the conditions these three men suffered were the result of the same cause is uncertain, as is whether these cases were pathogenically similar to those Einhard and other authors relate. Unlike blindness, speechlessness and deafness, however, all three of these ailments – *contractus nervus*, humped backs and mill hands – like all cases of *paralysis*, appear in Einhard’s *translatio* and other texts as acquired conditions that could persist for many years. While humps are always observed on the back, and hands, not feet, are said to have rotated, what limbs/tendons were ‘contracted’ varied considerably. Whether this is an indication that *contractus* was an umbrella term for many ailments is uncertain. Tightening of the tendons and the restricting of the limbs could have been the result of a variety of diseases, including severe cases of poliovirus or tendonitis, not to mention tendon ruptures, tendinopathy or one of the many forms of acquired myopathy.<sup>447</sup> Tightened tendons may also relate to a low level of calcium and magnesium, which in grain-dense early medieval diets would have been typical as some isotope studies already show.<sup>448</sup> Contracted hands may refer to Dupuytren’s contracture (also known as palmar fibromatosis) or osteoarthritis.<sup>449</sup> Similar ambiguity surrounds the ‘camel backs’ and ‘mill hands.’ The former could have stemmed from spinal arthritis or osteoporosis, severe cases of rickets/osteomalacia or tuberculosis, or, in children and teenagers especially, osteochondrosis.<sup>450</sup> The latter may have been caused by carpal tunnel syndrome.<sup>451</sup> Carpal tunnel could also account for reports of ‘withered hands.’ Dystonia (chronic muscle contraction) can also be caused by encephalitis and TB.

Before we consider the palaeopathological literature, a few additional observations may be noted about the written evidence. First, we may note the rarity of *febres* in accounts of elite illnesses collected in Catalogue 2 and commoners’ sicknesses

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<sup>447</sup> [www.who.int/mediacentre/factsheets/fs114/en](http://www.who.int/mediacentre/factsheets/fs114/en);  
[www.who.int/occupational\\_health/pwh10\\_lecture\\_06\\_effects  
on\\_human\\_body\\_musculoskeletal\\_system.pdf](http://www.who.int/occupational_health/pwh10_lecture_06_effects_on_human_body_musculoskeletal_system.pdf).

<sup>448</sup> For instance, Schutkowski et al (1999); also see the discussion below on the relation of lower statures to poor calcium intake.

<sup>449</sup> [www.who.int/occupational\\_health/publications/newsletter/en/gohnet4e.pdf](http://www.who.int/occupational_health/publications/newsletter/en/gohnet4e.pdf)

<sup>450</sup> [whqlibdoc.who.int/bulletin/2003/Vol81-No9/bulletin\\_2003\\_81%289%29\\_646-656.pdf](http://whqlibdoc.who.int/bulletin/2003/Vol81-No9/bulletin_2003_81%289%29_646-656.pdf); Davies (2002), p. 84.

<sup>451</sup> [www.who.int/occupational\\_health/publications/newsletter/en/gohnet4e.pdf](http://www.who.int/occupational_health/publications/newsletter/en/gohnet4e.pdf)

recorded in Einhard's *translatio* and elsewhere. This near absence of fevers in isolated episodes of sickness represents a sharp divide between pre-750 and post-750 hagiography. That *quartana febris* has been uncovered only once, *tertiana febris* once,<sup>452</sup> and *quotidiana febris* not at all, is too truly exceptional.<sup>453</sup> This need not mean, however, that illnesses characterized by fever, cyclical or not, were uncommon. The dearth of cyclical fevers in our texts may stem from the location of the composition of most of them: unlike many earlier texts, most of the written evidence for Carolingian and early Ottonian non-pestilential disease stems from northern continental Europe, away from areas traditionally associated with *tertiana*, *quartana*, *quotidiana febres* in earlier sources.<sup>454</sup> Second, *leprosus/leprae*, another biblical standard that appears regularly in pre-750 sources, is encountered neither in accounts of elite illness nor the *vitae* or *translationes* consulted for this study.<sup>455</sup> This too, however, need not mean that leprosy

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<sup>452</sup> Einhard notes that in the late 820s his notary's servant was 'seized by a tertian fever' and was periodically 'gripped by bouts of fever' after he entered Italia en route to the relics of Marcellinus and Peter in Rome: (1998a), pp. 71-3.

<sup>453</sup> Indeed, *febres* are regularly encountered in several earlier works. For instance, Jonas of Bobbio reports that Columbanus' successor at Bobbio, Attala, cured fevers in Milan, that Jonas and Attala were also overcome by a fever at Susa and Bobbio respectively, and that Bertulf, Attala's successor, was afflicted by fever near the fortress of Bismantova in *Italia*: (2001), pp. 123-26. In the *Hodoeporicon* of St. Willibald we read that when en route to the Holy Land in the early eighth century, Willibald, his brother and his father all fell ill. Willibald and his brother suffered a fever when in Rome that saw them 'at one moment' 'shivering with cold' and the next moment 'burning with heat.' Huneberc, the author of the *Hodoeporicon*, notes that they caught the 'Black Plague' and that they were 'scarcely able to move worn out with fever.' Earlier, Willibald's father had been 'struck down almost at once by a severe bodily sickness' near Lucca. He died a few days later. Interestingly, Huneberc states that in *Italia*, or Rome specifically, the 'increasing heat of the summer' was 'usually a sign of future fever.' Huneberc (1954), pp. 158-59. Fevers are also regularly found in Gregory of Tours' *Liber in gloria confessorum*, *Liber in gloria martyrum* and *Liber vitae partum*, as well as some Visigothic *vitae*: Fear (1997), pp. 133, 143. While most texts from our period and region of concern do not often report *febres* north of the Alps, two of Erchempert's three accounts of chronic disease and more circumscribed non-epidemic episodes of acute illness in his *Historia Langobardorum Beneventanorum* deal with fevers. He writes that people 'overcome by fever' commonly came a tomb of a holy person for healings and that in mid 880s Lando III had a 'burning fever:' (1878), pp. 239, 259.

<sup>454</sup> As noted, many of the Carolingian and early Ottonian elites weighed down by *febres* are known to have fallen ill in southern Europe, *Italia* in particular. That most of our sources were penned in the north cannot, of course, explain the dearth of non-cyclical fevers, as a wide range of diseases produce a fever.

<sup>455</sup> Leviticus 13: 2-3, 8-9, 11-3, 15, 20, 25, 27, 30, 42-3, 47, 49, 51-2, 59; Leviticus 14: 3, 7, 32, 34, 44, 54-5, 57; 2 Kings 5: 3, 6-7, 27; Notker documents one case of *leprosus*, and in a letter to Charlemagne in the late 760s, Pope Stephen indicates that there were *leprae* in early medieval Europe, at least south of the Alps, when denouncing the Lombards as a 'fetid' and 'hardly human' people that 'brought leprosy into the land:' (1969), p. 117; Dutton (2004), p. 25. Jonas of Bobbio also describes a man 'deeply afflicted by leprosy.' The man is said to have been in great pain and to have had 'limbs were covered in ulcers:' (2001), pp. 126-27. Of earlier authors, Gregory of Tours, in his hagiographical works, spoke often of lepers in *Francia*, at Poitiers, St. Claude and near Chalo-sur-Saone for instance: (1988a), pp. 18, 91, 101; (1988b), p. 37; (1985), pp. 32-3. There also are references to *leprae* in the seventh-century Lombard laws of Rothari:

or other severe ailments of the skin were uncommon in our period.<sup>456</sup> Third, toothaches and bowel-related illnesses appear relatively infrequently in the sources consulted,<sup>457</sup> while blindness and *paralysis* undoubtedly take up the lion share.

Fourth, there appears to be some clear distinctions between the ailments sustained by elites and those by commoners, though again the evidence surveyed is insufficient to support any definitive claims or generalizations, and these distinctions may primarily owe to the method in which the sicknesses of elites and commoners were documented. *Paralysis* and tightened tendons, for instance, figure prominently among commoners, but not elites, though there is some reason to think paralysis was underreported in accounts of elite illness.<sup>458</sup> It may be said that elites, unlike commoners, primarily suffered paralysis in old age,<sup>459</sup> and that cases of tightened tendons and ‘mill hands’ had occupational causes.<sup>460</sup> Elites too are not often said to have suffered visual, auditory or speech impairment. Unlike most sources for non-pestilential illness among elites, Flodoard also devotes some attention to the lower social strata, and it may be especially revealing that he only writes of *contractus nervus* in commoners. It may also be noteworthy that despite the regularity with which we encounter *contractus* in Einhard’s text, he documents no elites suffering the condition; no one at Loius’ court, for instance, is said to have been cured of the ailment when Einhard and the relics were present.<sup>461</sup> On

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Pilsworth (2000), p. 257; Skinner (1998), p. 298. Two Visigothic *vitae* also address *leprae*: Fear (1997), p. 5; Martyn (2008), 24.

<sup>456</sup> Cf. McCormick who suggests that leprosy ‘had been known in the Roman world for some time:’ (2001), p. 39. It has been proposed that elephantiasis refers to leprosy: Lechat (2002), p. 158.

<sup>457</sup> Naturally, this too does not necessarily reflect a rarity of dental- and bowel-related diseases in our period. In contrast, Gregory of Tours regularly documented toothaches in commoners and elites in his hagriographical texts: (1988a), pp. 91, 97, 104; (1988b), p. 65. Bowel-related illnesses are rarely found in Gregory’s work: (1988a), p. 40.

<sup>458</sup> In addition to those cases already noted, Erchempert reports that Lando I was stricken with ‘terrible paralysis’ in 859: (1878), p. 244.

<sup>459</sup> Whether this means they suffered the same ailments commoners did later in life or different ailments altogether is impossible to tell. For instance, Queen Emma was nearly seventy (C.2.38), Karlmann of Bavaria and Arnulf of Carinthia about fifty (C.2.48, 59, 65), and Henry the Fowler, Hagano of Hersfeld and Lando I were around the age of sixty (C.2.74, 81). Some palaeopathologists consider people 40 years of age and older as ‘mature/senile:’ Flohr and Schultz (2009), p. 268.

<sup>460</sup> That is to say that they were possibly the result of repeated movements, heavy loads and tension on joints; general wear-and-tear on the musculoskeletal system.

<sup>461</sup> However, that none of the king’s ‘chief men’ or ‘courtiers’ were cured of anything, nor the king, may have more to do with the purpose of Einhard’s text.

the other hand, some conditions like *podagricus* may have been particular to elites and associated, perhaps, to the elite diet.<sup>462</sup>

Lastly, while we cannot distinguish how prevalent any particular disease was on the grounds of the texts surveyed here, no matter how restricted the temporal or spatial parameters, there are some indications that non-pestilential disease was quite common among commoners. In the *vita* of Odo of Cluny we read of ‘crowds’ of blind, lame and paralyzed, and a ‘multitude of people suffering from some disease,’ and in Odo of Cluny’s *vita* of Gerald of Aurillac of a ‘multitude’ of sick flocking to Solignac, in south-central *Francia*, for cures.<sup>463</sup> In the *translatio* of the relics of Vitus, we are told that ‘a great multitude of the population,’ including men and women, old and young, came seeking cures in one village, that a great crowd of ‘blind and lame’ came for healings in another village, and that many came daily to be cured in yet another village.<sup>464</sup> Eigil, abbot of Fulda, tells us in his *vita* of St. Strum that there were many ‘sick and ailing’ among the community at Fulda in the mid eighth century and that the number of sick increased as the community did.<sup>465</sup> Rimbert also observes that there were ‘many people overcome with sickness’ in Dorestad and Hamburg, and in a *vita* of St. Lebuin we read that there were ‘many sick’ in Deventer, in the Low Countries.<sup>466</sup> Einhard too writes of crowds of sick in his *translatio* and implies that non-pestilential sicknesses were common when noting that that he only documented some of the ‘innumerable miracles’ that occurred in northeastern *Francia* after the arrival of Marcellinus and Peter’s relics.<sup>467</sup> In an address to the priests of his diocese of Orleans, Theodulf also wrote of the need for priests to care for the sick, administer baptisms to sick infants and exclude the sick from fasts, as if non-pestilential illnesses permeated his society.<sup>468</sup>

These are but a few examples. Many texts, *vitae* and *translationes* especially, contain similar statements about throngs of sick commoners. While such statements may

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<sup>462</sup> Gregory of Tours only documents his father’s *podagricus* in his hagiographical texts: (1988a), pp. xvi, 31.

<sup>463</sup> John of Salerno (1958), p. 84; Odo of Cluny (1958), p. 140.

<sup>464</sup> *Historia translationis S. Viti* (1828), pp. 583-84.

<sup>465</sup> Eigil (1954), pp. 191, 201.

<sup>466</sup> Rimbert (2004), p. 429; *Life of St. Lebuin* (1954), p. 234.

<sup>467</sup> For instance, Einhard (1998a), pp. 87, 122.

<sup>468</sup> Dutton (2004), pp. 110-11, 117-18. Halitgar, bishop of Cambrai, also included a prayer for the sick in his five books on penance, though this prayer may simply be a copy of one contained in an earlier penitential: (2004), p. 240.

be considered common stock of these genres – they served after all to emphasize that it was acceptable and advantageous to seek cures in a Christian context and from Christian relics<sup>469</sup> – we should not disregard them altogether: indeed, we should question how often sick commoners actually sought out Christian cures, not the existence of crowds of sick.<sup>470</sup> The emphasis on non-pestilential illness in these texts, as opposed to outbreaks of disease, also implies that these sorts of illnesses were often sustained, or that they were a more regular companion of everyday life than pestilence.<sup>471</sup> Einhard's focus on non-pestilential disease, for instance, would have only served to emphasize the healing power of the relics he procured if non-pestilential diseases were regularly encountered. That said, it appears as though Marcellinus and Peter could not have curbed an outbreak of disease if they wanted to c.830, as there is no evidence then for an epidemic (see 1.4.2).

As discussed in 0.1.5.1 and 1.2, the palaeopathology and palaeomicrobiology also cannot speak to the prevalence of any particular non-pestilential disease. Nor can we easily marry the available palaeoscientific literature with the written sources surveyed here; our inability to provide any definitive retrospective diagnoses of non-pestilential diseases recorded in texts ensures this.<sup>472</sup> More significant for us, is the near dearth of palaeopathological and palaeomicrobiological analyses of mid eighth- through mid tenth-century human remains, and early medieval peoples from *Francia* and *Germania* more generally. Still, the literature that does exist sheds some light on the non-pestilential illness that occurred in our period, including those documented, and not documented, in our sources. Here, in consulting this literature, we move beyond the textual evidence.

The mass of the palaeoscientific assessments of non-pestilential disease for the medieval period have centered on leprosy and tuberculosis. The latter, for instance, has been identified palaeopathologically and palaeomicrobiologically in numerous pre-modern European human and livestock remains, including some early medieval remains

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<sup>469</sup> As Rimbart indicates quite clearly: (2004), p. 429. Moreover, the crowd of sick trope is frequently found in the New Testament in connection with Jesus' healing miracles.

<sup>470</sup> That said, the emphasis on crowds may have primarily served to emphasize that turning to Christian relics for cures was already widely accepted.

<sup>471</sup> Early medieval *vitae* and *translationes* in general rarely provide evidence for pestilences. Exceptions include Gregory of Tours (1985), pp. 57, 80, 119; Gregory of Tours (1988b), p. 76; *Miracles of St. Ursmer* (2001), pp. 345-46; Alcuin (1954), pp. 16-7; Bede (1998a), pp. 55-6, 81, 86; Eddius Stephanus (1998), p. 127; Bede (1998b), pp. 189, 197; Anonymous (1998), pp. 214, 217-18.

<sup>472</sup> Some of the chronic conditions and circumscribed episodes of illness discussed above may not have even produced bone lesions.

from early medieval Austria, England, France, Hungary, Israel, Italy, Spain and Switzerland.<sup>473</sup> Considering how widely *Mycobacterium tuberculosis* and *Mycobacterium bovis* have been identified in Europe before and after our period, we can be quite certain that both were a factor in the Carolingian and early Ottonian periods regardless of the near dearth of direct written or material evidence for them. *M. tuberculosis* has even turned up in medieval rural sites, where one might instead expect *M. bovis*.<sup>474</sup> Much the same can be said for *Mycobacterium leprae* (leprosy). Though not as widely identified, palaeopathologically or palaeomicrobiologically, as *M. tuberculosis* it is also quite certain that leprosy would have been a factor in mid eighth- through mid tenth-century Europe, as the remnants of the disease have been found throughout much of Europe before and after our period.<sup>475</sup> Paget's disease and the metabolic disorders rickets

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<sup>473</sup> *Mycobacterium bovis*, for instance, has been isolated in four humans from Iron Age Tyva (Siberia): Stirland and Waldron (1990), Taylor et al (1996), Mays (2002), Bendry et al (2008); while *Mycobacterium tuberculosis* has been identified via PCR in the remains from several ancient Egyptian persons: Rollo et al (2006); a first-century man from Jerusalem: Matheson et al (2009); seventh-, eighth and seventeenth-century southern Hungarian persons: Haas et al (2000); high and late medieval English persons: Taylor et al (1996), Mays (2002); and early modern Lithuanian persons: Faerman et al (1997). *M. tuberculosis* has also been identified palaeopathologically on several Roman, early medieval, high medieval and late medieval English remains: Manchester (1981), Stirland and Waldron (1990), Mays and Taylor (2002) and Roberts and Buikstra (2003), pp. 132-42; early medieval and early modern Hungarian remains: Palfi and Marcsik (1999), Haas et al (2000) and Roberts and Buikstra (2003), pp. 151-54; seventh-century Israel: Roberts and Buikstra (2003), p. 172; seventh- through ninth-century Soria (Spain) and seventh-century Burgos (Spain); idem (2003), pp. 178-79; seventh- through ninth-century Avar persons and ninth-century Slav persons in eastern Austria: Wiltshcke-Schrotta and Berner (1999); eighth-century Frejus (southeastern France), early and high medieval La Celle (France), fifth- through seventh-century St.-Martin-de-Cadillan (France): Roberts and Buikstra (2003), pp. 167-69; eighth- through ninth-century Switzerland: idem (2003), pp. 161; late medieval Lithuania: idem (2003), pp. 154-56; high medieval Bohemia and Moravia: idem (2003), pp. 147-48; high and late medieval Denmark: idem (2003), pp. 148-50; eleventh-century Lund (Sweden): idem (2003), pp. 160-61; eleventh- through thirteenth-century Poland: idem (2003), pp. 158-59; late medieval Germany and the Netherlands: idem (2003), pp. 150-51, 156; as well as and ancient (fourth or third century BCE) and early medieval (sixth- through eighth-century) Italians: Mariotti et al (2005), Belcastro et al (2005), Rubini and Zaio (2009); neolithic eastern Mediterraneans: from a site outside Haifa, Hershkovitz et al (2008); and even Iron Age Siberian and northern Thailand: Murphy et al (2009); Tayles and Buckley (2004). 'Modern' *Africanum* TB has also been isolated in ancient Egypt: Zinc at al (2004).

<sup>474</sup> Roberts (2009), p. 213.

<sup>475</sup> *M. leprae* has been isolated in aDNA harvested from peoples of first-century Jerusalem: Matheson et al (2009); the twelfth-century Czech lands: Likovsky et al (2006); high medieval Orkney: Taylor et al (2000); and late medieval and early modern Germany and Hungary: Haas et al (2000); and it has been identified via skeletal lesions on remains from fourth-century BCE Italy: Mariotti et al (2005); fourth-century Dorset (England): Reader (1984); fifth-century northern and southern France: Blondiaux et al (2002); sixth- through eighth-century Morione and Campochiaro (Italy): Rubini and Zaio (2009); seventh-century Moise (Italy): Belcastro (2005); seventh-century Eccles (England): Manchester (1981); eighth- through ninth-century people from Radasinovci (Croatia) and Norwich (England): Watson and Lockwood (2009); high medieval High Wycombe (England): Farley and Manchester (1989); iron age and twelfth- through fourteenth-century Denmark: Boldsen (2005), Boldsen and Mollerup (2006), Boldsen (2009). Boldsen has surveyed several medieval sites, including Odense and Tirup. Also see Bennike, Bro-Rasmussen and Bro-

and scurvy too have been identified palaeopathologically in medieval remains, though far less regularly.<sup>476</sup> Palaeopathological assessments of bone lesions caused by syphilis are also now said to be ‘confirmed’ in Europe before New World contact, though how prevalent the disease may have been in the early Middle Ages is very uncertain: only one palaeopathological identification of venereal syphilis has been made of an early medieval individual.<sup>477</sup> Of course, the material evidence for all of these diseases, including those of the *Mycobacterium* complex, in medieval remains reflects the interests of scholars more than the existence, absence or prevalence of the disease at any particular point in the past. Evident gaps in the identification of tuberculosis in European regions and periods should not be thought, for instance, to represent a lack of evidence, but omissions in study. As Roberts and Buikstra note, signs of TB in pre-modern remains have very much been under-examined in several European countries, including, unfortunately, those we are primarily concerned with: Austria, France, Germany, the Netherlands and Switzerland.<sup>478</sup> Moreover, tuberculosis, as with so many bone-changing diseases, is widely held to be underrepresented in skeletal assemblages on account of the difficulty of detection. Additionally, many people are likely to die of TB before the disease has a chance to alter the bone.<sup>479</sup> For these reasons, we may suspect that in those sites where TB was

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Rasmussen (1987); and fifth- through seventh-century Lauchheim (Germany): Boldsen (2008); For possible cases of leprosy and syphilis in early medieval Wales see Holbrook and Thomas (2005), p. 51. Leprosy has also been advanced as a differential diagnosis of lesions on an Iron Age individual from northern Thailand: Tayles and Buckley (2004).

<sup>476</sup> For instance, rickets has been identified in remains from medieval Birmingham (England), scurvy in remains from medieval Macvanska Mitrovica (Serbia), and Paget’s disease in seventh-century Eccles: Brickley, Mays and Ives (2008); Brown and Ortner (2009); Reader (1974); Manchester (1981). On the antiquity of cancers see Capasso (2005), pp. 6-10.

<sup>477</sup> From England dating to the sixth-century: Cole and Waldron (forthcoming). On the palaeopathology of syphilis see Roberts (2009), pp. 215-16; Waldron (2009), pp. 104-105. It is suspected that the disease, while present in both the Old and New Worlds before Columbus, only became widely prevalent in the Old World in the early modern period, and only coincidentally after New World contact. Waldron notes that suggestions about the new World origin of syphilis had become ‘aggrandized by being called theories.’ Unfortunately, aDNA research into syphilis is quite limited, as the disease-causing agent, *Treponema pallidum*, has proven difficult to isolate biomolecularly: Bouwman and Brown (2005); von Hunnius et al (2007); cf. Waldron (2009), p. 108.

<sup>478</sup> To this list they add Finland, Greece and Norway: Roberts and Buikstra (2003), pp. 87, 131, 150, 156, 161, 171.

<sup>479</sup> For instance, idem (2003), pp. 87-8, 139. It is estimated that only 2 per cent of people generally develop any calcified lesions from tuberculosis infection: Waldron (2009), pp. 90-7. Of course, as discussed in 1.2.4, several other issues plague palaeopathological detections and prevent definitive diagnoses. Of course, as discussed in 1.2.4, several other issues plague palaeopathological detections and prevent definitive diagnoses.



identified that others found at the site also sustained TB infection and, more generally, that tuberculosis, *M. tuberculosis* in particular, was rather common in our period.<sup>480</sup>

Of course, singular palaeoscientific identifications of TB and leprosy, and other diseases, carried out randomly, do not provide any indication of trends in prevalence or occurrence. Diagnoses of diseases that are identified very infrequently, palaeopathologically or palaeomicrobiologically, should also, as noted in 1.2.3 and 1.2.4, not be accepted as definitive. Still, what we might regard as tentative identifications of rickets, scurvy, Paget's disease and syphilis, provide room for speculation in Part 3. Certainly, the available palaeoscience for *M. tuberculosis*, *M. bovis* and *M. leprae* allows for speculation on the impact of these diseases in Carolingian and early Ottonian Europe. Fortunately, two assessments of the prevalence of former in early medieval continental populations have been carried out. In their palaeopathological assessment of fifteen sites, some rural and some urban, spread across northern France spanning the fourth to thirteenth century, Blondiaux et al draw much attention to *M. tuberculosis*.<sup>481</sup> They divide these nine centuries into three sub-periods – stretching 300 to 500, 500 to 700 and 700 to 1200 – based on discernible trends in the prevalence of the disease. Between each of these periods they propose that there was a notable increase in the incidence of the disease, the most notable of which took place from the first to the second sub-periods on account of, they suggest, population growth in the region. The disease was most prevalent in urban sites in each period; rural sites show no major increase in the incidence of the disease between the second and third sub-periods. Whether the noticeable increase in prevalence across the first and second sub-periods took place before or after 750, or was gradual across the whole period under consideration, is hard to appreciate, as remains are difficult to date with precision. Likewise, it is difficult to discern whether the evident boost in the disease's prevalence in urban sites between the second and third groups occurred prior to 950 or in the high Middle Ages. However, that the incidence of the disease appears to have been more or less constant or rising across the whole period under consideration

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<sup>480</sup> Waldron (2009), pp. 90-7.

<sup>481</sup> Blondiaux (1999), pp. 519-30. Blondiaux et al examined 2208 bodies in 1997 (2498 in 1999) spread across 900 years. How many of the individuals examined by either author directly apply to our period is also unknown; but it is worth keeping in mind that only 50 of Jakob's 300 years and 200 of Blondiaux's 900 years fall within our focus. Further, only 29 of Blondiaux's nearly 2500 bodies surveyed in 1999 exhibited possible signs of tuberculosis. Note that Blondiaux et al (1999) is an updated version of an earlier report published in 1997.

here is certainly noteworthy: it implies a constant presence of TB across our period, at least in some regions of northern and southern *Francia*.<sup>482</sup> In her palaeopathological assessment of three early medieval southwestern German populations (at Neresheim, Nusplingen and Pleidelsheim) Jakob also found possible indications of tuberculosis infection – periostitis of the ribs and endocranial lesions – to be quite common.<sup>483</sup>

Considering how widespread tuberculosis seems to have been in our period, we may suspect that the infection resulted in some of the ‘hump backs’ reported in our sources. Both *M. tuberculosis* and *M. bovis* regularly affect the spine, producing Pott’s Disease in upwards of 40 per cent of cases. Pott’s Disease, which can appear in TB sufferers of any age, results when infection develops between the anterior of the vertebral body and the longitudinal ligament. It generates a ‘hump’ on one’s back and can even force one to hunch, perhaps like some of Einhard’s sick.<sup>484</sup> TB may have also contributed to cases of blindness brought on by uveitis, auditory impairment brought on by meningitis, or even some cases paralysis.<sup>485</sup> Likewise leprosy, whose appearance in our period seems near certain, may have been behind the withered hands and appendages described in some texts. However, we should not suspect, considering its low rate of communicability,<sup>486</sup> that the granulomatous disease was as widespread as tuberculosis in our period. That said, the oft-repeated history of leprosy’s medieval ebb and flow, which predates most of the palaeoscience, should not lead us to think that the disease was less common in the ninth or tenth centuries than it was in late antiquity or the high Middle Ages.<sup>487</sup>

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<sup>482</sup> That said, rural sites are underrepresented in the first sub-period and it is uncertain how prevalent TB was in the region of these sites prior to 500 in rural north *Francia*.

<sup>483</sup> Jakob (2009), pp. 108-118, 170. Jakob’s sites are situated in the general region of Stuttgart. In total, Jakob examined 495 bodies across 300 years, but only 50 of Jakob’s 300 years fall within our specific period.

<sup>484</sup> Roberts and Buikstra (2003), pp. 89-96.

<sup>485</sup> Idem (2003), pp. 100-03.

<sup>486</sup> Though the mechanisms of leprosy’s spread is uncertain, it is known that the disease is passed relatively ineffectively via nasal secretions: Waldron (2009), p. 98.

<sup>487</sup> In this common history, the rise and fall of leprosy appears to mirror the rise and fall of the *leprosarium*, the leper hospital, more than anything else: for example, Nutton (1995b), pp. 187-89; Roberts and Buikstra (2003), pp. 144-45. Not only has the textual evidence of pre-modern lepers yet to receive a comprehensive assessment, but the number of references to lepers in a given period does not necessarily represent the prevalence of the disease. A survey of the written evidence for leprosy would shed light on when the disease was most recorded, not necessarily when the disease was most common. Of course, neither does the decline of an institution necessarily reflect the decline of a pathogen, nor the rise and fall of the *leprosaria* the period in which leprosy was most prevalent. Rawcliffe and Miller make a similar observation: Miller

Many conditions of the skeleton, some caused by pathogens others, others the result of nutritional stress and wear and tear – are thought to have been fairly prevalent in pre-modern populations, but underreported in palaeopathological assessments.<sup>488</sup> Though direct evidence for several of these conditions in Carolingian and early Ottonian Europe is lacking, we may suspect that some, especially those that have been diagnosed in early medieval remains, were common in our period and account for some of the conditions regularly encountered in texts.<sup>489</sup> For instance, osteoporosis is said to be quite common in past populations and has been diagnosed with a high prevalence in a late antique population unearthed at Otranto (Italy), a population of 2000 individuals from early medieval Amiens, and the three aforementioned early medieval German populations.<sup>490</sup> Though osteoporosis is primarily a metabolic disorder, repeated movements and heavy workloads can promote the decline of bone density, which can affect hands, hips, knees and the spine. In untreated cases it can cause joint failure, fractures and disability, and we may suspect that it accounts for some of our *paralysi* and the hunched over peoples we encounter in texts.<sup>491</sup> Rotator cuffs disease, spinal arthritis or rheumatoid arthritis, all of which are thought to have been common in past populations (the latter two being diagnosed with some frequency in the aforementioned populations of Amiens Neresheim,

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(2007), pp. 650-51. Also see Hirsch (1885), p. 7. Instead, the rise and fall of the institution marks the rise and fall of one way of dealing with, or thinking about, lepers. That the decline of the leper hospital occurred contemporaneously to the Black Death, may indeed reflect the Black Death's effective killing off of most of Europe's lepers, or rather the high susceptibility (or vulnerability) of lepers to opportunistic infections. On the other hand, it may instead mark the decline of one way of dealing with and thinking about lepers. Indeed, the Black Death may have simply marked the end of *leprosaria*, not lepers. We may suspect, as some historians have, that the disease was widely prevalent across Europe before the diffusion of the *leprosaria*. See, for instance, Hirsch (1885), pp. 6-7. Also McCormick notes that leprosy became 'generalized' and 'endemic' between the fourth and sixth centuries: (2001), pp. 39-40. Since leprosy is commonly associated, by modern laboratory science, to poverty and poor hygiene, McCormick also proposes that late antique Europe, 'from Gaul to Syria,' must have 'experienced deteriorating health conditions and increasing poverty. Several questions remain to be asked. For instance, was leprosy's apparent high medieval rise and fall associated in some way to the coming and going of the medieval warm period, crusade-era contacts with the Near East, or to then growing populations and urbanization? Were lepers less common in the early centuries of the early Middle Ages because of the EMP and its reoccurrences?

<sup>488</sup> Poor representation of these diseases stems not only from difficulty of detection but also from a lack of interest among palaeopathologists: most bone-altering conditions are not, like leprosy and tuberculosis, in vogue. That said, we might, in lieu of much direct material data for these conditions in early medieval Europe, question whether speculation on prevalence relies on preconceived ideas about the antiquity of 'modern' disease-causing entities and presumptions about pre-modern nutrition, hygiene and medicine, not to mention preconceptions about European demographic and economic history.

<sup>489</sup> Though most of the bone-altering illnesses addressed here occur more often in adults.

<sup>490</sup> Skinner (1997), p. 23; Catteddu (2009), pp. 90-2; Jakob (2009), pp. 124, 166

<sup>491</sup> Waldron (2009), pp. 26-33.

Nusplingen, Otranto and Pleidelsheim), may have also have brought on *paralysis*.<sup>492</sup> Both conditions are also associated to heavy workloads and repeated movements.<sup>493</sup> In her examination of joint diseases in early medieval German remains, Jakob also found degenerative disc disease and Schmorl's nodes to be quite common.<sup>494</sup> Psoriasis, which can cause joint disease when untreated and impair function of the hands and fuse vertebrae, too is thought to have been common and may have caused some cases of *paralysis*.<sup>495</sup> Dental conditions described in texts may have been the result of abscesses, carries or periodontal disease (periodontitis), which are held to be the most prevalent dental conditions in past populations.<sup>496</sup> Nearly all the adults in the aforementioned southwestern Germany populations exhibited one or more forms of dental disease – namely ante-mortem tooth loss, carries, calculus, enamel hypoplasia periapical lesions, periodontal disease and pulp exposure.<sup>497</sup> Lastly, mastoiditis, which is thought to have been prevalent in the past and which could account for some of the hearing impairments we encounter in texts, has been identified in high frequency in seventh- and eighth-century cemeteries in Rhens and Dirmstein.<sup>498</sup>

Much less can be said about the non-pestilential diseases of livestock in Carolingian and early Ottonian Europe. Though in the *Capitulaire de Villis* we read of dependents having to provide meat from 'lame but healthy' stock and not 'diseased' cows or horses, or other 'diseased' beasts, no other indication of chronic disease or circumscribed periods of illness in livestock has been uncovered.<sup>499</sup> We should not suspect, however, that mid eighth- through mid tenth-century stock were free of such

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<sup>492</sup> Catteddu (2009), pp. 90-2; Skinner (1997), p. 23; Jakob (2009), pp. 76-95, 169. Rotator's cuff disease can impair movement of the shoulder joint, while rheumatoid arthritis can cause deformities in the elbow, feet and hands: Waldron (2009), pp. 40-1, 46-7.

<sup>493</sup> Idem (2009), pp. 66-7.

<sup>494</sup> Jakob (2009), pp. 76-95, 169.

<sup>495</sup> Waldron (2009), pp. 62, 109.

<sup>496</sup> Idem (2009), pp. 236-39; Srejic (2001), p. 121. Dental tumors and a variety of infections resulting in ante-mortem tooth loss are also encountered, though less regularly.

<sup>497</sup> Jakob (2009), pp. 59-76, 169.

<sup>498</sup> Flohr and Schultz (2009), p. 269.

<sup>499</sup> Dutton (2008), p. 88. 'Beasts' here probably refers to pigs, sheep and goats which are listed in the same chapter of the capitulary. The consumption of equines in the Carolingian and early Ottonian periods is addressed in Part 3. Evidence for such sickness in livestock appears, in fact, to be widely lacking in early medieval texts. Bede observes, in his *Historiam ecclesiasticam gentis Anglorum*, that sick animals were cured at the place where the Northumbrian king Oswald died. He gives one specific example of a horse foaming at the mouth and suffering great pain: (1999), pp. 124-25. The tenth-century Anglo-Saxon *Leechbook* of Bald also refers to circumscribed non-epidemic illnesses in stock: Mays (2002), p. 126. Some evidence is also gleaned from pastoral texts: Filotas (2005), pp. 148, 205, 254, 258, 263, 286.

disease. While palaeopathological assessments of animals in our period are also few, assessments of animals from other pre-modern periods indicate that Carolingian and early Ottonian stock would have suffered their share of chronic conditions. Chronic joint and dental conditions, osteoporosis and osteopetrosis have been diagnosed with some regularity,<sup>500</sup> and remains of ancient and medieval cattle, horses, sheep, goats and pigs have been diagnosed with *M. bovis*.<sup>501</sup>

Textual evidence reveals little about the current of disease underlying episodic outbreaks of disease in Carolingian and early Ottonian Europe. That there was an underlying current of illness, however, is most clear, as both textual and material evidence demonstrate. The available material evidence provides room for speculation about many of the conditions described in texts, but definitive retrospective diagnoses are out of reach. It is relatively sure that an undercurrent of *M. tuberculosis* and *M. bovis* existed throughout our period, in rural and urban sites, with higher frequencies of the former in more densely populated areas, and that some degenerative diseases – namely osteoporosis, periodontal disease and mastoiditis – were common in both humans and their domesticates. However, trends in the occurrence or prevalence of particular diseases and conditions recorded in texts and identified on bones in various regions, let alone across Carolingian and early Ottonian Europe, are unappreciable and previously advanced suggestions about the ubiquity and pervasiveness of some ailments or the general decline of non-pestilential disease in our period should be discarded: that Europeans were

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<sup>500</sup> In her assessment of pathological lesions on 156 bone fragments from cattle, sheep/goats and pigs from early and high medieval Emden (northwestern Germany), Grimm finds that most of the fragments exhibited joint and dental diseases. Of dental diseases, periodontal disease was the most prevalent. Of joint diseases in cattle, degenerative diseases, likely associated to traction and heavy workloads, were most common: (2008); the same conditions have been identified in stock remains from medieval Ireland: Murphy (2005); Gal finds that inflamed joints, osteopetrosis, osteoporosis and rickets were common in high medieval hens from Romania and Hungary: (2008); Brothwell too has identified osteopetrosis in hens from Roman Britain: (2002); Fabis has identified it in hens from Roman northern France and Turkey: (1997); and Martiniakova et al stress that it would have been quite common past animal populations: Martiniakova et al (2008); linear enamel hypoplasia appears to have been common in early medieval pigs from sites in northern Germany and Belgium: Teegen (2002); Davies proposes that linear enamel hypoplasia, osteomalacia, osteoporosis, periodontal disease and rickets would have been common of medieval stock generally: Davies (2002); and several palaeopathologists have also stressed that pre-modern draught cattle sustained a variety of joint diseases on account of their exploitation: for instance, de Cupere et al (2000), Miklikova (2008); lastly, Siegel brings attention to several additional conditions that may have been common, including the inflammatory disorders osteitis, periostitis, arthritis, degenerative joint disease, as well as, for instance, dental caries: (1976), p. 353.

<sup>501</sup> For example, Mays (2002); Bendrey (2008); Bendrey et al (2008); Daroczi-Szabo (2008); Csippan and Daroczi-Szabo (2008).

‘healthier’ after 750 is far from certain. In addition to tuberculosis and the aforementioned bone-altering ailments, there is good reason to believe that a wide swathe of mid eighth-through mid tenth-century peoples suffered blindness and paralysis of varying extents caused, possibly, by a wide range of diseases and conditions. The ramifications of this current of illness, underneath the epidemics and epizootics surveyed next, are considered in Part 3.

### 1.3.1 Malaria

Before moving on to epidemics and epizootics, however, it is necessary to consider malaria in our estimation of the underlying current of disease in Carolingian and early Ottonian Europe. There is a comparatively large body of evidence for fevers in Italy in our period, both individual cases, as we have seen, and epidemics, as detailed in 1.4.<sup>502</sup> Epidemics in *Italia* characterized by *febres* took place in 834, 869 and 877, and in 801 and 877 we hear of epidemics restricted to areas along the Rhine, the latter of which was characterized by *febres* and referred to by contemporaries as ‘*febris Italica*.’ Of the twelve cases of fever in elites,<sup>503</sup> eight are said to have occurred in *Italia*, and there is, as noted, one mention each of cyclical fevers *tertiana febris* and *quartana febris* in southern Europe in Carolingian sources.<sup>504</sup> Several other outbreaks of disease, not adhered symptom-specific labels, also occurred in *Italia* in our period, which may have been characterized by fever.<sup>505</sup> The evidence is hardly enough to provide any meaningful diagnoses of these individual occurrences, but considering recent aDNA studies and the plausible late antique identifications of *P. falciparum* in *Italia*, we may speculate that malaria was indeed endemic in *Italia* and broke out, occasionally, in epidemic proportions.<sup>506</sup>

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<sup>502</sup> On malaria epidemics in modern developing world populations see Patz and Olson (2008), pp. 94-6; McMichael and Woodruff (2008); Maharatna (2002), p. 117.

<sup>503</sup> That is, the eleven cases found in Catalogue 2 in addition to Lando III’s illness discussed above.

<sup>504</sup> Quartan fevers are generally caused by *Plasmodium malaria* and tertian fevers by *P. vivax*. Quartan fevers occur every 72 hours, tertian fevers every 48 hours and quotidian fevers every 24 hours (thus daily). *P. falciparum* can cause death a few hours after the appearance of symptoms (usually chills and fever).

<sup>505</sup> For instance (C.3.33, 90). Most campaigns into Italia in our period seem to be marked by epidemics of disease distinguished by fever.

<sup>506</sup> On the palaeomicrobiology of malaria see Sallares (2002), Sallares and Gomzi (2001), Soren (2003), Bianucci et al (2008b); cf. Taylor, Rutland and Molleson (1997).

There is also a range of evidence from pre-Carolingian early medieval Italy and southern Europe that indicates that epidemics primarily characterized by fevers were common.<sup>507</sup> We possess, in essence, a continuous record of fevers in early medieval southern Europe from late antiquity, when we have biomolecular identifications of *P. falciparum* (see 1.4.2.1.1), to the Carolingian period. While scholars have given much attention to malaria around the ancient Mediterranean basin, particularly Campania, Etruria and Latium, little, beyond claims that the disease remained a constant threat, has been said of the disease in post Roman Europe.<sup>508</sup> Several early medievalists have claimed that malaria was present not only in Italy in our period, but the Mediterranean plains generally as well as in England, and around much of the North Sea.<sup>509</sup> Yet nearly

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<sup>507</sup> In the 580s, Gregory of Tours reports that Merovingian forces were made to retreat from *Italia* on account of outbreaks of disease characterized by fever: Bachrach (1972), p. 61; in the first book of his *Chronicon*, Regino notes that the army of Childebert ‘became greatly worn down with sickness,’ and that this happened because ‘it was summer’ and ‘the army was unused to the unhealthiness of the air’ in *Italia*: Regino (2009), p. 97. Regino takes this from Paul the Deacon; many fevers in *Italia* are also reported in late antique and early medieval hagiographical texts: see n. 438 above; Gregory of Tours’ refers to tertian and quartan varieties, typically interpreted as malaria, no fewer than twenty-five times in his corpus. Other Merovingian writers also report fevers of these varieties: Handley (2003), p. 108. Visigothic texts seem not to speak of *tertiana*, *quartana* or *quotidiana*.

<sup>508</sup> On malaria and ancient Italia see Jones (1907); Sallares (2002).

<sup>509</sup> For example, Duby (1974), 13, 262; Lopez (1976), p. 12; Horden (2000), p. 213; Fowler (2002), p. 254; Sallares (2002), pp. 54, 54 n. 27, 157-58; Devroey (2003), p. 46; Handley (2003), p. 100, 102, 108. Conversely, Squatriti, following Grmek, suggests malaria was dormant in the early Middle Ages, (1998), p. 73 n.16. Dunn (1993), p. 861, states that the history of malaria is obscure following the fall of Rome. Hirsch (1883), p. 229, suggests that malarial epidemics cannot be detected before the sixteenth century. Gallagher (1969), p. 81, thought malaria devastated western forces in the first crusade. Some may have difficulty with the idea that malaria could have been dormant for some five or six centuries in a region in which it was once thought to have been endemic before and after. Grove and Rackham (2001), pp. 76-7, imply that the only serious disease of Mediterranean between the plague pandemics was malaria. They are careful to note, however, that the prevalence of malaria in antiquity is unknown and that it is not certain whether *P. falciparum* was widely present. That the ancient Mediterranean was quite malarial is also widely held: for instance, Schlagenhauf (2004); Sherman (2006), pp. 56-9. Pavesi (2005), p. 10, suggests *P. falciparum* reached the Mediterranean during the first migration of modern humans from Africa, probably carried out by *Anopheles gambiae*. Sallares, Bouwman and Anderung (2004), however, suggest that the distribution of malaria was much slower and occurred later. Biraben suggests that Vikings brought the disease (*P. vivax* specifically) ‘on their backs’ to North Sea coasts (along with its vectors presumably) after raiding towns in northern Africa and Mediterranean Europe. ‘In this way’, Biraben writes, it was established on the Danish, German, Dutch, Belgian, and French coasts whence it spread, along the rivers into the marshy areas further inland.’ Yet Biraben employs no specific textual or material evidence to back up his claim: (1998), p. 345. The supposed connection between malaria dissemination and warfare is an old one and appears to be totally unsupported: Burke (1996), pp. 2255-256. Knotternus proposes that malaria was endemic around the North Sea from ‘at least’ the seventh century. For him, the disease spread northward, not with Scandinavian raiders, but along the ‘warm’ river-banks of the Danube, Rhine and Rhone. Initially, Knotternus states Northwestern marshes would have been ‘invaded by malaria’ by at least the first millennium. Later, he suggests ‘it is very plausible’ that malaria had become endemic in the North Sea basin before 600. Knotternus (2002), pp. 339-40, 344-45.

all of these scholars, in lieu of aDNA or palaeopathological evidence,<sup>510</sup> base their claims on vague but possible written references to malaria,<sup>511</sup> and speculations on the existence of malaria-prone environments.<sup>512</sup> Though the Carolingian and early Ottonian evidence for cyclical fevers is minimal, and though fevers characterize most acute diseases, we may tentatively suspect that malaria, *P. falciparum* and *P. vivax* in particular, was continually present in central and northern Italy, and possibly along the Rhine.

It is impossible to know how widespread malaria was in the Carolingian and early Ottonian periods, or whether it was an ‘awesome power’ along Mediterranean and North Sea coasts.<sup>513</sup> Whether malarial plasmodia were widely disseminated across Europe in or prior to the Carolingian period is also uncertain. *P. falciparum* has been posited to have

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<sup>510</sup> The disease does not cause skeletal lesions. Though see Burke who states, drawing on older work from the 1960s, that the enlargement of the spleen, which is visible in Egyptian remains with preserved soft tissues, as well as skeletal signs on anemic conditions, and an overgrowth of spongy marrow in the skull, can be interpreted as signs of malaria, the latter as an indicator of *P. falciparum*: (1996), p. 2262 n. 40. He also stresses that all of these conditions are present in pre-historic and ancient human remains. I have found nothing in the more recent palaeopathological literature to support this. In fact, many palaeopathologists state frankly that malaria does not leave a mark on the skeleton. A blood-related disorder, common in modern Mediterranean populations, has also been drawn upon as evidence for the pre-modern history of malaria around that sea. Burke presents the argument that the presence of sickle-cell anemia and the G6PD deficiency (which makes individuals more susceptible to lethal reactions to the fava bean, favism) in some modern Mediterranean and African, from regions where malaria is thought to have long existed, is the result of the continuous contact of these populations with plasmodia over centuries and millennia: (1996), pp. 2256, 2261-262, 2263-266; Cf. McCormick (2001), p. 39, who draws on evidence of a malaria-related blood disorder common in populations now living in areas brought under the control of Justinian and argues that ‘malaria surged in the pathocenosis of late antiquity.’ That malaria could have been present in these regions before Justinian is not considered.

<sup>511</sup> Knotternus draws upon statements in the *vitae* of English saints regarding the haunted marshes and remarks of a malaria-like disease in Bald’s *Leechbook* which distinguished between tertian and quartan fevers: (2002), p. 344.

<sup>512</sup> Several authors have thought that in the wake of declining populations and a strong central governmental authority, swamps and wetlands were unmanaged and regenerated, and malaria more rampant. For example, Ell (1993), p. 510; Christie (2006), pp. 488-91. This runs against the ruined landscape theory, which sees fens and swamps generated by silting caused by erosion brought on by deforestation, which of course, is thought to have been widespread in around the Mediterranean basin Roman world. See Grove and Rackham (2001), p. 79. One might question, however, whether malaria’s impact would have been less than before of populations shrank in late antiquity and the first centuries of the early Middle Ages: if there were fewer people would they have necessarily lived in pestiferous landscapes where malaria was endemic? Squatriti notes that flooding, the regeneration of swamps and the creation of new wetlands in late antique and early medieval *Italia* was largely a product of human activity or ‘lack of it.’ Squatriti (1998), p. 69-74; also Christie (2006), p. 490. Likewise, early medieval flooding of coastal areas and rivers was not merely a product of climatic change, but the retreat of active human engagement with coastal, marsh and riverine environments. Horden and Purcell (2000), pp. 326-28, emphasize that changes to wetland environments would not have been sudden, or abrupt ‘shocks’ to surrounding peoples, but slow processes not clearly defined by the common periodization of antique (or late antique) and medieval (or early medieval). Knotternus’ suggestion that malaria was already in the North Sea in the fourth and fifth centuries relies on solely on the supposed collapse of North Sea coastal populations over those centuries.

<sup>513</sup> Sallares (2002), pp. 2, 283-85.



spread very slowly into and through *Italia* in antiquity,<sup>514</sup> and it may be thought, considering the slow rate of the disease's dissemination, that the disease could not have quickly established itself across much of southern and northern Europe in the early medieval period, as Biraben and Knotternus suggest.<sup>515</sup> Malaria's vectors also need be considered. The disease could not have existed without them, and it could not have been widely prevalent without a large population of *Anopheles gambiae* (or other anopheles species such as *A. atroparvus*, *A. labranchiae*, *A. messae*, or *A. sacharovi*). Moreover, to what extent different anopheles populations were susceptible to malaria plasmodia in the early Middle Ages is entirely unclear.<sup>516</sup> In addition to all of this, of course, biomolecular detections of *P. vivax* or *P. falciparum* have yet to be confirmed by independent researchers in independent labs and definitive proof for the existence of the malarial parasites in pre-laboratory Europe (particularly in areas where no biomolecular detections have been made at all) may still be questioned. At present we do little more than suggest that malaria was a part of the underlying current of disease in Carolingian and early Ottonian periods, in Italy and perhaps along the Rhine.

## 1.4 Carolingian and early Ottonian pestilences

### 1.4.1 The nature of the written evidence

The intention here is not to provide a detailed discussion of what the written evidence collected in Catalogue 1 tells us about the temporal or spatial parameters of individual outbreaks of disease, the impact of human and stock pestilences, or the responses humans took to offset outbreaks of disease, but to survey its form and content, establish what information is related and how, in terms of terminology and description, and, in doing so, discern patterns in how Carolingian and early Ottonian authors documented outbreaks of disease. Considerable continuity is ultimately seen in the Carolingian and early Ottonian reporting of human and livestock pestilences. This assessment naturally informs our

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<sup>514</sup> Sallares, Bouwman and Anderung (2003).

<sup>515</sup> It has been suggested malaria's spread across Italia had not fully taken place until c.1000 CE. Sallares, Bouwman and Anderung (2003), p. 318.

<sup>516</sup> Knotternus (2002), p. 344.

reading of individual passages collected in Catalogue 1 and, consequently, the assessment of Carolingian and early Ottonian disease throughout the remainder of 1.4 and Part 3. Surveys of the evidence for human and livestock pestilences in 1.4.1.1 and 1.4.1.2 are followed by a concise summary and an assessment of their implications for this study in 1.4.1.3.

#### 1.4.1.1 Epidemics

There are sixty-four individual passages in Catalogue 1 that refer explicitly to outbreaks of disease in human populations.<sup>517</sup> Most of these passages were collected from annals, though epidemics have on occasion been found in capitularies, *concilia*, correspondence, *gestae*, histories, poetry and *vitae*. There are an additional eleven plausible references to epidemics (C.1.18, 59, 139, 189, 192, 200, 242, 243, 248, 249, 253). These passages refer to human mortalities in the context of subsistence crises, they do not write specifically of *pestilentia* or *pestis*, but of *mortalitas*, and they closely tie the mortalities they relate to hunger. They are considered here as plausible references to epidemics on account of the role epidemic disease can play in food shortages. As discussed in 2.2.1.1.2, excess deaths in subsistence crises are by and large the result of disease, both opportunistic diseases and outbreaks of non-opportunistic diseases fostered by the socio-economic conditions that food shortages spawn. As far as can be discerned, these explicit and plausible references jointly illuminate at least thirty-two individual pestilences. The succinctness and ambiguity of much of the evidence for human pestilence, particularly in concerns to the temporality and spatiality of epidemics, prevents us from establishing an exact number of disease outbreaks. Considerable continuity can be seen in the how Carolingian and early Ottonian authors wrote about human pestilences. In terms of the length of reports, fifty-one of the sixty-four passages, or 80 per cent, are short, comprising a single sentence or less; in fact, twenty-three of these fifty-one passages are no more than a couple words in length. Thirteen passages are longer than a sentence, but no passage is longer than four.

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<sup>517</sup> Note that four passages relevant to this section contained in Catalogue 1 date to the 950s and '60s (C.1.296, 299, 300, 302). These passages are considered here in order to help us establish trends in the how our early Ottonian authors documented pestilences.

Forty-three of the sixty-four explicit references to human pestilences, or 69 per cent, are clearly labeled as such: *pestilentia/pestilens* is employed twenty-one times, *morbus* eight times (C.1.51, 70, 100, 176, 194, 224, 296, 299), *pestis* five times (C.1.194, 204, 263, 269, 292), *lues* thrice (C.1.51, 70, 279), *plaga* twice (C.1.156, 292), *langorus* once (C.1.131), *aegritudo* once (C.1.221), *afflictio* once (C.1.177), *clades* once (C.1.216) and the symptom-specific *febris* six times (C.1.119, 126, 193, 214, 235), *tussis/tussiendo* twice (C.1.132, 263) and *dissinteria* once (C.1.260).<sup>518</sup> The remaining twenty pestilences are referred to simply as a *mortalitas*. Where *mortalitas* is not closely associated to a food shortage, extreme weather, or conflict, it is interpreted, in this study, as an explicit reference to a pestilence.<sup>519</sup> Further, when *mortalitas*, not to mention *pestilentia*, *lues* and like terms, are not associated to a non-human species, as in *mortalitas boum*, but are encountered in a text on their own, it is interpreted as a reference to human deaths.<sup>520</sup> None of this is particularly unusual, but it is necessary to point out this measure of ambiguity in our sources and the problems of interpretation it can cause.<sup>521</sup> For instance, if we keep in mind the place of disease in food shortage mortality addressed in 2.2.1.1.2 how are we to interpret *mortalitas* when we encounter it in the context of a food shortage: did people die primarily of hunger, shortage-related outbreaks of disease or opportunistic diseases? As discussed in 2.4.1.1, no reference to human mortalities in the context of subsistence crises are specified to have been entirely the result of disease, though mortality is reported in the context of food shortages on forty-five occasions.

The majority of the explicit references to pestilences collected in Catalogue 1, 64 per cent, are, thus, employ one of two terms, *pestilentia* or *mortalitas*. Similarly, 65 per cent, or forty-three of the sixty-four epidemics, are identified clearly as pestilences of humans. And here too one term dominates: *homo* is encountered twenty-one times, while

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<sup>518</sup> On occasion one pestilence is referred to twice in a single passage with different terms, which explains why the tally here amounts to 52, not 43.

<sup>519</sup> Fifteen passages in Catalogue 1 clearly relate human mortalities to extreme weather and not disease or hunger (C.1.42, 46, 108, 109, 124, 151, 154, 192, 197, 201, 208, 220, 235, 258, 298).

<sup>520</sup> Cf. Newfield (2009), p. 161.

<sup>521</sup> Historians have long treated *mortalitas* interchangeably with *pestilentia*. In her translation of the *Annales Bertiniani*, for instance, Nelson translated *mortalitas* as pestilence without hesitation, see (C.1.159). Countless similar examples could be provided. From a medieval perspective, however, the two terms have different reference-points. *Pestilentia* refers to causation – corruption of the air – and hence points to the *extent* and *ubiquity* of the outbreak, while *mortalitas* focuses on the *acuteness* of the disease expressed as high mortality.

*humanus* appears four times and *populus* once; remaining pestilences clearly marked as affecting humans are assigned to particular groups of people, such as Bavarians, Magyars or Vikings. Sixteen of the sixty-two explicit references apply a qualifier regarding the magnitude of the pestilence. Two terms predominate here as well: *magna* and *valida* account for 75 per cent of the qualifiers employed. Across the board, little is said about the nature of disease. Only sixteen passages, or 26 per cent, give any indication of symptoms, and most indications take the form of brief, single-word qualifiers. Six, or 38 per cent, of the epidemics assigned some indication of symptoms, are said to have been characterized by *febris*; two are distinguished with *tussis* and another with *dissinteria*. Two other pestilences are also said to have been characterized by diarrhea and other bowel-related symptoms that we may associate to *dissinteria* (C.1.100, 176). We also read of blindness and insanity (C.1.140, 176) and ‘swelling of the head’ (C.1.260). Other symptoms are marked by considerable vagueness: we read of sores (*menbra/scabies*) (C.1.156, 176) and ‘swollen blisters’ (*vesica turgentis*) (C.1.156), as well as diseases causing ‘physical illness’ (*molestia corporis*) (C.1.147) and ‘diverse ailments’ (*diversis afficiens*) (C.1.269). One epidemic is said to have caused wounds of fire (*ignis plaga*) (C.1.292), and another people’s limbs to dissolve (*menbra dissoluta*) (C.1.156). Less is said about epidemiology, though some attention is given to mortality in twenty-seven of the sixty-two passages. Most references to mortality are general: we read of ‘many people’ or ‘countless people’ dying (C.1.89, 108, 126, 132, 178, 204, 214, 222, 235, 269, 292, 300), and regions or armies being ‘severely stricken’ (C.1.100, 140, 176, 193, 194, 205, 209, 221, 223, 260, 263, 296, 299). In total, twelve individuals, ten secular and religious elites, and one peasant, are specified as dying in a pestilence (C.1.147, 149, 194, 223, 263, 269, 300). No specific mortality count, or approximate death toll, is provided in any explicit reference to a pestilence, and only one vague estimate is encountered: the *Annales Fuldenses* notes that ‘nearly a third of the population’ of *Gallia* and *Germania* died in 874 through *pestilentia* and *fames* (C.1.209). No other mortality-related information can be gleaned from the texts, though the *Annales regni francorum* specifies that people of ‘both sexes and all ages’ died in the epidemic of 823 (C.1.108). No passage directly addresses morbidity, though three passages vaguely identify some people, who presumably fell ill, as surviving (C.1.126, 140, 260). Other passages also

indirectly reveal that some of those afflicted with disease did not die (C.1.100). Of course, it is safe to assume that if ‘many people’ died, ‘many people’ fell sick.

Thirty passages speak to an epidemic’s spatiality. More often than not, the spatial parameters given are non-specific: we read of an outbreak of disease at a monastery founded by St. Boniface (C.1.78), Fulda (C.1.79), St. Denis (C.1.176) and the Church of Mary in Paris (C.1.292), of outbreaks in the towns of Mainz (C.1.159), Piacenza (C.1.193, 194), Meaux (C.1.234), Rheims (C.1.269) and Paris (C.1.292), and of outbreaks in the regions of Upper Pannonia (C.1.100), Turenne (C.1.126), *Bavaria* (C.1.222), *Gothia* (C.1.260) and *Burgundia* (C.1.296). More often, however, we read of pestilences spreading through or affecting all, or parts, of the larger territories of *Francia/Gallia* (C.1.27, 28, 29, 30, 68, 69, 108, 209, 263, 296, 300) and *Germania* (C.1.68, 69, 209, 214, 263, 300). Some spatial parameters are incredibly ambiguous. For example, we read of one pestilence affecting ‘certain places’ (C.1.74) and another spreading ‘here and there’ (C.1.235). Fewer temporal parameters are provided: there are two references to epidemics in August (C.1.193, 194), one in October (C.1.269) and another shortly following Christmas (C.1.159). Fourteen of the sixty-two passages, or 23 per cent, refer to causation. Eight of these assign pestilences to anomalous weather (C.1.68, 69, 80, 81, 101, 103, 104, 126), four to the judgment of God (C.1.140, 176, 177, 193) and two to the putrefaction of organic substances, locusts (C.1.204) and humans (C.1.221). Fifteen of the sixty-two pestilence passages, or 24 per cent, illuminate outbreaks of disease associated, in some way, to conflict, namely sieges and armies on the march (C.1.51, 100, 119, 126, 140, 176, 193, 194, 205, 214, 221, 222, 260, 296, 299). Very few passages, a mere 5 per cent of the total, address the consequences of pestilences and the mortality they brought on, and all three that do (C.1.126, 205, 296) speak only of the effects pestilential mortalities had on military affairs. Similarly, only five passages devote time to the human response to outbreaks of disease. Here focus too centers on few issues: almsgiving, fasts and prayers (C.1.73, 110, 178, 292), and the attention of doctors (C.1.147).

#### 1.4.1.2 Epizootics

There are thirty-five explicit references in Catalogue 1 to livestock pestilences and one plausible reference.<sup>522</sup> Most passages have been taken from annals, though epizootics have also been found in *concilia*, *gestae*, histories, poetry and *vitae*. These entries, as far as can be discerned, illuminate between ten and thirteen individual livestock pestilences.<sup>523</sup> Most often Carolingian and early Ottonian authors wrote simply of a mortality of stock, employing *mortalitas* rather than a more specific term for disease, such as *pestilentia*, *lues*, *morbis* or *pestis*. In fact, twenty of these thirty-five animal pestilences are labeled *mortalitas*, eleven *pestilentia*, two *lues*, two *pestis* and one *extincta*.<sup>524</sup> As indicated above, it is not assumed that *mortalitas* universally refers to an outbreak of disease. On occasion, as demonstrated in 1.4.3 however, livestock deaths ambiguously described by one author as a *mortalitas* are described by another in disease-specific terms. Moreover, livestock deaths labeled *mortalitas* can rarely be said to have stemmed from a period of dearth, and weather-related stock mortalities, of which there are ten (C.1.108, 111, 131, 197, 208, 212, 219, 227, 241, 258), are all clearly labeled as weather-related mortalities. Thus, with periods of extreme weather and food shortage removed from consideration, it seems reasonable to consider *mortalitas* and *pestilentia*, at least in most cases, as synonyms.

There is, thus, significant continuity in the thirty-six terms used to label the thirty-five references to Carolingian and early Ottonian livestock pestilences: *mortalitas* accounts for 56 per cent of terms used to label epizootics and *pestilentia* 31 per cent, while *lues*, *pestis* and *extincta* together account for the remaining 13 per cent. Continuity is also seen in the length of passages. Most are short: sixteen, or 46 per cent, of passages that refer to an animal pestilence cannot be said to comprise a single sentence, several being no more than a couple of words in length, and nine, or 26 per cent, are one sentence in length. Eight passages are two to four sentences in length, and only two passages, or a mere 5 per cent of the total, are longer. Not only are reports of livestock pestilences brief but animal mortalities that are assigned a qualifier are assigned one of two: of those seven, or 20 per cent, of the pestilences that are assigned a qualifier, 71 per

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<sup>522</sup> (C.1.279). On the ambiguity of this passage see 1.4.2.1 and 1.4.2.2.

<sup>523</sup> As with epidemics, the evidence for epizootics is not sufficient to allow a concrete tally.

<sup>524</sup> Note that one passage refers to a stock plague twice with different terms, hence the total here of thirty-six.

cent are assigned a term derived from *magna* and 29 per cent stem from *immensa*. Similarities between passages are also clearly seen in regard to the recording of symptoms and epizootiology. Little is said about the symptoms sick animals exhibited. Only one reference (C.1.86), representing 3 per cent of the passages, notes that animals ‘showed the signs of the dreadful pestilence’ (*signa pestis*) and that the sick were ‘emaciated’ (*macies*). Little is also said about mortality. The Poeta Saxo notes that nine tenths of Charlemagne’s equines succumbed to disease in 791 (C.1.50) and the *Annales regni francorum* that all cattle to the last head perished in 810 (C.1.87). We also read that an epizootic in 878 caused ‘many deaths’ of cattle (C.1.215) and that few cattle survived the pestilence of c.939/42 (C.1.284). Aside from these references, Notker Balbulus refers to the death of fifty pairs of oxen in the panzootic of c.809/10 (C.1.92).<sup>525</sup> Considering the attention devoted to mortality, it is not surprising that nothing specific or general is said about morbidity.

Rough, let alone precise, temporal parameters to epizootics are also not given, though on occasion it is possible to deduce from other evidence, or the context in which a stock pestilence is reported, when within a particular year disease plausibly irrupted among animals; it may even be possible to discern the temporal parameters of the dissemination of the particularly well-documented pestilences of c.809/10, c.868/70, c.939/42. This is explored in 1.4.3. Spatial parameters are given 40 per cent of the time, or in 14 passages. Some of these parameters are rather specific: disease in animals is reported for northwest Hungary (C.1.50), along the river Rhine (C.1.69), in the provinces of Noricum (C.1.86) and Worms (C.1.215), and in the northern Apennines (C.1.250). Most spatial parameters, however, are rather vague: nine passages, or 64 per cent, of the passages that refer to spatiality speak ambiguously of entire territories, kingdoms or the whole Frankish empire. One of these simply states that disease spread westward across Europe (C.1.85), another that all of Europe was affected (C.1.89), and three others note that animals across much of the Frankish empire fell sick (C.1.87, 101, 103). *Francia/Gallia* and *Germania* are each thrice said have been widely afflicted (C.1.69, 195, 215, 216, 284), *Burgundia* is specified once (C.1.284), and the eastern regions of the *Slavi*, *Dalmatae*, *Soavi* and *Bohemi* are implied to have been hit in 878 (C.1.216).

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<sup>525</sup> The reliability of this passage is discussed in 1.5.1.

The mass of the references to livestock mortalities either refer specifically to ‘cattle’ or vaguely to ‘animals.’<sup>526</sup> Of the thirty-five passages, 54 per cent concern cattle, 40 per cent animals, and the remaining six per cent, or two passages, equines. One pestilence, that of 887, is said to have afflicted cattle and sheep. Of cattle, the ox (*bos/jumentum*) is specified 83 per cent of the time, cattle (*peccus/pecus*) taking up the remaining 17 per cent.<sup>527</sup> Of equines, both passages (C.1.50, 250) refer specifically to the horse (*equus*). The predominance of cattle, oxen specifically, no doubt stems both from the high position of cattle, the ox especially, in the Carolingian and early Ottonian agrarian economy, as discussed in 1.5. It is certainly not improbable, considering the importance of cattle, that most references to pestilences among ‘animals’ are, in fact, references to cattle pestilences. This is supported by the fact that some outbreaks ambiguously labeled *pestilentia animalium* can be associated firmly with outbreaks other authors clearly label *pestilentia boum*, as demonstrated in 1.4.3. As the horse, the primary military animal, took a back seat to the ox and cattle, agriculturally speaking, throughout most of the Middle Ages it should come as no surprise that both documented equine pestilence in Catalogue 1 are set in the context of a campaign.<sup>528</sup>

The scarcity of references to disease among equines, not to mention the complete dearth of references to diseases of other domesticates, notably goats, pigs, poultry and sheep (the one reference to *oves* aside), and undomesticated animals, may also owe to the relative infrequency or total non-occurrence of major outbreaks of disease among these animals. In later periods when evidence for livestock disease is far more dense, as in the eighteenth century, we clearly see that while outbreaks of disease among these domesticates did occur in the past, regional let alone major trans-boundary pestilences are not known.<sup>529</sup> Even English manorial accounts, which are most numerous from

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<sup>526</sup> The mass of late antique and early Byzantine references to animal mortalities too refer to cattle: Stathakopoulos (2004), p. 162.

<sup>527</sup> I find it unlikely that *bos* and *pecus* would have been employed indiscriminately. That *jumentum* can be reliably translated as ox is supported by the discussion here and in 0.1.4.1.1 about the role of the ox in traction in the early Middle Ages.

<sup>528</sup> In the course of the twelfth and thirteenth centuries, the horse came to dominant traction in some regions of the Low Countries and south-eastern England. The transition, however, was slow and not universal. The literature on this topic is now expansive, see relevant discussion in 0.1.4.1.1.

<sup>529</sup> The wealth of work on cattle panzootics and epizootics in the eighteenth and nineteenth centuries illustrates this. See, for instance, Wilkinson (1992). For all their shortfalls, various ‘catalogues’ of historical livestock disease occurrences, such as Fleming (1871), also demonstrate this point.



c.1270 to c.1450, and which allow us to discern outbreaks of disease in livestock on manorial farms with considerable detail, demonstrate clearly that in this period no major English outbreak of disease occurred among non-bovine animals, while at least one cattle panzootic, in addition to more regional bovine epizootics, can be discerned.<sup>530</sup> Though non-bovine domesticates were important for mid eighth- through mid tenth-century agrarian economies, contacts between like non-bovine animals in Carolingian and early Ottonian Europe were undoubtedly less frequent and of shorter distances. As live goats, pigs, poultry and sheep trekked less to pastures and markets, did not regularly accompany armies on campaign, or transverse regions, they would presumably have been less exposed to the virulent and communicable diseases that attracted the attention of our authors.<sup>531</sup> We may suspect that local epizootics and an underlying current of enzootic disease went unreported, as proposed in 1.3. Our writers were clearly more interested in the spectacular. Furthermore, that cattle were, economically, the most valuable stock of the period, representing the biggest investment on a head by head basis, would make large die-offs of them all the more noteworthy.<sup>532</sup> There may also be a coinciding cultural explanation for the predominance of cattle in Carolingian and early Ottonian reports of livestock disease. As Carolingian and early Ottonian writers regularly turned to classical authors for inspiration, it may be of some consequence that classical and late antique authors appear to mention cattle more regularly than any other domesticate.<sup>533</sup> Indeed, if

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<sup>530</sup> See Newfield (2009); Slavin (2009, 2010); Slavin pers. corresp. 10 August 2010. This too may account of the dearth of references to disease in non-domesticates, not to mention fish.

<sup>531</sup> There may have also been, for all we can tell, fewer acute and communicable pathogens of non-bovine animals in Carolingian and early Ottonian Europe. Avian and swine influenza, as known to modern science, may be highly contagious in birds and swine but if live infected birds or pigs are not regularly transported between farms and markets, and put into contact with like animals, widespread outbreaks are very unlikely to occur: [www.who.int/mediacentre/factsheets/avian\\_influenza/en](http://www.who.int/mediacentre/factsheets/avian_influenza/en). Jordan notes that pigs, as far as medieval sources indicate, are ‘amazingly resistant to disease:’ (1996), p. 55. We can add that pigs reproduce comparatively rapidly and are less expensive, making mortalities of them, quite possibly, less noteworthy.

<sup>532</sup> That our authors were interested in the spectacular is certain enough. Clearly, if one of the *Annales regni Francorum* annalists or Widukind witnessed the death of a few sick chickens the mortality went undocumented. The total absence of any reference to chronic or isolated episodes of stock disease supports this point.

<sup>533</sup> MacKinnon (2004), p. 86. MacKinnon speaks specifically of Roman agronomists but his observation has wider relevance.

a classical or late antique author reported an epizootic, he almost universally reported a cattle pestilence.<sup>534</sup>

Several passages, 37 per cent of the total, reference livestock and human pestilences in conjunction with one another; some document livestock and human deaths as though they occurred simultaneously and that they were, in fact, the product of one outbreak of disease, as *pestilentia hominum et animalium* (C.1.69, 89, 101, 103, 110, 115, 185, 186, 187, 215, 216, 217, 216). Whether the Carolingian or early Ottonian author intended in these instances to document a zoonose is unclear.<sup>535</sup> In any event, it is quite unlikely that any of these eleven passages refer to a zoonose. It is certainly not improbable that humans and livestock deaths were unrelated, the result of different pathogens, as no zoonose known to modern science is capable of disseminating rapidly and causing a significant mortality in both humans and a domesticated animal population; anthrax should certainly not be thought the source of death in these eleven passages.<sup>536</sup> Large outbreaks of disease among livestock and humans also cannot be discerned via analysis of English manorial accounts, which reveal disease in stock, and contemporary textual sources, which reveal disease in humans. Of course, for reasons articulated in 1.2.1 and 1.2.2, this is not definite proof that these Carolingian and early Ottonian passages do not refer to zoonoses. I would suggest, however, that the reporting of human and livestock pestilences in close succession, or as if both humans and livestock died from one plague, was simply a product of how these phenomena were documented: most of these references are very succinct and in each case the author is clearly not concerned with describing the events in any detail; documenting multiple phenomena that occurred throughout a year and were causally unrelated was also not uncommon;<sup>537</sup> and, furthermore, two of the longer passages, which cannot so easily be

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<sup>534</sup> A survey of several ‘catalogues’ that list multiple pre-Carolingian outbreaks of disease among stock demonstrates this point clearly. See, for instance, Fleming (1871), pp. 1-43, and Spinage (2003), p. 82.

<sup>535</sup> Of course, pre-modern Europeans did not share our notion of zoonose, though there were biblical and classical precedents for the idea that a pestilence could affect all living creatures.

<sup>536</sup> See the discussion on working diagnoses in 1.5.4.2. Anthrax ‘outbreaks’ are localized in occurrence, as the bacterium is not spread via the respiratory but digestive tract. Spores of the pathogen can survive in the environment for extended periods of time (decades), but they prefer particularly alkaline soil. There are no documented cases of human-to-human transmission. Essentially, for anthrax to cause a large or regional pestilence, a large quantity of the bacterium would have to be simultaneously present across the entire region. See [www.who.int/mediacentre/factsheets/fs264/en/](http://www.who.int/mediacentre/factsheets/fs264/en/); Spinage (2003), p. 85.

<sup>537</sup> This is clear in wide array of sources, including annals, capitularies, correspondence, histories poetry and *vitae*. See, for example, (C.1.74, 86, 108, 110, 115, 131).

taken as evidence of a zoonose, clearly disassociate stock and human mortalities (C.1.115, 216). Moreover, as discussed in 1.4.3, while some sources appear to reference an outbreak of a zoonotic disease, others that document the same mortality speak only of bovine deaths. Further, of the extreme weather events said to have caused stock mortalities collected in Catalogue 1, 50 per cent are said to have resulted in human deaths. It seems there was pattern of bundling deaths of humans and non-human animals (C.1.108, 111, 197, 208, 258). Other passages that refer to the simultaneous deaths of cattle and other animals and that imply the presence of a disease that could afflict multiple species, should also be treated with caution.<sup>538</sup> For instance, the pestilence of 810, which is labeled in the *Annales Xantenses* (C.1.90) as a *mortalitas boum et aliorum animalium*, is clearly documented in a number of other texts to have afflicted bovines alone; Agobard of Lyon makes this point quite clear (C.1.88). Though not contradicted by other evidence, the reference in the *Annales Fuldenses* (C.1.232) to a pestilence of sheep and cattle too should be considered carefully, as detailed below.

We can also speak to causation, effect and response, as reported in the sources. Fourteen passages include a remark of causation or at least imply causation. All but one relate livestock pestilences to extreme weather. Most of these, 57 per cent, associate the pestilence to a hard winter (C.1.165, 166, 167, 232, 271, 272, 273, 274, 275, 276), four, or 29 per cent, assign epizootics to heavy rains and flooding (C.1.101, 103, 250, 280), and two passages to humidity and uncharacteristically mild weather (C.1.69, 103). The one passage that does not relate livestock disease to weather or climate is that of Agobard (C.1.88). Only five passages, 14 per cent of the total, refer explicitly to some sort of consequence. Of these, three note that the pestilence in some way disrupted a campaign (C.1.87, 92, 250), another speaks generally of the ‘irretrievable loss’ the pestilence brought many, and another notes that dogs disappeared after consuming the flesh of animals that succumbed to disease. Twelve passages, or 34 per cent of the total, vaguely relate a livestock pestilence, most often of cattle, to a poor harvest (C.1.101, 103, 115, 131, 185, 186, 187, 195, 218, 258, 270, 284). Never is a bovine or animal pestilence directly identified as a cause of shortage, but on these twelve occasions pestilences are

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<sup>538</sup> As I have indicated elsewhere, it seems to have been a common motif to write of simultaneous deaths of a range of species: Newfield (2009), pp. 181-82. 33 per cent of weather-related stock deaths collected in Catalogue 1 are also said to have affected another domesticated.

related in tandem with reports of failed harvests, implying that the two may have been related, which in pre-industrial agrarian economies in which the domestic bovine occupied a central place is not unlikely. Only four texts mention any sort of human response taken to absorb the loss of animals. Two (C.1.86, 215) describe measures taken to dispose of sick and dying cattle, notably the removal of sick and dead animals from their stalls, and the culling of ill animals with swords. Another (C.1.250) notes that foodstuffs were packed on the backs of cattle after horses succumbed to disease in 896 and another (C.1.110) concerns Louis the Pious' call for fasts, prayers and almsgiving in order to placate God and quell the cattle pestilence and food shortage of the early 820s.

#### 1.4.1.3 Summary and implications

Carolingian and early Ottonian authors were clearly not concerned with documenting epidemics or epizootics in much detail. Of course, several passages pertaining to human pestilences display unique features, and some, such as the reports of the pestilences of 857, 865 and 877 in the *Annales Xantenses*, *Annales Bertiniani* and the *Annales Fuldenses* respectively (C.1.156, 176, 214), provide descriptions of symptoms not often or ever encountered in other early medieval texts.<sup>539</sup> Some passages provide insight into the responses taken to curb the spread of disease and others provide specific and unique spatial and temporal parameters. Likewise, several passages concerning livestock disease collected in Catalogue 1 display distinctive features, and a couple, such as the Poeta Saxo's description of the c.809/10 cattle panzootic (C.1.86), are more verbose than any other early medieval description of livestock disease.<sup>540</sup> Some passages provide insight into the responses taken to curb the spread of disease among stock in the early Middle Ages not found elsewhere, and others provide specific spatial parameters and describe theories of causation not read of in other early medieval sources. Yet the similarities between reports of both human and livestock pestilences far outweigh the differences.

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<sup>539</sup> For instance, the *Annales Xantenses* writes of an epidemic disease characterized by festering sores and the withering or dissolving of limbs, the *Annales Bertiniani* records an epidemic disease characterized by a skin rash (*scabies*) and diarrhea, and the *Annales Fuldenses* reports an epidemic disease referred to as 'Italian fever' and characterized by eye pain.

<sup>540</sup> The poet not only reports the bovine epizootic but comments on its spatial contours and the methods farmers employed to deal with the disease. This passage is explored in Part 3.

Indeed, sections 1.4.1.1 and 1.4.1.2 point not only to a lack of concern for detail but to a considerable degree of continuity in the reporting of outbreaks of disease.

Continuity is seen on several fronts. In regard to the reporting of epidemics, most passages are short in length and contain very little or no information about human responses to pestilences, let alone consequences (other than excess mortality), symptoms or epidemiology, including, for instance, morbidity and the temporality of pestilences.<sup>541</sup> Most disease outbreaks are labeled with one of two terms (*pestilentia* or *mortalitas*), are said specifically to have afflicted humans, and the majority of the pestilences that are assigned any sort of qualifier are assigned one of two (*magna* or *valida*). Further, those passages that do refer to causation, mortality and spatiality do so in a very similar manner. Much the same can be said about epizootics. Most are labeled with one of two terms (*pestilentia* or *mortalitias*), address cattle (*bos* especially) or *animalia*, and those that are assigned a qualifier are assigned one of two (*magna* or *immensa*). The majority of passages overlook the consequences of stock pestilences not to mention human responses, symptoms and epizootiology, including, for example, mortality, morbidity and the temporality of pestilences. Moreover, most of those passages that address spatial parameters do so in very general terms, and those passages that address causation or relate stock pestilences to food shortages or human mortalities do so in a very similar manner.

This degree of continuity in the reporting of both human and livestock pestilences suggests that there was a loosely or informally established paradigm that guided the documenting of pestilences in the Carolingian and early Ottonian periods, patterns of reporting that determined what was worth reporting and how it should be reported, what can almost be described as a predetermined language and method for the documenting of pestilences. Recognition of these patterns demonstrates plainly that individual entries cannot be read in isolation. Indeed, the high degree of congruence between individual reports of pestilences means that very few pestilences carry any real sense of individuality, which, of course, detracts from what we can possibly learn about individual pestilences from individual texts. The high degree of congruence between passages

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<sup>541</sup> As such, our evidence is, by and large, quite unlike that used by Stathakopoulos (2004), in terms of the length and verbosity, in order to articulate the epidemics of early Byzantium.

prevents us from reading too much into silences and extrapolating heavily from what little is documented. For instance, a *magna pestilentia*, whether of humans or cattle, should not be thought of as extraordinary, nor the assigning of human or livestock pestilences to extreme weather, or the general lack of any indication of the impact of outbreaks of disease or the human responses to pestilences, or symptoms or epidemiology of diseases. Pestilences should certainly not be thought, on account of the nature of written evidence alone, to have been often or universally asymptomatic, regularly or directly tied to extreme weather or ‘great’ in terms of extent and/or impact. It should also not be thought, on account of the nature of written evidence, that pestilences were of little consequence or that humans did little to combat them. Additionally, for example, it is important to recognize that the concentration on cattle in reports of epizootics, and the setting of equine pestilences in the context of military affairs, may simply be a product of how livestock disease was reported and not an indication that non-bovine stock were free of epizootic disease or that outbreaks of disease among horses occurred solely in the context of campaigns.

Closer attention to the recording of human and livestock pestilences in individual texts further demonstrates how alike most outbreaks appear and emphasizes our inability to read too much into extant passages, as some authors, or texts, record different pestilences in very similar terms. For example, the common language of livestock disease in our sources – *bos*, *animalia*, *mortalitas* and *pestilentia* – is encountered in the texts that document multiple stock pestilences and texts they seem to have influenced: both stock pestilences in the *Annales regni francorum* are labeled with *boum pestilentia* (C.1.87, 101), as are all four references in the *Annales Fuldenses* (C.1.103, 195, 215, 232), and entries in the *Annales Xantenses* and *Annales Laurissenses minores* for the c.809/10 panzootic (C.1.89, 90), which are at least partially dependent on the *Annales regni francorum*, also refer to *boves*; the reference to an epizootic in the *Annales Fuldenses* in 820 (C.1.103), which does not seem to be totally independent of *Annales regni francorum*’s account of the same pestilence (C.1.101), refers to a *pestilentia boum*, and the Astronomer’s report of a livestock pestilence c.823 (C.1.110), which may be dependent on the same entry in the *Annales regni francorum*, also employs *pestilentia*; interdependent passages in the *Annales Alamannicorum continuatio Sangallensis prima*,

*Annales Weingartenses* and *Annales Sangallenses maiores* use the same language in documenting the stock pestilences of c.860 and c.868/70, *mortalitas animalium/animantium* (C.1.165, 166, 167, 185, 186, 187); and the reference in the *Petri bibliothecarii historia francorum abbreviate* to the cattle pestilence of 878, which is at least partially dependent on that of the *Annales Fuldenses*, speaks, like the *Annales Fuldenses*, of a *boum pestilentia* (C.1.215, 216); similarly, though the interconnections between these texts are harder to discern, the *Annales Colonienses*, *Annales capituli Cracoviensis*, *Annales Sangallenses maiores*, *Cronicon Suevicum universale*, Flodoard of Rheims and Adalbert of Magdeburg all label the c.939/42 cattle panzootic *mortalitas* (C.1.271, 274, 275, 281, 282, 284, 285); likewise, four of the five epidemics encountered in the *Annales regni francorum* are labeled *pestilentia/pestilens* and are said to be the product of extreme weather (C.1.68, 80, 101, 108), and texts quite possibly dependent on the *Annales regni francorum* for these pestilences of 801, 808, 820 and/or 823, namely the *Annales Fuldenses*, *Annales Lobienses*, *Annales Xantenses*, *Einhardi annales* and *Herimanni Augiensis chronicon* (C.1.69, 81, 82, 103, 104), also employ *pestilentia* and assign these outbreaks to extreme weather. Similar observations could be made about the recording of human pestilences in the *Annales Bertiniani*, *Annales Fuldenses*, *Annales Xantenses* and Bavarian continuation of the *Annales Fuldenses*.

We can press further. If the common features of pestilence reports are encountered in major texts that document multiple outbreaks, and the texts they influenced, the rare features of pestilence reports identified in 1.4.1.1 and 1.4.1.2 are, naturally, regularly encountered in texts that document only one or two outbreaks. For instance, the only epizootic reported in the revised *Annales regni francorum* is an equine pestilence, which is itself unusual, and the pestilence is labeled *lues* as opposed to the far more common *mortalitas* and *pestilentia* (C.1.50). The only other reference to an equine pestilence is found in the Bavarian continuation of the *Annales Fuldenses* which refers to no other occurrence of non-human disease (C.1.250). The Poeta Saxo utilized *lues* and *pecus* in his sole reference to a livestock pestilence (C.1.86), and in the only reference to a stock pestilence in the *Annales Lobienses* we also find *peccus* (C.1.69). The lone appearance of *extincta*, and one of the two usages of *pestis* in a reference to an epizootic, are found in Notker's sole reference to a livestock pestilence (C.1.92), the second

employment of *pestis* is encountered in the *Herimanni Augiensis chronicon*'s only reference to a livestock pestilence (C.1.276), and the third, and last, usage of *peccus* is found in the sole report of an epizootic in the *Folcwini gesta* (C.1.217). These are but a few examples. The point, though, is clear enough: there are not only multiple features common to most reports of disease outbreaks, but individual authors/texts regularly documented pestilences in like terms, stripping them of their uniqueness and individuality, and, ultimately, limiting what we can possibly reconstruct of the disease history of Carolingian and early Ottonian Europe.

Lastly, we may note the lack of interest some texts/authors had in pestilences, whether of humans or livestock. Most notable, perhaps, is the dearth of outbreaks in the first section of the *Annales regni francorum*, one of the chief sources for mid and late eighth century Carolingian history.<sup>542</sup> The first human pestilence reported in this text comes in 801, the first livestock pestilence in 810 (C.1.68, 87). Multiple other texts, however, document epidemics the *Annales regni francorum* clearly overlooked: the *Annales Laureshamenses*, *Annales Augienses*, *Annales Sangallenses maiores* and *Chronicon Moissiancense* all report a *mortalitas* in the late 770s that likely refers to a human mortality caused by disease (C.1.37, 38, 39, 40), the *Annales Laureshamenses* and *Fragmentum annalium chesnii* report another *mortalitas* in the mid 780s likely the product of disease (C.1.45, 46), the Poeta Saxo writes of a pestilence (*lues*) consuming some of Charlemagne's legion in the early 790s (C.1.51), the revised version of the *Annales regni francorum* records an equine pestilence in the early 790s (C.1.50), the *Annales Lobienses* documents a cattle pestilence in 801 (C.1.69), and the *Chronicon Moissiancense* and Poeta Saxo document a bovine epizootic in 809, though this pestilence is very likely that same that documented in the *Annales regni francorum* documents in 810 (C.1.85, 86).

Other texts/authors overlook disease as well. For instance, the revised *Annales regni francorum* overlooks the aforementioned human mortalities of the late 770s and mid 880s, as well as the cattle pestilence of 801,<sup>543</sup> Regino of Prüm overlooks several

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<sup>542</sup> Several of the main sources for eighth century Frankish history mention nothing about pestilence. For example, the *Liber Historiae Francorum* fails to document any outbreak of disease in the first half of the eighth century, let alone the seventh century.

<sup>543</sup> The revised *Annales regni francorum* stop in 801: McKitterick (2008), pp. 27, 32.



human and livestock pestilences of the late ninth century and early tenth century that others record, Adalbert of Magdeburg neglects to mention several outbreaks of disease affecting humans encountered in other texts, and the major contemporary sections of the *Annales Bertiniani* (830-881), *Annales Vedastini* (873-900) and *Annales Xantenses* (832-873) all fail to report livestock pestilences that appear in other sources, as is discussed on a case by case basis in 1.4.2. The omission of outbreaks is also typical of the *vitae* of Charlemagne and Louis the Pious composed by the Astronomer, Einhard, Ermoldus Nigellus, Notker Balbulus and Thegan. It is apparent too that several sources, such as the *Annales Xantenses*, *Annales Vedastini* and Widukind of Corvey's *Res gestae Saxonicae*, that do regularly document epidemics do not document all epidemics.<sup>544</sup>

Attention needs also to be drawn to the larger holes in the evidence base. Most notably, the mass of the extant material concerns northern Carolingian and Ottonian Europe. Additionally, evidence for human pestilences is scant or non-existent from the 750s through the 760s, in the 820s and '30s, and from 890 through the mid 920s, and evidence for epizootics is non-existent from the 750s through the 780s, and slim from the 790s through the first decade of the ninth century, not to mention the 820s through the 850s. Evidence for outbreaks of disease in the context of conflict is also very scant prior to the 830s. These observations serve to emphasize that we must treat the extant evidence for pestilences collected in Catalogue 1 as representing the bare minimum occurrence of pestilence in mid eighth- through mid tenth-century Europe. Certainly, we should not expect all Carolingian and early Ottonian authors to have taken an interest in human or livestock pestilences, even temporally and spatially great outbreaks of disease that caused considerable mortality could have been unrecorded. Of course, it cannot be supposed that epidemics were not reported in, for instance, the 750s, '60s, 890s or early 900s, that animal pestilences were not recorded in the 750s, '60s, '70s and '80s, or that conflict-oriented outbreaks of disease were rarely reported prior to 830s, on account of the fact that they did not occur. Yet it cannot also be assumed that epidemics, epizootics and conflict oriented pestilences did occur or were common in these periods. While

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<sup>544</sup> Other major texts, such as the *Historia Remensis ecclesiae* of Flodoard of Rheims, also overlook outbreaks of disease. Why some authors would overlook disease is unclear. Recognizing that they did, however, prevents us from reading too much into the silences and assuming that the absence of pestilences in any text over a given period of time does not necessarily reflect an absence of pestilences on the ground.

consideration of mid eighth- through mid tenth-century evidence for areas outside of *Francia* and *Germania* in 1.4.2, and the ubiquity of disease in military affairs, especially sieges, made apparent in a wider selection of sources, provides some insight, we simply cannot know how common peacetime or conflict-oriented pestilences were in these poorly documented Carolingian and early Ottonian decades.

#### 1.4.2 Carolingian and early Ottonian pestilences in time and space

The intention here is to map mid eighth- through mid tenth-century pestilences in time and space as well as possible. Possible diagnoses of these pestilences are also given for heuristic purposes explored in 3.4, following the guidelines and considerations laid out in 0.1.6.3, 1.2.1 and 1.2.2; and some attention is given to evidence for mid eighth- through mid tenth-century malaria in northern *Italia*. Carolingian and early Ottonian sources, as well as contemporary sources from outside of Carolingian and early Ottonian Europe, are employed.

A few observations are necessary both about the organization of this section and what we can gain from the use of sources contemporary to our period but from outside Frankish and Ottonian Europe. Epidemics are considered in chronological order in 1.4.2.1 and epizootics in 1.4.2.2. Outbreaks are not divided and addressed thematically for several reasons. For example, conflict-oriented and peacetime pestilences are not considered in isolation of one another, as pestilences from both categories are sometimes reported in the same year and it cannot be said definitively in any instance that conflict and peacetime pestilences that are reported in the same year were unrelated. Likewise, pestilences associated to subsistence crises are not considered in isolation from non-shortage epidemics, as it is not definitively certain in any instance whether a pestilence reported in conjunction with a *fames* was strictly speaking the result of conditions engendered by a food shortage and/or limited to the area afflicted by the shortage. Lastly, what we might deem ‘poorly documented’ and ‘well documented’ outbreaks are not addressed in isolation from one another, for to bundle outbreaks into these categories would only serve to further obscure the uniqueness of individual pestilences and prevent us from establishing what further information about their contours we can gather from

the primary sources. After all, the written sources themselves, as stressed in 1.4.1.1 and 1.4.1.2, rarely provide detailed indications of the extent of the pestilences they record.

In regard to the use of non-Carolingian and early Ottonian sources, it need be noted that our understanding of mid eighth- through mid tenth-century pestilence has improved little despite the range of texts considered from areas outside *Francia* and *Germania*.<sup>545</sup> To begin, few non-Carolingian and early Ottonian texts document outbreaks of disease: only in the *Chronicle of Ireland* and Bar Hebraeus' *Chronography* do we encounter pestilences as often as we do in Carolingian and early Ottonian sources.<sup>546</sup> Byzantine, English, Italian, Spanish and Welsh texts very infrequently report outbreaks of disease, and nothing is available for eastern Europe, Scandinavia or Scotland.<sup>547</sup> Secondly, when texts from inside and outside *Francia* and *Germania* contemporaneously document a pestilence it is rarely certain whether the pestilences were in any way linked to one another. On occasion we may speculate about the occurrence of pan-European outbreaks of disease, but we must remain hesitant of any definitive claims about the existence of pan-European pestilences, particularly considering the scantiness and ambiguity of the evidence, in terms of the temporality and spatiality of outbreaks especially. It is presently impossible, for example, to ascertain whether pestilences reported in Ireland and *Francia* in the same year, or in close sequence, were pathogenically related. After all, many

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<sup>545</sup> For a full list of the non-Carolingian and early Ottonian sources consulted, see the primary sources section of the bibliography. Unfortunately, two major texts for the ninth and first half of the tenth century in Byzantium, the *Theophanes Continuatus* and *Synopsis historiarum* of John Skylitzes, could not be consulted. Also, texts from beyond Europe and the Middle East have not been considered here, as the evidence base is too slight to allow even speculations about a intercontinental pestilence spreading from East Asia to *Francia*. For instance, McNeill identified eight pestilences in China between 750 and 950 CE and five of them – those of 806, 840, 874, 891 and 892 – took place in years that Carolingian and early Ottonian texts also record outbreaks of disease, but we must consider the time it would take for a disease from East Asia to reach Western Europe (or vice versa) in the early Middle Ages; we might suspect ten years to have lapsed between the irruption of a pestilence in China and *Francia*. McNeill highlights epidemics in China in 762, 790, 806, 832, 840, 874, 891 and 892: (1976), p. 262. Twitchett discusses these Chinese epidemics in greater detail, though he overlooks that of 874: (1981), pp. 42-58. Twitchett also identifies human epidemics in Japan in 747, 749, 756, 770/74, 780/85, 790/91, 794, 807/09, 812, 822/24, 829/33, 836, 840/41, 843, 861/63, 867, 870, 872, 876, and in Korea in 747, 755, 867, 870 and 873: (1981), pp. 47-8, 50, 52. Farris too addresses early medieval Japanese pestilences: (1985), pp. 50-73. Whether or not this period in Japanese history was 'an age of plagues,' as Kiple (2006), p. 20 observes, none of these epidemics can reasonably be said to have been associated to outbreaks recorded in Carolingian and early Ottonian sources. Identifying pan-East Asian pestilences in this period is difficult itself, as Twitchett makes clear; though cf. Twitchett (1981), p. 52.

<sup>546</sup> On the composition and nature of the so-called *Chronicle of Ireland* see (C.3.2); on Bar Hebraeus' *Chronography* see (C.3.10).

<sup>547</sup> Stathakopoulos too has observed a dearth in reports of pestilences in Byzantine sources after 750: (2004), pp. 7-8. On the dearth of written evidence for early medieval Scotland see Hughes (1980), pp. 1-21.

outbreaks are documented in non-Carolingian and early Ottonian texts in years Carolingian and early Ottonian texts do not record disease.<sup>548</sup> It may be nothing more than a coincidence when reports of disease from inside and outside *Francia* and *Germania* temporally correspond.

Lastly, it is important to acknowledge that there are notable gaps in the recording of pestilences in texts from outside *Francia* and *Germania* as there are in Carolingian and early Ottonian texts. For instance, the *Chronicle of Ireland* provides a wealth of possibly relevant information for human and livestock pestilences in the eighth century (C.3.2, 3, 13, 15, 25, 28, 34, 35, 36, 37, 38, 40, 43, 47) but little in the ninth century (C.3.50, 55, 59, 60), particularly in its last three quarters. In fact, nothing pertaining to human or livestock disease is reported in the text from 826 to 907. The *Anglo-Saxon Chronicle*, on the other hand records nothing of relevance outside of its entry for 897 (C.3.91). Naturally, whether these gaps indicate an actual absence of pestilences or the prerogatives of the annalists is unknown. While we should not all suspect outbreaks to have been recorded, that other insular texts, as noted on a case by case basis in 1.4.2.1 and 1.4.2.2, record pestilences these texts do not imply that the annalists and compilers of the *Chronicle of Ireland* and *Anglo-Saxon Chronicle* did omit several mid-eighth through mid tenth-century outbreaks of disease among humans and livestock.

#### 1.4.2.1 Epidemics

762

The first mortality in our sources that may be assigned to disease took place in the context of a subsistence crisis. The *Chronicon Moissiancense* reports in 762 that many people died on account of hunger in the food shortage of the early 760s (C.1.18). Whether we should take the text at face value and assign these shortage-related deaths to hunger or whether we should assign them to disease, as proposed in 2.2.1.1.2, is debatable, hence the categorizing of this passage, in 1.4.1.1, as plausible reference to a pestilence. While the shortage appears to have been a rather general affair, as detailed in

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<sup>548</sup> The *Annals of Ulster*, *Chronicle of Ireland*, *Liber pontificalis* and Bar Hebraeus' *Chronography* report human pestilences in 769, 772, 774, 783, 814, 884, 907, 921, 950 and 957 that do not align with the Carolingian and early Ottonian record.

2.4.2, there is no other record of a human mortality in the early 760s in any Carolingian or non-Carolingian text. Only the *Chronicle of Ireland* refers to an outbreak of the ‘bloody flux’ in the context of a shortage there (C.3.25). As such, despite the evident generality of the shortage, we should avoid any definitive claims about the extent of the human deaths outside the purview of the *Chronicon Moissiancense*, which is known, in this period, to provide a contemporary record for southwestern Carolingian Europe. The text was discovered at Moissac in southwestern France and seems to have been composed in the tenth-century at the monastery of Ripoll, in Catalonia, from earlier regional sources.<sup>549</sup> However, it is not unreasonable to suspect that epidemic(s) were ubiquitous throughout shortage-afflicted Europe in the mid 760s and the *Chronicon* does specify that human mortalities were then common across much of southern Europe: the annalist writes not only of *Gallias* (presumably, as in 793, the regions of *Gothia* and *Provincia*), but also of *Illyricum* and *Thracia* (in southeastern Europe). There is no indication, though, as to when the mortality recorded in the *Chronicon* initially broke out.

779

We next encounter evidence for an epidemic in four texts in 779: the *Annales Augienses*, *Annales Laureshamenses*, *Annales Sangallenses maiores* and *Chronicon Moissiancense* (C.1.37, 38, 39, 40). Referred to in these annals as a *mortalitas*, the pestilence is listed in each source in conjunction with a food shortage, which is recorded in an additional Carolingian text that does not mention the mortality (C.1.41). Evidence for the shortage, as addressed in 2.4.2, is rather minimal, but as discussed above in 1.4.1.1 and in 2.2.1.1.2, there is good reason to think that this mortality was indeed an outbreak of disease, as that reported in the *Chronicon Moissiancense* in 762. Little indication of the spatial or temporal extent of the mortality is given in these four passages, which are very likely all interdependent: all state vaguely that the *mortalitas* occurred ‘in *Francia*.’ The root source is likely to have been either the *Annales Laureshamenses*, which is thought to have been composed at the abbey of Lorsch or the *Chronicon Moissiancense*.<sup>550</sup> The

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<sup>549</sup> On the composition of this text see (C.1.17).

<sup>550</sup> On these texts see (C.1.8) and (C.1.17). The *Annales Augienses* entry here appears to be ultimately derived from the *Annales Laureshamenses* and the *Annales Sangallenses maiores* was, like the *Annales Augienses*, written long after 779.

former, however, are thought to only provide a contemporary record from about 785 to 803, and the latter, as noted, are thought to give a unique southwestern perspective. If the passages in these texts do stem from the *Chronicon* we may suspect, as such, that the human mortalities and food shortage did not affect the southwest. On the other hand, that this *mortalitas in Francia* is documented in the *Chronicon* may itself indicate that the *Annales Laureshamenses* is the root text. Other eighth century events of relevance to this thesis that are reported in the *Chronicon* – food shortages namely – are assigned specifically to southern and southwestern Europe: *Spania*, *Gothia*, *Illyricum*, *Provencia* and *Thracia* (C.1.17, 18, 59). If the passage does indeed come from the *Annales Laureshamenses*, we could, consequently, speculate that the 779 mortality affected, at the very least, the area around Lorsch in central Germany. However, caution should be exercised when advancing such speculations, as to claim that the *mortalitas* took place in the locale of Lorsch is to assume that the annalist reported in 779 on events that occurred in that area, which is, of course, ultimately unknown, as is the timing of the outbreak's irruption.

Of course, the mortality may not have been a strictly local or regional affair. Contemporary references to outbreaks of disease in texts from outside Carolingian Europe in the late 770s, or early 880s, which are independent from these four Carolingian texts are few, however. Only in the *Chronicle of Ireland* do we find any possibly relevant information. In that text, in 777, we find reference to 'the bloody flux and many other diseases – almost an epidemic' (C.3.36); in 778 in the *Chronicle* we find the brief entry 'the bloody flux' (C.3.37); in 779 'the *bolggach* throughout Ireland' (C.3.38); and in 783 'the *scamach*' (C.3.40). Of course, whether the pestilence reported in Carolingian texts in 779 was the same as one of these recorded in Ireland cannot be proven. While the Carolingian pestilence may have been one of those diseases the Irish annalist(s) referred to as the bloody flux, *bolggach* or *scamach*, the Irish and Frankish mortalities may have been totally unrelated. The Irish pestilences also do not come in the context of a subsistence crisis. Nevertheless, that the *bolggach*, which is reported in the same year as the Carolingian outbreak, is said to have been widely prevalent may indicate that the Frankish and Irish pestilences of 779 were linked. After all, the Irish annalist's claim that the *bolggach* was not localized but widespread in Ireland implies that the disease (the

*bolggach*) was not endemic to Ireland and that its origins lay elsewhere, as a disease capable of irrupting widely across a region and causing notable mortality is unlikely to have been endemic to that region. Still, whether the disease came from *Francia* is uncertain, and if the Carolingian and Irish pestilences were related we have no way of knowing whether the disease spread westward across Europe and reached Ireland in 779 or 783. Though the absence of disease in the Anglo-Saxon chronicle in the late 770s should not, as suggested in 1.4.2, be construed as an indication that the outbreaks reported in Ireland and Carolingian Europe were not associated, the extent evidence is so slight that we must label any assertion about a pan-Channel pestilence *c.*779 as highly speculative.

786

The first evidence for a pestilence not associated to conflict or a food shortage in our sources is that recorded in the *Annales Laureshamenses* and *Fragmentum annalium chesnii* in 786 (C.1.46, 47). These two passages, which are clearly interdependent to some extent, speak of a *mortalitas* occurring shortly after Christmas.<sup>551</sup> Both also mention the death of Archbishop Lullus of Mainz, though it is not specified whether he died in the mortality. The general mortality, which cannot be tied to a subsistence crisis, is said in the *Fragmentum annalium chesnii* to have taken place soon after storms shook churches in *Wildi*, which may refer to Willy in the Illies area of northern France. If these references are independent, and if the author of the *Fragmentum* meant to indicate that people died in the area of *Wildi* too, we may tentatively infer that the mortality affected locales at least as far a part as Willy and Lorsch.<sup>552</sup> Though again we should not assume that the *Annales Laureshamenses* annalist was concerned only with the events that took place in the locale of Lorsch. Little else is known about this pestilence. When the pestilence irrupted is unknown, though we are informed that Lullus died in mid October.

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<sup>551</sup> These two texts may have relied on another source either no longer extant or unknown to me. For while the *Annales Laureshamenses* are known to provide, in general, a contemporary record for the mid and late 780s, the *Fragmentum annalium chesnii*, which is clearly not independent from the *Annales Laureshamenses*, contains information the *Annales Laureshamenses* does not. The *Fragmentum annalium chesnii*, moreover, is thought to provide an independent record of events from 786 to 790.

<sup>552</sup> *Annales Laureshamenses*, but not the *Fragmentum*, is thought to have been composed at Lorsch.

Nothing relevant appears in any other Carolingian source,<sup>553</sup> and of non-Carolingian sources we only encounter the report of another outbreak of the ‘*scamach*’ in the *Chronicle of Ireland* in 786 (C.3.43). As with the recorded pestilences of 779, however, we cannot know whether this Irish outbreak was linked to that in *Francia*. That said, if the Frankish outbreak did affect the locale of Mainz (assuming that the Archbishop of Mainz died of the epidemic and that he was in Mainz when he died, or his abbey at Hersfeld some 200 km to the northeast) and Willy some 500 km apart, as well as Lorsch, roughly 60 km from Mainz and 550 km from Willy, we may suspect it was capable of spreading farther afield. Moreover, *scamach* is said to indicate a disease of the pulmonary tract, such as influenza or streptococcic pneumonia.<sup>554</sup> Yet the evidence is again too scant to advance any definitive claims about a pan-Channel pestilence and the ‘*scamach*’ is reported to have already irrupted in Ireland in 783 (C.3.40).<sup>555</sup>

791?

The next pestilence reported in our sources appears in 791. In that year the Poeta Saxo, in his *Annales de gestis Caroli magni imperatoris*, writes of an outbreak (*lues*) irrupting in the legion that Charlemagne led against the Avars in northwestern Hungary (C.1.51). It is more than likely, however, that this is a confused reference to the 791 equine pestilence (see 1.4.2.2). The poet, who was based at Corvey, wrote his life of Charlemagne *c.*890 and relied heavily, for the late eighth century, on the revised *Annales regni francorum*, which provides the sole account of the horse pestilence that he states irrupted in Charlemagne’s legion plausibly near Savaria (Szombathely). While the poet, who wrote *c.*890 in Corvey, may have had access to sources about Charlemagne’s first Avar campaign that have not survived, the similarity in the form and content of the poet’s account and that of the revised *Annales regni francorum* indicates strongly that he was, in fact, referring to the deaths of equines. This is emphasized by the fact that no other

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<sup>553</sup> In his *Liber pontificalis ecclesiae Ravennatis* written in the 830s or ‘40s, Agnellus also mentions that a ‘deadly disaster’ occurred during Gratosus’ short tenure as the bishop of Ravenna (786-89) and that people were ‘seized with death:’ (2004), p. 290. The content of his account of this disaster, however, indicates that Angellus’ drew upon the *Annales Laureshamenses* or *Fragmentum annalium chesnii*.

<sup>554</sup> Ó Corráin (2005), p. 581. Thomas-Edwards, the editor of the *Chronicle of Ireland*, suggests that *scamach* be diagnosed as ‘influenzal pneumonia.’

<sup>555</sup> As before, the lack of any pestilence in the *Anglo-Saxon Chronicle* in the mid 780s is not an indication that these Irish and Frankish pestilences were unrelated.



reference to a human pestilence *c.*791 is encountered in any Carolingian or non-Carolingian text outside of the context of the subsistence crisis of the early 790s, and that the poet does not tie the pestilence in Charlemagne's legion to that food shortage.

793

The *Chronicon Moissiancense* provides another plausible reference to an epidemic, like that of 762, in 793 (C.1.59). The text reports that 'many' people died 'on account of' the subsistence crisis of the early 790s. As detailed in 2.4.2, this late eighth-century shortage, like that of the mid 760s, was clearly a general affair, multiple years in duration, which affected northern and southern Carolingian Europe. Human mortality during, or in the wake, of the crisis is not, however, reported in another text, Carolingian or non-Carolingian. We should again avoid, consequently, firm assertions about the ubiquity of the mortality or the spatial extent of shortage epidemic(s) across Europe, despite the known magnitude of this food crisis. However, we may speculate, assuming that the *Chronicon Moissiancense* annalist wrote about his own vicinity, that people died of disease in his immediate locale of Ripoll, as well as *Gothia* and *Provencia* more generally which he specifies were affected. Yet considering the known magnitude of the subsistence crisis (detailed in 2.5.2), it is not unreasonable to suspect that multiple outbreaks of disease irrupted and spread via the socio-economic conditions a shortage like this would have fostered. Non-opportunistic epidemic diseases may have been ubiquitous in most regions affected by the shortage, and not only in 793 but 794 as well. When the mortality reported in 793 set in is unknown.

801

In 801, the *Annales Lobienses*, *Annales regni francorum* and Poeta Saxo document an outbreak of disease among humans (C.1.68, 69, 70). All three texts clearly label the mortality a pestilence, *pestilentia* and *morborumque lues*, and the *Annales Lobienses* specifies that the disease afflicted humans. The *Annales regni francorum* is likely the root source for the *Annales Lobienses* and *Annales de gestis Caroli magni imperatoris* here.<sup>556</sup> That said, the poet may have drawn upon sources available to him at Corvey, and the

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<sup>556</sup> The *Annales Lobienses* are certainly non-contemporary.

reference in the *Annales Lobienses* to human deaths in conjunction with livestock deaths, which is unique to the *Annales regni francorum* entry, may indicate that it provides an independent reference. As indicated in 1.4.1.1, it should not be assumed that the disease was zoonotic. Both the *Annales regni francorum* and *Annales Lobienses* write of an earthquake affecting places near the Rhine and in *Germania* and *Gallia* immediately before mentioning the pestilence and we may suspect that the disease afflicted peoples along the Rhine too, or, perhaps, that it was prevalent in parts of the large territories of *Germania* and *Gallia*. Yet not only is this ultimately uncertain but the situating of natural disasters – pestilences included – ‘along the Rhine’ or ‘around the Rhine’ was a common expression employed in the *Annales regni francorum*, and other contemporary (and later) texts it influenced, and we may tentatively infer, as such, that the phrase is not necessarily representative of a phenomenon’s actual spatiality.<sup>557</sup> Conversely, as discussed below, the repeated referring to disease in the Rhineland may be an indication of a reoccurring waterborne disease in the area.

Within *Germania* and *Gallia*, it is possible that the pestilence was prevalent in the area in which the *Annales regni francorum* was composed, though it is not all that easy to discern where this passage was composed. The latter two sections of the text appear to have been, like Charlemagne and his court, written on the move and to reflect closely Charlemagne’s activities.<sup>558</sup> Most of the entry for 801 tells of Charlemagne’s return trip from Rome, which he is said to have left after Easter. Notice of the earthquake in *Germania* and *Gallia* and the pestilence comes after notice of an earthquake in *Italia* that is said to have occurred on 30 April. We also hear of Charlemagne staying in Ravenna and Pavia, before making his way to Aachen. If the passage in the *Annales regni francorum* is dependent on information gleaned from those who travelled with the king, it is possible that the pestilence occurred in the spring or summer in a region, or some of the regions, that Charlemagne transversed between Pavia and Aachen. We cannot be more specific. Though if the *Annales Lobienses* provides an independent reference we may speculate that the outbreak affected people in the region of Lobbes where that text

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<sup>557</sup> See (C.1.68, 69, 105, 149, 201, 214, 215).

<sup>558</sup> This is not to say that the text represents an ‘official history.’ McKitterick (2008), pp. 31-2. The first section of the *Annales regni francorum* end c.794/95. On the composition of this text see Appendix 4.5.

appears to have been composed. Nothing plausibly relevant to this pestilence is encountered in any other text, Frankish or non-Frankish.

### 803 and 805

In 803, the so-called *Einhardi annales* documents a *mortalitas* that is said to have occurred in Aachen and neighboring areas. The mortality is not found in other texts and little more can be said about it, other than that it was most likely a pestilence not associated to a food shortage. As with the pestilence of 801, there are no possibly associated outbreaks in non-Carolingian texts. The disease is said, however, to have irrupted in the winter. Whether this pestilence was linked to that of 801 is uncertain. Another reference to a poorly documented *pestilentia* in a letter Charlemagne wrote to Gerbald, the Bishop of Liège, appears in 805. Not only does Charlemagne himself provide few details, but nothing relevant to this pestilence is found in another Carolingian text. The king writes ambiguously that the outbreak affected ‘certain places’ and that it occurred in the context of failing crops. Of course, we may suspect that the regions Charlemagne was best informed about in 805 were those affected. The *Annales regni francorum* tells us that Charlemagne was in Aachen, Metz and Thionville in 805, and that his son Charles battled Slavs in Bohemia and told his father of his successes when both were in the Vosges mountains at Champ. Though it is uncertain if the pestilence affected the locales around Aachen, Metz and/or Thionville, we may suspect that it was primarily a central and eastern Carolingian affair, as Charlemagne spent most of 805 east of the Lorraine area and the towns he is known to have visited are situated relatively close to one another.<sup>559</sup> That the locale around Liège was affected, at least by the time Charlemagne wrote, is unlikely for Charlemagne would not have had to inform Gerbald of the irruption of a pestilence in Gerbald’s own territory. This implies that the outbreak may have indeed been spatially restricted, as Liège lies a mere 225 km from Metz and 200 km from Aachen. That the epidemic was prevalent in the Vosges is also improbable, as Charlemagne is unlikely to have gone hunting and arranged to meet his son in a region plagued by disease. There is one possibly related reference to a pestilence in a non-Carolingian source, again the *Chronicle of Ireland*. In January 806, that text

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<sup>559</sup> Metz is some 30 km from Thionville, which is about 225 km from Aachen.

reports that ‘a great epidemic arose in the Island of Ireland’ (C.3.50). While it is possible that the Frankish pestilence progressed from the continent to Ireland, it is ultimately uncertain, as is whether the epidemic reported in 805 was associated to that of 803.

#### 807/08

In 807 we have two, likely interdependent, reports of a *mortalitas* at Fulda. The common source is likely that of the *Annales Laurissenses minores* (C.1.78, 79). Neither passage mentions the mortality in conjunction with a food shortage though, as discussed in 2.4.2, there is some evidence for a shortage in that year (C.1.77). We may tentatively infer that the *mortalitas* also took place at least in the locale of Lorsch where the *Annales Laurissenses minores* were composed, some 200 km southwest of Fulda. Nothing plausibly relevant has been found in non-Carolingian sources, though in the *Annales regni francorum*, *Einhardi annales* and *Annales Xantenses* under the year 808 we find reference to a pestilence in the winter of 807/808 (C.1.80, 81, 82).<sup>560</sup> The entries in these three texts, which undoubtedly stem from the *Annales regni francorum*, provide no indication of the pestilence’s spatiality. It is known, however, that Charlemagne was in Aachen that winter, that he had been in Aachen since the previous April, and that he only went to Nijmegen in the spring of 808. This and the fact that the composition of the *Annales regni francorum* was closely associated to the court permit us to very tentatively suggest that the area around Aachen at the very least was affected.<sup>561</sup> It is uncertain whether the epidemics of 807 and 808 were related, though we may speculate that if they were at least regions of eastern Carolingian Europe were hit.

#### 810

In 810, in the *Annales Laurissenses minores*, we encounter another vague notice of a human pestilence (C.1.90). Here the human mortality is related to deaths of cattle. Of course, we should not assume that this disease was zoonotic, and in any case several other texts that document the bovine deaths, as detailed in 1.4.2.2, clearly indicate that

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<sup>560</sup> The first of these texts remarks that the Saracens were ‘plagued by misfortune’ while pillaging southern Carolingian Europe in 807, but it might be too much of a stretch to even speculate that some of these misfortunes were due to disease: Scholz (1970), p. 87.

<sup>561</sup> Of course, the court was a hub of information from across Frankish Europe and the information the annalist possessed may have come from one or several regions not in the vicinity of Aachen.

the disease that affected cattle affected cattle alone. The *Annales Laurissenses minores* annalist seems to imply that far more cattle died than did people, and it may be that the human mortalities were indeed more local in scale than the cattle mortalities. We may tentatively infer that the human deaths occurred in the locale of Lorsch, where the *Annales Laurissenses minores* were composed, and not in those regions in which cattle mortalities are recorded in other texts – southwestern, southern and central *Francia*, and central and northeast *Germania* – as several of the texts that document bovine deaths c.810 regularly record human mortalities and would have presumably recorded human mortality c.810 had it occurred in the region they were concerned with. While this is somewhat speculative, little else is known about the human deaths of 810: no other reference to human disease in Carolingian or non-Carolingian texts is known of and the *mortalitas* cannot be tied to a subsistence crisis.

820

The *Annales regni francorum*, *Annales Fuldenses* and *Herimanni Augiensis chronicon* document pestilences in 820. The *Annales regni francorum*, in fact, document two outbreaks in 820. The initial pestilence encountered in 820, which appears only in the *Annales regni francorum*, is the first certain conflict-oriented human pestilence in our source base (C.1.100). Three armies, recruited from *Saxonia*, East *Francia*, *Alamannia*, *Bavaria* and *Italia*, are said, in the spring of 820, to have marched on Ljudovit, a Slavic duke in the region of *Dalmatia* (on the eastern coast of the Adriatic Sea), one by way of *Italia* through Alps, another by way of *Carinthia* in southern Austria, and the third *Bavaria* and Upper Pannonia. The latter is said to have suffered an outbreak of disease when crossing the river Drave. A ‘considerable part’ of the army is reported to have been lost, though the contingent carried on to meet with the other two branches in Ljudovit’s territory. The party that travelled from *Carinthia* is also specified to have had crossed the Drave and not been affected by disease, and all three contingents, or what was left of them, are said to have made their return without sustaining further losses. It is plausible, consequently, that we are not dealing with a regional outbreak of disease here but an epidemic tightly restricted in time and space to the group that marched through *Bavaria* and Upper Pannonia. This is supported, as discussed in 1.5.4.1, by consideration of the

symptom that the annalist specifies those afflicted commonly exhibited, a loosening of the bowel. No other evidence distinctly relevant to this passage is encountered in Carolingian or non-Carolingian sources, though the *Annales regni francorum* signify that the outbreak would have occurred in the late spring or early summer.<sup>562</sup>

The second pestilence of 820 appears to have been a more general affair. The *Annales regni francorum*, which is quite likely the root source for the references to disease in the *Annales Fuldenses* and *Herimanni Augiensis chronicon*,<sup>563</sup> writes that the disease spread ‘far and wide’ and that ‘hardly any part of the entire Frankish kingdom could be found immune [from it] or untouched [by it]’ (C.1.101). The pestilence is mentioned in conjunction with a subsistence crisis, which may have also been a fairly spatially general affair lasting multiple years (see 2.4.2), and an outbreak of disease among cattle. All texts associate the pestilence to excessive rain, which the *Annales regni francorum* notes persisted into the fall. It seems, then, that the pestilence occurred, or was ongoing, in the spring and summer of 820. If we should not assume that the disease was zoonotic, it becomes somewhat unclear as to whether human or cattle deaths, or both, were widespread throughout the empire. The mortality is, though, clearly labeled as being the product of disease (*pestilentia*) and it is safe to assume, as such, that whether or not the mortalities were directly or indirectly associated to the food shortage, that they were not the result of hunger. Little of relevance to this outbreak is encountered in non-Carolingian sources. Only in Genesios’ *On the reigns of the emperors*, do we find something (C.3.54). Genesios refers vaguely to ‘horrific plagues’ that are said to have spread through cities and the ‘entire countryside’ in the reign of Leo V. Leo’s reign was rather short, spanning 813 to 820; if the Carolingian pestilence was indeed a general affair it is not entirely implausible that this Byzantine reference in the same period is unrelated. While unlikely, it is also not entirely implausible that the aforementioned third contingent to march on Ljudovit was weighed down by this disease as well.

823

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<sup>562</sup> The annalis specifies that the campaign was undertaken as soon as there was grass for the horses.

<sup>563</sup> These passages in the *Annales Fuldenses* and *Herimanni Augiensis chronicon* are non-contemporary and contain no information not encountered in the *Annales regni francorum* (C.1.103, 104); the composition of these texts see Appendix 4.5 and (C.1.104). See, in addition, the comments on the Astronomer’s *vita* of Louis the Pious in the discussion of the pestilence of 823.

In 823 we find another pestilence in the *Annales regni francorum* (C.1.108). The epidemic is qualified as *magna*, specified to have affected humans alone and said to have ‘raged furiously throughout *Francia*.’ Nothing possibly relevant is encountered in non-Carolingian texts and we learn nothing of the pestilences spatiality or temporality from the *Annales regni francorum* itself. The Astronomer refers to pestilences of humans and animals in the early 820s in his *Vita Hludovici pii* (C.1.110), but he is known to have written in the early 840s and to have relied extensively on the *Annales regni francorum* for the early years of Louis’ reign.<sup>564</sup> As proposed in 1.4.1.3, that the pestilence is reported to have been great in scale and extent tells us little,<sup>565</sup> though the Astronomer’s observation that the disasters of the early 820s, the outbreaks included, were significant enough to move Louis to urge for regular fasts, prayers and almsgiving in order to appease God, may signify that they were indeed major events.<sup>566</sup> As in 820, we learn nothing specific about the spatiality of the pestilence by considering references in the text to the regions Louis the Pious and his court, to which the text’s composition was closely tied, travelled. Not only was the emperor capable of knowing the ongoings of more regions of his empire than mentioned in the text, but in 823, as in 820, it is known that Louis not only transversed much of his territory but that he received envoys and nobles from across *Francia* as well as neighboring areas. Though the pestilence is mentioned in conjunction with several ‘prodigies,’ including a plausible reference to a subsistence crisis, and unusual events that occurred in places as disparate as Commercy (in northeastern France), Firihsazi (in *Saxonia*) and Como (in northern Italy), we ultimately know little more than that in 823 in some regions of *Francia* people died of disease. The annalists’ usage of *pestilentia*, of course, makes certain that deaths were the result of disease and not hunger, but this outbreak may have certainly been tied to conditions generated by a subsistence crisis.

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<sup>564</sup> Similarities in the form and content of the Astronomer’s work to the reports of pestilences in 820 and 823 in the *Annales regni francorum* confirm this observation.

<sup>565</sup> *Magna* was used indiscriminately. The *Annales regni francorum* annalist, for example, noted that both epidemics of the early 820s were great; that of 820 was labelled, like the weather and harvest of that year, a ‘great disaster.’

<sup>566</sup> On the other hand, Louis may have been easily moved to advocate for such measures. Furthermore, the Astronomer may have simply intended, with these remarks, to demonstrate Louis’ piety, and his devotion and concern for his people.

828?

In a general letter of 828, Louis and Lothar refer to the sterility of the lands, a food shortage, animal mortality, and a human pestilence in their kingdom. But not only is it unclear where or when the human pestilence took place in 828, but whether it took place at all in 828. The food shortage is specified to have been ‘continual,’ but the pestilences may have taken place earlier. Louis and Lothar could have, in fact, been referring to the human pestilences of 820 and 823.<sup>567</sup> In the *Chronicle of Ireland* we read of a ‘great pestilence’ in 825 and of a ‘plague’ in 826 (C.3.59, 60), but the evidence is too slight to suggest that these Irish outbreaks are related to that the Frankish kings mention. Nothing else plausibly relevant is encountered in Carolingian or non-Carolingian texts.

834

More can be said about the outbreak Thegan writes of in his *Gesta Hludowici imperatoris*. The biographer indicates that this pestilence occurred in the early 830s among Lothar’s company in *Italia* (C.1.119). The disease is said to have struck and killed several in Lothar’s party. Thegan hints that the Count of Orleans, Matfrid, succumbed to the disease, though the *Annales Bertiniani* simply states that Matfrid was ‘killed’ and the Astronomer notes that he died in a battle in late May.<sup>568</sup> Both of these texts date Matfrid’s death to 834 and we may speculate that Lothar’s company was hit in *Italia* in that year. While the *Annales Bertiniani* and the Astronomer, not to mention Ermoldus Nigellus in his *vita* of Louis and Nithard in his *Historiarum libri III*, do not document the pestilence, the Astronomer does state that ‘a mortal disease’ fell upon several Carolingian elites who had associated themselves to Lothar in the 830s, and that some died immediately, but it is clear that the elites specified were not overcome by disease in the same region let alone the same year.<sup>569</sup>

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<sup>567</sup> This would, if so, serve, of course, to further indirectly demonstrate their magnitude.

<sup>568</sup> On this matter see, for instance, Nelson (1991), p. 30 n. 8.

<sup>569</sup> The Astronomer notes that Wala of Corbie, Jesse of Amiens, Elias of Troyes, Hugh of Tours, Lantbert of Nantes and other prominent religious leaders were affected. Richard, a Count and one of Louis’ missi, is also said to have fallen sick and to have escaped the illness only to die ‘a little later.’ Elsewhere the Astronomer reports that Lothar and Wala were struck by a ‘sickness’ and ‘raging fever.’ While Lothar would recover after being ‘laid up in bed for a long time,’ Wala died. Wala, however, is known to have died in 836, and Hugh of Tours and Lantbert of Nantes in 837: Astronomer (2009), pp. 289, 291.



It is possible that the pestilence and Matfrid's death were unrelated and that Thegan bundled them together, confusingly, despite the fact that he wrote his *vita* in the mid 830s and would have likely been well informed of these events. It is possible that Lothar's company was hit by disease in *Italia* after the battle in the Loire Valley, which is documented by the Astronomer and Nithard, and in which Matfrid, according to the Astronomer, died. The *Annales Bertiniani* implies that Lothar left *Provencia* for Italy in the late summer or early autumn. No other relevant Carolingian or non-Carolingian evidence survives, yet considering the general region and likely seasonality of the outbreak – *Italia* and late summer – and the primary symptom expressed – *febris* – there is some reason to conjecture, as discussed in 1.5, that this was an outbreak of malaria and that Thegan's pestilence was, thus, endemic to the region and regional, or perhaps even local, in scope. Of course, the region of Italy in which Lothar's party was afflicted is not specified and there is need for hesitation when suggesting a retrospective diagnosis.

839

Another, somewhat similar, outbreak of disease among Lothar's men is encountered in the *Annales Bertiniani* in 839 (C.1.126). Here the Lothar's army is said to have been weighed down by disease in the autumn after it reached the area of Turenne (in southwestern France) from Clermont-Ferrand, some 200 km to the east and north. Nothing else pertaining to the spatiality or temporality of this pestilence is known, though it, like the disease of 834, is said to have been characterized by *febris*. Louis' biographers, the *Annales Xantenses* and Nithard also overlook the outbreak, and nothing plausibly relevant has been found in non-Carolingian sources. The omission of the pestilence in such a wide range of sources, however, need not affect our estimation of the pestilence's spatial contours or impact: the biographers regularly neglected to mention outbreaks of disease, the annalists of the *Annales Xantenses* appear to have omitted disease altogether for the first half of the period for which the text provides a contemporary account,<sup>570</sup> and Nithard saves his only account of general episode of

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<sup>570</sup> The text is held to provide a contemporary record of events from the early 830s but it is not until 857 that we encounter any evidence for an outbreak of disease.

disease until the conclusion of his text in which he mentions a range of natural disasters.<sup>571</sup>

842/43

It is in the winter of 842/43 that Nithard provides his only reference to an epidemic in his *Historiarum libri IIII*. He does so, however, very vaguely, writing simply that that season was ‘full of diseases.’ The *Fragmentum chronicon Fontanellensis* also writes of a ‘great’ outbreak in 842 that killed many people (C.1.131, 132). Though these two passages appear to be independent and contemporary, we can only speculate on the spatial contours of either pestilence and whether these outbreaks were linked, pathogenically, is quite uncertain. Before writing of the winter of 842/43, Nithard reports that Charles the Bald was at St. Quentin and then Valenciennes in northeastern France before heading to *Aquitania* in early 843. Considering Nithard’s western Frankish viewpoint, close association to Charles, and his tendency to document events particular to Charles’ region of activity, it is possible that the diseases he documents afflicted the regions Charles transversed. Whether the diseases were common to northeastern France or Aquitaine, however, is unknowable on the grounds of Nithard’s text alone, though Nithard appears not to have gone to Aquitaine with Charles in early 843 and he may have been far less aware of events there. The historian’s remark that the winter was long, excessively cold and harmful to cattle, which sets up his notice of the *langores*, might indicate that the diseases were not of southern Carolingian Europe, as there is some evidence for the poor winter of 843 in northern *Francia*,<sup>572</sup> and cattle were a more fundamental component of the agrarian economy of the north than the south. We may also suspect that Charles would not have headed for Aquitaine had he known of an outbreak in the region.

That the *Fragmentum chronicon Fontanellensis* appears to have been composed at Fontenelle in *Burgundia* roughly halfway between *Aquitania* and far northeastern reaches of *Francia*, and plausibly refers to human deaths in that region, does not help us define where this pestilence occurred or if we are dealing with multiple outbreaks. Since the season or month in which the epidemic, which the *Fragmentum* documents, irrupted is

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<sup>571</sup> As noted by Scholz (1970), pp. 26-7.

<sup>572</sup> Nithard himself mentions a heavy snowfall in March 843 and Lupus at Ferrières provides indirect evidence for a poor winter (C.1.134, 135).

unknown, it is hard to say with much certainty that it and that which Nithard records were related. Of course, it is likely that Nithard's use of the plural *langores* was not unintentional and we may suspect that multiple epidemics occurred in 842/43, and that one of these was that recorded in the *Fragmentum*.<sup>573</sup> We can know little else about the disease experience of 842/43 other than that the diseases these texts relate are explicitly associated to neither conflict nor a subsistence crisis in either text, though there is some indication of a food shortage in the early 840s.<sup>574</sup> Neither the *Annales Xantenses* nor *Annales Bertiniani*, nor any other Carolingian source, provides additional information, though, as observed, this need not impact our assessment of spatial extent of the epidemics Nithard and the *Fragmentum* report. Like the *Annales Xantenses*, the *Annales Bertiniani* only report a peacetime pestilence in the mid 850s, though they provide an independent and contemporary record from the early 830s.<sup>575</sup> Of non-Carolingian texts, only Bar Hebraeus, in his thirteenth-century *Chronography* which is based on earlier contemporary sources, reports a 'terrible pestilence' occurring some distance away in southeastern Turkey in 843 (C.3.64). Naturally, whether this pestilence is related to the disease referenced in the Frankish texts is entirely uncertain and perhaps unlikely, as Bar Hebraeus seems to tie his epidemic to a food shortage.

845

In 845, the *Annales Bertiniani* records another conflict-oriented pestilence. Disease is said to have struck down Vikings after they pillaged the area around the mouth of river Seine (C.1.140). The text indicates that the outbreak occurred in late spring, possibly June, after the monastery of St. Germain had been sacked. Few of the Vikings, who had been in the area since March, are said to have survived. Nothing directly relevant is found in other Carolingian texts, let alone non-Carolingian texts and whether Franks in

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<sup>573</sup> Yet Nithard's unusual use of a plural should not be construed as firm evidence for multiple epidemics. No other general episode of disease is reported in the contemporary sections of Nithard's text – he documents only the illness of the Count of Metz (C.2.20). It is unclear, as such, whether Nithard normally recorded pestilences, uncommonly, in the plural.

<sup>574</sup> Nithard notes that the winter was harmful to agriculture and the *Annales Bertiniani* provides a rather vague reference to a food shortage in 843 (C.1.133).

<sup>575</sup> Thus, even though the *Annales Bertiniani* is known to have been composed in Troyes in this period, the omission of the pestilences in the text cannot be construed as evidence that the disease Nithard reports was confined to the most northern reaches of *Francia* or that the disease the *Fragmentum chronicon Fontanellensis* records, likely at Fontenelle some 130 km to the south, was very local in scope.

the region were affected or not is uncertain. The *Annales Bertiniani* likewise documents a subsistence crisis in 845 which it says killed ‘many thousands’ in the western regions of *Gallia*, but the annalist does not tie the shortage to the disease the Vikings suffered (C.1.139). Nevertheless, the text does indirectly indicate that these mortalities, likely the result of shortage-related epidemic(s), took place in the spring, that is, when the Viking party is said to have been hit by disease. Though it is plausible that we are dealing here with multiple outbreaks, particularly considering how common localized epidemics in armies on the move appear to have been, it cannot be said definitively that the Vikings did not suffer the same epidemic(s) that the *Annales Bertiniani* plausibly refers to. We might suspect that if the pestilence was a general affair that it, like the shortage, would have been documented as such, but, as observed, Prudentius, the *Annales Bertiniani* annalist, does not document a peacetime pestilence until 856, some twenty years after taking up the *Annales Bertiniani*. Prudentius, in fact, may have neglected peacetime outbreaks altogether, for like the pestilence reported in the *Annales* in 858, the 856 outbreak may have been penned by Prudentius’ successor Hincmar or another annalist.<sup>576</sup>

847 and 856/58

In a letter from Lupus of Ferrières to Marcward of Prüm dated to August 847 we encounter notice of a possibly regional outbreak of disease (C.1.147). Lupus writes that several members of his community at Ferrières in north-central France, where he was abbot, had fallen sick. No more is known about this disease episode; as in 845, nothing plausibly relevant is found in non-Carolingian or other Carolingian sources. Next, in the mid 850s, we find three contemporary and independent references to pestilences. The *Annales Bertiniani* writes of a pestilence carrying off a ‘great part of the population’ in 856 and the *Annales Xantenses* reports a ‘great pestilence’ raging among the people in 857 (C.1.155, 156). It is unclear whether these two pestilences were linked. The first is implied to have occurred early in 856 and the second sometime in 857. It has been suggested, however, that annalist of the *Annales Xantenses* misdated the pestilence of

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<sup>576</sup> The *Annales Bertiniani* reports no other peacetime epidemics in *Gallia* after that of 858. Prudentius is thought to have written the text until his death in 861, but considering the unusual nature of these references to disease we may suggest that neither he nor Hincmar wrote these entries. See Appendix 4.5 on the composition this text.

857 by a year and that this passage should be assigned to 856.<sup>577</sup> This would certainly make things tidier, but, as has been noted, we should not assume that if a spatially vast or demographically significant outbreak is documented in 856, as in the *Annales Bertiniani*, that it would appear in all the ‘major’ texts of the period; as such, the *Annales Xantenses* passage should not necessarily be reassigned to 856 on account of the reference to an epidemic in the *Annales Bertiniani* in that year. Yet the pestilences reported in the *Annales Bertiniani* and *Annales Xantenses* share several qualities: both are said to have been general affairs and particularly mortal, and neither are tied to a subsistence crisis nor an episode of conflict. Moreover, both texts may refer to the same general region, western *Francia*: whether Prudentius, Bishop of Troyes, documented the outbreak of 856 in the *Annales Bertiniani* or not, the text has a clear western focus, and it has been suggested that this section of the *Annales Xantenses* was written at Cologne, though Ghent too has been proposed.<sup>578</sup> Though no non-Carolingian source or other Carolingian text is known to furnish additional evidence, it is not implausible for these reasons that these two passages do indeed refer to a single outbreak of disease.

The third reference to disease in the mid 850s also appears in the *Annales Bertiniani* (C.1.159). The text mentions a pestilence in conjunction with an earthquake that is said to have affected the area around Mainz in late December 857. No other Carolingian or non-Carolingian text presents any relevant data. However, that the *Annales Fuldenses* reports the earthquake, which it assigns to 1 January, but not the epidemic, may indicate that the disease was limited to western regions of Carolingian Europe that the *Annales Fuldenses* was not primarily interested with.<sup>579</sup> That said, the first explicit mention of human pestilence in the *Annales Fuldenses* comes in 873, some forty-three years after the text begins to provide a contemporary record of events, and the *Annales Xantenses* does not provide any indication of an outbreak of disease in 858. While little is known about the pestilence’s general spatial contours, let alone its temporality, we may conjecture that the area around Troyes, where Prudentius wrote, was possibly affected, if Prudentius, of course, did indeed write this passage and if, of course, he wrote about events that occurred in the locale of Troyes in north-central France.

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<sup>577</sup> *Annales Xantenses* (1909), p. 19.

<sup>578</sup> See Appendix 4.5 and (C.1.25).

<sup>579</sup> For comment see Appendix 4.5.

Whether the pestilence occurred in the area affected by the earthquake or soon after the earthquake is too ultimately uncertain, as is whether this outbreak was associated to those reported in 856 and 857, though we may, for all we know, here be dealing with a very large outbreak of disease spanning 856 to 858.

#### 865 and 869

We next encounter three vague references to disease in the *Annales Bertiniani* that are not mentioned in another text, Carolingian or non-Carolingian. Another epidemic among Vikings pillaging areas of northern *Francia* is reported in the in 865 (C.1.176). The Viking force is said to have been afflicted after attacking St. Denis on an island in the river Seine and it is clear that the disease irrupted in late fall or early winter. Like earlier conflict-related pestilences, this one appears to have been spatially restricted to the army on the march. This outbreak, however, did not take place in a year clearly marked by multiple pestilences or subsistence crisis. In the *Annales Bertiniani* entry for 866 we find highly ambiguous reference to an outbreak of disease. The annalist, Hincmar of Rheims, reports that ‘afflictions’ befell the Bulgarians in 865 (C.1.177). Yet where and when these afflictions irrupted in Bulgaria is unknown, as is whether or not these afflictions were disease-related. The *Annales* next reports an outbreak of disease among Lothar II’s company in the locale of Lucca in late spring or mid-summer 869 (C.1.193). Many of Lothar’s men are said to have died and Lothar himself is known to have succumbed to the disease after reaching Piacenza on 7 August. The party was headed for Lotharinga, having left Benevento in June and stopped in Rome on the way. In his *Chronicon*, Regino of Prüm assigns Lothar’s death to 8 August and stresses that many of his followers did indeed die (C.1.194). Regino’s passage, however, is more than likely dependent, at least partially, on that of the *Annales Bertiniani*. Though the *Annales Fuldenses* does not mention the pestilence, it does provide a contemporary and independent reference for the death of Lothar and ‘many’ in his company in the summer of 869.<sup>580</sup>

#### 867/68

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<sup>580</sup> The text, however, claims that Lothar died in July: Nelson (1991), p. 59.

More can be said about the shortage related deaths of the late 860s. In 867, the *Annales Xantenses* writes of an edict distributed by Frankish rulers that spoke of an imminent threat of a subsistence crisis and pestilence (C.1.178). Where the pestilence or shortage was thought to occur is not specified. The eventual food shortage, however, is well evidenced as discussed in 2.4.2. It appears to have set in late 867, persisted for about two years, and afflicted regions of northern and southern Carolingian Europe. Though few of the texts that document the shortage, explicitly report a human pestilence, it is probable, if a pestilence was tied to this crisis, that it too afflicted a wide area, as there are multiple contemporary indirect references to epidemic(s) during the food shortage. Three interdependent texts which likely derive from a common source composed at either Reichenau or St. Gall – the *Annales capituli Cracoviensis*, *Annales Sangallenses maiores* and *Annales Weingartenses* – document, in conjunction with the food shortage, a *mortalitas* of humans and animals in 868 (C.1.185, 186, 187), the *Annales Fuldenses* describes a subsistence crisis ‘throughout’ *Germania* and *Gallia* that caused an ‘immense loss of life’ in 868 (C.1.183) and the *Annales Bertiniani* report that thousands died in the crisis in 868 (C.1.184). Additionally, the *Annales sanctae Columbae Senonensis* writes of an ‘unheard of mortality through almost the whole empire of the Franks’ in 868 (C.1.189), and in 869 the *Annales Xantenses* reports that many died in the shortage in *Burgundia* and *Gallia* (C.1.192).<sup>581</sup> Byrhtferth’s *East Anglian Chronicle* also documents a human mortality in 868 in conjunction with a subsistence crisis in 869 (C.3.77). Yet this text, which was composed in the late tenth century at the Ramsey Abbey, is known to be highly composite and it is probable that this particular entry is dependent on the *Rouen Annal* and thus relevant to upper Normandy, not southeastern England.<sup>582</sup> While only the *Annales Xantenses*, in 867, assigns human deaths to *pestilentia*, there is, of course, good reason to believe that the excess deaths this shortage produced, like those the shortage of the early 760s and early 790s produced, were primarily the result of disease. Whether there were multiple epidemics or one single pestilence in the context of the shortage is, however, uncertain. It is plausible, though, that the disease that claimed

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<sup>581</sup> The editors of this text suggest again that this passage is a year late, and should, in fact, be assigned to 868.

<sup>582</sup> See (C.3.20). Conversely, it is also possible, considering its form and content, that the passage in the *East Anglian Chronicle* for 869 is dependent in some way on those encountered in the *Annales capituli Cracoviensis*, *Annales Sangallenses maiores* and *Annales Weingartenses*.

the lives of Lothar II and his men in 869 was not related to these crisis epidemic(s). As discussed below in 1.5.4.1, the location and seasonality of that outbreak imply that it might have been another regional, if not local, occurrence of malaria. Aside from the East Anglian text, no other non-Carolingian source seems to document any human mortality during the shortage of late 860s.

#### 873/74

In 873 and 874 we find several explicit and plausible references to outbreaks of disease, again in the context of a subsistence crisis. The *Annales Xantenses* writes that Frankish people were visited by several ‘pestilences’ in that year (C.1.202), the *Annales Fuldenses* documents ‘many’ human deaths in *Germania* and *Italia* on account of a food shortage that followed in the wake of the locust swarm of 873 (C.1.200), and in his near contemporary reference in his *Chronicon*, Regino explicitly states that a pestilence, which killed ‘many,’ occurred in the wake of the locust swarm (C.1.204). Though Regino ties this *pestis* to the stench of decaying locusts, it is probable that it was associated to the food shortage of the early 870s recorded by several other texts. In 874, the *Annales Fuldenses* reports that a third of the population of *Germania* and *Gallia* was lost in the shortage (C.1.209) and the *Gesta abbatum sancti Bertini Sithiensium* documents a mass mortality of humans (C.1.210). While most deaths during the shortage can be assigned to disease – Regino, the *Gesta abbatum sancti Bertini Sithiensium* and *Annales Fuldenses* in 874 write specifically of outbreaks – the contours of the subsistence crisis, as well as the path and prevalence of the locusts, are somewhat vague, as discussed in 2.4.2. Regino places the pestilence along the shores of the North Sea but both references in the *Annales Fuldenses* and what is known of the shortage’s spatiality indicate that outbreaks coinciding with shortages would have been quite common in several areas.<sup>583</sup> When these outbreaks and those referred to in the aforementioned texts occurred is unknown. Regino also refers to an army of Charles the Bald being afflicted by a pestilence and food

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<sup>583</sup> Of course, it is uncertain whether we are dealing here with a single pestilence or multiple pestilences. In writing of *plagae* in 873, the annalist of the *Annales Xantenses* was surely referring not only to disease but also to the locust swarm of that year, flooding along the river Rhine, and the early onset of the winter of 873/74: (C.1.197, 198, 201). In one instance the *Annales Xantenses* annalist explicitly refers to the locusts as a ‘plague’ (C.1.202). We should not, as such, consider his use of the plural as indicative of there been multiple epidemics.



shortage in 873 as it laid siege to Angers in northwestern France (C.1.205). We may infer, naturally, that this was a part of the larger disease and hunger experience of 873/74. No other text, Carolingian or non-Carolingian, provides additional insight. Hincmar does not mention the pestilence in the *Annales Bertiniani* though the reference to disease and hunger in the *Annales Fuldenses* and *Gesta abbatum sancti Bertini Sithiensium* signify that the area with which Hincmar was primarily concerned was affected.

877/78

The *Annales Fuldenses* then document multiple pestilences in close sequence in 877 (C.1.214). Possibly two epidemics, characterized by different symptoms, are said to have irrupted in *Germania*, along the river Rhine especially,<sup>584</sup> and Karlmann's army is said to have been weighed down by disease after encountering Charles the Bald's force in *Italia*. The *Annales Bertiniani*, which overlooks these epidemics, informs us that Karlmann himself fell sick (C.2.46). It appears that he and his company were afflicted in the autumn in northwestern Italy around Pavia and Tortona.<sup>585</sup> Whether the *Annales Fuldenses* annalist meant to refer to two individual epidemics along the Rhine with *febris dolorque oculorum* is unclear. Of course, one disease may have been characterized by both fever and eye pain. It is also possible that the *pestilentia* that infected Karlmann's force may have been the same as that which irrupted in *Germania*: the disease, or one of the diseases, along the Rhine is labeled *Italica febris*. The situating of the outbreak along the Rhine, however, may not, as noted, reflect the actual extent of the pestilence. On the other hand, the repeated notice of disease along the Rhine may be an indication of a reoccurring disease in the region.

The *Annales Bertiniani*, *Annales Fuldenses* and Regino of Prüm also inform us that Charles the Bald was struck by a disease in the autumn of 877 in *Italia* en route to Maurienne in southeastern France (C.2.43, 44, 45) and the *Annales Fuldenses* implies

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<sup>584</sup> Though, as noted, 'along the Rhine' was a common expression, one which we should not plausibly take at face value.

<sup>585</sup> Charles was in Vercelli, then Pavia and then Tortona. He is said to have attempted to flee to Maurienne once hearing of Karlmann's approach, though it does not appear he ever reached Maurienne. As indicated by the *Annales Fuldenses* and, in particular, the *Annales Bertiniani*: Nelson (1991), pp. 200-03.

that Charles' army was weighed down by disease.<sup>586</sup> Hincmar reports that Charles' disease was characterized by *febris*, but the *Annales Fuldenses* writes of *dissinteria*. It is not impossible, considering the proximity in time and space of both outbreaks, that both Charles and Karlmann, and their armies were afflicted by the same pestilence. Whether the epidemic was regional or local in scope, or tied to that recorded for *Germania*, however, is ultimately unknown: that Charles may have suffered a fever and that the German pestilence was characterized by fever is not a definitive indication either way, and no other source, Carolingian or non-Carolingian, provides additional information.

Three texts, the *Annales Fuldenses*, *Petri bibliothecarii historia francorum abbreviate* and *Folcwinii gesta*, document a human and cattle mortality in 878 (C.1.215, 216, 217). The *Annales Fuldenses* may be the root source for the other two texts, none of which provide any direct comment on the spatiality of the human mortality. Again, we should not assume that the human and cattle mortalities were pathogenically related. In any case, the *Annales Fuldenses* and *Petri bibliothecarii historia francorum abbreviate* themselves indicate that the two were separate events: the first text differentiates the two by referring to a cattle 'pestilence' and human 'mortality,' while the second writes of cattle 'pestilence' and human 'destruction.' These two texts report that the cattle pestilence occurred in *Germania*. The former specifies that bovines around the Rhine, Worms in particular, were affected, and the latter implies that cattle also died in regions east of Carolingian Europe. Whether the human mortalities occurred in the same regions, however, is not known. That the major western Carolingian texts, the *Annales Bertiniani* and *Annales Vedastini* (the *Annales Xantenses* concludes in 873), neglect to mention either the human or livestock mortalities may indicate that both were particular to eastern Carolingian Europe, though this is far from certain. Similarly, that Regino overlooks the human and bovine deaths should not be taken as an indication of their regional scope, as he fails to mention any pestilence after 873. For all we know the human mortality was associated to the aforementioned pestilence(s) in *Germania*, along the Rhine, and *Italia* in 877.

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<sup>586</sup> The annalist writes that his army was afflicted on account of the stench emanating from Charles' dead body.

The Bavarian continuation of the *Annales Fuldenses* reports two outbreaks of disease in 882 (C.1.221, 222). The first is said to have occurred during Charles the Fat's siege of Viking occupied Asselt near the river Meuse in the summer. Both the army carrying out the siege, and the besieged Vikings, are reported to have suffered disease. The outbreak may, as such, have afflicted the general area. The second pestilence is said to have irrupted in *Bavaria* once the Bavarian contingent of Charles' army returned from the siege in late summer or early fall. Whether the Bavarians carried the disease to *Bavaria*, or the outbreak's initial irruption in *Bavaria* happened to correspond to their return, is not specified. We may speculate that the disease irrupted in Bavaria after the army returned in late summer or early autumn, as Charles' force is said to have consisted of Lombards, Alemans and Franks none of whom are said in any source to have sustained an epidemic after the siege. The Bavarian continuation of the *Annales Fuldenses*, however, maintains a strong Bavarian focus in all but one of its reports of peacetime pestilences and shortages,<sup>587</sup> the primary western Carolingian text for this period, the *Annales Vedastini* (the *Annales Bertiniani* concludes in 881), does not record peacetime pestilences at all, and, as specified, Regino ignores all epidemics of the 880s, '90s and first decade of the tenth century.<sup>588</sup> Though nothing relevant has been found in non-Carolingian texts, we should not, as such, read much into the silences of the western texts.

### 883 and 888

In 883, the Bavarian continuation records an outbreak of disease among Berenger I's army in *Italia* (C.1.224). Berenger intended to confront Wido, count of Tuscany, and it appears that his army was infected in either the locale of Tuscany or nearer Spoleto in the spring. However, the annalist observes, and uniquely so for a report of a conflict-oriented outbreak, that the outbreak was not isolated to Berenger's company but prevalent throughout *Italia* and that the Italian king and his court were also infected. Nothing further about this pestilence is known of. In 888 we encounter another conflict-oriented epidemic in the *Annales Vedastini* (C.1.234). It is said that a food shortage and outbreak

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<sup>587</sup> See (C.1.241, 243, 253). That the text places the pestilence in Bavaria, as such, is neither suprising nor necessarily indicative of the pestilence's Bavarian focus.

<sup>588</sup> Regino's chronicle concludes c.909: see Appendix 4.5.

of disease afflicted those in Viking-besieged Meaux. From the context in which the siege is reported, we may suspect the outbreak occurred in the spring and summer.

889

In 889, the Bavarian continuation of the *Annales Fuldenses* appears to document two epidemics, one that ‘weighed down many’ and another that spread ‘here and there’ (C.1.235). Though the first of these is specified to have come from *Italia* and to have been characterized by a cough, and though these two references are not directly tied to one another in the text, it is unclear whether the annalist here indeed refers to multiple pestilences. The text indicates that these epidemics, or epidemic, took place in the spring, but where they occurred is entirely unknown. Considering the strong Bavarian slant of the text, we may speculate that they occurred in at least in Bavaria, perhaps around the locale of Regensburg where they were then composed.<sup>589</sup> No other text is known to report a mortality in 889, but two minor texts, the *Annales capituli Cracoviensis* and *Annales Laubacenses*, respectively record a ‘great’ and ‘extraordinary’ human pestilence in 890 (C.1.237, 238). Whether these brief interdependent references refer to the same disease mentioned in the Bavarian continuation is, of course, unclear, but not impossible. Both texts give no indication as to where the *mortalitas* they document occurred or when in 890, but we may infer that it took place in northern *Francia* around the locale of Lobbes where the *Annales Laubacenses*, which is quite possibly the root source for the 890 pestilence, was composed. If this pestilence was associated to that reported in 889, possibly at Regensburg some 800 km to the southeast, we may be dealing with another major outbreak of disease in the Carolingian period.

895/97

We next encounter five plausible references to pestilence(s) in the mid 890s in the context of another food shortage. Passages in the *Annales Augienses*, *Annales Colonienses* and *Annales Besuenses*, which are undoubtedly interrelated, simply document a human *mortalitas* in 896 (C.1.242, 248, 249).<sup>590</sup> The Bavarian continuation

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<sup>589</sup> On the composition of this text see Appendix 4.5.

<sup>590</sup> The *Annales Besuenses* misdates this passage to 893.

of the *Annales Fuldenses* also reports that ‘many’ people died in 895 on account of hunger (C.1.243) and in 897 the same text again reports that ‘many’ people died in a food shortage (C.1.253). The spatial contours of this mortality are somewhat unclear. The three interdependent passages, whose common source was likely the *Annales Augienses*, specify that the shortage occurred on Reichenau Island in Lake Constance and both passages in the Bavarian continuation place the mortality and shortage in *Bavaria*. As discussed in 2.4.2, the subsistence crisis may have been, on the continent, restricted to eastern Carolingian Europe. While it is possible that the second reference to the shortage in the Bavarian text is a doublet and that we possess two unique plausible references to human mortalities in the food shortage of the mid 890s, not five, we may suspect that the disease(s) reported in these texts were rather widespread and not limited to *Augia* and *Bavaria*, but central Europe in general.<sup>591</sup> Of course, the absence of disease in the sole remaining major western Carolingian text, the *Annales Vedastini*, cannot be thought to support this possibility. No other clearly relevant information is found in other Carolingian texts.

In his *Antapodosis*, which he wrote in the 960s, Liuprand of Cremona reports that an epidemic hit Arnulf of Carinthia’s army in Pavia in 895, and the *Anglo-Saxon Chronicle*,<sup>592</sup> which appears to have been initially compiled in the mid 890s, documents an epidemic and cattle epizootic that ‘crushed’ the English people for three years, c.895/97 (C.3.90, 91).<sup>593</sup> Whether these human deaths are related to those reported in Frankish sources is uncertain. The three interrelated central European texts mention Arnulf’s crowning as emperor in Rome in conjunction with the pestilence in their brief report of the events of 896, but the contemporary record of the Bavarian continuation specifies that the disease that irrupted in Arnulf’s ranks only affected equines (C.1.250). The food shortage of the mid 890s, however, is thought to have also affected insular Europe and it is very possible that the epidemics reported in the *Anglo-Saxon Chronicle*

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<sup>591</sup> That we are dealing with a doublet here seems probable as the second section of the Bavarian continuation is thought to commence in 896 (see Appendix 4.5) and considering that this second section, unlike the first, reports no other peacetime epidemics or food shortages, and that the form and content of the entries for 895 and 897 are near identical.

<sup>592</sup> Arnulf appears not to have been afflicted in this epidemic. Liuprand specifies that he died of disease in 899.

<sup>593</sup> On the dating of these texts see (C.3.21, 90).

were a part of a more general affair tied to the subsistence crisis, as the annalist implies and as the Carolingian pestilences likely were.

924

Our next epidemic comes over a quarter century later. In 924, Flodoard of Rheims provides a contemporary account of a pestilence irrupting among the Magyars in *Gothia* in southern *Gallia* (C.1.260). The outbreak, which seems to have occurred in the summer, is said to have been characterized by *dissinteria* and to have been limited to the force which had been pillaging areas of northern *Italia* and southern *Francia* in the spring and summer, and which had come to *Gothia* from Pavia, a distance of about 450 km, following a difficult pass through the Alps. No other evidence relevant to this outbreak has been found in other texts, though Flodoard himself specifies that Pavia was heavily depopulated after the Magyars visited the region before reaching *Gothia*,<sup>594</sup> which may be an indication that disease generally afflicted the peoples of the locale of Pavia, and perhaps even *Gothia*. That said, Flodoard, unlike some of his contemporaries, did not tightly restrict his view of disease to conflict-oriented epidemics or, for that matter, to overlook peacetime epidemics.<sup>595</sup>

927

In 927, for instance, Flodoard penned our next report of a peacetime pestilence. He writes of a large outbreak of disease in *Germania* and *Gallia* that he describes as being ‘mixed,’ characterized by two symptoms (C.1.263). He implies that outbreak took place in the spring and that it claimed the life of Widricus, Bishop of Metz. It is possible that Flodoard intended to imply that two epidemics then afflicted *Germania* and *Gallia*, when labeling the pestilence *mixta* and *quasi febris et tussis*, though this is uncertain. Moreover, he elsewhere describes a disease as having ‘diverse’ symptoms (C.1.269). More specific temporal parameters of the epidemic(s) are also unattainable, though we may suspect that the outbreak affected the vicinity in which Flodoard wrote, Rheims, as well as Metz

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<sup>594</sup> Flodoard estimates that only two hundred people remained in the region: Fanning (2004), p. 11.

<sup>595</sup> See, for instance, (C.1.263, 269, 292, 300). This said, Flodoard only documents two conflict-oriented pestilences and both concern the Magyars in *Francia*, though the second passage, like the first, cannot be tied to any regional or general epidemic (C.1.296).

roughly 200 km away, presuming that the Bishop of Metz succumbed to the disease and that he was in Metz when he did so. Flodoard, at least, did regularly document the ongoings of his own locale and he does set up his account of this pestilence with a notice of a comet seen from Rheims. Other relevant information is not encountered in early Ottonian. The absence of this epidemic in Widukind's *Res gestae saxonicae* and Adalbert of Magdeberg's *Chronicon* should not be thought indicative of its absence around Corvey or Wissembourg in Alsace, where Widukind and Adalbert respectively wrote, as both authors fail to provide us with any explicit references to peacetime epidemics.

934 and 941/42

In 934, Flodoard documents another pestilence about which we know very little (C.1.269). He again ties the outbreak to a comet seen in the sky from Rheims, this time in mid October, and implies that a representative of the church, Adelmarus the deacon of Verdun, succumbed to the disease. Yet again nothing relevant is found in other texts and it is unclear how soon the pestilence set in after the comet appeared and whether it affected locales around both Rheims and Verdun, 100 km apart. Widukind and Adalbert provide no additional information. We next encounter two plausible reports to disease in 941. The first is found in an epigram of Rumold, Bishop of Munster (C.1.279). It records that an epidemic laid low many bodies. The bodies, however, are specified to have been *fera*, and there is a chance that this is a reference not to human deaths but the animal deaths. As detailed in 1.4.2.2, cattle mortalities are fairly well documented c.939/42. Still, the description of the *corpora* as *fera* is also quite unusual for notice of an epizootic and it is possible that these deaths can be tied to the subsistence crisis known to have affect much of *Germania* c.940. Considering the scale of the shortage, detailed in 2.4.2, it is safe to suspect that outbreaks of disease were then common as they appear to have been in the early 760s, early 790s, late 860s and mid 890s. In mid October 941, Widukind also mentions people being terrified by the sight of comets, which they thought, he writes, foretold the arrival of a pestilence (C.1.280). Though he fails to specify whether an epidemic did indeed occur and he does designate where it was expected to take place, Widukind's notice of the expected pestilence does appear in the context of a food

shortage which is known to have affected central Europe, including, we may suspect, the locale of Corvey where Widukind wrote in the early 960s and is known to have been in the early 940s, and about which he may very well have been best informed.<sup>596</sup> With the scale of the shortage in mind, it is not implausible that both Corvey and Munster were indeed hit by shortage-related epidemics *c.*940, whether or not Rumold's epigram refers to human deaths; as in earlier similar shortages epidemics may have been quite common. Though no other early Ottonian source ascribes human mortalities to disease or hunger *c.*940, Bar Hebraeus documents a terrible human pestilence in 940 in the context of a subsistence crisis some distance away in Baghdad (C.3.104). Of course, it would be highly speculative to claim that these Middle Eastern and European outbreaks were linked, though there is reason to believe, as discussed in 2.4.2, that both were tied to food crises triggered by the extreme weather of the late 930s.

945

Flodoard provides us with our last reference to a pre-950 pestilence (C.1.292). He writes that in 945 people in the area around Paris and 'various other regions' were consumed by a *pestilentia*. What areas outside of Paris he refers to are unknown, though we may suspect that had the plague affected the area around Rheims, some 140 km east, or had it been a general affair of *Germania* or *Gallia*, Flodoard would have indicated so, as he did in 927 and 934. That he does not state that large territories were afflicted, let alone the area of Rheims, as he does in his description of other epidemics (C.1.263, 269, 292, 300), may certainly indicate that this outbreak was a regional affair confined to the greater area of Paris. Still, the omission of this pestilence in the works of Widukind and Adalbert cannot be taken as proof of its regional scope. We may conjecture based on the context of this report in Flodoard's text that this epidemic irrupted in the autumn, or possibly the late summer, of 945.<sup>597</sup>

#### 1.4.2.1.1 Diagnoses of epidemics for heuristic purposes

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<sup>596</sup> See Appendix 4.5.

<sup>597</sup> Notice of the pestilence follows notice of the death of Bishop Richarius of Tongres and the Viking capture and release of king Louis IV at Rouen, both of which appear to have taken place in the late summer and autumn.



Now to diagnosing. As outlined in 0.1.6.3, diagnoses are suggested here for heuristic purposes carried out in Part 3. Clearly, we have little grounds on which identify any of these pestilences. Symptoms and indications of epidemiology are rarely given, making comparisons with modern diseases and modern outbreaks of disease difficult. Often all we know for certain is that high mortality was high, from which we may infer that morbidity was high. Nothing approaching a definitive diagnosis can be established. If existing aDNA finds are accurate, we may presume that bubonic plague, dysentery, malaria, and typhoid did exist in pre-modern Europe, and, consequently, that these ‘modern’ diseases could have been the cause of Carolingian and early Ottonian pestilences. *Y. pestis* has now been isolated in DNA derived from eighteenth-century Berre L’Etang, Marseilles and Martigues, seventeenth-century Draguignan, sixteenth-century Lambesc, fourteenth-century Montpellier, seventh-ninth century Vienne, and sixth-century *Bavaria*.<sup>598</sup> Typhoid has been identified in remains dating to the fifth-century BCE Athens and dysentery (*Entamoeba histolytica* and *Giardia duodenalis*) has been isolated in crusade-era latrines in Acre.<sup>599</sup> Human malarias, including *Plasmodium falciparum*, have been isolated in remains from late Roman *Italia* and ancient Egypt.<sup>600</sup>

Epidemics tied to shortages, including those of 762, 793, 845, 867/69, 873/74, 895/97 and 941/42, may have been the result of a wide array of pathogens, both pathogens associated to the inhibited immune function that follows in the wake of a subsistence crisis and those not conditioned by nutritional status but spread via the socio-economic conditions a shortage commonly engenders. In these years we could be dealing multiple outbreaks of cholera, dysentery, influenza, measles, smallpox, typhus or typhoid. Migration for food and work in periods of food crisis may also introduced people to diseases endemic to particular regions and environments, such as malaria, and resulted in outbreaks of epidemic proportions of typically endemic infections.

Occurrences of rickets and scurvy of epidemic proportions might even develop in the

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<sup>598</sup> Drancourt et al (1998); Raoult et al (2000); Drancourt and Raoult (2002); Drancourt et al (2007); Garrelt and Wiechmann (2003); Wiechmann and Grupe (2005); Drancourt et al (2007); Bianucci et al (2008a, 2008c). Bianucci et al (2008c), p. 361, label their *Y. pestis* detections as ‘preliminary.’

<sup>599</sup> Papagrigoriakis et al (2006); Papagrigoriakis, Yapijakis and Synodinos (2008); Mitchell, Stern and Tepper (2008).

<sup>600</sup> Italy: Sallares (2002); Sallares and Gomzi (2001); Soren (2003). Egypt: Bianucci et al (2008b); cf. Taylor, Rutland and Molleson (1997).

wake of food shortages, though this is unlikely to result in sudden widespread mortality. Epidemics that do not appear to be associated to shortages, like those of 786, 801, 803, 805, 807/08, 856/58, 882, 889/90, 927 and 934, may have been diseases spread effectively via the respiratory tract and between people, such as influenza, measles, pneumonic plague and smallpox, and not soil- or vector-borne diseases.<sup>601</sup> Epidemics that seem to have covered a lot of ground in a short period of time, possibly such as those of 801, 807/08, 820, 823 and 856/58, may have been the result of exceptionally communicable diseases, which are easily spread between people, like influenza, while those that appear to have been more regional in scope may have been the result of pneumonic plague and smallpox. The former is so virulent that it is self limiting and highly unlikely to develop into a trans-boundary pestilence.<sup>602</sup> Siege-oriented outbreaks of disease, like those of 882 and 888, and pestilences that hit armies on the march, like those of 820, 834, 839, 845 and 924, in years not marked by subsistence crisis may have also, like shortage epidemics, been camp diseases, such as dysentery and typhus, though cholera and typhoid should not be removed from consideration.<sup>603</sup>

The symptoms that the sources do provide require some further attention. The epidemics of 842/43, 889 and 927 were characterized by a cough, which points to a respiratory disease, possibly influenza;<sup>604</sup> the outbreak of 856/58 was distinguished by swollen tumors, sores and dissolving limbs, which may be an indication of bubonic plague, smallpox or a complex of diseases breaking out simultaneously. Considering the extent of this possible pandemic, the suggested diagnosis of the report of the outbreak in the *Annales Xantenses* of ergotism poisoning should be rejected; the outbreak of 865 was characterized in part by a skin rash and diarrhea, which points to wide number of diseases, including measles and smallpox;<sup>605</sup> the epidemic of 924 was characterized by

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<sup>601</sup> [www.who.int/mediacentre/factsheets/smallpox/en](http://www.who.int/mediacentre/factsheets/smallpox/en); [www.who.int/mediacentre/factsheets/fs286/en](http://www.who.int/mediacentre/factsheets/fs286/en); [www.who.int/mediacentre/factsheets/fs211/en](http://www.who.int/mediacentre/factsheets/fs211/en). Vector borne diseases are local or regional in occurrence, being restricted by the ecology of their vector. They are highly sensitive to temperature, rainfall and humidity. These factors, as McMichael and Woodruff point out, affect their proliferation and population density: (2008), pp. 385, passim; also Patz and Olson (2008), p. 94.

<sup>602</sup> [www.who.int/mediacentre/factsheets/fs267/en](http://www.who.int/mediacentre/factsheets/fs267/en).

<sup>603</sup> Food- and water- borne diseases other than cholera, dysentery and typhus, like Salmonella, are unlikely to have been behind these conflict plagues. They are less morbid and mortal. [www.who.int/topics/salmonella/en](http://www.who.int/topics/salmonella/en).

<sup>604</sup> [www.who.int/mediacentre/factsheets/fs211/en](http://www.who.int/mediacentre/factsheets/fs211/en).

<sup>605</sup> Measles can cause severe diarrhea: [www.who.int/topics/measles/en](http://www.who.int/topics/measles/en).

diarrhea which points to cholera or dysentery, quite possibly the latter as only 20 per cent of modern cholera cases develop diarrhea;<sup>606</sup> and the mortality of 945 is said to have been characterized by a burning sensation in the limbs, or, in Flodoard's words, '*ignis plaga*,' which may be an indication of smallpox or, as some have suggested, ergotism poisoning; both are considered in 3.2. Several epidemics, such as those of 839 and 927, were distinguished by fever. *Febris*, of course, may point to any number of pathogens, including influenza, measles, pneumonic plague or smallpox. Many of these epidemics characterized by fever, however, occurred in *Italia*, which forces us to consider the existence of malarial epidemics.

#### 1.4.2.2 Livestock pestilences

791

The first stock mortality in our sources is recorded in the revised version of the *Annales regni francorum* (C.1.51). In 791, the reviser reports that a pestilence (*lues*) irrupted among the equines under Charlemagne's command on his first campaign against the Avars. The reviser is thought by most scholars to have written either in the first years of the ninth century or soon after the death of Charlemagne in 814. His account of the pestilence is not, thus, necessarily a firsthand witness, though it is possible that he may have heard of the pestilence from a source closer to the event or used some earlier written record.<sup>607</sup> Not only is this source for the pestilence not contemporary, but no other text, Carolingian or non-Carolingian, explicitly documents the pestilence.<sup>608</sup> The *Annales regni francorum* and *Annales Laureshamenses* tell us that the Charlemagne set out from Regensburg in the fall of 791, proceeding along the south bank of the Danube with Saxon and Frisian auxiliaries, under the command of Theodoric and Meginfried, marching along the north bank. At Cumeoberg and Kamp, north of Vienna, the Franks encountered the Avars, reportedly forced them to flee, and pursued them on both sides of the Danube

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<sup>606</sup> [www.who.int/mediacentre/factsheets/fs107/en](http://www.who.int/mediacentre/factsheets/fs107/en).

<sup>607</sup> While the reviser implies that he had an oral source and that he was not involved with the 791 campaign when stating that a tenth part 'is said' to have survived, this may be nothing more than a literary construction. Some have suggested that the reviser wrote closer to 830: McKitterick (2005), p. 27. On the composition of the revised *Annales regni francorum* see (C.1.50).

<sup>608</sup> Though see remarks on the Poeta Saxo's report of disease in 791 given in 1.4.2.1.

as far as the river Raab (also Raba). There the auxiliaries appear to have begun their return, while Charlemagne pushed on as far as Savaria (Szombathely).

Exactly where the horses were infected on this campaign is unknown. Presumably, Charlemagne ended his offensive at Savaria in northeastern Hungary on account of the equine losses his contingent sustained. Yet whether his horses succumbed at the Danube tributary, before they reached the tributary, in the immediate environs of Savaria, on the return home, or at multiple points throughout the campaign is uncertain.<sup>609</sup> At no other point in Carolingian or early Ottonian sources are equines said to have succumbed to an infection in Pannonia, along the Danube or Raab, or near Cumeoberg or Kamp, though it has been suggested that a similarly significant number of Frankish horses was never again present in the area.<sup>610</sup> It is also unclear whether only those animals under Charlemagne's command were infected, as the reviser implies, and not those of his auxiliaries, the Avars, or the region generally, as the reviser tended not only not to speak to the general affairs of Carolingian Europe but to associate the misfortunes he added to the *Annales regni francorum* directly to the king.<sup>611</sup> Further, Charlemagne's auxiliaries may have turned back before the king on account of an outbreak of disease among their horses and Charlemagne may have pushed on as far as he could after sustaining losses to his cavalry, as Louis the Younger did following the equine pestilence of 896. That the campaign was called off strictly because of the horse mortalities is, while possible, also not definitely certain, Charlemagne may have simply turned back, in what would have been late October, on account of the onset of winter. While it is unlikely that equines were afflicted across Carolingian Europe in 791, it is possible that the Avars sustained

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<sup>609</sup> Cf. Gillmor who holds that the losses took place near Savaria: (2005), pp. 26-7, 29-30; (2008), p. 32.

<sup>610</sup> Gillmor (2005), p. 30. No equine mortalities are reported when the Franks defeated the Avars in 796.

<sup>611</sup> Many of the reviser's additions to the *Annales regni francorum* concern military reverses and discord between Franks as well as with neighboring peoples (in 760, 775, 778, 782, 785, 789, 792, 793 and 798), and environmental or biological shocks such as this equine pestilence and the heavy rains reported in 793, and the vast majority of them concern, or are directly associated to, the king or ruling elite. For instance, instead of reporting on the subsistence crisis of the early 790s, the reviser writes only of how the heavy rains of the 793, which others texts tie to failed harvests and food shortage, ruined Charlemagne's attempts to dig a massive ditch between the rivers Rezat and Altmühl. On the shortage see 2.5.2; on the ditch see Squatriti (2002). Gillmor takes the reviser verbatim and asserts that only the horses under Charlemagne's command were infected.

considerable losses in *Pannonia* and that this may have partially accounted for their military decline and defeat in 796.<sup>612</sup>

801

In 801, the *Annales Lobienses* document an outbreak of disease (*pestilentia*) among cattle (C.1.69). The text assigns no spatial or temporal contours to the pestilence, though the pestilence is reported in conjunction with an earthquake that is specified to have affected *Gallia* and *Germania*, especially areas along the Rhine. It is uncertain, of course, whether the epizootic affected the same area as the earthquake. As noted in 1.4.2.1, the outbreak is also reported in conjunction with a human mortality documented in the *Annales regni francorum* and by the Poeta Saxo. Like the cattle pestilence, however, this human mortality is not ascribed any contours. The *Annales Lobienses* are thought to have been composed at Lobbes and we may suspect that the pestilence affected bovines in northern *Francia*, at least the Hainaut area of Belgium, though we should not presume that the annalist wrote of events that occurred in his vicinity and we may, considering the similarities of this passage with that of the *Annales regni francorum* for 801 (C.1.68), suspect that the pestilence occurred not only in the locale of Lobbes, but the locale of Aachen, some 130 km east, in which the *Annales regni francorum* entry for 801 may have been composed.<sup>613</sup>

No other Carolingian text documents the pestilence.<sup>614</sup> However, the *Historia Regum*, possibly written by Simeon of Durham in the twelfth century, records a great

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<sup>612</sup> Though the reviser's focus was set east of the Rhineland and he may not have reported a pestilence west of the Rhine had it occurred, Pippin and Louis took an army into *Italia* in 793, which implies that western stocks were not seriously affected: (C.1.57, 58, 59).

<sup>613</sup> The *Annales Lobienses* and *Annales regni francorum* entries are nearly identical other than that the former does not report the cattle pestilence. That the latter does not report bovine deaths does not necessarily indicate that cattle did not die in the region in which the text was written but that the text may not have been the root source of the *Annales Lobienses*.

<sup>614</sup> That said, it is not unreasonable to speculate, considering his confused account of the 791 equine epizootic, that the Poeta Saxo's vague report of a pestilence in 801 is, in fact, a reference to bovine mortalities (C.1.70). If so, we may speculate that the bovines died in the region of Corvey, where the poet wrote and drew upon materials to compose his *vita* of Charlemagne. In fact, the poet's may have used the plural *morbi* in order to convey that both humans and livestock were affected by disease in 801, as *Annales Lobienses* observed. Agnellus also indicates that he was aware of this pestilence. In a 'sermonette' contained in his description of Gratosus' time as bishop at Ravenna, he mentions, in the future tense, that 'there will be a savage and dreadful plague against men and beasts' and that there 'will be a disaster against nature and against cattle and beasts of burden.' (2004), pp. 293-94. Gratosus was succeeded by Valerius who remained at Ravenna until c.810.

destruction of cattle in 800 (C.3.48). Though no specific spatial or temporal contours are given, and though the epizootic is only said to have afflicted ‘various places,’ it is possible that this passage refers to bovine deaths in Northumbria. Simeon is known to have been active in Durham and it has been suggested that much of the earlier portions of this text, including this passage which does not appear in another insular source,<sup>615</sup> depend on no-longer extant material from northern England.<sup>616</sup> There too is little reason to think that this passage was sourced from the continent, as it is quite unlike that of the *Annales Lobienses*, let alone that of the *Annales regni francorum*.<sup>617</sup> Moreover, the focus of the *Historia regum*, like Simeon’s *Libellus de exordio atque procursu istius, hoc est Dunhelmensis ecclesie*, is set in the locale of Durham, and a reference to continental affairs would be quite out of character for the text. The passage is also quite unlike insular references to the cattle mortality of c.810, which implies that neither the author of the *Historia regum* nor his source confused the dating of this pestilence.<sup>618</sup> However, whether we are dealing with a pan-European pestilence here – in effect a precursor to what was to come in c.810 – is ultimately uncertain. It may be unlikely that widespread simultaneous deaths of cattle in two regions of Europe in one year would have been unrelated, but it is not impossible. Still, definitive claims about a panzootic c.800 should be avoided on account of the scantiness of the written evidence.

809/10

Much more can be said about bovine mortalities ten years later. At least four contemporary sources document a cattle pestilence c.810. In 809 the *Chronicon Moissiancense* writes of a great mortality of animals (C.1.85), in 810 the *Annales regni francorum* documents a pestilence among cattle (C.1.87), in his *De grandine et tonitruis* composed c.814, Agobard of Lyon wrote of a very widespread mortality of cattle ‘a few years ago’ (C.1.88), and in 810 the *Annales Laurissenses minores* document the ‘greatest mortality’ of cattle (C.1.89). In addition, the Poeta Saxo, in his late ninth-century *Annales*

<sup>615</sup> As noted in 1.4.2, that the *Brut Y Tywysogion*, *Chronicle of Ireland*, *Anglo-Saxon Chronicle* or the *East Anglian Chronicle* do not document a cattle pestilence c.800 must not be construed as evidence of the absence of cattle disease in England, Ireland or Wales c.800.

<sup>616</sup> Whitelock (1955), p. 239.

<sup>617</sup> Unlike, as discussed below, the reference to a cattle mortality in 869 in Byrhtferth’s *East Anglian Chronicle* (C.3.77).

<sup>618</sup> Of course, either the author or his source may have altered the form and content of a root source.

*de gestis Caroli magni imperatoris*, provides the most verbose extant account of a cattle pestilence in early medieval Europe, which he assigns to 809 (C.1.86), and Notker, in his late ninth-century *Gesta Karoli magni imperatoris*, too documents a devastating cattle mortality in 810 (C.1.92). The *Annales Xantenses* and *Annales sancti Emmerammi Ratisponensis* also provide a brief report of a cattle panzootic in 810 but both texts are quite plausibly dependent on those already mentioned, notably the *Annales regni francorum* (C.1.90, 91).

Few of these texts provide any direct indication of the spatiality or temporality of the cattle mortalities they record. The *Chronicon Moissiacense* very generally observes that the pestilence ‘came from the east and spread over to the west,’ though we may tentatively infer that animals were dying in southwestern Europe, the area in which the text was composed. The *Annales regni francorum* claims that cattle in ‘all the provinces’ subject to Charlemagne were affected. Considering the relationship of the *Annales regni francorum* to the court, we may suspect that the annalist’s claim that much of Europe was affected was not too gross an exaggeration, as though Charlemagne spent most of 810 at Aachen, and areas to the north and east, he is known to have received envoys from Byzantium, *Italia*, Scandinavia and Spain. The text also reports that the disease irrupted in the bovines of Charlemagne’s army when en route to Frisia, which was being pillaged by Vikings, in the late spring. Where on the campaign cattle were hit is, however, unclear. Leaving Aachen in June, Charlemagne crossed the Rhine at Lippeham and then proceeded to the tributary of the rivers Aller and Weser where he heard news that the Vikings had left Frisia and that King Godofrid had died. We are told that he then ‘settled affairs’ in *Saxonia* before returning to Aachen in the autumn.<sup>619</sup> It is plausible that the cattle pestilence appeared in Charlemagne’s animals at the meeting of the rivers Aller and Weser, considering the king’s decision not to pursue the Vikings who were in disarray, or in *Saxonia*, considering that it is unlikely Charlemagne would have been able to march as far as the Elbe, and convincingly settle affairs had the bovines, on which his army relied, died or fallen sick prior.<sup>620</sup>

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<sup>619</sup> The Wilzi had captured a castle on the Elbe and a garrison of east Saxons.

<sup>620</sup> Moreover, it is implied in the *Annales regni francorum* entry for 811 that Charlemagne was unable to recapture the Hohbuoki castle on the Elbe. The significance of bovines in the Carolingian military is addressed in 2.6.

Agobard implies that the outbreak he records was quite general. He writes of a pestilence spreading across ‘fields and mountains, meadows and rivers.’ While he does not specify what fields, mountains, meadows and rivers, he notes that the people of the region in which he wrote, Lyons, claimed that the duke of Benevento had caused the mortality. We may, as such, suspect that Agobard was referring not only to Lyons and the region of central *Francia*, but the Alps and southeastern Carolingian Europe. Though the *Annales Laurissenses minores* provides no indication of the contours of the outbreak it records, it is not unreasonable to speculate that cattle in the locale around Lorsch, where the text was likely composed, were affected.<sup>621</sup> While the *Annales Xantenses* and *Annales sancti Emmerammi Ratisponensis* entries were quite plausibly derived from the *Annales regni francorum*, or even the *Annales Laurissenses minores*, the form and content of their entries for 810 differ remarkably from that of the *Annales regni francorum* and the annalists of either or both of these texts may have had access to other independent sources.<sup>622</sup>

While definitive claims about the deaths of cattle in 810 in the areas around Lorsch and Regensburg, where the *Annales Xantenses* and *Annales sancti Emmerammi Ratisponensis* may have been respectively composed, should be avoided, the Poeta Saxo appears to provide reliable information not found in other texts.<sup>623</sup> Though written c.890, the poet’s *gesta* may exhibit information derived from other materials found at Corvey where the poet seems to have been based.<sup>624</sup> Though the poet speaks generally about the epizootic affecting ‘many lands’ and killing off all domestic bovines, he stresses, uniquely and perhaps not surprisingly, considering his focus on Charlemagne’s presence in *Saxonia* and the eastern regions of Carolingian Europe, that the region of *Noricum* (eastern Austria and Slovenia) and its neighboring regions were particularly affected.

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<sup>621</sup> On the history of the composition of this text see (C.1.33).

<sup>622</sup> On the composition of the early portions of the *Annales Xantenses* see (C.1.25).

<sup>623</sup> The poet is often said to have relied heavily on the *Annales regni francorum* and the revised *Annales regni francorum*, but on occasion he provides evidence relevant to this study not encountered in those texts, as seen above in regard to the pestilence of 801 (C.1.70). His dating of the c.809/10 cattle pestilence to 809, unlike the *Annales regni francorum*, may indicate, like the form and content of his passage, that he did not in the least base his account for the 809/10 pestilence on the *Annales regni francorum*. On the Poeta Saxo and his text see (C.1.51).

<sup>624</sup> The poet’s note that some of the details he provides ‘are said’ to have happened, implies that he was working with another non-longer extant text or oral histories made available to him. On the Poeta Saxo and his text see (C.1.51).



Conversely, Notker provides no indication of the contours of the pestilence he records, though he implies that Charlemagne did give up his campaign against the Vikings in Frisia on account of the cattle mortality. It is more than likely that these reports of cattle mortalities *c.*809/10 refer to a massive cattle mortality that spread across much of Carolingian Europe, and possibly, considering the observations of Agobard, and the *Annales regni francorum* and *Chronicon Moissiancense*, regions not ruled by Carolingians, namely eastern Europe and Scandinavia. As it is unlikely that a clearly infectious and mortal disease, which could achieve wide prevalence over a large region, would spontaneously irrupt, or exist enzootically, in Carolingian lands, the epizootic may have spread from eastern Europe, across *Germania* and into *Francia*. Where in the east the pestilence came from is uncertain. Agobard and *Annales regni francorum* give us room to speculate that ‘*ab oriente*’ in the *Chronicon Moissiancense* may have meant Italy or eastern Europe.

Though the pestilence appears in no other Carolingian text – excusing a plausibly relevant reference from the Council of Tours (813) about the inability of magic and incantations to cure sick animals<sup>625</sup> – including Einhard’s *Vita Karoli magni*,<sup>626</sup> possibly related notices of cattle mortalities are encountered in insular sources. The *Annales Cambriae* reports ‘a cattle pestilence in Britain’ in 810 and the *Brut Y Tywysogion* ‘a mortality of cattle over the island of Britain’ (C.3.52, 53). The first of these texts is thought to have been composed on a year-by-year basis at St. David’s in Wales in the late eighth and early ninth centuries. Though the text speaks only very vaguely of the mortalities’ extent, it is contemporary, not to mention independent, of Carolingian texts. The passage in the *Brut Y Tywysogion*, however, is possibly dependent on that of the *Annales Cambriae*. This text, which is regarded as a compilation of earlier annals, was put together at Strata Florida, roughly 120 km to the north of St. David’s, and only survives in a late thirteenth-century Welsh translation. While it is possible that the text provides an independent account of a cattle pestilence in Wales, it is ultimately uncertain.

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<sup>625</sup> Filotas (2005), p. 286. In his *Decretum*, Buchard of Worms might also provide a reference to an early eighth-century source (a penitential) for the disease in the area of Salzburg: idem (2005), p. 205.

<sup>626</sup> It is noteworthy that Einhard does not include the cattle pestilence in his summary, in Chapter 32 of his *Vita Karoli magni*, of the portents that occurred over the last three years Charlemagne’s life and foretold the king’s death. In fact, Einhard mentions a comet Charlemagne witnessed on the campaign of 810 and a fall from his mount, but not the bovine mortalities: (1969), pp. 84-6. That said, Einhard documents nothing directly relevant to the history of pestilence, food shortage or extreme weather in his *vita*.

Whether these Welsh mortalities can be aligned with the well-documented contemporary deaths of cattle on the continent, however, seems probable, considering the discernible scale of the outbreak. As noted in regard to the cattle pestilence *c.*800, that other insular texts do not record the pestilence should not be construed as an indication that the bovine mortalities recorded in Wales were restricted to Wales.<sup>627</sup> After all, though we might not want to take the Welsh texts at face value, both do imply that the disease was rather widespread, and there is some sign that cattle were infected by disease in Ireland in 810 and shortly thereafter. The *Boshlechte*, a law prohibiting the stealing and killing of cattle, was circulated in the locale of Munster in 810, Connacht in 812 and Ul Neill in 813, and may indicate a heightened concern for cattle numbers on account of an outbreak of disease.<sup>628</sup> Other evidence plausibly relevant to the Carolingian cattle mortalities from outside *Francia* and *Germania* has not been found.

820

Much less can be said about the cattle mortality of the early 820s. The *Annales regni francorum* and *Annales Fuldenses* document a pestilence (*pestilentia*) of bovines in 820 (C.1.101, 102).<sup>629</sup> The latter passage is clearly dependent on the former, which simply tells us that the pestilence spread ‘far and wide’ and that ‘hardly any part of the Frankish kingdom’ was left untouched. The epizootic is related in conjunction with a human pestilence, but while we can be relatively certain that the disease was not zoonotic, whether these vague spatial contours even apply to the cattle pestilence or the human pestilence is uncertain. That the composition of the *Annales regni francorum* was closely associated to the court may indicate that the disease was prevalent in some of the regions addressed in the account of 820. Many regions, however, are addressed (including regions as disparate as *Aquitania*, northern *Italia*, *Carinthia*, *Pannonia* and northern *Francia*), and there is no way to narrow down which may have been afflicted. When in

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<sup>627</sup> See 1.4.2. The *Anglo-Saxon Chronicle* omits any mention of stock disease prior to the late ninth century, and later texts like Florence of Worcester’s also mention nothing of a cattle pestilence in the early ninth century. Florence, in fact, says nothing of the years 806-11: (1988), p. 43.

<sup>628</sup> Ó Corráin (2005), pp. 583-84. That the *Boshlechte* appears to have been the first of its kind may be taken as an indication of the scales of the bovine losses in Ireland. The law was ‘reissued’ in 826 in Connacht, after an outbreak of disease and food shortage.

<sup>629</sup> The 820 entries in the *Herimanni Augiensis chronicon* and *Annales Sithienses* also appear to be dependent on the *Annales regni francorum* though they do not report the cattle pestilence (C.1.102, 104).

the year the pestilence irrupted is also not noted, though the pestilence is tied to excessive humidity and rain and we may speculate, subsequently, that animals fell in winter, as winter is the only season in the *Annales regni francorum*, and other texts contemporary to it, explicitly labelled to have been humid, mild or characterized by heavy rain.<sup>630</sup> In his *Vita Hludovici pii*, the Astronomer also writes of pestilences of humans and animals in the 820s but provides no indication of the contours of either and his account of the early years of Louis' reign is known to be heavily dependent on the *Annales regni francorum* (C.1.110). Yet the Astronomer's observation that Louis was compelled partially on account these pestilences to request that fasts, prayers and generous alms be given throughout his realm, may indicate that the cattle pestilence of the early 820s was indeed a general affair.<sup>631</sup> No other plausibly relevant information has been found in Carolingian or non-Carolingian texts, Louis' other biographers, Thegan and Ermoldus Nigellus, are silent on the matter. In the *Hludowici et Hlotharii epistola generalis* of December 828 we encounter another reference to a mortality of animals, though whether the deaths referred to in this general letter took place in 828 or whether Louis and Lothar were referring to mortalities in the early 820s in entirely uncertain (C.1.115). The letter says nothing specific of the animal mortality, and no evidence relevant to an outbreak of disease in the late 820s has been gleaned from texts composed outside of *Francia* and *Germania*.

#### 842/43 and 860

In his *Historiarum libri iii*, Nithard reports that the winter of 842/43 was 'full of diseases' and 'harmful to cattle' (C.1.131). Nithard account, like the *Hludowici et Hlotharii epistola generalis*, fails to provide any indication of the temporality or spatiality of these 'diseases' and it is unclear if the cattle were affected by disease or extreme weather. The *Fragmentum chronicon Fontanellensis*, as suggested above, implies that people succumbed to disease in 842, not livestock, and Nithard too may have been primarily referring to human deaths. With '*langores*' he may have meant to reference human and non-human deaths. If cattle were infected in the early 840s, we might suspect that they were so in northern France around St. Quentin and Valenciennes,

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<sup>630</sup> See (C.1.68, 69, 80, 137).

<sup>631</sup> As noted in 1.4.2.1, however, the Astronomer may have had other intentions in making sure Louis' actions after the pestilences were documented.

as Nithard's text closely follows the movements of Charles the Bald and Charles is said to have been in northern *Francia* until early 843 before departing for *Aquitania*, a region less dependent on cattle raising.<sup>632</sup> Slightly more is known about the non-human mortality of 860. In that year, we find three references, which are likely interdependent, to an 'animal mortality' in the *Annales Alamannicorum continuatio Sangallensis prima*, *Annales Sangallenses maiores* and *Annales Weingartenses* (C.1.165, 166, 167). Literally nothing is related about the spatial or temporal contours of the mortality, nor do these texts specify what species was affected, though we may suspect, as noted in 1.4.1.2, that the *animalia* were cattle. All the texts are central European in origin, and likely derive from a common source composed at either Reichenau or St. Gall. While we may suspect that bovines were affected in the central Europe, we should again not assume that the root source reported on events that occurred in his vicinity. When animals began to die is unknown.

That the *Annales Bertiniani*, *Annales Xantenses* or *Annales Fuldenses* do not report a non-human mortality c.860 does not necessarily signify that the deaths referenced in the three central European texts did not occur in western Carolingian Europe generally, the locale of Troyes where Prudentius may have still been composing the *Annales Bertiniani* or Cologne where Gerward may have been writing the *Annales Xantenses*, or, for that matter, the locale of Mainz where the *Annales Fuldenses* appears to have then been penned. The *Annales Bertiniani* and *Annales Xantenses* fail to document any non-human mortalities associated to disease, including those documented in other texts. In fact, both texts uniquely show no interest in livestock mortalities of any sort.<sup>633</sup> On the other hand, all references to livestock disease in the *Annales Fuldenses*, which provide a contemporary record of events from 830 to 887, appear in the eighteen years spanning 870 to 887.<sup>634</sup> All references in the *Annales Fuldenses* to weather-related livestock mortalities also appear in the same period, specifically between 872 and 886.<sup>635</sup> Thus, like the annalists

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<sup>632</sup> See the discussion of the reports of disease in 842 and 843 in 1.4.2.1.

<sup>633</sup> Notably, livestock mortalities associated to weather are not reported in the *Annales Bertiniani* or *Annales Xantenses* as they are in other texts (C.1.108, 111, 131, 197, 208, 212, 219, 227, 241, 258).

<sup>634</sup> (C.1.195, 215, 232). The only reference to a livestock mortality in the *Annales Fuldenses* prior to 870, that reported in 820 (C.1.103), is, as noted, derived from the *Annales regni francorum*.

<sup>635</sup> (C.1.197, 208, 212, 219, 227).

of the *Annales Bertiniani* and *Annales Xantenses*, the authors of the *Annales Fuldenses* were not interested in livestock health prior to the 870s.<sup>636</sup>

868/70

We next encounter references to livestock disease in 868. In that year, the *Annales Alamannicorum continuatio Sangallensis prima*, *Annales Sangallenses maiores* and *Annales Weingartenses* again provide us with a reference to a ‘mortality of livestock’ (C.1.185, 186, 187). All three texts are undoubtedly interrelated and, as noted, likely stem from a text written at St. Gall or Reichenau. No reference to the contours of the mortality is given nor do the texts specify the species infected, though we may suspect that the animals died in central Europe. The animal mortality is related in conjunction with a food shortage and a human mortality, which are also both not set in time or space. The shortage and human mortalities, however, are fairly well documented in other texts, and it is possible that the animal mortalities were, like the human mortalities, associated to the subsistence crisis.<sup>637</sup> The shortage conditions of the late 860s may have fostered the dissemination of a disease among cattle and defined the spatial contours of the mortality.<sup>638</sup> Whether this was the case is ultimately uncertain, though two other texts shed some light on the matter. In 870, the *Annales Fuldenses* report a ‘serious pestilence’ of cattle in ‘many parts of *Francia*’ (C.1.195). It may appear odd that this text would address *Francia* when its focus is generally set on *Germania*. As noted, the *Annales Fuldenses* demonstrates an acute interest in livestock mortalities from the 870s and it is feasible that the annalist’s general concern for livestock health led him to comment on cattle in western Carolingian Europe. While it is not certain, it is possible that the pestilence the *Annales Fuldenses* records is associated to the animal mortalities reported in central European texts in 868: the disease may have been prevalent in eastern Carolingian Europe in the late 860s, declined in the east before 870 when a new author appears to have taken up the *Annales Fuldenses*, and disseminated into the west in 870.

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<sup>636</sup> It may be remarkable that prior to 870 the *Annales Fuldenses* were not regularly composed contemporaneously to the events they detail: Reuter (1992), p. 4.

<sup>637</sup> See discussion of the 868 human mortalities in 1.4.2.1.

<sup>638</sup> As in the early fourteenth century: Newfield (2009), pp. 176-78.

Plausibly relevant information in non-Carolingian texts is encountered only in Byrhtferth's *East Anglian Chronicle*. In 869, that text succinctly reports 'a pestilence affecting beasts' (C.3.77). Where this epizootic exactly took place is uncertain and it is not even that the *East Anglian Chronicle* refers to a bovine pestilence in England. Not only is the text, as noted in 1.4.2.1, thought to be highly composite, but it has been suggested that this particular entry derives from the *Rouen Annals*.<sup>639</sup> This Anglo-Saxon text may, as such, furnish additional evidence for the pestilence in western Carolingian Europe. That said, the passage closely mirrors that of the aforementioned central European texts in form and content, and may stem from those annals or share a common source with them. We may have in the late 860s a pan-European cattle pestilence documented in central and western continental Europe, and possibly England, or, on the other hand, independent references to two separate cattle pestilences in 868 and 870. In any event, we should not suspect, as observed above, that bovine deaths were restricted to central Europe or only local or regional in scope in the western regions of Carolingian Europe on account of its omission in the *Annales Bertiniani* and *Annales Xantenses*. The omission of cattle mortalities in Regino of Prüm's *Chronicon* should also not affect our assessment of the pestilence's contours, as Regino too reports neither livestock disease nor weather-related mortalities of stock.

878

Within a ten year span the *Annales Fuldenses* documents two additional cattle pestilences. The first is reported for 878 (C.1.215). In that year a 'terrible pestilence' is said to have consumed cattle in *Germania*, especially around the Rhine. It is specified that bovines in a town in the county of Worms, Walahesheim near Ingelheim, were affected. What other areas in *Germania* were hit is uncertain, though we may suspect that the animals in the locale of Mainz, some 100 km north, where the text was composed were afflicted. We may also suspect that the outbreak irrupted in late autumn as notice of the pestilence follows a report of an eclipse in 15 October and a 'dimming of the sun' on 29 October. A cattle epizootic is also reported in the *Petri bibliothecarii historia francorum abbreviate* and *Folcwini gesta* in 878, yet whether these reports are

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<sup>639</sup> (C.3.20).

independent of the *Annales Fuldenses* is uncertain (C.1.216, 217). The first of these texts too records that the pestilence hit *Germania* and seems to mirror the *Annales Fuldenses* in word choice and content.<sup>640</sup> However, it also seems to imply – unlike the *Annales Fuldenses* – that cattle in the eastern European regions of the *Slavi*, *Dalmatae*, *Soavi* and *Bohemi* were also affected. The *Folcwini gesta* simply observes a mortality of cattle and humans and gives no spatial or temporal parameters to the pestilence. Other Carolingian, let alone non-Carolingian, texts are not known to provide any additional information. The *Annales Bertiniani*, *Annales Xantenses* and *Chronicon* of Regino of Prüm, and also the *Annales Vedastini* which begin to provide a contemporary account of western Carolingian events in 873, fail to document the outbreak. This need not impact our assessment of the pestilence's contours, however, as the *Annales Vedastini*, like these other texts, fails to document any livestock mortality, whether the result of disease or weather.

887 and 896

Next, in 887, the *Annales Fuldenses* reports a 'severe pestilence' (*pestilencia*) that affected cattle and sheep (C.1.232). Oddly, as in 870, the annalist specifies that livestock were affected in *Francia*,<sup>641</sup> though where in that general territory he does not say. Whether this is an indication that cattle were not affected in *Germania* is unclear, though it is quite possible, considering that the *Annales Fuldenses* annalist(s) somewhat regularly documented livestock mortalities, owing to weather and disease, in *Germania* in the 870s and 880s, that if cattle there were infected in *Germania* they would have been reported as such, as in 878. Nothing else plausibly relevant to this mortality has been uncovered in Carolingian or non-Carolingian sources. As in 878, the temporal parameters of the outbreak within 887 are non-specific: the annalist assigns the mortalities to winter. Relatively little is also known about the equine mortality the Bavarian continuation of the *Annales Fuldenses* documents in 896 (C.1.250). The pestilence is said to have irrupted in the horses of Arnulf of Carinthia's army as he marched towards Rome from Regensburg

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<sup>640</sup> Like the *Annales Fuldenses*, for instance, it notes that the disease was 'followed' (*secuta est*) by a 'mortality' (*mortalitas*) of humans.

<sup>641</sup> Odd considering that these are the only two references in Catalogue 1 from the *Annales Fuldenses* that refer to phenomena in *Francia* and not *Germania*.

in the late fall and winter. The losses are said to have occurred on account of the ‘great difficulty’ of Arnulf’s passage across the Alps, but exactly where the equines were affected is uncertain. Though the whole army is said to have been hit, it is specified that the army divided into two with one group reaching Florence by way of Bologna and the other heading through the Apennines to Turris and then Luni.

It is possible naturally, that the losses noted here had more to do with exhaustion and a shortage of food than disease. While the annalist implies that the scale of the mortality was unusual, he does state that losses of this nature were common on campaigns. The general concern in the sources for adequate fodder for horses on campaign, and the infrequency with which we encounter horse epizootics in Carolingian and early Ottonian evidence, both signify that hunger, not outbreaks of disease, may have more regularly diminished equine numbers on campaign.<sup>642</sup> Moreover, the mid 890s are known to have been marked by a general food shortage, as detailed in 2.4.2, and the ‘difficulty’ of the journey is specified to have stemmed from storms, excessive rainfall and flooding. This said, the annalist does specify that disease (*pestilencia*) was the cause,<sup>643</sup> and if the horse mortalities in Arnulf’s ranks did stem from hunger we should suspect that all stock brought on the campaign would have been affected, yet the author indirectly notes that the cattle were not affected.<sup>644</sup> Whether horses in the immediate area of northern *Italia* more generally were infected in 896 is uncertain. In 888, the Bavarian continuation documents a large mortality of horses in an army in northern *Italia* in the environs of Trent and Friuli, and in 936 Flodoard writes of another large mortality of horses in northern *Italia*.<sup>645</sup> The cause of these mortalities are not specified, but we may suspect, considering this additional evidence,<sup>646</sup> that the disease reported in 896 was

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<sup>642</sup> On the concern for fodder see, for instance, Scholz (1970), pp. 99, 107; McCormick (2001), p. 445. Nithard also mentions a shortage of horses in an army after a campaign in 841. The cause is not specified but it is implied that the length of the march contributed to a decline in equines: Scholz (1970), p. 152; cf. the notice of tired horses in the *Annales Bertiniani* in 876: Nelson (1991), p. 197.

<sup>643</sup> And the Bavarian continuation’s account is known to have been contemporary. See Appendix 4.5.

<sup>644</sup> He notes that when the horses died the army’s baggage had to be transported on the backs of oxen. He does not, thus, specify that cattle were not at all infected, but simply implies that horses were more widely afflicted than cattle.

<sup>645</sup> Reuter (1992), p. 117; (C.1.270).

<sup>646</sup> Both mortalities are not associated with warfare. There is some indication that the horse mortality of 936 was associated to hunger, not disease.



enzootic to the region. No other text, Carolingian or non-Carolingian, is known to refer to these mortalities.

939/42

We again encounter livestock mortalities in our sources some forty years later. In the *Annales Colonienses*, *Annales capituli Cracoviensis*, *Annales Leodienses*, *Annales Sangallenses maiores*, *Herimanni Augiensis chronicon*, *Cronicon Suevicum universale*, *Chronicon* of Adalbert of Magdeburg, *Annales* of Flodoard of Rheims and *Res gestae Saxonicae* of Widukind of Corvey we find nine references to animal deaths that may illuminate a rather general pestilence of cattle between 939 and 942 (C.1.271, 274, 275, 276, 280, 281, 282, 284, 285). There is an additional plausible reference to an animal mortality in 941, in the epigram of Bishop Rumold of Munster which refers to a mortality of ‘bodies’ (C.1.279). Several of these ten references seem to be inter independent, though the connections between them are hard to discern. For instance, Adalbert’s entry for 942, in which he documents a mortality of cattle, is similar in form and content to the entry in the *Annales capituli Cracoviensis* for 940 and the *Annales Sangallenses maiores* for 941 in that they all report a comet prior to the livestock pestilence and write of a *mortalitas* rather than a *pestilentia*.<sup>647</sup> Further, the *Annales Colonienses* in 939, *Annales capituli Cracoviensis* in 940, *Cronicon Suevicum universale* in 940 and *Herimanni Augiensis chronicon* in 940 all report a hard winter prior to the livestock mortality and employ *mortalitas* rather than *pestilentia*.<sup>648</sup> All of these passages are also succinct, being no longer than a sentence in length. Yet the variety of dates assigned to these references, which show similarity in form and content, may indicate that most of these passages are, in fact, independent, as may the reference in some texts to *animalia*, in others to *boves* and in others yet to *iumentores*.

Only a few of these sources provide any indication of the spatiality or temporality of the mortalities they document: Widukind seems to ascribe the pestilence he reports to the territory of King Henry I, which prior to his death encompassed much of central and

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<sup>647</sup> Widukind too includes mention of a comet prior to mentioning a cattle pestilence, though he also reports several other events. In 941, the *Annales Leodienses* reports a comet and food shortage, but not a cattle pestilence (C.1.277).

<sup>648</sup> There is also a chance that the 942 reference in the *Cronicon Suevicum universale* is a doublet of the passage for 940, as in both years we find ‘*mortalitas animalium facta*.’

southern Germany, Flodoard observes that the mortality he documents occurred in *Francia* and *Burgundia*, and we may speculate that the deaths referred to in Rumold's epigram took place around Munster. In 939, the *Annales Colonienses* simply reports 'a mortality of animals,' and in 940 the *Cronicon Suevicum universale* and *Herimanni Augiensis chronicon* 'a mortality of animals.' In the same year the *Annales capituli Cracoviensis* writes only of a 'mortality of cattle,' and in 941 the *Annales Sangallenses maiores* of 'a pestilence of cattle,' and in 942 Adalbert and the *Cronicon Suevicum universale* of a 'mortality of animals.' We may attempt to infer the general area in which these animal deaths occurred by considering the areas in which these texts were written. Though we should not assume, as observed, that annalists wrote about mortalities that occurred in their immediate or near vicinity, we can safely speculate that animals in central Europe were affected, since so many of these texts stem from that general area.

More specifically, we may suspect that animals were dying in the locale of Wissembourg in Alsace where Adalbert wrote his text in the 960s and may have accessed texts from the region to fillout his *Chronicon* and in St. Gall where the *Sangallenses maiores* appear to have been composed. That the animals are known to have succumbed in *Francia* and *Saxonia* may signify that the disease was contagious and may have widely affected these areas and others. As in the late 860s, the spread of the disease may have been fostered by the conditions the subsistence crisis of the mid 930s and early 940s engendered. The shortage, detailed in 2.4.2, may have in fact determined the extent of the pestilence. Nothing can be discerned about the pestilence's temporal contours, though we may speculate that in the area for which Widukind provides notice of cattle deaths that the animals only began to die in the fall of 941, as Widukind implies that the pestilence irrupted after a comet was seen in mid October.<sup>649</sup> No other texts, early Ottonian or not, are known to record an animal mortality *c.*940, but it is probable that the mortalities these texts relate were associated and the we are indeed dealing here with a general plague of cattle that affected central Europe and some regions of *Francia c.*940.

#### 1.4.2.2.1 Diagnoses of epizootics for heuristic purposes

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<sup>649</sup> He also considers the pestilence one of the portents that appeared prior to the death of Henry.

As outlined in 0.1.6.3, diagnoses are suggested here for heuristic purposes carried out in Part 3. Clearly, we have little grounds on which identify any of these pestilences, as in 1.4.2.1.1. There is one indication of a symptom, the Poeta Saxo's notice of the emaciation of cattle, and virtually nothing is said of epizootiology, though it is generally clear that these epizootics were characterized by high mortality and morbidity. Most of the stock pestilences concern cattle, as the sources demonstrate themselves and as argued in 1.4.1.2. Cattle pestilences which may have been rather general spatially, like those of 801, 809/10, 842/43, 868/70, 878, 887 and 939/42, were likely brought on by a respiratory infection spread between like animals, such as the rinderpest virus (RPV) or contagious bovine pleuropneumonia (CBPP), and not vector- or soil-borne diseases, such as bluetongue and anthrax.<sup>650</sup> Certainly, the *stultitia* Agobard notes contemporaries outside of Lyon thought caused the cattle panzootic of 809/10, should not be thought to indicate anthrax.<sup>651</sup> The foot-and-mouth disease virus and *M. bovis*, as we know them, are unlikely to have been behind any of our stock plagues on account of their low mortality and the slow rate of transmission of *M. bovis*.<sup>652</sup> Both, however, may have been quite common and the latter may have caused tuberculosis in human populations. Particularly widespread pestilences (possibly panzootics), such as those of 809/10, 868/70 and 939/42, were likely brought on by rinderpest, one of the most communicable diseases known to modern science.<sup>653</sup> CBPP, a less contagious and acute disease, is also a possibility, however. The emaciation of bovines described by the Poeta Saxo in 809/10 (C.1.86), provides some indication that outbreak may have indeed been RPV; that animals then died rapidly too may be an indication that RPV was the cause. The sheep pestilence of 878, which is likely not associated to the cattle pestilence of the same year, may have been caused by sheep pox, a highly contagious pathogen or, perhaps, peste des petits ruminants.<sup>654</sup> The equine plagues of 791 and 896, however, may have been brought on by pathogens enzootic to the areas in which they occurred. What these could have been is highly uncertain, though Gillmor's EEE diagnosis is not well founded. If we drop the idea that these two equine plagues were enzootic to particular regions or vector-borne, it may

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<sup>650</sup> Barrett and Rossiter (1999); ter Laak (1992).

<sup>651</sup> See n. 535 above.

<sup>652</sup> Mahy ed (2005); Mays (2002).

<sup>653</sup> Barrett (1999).

<sup>654</sup> Barrett, Pastoret and Taylor eds (2006).

be suggested that we are here dealing with an outbreak of strangles as Hyland proposed.<sup>655</sup>

#### 1.4.3 Frequency of human and livestock pestilences

The frequency with which outbreaks of disease occurred in particular periods in the Middle Ages, such as the Carolingian and early Ottonian, have rarely been considered.<sup>656</sup> Naturally, this stems from the fact that very few studies of medieval disease have attempted to survey the occurrence of pestilences over time and space, and that the purview of most scholars has not extended beyond a single outbreak of disease. Yet the regularity with which outbreaks of disease occurred, has much to do with an assessment of the aggregate impact of disease over a particular period. The attention here to pestilence frequency, consequently, is of much importance for the assessment of the consequences of disease in mid eighth- through mid tenth-century Europe in 1.5.

In calculating pestilence frequency it is essential to consider the pestilences which the extant written sources illuminate altogether, not the frequency of pestilences reported in individual texts.<sup>657</sup> For instance, though the *Annales regni francorum* documents four general peacetime human pestilences over an eighty-nine year period, spanning 741 to 830, that is, one outbreak every twenty-two and a quarter years; though the *Annales Bertiniani* records eight human pestilences over a period of fifty-three years, spanning 830 to 882, that is, one about every six and a half years; though the *Annales Fuldenses* reports seven epidemics over a period of fifty-eight years, that is, about one every eight years; the *Annales Xantenses* documents five human outbreaks over a period of forty-one years, spanning 832 and 873, that is, about one pestilence every eight years; and though the *Annales Vedastini* records two epidemics over a period of eighteen years, spanning 873 to 890, that is, one pestilence every nine years, several of the outbreaks these texts report are, as observed on a case by case basis in 1.4.2.1, likely related to one another,

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<sup>655</sup> See reports on these diseases in Blancou (2003).

<sup>656</sup> The primary exception being Stathakopoulos' assessment of the frequency of human pestilences in the early Byzantine period (284-750 CE): (2004), pp. 23-34

<sup>657</sup> That said, the frequency with which pestilences are reported in the main Carolingian sources surveyed here is not too out of line with the frequency of epidemics derived below from a consideration of all the evidence for plagues addressed in 1.4.2.1.

and source-restricted calculations of the frequency of pestilences fail to take into account the gaps, in individual sources, in the documenting of epidemics, not to mention the clear omission in some texts of pestilences that are known to have occurred. For instance, no pestilence is recorded in the first section of the *Annales regni francorum* and if we were to exclude that section (which spans 741 to 794/95) from our calculation of the frequency of pestilences in that text we would find that one epidemic was recorded about every nine years.<sup>658</sup> Moreover, such calculations ignore the fact that many of these pestilences occurred in different contexts (periods of peace, conflict and shortage) and were of very different scales. Still, if we calculate the frequency of pestilences in Carolingian and early Ottonian Europe from the reconstruction of individual epidemics in 1.4.2.1, and epizootics in 1.4.2.2, it is crucial to recognize that the results achieved may have more to do with the frequency with which pestilences were recorded, rather than the frequency with which they actually occurred.

Thirty-two peacetime epidemics, which are clearly not restricted to sieges, are highlighted in 1.4.2.1. Epidemics occurred in 779, 786, 791, 801, 803, 805, 807, 808, 810, 820, 823, 828, 834, 842, 843, 847, 856, 857, 858, 866, 869, 873/74, twice in 877, 878, 882, 883, 889, 890, 924, 927, 934 and 945. This makes for at least one pestilence about every 6 years on average over the Carolingian and early Ottonian periods. An additional ten mortalities, which can quite plausibly be labeled as pestilences, associated to subsistence crises are reported in 762, 793, 845, 863, 868, 869, 895, 896, 897 and 941. These included, our tally rises to forty-two pestilences over the mid eighth through mid tenth century, or one about every 5 years. As observed above, however, epidemics may not have actually taken place in 791 and 828, the pestilences of 807 and 808 may have been pathogenically related, as may have the epidemics of 842 and 843, the outbreaks noted for 856, 857 and 858, and the epidemics of 868 and 869. Furthermore, three pestilences – not two – may have taken place in 877 and one of these may have been tied to that of 878, two epidemics – not one – may have occurred in 889, and one of these

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<sup>658</sup> Similarly, little could be said about the regularity with which livestock mortalities occurred in the ninth century by calculating the frequency with which they are reported in the *Annales Fuldenses*. The text records three animal mortalities but it does so within the last eighteen-year span of the text that is known to have been composed on a year-by-year basis. To calculate the frequency with which plagues were recorded by weighing these three mortalities against the total fifty-eight years for which the text provides a contemporary record would ultimately obscure what we can know about the regularity with which pestilences occurred and were reported.

may have been linked to that of 890, and the pestilences of 895, 896 and 897 may have been caused by the same disease.<sup>659</sup> These considerations may reduce our tally to thirty-four, that is, one pestilence about every 6 years. Yet we should consider too that multiple epidemics likely characterized periods of food shortage, that reports of mortalities in 762, 793, 845, 863, 868, 869, 895, 896, 897 and 941 may be indicative of multiple outbreaks of disease, and, consequently, that roughly thirty-five to forty-five pestilences occurred in the Carolingian and early Ottonian periods, that is, one epidemic every 5.5 to perhaps 4.5 years.<sup>660</sup>

That at least one pestilence occurred every 5 years on average in the Carolingian and early Ottonian periods may seem inconceivable. Yet the epidemic frequency of our period becomes even more striking if we remove from consideration the two extended sub-periods (of 750 to 760 and 890 to 924) when the sources are thin and human pestilences not recorded. If human pestilences were only regularly being reported for one hundred and fifty-five years of the two hundred years of the Carolingian and early Ottonian periods, we may speculate that one epidemic occurred about every 4.5 or 3.5 years on average. Of course, it is important to remember that not all of these thirty-five to forty-five pestilences affected the same area, that *Bavaria*, *Germania* and *Gothia*, for instance, were not hit once every four years. Carolingian and early Ottonian Europe encompassed much of the continent and relatively few of these pestilences can be said, on the basis of the evidence available, to have been general affairs that affected most Carolingian or early Ottonian regions. Only the possible multi-year pestilence of 856/58, as well as the mortalities tied to subsistence crises in the early 760s, mid 790s, late 860s, mid 890s, and c.940, may be thought of as having surely affected a large area of northern and southern Carolingian Europe. In contrast, it cannot be said that the pestilence of 847 extended beyond the locale of Ferrières, the possible epidemic of 866 beyond Bulgaria, the pestilence of 882 outside Bavaria, the outbreak of 924 beyond Gothia, or the

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<sup>659</sup> The reference in 866 to ‘afflictions’ may also not have been a reference to disease.

<sup>660</sup> Additionally, if the siege-related epidemics of 820, 845, 873, 882 and 888 are thought to be telling of more general outbreaks of disease (essentially peacetime epidemics in areas not affected by the siege), we may suspect forty or fifty pestilences to have taken place in our period, that is, one every five or four years. That said, the siege-related epidemics of 820, 873, 882 and 888 may have been respectively tied to, and not pathogenitically distinct from, the peacetime pestilences of 820, 873, 882 and 889. If this is the case, we would again be dealing with an estimate of roughly one pestilence for every five and half to four and half years.

pestilence of 945 outside of the Paris basin. However, some areas do appear to have been routinely struck and it is possible that disease irrupted in the same areas of *Francia* not only during the subsistence crises of the early 760s, early 790s, late 860s, mid 890s and c.940, but also in epidemics of 779, 786, 801, 803, 820, 823, 842/43, 845, 856/58, 873/74, 927 and 945. Likewise, some regions of *Germania* may have been hit by disease both in the context of the shortages of the early 760s, early 790s, late 860s, mid 890s and c.940, and in 786, 801, 803, 807/08, 810, 820, 856/58, 873/74, 877/78, 889/90 and 927. Pestilence may have eroded the population of some regions of *Francia* once every 12 years, and *Germania* once every 18 years.<sup>661</sup> Epidemics also occurred in northern *Italia* on no fewer than four occasions in our period.<sup>662</sup>

Livestock pestilences occurred less frequently. Evidence for thirteen outbreaks of disease – in 791, 801, 809/10, 820, 828, 842/43, 860, 868, 870, 878, 887, 896 and 939/42 – was addressed in 1.4.2.2. This makes for one stock plague about every fifteen years on average in the Carolingian and early Ottonian periods. As observed above, however, epizootics may not have actually occurred in 828 and 842/43, and the epizootics reported in 868 and 870 may have been pathogenically linked. This may reduce our stock pestilence tally to ten and increase the average interval between plagues to twenty years. Though if we were to remove the two sub-periods in which evidence for stock plagues is non-existent – 750 to 790 and 900 to 940 – we might speculate that outbreaks of livestock occurred once every 12 years from 750 to 950. This too might seem surprising, but again we must consider that many of these epizootics may not have affected the same region and that most do not appear to have been general affairs that affected most of Carolingian or early Ottonian Europe. While the pestilences of 809/10, 820, 868/70 and 939/42 seem to have been general affairs, those of 860, 878 and 887 can only be said to have been regional in scope, and those of 791 and 896 appear quite clearly to have been restricted respectively to northwest Hungary and northern Italy. While clearly major pestilences – 809/10, 868/70 and 939/42 – occurred only once every sixty-seven years, it is possible that disease hit cattle in same regions of *Germania* in 809/10, 820, 860, 868/70 and 878, and the same regions of *Francia* in 809/10, 820, 860, 868/70 and 887.

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<sup>661</sup> If we exclude the sub-periods when pestilences are not recorded we find that the same regions of *Francia* may have been hit every 9 years and *Germania* every 10 years.

<sup>662</sup> Possibly five occasions if the epidemic of 924 too hit the region.

Farmers in *Germania* may have lost many animals to disease at least once every 14 years between 810 and 880, and farmers in *Francia* once every 16 years between 810 and 890.

If we combine human and livestock pestilences we find Carolingian and early Ottonian Europe was afflicted by about forty-five to perhaps sixty pestilences, or one outbreak at least every 3 to 4.5 years. If we remove from our calculations the sub-periods in which sources are scant and pestilences unreported,<sup>663</sup> we find that an outbreak of disease may have taken place once every 2.5 to 3.5 years. Again, many of these outbreaks would not have affected the same region. Moreover, the occurrence of outbreaks was not uniform over time as the estimate implies: the first decade of the ninth century, the early 820s, the mid 850s, late 860s, early 870s, late 870s, mid 890s and late 930s were periods of high pestilence concentration, and the intervening periods appear to have primarily been periods of respite.

## 1.5 Summary

We have surveyed the historiography of Carolingian and early Ottonian epidemics, epizootics and non-pestilential disease in 1.1. The practice of retrospective diagnosing and establishing the pre-modern existence of ‘modern’ diseases have been examined in detail in 1.2, as assumptions about the antiquity of diseases known to laboratory science and the worth and credibility of retrospective diagnosis often mar the articulation of the contours and impact of pestilential and non-pestilential disease in modern histories of the disease of distant periods. What the palaeosciences offers the assessment of pestilential and non-pestilential disease in our period is also assessed in 1.2. We stand to gain much from palaeopathology and palaeomicrobiology in coming years. The current of disease underlying more episodic and pronounced epidemics and epizootics is assessed in 1.3. It is proposed that malaria, tuberculosis and leprosy were endemic to Carolingian and early Ottonian Europe, the former especially in Italy and perhaps along the Rhine. Several degenerative diseases, some partially result of wear-and-tear, were likely quite common. Osteoporosis, periodontal disease and mastoiditis may have been widely sustained. A number of other ailments, judging from the written evidence, appear to have been fairly

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<sup>663</sup> That is, 750 to 775 and 900 to 920.



prevalent. The primary symptoms of these were blindness, paralysis and ‘tightened tendons.’ In 1.4, the language and method of documenting pestilences in Carolingian and early Ottonian Europe is surveyed and individual passages are shown to lack much individuality, which, it was suggested, affects how we reconstruct epidemics/epizootics in time and space in 1.4 and interpret their impact in Part 3. Roughly thirty-two peacetime epidemics and ten additional periods of excess mortality tied to subsistence crises, but likely the result of disease (possibly multiple outbreaks of disease; see 2.2.1.1.2) were identified from the sources collected in Catalogues 1 and 2. One human pestilence may have occurred at least every five years, though the spatial and temporal contours of individual pestilences varied widely and the same areas/populations were not always affected. Roughly thirteen epizootics have been identified, and it is suggested that vast majority of references to animal mortalities refer outbreaks of disease in cattle. At least one stock pestilence occurred every 15 years. A preliminary assessment of the ramifications of these epidemics and epizootics, as well as the underlying current of non-pestilential disease, is presented in Part 3.

## Part 2

### The contours of hunger

Part 2 examines the hunger of Carolingian and early Ottonian populations, both food shortages and the undercurrent of endemic malnutrition.<sup>664</sup> Due to the nature of the available evidence the focus rests predominantly on food shortages. The history of endemic malnutrition or chronic hunger of all pre-industrial European periods is in its infancy and though this is in large part the product of the interests of modern historians in other matters, the dearth of any deep understanding of chronic hunger, particularly for periods for which the written evidence is scant and ambiguous, ultimately stems from an insufficient number of palaeonutritional and palaeopathological assessments of human remains. Of course, some palaeonutritional assessments have been conducted, but for most pre-industrial periods, including the Carolingian and early Ottonian as discussed in 0.1.5.1, these assessments are presently few and far between.<sup>665</sup> In section 2.3, an introduction is given to how a history of chronic hunger in Carolingian and early Ottonian Europe could be undertaken, and why it should be, even though no definitive is possible.

As in Part 1, attention is given on the written and material evidence available for mid eighth- through mid tenth-century hunger, and a survey of the scholarship relevant to the hunger history of Carolingian and early Ottonian populations precedes a thorough discussion of the methodologies and theory employed to examine hunger. With respect to methods, attention is given to how we might define and measure the severity of subsistence crises in the past and determine the causation of crises. Space is devoted in each of these sections to scholarship on hunger in periods preceding and succeeding ours, for though the study of early medieval hunger is very much underdeveloped, a

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<sup>664</sup> ‘Subsistence crisis,’ ‘food shortage,’ and ‘dearth’ are used interchangeably in this study, while ‘famine’ refers specifically to an extreme subsistence crisis as define in 2.2.1.1. ‘Lesser food shortage’ refers specifically to a non-famine, or less than famine, subsistence crisis. For more discussion on the terminology employed in this part, including ‘chronic hunger,’ ‘endemic malnutrition’ and ‘epidemic malnutrition,’ see the Definitions section (0.2).

<sup>665</sup> One recent and notable example advertised on the Institut National de Recherches Archéologiques Préventives (INRAP) website concerns six hundred graves, dating to the Merovingian and Carolingian eras, which were recently discovered at Noisy-le-Grand. The human remains recovered from the site are set to be examined for nutritional deficiencies: [www.inrap.fr/preventive-archaeology/Press-release/Last-press-release/2009/p-2583-Ig1-Merovingian-and-Carolingian-cemeteries-in-Noisy-le.htm](http://www.inrap.fr/preventive-archaeology/Press-release/Last-press-release/2009/p-2583-Ig1-Merovingian-and-Carolingian-cemeteries-in-Noisy-le.htm). Whether episodic food shortages, or brief periods of epidemic malnutrition, leave visible marks on human and non-human animal bones requires further research.

considerable amount of work has appeared on Greco-Roman, late antique, early Byzantine, late medieval and early modern food shortages, which can, if applied carefully, inform our own assessment of Carolingian and early Ottonian food shortages and help us determine whether modern ‘famine theory’ can be applied to pre-modern shortages.<sup>666</sup> As the mass of existing famine theory stems from assessments of modern food shortages, it is pivotal to ask whether, and how, it can help us understand early medieval hunger. Though modern theory is ultimately employed to help establish a definition of famine and to speak to both the frequency and causation of mid eighth- through mid tenth-century shortages, it is not implemented dogmatically. To the contrary, it is suggested that detailed assessments of the subsistence crises of the distant past, like that carried out here, can help reshape, and in some cases reinforce, existing famine theory.

In 2.4, some comment is given to the impact of food shortages on livestock, a topic which though poorly documented and widely overlooked by modern scholars is deserving of attention on account of the place of livestock in pre-industrial human agricultures and economies. In 2.4, the evidence for Carolingian and early Ottonian subsistence crises is assessed with the intention of identifying famines and lesser shortages, as well as the frequency and causes of both.

## **2.1 The historiography of Carolingian and early Ottonian Europe hunger**

Early medievalists have paid little attention to the evidence for Carolingian and early Ottonian hunger, and those that do seem to consider food shortages infrequent and insignificant, and chronic hunger inconsequential. This may seem paradoxical as many scholars of other pre-industrial periods have considered subsistence crises and malnutrition significant determinants of population and economic trends. Indeed, food shortages have occupied a major role in the historiography of late medieval and early modern Europe since the early twentieth century, and of the Greco-Roman world since the 1980s. Though no critical assessment of mid eighth- through tenth-century food

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<sup>666</sup> ‘Famine theory’ refers to theories regarding the causation and impact of food shortages generally, not ‘famines,’ as defined in this study, alone.

shortages, or chronic hunger, has been undertaken, and though most shortages of this period have yet to receive any attention at all, some scholars have advanced some comment on these matters. As is demonstrated here, however, most comment has been advanced in lieu of any detailed survey of the written or material evidence available. Ideas about the prevalence of chronic hunger and the extent of food shortages, for instance, have been used to support various stances on Carolingian and early Ottonian economic, demographic and political history, and vice versa. Endemic malnutrition and subsistence crises, or rather assumptions about them, have been invoked to support both ‘optimistic’ and ‘pessimistic’ views on mid eighth- through mid tenth-century Europe.

The literature discussed below reflects two broad currents of opinion. One is that the Carolingian and early Ottonian periods were unmarred by serious food shortages and that chronic hunger became less prevalent and less acute in the Carolingian and early Ottonian periods. Like presumptions about a disease-free Carolingian and early Ottonian Europe, this opinion has much less to do with an examination of the evidence than the idea that the Carolingian or early Ottonian eras were unlike the medieval centuries before them, and that the cultural renaissance of the Carolingian age in particular somehow coincided with marked improvements in human health and a decline in human vulnerability to scarcity. The contrasting stance, equally unsupported, is that the Carolingian and early Ottonian periods were, like late antique and early medieval Europe in general, regularly plagued by major shortages and characterized by widespread chronic hunger and severe malnutrition. Whereas this stance generally does not interpret the Carolingian and early Ottonian periods as distinct in the greater medieval or pre-industrial history of European hunger, the former envisions the beginning of a new European world *c.*750, one which many scholars believe would not be seriously disrupted until the early fourteenth century.

Relevant scholarship is assessed in three parts: attention is given first to existing comment on the regularity and severity of food shortages, then the repercussions of, and human responses to, mid eighth- through mid tenth-century subsistence crises, and, lastly, to theories of shortage causation. This scholarship review does not survey the opinions advanced in various historical sub-disciplines one by one, as was done in 1.1.1, as only socio-economic and political histories have devoted attention to food shortages and the

views expressed in these two sub-disciplines are not particularly distinct. Following this, scholarly opinion on hunger is surveyed in 2.1.2. As in Part 1, this scholarship survey is not meant to be exhaustive but to represent the positions scholars have taken and to demonstrate the foundations on which they have constructed their opinions.

### 2.1.1 Food shortages: extent and frequency

Several scholars ignore Carolingian and early Ottonian food shortages altogether, while assigning considerable agency to high medieval food shortages. Others simply downplay mid eighth- through mid tenth-century shortages, in order to emphasize those of the high Middle Ages. Duby, for example, notes that famines had an ‘abiding presence’ throughout the early Middle Ages, yet he focuses exclusively on the subsistence crises of the eleventh-, twelfth- and thirteenth-centuries.<sup>667</sup> Fossier, following Duby’s lead, thought that food shortages prior to 1000 were essentially local in scope, and that massive continental shortages only set in after 1000.<sup>668</sup> Likewise, Hollister noted that famines only ‘occasionally’ struck large areas prior to the twelfth century.<sup>669</sup> Though pointing to subsistence crises in the early 790s and the years 850, 853, 869, 882 and 889, Smith stressed that food shortages, were always spatially limited in the ninth and tenth centuries.<sup>670</sup> While she continued to state that famines are ‘a marked feature of the historical record from c.800 onwards,’ she concludes that ‘only on one occasion is it clear that all Europe was affected simultaneously’ in the early Middle Ages – and that particular occasion came in 1005.<sup>671</sup> In like fashion, Karlen thought that between roughly 750 and 1000, populations across European got the ‘rest’ they ‘desperately needed,’ partially on account of the recession of recurrent famines.<sup>672</sup>

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<sup>667</sup> Duby (1974), p. 29.

<sup>668</sup> Fossier (1988), p. 79. Bonnassie comments on the preference of medievalists for high medieval famines: (1990), p. 15.

<sup>669</sup> Hollister (1982), p. 173.

<sup>670</sup> She does, however, label the crisis of the early 790s as ‘severe and widespread.’ Smith (2005), pp. 63-5, 75-6.

<sup>671</sup> ‘The terrible hunger of 1005,’ Smith writes, was ‘exceptional.’ (2005), p. 63. This may be an example of a modern scholar being led astray by Raoul Glaber’s especially graphic reports of early eleventh-century subsistence crises. Cf. Herlihy (1974), p. 19. Smith thinks the famine of 1005 was universal on account of the fact that it affected lands as far apart as England and Bavaria. On the more severe demographic and economic implications of pan-European famines over lesser shortages, see 2.2.1.1.3.

<sup>672</sup> Karlen (1995), pp. 79-80, 85.

In contrast to those who have focused primarily on pre-850 shortages, Herlihy addresses post-Charlemagne shortages, and gauges Charlemagne's reign as one of prosperity and success, partially on account of, as he saw it, an absence of famine in the late eighth and early ninth centuries. In stark contrast, he thought Europe after Charlemagne, particularly after 850, was marked not only by 'new waves of invaders' but 'severe famines that struck Europe in appalling numbers.'<sup>673</sup> For Herlihy, 'poverty and starvation' were 'widespread' between 850 and 1000.<sup>674</sup> Similarly, Misbach claimed that there were few indications of famine in the late eighth century,<sup>675</sup> and Gillmor, in one of the most sustained discussions of a Carolingian or early Ottonian shortage to date, namely that of the early 790s, minimized both that shortage's extent and severity in order to highlight the impact of the 791 equine epizootic. Drawing attention to accounts in the *Annales Laurehamenses* and *Chronicon Moissiacense*, she proposed that the shortage of the early 790s affected only southern *Francia* and northern *Italia*, and was not, as such, a significant concern for Charlemagne, unlike the 791 epizootic.<sup>676</sup> One of the most thorough analyses of a Carolingian crisis was, thus, carried out under the preposition that the shortage was insignificant.

Others scholars have suggested that subsistence crises were neither unknown nor uncommon throughout mid eighth- through mid tenth-century Europe. McKitterick noted that the 'fear of famine' was 'often realized' and that Carolingian annals regularly refer to 'famine, terrible hunger and failed crops.'<sup>677</sup> Toubert asserted that Europeans in the Carolingian period were hit by crises, disasters and 'some authentic famines,'<sup>678</sup> and Bonnassie stressed that many 'famines' were recorded in the ninth century, particularly around the year 800, and that several of these were undoubtedly 'horrifying.'<sup>679</sup> Dill wrote that famine was 'more terrible and unnerving' than any of the other 'ravages' Frankish peoples faced, and Munz that 'hunger' was 'rampant' throughout the ninth

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<sup>673</sup> Herlihy (1974), p. 19. Herlihy states that famines were especially severe 'around 1000.'

<sup>674</sup> Ibid (1974), p. 20.

<sup>675</sup> Misbach (1972), p. 270. Misbach was primarily working from *vitae*.

<sup>676</sup> Gillmor (2005), pp. 23, 31, 37-8.

<sup>677</sup> McKitterick (1983), p. 20; (2008), p. 272.

<sup>678</sup> Toubert (1990), p. 64.

<sup>679</sup> Bonnassie (1990), p. 14.

century.<sup>680</sup> Bloch thought that famines, together with epidemics, accounted for the ‘many premature deaths’ of the period, and that the poor were hit especially hard,<sup>681</sup> and Butt claimed that famine was ‘always present’ in the ninth century and Faith that peasants ‘must have been vulnerable’ on account of their poor agricultural productivity, while Wallace-Hadrill, for reasons he did not express, suggested that the reign of Louis the Pious was particularly ‘famine-stricken.’<sup>682</sup> Doehaerd has also drawn attention to shortages in 793/4, 805/6, 843, 868 and 942, Pearson to shortages in 820, 861, 862, 867 and 868, and Riché to ‘famines’ in 780, 792, 794, 805, 807, 843, 867 and 869, while Nelson and Reuter point to a other crises, in particular the shortage of 892 documented in the *Annales Vedastini*.<sup>683</sup>

Devroey, Verhulst and Gottfried have given more time to Carolingian and early Ottonian subsistence crises than others, though their use of primary evidence is equally cursory as those addressed above. On multiple occasions, Devroey has drawn attention to several Carolingian and early Ottonian ‘famines:’ in 2003, he drew attention to ‘general famines’ in 792/3, 805/6, 821/2, 868 and 896, and lesser shortages in 803, 805, 807, 820, 824, 843, 850, 861, 862, 863, 869, 873, 874, 892, 893 and 895,<sup>684</sup> and, in 2006, he pointed to the years 792/3, 805/6, 821/2, 850, 868 and 896. All but that of 850 were, Devroey states, ‘general and of great magnitude.’<sup>685</sup> He also hinted of another ‘general famine’ in 813.<sup>686</sup> Not surprisingly, Devroey claimed that famines were ‘particularly frequent’ in the ninth century. He also noted that food shortages were ‘more regularly mentioned’ in the eighth century than earlier, that there were more ‘universal famines’ in the ninth century than in the tenth, and that between the eighth and eleventh centuries

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<sup>680</sup> Dill (1926), p. 254; Munz (1969), pp. 19-20. Dill’s work here concerns Merovingian Europe, though this comment applies to the ‘common people’ of Frankish Europe generally.

<sup>681</sup> Bloch (1961), p. 73.

<sup>682</sup> Butt (2002), p. 53; Faith (2010), p. 199; Wallace-Hadrill (1962), pp. 140-41. Wallace-Hadrill asserts Louis ‘inherited’ this from Charlemagne. Faith’s comments are directed at peasants of ninth-century southern France.

<sup>683</sup> Doehaerd (1978), pp. 2-6; Nelson (1992), pp. 27, 39; Nelson (1986), p. 46; Reuter (1991), p. 99; Riché (1997), p. 103; Pearson (1997), pp. 24-5.

<sup>684</sup> Devroey (2003), pp. 66, 76-7.

<sup>685</sup> Devroey (2006), pp. 323, 337. ‘[G]enerales de grande amplitude.’

<sup>686</sup> Devroey (2006), pp. 90-1.

there were sixty-four famines, that is, one every 6 or 7 years.<sup>687</sup> Bonnassie's calculations differed slightly: he proposed that one famine took place every 7 or 8 years.<sup>688</sup>

Verhulst also thought that more famines occurred in the ninth century than in the tenth or eleventh, though most of the attention he devoted to food shortages was centered on the crises of Charlemagne's reign. While his focus contrasts sharply with that of Herlihy and, for instance, Wallace-Hadrill, Verhulst appears to have generalized his discussion of these crises to the Carolingian period as a whole.<sup>689</sup> He writes that Charlemagne's reign saw 'numerous famines,' though it appears he primarily referred to two, those which he dates to 793/4 and 805/6.<sup>690</sup> Similarly, Gottfried thought that the ninth and early tenth centuries were particularly famine-prone. He points to famines in 809, 821 and 835, states that all ninth century shortages were widespread events and that there were 'at least twenty severe famines' between 857 and 950, that is, about one every 5 years.<sup>691</sup> As Verhulst observed, the shortages of the late eighth and early ninth century have garnered the most attention.<sup>692</sup> Not only have Verhulst, Devroey and Bonnassie focused foremost on these crises,<sup>693</sup> but most others who have commented on Carolingian or early Ottonian subsistence crises, however fleetingly, mention these shortages over any

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<sup>687</sup> Devroey (2006), p. 337; idem (2003), p. 76; idem (2001), p. 104. He regards this as a paradox, as it is in this period, in his perspective, as discussed in 2.1.2, that endemic malnutrition was on the decline. Devroey clearly utilized Curschmann (1900). On Curschmann's famine 'catalogue' and the value of other catalogues see 0.1.3.1. In using Curschmann one risks assuming that his compilation is fully representative of the food crises of the period and that it conveys a true sense of scale of individual crises that allows us to distinguish between famines and lesser shortages. Note that Lucas observed that the Great European Famine of the early fourteenth century does not stand out in sharp relief from lesser crises in Curschmann's collection of sources as it should: (1930), p. 343. Closer attention needs to be attributed to the temporal and spatial parameters of these crises. Further, tallies of food shortages, such as Curschmann's, assume that all subsistence crises of the period of one's concern were recorded, that is, that the extant record is fully representative of what happened 'on the ground.' Further yet, Curschmann paid no attention to the contemporariness or place of composition of the texts he drew upon. It is noteworthy that Verhulst, in the roundtable discussion at Flaran in 1990, criticized Curschmann's work, noting that a critical inventory, which attempted to discern between various types of 'famines' and to establish how evenly, or unevenly, these 'famines' were spread out over the early Middle Ages, was very much still needed: Duby (1990), p. 188.

<sup>688</sup> Bonnassie (1990), p. 14.

<sup>689</sup> See, for instance, Verhulst (1995), p. 488; idem (2002), p. 71.

<sup>690</sup> Verhulst (1995), p. 483; idem (2002), p. 25, 134; idem (1965), p. 183. He also briefly refers to famines in 779, 803, 805, and 807. The shortages of the early 790s and early 800s were the primary focus of his earlier work: (1965), pp. 178-82, *passim*. In 2002 and 1995 Verhulst did not provide references for these shortages, though one suspects he drew, like Devroey, on Curschmann.

<sup>691</sup> Gottfried (1982b), pp. 5, 6.

<sup>692</sup> Verhulst (1995), p. 483; idem (2002), p. 25.

<sup>693</sup> Devroey (2003), pp. 66, 76, 157, 286; idem (1987), p. 68.



other, as some of the work of Campbell, Fichtenau, Latouche, Bullough, Ganshof, Wallace-Hadrill, Hollister, Riché, De Jong and Butzer attests.<sup>694</sup>

The coverage devoted to mid eighth- through mid tenth-century crises has clearly been uneven. Attention has centered on the shortages of *c.*800, though some scholars have overlooked these crises altogether, and some shortages of Charlemagne's reign have been passed over. Opinions on the temporal and spatial contours of shortages are far from reaching consensus. Consideration of scholarly views on causation can help explain the difference of opinion in the work of Duby and Smith, on the one hand, and Verhulst and Devroey, on the other. The evidence for shortage has also been employed somewhat uncritically. For instance, Devroey's proposal that both shortages of the early 790s and 800s were 'general famines' is rooted in his acceptance of the language of the capitularies he used,<sup>695</sup> and arguments for and against the presence of 'universal famines' in our period, seen in the work of Gottfried and Smith for instance, are not founded in a thorough assessment of the evidence, but speculation about grain production and population trends;<sup>696</sup> so too calculations of the frequency of famines in the Carolingian and early Ottonian eras.<sup>697</sup>

The dearth of attention to the basic spatial and temporal contours of crises is especially striking given the agency some scholars have attached to particular shortages. Verhulst, for example, does not attempt to establish whether the late eighth- and early ninth-century famines he addresses affected the same areas or populations; of course, whether these 'famines' had cumulative effects has much to do with whether they struck

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<sup>694</sup> Campbell (2010), pp. 249-50; Fichtenau (1957), pp. 150, 178; Latouche (1961), pp. 156-7; Bullough (1965), pp. 52, 59; Ganshof (1971), pp. 20, 128; Wallace-Hadrill (1975), p. 163; Hollister (1982), pp. 82-3; Devroey (1990), p. 247; Riché (1993), p. 312; De Jong (2005), p. 128; Butzer (1993), p. 572. Wallace-Hadrill (1962), p. 104, notes that the famines of these years were particularly 'widespread.' Ganshof considered the famine of the early 790s a part of the 'second serious crisis' of Charlemagne's career, the first having taken place in the late 770s (also a period of famine as shown in 2.4.2). Latouche uniquely pointed to a famine in 809, while Bullough drew attention to the famine in the late 770s, in addition to the shortage of the early 790s.

<sup>695</sup> For example, Devroey (1990), p. 247; *idem* (2003); *idem* (2006), pp. 90-1.

<sup>696</sup> Nor are the claims of late medievalists that high medieval famines were neither universal nor common: for instance, Gimpel (1977), pp. 205-06. Though high medieval famines very much need to be reappraised, it should be noted that both Pere Benito of the University of Lleida and Nils Hybel of the University of Copenhagen are currently working in this area.

<sup>697</sup> One suspects that Curschmann (1900) has been regularly drawn upon, though he is rarely cited.

the same people.<sup>698</sup> Gillmor's brief assessment of the 792/94 crisis is the only attempt to map the chronology or contours of a shortage, though the recent work of McCormick, Dutton and Mayewski on volcanically-forced cold winters has paved the way for establishing both the temporal and spatial parameters of several food shortages via consultation of written and material evidence.<sup>699</sup> More significant, historians do not agree on when crises took place. A quick glance at the famine years surveyed above demonstrates the lack of consensus. Central to all of this, of course, is the lack of attention to the definition of 'famine,' the characteristics of famines and lesser food shortages, and how we might go about diagnosing famines and lesser crises. The indiscriminate use of 'famine' implies that all food shortages were famines and that all food shortages were thus the same, or at least similar, in terms of extent and impact. Moreover, where different terms have been employed the meaning of the terms remains uncertain. What, for instance, differentiates a 'famine' from an 'authentic famine,' or a 'universal famine' from a 'general famine'? Can a famine not be severe if it is not 'universal' but only 'regional'? Is a food shortage only a famine if it lasts multiple successive years? Certainly, the distinction Devroey has made between famines and 'the gap between harvests' is a very important one.<sup>700</sup>

Also noteworthy is a lack of critical attention to the written sources for food shortages. To date, sources have been taken at face value. The position of Squatriti, as presented in his review of Verhulst's *The Carolingian Economy* however, stands out in sharp relief. Squatriti suggests we treat evidence for shortage carefully. He writes, 'Carolingian authors' terrifying accounts of famines fit inside moralizing discourses, and should be treated gingerly as evidence of cereal dearth.' He continues, 'chroniclers were just as likely to mention famine as proof of divine displeasure with aristocratic politics as

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<sup>698</sup> In discussing the famines of Charlemagne's reign, Verhulst observes that the populations under the most pressure were those in the Ile de France and northern Italy, implying, thus, that these remote areas were affected: (1995), p. 483.

<sup>699</sup> They point to environmental conditions that would have produced shortages in 763/4, 821/2, 823/4, 855/6, 859/60, 873/4, 913 and 939/40. McCormick, Dutton and Mayewski (2007), pp. 878-89.

<sup>700</sup> Devroey (2001), p. 104. Idem (1987), p. 88, refers to this as 'seasonal scarcity.' Similarly, Doehaerd (1978), p. 2, notes that an alternating pattern of 'plenty and scarcity' would have characterized agricultural production throughout the Middle Ages. Dodgshon, who refers to these shortages as 'lower-order crises,' holds that these crises affected the population he studies – the early modern Scottish Highlanders and Hebrideans – on a 'routine basis' and left people 'without sufficient meal for about a month' every year. Such shortages were, Dodgshon writes, 'endemic' to past agricultural-based populations: (2004), pp. 1-2.

they were to describe actual penury.<sup>701</sup> Others too have pointed to the fact that food shortages, not to mention disease and warfare, were on occasion interpreted by Carolingian and early Ottonian authors as evidence of ‘divine displeasure.’ McKeon, for instance, wrote that ‘natural disasters’ were construed as evidence of God’s punishment for human sin.<sup>702</sup> Textual accounts of shortage certainly need to be tackled carefully, motifs need to be identified, as do borrowed phrases and terms. Further, concern needs to be devoted to the place and timing of the composition of each source. Yet, as outlined in 0.1.5, there are ways to ‘get around’ individual accounts of famine, whether they appear exaggerated to the modern observer or not, and to establish actual occurrences of food shortages and general, but reliable, reconstructions of their contours. It is possible, in essence, to both listen respectfully to the sources, and also distinguish their layers of discourse, and to establish, in most cases, that reports of crises were not simply literary embellishments meant to chastise or reflect opinion on political matters, but rather, or also, reports of actual events that took place ‘on the ground.’ Moreover, because a shortage is documented as evidence of divine displeasure does not mean that it did not occur; as we have seen, the documenting of crises could serve two purposes. Thus, though we should be careful of the sources as Squatriti suggests, certainly far more so than the mass of socio-economic historians have been, we should not dismiss the evidence altogether. As stressed in 0.1.5, that early medieval authors treated food crises as signs of divine displeasure does not mean that shortages did not take place. In the early Middle Ages the ‘miseries of hunger’ were, as Pearson asserts, ‘very real.’<sup>703</sup>

#### 2.1.1.1 Food shortage: causation

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<sup>701</sup> Squatriti (2003). Ibid (2002), n. 6, skirts the role of the famine of the early 790s in Charlemagne’s decision in 793 to construct a massive ditch between the rivers Rezat and Altmühl. While the king’s ditch-digging should not be interpreted as a product of the problems the famine posed to the Carolingian offensive against the Avars, as Squatriti argues, that the digging took place in the immediate wake of the famine should not be dismissed too quickly. Failed harvests, possibly across two back-to-back years, and poor conditions for agriculture may have facilitated Charlemagne’s gathering of a large labour force and decision then to construct his trench.

<sup>702</sup> McKeon (1974), pp. 440, 442.

<sup>703</sup> Pearson (1997), p. 24. Squatriti’s critique is most applicable not to Verhulst’s assessment of late eighth- and early ninth-century subsistence crises (on account of the fact that Verhulst appears to have relied on capitularies and not annals or chronicles), but the claims of an earlier generation of scholars, such as Wallace-Hadrill (see n. 682), that food shortages were more a ‘fact of life’ after, rather than during, the ‘great’ reign of Charlemagne. In like fashion, McKitterick observes that scholars long thought the the Carolingian renaissance ceased with the death of Charlemagne: (1983), p. 166.

Few studies which address Carolingian or early Ottonian food shortages have offered comment on causation. Dill hypothesizes, in a Merovingian context, that armies could nurture famine conditions ‘to a great extent,’ though he also noted that ‘a Merovingian army could only desolate a narrow track of land on its march.’<sup>704</sup> Gottfried proposed that Viking and Saracen raiders served to break down lines of supply from the late ninth to the early tenth centuries and in doing so helped generate more food shortages in that period.<sup>705</sup> When writing of the detrimental role of a food crisis at Charles the Bald’s siege of Viking-occupied Angers in 873, Leyser generalized that siege-induced food shortages ‘happened all too often.’ Though he provided no further examples, his emphasis on the ability of food supply problems to ‘dominate and shape’ military matters should not be dismissed hastily.<sup>706</sup> Wickham has proposed that Charlemagne’s army was responsible for the famine in *Italia* in the mid 770s and Halsall that early medieval armies, though regularly slight in number (no more than a few thousand by his estimation), could still cause ‘local famines’ in the areas they transversed. Halsall also pointed out that the degree to which an army could leave a trail of hunger in its wake depended not only on the size of the army but the production capabilities of the areas it affected.<sup>707</sup> Similarly, Pearson stresses that military campaigns in general hurt the food supplies of the areas they passed through, as troops foraged for and destroyed crops and livestock. She notes Charlemagne’s attempts to subdue the Saxons by ‘devastating their countryside,’ the Vikings’ plundering of Frisia in 834 and 837, Rouen in 841 and other locales from the mid 850s, and the damage civil wars did to agrarian production in 843.<sup>708</sup> Wickham has also proposed that the values of goods would have likely climbed not only in times of famine but ‘when armies passed.’<sup>709</sup> In general, though, few have thought that military

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<sup>704</sup> Dill (1926) pp. 254, 298.

<sup>705</sup> Gottfried (1982b), p. 6.

<sup>706</sup> Though these food shortages may have been extremely local, and Leyser may essentially be addressing the problem of provisioning an army in the field. Certainly, as argued in 2.4.2 and 2.4.4, few reports of a food shortage in the context of a siege amount to a report of a bad harvest, or significant hunger in the population at large. Leyser (1994), pp. 44-5; Wallace-Hadrill (1962), p. 41, notes armies had ‘little or no control’ over food shortages.

<sup>707</sup> Wickham (1989), p. 48; Halsall (2003), pp. 126-33. On Charlemagne’s role in the supposed ‘Italian’ famine of the 770s cf. McCormick (2001), p. 878 n. 50.

<sup>708</sup> Pearson (1997), p. 26.

<sup>709</sup> Wickham (1989), p. 88.

activity resulted in food shortages. Several major synthesis on Carolingian and early Ottonian military matters overlook the topic of hunger altogether.<sup>710</sup>

Several scholars have assigned Carolingian and early Ottonian famines to natural shocks to production, episodes of extreme weather especially, and have viewed famines as ‘agricultural catastrophes.’<sup>711</sup> Though few have specified what type of weather was at the heart of the food shortages they observed, Gottfried suggested that wet weather was the primary harbinger of crisis in our period and Pearson suggested droughts, at least in the 860s.<sup>712</sup> Conversely, McCormick, Dutton and Mayewski have argued that hard winters played an important role. They assign acidity peaks identified in Greenlandic ice to eight shortages reported in Carolingian and early Ottonian texts as well as some sources from insular Europe, Iberia, north Africa and the Near East.<sup>713</sup> Gottfried also pointed to livestock mortalities as another natural cause of dearth. He stopped short of specifying whether he thought stock mortalities, from disease or extreme weather, were a contributing factor, a root cause, or a consequence of food shortages, but he did indicate that their role in food crises requires further attention.<sup>714</sup>

Most historians of early medieval Europe who have addressed food shortage causation, however, have adopted a Malthusian lens. The widespread belief that early medieval famines were the result of overpopulation, or ‘accidents of growth,’ has greatly conditioned which shortages historians have drawn attention to and which shortages they

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<sup>710</sup> For example, Bachrach (1972, 2001) in his magisterial studies on Merovingian and Carolingian military organization and military affairs has paid attention neither to food shortages amongst military forces during sieges or on campaign, nor, on the other hand, the ability of an army to cause a food shortages in civilian populations. Though he does, naturally, pay attention to provisioning. This is also true of Bachrach (2003). Conversely, the wars and armies of late antiquity are often said to have brought hunger. Lopez thought that the wars of late antiquity ‘caused the death rate to soar, not so much on account of battlefield casualties, as they were apt to bring famine in their wake, and famine in turn exposed men to disease:’ (1976), p. 11; Butzer proposed that competing armies and peasant uprisings ‘spelled chronic insecurity’ in late antiquity: (1993), p. 552.

<sup>711</sup> For example, Wallace-Hadrill (1962), p. 41; Bullough (1965), p. 59; James (1982), p. 74; Gottfried (1982b), p. 3; Leyser (1994), p. 226; Pearson (1997), pp. 24-5; Smith (2005), p. 65. Nelson observes that famines were ‘natural problems:’ (1992), p. 39. While Lopez overlooked Carolingian and early Ottonian famines, he assigned late antique famines to ‘pulsations of climate:’ (1976), p. 12. Notably, Verhulst did not associate food shortages to exogenous forces. For him, crises were entirely endogenous to Carolingian society: (2002), p. 71.

<sup>712</sup> Gottfried (1982b), p. 3; Pearson (1997), p. 25.

<sup>713</sup> McCormick, Dutton and Mayewski (2007), pp. 878-89.

<sup>714</sup> Gottfried (1982b), p. 8. Gottfried’s examples all stem from high medieval England. Smith (2005), pp. 63, 65, takes some Irish evidence matter-of-factly and writes that a cattle pestilence caused famine in early eighth-century Ireland. Ó Corráin too suggests that cattle epizootics could, and often did, result in food shortages in early medieval Ireland: (2005), p. 576.

have overlooked. For example, Duby does not see food shortages as a particularly Carolingian or early Ottonian phenomenon because he only sees population pressure mounting after 1000 and because he favors an overpopulation model to famine causation.<sup>715</sup> Similarly, Verhulst's adoption of Malthusianism and belief that population rebounded primarily in the reign of Charlemagne caused him to focus on crises *c.*800. For him, famines were a sign that populations were becoming increasingly dense and 'sensitive' to crises, that, in short, population was outgrowing grain production.<sup>716</sup> Yet Verhulst not only couched food shortages *c.*800 in Malthusian terms, but construed them as additional proof of rapid population growth in the reign of Charlemagne.<sup>717</sup> In fact, Verhulst's proposition that there were more famines in the ninth century than the tenth or eleventh, rests heavily on his premise that population was putting a greater strain on food production in the early ninth century, not on a critical survey of the primary evidence for food shortages.<sup>718</sup> In like fashion, Bonnassie argued that famines were 'accidents of growth' that took place on account of a 'discrepancy' in the growth rates of population and agricultural production, the former simply outgrew the former.<sup>719</sup>

In his overview of medieval famines, Gottfried presents a similar analysis.<sup>720</sup> For him, the ninth century 'opened a 250-year period in which famine was far more frequent and widespread than it had been between 300 and 800.' Gottfried, like others, based this opinion on his own configuration of early medieval population trends, agricultural productivity and his adoption of a Malthusian lens. For Gottfried, as Verhulst, population started to grow rapidly *c.*800,<sup>721</sup> which meant that famines too must have been more

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<sup>715</sup> For high medieval Malthusian checks: Duby (1974), pp. 158-59; idem (1968), p. 122. As noted in 0.1.4.1, however, Duby did view Carolingian populations reaching a population ceiling but he seems to have thought Carolingian populations were self correcting, partially on account of a lack of improvement in agrarian production and the failure of peoples to expand arable. Subsistence crises did not play a role, as far as Duby was concerned, in the stagnation of ninth-century demographic trends.

<sup>716</sup> Verhulst (1995), p. 483; idem (2002), pp. 26, 71; cf. idem (1997), p. 92.

<sup>717</sup> As observed in 0.1.4, he argued for population growth in Carolingian Europe. Verhulst (1995), pp. 483, 488, 506; idem (2002), pp. 26, 71, 134. Verhulst here builds on the comments of Bonnassie (1990), pp. 13-35; and Toubert (1990), pp. 53-86.

<sup>718</sup> According to Verhulst, there were more famines in the ninth and twelfth centuries because these were 'the most expansive centuries:' Verhulst (1995), p. 488; idem (2002), p. 71. Cf. Devroey who states that though 'universal famines' declined in the tenth century, they arose again in the eleventh: (2001), p. 104; and Duby who suggests that 'famines' did not disappear in the twelfth century, but they lost 'their tragic character:' (1974), p. 209.

<sup>719</sup> Flaran roundtable discussion of 1990: Duby (1990), pp. 188, 196. There Salrach agreed with Bonnassie.

<sup>720</sup> Gottfried (1982b), pp. 5-6.

<sup>721</sup> Elsewhere, Gottfried has proposed that population started to expand *c.*750: cf. (1982b), p. 6.

regular and severe. Gottfried, however, stretched his Malthusian outlook to all medieval centuries and concluded that population must have waned in the mid and late tenth century, as it had from the fourth to the ninth, as food shortages appear to have been less common and less severe then.<sup>722</sup> For Gottfried, thus, the Carolingian and early Ottonian periods (excusing 750-800) marked a unique period in the European history of famine.

Likewise, Herlihy proposed that mass famines only set in ‘around the year 1000’ when population, in his estimation, really started to grow.<sup>723</sup> Herlihy, however, advanced a more nuanced, or neo-Malthusianist, explanation for shortage causation. Shortages were a product of overpopulation, but of overpopulation in isolated communities which relied predominantly on local agrarian production and which were largely without access to market. Additionally, the attempt of these communities to curb population pressure by subdividing their lands, ‘deepened their poverty’ and made them more vulnerable to the ‘risks of famine.’<sup>724</sup> Doehaerd and Devroey have advanced similar positions. The latter associates this pattern to the demise of the ‘classical bi-partite system.’<sup>725</sup> Though a lack of market integration has not been thought to have prevented food shortages in the early Middle Ages, as few scholars have envisioned markets as a cause or perpetuator of crises, some, such as Herlihy, have suggested that a lack of such integration contributed to the severity of subsistence crises and increased the frequency with which they occurred.<sup>726</sup> These scholars have thought that if interregional markets were in place, and if early medieval communities had had access to markets, that markets would have functioned in a manner that was fair and favorable to the purchaser. In this light, food shortages in those

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<sup>722</sup> This opinion, of course, appears to contradict his earlier assertion that famines were widespread and regular between 800 and 1050. A full reading of Gottfried’s work indicates that he likely meant 800 to 950.

<sup>723</sup> For instance, Herlihy (1958), p. 31. One might suggest that Raoul Glaber’s lurid and well-known accounts of early eleventh-century famines have misdirected Herlihy or Duby’s focus (as perhaps Fossier and Smith (see n. 671)), but overarching ideas about general trends in population growth and the predominance of a Malthusian approach are what account for Herlihy’s thinking that general food crises only really set in around or after 1000. Certainly, an earlier generation of scholars (for example, Duruy (1891), pp. 213, 224), who were quite taken with Glaber, might have influenced those writing in the 1950s, ‘60s and ‘70s. As noted Fossier claimed, using Glaber, that truly massive famines were phenomena of the eleventh century and after, not earlier: (1988), p. 79.

<sup>724</sup> Herlihy (1974), pp. 19-20.

<sup>725</sup> Doehaerd (1978), p. 1; Devroey (1989b), p. 7; Verhulst also refers to ‘a rigid economic structure,’ especially on the *mansus* of large estates, which, in tandem with overpopulation, generated famine: (1995), p. 483. Cf. Duby (1974), p. 81.

<sup>726</sup> Indeed, Herlihy seems to have thought that only with the wider integration of communities and markets in the high Middle Ages was population pressure on local resources lifted: (1974), pp. 19-20. Gottfried also offered this explanation under an overarching Malthusian outlook: (1982b), p. 3. Smith implied that if long distance trade had been in place famines could have been averted: (2005), p. 63. Cf. Pearson (1997), p. 24.

few areas that are thought to have been heavily dependent on the market for food supplies have been considered, at least as far as the market is concerned, the product of the disruption of lines of supply of foodstuffs to those markets, not unfavorable market activity, profiteering, or hoarding.<sup>727</sup>

Though questions of entitlements have not been well integrated into discussions on Carolingian or early Ottonian famines, several scholars have drawn some attention to evidence for what we can label the ‘entitlement decline’ of the lower socio-economic strata in the wake of bad harvests. Doehaerd, for example, surveyed various strands of early medieval evidence for elites buying up harvests and generating want amongst commoners in order to obtain higher prices on their produce.<sup>728</sup> Dopsch, Wickham and others have, on the other hand, thought that high prices were a natural consequence of poor harvests.<sup>729</sup> Similarly, Fichtenau – quite unlike Verhulst – asserted that speculation and usury were ubiquitous ‘in all times of scarcity’ despite secular and religious prohibitions. For Fichtenau, ‘ecclesiastical legislation could not prevent people from using the opportunity to enrich themselves through the distress of their fellow men.’ Fichtenau pointed out that while prices were fixed and hoarding denounced, sanctions against hoarding and the taking of interest were never established. He suspected, moreover, that the owners of estates more so than merchants, or ‘middle men,’ bought up harvests and ratcheted up the price of grain in times of want.<sup>730</sup> Doehaerd has also emphasized that loans of money at interest, and in kind, would have ‘remained common’ despite religious and secular prohibitions and, moreover, that there were several ways to get around restrictions on loaning.<sup>731</sup> On a more general level, Wickham has argued that

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<sup>727</sup> For an excellent example of this see Verhulst (2002), p. 100. Fossier (1988), p. 79, is an exception. He suggested that pre eleventh-century subsistence crises were local and insignificant on account of the ‘compartmentalization’ of economies and that they occurred because market forces persistently drew produce from producers.

<sup>728</sup> Doehaerd (1978), pp. 6-7.

<sup>729</sup> As opposed, perhaps, to human intervention in the market. Dopsch drew our attention to a famine in the mid 580s in which, according to Gregory of Tours, merchants bought up harvests and sold them back to the populace at a higher price: (1937), pp. 322, 344. Cf. Wickham (1989), p. 88.

<sup>730</sup> Fichtenau (1957), pp. 135, 150-51. That the estate owners were the primary hoarders, as Fichtenau proposed, may have much to do, as Fichtenau noted (citing Schaub), with a lack of sanctions against speculation and loaning at interest. That a diet or great council consisting of these owners would have passed such a sanction is, Fichtenau wrote, ‘inconceivable:’ ‘moral condemnation was sufficient to satisfy Christian and ecclesiastical requirements:’ (1957), p. 151. Riché offers some strands of evidence to the contrary: (1993), p. 315.

<sup>731</sup> Doehaerd (1978), pp. 245-48.



commoners who were forced to pay taxes or rents were ‘much closer to disaster’ than those that did not, implying that Carolingian and early Ottonian peasants would have been worse off than earlier peasantries during the so-called ‘Golden Age of the peasantry’ of the sixth and seventh centuries.<sup>732</sup>

More attention is given to the food shortage causation in 2.2.2 and 2.4.4. Certainly, more time needs to be paid to the environmental causes of food crises. McCormick, Dutton and Mayewski have provided an excellent example of the work that needs to be carried out, yet whether dust veils, droughts, heavy and persistent rains, or hard and long winters were a common cause of Carolingian and early Ottonian food crises remains to be determined. The role of other phenomena, such as locust swarms, outbreaks of disease among draught animals, and crop blights, too need to be considered. The impact of the climatic regime(s) of the Carolingian and early Ottonian periods on the regularity and severity of shortages requires more consideration too.<sup>733</sup> Could overarching climatic patterns have affected, or made our period more, or less, shortage-prone than succeeding or preceding periods? On account of the decline of the EMCA, Cheyette has suggested that food shortages would have been more frequent in the sixth century than the eighth, ninth or tenth.<sup>734</sup> In like fashion, Pearson writes that ‘both the long-term shift in the climate and the short-term fluctuations in local micro-climates’ could cause food crises and that the EMCA would have ‘shortened growing seasons throughout the temperate zone.’<sup>735</sup> We may speculate, in contrast to Verhulst and Devroey, that food shortages may have declined in frequency in the ninth and tenth centuries under generally more favorable climatic conditions. Yet this, like all of the theories raised here, must be tested.

#### 2.1.1.2 Food shortages: repercussions and responses

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<sup>732</sup> Wickham (2004), p. 558. For comment on the ‘Golden Age of the peasantry,’ typified by a decline in elite taxation of commoners, see Wood (2007), p. 227.

<sup>733</sup> Though explicitly stated that we need not bother with general climatic trends because ‘minor’ changes in the realm of a centigrade or two were of ‘little importance’ when compared to short-term extreme weather and climatic change: Gottfried (1982b), p. 3.

<sup>734</sup> Cheyette (2008), pp. 161.

<sup>735</sup> Pearson (1997), p. 24; cf. Dodgshon on the early modern period: (2004), p. 3. For a Chinese perspective see Zhang et al (2007) who argue that conflict was more frequent over the last 1000 years in eastern China in periods of cooler climate as such periods were characterized by a lower aggregate production of basic foodstuffs.

Most historians who hypothesize that shortage racked mid eighth- through mid tenth-centuries populations imply that the consequences were severe.<sup>736</sup> Doehaerd asserted that Carolingians and early Ottonians, like early medieval peoples in general, were unable ‘to organize any form of resistance’ to famine. Like a few others, she consulted some textual accounts of shortage, and like most she accepted the repercussions of famine listed by medieval chroniclers as unedited reporting. She concluded that the consequences of famines were brutal: ‘a bad harvest meant not simply what it means today, it meant men eating earth, the rotting flesh of animals, even human flesh; it meant death and depopulation.’<sup>737</sup> Likewise, Munz claimed that the famine of the early 790s ‘led to cannibalism and some people even ate members of their own family.’<sup>738</sup> Modern scholars regularly cite cannibalism as a consequence of a poor medieval harvest.<sup>739</sup> Riché, though, focused on ‘vagabonds and beggars’ that he states ‘crisscrossed’ Charlemagne’s kingdom in the wake of crises in 789 and 806, and McCormick has suggested that the prominence of spelt on Carolingian manors was a product of Malthusian pressures and the better ‘shelf life’ of the species. He also repeatedly draws our attention to Pope Hadrian I’s claim that people and entire families were selling themselves into slavery because of the shortage conditions perhaps in the late 770s.<sup>740</sup> Drawing on the example of 892, Nelson suggested that a shortage could cause, perhaps force, invading peoples, in this case Vikings, to flee *Francia*.<sup>741</sup> She also drew attention to some high prices in periods of famine in the reign of Charles the Bald (seeing these not as a cause but a repercussion of shortage) and tentatively inferred that food shortages could force peasants to flee their lands.<sup>742</sup> Reuter has likewise proposed that ‘bad harvests’ could cause impoverishment and impel free peasants into a ‘position of dependence.’<sup>743</sup> For Fichtenau too, subsistence

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<sup>736</sup> For instance, Fichtenau (1957), p. 150; Butzer (1993), p. 572; Butt (2002), p. 78; Devroey (2006), pp. 323, 337.

<sup>737</sup> Doehaerd (1978), p. 2. However, Doehaerd later refers to Charlemagne’s attempt to fix prices in 794 and 805, as well as later elite attempts to quell hunger: (1978), pp. 5-6.

<sup>738</sup> Munz (1969), pp. 19-20.

<sup>739</sup> For example, Smith (2005), pp. 63, 65, 75; Duby (1974), p. 159; Bonnassie (1990), p. 14; Hollister (1982), p. 83; Duruy (1891), p. 224; Fichtenau (1957), p. 150; Ó Corráin (2005), p. 576; Bradbury (2007), p. 95.

<sup>740</sup> Riché (1993), p. 313; McCormick (2001), pp. 35, 626, 749, 877-78

<sup>741</sup> Nelson (1986), p. 46.

<sup>742</sup> Ibid (1992), pp. 27, 39.

<sup>743</sup> Reuter (1991), p. 99.

crises allowed estate owners to bring ‘small free and half-free peasants,’ who were unable feed themselves, and who were depressed by poverty, under their control.<sup>744</sup>

Again Verhulst presents the most thorough discussion. His steadfast belief that population experienced an upward swing during the reign of Charlemagne, coupled with his general neglect of post-Charlemagne crises, led him to conclude not only that Carolingian shortages should be interpreted as accidents of growth but that shortages would have had short-lived demographic repercussions on account of ‘the dynamic qualities of a young population,’ that is, the ability of a rapidly growing population to make up the losses.<sup>745</sup> A Malthusian outlook may have prevented any other interpretation, unless successive famines, like those of the early 790s and early 800s, were thought to have affected the same peoples, and, consequently, exercised a cumulative demographic impact. Nevertheless, Verhulst does not deem late eighth- and early ninth-century food shortages as having a snowball effect on the overall demographic character of Carolingian populations, as, according to him, fourteenth- and fifteenth-century food shortages did not then.<sup>746</sup> While Devroey also suggested that ‘crisis and food shortage did not have any lasting effect’ on the ‘long-term’ demographic trend of the eighth through eleventh centuries,<sup>747</sup> Gottfried, like Herlihy but few others, proposed that after the 840s famines became more severe and regular, and began, consequently, to raise ‘mortality rates,’ depress ‘fertility rates’ and reverse Europe’s ‘century-long population expansion.’<sup>748</sup> For

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<sup>744</sup> Fichtenau (1957), pp. 135, 150. The idea that subsistence crises brought peasants under the authority of larger landowners appears to have deep roots in German historiography, which require more attention. Fichtenau seems to imply that landowners bought up grain supplies in bad years in order to bring free peasants under their wing. If this did occur, we need to consider more closely whether land owners bought up harvests deliberately for this purpose, or whether it was an unintended (but fortuitous) consequence. Innis presents a contrasting view: (2000), pp. 47-50. Note that neither Fichtenau, nor Innis assess the severity or regularity of shortages in the Carolingian period.

<sup>745</sup> Verhulst (1995), p. 483; idem (2002), p. 26.

<sup>746</sup> Verhulst (1995), p. 483; idem (2002), pp. 26, 134. Verhulst does not specify what late medieval famines he refers to. However, it can be said that it is not commonly argued that famines after the Great European Famine of the early fourteenth century had cumulative effects on the overall demographic character of late medieval Europe. Indeed, that is the role commonly assigned to the Black Death and subsequent pestilences. See, for instance, the work of Campbell (2009, 2010) and Alfani (2007). Verhulst may have taken this point from Toubert: (1990), p. 64.

<sup>747</sup> Devroey (2001), p. 104; idem (2003), pp. 76-7.

<sup>748</sup> Gottfried (1982b), p. 6.

Gottfried, unlike Verhulst and Devroey, food shortages eventually did take a demographic toll in the Carolingian and early Ottonian periods.<sup>749</sup>

Verhulst also addressed the measures rulers took to remedy subsistence crises. While medieval elites, particularly secular elites, are often thought to have done little to offset shortages, Verhulst on several occasions has argued that Charlemagne ‘took general and drastic measures’ to curb the severity of crises in ‘setting maximum prices for bread and grain, introducing new units of measurement, weight and currency, establishing help for the needy’ and even ‘requiring the saying of prayers in churches and monasteries.’<sup>750</sup> For Verhulst, these tactics, especially the price fixing and control of measurements, would have gone a long way to curb the impact of shortages *c.*800.<sup>751</sup> As argued in Part 3 however, that these measures were required at all demonstrates how severely shortages affected the mass of the population and how lower social strata were abused at markets. Pressing further, Verhulst proposed that Charlemagne encouraged the holders of estates to provide for dependent families in times of want. Verhulst did not, though, consider to what extent these measures did, or were able to, alleviate the hunger of the masses (or whether holders of estates ever did offer help and why Charlemagne needed to remind them to do so), and himself stated that the upkeep of royal manors, ‘their production capacity and [grain] stocks,’ were a primary concern during crises.<sup>752</sup> Additionally, Doehaerd and McCormick have drawn attention to Charlemagne’s attempts to prevent the sale of food outside of Frankish Europe. The latter also highlights the king’s effort to invalidate ‘all sales into slavery’ caused by shortage in the late 700s.<sup>753</sup>

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<sup>749</sup> Smith suggests that ‘frequent famines,’ though not ‘universal,’ managed to suppress population growth until 950: (2005), p. 65.

<sup>750</sup> Verhulst (1995), p. 483; idem (2002), pp. 25, 123-25. Several others have addressed Charlemagne’s price fixing: Devroey (1989), pp. 89-90; idem (2006), p. 337; Smith (2005), p. 76; Riché (1993), pp. 312-13. Smith assigned the price fixing to 792/93 and Riché noted the capitulary evidence outside of the context of famine. De Jong addressed Charlemagne’s urging of the appeasement of God through prayer: (2005), p. 128; and Ganshof paid some attention to Charlemagne’s requests for more intensive almsgiving in the early 790s and 800s: (1971), p. 128.

<sup>751</sup> Verhulst (2002), pp. 25-6, 128-29; idem (1995), p. 506. Verhulst asserts that these measures were ‘far-reaching’ and ‘severely controlled.’ His views on these policies and their effectiveness is undoubtedly a part of his overarching idea that the Carolingian elite could control and drive matters of production and supply (though he skirts the idea of an official ‘agrarian policy’).

<sup>752</sup> As observed, Verhulst also thought that profiteering and hoarding did not occur since the ‘building up of grains stocks’ and the ‘purchasing of future harvests’ were prohibited: (2002), p. 128. The contrasting views of Fichtenau and Doehaerd on this matter seem more fitting as prohibitions, especially repeated prohibitions, may signal the continuation of the practice one wishes to prohibit: see Part 3.

<sup>753</sup> Doehaerd (1978), p. 5; McCormick (2001), pp. 610, 749, 878.

Scholarship on early medieval charity has addressed the desire of religious institutions to alleviate hunger in times of want. How useful this charity was, or how much of an impact it could have had, has yet to be studied in any depth.<sup>754</sup>

Several important points have been raised about the repercussions of Carolingian and early Ottonian food shortages, though little grounded or sustained discussion has appeared and the ability, or inability, of Carolingian and early Ottonian populations to absorb or respond to crises has been overlooked. As McCormick, Dutton and Mayewski state in their survey of severe Carolingian and early Ottonian winters, ‘how different systems were capable of responding, or not, to unforeseen challenges is a crucial part of the story.’<sup>755</sup> The prevalent idea that early medieval peoples were extremely vulnerable to crises, may stem from the omission in the primary sources of the capability of peasants or elites to absorb and respond to crop failures. Though Wickham, in sharp contrast to this stance, briefly suggested that early medieval peasant families would have banded together in times of ‘emergency or famine,’<sup>756</sup> there has been little attention, for instance, to early medieval food storage, grain trade, survival techniques, including recourse to ‘famine foods,’ that contemporaries may have implemented.<sup>757</sup>

In summary, two general points regarding scholarly views on Carolingian and early Ottonian food shortages may be emphasized. Firstly, discussion on the scope, frequency, causation and repercussions of shortages has been conducted in a very circular manner. What has been said about the scope, frequency, causation and repercussions of shortages

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<sup>754</sup> For example, Niederer (1958), pp. 288-89; James (1982), pp. 54-5; Brennan (1992), pp. 117, 135; Knight (1999), pp. 65-6; Smith (2005), p. 76. Brennan draws attention to bishops providing relief in the wake of ‘famines’ and urban fires in the poems of Venantius Fortunatus. He also refers to an aristocratic tradition in at least Roman and early Merovingian Gaul of feeding the poor in times of want. It has been suggested, though, that religious institutions, like land owners, had something to gain during food shortages. James, for instance, suggests that bishops could possibly benefit in times of want. Their intervention could help them build prestige and influence: (1982), pp. 54-5. James cites Merovingian bishops ransoming captives and organizing large scale relief, including grain-loaded ships, during shortages. Wallace-Hadrill has also suggested that famine and its alleviation were central to the growth of the political and territorial power of the papacy in the early Middle Ages: (1962), p. 45. His opinion may have more to do with peasants giving up their land for protection from the church, in the form of foodstuffs, than the church gaining influence via almsgiving.

<sup>755</sup> McCormick, Dutton and Mayewski (2007), pp. 891-92.

<sup>756</sup> Wickham (2004), pp. 538, 551.

<sup>757</sup> Smith (2005), pp. 75-6, like a few others who do address famine foods, focuses solely on textual accounts of the extreme, like references to the consumption of dogs. The most substantial discussion to date on possible early medieval famine foods is Pearson (1997), whose work is discussed below.

has derived primarily from ideas about Carolingian and early Ottonian population trends, not any thorough assessment of the available source material. The remarks of Verhulst, Devroey, Gottfried and Smith, for instance, about the demographic impact of mid eighth- through mid tenth-century subsistence crises are entirely deduced from their conception of early and high medieval demographic history.<sup>758</sup> Secondly, very little has been ‘imported’ into the discussion of food shortages. No attempt has been made to set mid eighth- through mid tenth-century shortages into their greater early medieval context, or to draw on the evidence and experience of later pre-industrial or modern populations for guidance and insight. The only ‘import’ into any discussion on Carolingian and early Ottonian famines, and early medieval Western European famines more generally, is Malthusianism,<sup>759</sup> which is a strong indication of the underdevelopment of the modern study of early medieval hunger.

### 2.1.2 Chronic hunger and endemic malnutrition

Indirectly, the severity and extent of chronic hunger in early medieval Europe, the Carolingian and early Ottonian periods more specifically, has garnered more comment in modern socio-economic histories of the early medieval era than episodic food shortages. With a few exceptions, however, little energy has been devoted to the direct evidence for endemic malnutrition, rather it has been regularly been measured on the basis of agricultural productivity.<sup>760</sup> Historians who have gauged early medieval production as

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<sup>758</sup> Of course, the chief exception here is the work of McCormick, Dutton and Mayewski (2007), which surveys a large number of written sources in order to illuminate crises that temporally correspond to volcanic events evidenced in polar ice; Gillmor’s discussion of the crisis of the early 790s is also divorced from ideas about population trends: (2005), pp. 23, 31, 37-8.

<sup>759</sup> Though see Pearson’s ‘hypothetical diet’ discussed below.

<sup>760</sup> While few have rooted their opinions on chronic hunger in direct evidence, there are some exceptions. Duby drew upon studies of bones and teeth derived from sixth-century grave sites that showed signs of dietary deficiencies, which he thought would be representative of early medieval populations as a whole. He also employed nutritional assessments of tenth- and eleventh-century remains from what is now Hungary, writing that ‘it is not unreasonable to assume’ that tenth- and eleventh-century southeastern European peoples would have had a similar nutritional standing as early medieval western Europeans: (1976), pp. 13, 29. Devroey also utilized some evidence derived from palaeopathological studies of human remains, but in doing so offered a reading very different than Duby’s. For Devroey, chronic hunger and endemic malnutrition were on the decline in the Carolingian period across Europe, though it should be noted that Devroey does not appear to have employed nearly enough material (or written) evidence to be representative of pan-European trends: (2003), pp. 49, 67; idem (2001), p. 104. Treating height as a proxy for nutritional status, Butzer additionally referred to the average height of men and women retrieved from a

barely adequate have thought that chronic hunger was widespread. Conversely, those who have gauged Carolingian and early Ottonian production as growing and robust, by early medieval standards, have thought that it was on the decline and not prevalent.

Of course, chronic hunger and malnutrition are the result in all societies not only of production capacities but economic, environmental and social factors: the way people exploited the environment in which it lived, the way they were socially tied to the land, market access and integration, for instance.<sup>761</sup> Culture is also closely tied to endemic malnutrition. It determined how vulnerable a population was, and it conditioned what people would eat and how and when they would eat it. While it is necessary to recognize the complexity of the causes of chronic hunger, and to not reduce any discussion of these phenomena to agrarian production alone, this is not the place to review the scholarship on its early medieval economic, environmental or social context. Instead, we shall undertake a survey of scholarly opinions on mid eighth- through mid tenth-century chronic hunger. A brief overview of the rationale for these opinions, specifically in terms of agrarian production, is then given. The need for a comprehensive examination of the written and material evidence, particularly once more of the latter becomes available, is stressed in the following pages. It should be noted, however, that though primary evidence for chronic hunger and malnutrition is scant and scattered in the scholarship, strong opinions have advanced on these matters. Some historians have viewed chronic hunger and malnutrition, or a lack thereof, not only as an end result of agricultural productivity, and thus general population trends, but as indicative of agricultural productivity and population trends. Some projected ebbs and flows of the severity and extent of chronic hunger have, very problematically given the nature of our present understanding of the chronic hunger, acted as a barometer for the ebb and flow of agrarian capacities and demography.

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grave site near St. Denis that roughly dates to the Carolingian period in an effort to demonstrate that Carolingians were less malnourished than their early medieval predecessors: (1993), p. 569. Devroey points to the fact that bones, specifically a better grasp of average heights, will eventually tell us more about a population's nutritional status: (1987), p. 88. The uses of anthropometry are discussed in 2.3.

<sup>761</sup> Cf. Millman and Kates (1990), p. 3; Golkin (1987), pp. xv, 1, 17. While several theories of famine causation covered in 2.2.2 address the root causes of hunger, Marx argued more forcefully than others that the roots of hunger are found in the organization of food production and the socio-economic constraints imposed on the majority of a population.

In the socio-economic scholarship, two general stances have been adopted, those which view the Carolingian and early Ottonian periods as racked by chronic hunger and malnutrition, and those which see these periods as marking a distinct rupture in the medieval history of these phenomena. The latter take chronic hunger to be characteristic of Europe post 750/800. The position of Duby is rather typical here. For Duby, ninth-century Europeans ‘lived permanently in the spectre of starvation,’ many were ‘half-famished,’ and ‘malnutrition’ and ‘undernourishment’ were widespread.<sup>762</sup> For Duby, agricultural production in the Carolingian period was ‘woefully inadequate to provide nourishment.’<sup>763</sup> Others have also molded their assessments of the severity and prevalence of chronic hunger around their understanding of demographic history. Like Duby, Lopez thought the supply of bread was ‘scarce and uncertain’ until the late tenth century and that while the fall of Rome reduced disparity between social strata, the mass of population throughout the early Middle Ages was nevertheless ‘ill-nourished.’<sup>764</sup> Similarly, Doehaerd thought an inadequate food supply was endemic to Frankish Europe.<sup>765</sup> Drawing upon several snippets of textual evidence, she proposed that the mass of the Carolingian population was malnourished, suppressed in deep poverty, and completely destitute.<sup>766</sup> Likewise, James saw Frankish peasant life as typified by ‘poverty and precariousness,’ while Hollister thought it ‘near the subsistence level,’ and Heer claimed ‘hunger was never far away’ and Butt that ‘life for the common people in the age of Charlemagne was, in a word, awful:’ endemic malnutrition, like famine, was ‘always present.’<sup>767</sup> Though some have taken a middle road, like Boussard, and proposed that poverty would have varied dramatically from region to region, a few scholars have adopted a stance that contrasts sharply with those of Duby, Lopez and Doehaerd.<sup>768</sup>

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<sup>762</sup> Duby (1974), pp. 29, 81-2. For Duby, similar conditions, in the sixth and eleventh centuries, nurtured the spread of disease: (1974), pp. 13, 158, 183.

<sup>763</sup> Duby (1974), pp. 13, 28-9.

<sup>764</sup> Lopez (1976), pp. 17-8.

<sup>765</sup> Doehaerd (1978), p. 1.

<sup>766</sup> Ibid (1978), pp. 5, 63.

<sup>767</sup> James (1982), p. 75; Hollister (1982), p. 82; Butt (2002), pp. 53, 67. Butt continues, ‘people were barely able to survive.’ Recently, Faith has asserted that the peasant economy of ninth-century Provence was subsistence level at best: (2010), p. 199. In an early medieval Irish context, Ó Corráin claims that ‘there was never an abundance for all:’ (2005), p. 574.

<sup>768</sup> Boussard (1968), p. 52. Several historians have claimed that pre-industrial peasants ‘lived in a chronic state of undernourishment and under the constant threat of starvation.’ See, for example, Cipolla (1994), p. 23.



Representative of this position is Devroey, who boldly asserts that ‘everywhere in Europe’ the study of human remains indicates a ‘significant decrease in malnutrition’ in the eighth century.<sup>769</sup> We shall return to this position below.

Some have drawn upon evidence for food rations to support the idea that endemic malnutrition was not typical of the Carolingian and early Ottonian periods. Consultation of this evidence allowed Butzer, for instance, to assert that ‘both commoners and monks were well fed’ and that ‘basic rations of 1 to 1.4 kilograms of mixed rye-wheat bread per day’ were normal.<sup>770</sup> Butzer, though, built upon the work of Devroey yet ignored Devroey’s reservations about his own evidence and methods. Before Devroey, Rouche had argued that Carolingian peasants would have consumed between 6000 and 9000 calories a day, or 1.5 to 2 kilograms of bread.<sup>771</sup> In a sharp critique of Rouche, however, Hocquet proposed that Carolingian peasants would have consumed between 40 to 80 per cent less.<sup>772</sup> Yet in his survey of Rouche and Hocquet, Devroey convincingly argued that evidence used to reconstruct rations is hardly trustworthy and established more cautious estimates. He concluded with the bread rations Butzer notes but several reservations Butzer does not cite.<sup>773</sup>

Devroey’s argued that his calculation of 1 to 1.4 kilograms of bread a day cannot be widely generalized or even thought to have ever been put into place, as it derives solely from the Council of Aix in 816 and refers specifically to the bread that one Bishop, Edelfonus, thought good enough to ‘last a man’ for a day. As Devroey points out, ‘such specific rations tell us nothing of the eating habits of the mass of the people.’ Rations have been calculated from a wide array of monastic rules and constitutions from the period, yet the data is more often than not ambiguous and thin. Importantly, it must be recognized that the existing data reflects contemporary ideas about what would be sufficient or even ideal, not how much food was actually rationed or consumed. Moreover, most of the evidence pertains to whole religious institutions, not individuals, and it is hard if not impossible to distinguish whether the rations listed were meant only

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<sup>769</sup> Devroey (2001), p. 104. This position seems to stem from the work of White (1962), pp. 69-76.

<sup>770</sup> Butzer (1993), p. 569. These rations, Butzer noted, were better than those given to ‘Byzantine or early Modern soldiers.’

<sup>771</sup> Rouche (1973).

<sup>772</sup> Hocquet (1985).

<sup>773</sup> Devroey (1987), p. 87, *passim*; cf. Pearson (1997), p. 32.

for those living at the institution or if they included rations to be distributed to the poor, travelers, and, as Devroey notes, ‘unexpected visitors.’<sup>774</sup> Furthermore, measurements were not standardized in the early Middle Ages; regional measurements existed, which seem to have evolved discordantly, rendering those listed in various monastic rules and constitutions incomparable and their comparison to modern measurements difficult, if not impossible. Clearly, as Devroey asserts, there is a ‘wide range of possible causes of error.’ Ultimately, evidence for food rations tells us little about consumption patterns, let alone chronic hunger.<sup>775</sup>

Difference of opinion on the extent of malnutrition in early medieval Europe can be attributed primarily to a difference of opinion on the capabilities of agricultural production. Duby, Doehaerd and Lopez, for example, have all proposed that yields in the early Middle Ages, and the Carolingian period specifically, were very poor. For Lopez, in the Carolingian period, which he regards as ‘the high point of the barbarian age,’ the best harvests reached a yield ratio of 2:1 and the worst 1.5:1, that is, two, or one and a half, seeds reaped for every one sown.<sup>776</sup> Duby cites Carolingian yields for one royal manor (Annapes) of 1.8:1 for spelt, 1.7:1 for wheat, 1.6:1 for barley and 1:1 for rye.<sup>777</sup> He then generalized these findings to all of Carolingian Europe, though he observes that these yields corresponded to a ‘bad year’ and that the farms attached to this manor achieved, in the same year, a comparatively impressive barley yield of 2.2:1. He concludes, however, that we should expect yields to have fallen between 1.6:1 and 2.2:1.<sup>778</sup> Slicher van Bath offered similarly low estimates, and Bloch, among others, also emphasized how poor yields were in our period.<sup>779</sup>

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<sup>774</sup> Devroey (1987), p. 87.

<sup>775</sup> Further, it is difficult if not impossible to grasp the nutritional value of the bread that would have been consumed, as it is hard to estimate the flour content of the bread, as data pertaining to the amount of water, salt, and rising agents are not given, and values pertaining to the amount of grain devoted to bread making are not necessarily accurate reflections of the amount of flour used, as the extraction rates of flour from grain varied widely. Extraction rates may have in fact been quite low: Devroey (1987), pp. 70, 81, 87; Pearson (1997), p. 19.

<sup>776</sup> Lopez does not specify grain species. Lopez (1976), p. 17.

<sup>777</sup> Duby (1974), p. 28. This is based on earlier work: idem (1966), pp. 267-83; also idem (1968), p. 25.

<sup>778</sup> It is clear that Duby thought yields would have been in most years closer to the lower of these two limits: (1974), pp. 28-9.

<sup>779</sup> Slicher van Bath (1966), pp. 399-425; Bloch (1966), p. 25; Heer (1975), p. 64; James stresses that yields were ‘appalling low.’ (1982), p. 74; Butt writes that ‘harvests, at their best, were marginal successes.’ (2002), p. 78; and Smith asserts that ‘extremely low grain yields’ appear to have been common throughout early medieval Europe: (2005), p. 64. Low yield estimates are also found in Smil (1994), p. 74.

Differences of opinion on agrarian productivity have been addressed in 0.1.4.1, but it is worth emphasizing again that Duby, Doehaerd, Lopez, Slitcher van Bath, and the others who share their ‘pessimistic’ outlook on the Carolingian and early Ottonian agrarian economy, have deemed early medieval agrarian production capabilities as ‘feeble’ and ‘insufficient’ and that this view has significantly conditioned their opinion on the prevalence and severity of chronic hunger.<sup>780</sup> Likewise, the ‘optimistic’ view on agrarian productivity of Verhulst and Devroey, for example, has had a significant impact on their conceptualizations of chronic hunger and malnutrition. In contrast to pessimists, Verhulst proposes that yields of 2:1 to 3:1 should be expected, and Comet suggests that we should suspect yields of 4:1!<sup>781</sup> At the crux of the matter, though, is the per capita amount of grain Carolingians and early Ottonians could produce; total production capabilities, or crop output values, may be regarded as equally, or more, important than yields.<sup>782</sup> Thus, how much land was brought under cultivation and how that land was worked are important topics. As observed in 0.1.4.1, opinions have diverged widely on these matters too. It is noteworthy, though, that those who consider the Carolingian age one of arable expansion also consider it less marked by chronic hunger than earlier centuries.

The most concentrated work relevant to early medieval chronic hunger demonstrates just how effective such a survey of the context of human hunger and nutrition can be. In her survey of early medieval nutrition and diet, Pearson constructs what she calls a ‘hypothetical diet’ by examining written sources, yield data, palaeobotany, zooarchaeology and some palaeonutritional and palaeopathological assessments of human remains.<sup>783</sup> Several of Pearson’s observations drastically limit any attempts, like those made by Devroey, to generalize about endemic malnutrition over time or space. For instance, she points out that different climates, soils and terrains, differences

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<sup>780</sup> Duby (1974), p. 198; Lopez (1976), pp. 13-8. These scholars drew upon polyptychs.

<sup>781</sup> Verhulst (1990), pp. 21-2; Comet (1997), p. 18; also see comments of Devroey (1990), p. 244, and Reuter (1991), p. 95. These scholars have drawn upon a wider array of polyptychs than Duby and Lopez.

<sup>782</sup> O Grada (2007), p. 8.

<sup>783</sup> Pearson (1997), pp. 1-2. A reading of Pearson’s text indicates how rare nutritional assessments of early medieval remains are. Pearson is able to comment on possible nutritional deficiency-related diseases by comparing her findings of early medieval diet and nutrition to modern scientific studies on nutritional deficiency diseases, like osteoporosis and rickets, not actual palaeopathological or palaeonutritional studies of early medieval skeletons. She focuses on age at death estimates, though avoids anthropometry an indicator of nutrition: Pearson (1997), pp. 28-32.

of social class and ethnic identity, regional variation in market accessibility and integration, regional variation in socio-economic exploitation, and variation in population density and distribution, all drove the peoples of early medieval Europe to eat different types of food of varying quality and quantity. Early medieval populations were not, thus, nutritionally homogenous or equally susceptible to malnutrition. With these caveats in mind, however, Pearson presses forward in order to establish the ‘general nature of the early medieval diet and its health consequences.’<sup>784</sup> Following a survey of all the foods ‘theoretically available’ and an assessment of the nutritional values of all these items, she suggests that this theoretical diet was marginally adequate by United States Department of Agriculture standards.<sup>785</sup> However, she then surveys the various impediments that ‘existed along the road to good nutrition’ and concludes that ‘the majority of early medieval people likely suffered some degree of malnutrition.’<sup>786</sup> Certainly, as addressed in 2.3, this sort of investigation, this contextualization, can help us better understand the endemic malnutrition of Carolingian and early Ottonian populations.

## 2.2 Methodologies

Several methodologies common to the study of modern subsistence crises (*c.*1850-*c.*2000 CE) are surveyed here that are employed in this study in order to establish a definition of famine and lesser food shortages, as well as to ascertain the frequency and causation of Carolingian and early Ottonian famines and lesser food shortages.<sup>787</sup> The discussion is somewhat detailed as to not cloud our discussion of the contours of mid eighth- through mid tenth-century subsistence crises in 2.4 or the impact of subsistence crises in Part 3 with methodological issues. Moreover, the methods and theory covered below are, for the most part, foreign to the study of early medieval subsistence crises.

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<sup>784</sup> Idem (1997), p. 2.

<sup>785</sup> Idem (1997), p. 14.

<sup>786</sup> Idem (1997), pp. 28, 32.

<sup>787</sup> ‘Modern’ food shortages (or famines) are defined as crises that occurred after the mid nineteenth-century Irish Famine. Some theorists and historians of ‘modern famines,’ however, distinguish modern from pre-modern shortages on the grounds of the scale, severity and causation of the crisis, and, consequently, mark some twentieth-century crises, such as China’s Great Leap Famine of and the Bangladeshi famine of 1974/75, as pre-modern.

The defining of both famine and lesser shortages, the diagnosing of subsistence crises as either famines or lesser shortages, and the establishing of the frequency and causation of shortages, are all intricate topics that have, for over a century, been the subject of considerable discussion and debate. All studies of past food shortage must address these topics. Most of the literature on these issues, however, is modern in focus and while modern famine theory and histories of modern shortages may help us define exactly what we, in studying past hunger, are looking at, and what we should, perhaps, be looking for, embedded in much of this literature is the idea that pre-modern shortages differed from modern shortages in terms of causation, extent and mortality.<sup>788</sup> The pre-modern and modern divide theorists draw is highlighted throughout this section, as failure to recognize this division could negatively affect our use of modern theory for the interpretation of Carolingian and early Ottonian crises. Ultimately, we should avoid the binary categorization of pre-modern and modern shortages that modern theorists have provided, and not assume that early medieval subsistence crises were necessarily widespread, caused primarily or solely by extreme weather, and characterized by large mortalities. Modern theorists, after all, are students of modern, not early medieval, hunger.

### 2.2.1 Definitions and the measurement of subsistence crises

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<sup>788</sup> Devereux and O Grada hold that modern crises are less widespread and severe, and that they cause fewer deaths. This, they hypothesize, stems from the fact that poor political accountability has shaped modern shortages more than pre-modern shortages. This, in turn, has meant that modern shortages are more complex: there are more ways to cause and prevent them: for instance, Devereux (2007a), pp. 1, 3-5, 7, 9, 22-4; idem (1993), pp. 181, 184-89; idem (2007b), p. 69. Pre-modern crises are simple in terms of causation, being ‘triggered’ by extreme weather or conflict: Devereux (2007a), p. 3; Howe and Devereux: (2004), p. 356. O Grada likewise states that modern shortages tend to stem from human agency and pre-modern shortages from simple harvest failures: (2008), p. 5. That said, O Grada does not stress, as Devereux, that human agency is the primary cause of most modern famines. Devereux and O Grada also observes that a smaller percentage of a population succumb to disease or starvation in modern shortages than did in pre-modern famines, and that ‘classical’ famines, shortages characterized by ‘widespread hunger and starvation, steeply rising mortality and social breakdown,’ are a thing of the past: for instance, idem (2007), p. 5; Dyson and O Grada (2002), p. 15. ‘Famines that kill,’ Devereux has said, ‘are a thing of the past.’ The distinction these theorists draw between modern and pre-modern subsistence crises is largely a product of the rise of Sen’s theory of entitlements (2.2.2.2), as well as modern aid and medicine: as clearly indicated by Devereux (2007a), p. 9; also, Gazdar (2007), pp. 127, 132-33. Unlike most theorists, Golkin sees continuity between pre-modern and modern food shortages in terms of cause, effect and relief: (1987), pp. xv, 1-2, 12. This stems at least partially from her neglect of Sen’s theory of entitlements (2.2.2.2), though she does (rather puzzlingly) demonstrate her awareness of Sen’s work: (1987), pp. 17-8.

What is a famine, and why is it important to distinguish famines from other food shortages? Can there be a single definition of famine? If so, are there universal features of famines? If a single definition of famine is feasible, should that definition be based on modern experience and theory or the experience of the population one wishes to study? If we set particular criteria for famine, by what means do we define lesser food shortages? Here in 2.2.1 we discuss how we may go about defining famine and how the modern experience of food shortage, and modern famine theory, can be used to explain and categorize the subsistence crises of the Carolingian and early Ottonian periods. As Garnsey has argued, it is essential in the first instance to establish a general definition of famine and what differentiates famines from lesser food shortages. Our sources, he proposes, will make ‘more sense’ if we approach them with ‘a firm set of criteria for famine, drawn from a wider survey of food crises than any primary sources can control, and arrived at with the aid of a conceptual framework lacking to earlier historians and chroniclers.’<sup>789</sup> As Garsney writes, to approach the hunger of an historical period without a precise definition of what a famine is, and is not, is to blur the existence of the hunger continuum that existed in all pre-industrial populations, and to make studies on historical food shortages incomparable.<sup>790</sup>

#### 2.2.1.1 Famine and lesser food shortages: historians, modern theorists and a general definition of famine and lesser food shortages

In all cases, *fames* and like terms,<sup>791</sup> are interpreted here as a food shortage, unless their usage is clearly rhetorical. A food shortage, of course, is very distinct from any underlying current of chronic hunger: it is acute, episodic, and generates epidemic malnutrition.<sup>792</sup> Yet *fames*, and like terms, cannot simply be translated as famine, as all

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<sup>789</sup> Garnsey (1998), p. 279. Garnsey states that a ‘strong definition’ of famine is needed before we approach the sources for any pre-industrial shortage. There is ‘a need,’ he continued, ‘of a ground-clearing operation, which sets out to clarify the nature of famine, to lay down guidelines as to how to identify it in the records of the past.’ This thinking is also evident in his earlier work: (1988), p. 6; *ibid* (1990), p. 126.

<sup>790</sup> Garnsey (1988), p. 6. As Scheidel notes in his addendum to Garnsey’s essay of 1992, ‘loose terminology’ causes ‘confusion and impedes accurate and sensible comparative analysis.’ Garnsey (1998), p. 291.

<sup>791</sup> Such as *caritas*, *inedia*, *inopia*, *penuria* (when used to define a particular period of crisis).

<sup>792</sup> As many have emphasized: for instance, Sen (1981), pp. 39-41, 43; *idem* (1990), p. 376; Golkin (1987), p. xv; Rivers (1988), pp. 57-8.

food shortages, all *fames*, were not identical: food shortages could have differed widely in terms of severity, short- and long-term consequences, spatial and temporal extent, and causation.<sup>793</sup> And if all food shortages were labeled ‘famine’ we would lose sight of the fact that all shortages are not the same.

There is no evidence that early medieval Europeans employed *fames* systematically, or that *fames* referred to a particular type of food shortage.<sup>794</sup> There is no indication that Carolingian and early Ottonian writers employed any standard terms, characterized by specific sets of criteria, to distinguish famines from lesser food shortages, or that early medieval rulers attempted to discern between food shortages in order to determine the magnitude of their responses, if they responded at all. Though the peoples of Carolingian and early Ottonian Europe may have, like several populations prone to shortage in the developing world as de Waal has pointed out, identified several degrees of shortage and have thought of food shortages not merely as hunger and death but as periods marked by ‘social breakdown, loss of livelihood and disease,’ we have little evidence for it.<sup>795</sup> It is necessary, consequently, to establish a definition of famine that we can superimpose onto our evidence. A review of the literature on both historical and modern subsistence crises demonstrates that no universally-adopted definitions for famine or lesser food shortages exist and that we must establish definitions ourselves.<sup>796</sup>

Few historians of pre-industrial food shortages have attempted to establish a definition for famine or to differentiate famines from lesser subsistence crises.<sup>797</sup> Many have employed ‘famine’ uncritically, implied all food shortages were famines, and/or

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<sup>793</sup> In his monograph on Greco-Roman food supply and shortage, Garnsey asserts that it is a ‘categorical error to describe every food crisis as a famine:’ (1988), p. 6. As far as I am aware, he and Stathakopoulos (2004) are alone in making such an important distinction. In a later essay, Garnsey noted, though indirectly, that a failure to differentiate between different types of food crises could lead to confusion and a marring of our understanding of past societies: (1998), p. 273. Likewise, Golkin stresses that no famines or lesser shortages are identical: (1987), p. 20.

<sup>794</sup> How pre-modern European peoples differentiated famines from lesser food shortages, in terms of the definitions and labels they adhered to the crises they experienced, is uncertain: see O Grada’s discussion of terms for famine that peoples, from various undeveloped societies, have employed: (2009), pp. 4-6. Perhaps not all pre-modern societies attempted to differentiate food shortages from one another, they may have had little reason to do so: those living in the midst of a subsistence crisis surely had no reason to define famine or establish how severe it was in comparison to those of the recent, let alone distant, past.

<sup>795</sup> Howe and Devereux (2004), p. 356; de Waal (1989).

<sup>796</sup> As Howe and Devereux have stated (2004, 2007), this lack of a precise and commonly-accepted definition of famine has had a significant and often tragic effect on governmental and aid agency responses to recent food shortages; also Golkin (1987), p. 18.

<sup>797</sup> Some studies of modern shortages also neglect to define famines and lesser food shortages: for example, Gewald (2003); Hart (1993); Mohanty (1993); Mitra (1989).

suggested that there was in the past only chronic hunger and famine.<sup>798</sup> That most scholars have studied food shortages in isolation, that surveys of food shortages over historical periods (whether spans of fifty or five hundred years) are rare, and that the shortages that have been studied have been the severe and spectacular subsistence crises of Europe's past undoubtedly accounts for this dearth of definitions.<sup>799</sup> The well-known essays and monographs of Appleby and Post on early modern European subsistence crises demonstrate this well. Though Appleby often regarded food shortages in binary terms, as either 'famine' or 'not famine,' and though he occasionally drew attention to some characteristics of 'famine,' he neither provided a definition of famine nor discussed how he distinguished famines from lesser shortages.<sup>800</sup> Post likewise overlooked

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<sup>798</sup> This is clear in studies of pre-modern shortages in Europe, the Middle East and Asia. Europe: in his influential assessment of early modern demographic trends, Flinn (1981) does not let his readers know what he means when he writes of 'famine,' nor do Cunningham and Grell (2000) in their study of fifteenth- and early sixteenth-century disease, famine and war. Dodgshon (2004) also fails to define famine in his assessment of early modern Scottish subsistence crises and, Seavoy (1986) does not, surprisingly, provide a definition of famine in his study of 'famine' in peasant societies. Jones (2003), in his study of late medieval and early modern natural disasters, also does not attempt to define famine and speaks of the famines he identifies in very general terms. Braudel too neither provided a definition of famine nor attempted to discern between different types of crises. For him, as Garnsey stressed, all food shortages fit under the umbrella of 'shortage:' Garnsey (1998), p. 274. O Grada and Chevet's 2002 study of French famines shortly before and after 1700 too does not present a definition of famine. Also see Alfani (2000); Ashton et al (1984), Day (2002); Goodkind and West (2001), Hagen (2002), Hionidou (2002), Hoyle (forthcoming), Mudar and Speaker (2003), Smith (1996) and Vaughan (1985). In most of these studies, high mortality and weather are considered prerequisites for famine; Alfani also does consider a reduction in fertility: (2000), p. 563. Asia: while he discusses what many modern theorists would label as common traits of true famines in his survey of early modern Japanese subsistence crises, Saito neither establishes specific criteria for famine nor sufficiently describes the methods he implements to differentiate between famines and lesser shortages: (2002), pp. 218-222. In her study of early modern Japanese shortages, Jannetta does much the same, as Maharatna does in his examination of late nineteenth- and early twentieth-century Indian 'famines:' Jannetta (1992); Maharatna (2002), pp. 113-15. Adamets (2002) does even less assessment of nineteenth- and early twentieth-century Russian shortages. In his brief survey of medieval Islamic shortages, however, Dols defines famine as an 'extreme and general scarcity of food:' (1982), p. 1.

<sup>799</sup> Garnsey recognized that scholarly surveys of food shortages over long periods of time are rare, asserting that 'historians of famine tend to be well-versed only in their own famines:' (1998), p. 273. Naturally, scholarly concentration on the severe stems from the fact that the severe are often the best documented. It is worth noting that studies directed specifically at lesser food shortages are exceedingly rare. I am aware only of Dodgshon (2004).

<sup>800</sup> Appleby (1975, 1977, 1979, 1980). In his article of 1977, Appleby differentiates between 'harvest failures' and 'famine,' and in his essay of 1979 between 'food crises' and 'severe subsistence crises,' then 'minor crises' and 'famine.' Not only are these terms loose and undefined, but they are not employed systematically. This indiscriminate use of terms inhibits the drawing of comparisons between the crises Appleby himself studied. High mortality (from disease mainly), high grain prices, low fertility, and migration for food were clearly some of the criteria Appleby employed to discern true famines, though he draws attention to these randomly and does not employ them in an effort to diagnose food shortages as either 'famines' or 'not famines:' (1977), p. 512; (1979), p. 865; (1980), pp. 655-56. In his monograph on early modern English 'famines,' Appleby does, however, provide a straightforward definition: famine is 'a crisis of starvation and starvation-related disease, a crisis measured by the increase in the number of



definitions of famine and lesser shortages,<sup>801</sup> though he thought high mortality from disease in times of crisis one criterion that distinguished famines from lesser shortages.<sup>802</sup>

There are some exceptions. In his recent study of late medieval and early modern English subsistence crises, Campbell defined a famine as a food shortage marked by two or more successive harvest failures and a decline in yields of 25 per cent.<sup>803</sup> In his study of high medieval subsistence crises, Hybel, like Campbell, defined a famine as a subsistence crisis marked by at least two back-to-back harvest failures.<sup>804</sup> In his study of the Great European Famine (GEF) of 1314-22, Jordan also provides a set definition of famine regardless of the fact that the GEF has long been considered the most disastrous food shortage in pre-industrial European history. For Jordan, famine refers to 'a catastrophic subsistence crisis, the extreme limit of a wide spectrum of shortages.' Jordan makes clear that for a food shortage to be a famine it must be 'protracted,' 'extensive' and the product of unfortunate consecutive harvest 'tides.'<sup>805</sup>

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deaths:' (1978), p. 1. He defines starvation as including deaths brought on by eating 'unsuitable' foods in times of want but not deaths caused by nutritional deficiencies or opportunistic diseases that preyed on the malnourished: (1978), p. 97.

<sup>801</sup> Post (1976, 1980, 1984).

<sup>802</sup> For instance, Post (1984), pp. 3-4. Following Meuvret, Post observes that deaths from starvation were rare and that hunger brought on death far more often 'by roundabout means.' Post also hints that consecutive harvest failures were necessary for famine conditions: (1984), p. 14. Though high mortality is a key factor in some of his work, it is the one element missing from the general definition Post provides in another study: 'pre-industrial food shortages invariably involved meteorological stress, increased food prices, elevated unemployment levels, and mounting social disarray.' While he continued to note that these factors 'could create a matrix that fostered epidemics of several disease entities,' Post did not stress high mortality in periods of dearth as a prerequisite for famine or lesser shortages: (1990), p. 42. Post indicates elsewhere that abnormal mortality was not necessary for famine when stating 'it is essential to match famine conditions with rates of mortality in order to clarify the degree of correlation between the two:' (1976), p. 19.

<sup>803</sup> Campbell (2009), p. 23. This precise definition based on yield information is only possible on account of his collating a great deal of statistical manorial data, which is available only for England and only in great quantity between the mid thirteenth and late fifteenth centuries. For the early modern period, Campbell, like others, is forced to draw on price indices in attempts to identify harvest failures and discern famines. Yet as several scholars, including Campbell, have pointed out, a price index provides only indirect evidence of harvest failure and mortality, and should, consequently, only be used to identify a famine, or lesser food shortages, when employed in conjunction with textual or other direct evidence of extreme hunger: Campbell (2009); Appleby (1978); Hoyle (forthcoming). On the unreliability of prices as proxies for agricultural output see Jordan (1996), pp. 48-55. Few other famine definitions require yield data: O Grada suggests that yields 15 per cent below average conveyed a 'critical harvest:' (2007), p. 8; and the Indian Famine Codes called for yields 50 per cent below average: Singh (1993), pp. 149-50.

<sup>804</sup> Hybel (2002), p. 281. Northern Europe here refers to Scandinavia, northern Germany and France, the Low Countries and Britain. Hybel's approach finds support in O Grada (2007), p. 7, who suggests famines can be identified if harvests are known to have failed across two consecutive years.

<sup>805</sup> Jordan (1996), p. 7. Of all pre-modern European famines, the GEF has attracted the most attention: see, for instance, Lucas (1930), Kershaw (1973a), Jordan (1996, forthcoming), and Davies and Kissonock (2004).

Among historians of pre-modern hunger, Garnsey is the real exception. In his ground-breaking study of Greco-Roman food supply and shortage, Garnsey devised precise definitions of famine and lesser crises. Like Appleby, though with greater precision, Garnsey adopted a binary definition of subsistence crises, differentiating ‘shortage’ from ‘famine.’ Shortage was ‘a short-term reduction in the amount of available foodstuffs, as indicated by rising prices, popular discontent, hunger, in the worst cases boarding on starvation,’ and famine ‘a critical shortage of essential foodstuffs leading through hunger to starvation and a substantially increased mortality rate in a community or region.’<sup>806</sup> In his study of late antique and early Byzantine shortages, Stathakopoulos adopted Garnsey’s binary division and definitions verbatim, though he emphasized that mortality associated to food shortages is the principal defining factor of famine.<sup>807</sup>

More can be done. In defining famine, theorists and historians of modern hunger have focused on a variety of different elements, but most, as Devereux notes, have focused on three: a shortage of food, severe hunger and excess mortality.<sup>808</sup> Many have also drawn attention to socio-economic ‘symptoms’ of famine and set particular temporal and spatial parameters that a food shortage must meet in order to be labeled a famine. The definition of famine employed here has been established following a review of the wide-ranging literature on famine. It has six criteria: a famine is a food shortage; it is a food shortage that produces a demographic contraction as a result of excess deaths from starvation and disease, and a decline in fertility and fecundity; it is a food shortage that affects a wide area, a region, multiple regions or territory, not a single locale;<sup>809</sup> it is a food shortage that lasts two or more successive years; it is a food shortage characterized by a sharp rise in the price of basic food stuffs; and it is a food shortage that fosters particularly ‘extreme’ socio-economic responses, from cannibalism to migrations in and out of the famine-afflicted area for food and work.<sup>810</sup> Famines are, as such, biological as well as social crises.<sup>811</sup>

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<sup>806</sup> Garnsey (1988), p. 6; idem (1990), pp. 126-27.

<sup>807</sup> Stathakopoulos (2004), pp. 4-5, 24. In his more recent discussion of late antique shortages, however, Stathakopoulos (2007) provides no such distinction and speaks vaguely of ‘food shortages,’ ‘subsistence crises’ and ‘famines,’ though he implies that a high rate of mortality was an indicator of famine.

<sup>808</sup> Devereux (1993), p. 181.

<sup>809</sup> For a definition of ‘locale,’ ‘region’ and ‘territory’ see the Definitions section of the introduction.

<sup>810</sup> High prices are not considered a socio-economic symptom as they may not merely be a symptom of shortage and hunger but a cause. The ability of some socio-economic symptoms, such as migration, to

Though not identical to any other, this definition is in line with most definitions that modern theorists, governments and aid agencies have employed. It is also in line with the definitions given by those historians of modern and pre-modern shortages who have attempted to establish a definition of famine. Like most, it treats famine as an event, not a process spanning several years or decades, and it does not, like most definitions, address causation. Four of the definition's six criteria are examined here in more detail to demonstrate how ubiquitous they are in the literature but also how opinion on specifics has varied. Attention to these specifics conditions our ability to diagnose mid eighth-through mid tenth-century famines, and to differentiate them from lesser shortages. Of the six criteria, additional attention to prices and socio-economic symptoms is not necessary. Indeed, not much needs to be said about prices, other than that no common or exact rate of inflation is commonly given in famine definitions, and that some theorists and historians overlook the role of prices altogether.<sup>812</sup> Much the same can be said about socio-economic symptoms: some have ignored them outright while others, particularly those who favor process-oriented and 'early warning' definitions of famine center their discussions around them. Common symptoms discussed include not only the consumption of alternative foods – famine foods – and migrations in and out of the famine-afflicted area, but sales of land and other forms of property, such as livestock, tools and clothing. Others also speak generally of 'social dissolution' and the

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perpetuate shortage conditions is discussed in Part 3 but it is very unlikely, in our period, that any socio-economic symptom identified here would have caused shortages, as high prices could.

<sup>811</sup> While some famine theorists and historians of modern hunger would suggest that the definition of famine employed here should be more precise, we rarely possess, as discussed in 2.2.1.2, the evidence necessary to satisfy the definition as is. Our definition requires no statistical precision, which suits an assessment of mid eighth- through mid tenth-century sources: neither the number of people affected, the number of deaths incurred, the morbidity rate of famine diseases, the prevalence of epidemic malnutrition, nor the size of the area involved is marked with precision. While this serves our purposes, it lacks the 'operationally usefulness' required by modern governments and aid agencies: cf. Howe and Devereux (2004), pp. 355, 357, 360. Howe and Devereux's definition based on 'intensity' and 'magnitude' scales provides the greatest operational 'clarity' in terms of diagnosing famines to date, yet it is totally inapplicable to medieval (let alone most twentieth-century) subsistence crises.

<sup>812</sup> The Indian Famine Codes also identified a famine in part by rises in price of basic foodstuffs of over 40 per cent: Singh (1993), pp. 149-50. Cuny, however, notes simply that adverse market activity, which he describes as markets not supplying food 'at costs that a substantial number of the population can afford,' is an essential component of famine: (1999), pp. 1-2; and in his most recent work, O Grada has emphasized a high price of staple foods, noting that 'the greater the increase in the price of basic foodstuffs and the longer [this increase in prices] lasts, the more serious the famine:' (2009), p. 4.

‘disintegration of customary moral codes,’ which may refer to higher rates of crime, the breaking of taboos, etc.<sup>813</sup>

#### 2.2.1.1.1 A shortage of food

That a famine is a period of food shortage may seem obvious. Most theorists and historians of modern and pre-modern hunger do indeed consider famines food shortages, product of disruptions of food production and/or supply.<sup>814</sup> Yet not all theorists see famines as food shortages or, rather, as specific events.<sup>815</sup> Some suggest that a famine is a process, a term that may apply to all forms of hunger, from chronic malnutrition to major food crises, and that areas and periods marked by food riots, heightened criminal activity involving theft of property and moveable wealth, a clear fear of dearth and/or high prices, and increased rates migration can be identified as suffering ‘famine.’ In primarily agricultural and ‘famine-prone economies,’ such as those of the developing world, some assert that famine is always present. For these scholars and aid agencies, the quantity and quality of food available is not the main issue of concern or an issue at all. The main issue, rather, is the socio-economic symptoms, the so-called ‘early warning signs,’ that set in prior to widespread hunger.<sup>816</sup> This defining of a famine as a long-term socio-economic

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<sup>813</sup> For instance, Hugo (1984), pp. 10-12, 22-7; Mellor and Gavian (1987), p. 539; Golkin (1987), pp. 17, 19, 21-3; Watkins and Menken (1985), pp. 649, 652, 656, 658. Golkin deemed these symptoms ‘universal features of famine.’

<sup>814</sup> Of theorists see Cuny (1999), pp. 1-2; Maddox (1990), p. 181; Golkin (1987), pp. 17, 19, 21-3; Watkins and Menken (1985), pp. 649, 652, 656, 658; Hugo (1984), p. 7; Mayer (1975), p. 572; Masefield (1963), pp. 3-4; Bongaarts and Cain (1982), pp. 44-55; of historians of modern famine see Dirks (1992), p. 157; O Grada (2007), pp. 5, 18; idem (2005), p. 146; idem (2008), pp. 5-6; idem (2009), p. 4; Dyson and O Grada (2002), p. 1; no scholar of pre-modern food shortage appears to regard famines as anything but food shortages.

<sup>815</sup> For more comment on the sorts of definitions discussed here see Howe and Devereux (2004), pp. 355-56; Devereux (1993), p. 181. Rangasmi, for instance, envisioned a three-part ‘famine’ process, in which each stage led into the next. Her stages were ‘dearth,’ ‘famishment’ (or maturing famine), and ‘full-blown famine.’ All stages are not characterized by a shortage of food. Others have drawn up processes with stages titled ‘famine,’ ‘severe famine’ and ‘extreme famine.’ (1985), p. 1747.

<sup>816</sup> For instance, the Indian Famine Codes, developed by the British regime in the late nineteenth century identified famine by its early warning signs in an effort to offset shortages. Warning signs referred to the socio-economic symptoms of higher grain prices, higher rates of migration and higher rates of crime. If attempts to offset looming crises were failing, or outright failed, these codes had in place a three-part definition of food shortage in order to help systematize the response: ‘near-scarcity,’ ‘scarcity’ and ‘famine.’ Scarcity was identified as ‘a prevailing want of food or other necessities’ and famine as ‘the aggravation of conditions of scarcity into a state of extreme scarcity.’ Singh (1993), pp. 149-50. Several more recent definitions of famine, established both by aid groups, such as Oxfam, and international

process contrasts sharply with that which treats famine as an event. Of course, from a modern perspective process-oriented definitions make sense: for an event-based definition to be applied one has to wait and see what happens, which costs lives.<sup>817</sup> Nevertheless, the interpretation of a famine as a process is too general for our evidence, and in any event historians unlike aid agencies need not yoke their definitions to a need to take action. Moreover, if famine encapsulates all forms of hunger and the whole spectrum of food shortages, how would we distinguish, let alone analyze, different degrees of hunger, from endemic malnutrition to famines?

#### 2.2.1.1.2 Demographic impact

Most commentators on famine, theorists and historians who advance event-oriented definitions, center their definitions on a famine's demographic impact, particularly on excess mortality.<sup>818</sup> Opinion on what segment of an afflicted population is hit hardest, and on what people die of, has, however, varied, and some attention has been given to other causes of death in famines. Infants, children, the elderly and the sick are often said to be the most vulnerable. Of adults, women are regularly said to be in a better position to

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organizations, such as the FAO, have been based on early warning signals. In this way, food shortages are conceptualized as hazards that can be avoided. Some, such as the Turkana District Early Warning System for northern Kenya, also take into account weather and short-term climate patterns: Howe and Devereux (2004), p. 357; Millman and Kates (1990), p. 7.

<sup>817</sup> Cf. Sen (1981), p. 40. Howe and Devereux have recently argued for the implementation of a more sophisticated and systematic definition of food shortages, which treats them as a process leading to an event: (2004), pp. 360-67.

<sup>818</sup> Of theorists see Millman and Kates (1990), pp. 15-22; Golkin (1987), pp. 17, 21. Cuny (1999), pp. 1-2; Maddox (1990), p. 181; Mayer (1975), p. 572; Masefield (1963), pp. 3-4; Bongaarts and Cain (1982), pp. 44-55; Rivers (1988), p. 58; Johnston (1973), p. 58; Sen (1981), pp. 39-44. Hugo comments on how demographically driven definitions of famine commonly are in works on modern hunger: (1984), pp. 7-10, 14; of historians of modern crises see Dirks (1992), p. 157; O Grada (2007), pp. 5, 18; idem (2005), p. 146; idem (2008), pp. 5-6; idem (2009), p. 4; Dyson and O Grada (2002), p. 1; of historians of pre-modern crises see, for instance, the work of Appleby, Garnsey, Jordan, Post and Stathakopoulos discussed above.

Some late twentieth-century aid agency definitions of famine center on death rates alone. If death rates in regions stricken by a food shortage exceeded 1 in 10,000 some agencies knew they were dealing with a famine; anything less was simply a 'food shortage.' For others, famine occurred when 20 per cent of a region's child population was suffering 'kwashiorkor,' a term originating in coastal Ghana that refers to an extreme form of malnutrition characterized by oedema, anorexia, ulcerating dermatoses and an enlarged liver, among others symptoms. What others have referred to as 'extreme famine' is defined as a death rate of 5 per 10,000 and a 40 per cent rate of kwashiorkor among a region's children. Other definitions have relied on clinical signs of wasting, measured predominantly in children by assessing weight-for-height loss. Such number-based definitions have helped aid agencies and governments gauge how severe a food shortage is and determine the quantity of aid and attention a given crisis requires: on these definitions see O Grada (2009), p. 4; Howe and Devereux (2004), pp. 359-60.

withstand famine conditions, unless pregnant or lactating. Men are said to be more at risk as it is typically they who venture out of famine-afflicted zones in search of work and food.<sup>819</sup> Variance in opinion on who is most at risk stems from the different evidence samples theorists and historians have drawn upon and the different approaches famine-afflicted populations have employed to combat hunger. The general rule of thumb, however, is that famines are Darwinian: the weak and most vulnerable die first.<sup>820</sup>

But what do people actually die of in famines? It has long been thought that people starve to death.<sup>821</sup> This seems logical: without food how else would people die? The last major scholar of famine to make such an assumption, however, was Sen,<sup>822</sup> and the place of disease as the prime cause of mortality in famines has been increasingly emphasized since (over the last three decades).<sup>823</sup> Three types of disease warrant attention: chronic diseases associated to malnutrition, that is, opportunistic diseases that affect on the malnourished (such as scurvy); non-opportunistic endemic diseases that become epidemic in famine conditions, namely crowding in cities or towns and migrations for work and/or food (such as dysentery); and non-opportunistic non-endemic diseases that take on epidemic proportions in famines and which are spread by the social dislocation and migration for food and/or work that famine entails (such as smallpox).<sup>824</sup> Some have gone so far to assert that no, or few, people actually starve to death in famines, past or present, and that most, or all, famine deaths can be attributed to disease. Others have focused on the synergy between starvation and disease, and argued that while starvation may not cause death outright, it does facilitate the outbreak of opportunistic

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<sup>819</sup> For instance, Cuny highlights women and children as the hardest hit: (1999), p. 1; Watkins and Menken stress that the ‘very young and the very old die disproportionately’ and that of adults men are more susceptible than women: Watkins and Menken (1985), p. 654; Bongaarts and Cain, as well as Hugo, assert that infants, children and the elderly, as well as pregnant and lactating women, are most vulnerable, and Dyson and O Grada note that children, the poor and adult males are ‘usually’ the most affected: Bongaarts and Cain (1982), pp. 41-2; Hugo (1984), pp. 17-8; Dyson and O Grada (2002), pp. 14-5.

<sup>820</sup> Hugo (1984), pp. 17-8.

<sup>821</sup> As Devereux comments: (1993), p. 181.

<sup>822</sup> Sen (1981), p. 39. Devereux has observed (and critiqued) this: (1993), p. 185; idem, (2007b), pp. 73-5. However, while Sen did not include disease-related deaths in his definition of famine, he did not fail to mention the matter altogether. He writes, ‘many of the famine deaths – in some cases most of them – are caused by epidemics...’ Sen (1981), p. 50; also see idem (1990), p. 376.

<sup>823</sup> In addition to the scholarship already addressed in 2.2.1.1, see Arnold (1988), pp. 26-7; Hugo (1984), p. 15; Millman and Kates (1990), pp. 15-6. O Grada likewise comments on this: (2007), p. 20.

<sup>824</sup> As Dyson and O Grada note, both lower and upper social strata are vulnerable to outbreaks of non-opportunistic infections, particularly, they suggest, in pre-modern famines that afflicted urban environments. Before the rise of germ theory and modern medicine, elites could have died as regularly as the poor from diseases that cared not how well one was fed: (2002), pp. 14-5.

and non-opportunistic diseases, the latter of which cause large mortalities.<sup>825</sup> However, the relationship between malnutrition and disease is neither simple nor clearly understood at present, and despite the heavy focus on disease as of late, it is certain that we should not assume that all famine deaths were the result of disease in Carolingian and early Ottonian Europe. Several modern famines have been free of epidemics and extreme malnutrition has caused many documented deaths in recent years.<sup>826</sup> People can die from outright starvation: as the gap between energy expenditure and intake widens, the body begins to eat way or break down fat, muscle and other tissues to ensure the maintenance of the nervous system and function of the heart.<sup>827</sup> People experience fatigue, wasting, extreme vitamin deficiencies, muscle atrophy, and often dehydration as victims generally become too weak to sense thirst. One's immune function becomes significantly impaired, and if disease does not intervene and the intake of food continues to decline or be disrupted, the nervous system and heart simply shut down.<sup>828</sup> That said, most deaths in early medieval famines should not be attributed to starvation: evidence supporting the conclusions that the semi-starved often fall victim to opportunistic diseases before starving outright, and that epidemics of non-opportunistic diseases, which the socio-economic conditions of famines foster, account for the mass of famine deaths, is

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<sup>825</sup> Of historians of pre-modern subsistence crises, see the works of Appleby, Livi Bacci, and Post. Rivers notes that malnutrition is best understood as a 'complex of diseases:' (1988), pp. 57, 59.

<sup>826</sup> Hionidou (2002); Dyson and O Grada (2002), p. 14.

<sup>827</sup> This is catabolysis.

<sup>828</sup> For information on starvation deaths and the biochemistry of reduced food intake see [www.fao.org](http://www.fao.org) and [www.who.int](http://www.who.int).

overwhelming.<sup>829</sup> Carolingian and early Ottonians themselves seem to have made a famine-disease connection.<sup>830</sup>

Whether we include deaths attributable to outbreaks of non-opportunistic diseases, resulting from the social conditions famine engendered, is an important issue. Appleby and Post, of historians of pre-modern shortages, and Dyson and O Grada of the scholars of modern shortages, include (or seem to in the case of the historians of pre-modern Europe) disease-related deaths in periods of famine as ‘famine deaths.’ Watkins and Menken assert that disease-related mortality should not be included in a famine’s ‘death count’ and that famine mortality should consist only of those who died from extreme malnutrition, starvation or wasting.<sup>831</sup> They, however, are the exception.<sup>832</sup> Following the majority of opinion it seems wise to include epidemics in the definition of famine, and under famine deaths, deaths the resulting from epidemics of both opportunistic and non-opportunistic diseases. This is particularly so as without epidemics, famines may not have produced excess mortality. Moreover, the inclusion of disease-related mortality in a definition of famine furnishes more grounds on which to differentiate famines from lesser crises.

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<sup>829</sup> Stathakopoulos emphasizes this in his study of late antique and early Byzantine food shortages: (2004), pp. 156, 159-60; also Garnsey (1988), pp. 25-6, 36-7. In his well-known assessment of European demographic trends from the Black Death to the Industrial Revolution, Livi Bacci argued that the nutritional status of a population greatly affected the susceptibility of that population to disease, at least until the eighteenth century. However, one of Livi Bacci’s main arguments was that the virulence and effect of a pathogen on a population was not always or often determined by nutrition. While nutrition affected mortality, disease outbreaks in periods of extreme want were, for Livi Bacci, more the product of the ‘social chaos’ that famine engendered than mass starvation or a population’s malnutrition. Livi Bacci (1991), p. 104. Livi Bacci popularized this idea, but it was not new with him: see Meuvret (1946). Some scholars have asserted that pre-modern Europeans were themselves well aware of the relationship, as they regularly documented food shortages preceding outbreaks of disease: Appleby (1975), p. 1. For non-opportunistic diseases in modern developing world shortages see, for instance, Maharatna (2002), pp. 113-15, 137; Geary (1996).

<sup>830</sup> Several texts imply that famine deaths were the result of disease see (C.1.37, 38, 39, 40, 60, 74, 101, 103, 104, 115, 131, 178, 185, 186, 187, 209, 210, 242, 248, 249, 279). Several texts also speak directly of death via starvation: (C.1.18, 63, 75, 114, 141, 149, 190, 200, 243, 253).

<sup>831</sup> Watkins and Menken (1985), pp. 649-50. In like fashion, others point out that, while it is difficult to do, famine deaths should not include those product of a ‘background of endemic malnutrition.’ Dyson and O Grada (2002), p. 1. Of course, we cannot, on account of the early medieval sources, attempt any such assessment.

<sup>832</sup> Dirks, for instance, argues that famines increase disease occurrence, or morbidity, on three levels. Of epidemics, he noted that though they did not always accompany famines, they were common enough to be referred to as famine’s ‘classic concomitant.’ (1992), p. 157. Maharatna sees all causes of mortality during famines as fundamental in the definition of famine, though he notes that others have not, preferring a lack of food and widespread starvation: (2002), pp. 113-15; also Golkin: (1987), p. 25; and Saito (2002), p. 219.



Lastly, it is essential to emphasize that not all scholars limit a famine's demographic impact to excess mortality. As Dyson and O Grada emphasize, in addition to causing a large number of deaths, famines 'typically' reduce births and marriages and in so doing result in numerous, possibly thousands, of lost births. These authors specify that the migrations severe food shortages often cause result in family and social dislocation and encourage a decline in fecundity. Such migrations, thus, ensure a decline in the birth rate.<sup>833</sup> Additionally, the malnourishment people suffer in famine can prematurely terminate preexisting pregnancies and reduce the capacity of people to reproduce: women may stop menstruating and ovulating, and sperm mobility and longevity decline. Birth weights of children born in famines are also often quite low, heightening the risk of early death.<sup>834</sup>

Clearly, then, in assessing the demographic impact of Carolingian and early Ottonian subsistence crises we should consider, where possible, variation in mortality between age groups, sexes, social strata, and living environment (rural or urban). We should also define famine not only by the mortality it produces but by the total demographic shock it entails; famines can be defined as shortages that generate both excess mortality and also a decline in the birth rate.

#### 2.2.1.1.3 Spatial parameters

The vast majority of scholars, theorists and historians alike, hold that famines are 'area wide' phenomena, food shortages that afflict a whole, or several, counties, provinces, regions or territories. For Sen and O Grada, for instance, it is without question that famines involve 'widespread acute starvation.'<sup>835</sup> For Cuny, famines are undoubtedly 'area-wide' events, and for Hugo and Alamgir a hungry community, at the very least, is required for a famine.<sup>836</sup> Famines are not, then, food shortages of local parameters or of individual cities or settlements. Yet this begs the question: how large an area must a food

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<sup>833</sup> Dyson and O Grada (2002), p. 1; also O Grada (2007), pp. 5, 23; Saito (2002), p. 219; Watkins and Menken (1985), pp. 649, 652, 656, 658; Bongaarts and Cain (1982), pp. 44-55; Hugo (1984), pp. 19-21.

<sup>834</sup> Bongaarts and Cain (1982), pp. 47-8; Hugo (1984), p. 20; Millman and Kates (1990), pp. 16-7.

<sup>835</sup> Sen (1981), p. 43; O Grada (2007), pp. 5, 18; idem (2005), p. 146; idem (2008), pp. 5-6; idem (2009), p. 4; Dyson and O Grada (2002), p. 1.

<sup>836</sup> Cuny (1999), pp. 1-2; Hugo (1984), p. 7.

shortage impact for it to be labeled a famine, and should we really be concerned with the physical area affected or the number of people?

Of course, universal answers for these questions do not exist, though two points require note. First, it should not be assumed that a famine must be an interregional or country-wide phenomenon, as the area required for a food shortage to be famine is subject to the population and economy affected. For example, if grain trade and markets were few and poorly connected in an afflicted area, we should also not assume that a food shortage had to be spatially vast to be a famine: acute hunger, mass starvation, excess mortality, and a wide range of socio-economic symptoms could appear on a regional level in dislocated or unconnected economies without recourse to external aid. So while a famine is undoubtedly an area-wide event, the spatial parameters of the shortage must take a back seat to other famine criteria, as they can occur even if the affected area is not vast.

Second, the idea that a food shortage must be ‘area-wide’ is at odds with the claim of several scholars of pre-modern Europe who speak of siege-induced famines, or shortages caused by a disruption of food supply, that are in effect city- or settlement-wide.<sup>837</sup> As high mortality is what often makes these crises notable, and as this mortality is commonly the product of outbreaks of opportunistic disease among the malnourished, we must ask whether these shortages are not famines too. Such intentionally afflicted shortages, particularly those caused by sieges or disruptions to food supply, are not the product of harvest failures, let alone successive harvest failures. Generally speaking, such ‘local’ shortages also neither generate migrations, nor the aforementioned socio-economic symptoms of famine. This is at least partially because the population afflicted is contained and unable to react to the shortage as it normally might. Nevertheless, such local crises are distinct from other shortages and warrant some distinction. As such, reference is made throughout this study to siege-induced crises and episodes of intentionally inflicted starvation.

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<sup>837</sup> For some periods, the vast majority of available evidence for shortage concerns settlements alone. Stathakopoulos’ discussion of the subsistence crises of early Byzantium, like Garnsey’s of the ancient Greco-Roman Mediterranean, is forced by the nature of his evidence to be primarily concerned with settlements. The mass of the evidence Stathakopoulos gathers for famine and lesser shortages, in both of his studies on the issue, concern urban centers, chiefly Rome and Constantinople. This is reflected in his table showing the regions to which his evidence applies best: Italy and the Balkans: (2004), pp. 27, 32, 53, 215; also *idem* (2007), pp. 212-14.

#### 2.2.1.1.4 Temporal parameters

Most have proposed that for a food shortage to be a famine, harvests must fail at least two successive years.<sup>838</sup> Few, however, attempt to qualify ‘failed harvests,’<sup>839</sup> and two assumptions are wrapped up in the idea that harvests must fail twice in order to generate a famine. First, it is assumed that harvests must fail for a shortage to occur. Though harvest failures are often thought typical of pre-modern famines they are not theoretically necessary in order to generate widespread hunger and excess mortality, as discussed in 2.2.2. The other assumption is that one harvest is not enough and that two is. Hybel and Campbell, for example, assume that one harvest failure was not sufficient to provoke widespread hunger (at least in high medieval northern Europe, and late medieval and early modern England), that Europeans could have warded off the threat of starvation and mortality that one dismal harvest presented, and that two failed harvests would have routinely caused famine.<sup>840</sup> Campbell and Hybel are not alone: the vast majority of pre-industrial European famines historians have studied persisted for at least two years. Yet while two year shortages may not be atypical, three-year shortages are rare, four-year crises nearly unheard of, and five year shortages totally exceptional.<sup>841</sup>

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<sup>838</sup> Arnold asserts that ‘rural societies could generally survive the effects of one bad harvest:’ (1988), p. 26; and Seavoy claims that ‘famines usually ensue when there are two or more consecutive poor crop years:’ (1986), p. 27. In addition to the opinions of modern historians of pre-modern Europe covered above (see Appleby and Post, as well as the scholarship addressed in 2.2.1.2), Lucas asserts that famines stem from a ‘series’ of ‘very bad years:’ (1930), p. 345; Jordan stresses that famine came in the wake of ‘poor harvest tides’ following in close succession: (1996), p. 7; and Alfani proposes that only ‘consecutive years of bad weather’ produce famine: (2007), p. 567. Mellor also notes that ‘seldom does famine arise from a single bad growing season:’ (1987), p. 540. Watkins and Menken consult Walford’s nineteenth-century ‘catalogue’ of world famines and assert that famines have a ‘common duration’ of two to four years: (1985), pp. 649, 652, 656, 658. (On Walford see 0.1.3.1.) O Grada argues that back-to-back harvest failures were behind, if not necessary for, famine, that ‘even the poorest societies could muster the resources to guard against occasional failures,’ and that ‘even the most backward economies often have the resilience to cope with once-off harvest shortfalls:’ (2007), p. 7; idem (2009), p. 31. He continues (p. 32), however, to note that the efforts employed to get through one bad year could have had effects on the next year, even if the weather was good. He may be referring here to the consumption of seed-corn.

<sup>839</sup> The exception being those few discussed above who have turned to yield data.

<sup>840</sup> Hybel (2002); Campbell (2009).

<sup>841</sup> A seven-year famine is said to have occurred in the reign of the Egyptian pharaoh Djoser in the third millennium BCE, on account of the Nile failing to break its bank for seven successive years: O Grada (2009), p. 32. One also reads of a seven-year ‘famine’ in Egypt in the book of Genesis: Genesis 41:30, 41:54 and 47:13-26. Herodotus too spoke of a seven-year drought and famine on Thera in the seventh century BCE, which he states forced people off the island. Herodotus states the immigrants founded the

Very few major shortages that developed in the wake of a single harvest failure have yet to be identified, though Garnsey, Saito and Stathakopoulos have suggested that a lone harvest failure could indeed generate famine conditions, as defined here.<sup>842</sup>

Following the lead of these scholars, we should not presume that a single bad harvest could not cause a famine in the early Middle Ages, or that all strata of an early medieval population would have survived a poor harvest unmarred. Crises need to be assessed in their contexts and the adaptability of the afflicted populations needs to be assessed. That two successive failures guaranteed a famine should also not be presumed, though it is more likely that back-to-back failures would have caused famine in early medieval Europe than single failures. Nevertheless, while we may adhere to the idea that two successive failures constitute a famine, we should not disregard shortages that appear to

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Greek colony of Cyrene in present-day Libya. There is a report of a seven or eight year shortage at Constantinople between c.330 and c.337 CE. These accounts, however, should not be taken at face value: Garnsey has already questioned the credibility of the Thera famine and the evidence for the famine at Constantinople is very thin, a single *vita*: Garnsey (1988), p. 23; Stathakopoulos (2004), pp. 28, 183-84; idem (2007), pp. 215, 216; Kohns (1994), p. 875. The number seven may have carried some symbolic resonance. Some also claim that Scotland suffered a seven-year famine in the 1690s, though this too may not be all that credible. A Bengali famine in the early 1770s is commonly said to have lasted three years, and much of Europe is known to have been afflicted by a subsistence crises c.1816/18 that was caused by three successive harvest failures. The Finnish famine of the late 1860s also lasted three years and two five-year famines are thought to have occurred in early modern Japan (1782/87 and 1833/37): Jannetta (1992), p. 428; O Grada (2009), pp. 32-3. The GEF is often said to have spanned 1314 to 1322 and to have afflicted much of central, northern and north-western Europe, but harvests did not fail for eight consecutive growing seasons: harvests did fail, and massively at that, over 1314/17 and then again 1320/21, and in the intervening period, a cattle panzootic spread across much, if not all, of famine-afflicted Europe, and sheep died en masse c.1315. All of this, in combination with significant outbreaks of disease among humans c.1315 and c.1320, and extreme and volatile weather, contributed to the prolonging of what might be defined as 'famine-like conditions' throughout much of 1317/20: Lucas (1930); Kershaw (1973a); Jordan (1996). Lastly, it can be noted that the Indian Famine Codes identified a famine in part by three back-to-back harvest failures: Singh (1993), pp. 149-50. Note that where the three-course rotation was in place in Carolingian and early Ottonian Europe, two harvests would fail for every year of shortage.

<sup>842</sup> In his study of Greco-Roman shortages, Garnsey suggests that while successive harvest failures would have produced a more serious subsistence crisis, a lone harvest failure could itself provoke a serious shortage. Though he states that 'a succession of bad harvests will produce a much more serious shortage than a single bad harvest,' he draws attention to the famine at Edessa c.500 CE reported in the *Chronicle of Pseudo-Joshua the Stylite* that is said to have occurred following one harvest failure: Garnsey (1988), pp. 3-6, 17, 23; also Stathakopoulos (2007), p. 213 n. 16. Saito asserts that one-year failures could, and often did, cause large-scale mortalities in Japan: (2002), p. 222, and Stathakopoulos notes that a single failed harvest could have 'devastating effects' on small farmers, who 'usually produced merely enough food for their sustenance:' (2004), p. 55. Though others do not appear to have adopted a similar stance, Dodgshon (2004) notes that one year of bad weather could cause two successive poor harvest years, as the initial failed harvest may result in the consumption of seed and, thus, generate a second below-average harvest. Dyson and O Grada also seem to imply that a true famine could indeed occur following a single poor harvest and that successive bad harvests, thus, may not be a requirement for 'famine': (2002), p. 13. Cf. idem (2007), p. 7; (2009), pp. 31-2.

be true famines as non-famine events because they were occurred following a single failure.

#### 2.2.1.1.5 Lesser food shortages

With a definition of famine established, we may now set criteria for lesser food shortages. In this study, a lesser shortage is, like a famine, understood to have been an event, characterized, as Garnsey indicates, by a short-term reduction in the amount of available foodstuffs, a slight rising in prices, and a briefer period of epidemic malnutrition. A demographic contraction result of excess deaths from starvation and disease, or a decline in fertility and fecundity, does not characterize a lesser shortage, nor do outbreaks of disease, or extreme socio-economic responses such as cannibalism and mass migrations in and out of the famine afflicted area for food or work. Like famines, lesser food shortages are biological as well as social crises, they simply precipitate weaker social and biological consequences. Smaller numbers of the most vulnerable may migrate, price inflation is less pronounced, harvests would not have failed successively, and a smaller area would have been affected. Socio-economic symptoms of the shortage too would have been less, with the escalation of crime rates, and the intensification of the sales of property and movable wealth, less dramatic.

While distinguishing famines from lesser shortages is rather simple, distinguishing between various 'levels' of lesser crises is anything but. Still, we should not adopt a binary division of 'famine' and 'not famine' shortages. As theorists Howe and Devereux argue, a 'graduated multilevel definition' of food shortages should be envisioned, one which forces us to acknowledge a spectrum of food shortages and which appreciates that no two shortages are the same.<sup>843</sup> This is advisable regardless of whether precise definitions can be applied to the various levels of lesser shortages. 'Levels' of lesser crises should be thought of as porous and our definition of a lesser crisis rather elastic. It is worth noting that the problems one faces in attempting to discern between various levels of lesser shortages are mirrored in attempts to differentiate famines by severity.

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<sup>843</sup> Howe and Devereux (2004), pp. 353, 368.

Many shortages might fit the famine criteria listed above, but a two-year shortage would have paled in significance to four-year shortage.

#### 2.2.1.2 The frequency of famines and lesser subsistence crises

Scholars of pre-industrial shortages have taken one of two approaches to determine the frequency of famines and lesser crises. Garnsey, on the one hand, has adopted the idea propounded by modern theorists that famines occur very infrequently compared to lesser food shortages.<sup>844</sup> He employs this concept to make sense of his scattered and vague Greco-Roman evidence for food shortage; without it he would not be able to discern or even speculate on how frequent food shortages were. In contrast, Campbell and Hybel determine the frequency of shortages in their respective periods solely by considering the evidence available. This latter approach is ideal, as the superimposition of theory based on the modern food shortage experience carries the assumption that food shortages occurred in the pre-modern past with the same or similar regularity as they have in the modern period, that is, that famines have transpired with much consistency throughout history.<sup>845</sup> That famines occur infrequently relative to lesser crises is also founded on modern models, and modern history, of population growth.<sup>846</sup> It is said that famines are rare because upward population trends could not exist if they were not: if famines were frequent, one might see demographic stagnation or even contraction instead of growth. Consequently, to superimpose the modern concept that famines were rare in the Carolingian and early Ottonian periods would be to assume that the general mid eighth-through mid tenth-century continental European population trend was positive, which is, as demonstrated in 0.1.4.1, impossible to establish with much certainty. Furthermore, in superimposing the modern concept that famines are rare one may overlook especially 'famine-dense' decades or centuries. This observation stresses one of Campbell and

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<sup>844</sup> Garnsey (1988), pp. 6, 271; idem (1990), pp. 127, 130. He concludes his major survey of subsistence crises in the Greco-Roman by stating 'shortage was common, but famine rare, the outcome of abnormal conditions.' O Grada, in his survey of famines in world history for instance, concluded much the same: famines were 'rare' and lesser food shortages 'much more common:' (2009), pp. 31-2, 35.

<sup>845</sup> In effect, Garnsey implements theory stemming from nineteenth- and twentieth-century experience in the developing world in order to understand the frequency of food shortages that occurred upwards of two thousand five hundred years earlier around the Mediterranean basin.

<sup>846</sup> See, for instance, Watkins and Menken (1988), pp. 166-67.

Hybel's chief achievements. Their decision to turn to the evidence, not social scientists, allowed them to discover that famines, as they define them, were more frequent in some centuries than others.

Consideration of the frequency of famines in pre-modern periods studied without reference to modern theory proves insightful for the assessment of the frequency of famine and lesser shortages in Carolingian and early Ottonian periods. Indeed, a survey of the famine frequencies established for other periods demonstrates the inapplicability of this modern concept to pre-modern periods. For instance, in his study of late antique and early Byzantine food shortages, Stathakopoulos, like Garnsey, holds that famines were 'rare events, perhaps as rare as shortages of every kind were common,'<sup>847</sup> but he does not superimpose this concept over his evidence. Indeed, he discerns 134 shortages between c.284 and c.750 CE, that is, one every 3.5 years, with thirty-one crises in the fourth century, thirty-five in the fifth, thirty-seven in sixth, nineteen in the seventh and twelve in the first half of the eighth. Fourteen of these one hundred and thirty-four shortages, Stathakopoulos proposes, were famines.<sup>848</sup> In his survey of high medieval shortages, Hybel identifies two famines in the eleventh century, five in the twelfth, one in the thirteenth, one in the fourteenth, and none in the fifteenth.<sup>849</sup> And in his survey of six hundred years of English food shortages (1200-1800) in which he employs yield data, price indices, tithes, and palaeoclimatic evidence, Campbell identifies four 'major' famines, 1315/21, 1437/38, 1594-97/1603, 1740/42, and six 'shortages' between 1270 and 1500 (the period in which yield data survive in bulk) of back to back harvest failures

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<sup>847</sup> Stathakopoulos (2004), p. 26.

<sup>848</sup> These occurred in 312/13, 333, 383/84, 418, 450/54, 466/67, 545/47, 581/82, 602/04, 608/11, 646/47, 674, 748/50: Stathakopoulos (2004), p. 26. However, Stathakopoulos expresses uncertainty over the famine diagnoses of several of these shortages: (2004), pp. 207-08, 339-40, 354. In his 2007 discussion of late antique eastern Mediterranean shortages, Stathakopoulos notes that severe subsistence crises at Constantinople were relatively rare with one 'famine' in the fourth century (that of the 330s), one in the fifth, two in the sixth, one in the seventh and one in the eighth. This infrequency was a product, he reckons, of the redirection of the Egyptian *annona* towards the new capital. Famine at old Rome, however, was common, eight between c.390 and c.550: (2007), pp. 214-15.

<sup>849</sup> Hybel (2002), p. 281.

in excess of 25 per cent: 1315/16, 1349/51, 1374/75, 1408/09, 1437/38, and 1471/72.<sup>850</sup> Over the whole period he identifies ten occasions of large harvest failures.<sup>851</sup>

It is also possible to gather some idea of the frequency of famine in other pre-industrial European periods from a range of studies that, for the most part, address subsistence crises in isolation. Hoffmann, for example, drew attention to famines in Silesia in the early and late 1430s, the late 1450s and early 1460s, and the early 1470s,<sup>852</sup> and Seavoy proposed that England suffered ‘at least’ twelve ‘local famines’ between 1086 and the Great European Famine of 1314/21. Between 1525 and 1625, England, according to Seavoy, sustained another six of these famines.<sup>853</sup> In accordance with Campbell, Appleby identified famines in the south of England in 1555/56, 1596/97, as well as in the late 1640s and the early 1660s, and in the north in 1623 and 1649.<sup>854</sup> The English Midlands were hit by famine in 1727/28 and Germany and Scandinavian in the early 1770s. But the suffering of France in the early modern period, Appleby showed, was far greater: ‘terrible crises’ took place in 1630/31, 1649/52, 1661/62, 1693/94 and 1709/10. France was then not hit by general famine until the mid 1790s. As Post and Appleby demonstrate, ‘many parts of Europe’ experienced another major shortage in the mid 1810s,<sup>855</sup> and Post, in his collective works, also drew attention to what he deemed major pan-European crises in the early 1740s and the early 1770s.<sup>856</sup>

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<sup>850</sup> Campbell (2009), pp. 28, 42-50. The harvests of 1457 and 1485 are said also to have failed in excess of 25 per cent, though they appear not to have been immediately followed by a second harvest failure of excess of 25 per cent.

<sup>851</sup> Some of these failures, however, did not result in famine on account of the intervention of disease which significantly cut the demand put on available foodstuffs; a phenomenon Hybel could not, because of the nature of his evidence, consider in detail. The Black Death, for instance, prevented the exceptionally poor harvests of 1349/51 from generating a famine: Campbell (2009), pp. 43, 46.

<sup>852</sup> Hoffmann (1972), pp. 284-85, 295.

<sup>853</sup> Seavoy (1986), pp. 71, 75.

<sup>854</sup> Appleby (1975), pp. 5, 8, 10. The famine of the 1590s appears to have been pan-European. In addition to Appleby and Campbell see de Vries (2009), p. 159 and Alfani (2000), p. 567, *passim*. Hoyle (forthcoming) demonstrates that the crisis of 1623 afflicted northern England as well as Scotland and Ireland.

<sup>855</sup> See specifically Appleby (1980), p. 643. Appleby writes that famine retreated from western Europe after the Irish famine of the 1840s. Finland, however, experienced a major crisis 1867/68 and several regions of Europe, including Greece and the Netherlands, experienced dire shortages in the midst of World War II. For a comparison between the occurrence of famine in France and England in the early modern period see Appleby (1979). In that work (p. 865) he specifies that the famine that began in 1649 ended in 1651. O Grada and Chevet (2002) also address these French famines critically.

<sup>856</sup> Post (1976, 1980, 1984, 1990).



Clearly, famines neither occurred with regularity over time, nor were they universally infrequent.<sup>857</sup> Garnsey's assertion that ancient populations suffered famine on only six occasions over the nine hundred years he studies (three in ancient Greece: 405/4, 295/4 and 87/6 BCE; and three for Rome: 80s, 40s and 30s BCE) stands out in sharp contrast to the work of other scholars.<sup>858</sup> Of course, how one defines a famine affects how frequently one thinks famines occurred, and Garnsey, as we have seen, is one of few who have developed strict criteria for famine. Though the inconsistent and vague famine definitions employed in most of the studies surveyed here inhibits us from drawing too much from these estimates of famine frequency, it is clear nonetheless that the modern theory Garnsey employs to establish famine frequency is not generally applicable to the pre-modern experience in Europe or elsewhere.<sup>859</sup> In the high and late Middle Ages, and

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<sup>857</sup> We may also suspect that lesser shortages too did not occur uniformly over time. As Garnsey: (1988), p. 14. Garnsey holds that lesser shortages were frequent at Rome between 509 and 384 BCE, when one occurred, on average, every nine years, and between 123 BCE and 50 CE when one occurred, on average, every five years; from the fourth century BCE, Garnsey writes, Athens was 'extremely' prone to subsistence crises. Athens was apparently hit by few shortages prior to the fourth century and in general food shortages at Rome and Athens were rare when 'successful imperialism abroad was combined with stable government at home.'

<sup>858</sup> Garnsey (1988), pp. 17-39.

<sup>859</sup> Golkin notes that fourteen 'serious famines' occurred between 1000 and 1600 in India, and another twelve between 1765 and 1858. She further claims that parts of India were afflicted by 'severe scarcity' on sixteen occasions between 1860 and 1908. More alarmingly yet, she asserts that between 108 BCE and 1929 CE China sustained no less than 1800 famines: (1987), p. 3. Though partially incredible, Dando claims to identified 8000 famines over six thousand years of world history: (1980), vii. In his assessment of food shortages in Japan from the seventh century to the late nineteenth CE, Saito argues that 185 famines occurred, more than half of which he states were country-wide. Some centuries, however, were clearly hit harder than others (though source composition and survival may account for some of the variation): for example, thirty-six major shortages are said to have occurred in the eighth century and thirty-seven in the ninth century, yet only five in the tenth and four in the eleventh: (2002), p. 223. Farris, in his demographic history of medieval Japan, is generally in accordance with Saito. He notes that crops failed once every three years in the relatively well-documented eighth and ninth centuries and that afterwards 'famines' were less frequent. From 1150 to 1300 he documents major famines in 1180-82, 1229-32, 1257-60, as well as several other crop failures that produced lesser shortages: (2006), pp. 29, 51-4. Over a longer period, Farris (2007), p. 276, presents slightly different tallies than Saito, though the general trends remain the same. Major crises appear to have occurred relatively frequently in more recent periods in several other regions of the world. In his discussion of late nineteenth- and early twentieth-century Indian famines, Maharatna identifies 'major famines' in 1876/78, 1896/97, 1899/1900 and 1907/08: (2002), p. 115. Greenough, in his more extensive but perhaps less careful survey of Indian subsistence crises from antiquity to the mid twentieth century, identifies four 'famines' between 298 BCE and 1000 CE, twenty-four between 1000 and 1500 CE, eighteen in the sixteenth century, twenty-seven in the seventeenth, eighteen in the eighteenth and eighteen in the nineteenth: (1982), pp. 276-85 (Appendix A). Naturally, the unevenness in this famine tally owes much to source composition and survival. The same remark applies to a recent reckoning of famines in Ethiopia from 100 and 1900 CE. This tally discerns four famines between 100 and 1400, four more over the next two centuries, and eight between 1800 and 1900: O Grada (2009), p. 27. Early modern-era annals (*tarikhs*) from Timbuktu also illustrate, according to Cissoko, report two famines in the first half of the seventeenth century: (1968). Jannetta identifies three major Japanese famines in the early modern period within a period

early modern period, not only were famines not nearly as infrequent as Garnsey holds, but they clearly occurred in ‘cycles’ on century and multi-decadal scales. This is particularly clear in Northern Europe in the twelfth century, Silesia in the mid fifteenth century, and in France and England from the mid seventeenth to the early eighteenth centuries.<sup>860</sup>

That famines occur irregularly indicates two things. First, that we should not invest too much weight in average intervals of famine, as Bonnassie, Devroey, Gottfried, Herlihy and Verhulst have for the Carolingian and early Ottonian periods.<sup>861</sup> The implementation of such averages could lead one to conclude that famines occur with some uniformity and that they exact a similar toll on populations over time; in effect, averages intervals blur what O Grada deems ‘the strong element of randomness in natural and ecological occurrences’ that is behind most pre-industrial famines.<sup>862</sup> Acknowledging this randomness should also prevent us from using modern weather or climate data in order to interpret the frequency of famines in the past, as Garnsey did.<sup>863</sup> Second, that

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of one hundred years: (1992), pp. 427-29. And in his survey of nineteenth- and early twentieth-century Russian ‘famines,’ Adamets identifies ‘poor harvests’ and ‘food shortages’ in 1820-21, 1833-34, 1839-40, 1843-46, 1848-51 and 1854. He also points to 1867-69, 1872-73, 1882-84, 1892, 1906, 1911 and 1921-24 as periods of ‘famine:’ (2002), pp. 158-59.

<sup>860</sup> Dyson and O Grada (2002), p. 13, observe, following a survey of modern famines in the developing world, that food crises ‘often come in pairs.’ They refer to these pairs of famines as ‘big-bang famines.’ They state that a population, having been weakened by a famine, was naturally ‘more susceptible to another.’ It is unclear, however, what Dyson and O Grada refer to by ‘big bang famines,’ whether individual famines that occurred in close sequence or back-to-back harvest failures that produced one famine. Howe and Devereux pick up on Dyson and O Grada’s point but do not question its meaning: (2004), p. 370 n. 18. Cf. O Grada (2009), p. 32, where the author seems to indicate that ‘big bang’ famines are, at least to him, two successive harvest failures that produced one famine, not two individual famines that took place in close succession. It is worth noting that the fourteenth century, like the twelfth and seventeenth, too may be regarded as exceptional, as the much of Europe was afflicted not only by the GEF but massive harvest failures c.1350 that would certainly brought on severe famine had they not occurred in the midst of the Black Death: Campbell (2009).

<sup>861</sup> As surveyed in 2.1.1.

<sup>862</sup> O Grada (2009), p. 39. Many have long sought to establish such averages, however. Malthus’s conclusion, based on the mid eighteenth-century work of Short, that famine occurs in Europe once every seven and a half years reveals little about how severely or regularly famine hit any particular population in the past. Likewise, Farr’s conclusion that England between the eleventh and the seventeenth centuries was hit by famine ten times every one hundred years and Wilde’s conclusion that famine afflicted Ireland once every fifteen years or so throughout the Middle Ages and early modern period tells us little about what regions of England and Ireland, and what periods of English and Irish history, were most racked by shortage. The same applies to Mallory’s claim that between 108 BCE and 1911 CE, China sustained 1028 famines: Mallory (1926), p. 1, *passim*; O Grada comments on the results of Farr, Short and Wilde: (2009), pp. 26-7.

<sup>863</sup> This was in effect Garnsey’s supplementary avenue for establishing famine frequency in the Greco-Roman world. Garnsey argued we could draw upon recent precipitation data and knowledge of the moisture threshold of crops grown around the ancient Mediterranean in order to establish the regularity with which weather conditions, which would have likely caused successive harvest failures in the ancient world,

shortages of all kinds occur irregularly emphasizes how important it is to rely on the primary evidence available, not modern theory, in order to establish the frequency of famines and lesser shortages in our period. We should not presume that famines were rare and lesser shortages more frequent, the evidence, should rather, speak for itself.<sup>864</sup>

### 2.2.1.3 Diagnosing Carolingian and early Ottonian food shortages

Though it is crucial to establish a definition of famine, and to communicate to one's readers what one means when speaking of famine, the application of definitions of famines and lesser food shortages to subsistence crises documented in pre-modern texts is far from straightforward.<sup>865</sup> While there is no reason to disregard the definition of famine reached above, its stringent application to Carolingian and early Ottonian evidence may produce misleading results. Garnsey, who himself spent much time establishing a definition of famine, found it difficult to apply that definition to his Greco-Roman

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occurred in the twentieth century. This approach presumes, however, that modern weather patterns and anomalies are representative of those of antiquity, not to mention that two successive harvest failures were required to generate a famine. It also does not account for other causes of famine and lesser food shortages, such as dust veils, hard winters and locust swarms, not to mention profiteering, conflict and civil discord. Furthermore, as we have seen, overarching climatic regimes of distant eras may be quite distinct and generate shortages at different frequencies: (1988), pp. 9-14. Thus, while modern data may provide some rough idea of how often crises would have occurred, natural weather and climate proxies for the period one is studying provide far better insight (see 0.1.5.1). This is the approach Campbell (2009, 2010) has taken in his studies of late medieval and early modern English subsistence crises. In some respects, Garnsey's implementation of modern precipitation data to understand better ancient harvest failures mirrors Scheidel's use of early modern Egyptian disease history, and Sallares' use of the early modern Italian history of malaria, to understand better the disease environment of Roman Egypt and ancient Rome respectively: see n. 136 in Part 1.

<sup>864</sup> It must be said, however, that while our evidence base is not as dense as Hybel's or possibly Stathakopoulos', let alone Campbell's, it is certainly better than Garnsey's, and that we are undoubtedly in a better position than him to rely on written evidence to determine the frequency of famines and lesser shortages.

<sup>865</sup> As many, including some modern theorists, have commented. For instance, Watkins and Menken note that famines 'are usually only dimly visible' and their 'demographic consequences 'usually' un-measurable. Dyson and O Grada are quick to point out that while famines must be defined at least in part by the high mortality they cause, a famine's toll on human lives 'is often difficult to measure:' (2002), pp. 1, 10-11, 13. Elsewhere O Grada asserts that for most historical famines 'establishing excess mortality with any precision is impossible and inferences derived from incomplete data are often controversial:' (2007), pp. 18-9. Hugo has likewise observed how scholars of modern famines are routinely plagued by a lack of 'appropriate and accurate data' and that though excess mortality is a quintessential criterion of famine there is 'surprisingly little data available to precisely quantify the impact of famine on mortality rates.' He continues, 'accurate measurements of excess deaths are few and far between:' (1984), pp. 12, 14-5. Golkin also writes of the 'indefinite nature' of famine mortality figures: (1987), p. 21.

sources.<sup>866</sup> Stathakopoulos too was forced to admit that ‘in a large number of cases’ his definition ‘cannot be used other than in an arbitrary way.’ He continued, ‘where there is very little information about a crisis the scholar can only decide according to his/her judgment as to whether the crisis was more, or less, severe.’<sup>867</sup>

At the heart of the matter is the fact that we cannot presume that the contemporaries or near contemporaries who documented pre-modern food shortages would have recorded the evidence we need to accurately apply our diagnosis. A reported food shortage may have indeed been a famine by our definition whether or not all the criteria we need to diagnose that shortage as a famine can be met. A severe demographic shock, high prices of basic food stuffs, or migrations for food or work, may not have been recorded, though they may have taken place. Additionally, it is quite difficult in the Carolingian and early Ottonian periods to establish the temporal parameters of a shortage with precision.<sup>868</sup> The scant and ambiguous nature of most of the evidence prevents us from establishing with much certainty which shortages were the most severe, or from establishing a definitive tally of famines and lesser shortages. While it is unlikely that a severe crisis would have gone completely unnoticed in the Carolingian and early Ottonian periods, what was a severe crisis may not look like a severe crisis in our sources.<sup>869</sup>

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<sup>866</sup> Garnsey (1998). Though he makes a sharp distinction between famine and lesser shortages, Garnsey writes that the line between famines and lesser shortages in the pre-industrial past is undoubtedly indistinct on account of the nature of the evidence: (1988), pp. 6, 17-8.

<sup>867</sup> Stathakopoulos (2004), p. 24.

<sup>868</sup> This is true, in fact, for the vast majority of pre fourteenth-century subsistence crises. Stathakopoulos attempts to categorize food shortages with a relatively high degree of specificity via consideration of duration. He speaks of zero to three month shortages, three to nine month shortages, and nine plus month shortages: (2004), p. 53. The grounds on which he attempts to establish the duration of the subsistence crises he isolates in his sources, however, are unclear. Nevertheless, it is not possible to define the duration of early medieval shortages with such precision.

<sup>869</sup> The worst documented shortages may have been the most widespread and demographically devastating. Garnsey also acknowledges how the scant and ambiguous nature of his evidence may affect his results: for instance, (1988), pp. 6-8, 14, 17-8. However, Garnsey’s suggestion that Greco-Roman famines are unlikely to have gone unnoticed seems doubtful as data from better-documented later pre-modern periods indicate. Recall that five famines occurred in the twelfth century alone, and an equal or greater number occurred in the seventeenth century. That famine affected the ancient Mediterranean six times in nine hundred years is simply too hard to believe, especially when considering that several of these shortages, which Garnsey labels famines, were directly related to conflict and governmental upheavals and that pre-modern famines were generally the product of harvest failures, as he and others suggest (see 2.2.2.3). Cf. Stathakopoulos (2004), p. 27, who observes that the ‘number’ of famines recorded in his sources does not reflect the ‘actual occurrence’ of famine. Indeed, the decline in shortages in seventh- and early eighth-century Byzantium, which Stathakopoulos identifies, may owe to the survival of fewer sources from this 150 years than to an actual decline in the number of crises: (2004), pp. 23-5, 55, 170. That said, Stathakopoulos also suggests

Of course, we should not assume, on account of these difficulties, that famines did not occur in our period. Some mid eighth- through mid tenth-century shortages are sufficiently well documented to be labeled a famine as defined here. Yet on account of the difficulties entailed in accurately diagnosing famines and lesser shortages, we should keep in mind that some shortages may be improperly diagnosed and that the famines that can more or less be reliably identified should be understood to represent a baseline: the minimum, not total, number of famines that occurred in mid eighth- through mid tenth-century continental Europe. If anything some shortages diagnosed as lesser famines should be upgraded to famine status. To prevent several famines from slipping through the cracks we must be somewhat lenient with our criteria. We must follow the lead of other scholars and establish which, if any, of our criteria are indispensable.<sup>870</sup> Regardless of how many criteria are drawn upon to advance a diagnosis, when a food shortage is identified as a famine in 2.4.2, it is considered to have exhibited all six, regardless of the lack of direct evidence.

As mid eighth- through mid tenth-century food shortages often appear in the texts as straightforward reports of a decline in food availability, a documented shortage of food, whether the result of natural or human forces, may be regarded as essential to the defining of a famine.<sup>871</sup> Reports of high mortality may also be regarded as essential, and extreme socio-economic symptoms such as migrations for food or work, and cannibalism, too may be thought to be indicative of famine. High prices, on the other hand, may not necessarily indicate famine, but a fear of dearth. As such, like notices of various socio-economic symptoms, reports of price inflation do not themselves permit us to ascertain the severity, let alone spatial and temporal contours, of any given shortage. Furthermore, early medieval textual accounts of high prices, like reports of cannibalism for example, may be nothing more than *topoi*. Though reports of high prices may qualify as a motif

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that fewer famines may have occurred over the period of 600-750 on account of the EMP lessening pressure on foodstuffs: (2004), pp. 26-7, 167.

<sup>870</sup> As we have seen, Hybel (2002) focused solely on the spatial parameters of crises, Stathakopoulos (2007) has observed that notice of high mortality is more important, and Watkins and Menken have concentrated on reports of high mortality, and when those are non-existent indications of price inflation, a 'sharp rise' in the 'prices of staples,' can indicate a severe food crisis: (1985), p. 647.

<sup>871</sup> However, on a couple occasions in regions and sub-periods when the textual evidence is thin, palaeoclimatic data clearly illuminates adverse short-term climatic anomalies that would have most certainly caused shortages, which are, though, not documented in any texts. This is most notable *c.*900: see 2.4.4.

and reflect material world events, they should not be employed as evidence of a crisis without corresponding evidence of an actual food shortage.<sup>872</sup> In the end, we must, as Stathakopoulos observes, use our best judgment and clearly label uncertain diagnoses as such. Of course, shortages uncovered in multiple independent and contemporary, or near contemporary, texts are more easily diagnosed as famines or lesser shortages.

### 2.2.2 The causation of subsistence crises

Though the causes of famine and of lesser food shortages are many, several mono-causal explanations for shortages have been advanced over the last two hundred years which scholars of modern and pre-modern hunger continue to adopt.<sup>873</sup> An introduction to these common theories of shortage causation, and some key critiques of these theories, is provided here. Discussion here informs our assessment of Carolingian and early Ottonian shortage causation in 2.4.4 and impact and in Part 3.<sup>874</sup>

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<sup>872</sup> While it is tempting to suggest that some of the common motifs found in early medieval records of shortage, such as reports of cannibalism and statements regarding the ‘unheard of’ nature of a crisis, for example (C.1.242), are in fact indicators of the severity of the subsistence crisis described, this would surely be a step in the wrong direction. Even if a report of a food shortage containing such a motif or qualifier were given contemporaneously, and even if it could be established without doubt that a major famine did indeed occur where and when the author says it did, early medieval writers would have had no means by which to employ a term in such a standardized way. The description of food shortages in the early Middle Ages was, and still is, subjective, and while such ‘motifs’ may have been the means by which an author intended to communicate to a contemporary or near contemporary audience that the event he described was severe we cannot know this with any certainty. Cf. Jones who rightly dismissed Hollingsworth’s suggestion that we can discern between ‘locally severe’ and ‘widespread’ crises on the grounds of reports of cannibalism: (2003), p. 29. Others have not dismissed this approach and argued that cannibalism is indeed a good indication of a severe crisis: for example, Golkin (1987), pp. 21-2. Garnsey also reads much into ‘the language’ of ancient food shortages: (1988), pp. 18-20.

<sup>873</sup> For instance, Millman and Kates (1990), p. 3.

<sup>874</sup> It is worth noting that though these theories are assigned here to the individuals who fully developed and popularized them, each has roots in the work of earlier thinkers. For instance, while Malthus is often said to be the first to have drawn attention to the limits that the natural environment imposed on population growth, indications of ‘Malthusian thinking’ are found in antiquity: as Herlihy observed: (1985), p. 24. Tertullian (c.160-c.220 CE), for instance, wrote that ‘plague, famine, wars and earthquakes must be regarded as a blessing to civilization, as they cut away at the luxuriant growth of humanity.’ Sen-like thinking can be found in the writings of Marx and several later pre-Sen famine theorists: Devereux (1993), p. 184; O Grada (2005), p. 144. Adam Smith asserted that early modern famines were the product of governmental policies that failed to stop lesser food shortages from turning into major subsistence crises. Thus, famines were not the result of natural but human agency. Additionally, famines have on occasion been blamed since antiquity on hoarding exclusively: O Grada (2008), p. 33. Lastly, Malthus’ contemporary, Weyland, presented ideas very much like those of Boserup. As Golkin observes, Weyland did not share Malthus’ ‘negative views’ on population, instead he argued that ‘an increase of people’ was necessary to ‘stimulate’ the further production of food: (1987), p. 5.

### 2.2.2.1 Malthusianism, Boserup and neo-Malthusianism

Over two centuries ago Malthus constructed what still is the most famous and influential theory of food shortage causation.<sup>875</sup> Indeed, modern and pre-modern food shortages have a long history of Malthusianism.<sup>876</sup> While Malthusianism may now be said to be on the decline, following the rise of Sen's entitlement theory and the recent return to 'agricultural catastrophes,' for some scholars working on periods, like the Carolingian and early Ottonian as demonstrated in 2.1.1.1, Malthus still reigns.

Malthus argued that human populations could not expand *ad infinitum* in a world of limited natural resources. While a population grew geometrically, or exponentially, its means of providing or generating subsistence grew arithmetically, or linearly. A population would eventually, as such, outgrow its ability to support itself. To compensate for this imbalance, nature, Malthus proposed, would intervene, in the form of 'preventative' and 'positive' checks, to ensure that a population remained within its means of subsistence. Preventative checks refer to the limits on growth individuals within the population themselves impose: self-imposed controls of fecundity and fertility, such as the delaying of marriage, the adoption of celibacy and the use of contraceptives. The ability of these preventive checks to curb population growth, though, paled in comparison to that of Malthus' positive checks, which were, in effect, sources of widespread mortality: famine, pestilence and warfare. For Malthus, food shortages were the inevitable result of a population's ability to outgrow its means of subsistence.

Malthusianism has been criticized on two fronts. Some have argued that Malthus was simply wrong: people can and have enhanced the productivity of their land and in doing so have achieved sustained population growth.<sup>877</sup> Though Malthus wrote before the industrial, agricultural, transportation and green revolutions significantly lessened human vulnerability to hunger, and though it may seem, consequently, that this critique of

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<sup>875</sup> Malthus published his essay for the first time in 1798. See Malthus (1807) and, for some commentary, Devereux (2007a), pp. 5-7; *ibid* (1993), pp. 183-84.

<sup>876</sup> O Grada comments on this: (2008), p. 5. More generally, Malthusian thinking has long guided historical reconstructions of European and world demographic and economic history. Clark (2007) is recent example. For a critique of Clark's Malthusianism see Persson (2008), and for Clark's response: Clark (2008).

<sup>877</sup> In this regard, Devereux observes that Malthus' theory has 'severe limitations' and that Malthus has been 'convincingly refuted by history:' (2007a), p. 6; *idem* (1993), p. 183.

Malthus is not applicable to pre-modern periods, we have few grounds on which to assert that pre-modern peoples did not respond to population pressure with technological advance.<sup>878</sup> Boserup forcefully argued that population growth drives technological innovation and augments the ability of a population to produce food. In this model, population density encouraged investment in the technology of production, as well as rural infrastructure, including better roads and more markets, which, in turn, facilitated the generation, and more reliable distribution, of food. Necessity, as such, drove invention. Though Boserup made no claim that her theory was universally applicable, the applicability of her theory to modern societies forces us to reconsider Malthusian-driven reconstructions of the causation of pre-modern and modern food shortages, particularly where support for Malthusianism is thin or non-existent.<sup>879</sup>

Second, several critics propose that Malthusianism does not in itself explain subsistence crisis causation: famine is not, in Devereux's words, a 'Malthusian leveller.'<sup>880</sup> The common cause of death in famine, modern theorists assert, is not starvation as Malthus had it, but disease, and food shortages, at least pre-modern shortages, were triggered almost universally by natural events, not sudden, dramatic increases in population. Indeed, food shortages are sudden events characterized by rapid declines in food availability and/or entitlement, not a population suddenly exceeding its available resources in the period of three, six or twelve months.<sup>881</sup> Furthermore, some theorists, as detailed in Part 3, argue that famines often generate 'baby booms' and drive populations upward in the long run.

Neo-Malthusianist interpretations of food shortages, which we commonly encounter in the literature on pre-modern food shortages, are still vulnerable to these critiques, as neo-Malthusianists, like Malthus, ultimately hold that 'too many people' and

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<sup>878</sup> As Devereux notes, Malthus failed to 'foresee' these revolutions and the effect they would have on food production and distribution. To demonstrate his point, Devereux observes that western Europe and Japan are far more densely populated than Africa but far less prone to famine and that western Europe unlike Africa produces an enormous surplus of food: (1993), p. 183; cf. Desai who notes that the Malthusian threat 'lost its credibility' in the developed world in the twentieth century: (1988), p. 107.

<sup>879</sup> Boserup (1965). Commentary on 'Boserupian logic' or the 'Boserup effect' can be found in Millman and Kates (1990), p. 8; Devereux (1993), p. 183.

<sup>880</sup> Ibid (1993), p. 183.

<sup>881</sup> Sen (1990), p. 376; O Grada (2008), p. 5 n. 2.



‘too little food’ can explain food shortages.<sup>882</sup> Neo-Malthusianism predominantly focuses on the concepts of carrying capacity and property partitioning. The former refers to the expansion of people in densely populated areas into economically precarious or marginal land, such as those characterized by fragile or degraded soils. This theory purposes that food shortages occur in populations whose growth forces them to expand onto these soils, which are less able to support the people and animals it is intended to. Land partitioning, on the other hand, refers to the ability of population growth to ‘perpetuate poverty’ and ‘famine vulnerability’ by generating higher rates of dependency (children on parents, for instance) and, in turn, applying greater strain on available food. This theory holds that population growth results in the greater partitioning of land, technology and resources among heirs, which in turn results in less land and, as such, less food for more people. While neo-Malthusianism cannot explain the causation of food shortages, past or present, it helps us appreciate the vulnerability of a population to crisis.<sup>883</sup> Neo-Malthusianism and Malthusianism help us identify a ‘declining trend in food consumption’ by forcing us to look for evidence of population pressure, like property partitioning, the cultivation of fragile soils, and higher rates of dependency, which all speak to a society’s vulnerability to shortage.<sup>884</sup>

#### 2.2.2.2 Sen, entitlements, and FAD vs. FED

It has been said that Sen has affected how we conceive of and explain food shortages, more than any other scholar with the exception of Malthus.<sup>885</sup> Certainly Sen’s entitlement

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<sup>882</sup> See, for example, Devereux (1993), pp. 183, 187. Signs of this thinking can be seen in some interpretations of the causation of Carolingian and early Ottonian shortages surveyed in 2.1.1.1, particularly in the work of Herlihy and Doehard; also see, for example, Stathakopoulos (2004), pp. 26-7. Neo-Malthusianism has long formed the backbone of modern interpretations of the environmental and population crises of the early fourteenth-century: Lucas (1930), p. 345.

<sup>883</sup> As even Devereux (somewhat) admits: (1993), p. 184.

<sup>884</sup> Sen (1981), pp. 40-1; Devereux (2007a), p. 6.

<sup>885</sup> It has been said that Sen ‘effectively displaced Malthusianism as the dominant theoretical framework for explaining and analyzing famines:’ Devereux (2007a), p. 6; idem (2007b), p. 66; O Grada (2007), p. 26. The idea of entitlements, Devereux writes, ‘represents the most important conceptual advance in famine theorizing since Malthus:’ (1993), p. 185. However, Sen-like thinking has yet to permeate analyses of ancient, medieval or early modern subsistence crises. There are a few exceptions. Garnsey (1988), p. 10, writes that a ‘crop failure is neither a sufficient nor a necessary condition of food crisis, but it does underlie many such crises.’ Cf. Stathakopoulos (2004), pp. 35-6; Dodgshon (2004), p. 13; Fogel (1992), p. 380. Hoyle (forthcoming) seeks to downplay Sen-like analyses of seventeenth-century famines by demonstrating

theory helps us unpack and look beyond our thin and ambiguous evidence for the impact of subsistence crises when contextualizing our shortages in Part 3. Entitlement theory forces us to dig deeper into the causation and perpetuation of shortages.

Sen argued that chronic hunger and food shortages do not require failed harvests or natural catastrophes but a population's, or a segment of a population's, entitlement to food to decline.<sup>886</sup> He proposed that people in all societies have 'differential access' to, or 'different commanding powers' over, food and that regardless of how widespread or acute a crisis is 'there is no reason to think that it will affect all groups in the affected nation.' In effect, Sen forces us to examine the implications of a food shortage in terms not merely of food availability but food consumption, and consumption across the social strata of a population, at the regional, community and household level. Food entitlement at these 'micro levels' could decline, Sen demonstrated, via disruptions or cessations of production, trade, labor, gifts and/or transfers: whether one starved or did not depended more on their 'socially recognized right' to food, as well as a lack of disturbance to that right, than to the success or failure of a harvest.<sup>887</sup> In other words, people could starve in years when aggregate food production was undisturbed or agricultural output greater than usual.

Sen identified two principal forms of food entitlement, 'direct' and 'trade' entitlement. The former refers to the entitlements of subsistence cultivators who produce food for their own intake on their own land. 'Trade entitlement,' on the other hand, refers to those people who rely on markets to meet their subsistence needs, people who exchange and/or purchase goods and/or labor in order to procure their food. Sen includes all those that do not produce their own food in this category of entitlements, including,

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the extent of the harvest failures that were at their 'root.' For a rather unique application of the entitlement approach to a medieval famine see Day's brief comments on the northern Italian famines of c.1340: (2002), p. 110 n. 62.

<sup>886</sup> Sen (1981, 1990). In this way, Sen shifted the focus in discussions on food shortage causation from supply to demand: Devereux (1993), p. 184. To demonstrate his argument Sen drew on four twentieth-century 'famines' that were not characterized by an 'overall' shortage or decline in the availability of foodstuffs, or in which harvest failures were insignificant (at least according to Sen). In these famines, people died because of a loss of entitlement to food. Once people in these crises lost their entitlements or suffered entitlement decline, they became entitled only to starve. For commentary on Sen's work see Devereux (2007b); Millman and Kates (1990), pp. 5-6; Devereux (2007a), p. 6.

<sup>887</sup> Via looting or stealing, for instance, one could augment their entitlement to food. But one is obviously not 'entitled' to the food one obtained through these means, hence Sen did not include these methods of obtaining food in his entitlement theory: for example, Sen (1981), pp. 45, 49; Devereux (2007b), pp. 67, 75.

thus, landless laborers. One's trade entitlement declines, for instance, if one relies on money to purchase food and the circulation of money in an economy declines, if one produces pottery and the market at which they sell their pottery in order to obtain foodstuffs dissolves, if one crafts jewelry and their ability to obtain the necessary raw materials is obstructed, or, of course, if the supply of food at market declines. One's direct entitlement declines, on the other hand, if they lose the right to sell, or own, the crops they produce; or if their harvest, land or farming implements, are destroyed or stolen.

Sen argued that those who are dependent on direct entitlements are most susceptible to hunger and starvation as their entitlement derives from one source, from production; in contrast, those dependent on trade entitlements, with the exception of landless laborers, are often more resourceful and in possession of more means to obtain food. In addition to direct and trade entitlements, Sen identified 'own-labor' and 'inheritance and transfer' entitlements; the former declines when one is unable to sell their labor and the latter when one loses their rights to inheritable goods and property, and gifts and bequests. In many ways, thus, people may lose access to food despite the presence of food. It is likely, however, that in most societies many people would have possessed 'entitlement sets:' multiple types of entitlement to food, one may, for instance, have trade and transfer entitlements.<sup>888</sup>

Like Malthus, Sen has not avoided critics. Some attention to these criticisms is pertinent for our use of Sen-like thinking in our analysis of the causation and impact of mid eighth- through mid tenth-century subsistence crises. Existing criticisms may be grouped into five categories.<sup>889</sup> It has been said that Sen unjustifiably ignored disease; that the entitlement approach does not work for conflict-induced shortages; that it ignores

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<sup>888</sup> Sen (1981), p. 51.

<sup>889</sup> As summarized by Devereux (2007b), pp. 82-3. Some of these criticisms, notably the second and last, have themselves been criticized. Most of these criticisms derive from Sen's 'selective' analysis of the four modern famines on which he based his theory and the inapplicability of his theory to other modern shortages. Devereux, for instance, notes that 'contra Sen's assertion, most recent famines...have been triggered either by political instability or civil war, or by the lethal combination of war plus drought,' and not thus poverty and market failures: Devereux (2007b), p. 80. In 2007, O Grada also suggested that Sen's 'paradigmatic case study for the unimportance of FAD,' the Bengali famine of 1942/44, may indeed turn out to be a case of FAD, as new research shows that crop blight was then widespread in Bengal: (2007), p. 27. And in 2008 O Grada pressed further and showed that Sen's Bengali famine was indeed a FAD event: (2008), p. 33.

some important coping strategies; that it overlooks other forms of entitlement, namely what is referred to as the ‘dependent’ entitlement; and that it erroneously establishes the entitlement approach in contrast to the older food availability approach.

That Sen downplayed the role of disease as a major cause of famine mortality, has already been addressed in 2.2.1.1.2. In regard to the second major criticism, the entitlement approach is often thought to be incompatible with conflict-driven shortages since it solely concerns legal or socially-recognized rights to food, and that it ignores the fact that some segments of a population may actually benefit from food shortages. In war-induced subsistence crises, there are what some refer to as ‘extra-legal transfers’ of entitlements; livestock, crops, property and moveable wealth, for instance, are stolen or illegally possessed, and then employed to obtain food, directly or indirectly. As critics point out not all food entitlements are legal or socially acceptable, and this is certainly true for the early medieval period. Still, as Devereux has emphasized, the entitlement approach can help us unpack and categorize the ability of war to generate hunger: for example, the destruction of fields, buildings, and agrarian equipment results in declines of direct entitlements, and the ability of conflict to disrupt agricultural or craft production, and the operation of markets, and food distribution systems, results in declines of trade and labor entitlements.

The entitlement approach has also been said to ignore some common coping strategies employed in times of want, notably the choice that some make to starve. Sen’s theory is founded on the idea that people use their entitlements to avoid hunger: in periods of shortage, people search for food, transfer goods and sell their labor to obtain food. This fails to acknowledge a fairly well-documented coping strategy in modern famines: people choosing to starve in order to preserve these entitlements. Instead of searching for food or work, some choose to ration their food in an attempt to preserve their assets, such as livestock that they may have otherwise sold. Of course, not all segments of a society will have food to ration, at least not for long, but the point still stands. Fourthly, Sen is said to have ignored another form of entitlement. In addition to ‘extra-legal’ transfers, theorists have identified the ‘dependent’ entitlement, which refers to people who are dependent on the entitlements of another, usually within their own

immediate family, for instance, children on parents, elderly on children, a wife on a husband or a husband on wife.<sup>890</sup>

Lastly, it has been said that Sen wrongly established the entitlement approach against older approaches that focused on food availability.<sup>891</sup> There was initially a strong reaction amongst famine theorists and historians of modern subsistence crises to the idea that harvest failures and natural disasters were not at the root of food shortages; that famines were not the product of agricultural catastrophes. Food availability decline (FAD) and food entitlement decline (FED), coined by Sen,<sup>892</sup> were often conceived through 1980s and '90s as polar opposites.<sup>893</sup> This is in itself wrong: FAD and FED are, in fact, deeply integrated.<sup>894</sup> Bongaarts and Cain, for instance, note that while food availability need not decline for all types of food entitlement to decline, a decline in food availability, which refers directly to a reduction in food production, undoubtedly results in a decline of most forms of entitlement, especially direct entitlement.<sup>895</sup> Indeed, direct entitlements decline when harvests fail and food becomes unavailable. Additionally, harvest failures result in a decline in the food entitlement of those who rely on the market, as a contraction of food production results in higher prices. The amount of food one may obtain via goods obtained via trade, transfers, or inheritance also closely relates to the price of food and, thus, the aggregate quantity of available food. Further, food production can be an avenue of employment and furnish those selling labor with entitlement. If extreme weather gravely restricts the ability to produce food, the food entitlement of someone who relies on their ability to sell their labor declines. Though all shortages do not require FAD, FAD is clearly not an alternative to FED, or vice versa. Most famines are undoubtedly the product of both FAD and FED.

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<sup>890</sup> Dependent entitlements were identified by Bongaarts and Cain: (1982), p. 54; see Devereux for further comment (2007b), pp. 72-3.

<sup>891</sup> Ibid (2007b), pp. 68-70.

<sup>892</sup> Devereux (1993), p. 182.

<sup>893</sup> Still one regularly finds indications of this thinking. Of the small group of scholars of ancient and medieval hunger to make pay Sen's entitlement approach attention, Stathakopoulos holds that FED conflicts with FAD: (2004), p. 35. Hoyle (forthcoming) also constructs a FAD vs. FED scenario in his reassessment of an early seventeenth-century food shortage.

<sup>894</sup> As some theorists, including Sen, have demonstrated: Sen: (1990), pp. 377-78: 'the dissonance between the causal analysis of famines in terms of declines of food output and availability, on the one hand, and entitlement failures, on the other, does not lie in the fact that availability and entitlement are unrelated to each other. They are, of course, linked in many different ways.'

<sup>895</sup> Bongaarts and Cain (1982), p. 55. Sen, as noted above, did in a roundabout way observe this point in his original thesis.

### 2.2.2.3 Food shortage as agricultural catastrophe

Numerous ancient,<sup>896</sup> late antique,<sup>897</sup> early medieval,<sup>898</sup> high and late medieval,<sup>899</sup> and early modern<sup>900</sup> food shortages have been said to have been the product of agricultural catastrophes.<sup>901</sup> The interpretation of a subsistence crisis as an agricultural catastrophe, as

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<sup>896</sup> Greco-Roman food shortages were for Garnsey the product of a variety of causes, most notably anomalous weather events. Like Stathakopoulos, he thought that drought was the greatest concern to agricultural production around the Mediterranean: 'for the most part a crop fails because of insufficient or excessive rainfall at the critical period of plant growth:' (1988), pp. 9-10, 15, 17, 20, 23-4, 95-6; idem (1990), p. 126. Drought is generally the biggest concern for pre-modern Mediterranean European agriculture in general: Shiel (2006), pp. 216, 224; Schachner (2006), p. 91.

<sup>897</sup> Stathakopoulos, for instance, thought most late antique food shortages of the eastern Mediterranean were FAD-induced, caused by extreme weather and short-term climatic anomalies, primarily droughts, not to mention locusts, rodents and other 'pests:' (2004), pp. 35-46, 55; idem (2007), pp. 212, 215. Stathakopoulos concludes that 'larger-scale climatic anomalies that had an overwhelming effect on the food production system of the whole Mediterranean:' (2004), p. 26.

<sup>898</sup> As we have seen in 2.1.1.1, this is true of some Carolingian and early Ottonian shortages.

<sup>899</sup> Campbell and Hybel, in their surveys of early modern food shortages, also focus primarily on natural causes, weather and climate especially: Campbell (2009), *passim*; idem (2010), *passim*; Hybel (2002), p. 281. Additionally, the most famous of medieval famines, the Great European Famine of the early fourteenth century, is often said to have been the result of multiple consecutive years of extreme weather: Lucas (1930), pp. 345-51, 361, 365, 373-74; Jordan (1996), pp. 7-39.

<sup>900</sup> Alfani, for instance, sees the Italian and southern French famine of 1590/93 as the result of bad weather and crop disease (though he later (p. 586) also refers to the famine as a Malthusian crisis): (2007), p. 567. In his study of the disasters of late medieval and early modern Europe and Asia, Jones views food shortages as the product of agricultural catastrophes, namely, poor weather (drought and flooding in particular), locust swarms, large disease-induced mortalities of humans, crop diseases and outbreaks of disease among draught animals: (2003), pp. 29-33. Peacetime food shortages remained common in Europe prior to industrialization, according to Smil for instance, simply on account of the inability of pre-industrial agricultural technology to withstand the vagaries of weather: (1994), p. 65. In his study of early modern and modern food shortages in northern Europe, India and Indonesia, Seavoy concluded that the 'usual' cause of subsistence crises was abnormal weather, particularly drought, but also 'excessive rains, floods, locust swarms, and cold and shortened growing seasons:' (1986), p. 27. Many others studying pre-modern subsistence crises in Asia also assign shortages to bad weather: for example, Saito (2002), Maharatna (2002), and Jannetta (1992).

<sup>901</sup> Many theorists, particularly Sen and Devereux, have claimed that modern famines are for the most part human generated. And some, Devereux especially, have asserted that droughts, floods, extreme cold periods, locusts, crop blight, livestock disease, etc., were the primary triggers of pre-modern food shortages: Devereux (2007a), p. 3. O Grada, for instance, maintain that most modern famines, like all pre-modern famines, are predominantly the result of harvest failures, including some of Sen's chief FED famines. In general, O Grada notes that 'most harvest shortfalls are caused by extreme weather' and that 'most famines in poor economies are associated with the impact of extreme weather:' (2007), pp. 7-8. Elsewhere, O Grada writes that no matter how well-functioning the market, catastrophic harvest failures in pre-industrial Europe could overwhelm markets, that speculative hoarding was rare, and that markets were, thus, very unlikely to generate crises themselves without bad weather: (2005), p. 165. Of modern theorists, Golkin also maintains that most food shortages, past and present, can be attributed to crop failures incurred in the wake of drought, flood, and plant and livestock diseases: Golkin (1987), pp. 18-20. Other studies that label modern famines natural disaster FAD-induced include Gewald (2003), p. 211; Hart (1993), p. 27; Mohanty (1993), p. 63; Dyson and Maharatna (1992), pp. 1325, 1331; Maddox (1990), p. 181; Mitra (1989), p. 253.

the result of some kind of anomalous event in the natural world, however, whether a locust swarm or a dust-veil event, may be regarded as reductionist or overly simplistic. Theorists, such as Devereux, consider agricultural catastrophes as triggers, not grand or overarching causes of shortage. After all, recent anomalous events in many parts of the world detrimental to agricultural production, such as 2004 African locust swarm or the 2010 eruptions of Eyjafjallajökull, have not caused shortages or widespread famine-related deaths; for excessive precipitation to cause a harvest failure and, subsequently, a food shortage, certain socio-economic and political factors or vulnerabilities must exist.<sup>902</sup> Devereux illuminates four problems common to accounts of famine causation that put too much emphasis on agricultural catastrophes.<sup>903</sup> Firstly, catastrophes (for the most part) disrupt food production and not food distribution,<sup>904</sup> and those who point to agricultural catastrophes as the cause of food shortages assume that the shortage-afflicted society was characterized by a ‘totally closed economy’ and that an adequate supply of food could not be obtained from outside the affected area via trade or aid. Secondly, catastrophe theories suggest that all segments of a population are affected, though a smaller proportion of elites die. Thirdly, catastrophe theories fail to explain why some populations suffer more than others in the wake of the same disasters, that is, catastrophe theories fail to take into account food entitlements, not to mention the coping mechanisms, and insurance against shortage, that some societies put into place and others did not.

So catastrophe theories cannot explain the total famine experience. Like Malthusian or entitlement-based approaches, the identification of a shortage as an agricultural catastrophe fails to tell the whole story. That said, the role of agricultural catastrophes in food shortage causation cannot be ignored. As we have seen, modern theorists who have commented on pre-modern shortages as well as historians of pre-modern subsistence crises, and our Carolingian and early Ottonian authors themselves, all emphasize natural anomalies as the primary cause of food shortages in the Carolingian and early Ottonian periods. As agricultural catastrophes must be considered as the

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<sup>902</sup> O Grada (2007), p. 6.

<sup>903</sup> Devereux (1993), pp. 182-83.

<sup>904</sup> We may suspect that damage done to roadways in floods and earthquakes, for instance, would have disrupted distribution and trade of foodstuffs in early medieval Europe.

primary triggers of shortage, an attempt is made here to articulate underlying climatic anomalies as best as possible via consultation of written and material evidence.

#### 2.2.2.4 Market failures, war, labor inputs, response failures, underlying vulnerability, and multi-faceted explanations of shortage causation

Other mechanisms of shortage causation require attention. Occasionally markets are blamed for causing or perpetuating food shortages. Unreliable markets are said to be particularly dangerous if a large portion of a population relies on them to obtain basic foodstuffs.<sup>905</sup> In regard to market failures, theorists describe ‘pull failures’ and ‘response failures.’ The former refers to hoarding, both precautionary and speculative, carried out by merchants themselves or elites. This pulling of food from the market drives the general supply of food down and the price of the food available at market up. Pull failures also, of course, do not require actual harvest failures or the aggregate supply of food to decline. The fact that a pull failure may be divorced from the state of the harvest, allows it to spread geographically, whether or not a harvest actually fails, on local, regional or interregional levels: once food is pulled in one area or at one market, fear can develop of an impending shortage and food may be pulled on a more spatially general level, causing food prices to rise in waves from the first market from which the food was pulled.<sup>906</sup> Response failures, on the other hand, refer to the inability of a market or market system to satisfy the demand for food felt in areas experiencing shortage. Modern developing societies, like those of pre-modern Europe, may experience both types of market failure simultaneously. Moreover, a market system may experience both pull and response failures in sequence; food may be pulled from a market and not simultaneously supplied from other areas or sources.

Attention to the degree and nature of market integration is also necessary, as the response to a market pull or a harvest failure depends in large part on market integration.<sup>907</sup> If markets are well-connected, and transportation costs are minimal or at

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<sup>905</sup> Devereux (1993), pp. 185-86.

<sup>906</sup> This is referred to as the ‘price ripple hypothesis,’ as well as ‘market contagion.’

<sup>907</sup> Devereux notes that the principal source of vulnerability to food shortages in shortage-prone communities stems from ‘weak or unfavorable’ integration of markets: (2007b), p. 78.



least constant, markets could act to keep the price of staple foodstuffs at reasonably low rates in a period of food shortage. Since crop failures always vary in intensity across a the affected area, ‘spatial and inter-temporal arbitrage,’ as O Grada writes, could help mitigate or reduce the cost of want. This is typically possible only in commercialized economies. Indeed, markets have routinely shown to work poorly in weakly commercialized economies during modern crises: regional arbitrage has been inadequate and market pulls, on part of producers and traders, ‘excessive.’ The market release of available foodstuffs has, thus, regularly declined when the amount of food available has declined.<sup>908</sup> However, O Grada has found that market activity in late seventeenth-, eighteenth- and nineteenth-century Europe, unlike that of twentieth-century Africa and Asia, seems to have had a less adverse effect on the ability of people, in shortage-stricken areas, to purchase food at market, as the responses of markets to food availability shortfalls was less dramatic and slower to take effect. Moreover, regional markets in late seventeenth- through nineteenth-century Europe have proven to be more congruent in pricing, that is, markets across a shortage-afflicted area, and even outside of a shortage-afflicted area, exhibited similar prices.<sup>909</sup> This is because, O Grada suggests, food from non-afflicted areas was imported into afflicted areas, balancing the supply and demand in favor of the buyer. That said, poor communications infrastructure, in addition to war or civil unrest in times of want, can impede or inhibit an adequate market response which might keep market prices congruent and less dramatic.<sup>910</sup>

Though markets have been of little interest in terms of famine causation to historians of pre-modern food shortages, lesser conflicts and full-blown wars are regularly said to be the cause of subsistence crises, modern and pre-modern.<sup>911</sup> Next to agricultural

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<sup>908</sup> O Grada (2007), pp. 11-2.

<sup>909</sup> Idem (2007), p. 14.

<sup>910</sup> Idem (2007), p. 12.

<sup>911</sup> Conflict can, and in recent decades has, caused hunger and famine in regions not ‘historically famine-prone.’ Devereux (2007a), p. 5. Ea addresses what are deemed ‘war-induced famines’ in Kampuchea that are said to have ‘severely reduced’ population levels in the 1970s: (1984), p. 33. For Schachner, warfare itself could result in food shortages in the ancient Mediterranean: (2006), p. 91. Erdkamp followed his sources and argued forcefully that ancient wars were indeed ‘dreadful catastrophes’ that not only spread disease but caused widespread hunger: (1998), p. 2. Jones saw war as a cause of famine in early modern Europe and Asia: Jones (2003), pp. 34-8; and Garnsey suggests that food shortages were particularly frequent at Rome during the third-century BCE Punic Wars and the civil wars c.49-31 BCE: (1988), p. 14. Stathakopoulos observes that many famines he identifies in late antique sources his are attributable to military conflict, civil discord and the breakdown of governments: for instance, (2007), pp. 214-17.

catastrophes and Malthusian pressures, conflict is the most regularly cited cause of pre-modern shortage.<sup>912</sup> As Erdkamp, among others, has noted, ancient and medieval Europe was characterized by a structural weaknesses that made it prone to food shortages and highly vulnerable to the impact of war. Food distribution and production capacity was not only weak, by modern standards, but susceptible to disruption via conflict.<sup>913</sup> In his investigation of the impact of the wars of the Roman Republic on food supply, Erdkamp's stresses that it is essential to consider both the hunger of those on campaign and the hunger warfare can bring to 'civilians.'<sup>914</sup> He argues that ancient warfare could severely dislocate local and even regional economies, and in doing so disrupt food production and distribution in an area long after an army passed through. Warfare could, consequently, facilitate the lingering of hunger amongst those not directly involved in war. Ancient and medieval armies transported provisions with them, but accounts of pillaging and foraging forces in ancient and medieval texts are quite numerous and Erdkamp proposes that these should not be too hastily dismissed.<sup>915</sup> Armies are said with great regularity to have ravaged fields, plundered reserves, burned homes and farm structures, stolen property and drove away livestock.<sup>916</sup>

With this in mind, Erdkamp argues that it is essential to pay attention to when, in relation to the growing season and overall production cycle of that area, an army passed through a area. Certainly when and where an army passed could significantly alter the outcome of the army's toll, not to mention the ability of the army to obtain a sufficient quantity of foodstuffs via pillaging and foraging. Erdkamp also argued that conflict can cause population displacement, temporary and permanent, and that this displacement cannot only affect food production and distribution, but the ability of the population to recover, demographically. Further yet, the animals brought on campaign, horses, mules and cattle, too may have consumed foodstuffs meant for local animals or people.

Two additional possible causes of shortage are found in modern literature on hunger. First, Seavoy has suggested that food shortages in peasant societies can stem

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<sup>912</sup> Though Seavoy argued that peacetime shortages were more common than war-induced shortages, at least in modern peasant societies: (1986), pp. 26-7.

<sup>913</sup> Erdkamp (1998), p. 302.

<sup>914</sup> Idem (1998), p. 1.

<sup>915</sup> As Vegetius asserts, 'to distress the enemy more by hunger than the sword is a mark of consummate skill:' Erdkamp (1998), pp. 1-2.

<sup>916</sup> For example, Erdkamp (1998), pp. 2, 302.

from marginal labor inputs. In societies that transfer a significant degree of labor to the 'least motivated members of a society' (which for Seavoy comprises slaves, landless peasants and child laborers), there is a risk of low yields or even harvest failure stemming from inadequate labor invested in cultivation, or a lack of motivation to generate a bountiful harvest.<sup>917</sup> Peasants in general, he suggests, aim to meet their subsistence, nothing more. The ability of minimal labor inputs to cause shortage is most prominent when the mass of the peasantry earns neither a wage nor an income by producing food. On the other hand, those with access to markets and who do earn a wage or an income via food production invest more labor in cultivation in order to assure subsistence and surplus. Thus, in societies where most producers are 'money motivated' there is less risk of famine stemming from marginal inputs and a greater buffer to withstand years in which war or weather destroy harvests.<sup>918</sup>

Second, Dodgshon views crises as failures of response or risk aversion. He asserts, for instance, that 'climatic hazards were easily the most obvious and recurrent source of risk' in early modern Scotland, yet he believes that famines would have been more common had early modern Scottish not regularly responded well to threats of shortage via a series of risk aversion strategies.<sup>919</sup> In a similar fashion, Garnsey has suggested that food shortages were common and famines rare in antiquity because ancient peoples had developed means by which they could prevent food shortages from turning into famines, not, for instance, on the rarity of bouts of extreme weather. According to Garnsey, furthermore, Greco-Roman shortages occurred when measures employed to buffer food shortages failed or proved inadequate in the face of extreme weather.<sup>920</sup>

Lastly, some consideration is required of what actually allows a famine to occur. While we may regularly regard, following the lead of modern media, natural disasters, climatic anomalies, extreme weather events and conflict the common causes of shortage, what ultimately allows shortage to occur are the underlying socio-economic, political and demographic factors that make a society vulnerable.<sup>921</sup> Early medieval descriptions of subsistence crises, like modern media reports, focus on the extreme, on the major events

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<sup>917</sup> Seavoy (1986), pp. 27, 259, 387.

<sup>918</sup> Ibid (1986), pp. 387-88. Cf. Sen (1981), p. 50.

<sup>919</sup> Dodgshon (2004), p. 2.

<sup>920</sup> For example, Garnsey (1990), p. 130.

<sup>921</sup> Devereux (1993), p. 182.

that are perceived to have triggered crises, but in the early Middle Ages, as today, it was the human context in which anomalous events in the natural world occurred that allowed extreme weather to produce crises.

Any assessment of a population's vulnerability to shortage is going to be complex and focus on processes, long term over short term, rather than events.<sup>922</sup> Modern theorists have defined several quintessential political, social and economic criteria that set a population up for shortage.<sup>923</sup> Theorists identify a lack of early warning signals, pre-established information networks and avenues of aid, poor regional and interregional communication and transportation, inaccessible villages, communities and households, and a 'callous' disregard, on behalf of the ruling elite, for the hunger-stricken, or, rather, the inability of the ruling elite to lessen suffering.<sup>924</sup> An absence of coping mechanisms, including crop insurance, adequate storage facilities, trade and public action, are also regularly cited as characteristics of shortage-prone societies. Populations typified by poor (by modern developed-world standards) hygiene and sanitation are likewise said to be more prone to famine epidemics, and general poverty, variously measured, is additionally said to be an indicator of the susceptibility to shortage and famine epidemics.<sup>925</sup> In societies in which these qualities are typical, the scale of a subsistence crisis is said to depend foremost on the scale of the harvest failure.<sup>926</sup>

We have much to think about in 2.4.4. In addition to Malthusian pressures, entitlement declines and agricultural catastrophes, the underlying vulnerability of the population, market activity and role of conflict all need to be considered. The causation of many shortages may require multi-faceted explanations, as some have insisted.<sup>927</sup> Ultimately,

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<sup>922</sup> Hence the focus on processes (detailed above) in some recent definitions of famine.

<sup>923</sup> Ibid (1993), p. 182.

<sup>924</sup> Ibid (1993), p. 188.

<sup>925</sup> O Grada (2007), pp. 6-7.

<sup>926</sup> As Golkin writes, famines occur only when a population is without the 'political, economic and social resources' needed to withstand or prevent a decline in food: (1987), p. xv.

<sup>927</sup> Some modern theorists, as well as historians of modern shortage, claim conflict and political failures coupled with agricultural catastrophes are the most common sources of modern shortage: see Gewald (2003), p. 211; Hart (1993), p. 27; Maddox (1990), p. 181; Mitra (1989), p. 253, and Devereux in n. 340. Garnsey (1988), pp. 16, 20, 271, also notes that ancient Mediterranean communities in general 'were endemically vulnerable to food crisis through a combination of human and natural causes.' He later states that the causes of subsistence crises 'might be natural, man-made or a combination of the two.' Several

explanations of food causation that focus on a single cause not only limit themselves but possibly misrepresent the reality of the crisis. We may regard shortages, as Devereux does, as intrinsically ‘multi-dimensional.’<sup>928</sup> Certainly, explanations dependent solely on Malthusianism or agricultural catastrophes are insufficient.

### **2.3 Chronic hunger in Carolingian and early Ottonian Europe**

The underlying current of chronic hunger or the endemicity of malnutrition in our period is hard to appreciate. Chronic hunger is defined here as the inability of an individual to meet their dietary needs and obtain enough food for growth, activity and the upkeep of good health.<sup>929</sup> As we have seen in 2.1.2, several scholars have proposed that a large portion of Carolingian and early Ottonian society was chronically hungry. Though chronic hunger may have been more important in the long term than episodic subsistence crises in our period, as many modern theorists and historians of modern hunger have argued for later periods,<sup>930</sup> direct evidence for it is lacking. Written evidence is inconclusive and sparse, and there is a dearth, at present, of direct material evidence. Regularly, in hagiographical texts, one encounters brief remarks about ‘crowds’ of poor and hungry people, but never are the effects of chronic hunger on a person or group described.

It is possible to establish indirectly some idea of the chronic hunger people sustained in mid eighth- through mid tenth-century Europe. Pearson’s hypothetical early medieval diet strongly implies that endemic malnutrition was severe and widespread in the last half of the first millennium CE. While early medieval Europeans could have, in theory, achieved adequate levels of nutrition, Pearson argued that there were many impediments to good nutrition in the early Middle Ages, including settlement congestion (high competition for foodstuffs), high food rents for dependents, the gradual growth of urban communities that would have ‘siphoned off’ surpluses, inadequate market access,

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assessments of the Great European Famine likewise stress a multitude of factors, namely bad weather and conflict: for instance, Jordan (1996), pp. 7-39.

<sup>928</sup> Devereux (2007a), pp. 5-7.

<sup>929</sup> This closely follows the definition found in several works on hunger in the developing world: for example, Millman and Kates (1990), p. 3.

<sup>930</sup> For instance, Saito (2002), p. 219.

poor market integration, conflict, the vagaries of climate that caused subsistence crises, and Christian fasts and dietary restrictions.<sup>931</sup> Pearson's groundbreaking study, addressed the early Middle Ages generally, and we may suspect that some of these impediments were more pronounced in our period than in the Merovingian. While major conflicts and dislocations of people were less numerous within western Europe in our period, settlement congestion seems to have been more pronounced than earlier, at least in the Ile de France and Po valley, manorialism too was a far more general phenomenon in the Carolingian and early Ottonian period than before 700, urban communities may have been more numerous and larger, and we may suspect that more people followed a Christian diet.<sup>932</sup> It is also possible that markets were more numerous, reliable and interconnected, but, as argued in 2.4.4 and Part 3, we cannot assume that they regularly operated in a manner favorable to the lower social strata. That more grain was produced in our period is quite possible, but as proposed in 0.1.4.1.1, we should not assume that this meant much for the average peasant. Furthermore, subsistence crises, as this study shows, were quite numerous in the Carolingian and early Ottonian period, far more so than Pearson seems to have suspected.<sup>933</sup> This, for modern famine theorists, is itself a strong indication that much of mid eighth- through mid tenth-century Europe was chronically hungry.<sup>934</sup>

Another proxy for chronic hunger is disease. Many non-pestilential diseases, including several addressed in 1.3, tell of poor nutrition and chronic hunger. Several conditions of the lower social strata, including *contractus nervus*, may speak not only of heavy and repetitive workloads but endemic malnutrition. 'Mill hands' and 'humped backs,' and some cases of paralysis and blindness, not to mention some dental ailments, may have also stemmed, in whole or in part, from malnutrition. For instance, humped

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<sup>931</sup> Pearson (1997), pp. 23-7.

<sup>932</sup> On population density in the Po Valley and the Ile de France, as well as towns and emporia, see 3.1; on manorialism see 0.1.4.1.

<sup>933</sup> This is not to say that they were not comparably numerous prior to 750, but simply that we know for certain that they were numerous post 750. Pearson focuses on crises c.820, and in the 860s and early 870s: (1997), p. 25.

<sup>934</sup> That shortages occurred regularly implies that people generally lived on the cusp of subsistence. Endemic malnutrition seems to have been a fact of life in societies racked by shortage. For Golkin and Sen, for instance, the regularity with which crises occurred in our period would indicate strongly that 'chronic hunger was a way of life' for Carolingians and early Ottonians: Golkin (1987), pp. xv, 12-3, 17-8; Sen (1981), p. 39.

backs may have been caused by severe cases of rickets/osteomalacia, caused by vitamin D, calcium and/or phosphorus deficiencies,<sup>935</sup> and blindness, especially in children, may have been due to a vitamin A deficiency.<sup>936</sup> Fortunately, several vitamin and mineral deficiency diseases are visible on bones.<sup>937</sup> While ailments particular to a specific vitamin or mineral deficiency do not necessarily imply chronic hunger, but an incomplete diet, the two chief signs of deficiency seen on bones in pre-modern Europe – acquired anaemia and osteoporosis – are generally interpreted as signs of chronic hunger.<sup>938</sup>

Several forms of acquired anaemia, especially iron-deficiency anaemia, as well as osteoporosis, are regularly diagnosed in medieval remains. Rickets/osteomalacia and scurvy, on the other hand, appear less frequently, though complications in diagnosing these conditions palaeopathologically may account for this.<sup>939</sup> Theoretically, at least, scurvy would have become increasingly prevalent in societies whose dependence on cereals intensifies; as some palaeopathologists suggest, scurvy may have been most prevalent in the wake of subsistence crises and during cold European winters when vegetable crops were minimal.<sup>940</sup> Osteoporosis often signals, in pre-modern contexts, poor calcium and/or vitamin D levels. In terms of anaemia, what type of iron the body was short of, haeme (from fish, meat and poultry) and non-haeme (fruits, nuts and vegetables), is impossible to tell pathologically. In a Carolingian and early Ottonian perspective, we may suspect that a heavy intake of grains was a primary cause of anaemia, as the iron in grain and vegetables is poorly absorbed by the intestines.<sup>941</sup> As high rates of anaemia are regularly considered indicative of general malnutrition, we may suspect, if cerealization was a more pronounced feature of mid eighth- through mid tenth-

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<sup>935</sup> Davies (2002), p. 83.

<sup>936</sup> See 1.3.

<sup>937</sup> As vitamin and mineral intake affect the growth and upkeep of bone: Jakob (2009), p. 31. On the complications of diagnosing such conditions and interpreting signs of ‘stress’ as direct indications of poor diet, however, see Roberts and Manchester (2005), pp. 221-22, 228.

<sup>938</sup> For instance, Jakob (2009), pp. 32-4, 164-65

<sup>939</sup> As Jakob observes (2009), p. 31. On the prevalence of anaemia and osteoporosis in pre-modern European populations see Roberts and Manchester (2005), pp. 223, 226-32, 242. Lower rates of rickets and scurvy may owe to difficulties of diagnosis: idem (2005), pp. 237, 239-40. As 90 per cent of one’s vitamin D requirements are generally derived from exposure to the sun, we may suspect that the disease was rare among the labouring classes of early medieval Europe. See 1.2.3 for the difficulties in diagnosing scurvy and rickets/osteomalacia.

<sup>940</sup> Roberts and Manchester (2005), p. 236.

<sup>941</sup> Idem (2005), p. 226.

century Europe than the first centuries of the early Middle Ages, that continental European society actually became increasingly malnourished over our period.<sup>942</sup>

In her study of fifth- through eighth-century southwestern German populations, Jakob found no clear-cut cases of rickets or scurvy, but many cases of iron-deficiency anaemia (diagnosed via *Cribra orbitalia*). In fact, at Pleidelsheim, a quarter of all individuals showed signs of *Cribra orbitalia*, while at Nusplingen a third showed signs of the condition, and at Neresheim more than half the population were affected. Non-adults (peoples under 35 years of age) expressed signs of the disease most regularly and more adult men than adult women were affected.<sup>943</sup> Most of these individuals can safely be read as have suffering iron-deficiency anaemia, though *Cribra orbitalia* may also stem from B12 and folic acid deficiencies. A high percentage of both the non-adult and adult population of Jakob's study (about 20 percent) showed signs of osteoporosis (diagnosed tentatively via specific bone fractures). As Roberts and Manchester indicate osteoporosis is typical of pre-modern societies, non-adult males and adult females were most commonly affected.<sup>944</sup> Diseases characterized by osteoporosis, such as rheumatoid arthritis, were also common at early medieval Amiens,<sup>945</sup> and osteoporosis was fairly widespread in the late antique population of Otranto, and several individuals from Merovingian Ciproly were diagnosed with *Cribra orbitalia*, enamel hypoplasia, and Harris Lines.<sup>946</sup> The latter, lines of stress visible in radiographs of long bones, are a direct, though aetiologically non-specific, indication of an inadequate diet in pre-adult life.<sup>947</sup>

Several other metabolic diseases are said to have been common in pre-modern populations and we may suspect Carolingian and early Ottonian Europe. Enamel hypoplasia and tibial periostitis, which though aetiologically non-specific are clear signs of chronic hunger and poor levels of nutrition, are thought to have been widely prevalent in medieval populations,<sup>948</sup> though evidence for them in mid eighth- through

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<sup>942</sup> The growing importance of grain over meat in the diet would contribute to the prevalence of anaemia. Cereals are a poor source of iron and certain compounds in nuts and legumes (phytates) inhibit iron absorption: Idem (2005), p. 226.

<sup>943</sup> Jakob (2009), p. 122.

<sup>944</sup> Idem (2009), pp. 124, 166; Roberts and Manchester (2005), p. 232.

<sup>945</sup> Catteddu (2009), p. 90; Roberts and Manchester (2005), p. 243.

<sup>946</sup> Skinner (1997), p. 22-4; Devroey (2003), p. 67.

<sup>947</sup> Roberts and Manchester (2005), p. 240. They may also, as enamel hypoplasia and tibial periostitis, indicate specific periods of extreme stress (food shortages) in non-adult life.

<sup>948</sup> Srejcic (2001), pp. 121-22; Roberts and Manchester (2005), pp. 173-74; also see 1.3.



mid tenth-century Europe is generally lacking.<sup>949</sup> Tuberculosis is also known to be associated with malnutrition and chronic hunger,<sup>950</sup> and carpal tunnel syndrome, a possible cause of the ‘mill hands’ and ‘withered hands’ we encounter in early medieval texts, may relate to a B6 deficiency.<sup>951</sup>

Other proxies for nutrition in our period, such as height and longevity, should be collected.<sup>952</sup> It has been estimated, for instance, that until the males of a population reach an average height of 185 cm and the females 170 cm, that stature reflects, in part, nutritional status.<sup>953</sup> We may provisionally conclude from the studies presented below that stature in the Carolingian and early Ottonian periods was considerably below these levels, as average heights are thought to decline in periods characterized by poverty, chronic disease, food shortages and pestilence. However, diets characterized by high grain consumption may also produce a short, but not necessarily chronically hungry, population as protein intake – specifically milk and meat – has been positively associated to stature in pre-modern Europeans.<sup>954</sup> Generally, deficiencies in vitamins C and D can retard growth both in utero and before adulthood.<sup>955</sup>

The average height of females in the three early medieval German populations Jakob studied was 162 cm, while males came in at 174 cm.<sup>956</sup> The women and men of another early medieval German sample (numbering over 2000 individuals) were considerably shorter, 154 cm and 165 cm respectively.<sup>957</sup> The average heights of nearly

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<sup>949</sup> Problems in dating remains may account for this, however: see 0.1.5.1.

<sup>950</sup> Semba (2006), p. 1407.

<sup>951</sup> Mackey, Davis and Gregory (2006), p. 459.

<sup>952</sup> On stature and nutrition see: Kelly (1992); Roberts and Manchester (2005), pp. 39-41, 223; Kolmos (2009), pp. 341-43, 353; Jakob (2009), p. 8; Skinner (1997), p. 24 n. 10; Hart (1993), p. 45. Prior to reaching adulthood, height is determined by nutritional intake, energy expenditure, and, of course, genetics. Kelly notes that anthropometry can provide an indication of access to food and, thus, chronic hunger. All populations have a ‘genetic height predisposition,’ but it is the alterations in the heights of a single population over time that reflect changes in nutritional status. Average adult heights, as such, reflect levels of nutrition before the body reaches adulthood or stops growing around between the ages of 20 and 25. In terms of longevity, note that estimates of longevity based on excavations may be flawed as the unearthed represent only the ‘dead’ population of period, and the longevity of the dead may not represent that of the living population: Jakob (2009), p. 126.

<sup>953</sup> Kolmos (2009), p. 342.

<sup>954</sup> Koepke and Baten (2008), pp. 127, 143.

<sup>955</sup> Roberts and Manchester (2005), pp. 237, 243; Kemkes-Grottenthaler (2005), p. 342.

<sup>956</sup> Jakob (2009), p. 56.

<sup>957</sup> Kemkes-Grottenthaler’s study focuses on the relationship between height and longevity and does not specify where these early medieval bones were unearthed: (2005), p. 343. It is hinted that the bones came from the region around Mainz.

2000 individuals from early medieval Amiens were similar to these: 157 cm and 168 cm for males.<sup>958</sup> So too at St. Denis: unearthed women and men dating roughly to our period averaged 156 cm and 165 cm respectively.<sup>959</sup> Such adult heights signify, following Roberts and Manchester, chronic undernourishment, a high incidence of episodic subsistence crises, as well as a high incidence of non-pestilential and pestilential disease.<sup>960</sup> Considering that high infant and child mortality rates are an indication of a high incidence of malnourishment and disease, it is certainly worth noting that the majority of the individuals in Jakob's study were under the age of 16. In general, however, we may infer, according to palaeopathologists, a low life expectancy in our period from these low stature estimates.<sup>961</sup>

The ubiquity and severity of malnutrition would have presumably varied between regions. Free peasants may have been better nourished in lieu of rents in kind or money, as may have those living in smaller less densely-populated communities, or near wetlands and waterways.<sup>962</sup> While trends in the ubiquity and severity of malnutrition over our period cannot be discerned, the proxies for chronic hunger in Carolingian and early Ottonian Europe surveyed here certainly indicate that nutritional stress was likely common and chronic hunger a part of life for the vast majority of Europeans in our period. Livestock too may have been undernourished, though how much so is not certain. It has been assumed that fodder-crops were inadequate in medieval economies, as indicated by the low average height of medieval animals, though how fundamental a role stall-feeding played in mid eighth- through mid tenth-century agriculture is uncertain.<sup>963</sup> Enamel hypoplasia, generally common in medieval stock as noted 1.3, indicates nutritional stress, even food shortages, and other conditions relating partially or wholly to

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<sup>958</sup> Catteddu (2009), pp. 90-1.

<sup>959</sup> Cuisenier and Guadagnin (1988), p. 182.

<sup>960</sup> Roberts and Manchester (2005), pp. 41-2.

<sup>961</sup> As Kemkes-Grottenthaler, for example, argues in her article 'The Short Die Young:' (2005), pp. 340-47.

<sup>962</sup> Cf. Pearson (1997), p. 23.

<sup>963</sup> Kron (2002), pp. 55-7. Cattle would have likely been grazed on meadows and foddered in the colder seasons. Of course, fodder supplies could be gathered from forests: Verhulst (2002), pp. 38-9; Latouche (1961), pp. 36, 92. On short medieval livestock Teichert (1984); Filean (2008); Kron (2002); MacKinnon (2004), pp. 84-5.

an incomplete or inadequate diet, such as osteoporosis and rickets, seem to have been common among pre-modern domesticates.<sup>964</sup>

## 2.4 Carolingian and early Ottonian food shortages

### 2.4.1 The nature of the written evidence

As in 1.4.1, the intention here is not to discuss in depth what the written evidence collected in Catalogue 1 tells us about the impact, or temporal and spatial parameters, of individual food shortages, or the responses humans took to offset famines and lesser crises, but to survey its form and content, establish what information is related and how it is related, in terms of terminology and description, and, in doing so, discern patterns in the Carolingian and early Ottonian documenting of food shortages. This assessment informs the reading of individual passages collected in Catalogue 1 and, consequently, the assessment of Carolingian and early Ottonian shortages in 2.4.2, 2.4.4 and Part 3.

#### 2.4.1.1 Food shortages

There are ninety-eight individual entries in Catalogue 1 that refer explicitly to food shortages. An additional thirty passages quite plausibly refer to food shortages but do not explicitly speak of *famines* or widespread human hunger.<sup>965</sup> Instead, these passages speak of poor harvests, damaged crops or fear of shortage (C.1.63, 75, 86, 95, 96, 105, 108, 130, 131, 135, 136, 141, 144, 145, 151, 154, 161, 164, 178, 197, 198, 201, 202, 204, 207, 212, 228, 241, 257, 289). Both explicit and plausible references to food shortages are found in a wide variety of texts including annals, capitularies *concilia*, correspondence, histories, *gestae*, poetry and *vitae*. Clearly, there is far more evidence for famines and lesser food

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<sup>964</sup> These conditions indicate dietary deficiencies, vitamin D and calcium deficiencies specifically. Teegen (2002), p. 91; Siegel (1976), p. 357; Davies (2002), pp. 82-5; MacKinnon (2002), p. 86. We may suspect that rickets was most common among stall-fed animals: Roberts and Manchester (2005), p. 238; osteoporosis can also, as noted in 1.3, result from wear and tear.

<sup>965</sup> Note that six of these explicit and plausible references concern shortages outside of the main period of focus of 750-950: two references date to *c.*710 and four to the 950s and '60s (C.1.3, 5, 297, 299, 301, 303). As in 1.4, these passages are considered here in order to help contextualize the mid eighth- through mid tenth-century evidence and provide a wider perspective on the nature of evidence and the documenting of shortages in individual texts.

shortages in Catalogue 1 (and Carolingian and early Ottonian sources in general) than there is for human or livestock pestilences, let alone evidence of good harvests.<sup>966</sup> The ninety-eight explicit and thirty implicit references appear to illuminate between twenty-one and twenty-six peacetime subsistence crises, several multiple years in duration, in addition to several episodes of intentionally inflicted starvation (C.1.133, 173, 205, 223, 225, 231, 234, 236, 261, 268, 270, 297, 299). Not surprisingly, there must be some hesitation in proposing an exact number of shortages. The Carolingian and early Ottonian evidence is often too scant and ambiguous, especially in terms of the temporality and spatiality of shortages, to permit the articulation of precise tallies of famines and lesser shortages. As discussed in 2.4.2 and 2.4.4, it is sometimes uncertain, for instance, whether different explicit references to a crisis refer to the same crisis or not, let alone whether plausible references to shortages refer to shortages documented explicitly elsewhere or other shortages altogether.

Seventy-eight of the ninety-eight explicit reports of food shortages, or 80 per cent, are short in length, comprising a single sentence or less. In fact, forty-four of these seventy-eight references are very brief, some no more than a couple words in length. A mere sixteen of the ninety-eight explicit references to shortages are between one and four sentences in length (C.1.18, 54, 57, 59, 61, 73, 101, 103, 115, 133, 184, 190, 136, 258, 278, 279), and only four passages are longer (C.1.60, 76, 149, 189). Eleven of the thirteen passages that illuminate food shortages in the context of conflict are also short (C.1.173, 205, 223, 225, 231, 234, 261, 268, 270, 297, 299). The remaining two are between one and four sentences (C.1.133, 236). Of plausible references to food shortages, twenty-four, or 80 per cent, are a single sentence or less in length, while five are between one and four sentences (C.1.86, 95, 135, 151, 197) and one is longer (C.1.63). Of the ninety-eight explicit references to shortages, eighty-five are labelled *fames*, while *sterilitas terrae* or *sterilitas frugum* (C.1.61, 74, 115, 219, 239) is encountered in five passages, *deficiens fructus* and *inopia* in four passages each (C.1.3, 5, 83, 101, 103, 235, 273, 303), *inedia* in three (C.1.173, 190, 200), and *penuria* and *escae coeperunt minui* in one a piece (C.1.231,

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<sup>966</sup> There are eight references to good crop years, five of which are interdependent (C.1.12, 13, 14, 15, 16, 65, 125, 259).

252).<sup>967</sup> Thus, 87 per cent of food shortages are labelled in the same way. Roughly half, 54 per cent, of the explicit references to shortages are assigned a qualifier, all of which refer to the greatness or severity of the crisis. Terms stemming from *valida* are employed on twenty-six occasions, or 49 per cent of the time, while *magna* or derivative terms are encountered on thirteen occasions, *acerrima* on three occasions (C.1.185, 186, 192), and other adjectives, such as *dira* (C.1.17), *gravis* (C.1.18) and *nimia* (C.1.191), are employed once. In what way crises were great or severe is never specified. Authors may have been referring to the scale of the mortality or the temporal and/or spatial vastness of the crisis, or both.

The crops at the heart of explicit and plausible references to food shortages are specified in thirty-five, or 27 per cent, of the one hundred and twenty-eight passages. Several passages refer to multiple crops, but, in total, there are twenty-eight references to grains, thirteen to wine or vineyards (C.1.86, 101, 103, 125, 135, 136, 145, 146, 212, 214, 243, 257, 289), and one each to figs (C.1.18), flax (C.1.228), olives (C.1.18), pears (C.1.135), and vegetables/beans (*legumen*) (C.1.101). Multiple individual species of grain – namely barley, oats, rye, spelt and wheat – are listed on three occasions (C.1.63, 76, 191). In passages where grain or agricultural produce is referred to generally, *fruges* is employed on twelve occasions (C.1.74, 103, 115, 125, 130, 166, 185, 199, 200, 203, 230, 235), *annonā/anonā* on five occasions (C.1.63, 64, 73, 75, 76), *frumentum*,<sup>968</sup> *seges* and *fructus* twice each (C.1.101, 145, 236, 279, 303), and *sata* and *proventus* once each (C.1.61, 289).

Spatial parameters of food shortages are given in forty-seven, or 48 per cent, of the explicit references to shortages. Several passages give various degrees of spatiality and address territories, regions and locales,<sup>969</sup> though most speak very generally about a shortage's spatiality. There are twenty-five references in total to territories, namely *Francia/Gallia* (C.1.18, 37, 38, 39, 40, 52, 56, 57, 59, 61, 139, 183, 189, 192, 209, 211, 240, 254, 284), *Germania* (C.1.149, 183, 200, 209), *Italia* (C.1.59), and *Spania* (C.1.17),

<sup>967</sup> In some passages an author refers to a food shortage multiple times with different terms; hence the total here of 103 and not 98.

<sup>968</sup> *Frumentum* has been translated as 'grain' when it occurs in isolation from other terms for grains (C.1.101, 236). When it is found in a list of different species of grains it is translated as 'wheat' (C.1.63, 76, 191).

<sup>969</sup> For definitions of these terms see 2.2.1.

and seventeen references to regions, namely *Aquitaina* (C.1.189, 236), *Bavaria* (C.1.243, 253), Benevento (C.1.57, 58), *Burgundia* (C.1.57, 59, 189, 192, 284), *Gothia* (C.1.59), *Illyria* (C.1.18), *Provincia* (C.1.59), *Saxonia* (C.1.153), *Thracia* (C.1.18), and possibly Brittany (C.1.112).<sup>970</sup> In terms of locales, we read of shortages affecting Aniane (C.1.60), Brandenburg (C.1.261), Conse (C.1.191), Grabfeld (C.1.149), Loven (C.1.240), Mainz (C.1.149, 200), Meaux (C.1.234), Nidda (C.1.219), Pont-sur-Yonne (C.1.189), Rheims (C.1.257), Sens (C.1.189) and Worms (C.1.219). Eight additional entries speak very generally to spatiality: four speak to shortages affecting all or most of the Frankish kingdom (C.1.54, 103, 189, 190), while one annalist writes of a crisis affecting ‘many places’ (C.1.108), another ‘numerous places’ (C.1.189), and another ‘many regions’ (C.1.303). Lastly, one annalist vaguely notes that a shortage was ‘extensive’ (C.1.287).

Thirteen of the ninety-eight explicit passages refer, in some regard, to temporality. Though some passages give varying degrees of temporality, no passage provides strict temporal limits or specifies when a shortage began and ended. In several cases, as discussed in 2.4.2, such general temporal parameters of shortages can be established indirectly from the evidence, and from natural proxies of past climate. We read of shortage conditions in all seasons: spring (C.1.272), summer (C.1.197, 207), autumn (C.1.105, 112) and winter (C.1.57, 59, 201), and in the months of March (C.1.241), May (C.1.144) and August (C.1.112). Otherwise, we encounter shortages ‘in the time of Rumold’ (C.1.279) and lasting through Lent (C.1.57, 58, 59).

Eleven passages refer to some form of human response taken to offset a crisis. Almsgiving (C.1.60, 71, 76, 95, 96, 278) and the setting of grain prices (C.1.63, 73, 76) are encountered most regularly, though we also read of restrictions on the selling of grain outside of the Frankish Kingdom (C.1.73), prayers (C.1.73), fasting (C.1.178), and the delaying of a campaign (C.1.112). There is also indication that a diplomatic meeting should have been delayed on account of a subsistence crisis (C.1.191). Twenty-one passages refer to what have been defined above as socio-economic symptoms of food shortages. Thirteen, or 62 per cent, of these refer to extreme alterations in diet and the consumption of famine foods. Of these thirteen, we encounter what might be defined as

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<sup>970</sup> Whether shortage conditions hit Brittany in the early 820s, as this passage may indicate, is discussed in 2.4.2.

survival cannibalism eight times (C.1.54, 189, 190, 192, 242, 248, 249, 252), the eating of meat, for want of grain, during Lent (C.1.57, 58, 59), as well as the consumption of bread made with earth (C.1.133) and the consumption of carrion (C.1.149), dogs (C.1.192) and horses (C.1.153).<sup>971</sup> Explicit reports of high grain prices in times of want are found four times (C.1.61, 149, 189, 236) and indirect evidence for high prices in the form of price controls on grain in times of want is met three times (C.1.63, 73, 76). There is also reference to high prices of livestock in a period of shortage (C.1.236). Migration of the hungry is reported three times (C.1.60, 149, 239), and robbery and the delaying of the purchasing of non-edible materials (iron) once each (C.1.161, 184).

The most common consequence of a shortage encountered in the sources, however, is excess mortality. Forty-four, or 45 per cent, of the ninety-eight explicit references to food shortages document mortality in the context of a subsistence crisis. Fourteen of these forty-one references speak of death through the failure of crops or hunger specifically (C.1.18, 59, 60, 61, 63, 75, 149, 183, 184, 200, 205, 243, 253, 268). In no case is disease explicitly said to have been the cause of human mortality in the midst of a shortage, though disease is vaguely related to a subsistence crisis on ten occasions (C.1.74, 101, 103, 104, 108, 131, 185, 186, 187, 235) and disease and hunger appear to be viewed as a joint cause of shortage mortality six times (C.1.178, 205, 209, 234, 268, 299). Most references to excess mortality in times of shortage are causally non-specific (C.1.37, 38, 39, 40, 139, 189, 192, 201, 219, 242, 248, 249, 258, 301), and there is only one exact mortality tally in the entire source base (C.1.189), though the *Annales Fuldenses* also provides a vague mortality estimate in the wake of both a shortage and outbreak of disease in the mid 870s (C.1.209).

Aside from the thirteen instances of intentionally inflicted starvation which are all clearly documented as being the result of conflict, few other passages refer explicitly to the causation of food shortages. Sixteen explicit references to subsistence crises assign dearth to extreme weather (C.1.18, 74, 102, 103, 104, 110, 150, 152, 183, 191, 219, 235, 244, 245, 258, 272) and another assigns dearth to the 873 locust swarm (C.1.200). Seventeen of the thirty plausible references to food shortages, however, speak of extreme weather damaging crops (C.1.73, 105, 108, 130, 131, 144, 145, 154, 164, 197, 198, 201,

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<sup>971</sup> Whether or not we can take these reports at face value is discussed in 2.6.1.

207, 212, 228, 241, 257), and two other plausible references to shortages mention locusts damaging crops in the early 870s (C.1.202, 204). Additionally, five passages refer to non-natural causation: three shortages are said to have been the result of sin (C.1.54, 125, 202) and two the work of demons (C.1.64, 289).<sup>972</sup> As seen in 1.4.1.2, twelve passages vaguely relate livestock mortalities to failed harvests and food shortages (C.1.101, 103, 115, 131, 185, 186, 187, 195, 218, 258, 270, 284). No human mortality, whether precipitated by disease, conflict or extreme weather, is reported to have caused a food shortage.

As with human and livestock pestilences, Carolingian and early Ottonian authors were clearly not concerned with documenting food shortages in much detail. Of course, several passages pertaining to shortages display unique features, and some, such as those found in the *Annales Fuldenses* and *Annales sanctae Columbae Senonensis* in 850 and 868 respectively (C.1.149, 189), are more verbose than any other early medieval account of a subsistence crisis. Some passages provide detailed insight into the spatiality of crises, the high prices of grain and other foodstuffs, and the human responses taken, or proposed, to offset crises. Other passages provide specific temporal parameters and note of non-natural causes of shortages. Yet the similarities between reports of food shortages far outweigh the differences. Indeed, the foregoing discussion points not only to a lack of concern for detail but to a considerable degree of continuity in shortage documentation.

Continuity is seen on several fronts. The vast majority of explicit and plausible reports of shortages are short in length and nearly all explicit references to shortages are labelled *fames*.<sup>973</sup> Most of the shortages that are assigned a qualifier are assigned one of two (*valida* or *magna*) and most of those passages that refer to the crops at the heart of explicit and plausible references to food shortages refer vaguely to grains (*fruges* and *annona* mainly). The majority of passages that refer to the spatiality of subsistence crises speak generally of large territories and the majority references to mortality are very general in terms of the cause and scale of mortality. Likewise, most of the explicit and plausible reports of shortage that address causation assign crises to extreme weather, and most of those passages that refer to socio-economic symptoms refer to extreme changes

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<sup>972</sup> Elsewhere since is said to be cause of shortage (C.1.114, 115).

<sup>973</sup> As such, our evidence is largely dissimilar to that drawn upon by Garnsey (1988) and Stathakopoulos (2004): there are many more verbose accounts of shortage found in ancient, late antique and early Byzantine sources than Carolingian or early Ottonian sources.



in diet. Moreover, very few passages refer to the temporal limits of shortages or the responses humans took to offset the impact of hunger.

As with the reporting of disease outbreaks, this degree of continuity in the reporting of shortages suggests that there was a loosely or informally established paradigm that guided the documenting of food shortages in the Carolingian and early Ottonian periods, patterns of reporting that determined what was worth reporting and how it should be reported, what can almost be described as a predetermined language and method for the documenting of subsistence crises. Recognition of these patterns demonstrates plainly that individual entries should not be read in isolation, especially when examining cause, contours and impact of specific shortages. The high degree of congruence between individual reports of subsistence crises means that very few crises carry any real sense of individuality, which, of course, detracts from what we can possibly learn about individual shortages from individual texts. Essentially, the high degree of congruence between passages prevents us from reading too much into silences and from extrapolating heavily from what little is documented. For instance, a *valida fames* should not be thought of as extraordinary, nor the assigning of food shortages to extreme weather, or the general lack of any indication of the impact of shortages, other than mortality, or, for that matter, the overlooking of human responses to crises. Shortages should certainly not be thought, on account of the nature of the written evidence alone, to have been poorly absorbed by contemporaries, often ‘great’ in terms of extent and mortality, or universally tied to extreme weather. Shortages should also not be thought, on account of the nature of the written evidence, to have been of little demographic or socio-economic consequence.

Closer attention to the recording of subsistence crises in individual texts further demonstrates how alike most shortages appear. For example, the *Annales Sangallenses maiores* labels three of the four shortages it records *deficiens fructus* (C.1.5, 273, 303), and the *Annales Nazariani*, in its sole reference to an eighth-century shortage which is quite possibly dependent on the *Annales Sangallenses maiores*, too applies *deficiens fructus* (C.1.3); all three explicit references to subsistence crises in the *Annales Xantenses* refer to *fames* and two refer to extreme alterations in diet and the spatiality of crises (C.1.152, 153, 192); four of the five explicit reports of food shortages in the *Annales*

*Vedastini* speak of *fames* and intentionally inflicted starvation (C.1.223, 231, 234, 239, 240); Widukind of Corvey likewise writes of *fames* and intentionally inflicted starvation in four of his five explicit references to food shortages (C.1.261, 268, 297, 299); all four of the explicit reports of subsistence crises in the first section of the *Annales Fuldenses* label crises *fames*, assign a qualifier derived from *magna*, situate crises in *Germania* and mention human mortality (C.1.149, 183, 200, 209);<sup>974</sup> in both of his explicit references to food shortages, Flodoard employs *fames* and ties shortages to losses of domestic animals (C.1.270, 284); each of the explicit reports of food shortages in the Bavarian continuation of the *Annales Fuldenses* speak of *fames*, *inedia*, assign the qualifier *valida*, and situate crises in Bavaria (C.1.243, 253); all four usages of *annona* are found in references to shortages in the capitularies dating to Charlemagne's reign (C.1.63, 64, 73, 75, 76); and the four explicit references to shortages in the *Annales capituli Cracoviensis* are very brief, employ *fames*, and where they apply a qualifier they use *valida* (C.1.170, 185, 244, 246).

As in 1.4.1.3, we can press further. If the common features of reports of food shortages are encountered in major texts that document multiple shortages, and the texts they influenced, the aforementioned rare features of reports of shortages are, naturally, going to be regularly encountered in texts that document one or two shortages. For instance, the only mention of olives, figs, *Gothia*, *Illyricum*, *Provincia*, *Spania* and *Thracia*, the sole usage of *dira*, and one of the few usages of *gravius*, are found in the three reports of mid eighth-century shortages in the *Chronicon Moissiancense*, which were quite plausibly composed by a single annalist (C.1.17, 18, 59); the sole usage of *proventus* and one of the only references to high grain prices outside of capitularies are encountered in Notker Balbulus' only reference to a subsistence crisis (C.1.61) and the sole reference to prices of livestock in periods of want in the lone reference to a shortage in the *Richeri historiarum libri III* (C.1.236); in the only reference to a shortage in the *Vita Benedicti abbatis Anianensis* we find the uncommon *inedia* and a rare notice of migration in the wake of a crisis (C.1.60), and in the only undoubtedly contemporary reference to a subsistence crisis in the *Annales sanctae Columbae Senonensis* we find our sole tally of shortage mortality, one of the only two references to high grain prices outside

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<sup>974</sup> On the textual history of the *Annales Fuldenses* see Appendix 4.5.

of capitularies, and the only detailed account of cannibalism (C.1.189);<sup>975</sup> the sole usage of the qualifier *horrenda* too appears in a source that documents one crisis (C.1.272). Many more examples could be provided, but the point is clear enough: not only is the form and content of most reports of shortages quite similar, but individual authors and texts regularly documented subsistence crises in like terms, stripping them of their uniqueness and individuality, and, in the end, restricting what we can possibly know about individual episodes of hunger in mid eighth- through mid tenth-century Europe.

Lastly, we may note the lack of interest some texts/authors demonstrate for subsistence crises. For instance, the first section of the *Annales regni francorum*, a major source for the mid and late eighth century, contains no reference to shortages.<sup>976</sup> Indeed, only the third distinct section of the text, which most hold commences after 815, contains any explicit or plausible references to food shortages (C.1.101, 105, 108, 112).<sup>977</sup> While earlier sections of the *Annales regni francorum* document several instances of extreme weather, none are tied to a food shortage or damaged crops (C.1.19, 35, 44, 45, 68, 80, 93, 98, 99). In fact, the only time crops and extreme weather are mentioned in relation to one another prior to 816 in the text is in the entry for 800 where the annalist specifies that the severe frost (*aspera pruina*) of that year did not harm the harvest (C.1.67). While we should not assume that the lack of explicit or plausible references to food shortages in the *Annales regni francorum* prior to 820 reflects either an absence of shortages in early Carolingian Europe or the disregard of the text's authors for subsistence crises, other contemporary and near contemporary texts make it clear that the neglect of shortages in the first sections of the *Annales regni francorum* was undoubtedly deliberate: the *Chronicon Moissiancense*, *Annales Laurehamenses*, *Annales Augienses*, *Annales Sangallenses maiores*, *Annales Colonienses*, *Annales Flaviacenses*, *Annales sancti Dionysii*, *Annales Mosellani*, *Annales sancti Quintini Veromandensis*, *Annales sancti Germani minores*, *Annales Laurissenses minores* and *Vita Benedicti abbatis Anianensis*, in addition to several capitularies, a letter and a poem, not to mention Notker's *Gesta Karoli*

<sup>975</sup> It is less certain whether the shortage documented in this text in 910 is contemporary (C.1.254), though it is quite likely that the author of the entry for 868 did not author that of 910.

<sup>976</sup> As for outbreaks of disease, several of the main sources for eighth century Frankish history mention nothing pertaining to subsistence crises. For example, the *Liber Historiae Francorum* fails to document any shortage in the first half of the eighth century or the seventh century. Other sources, however, do speak of shortages in this period. See, for instance, (C.1.3, 5).

<sup>977</sup> On the composition of the texts discussed here see Appendix 4.5.

*magni imperatoris*, all document pre-820 shortages (C.1.17, 18, 37, 38, 39, 40, 41, 49, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 63, 64, 65, 66, 73, 74, 76, 77, 83, 86, 95, 96).

Other sources also pay little or no attention to shortages that are documented in other texts. For example, the revised version of the *Annales regni francorum*, the first section of the *Annales Bertiniani*, the second section of the Bavarian continuation of the *Annales Fuldenses*, Regino of Prüm, and his continuator Adalbert of Magdeburg, all neglect to mention shortages others report, and, as already indicated, several texts/authors, such as the *Annales Vedastini* and Widukind of Corvey, were predominately or solely interested in particular types of shortages, namely episodes of intentionally inflicted starvation.<sup>978</sup> The omission of late eighth century and early ninth century subsistence crises is also characteristic of the *vita* composed by the Astronomer, Einhard, Ermoldus Nigellus, Notker and Thegan. It is also clear, as will be demonstrated in 2.4.2 on a case by case basis, that some texts that do regularly document shortages, such as the *Annales Fuldenses*, *Annales Xantenses* and the second and third sections of the *Annales Bertiniani*, do not record all shortages known to have occurred across Carolingian and early Ottonian Europe, let alone shortages that transpired in the area with which they were primarily concerned.

In addition to these observations, we should note, as in 1.4.1.3, several holes in our evidence base. Again, the mass of the extant material concerns northern Carolingian and Ottonian Europe, but evidence for food shortages is non-existent or slim from the 750s through the 780s, and in the 830s, 840s and the first decade of the tenth century, for eastern Carolingian Europe prior to 850 and for western Carolingian Europe after c.880. Episodes of intentionally inflicted starvation are also not reported prior to 843. These points serve to emphasize that we must treat the extant evidence for food shortages collected in Catalogue 1 as representing the bare minimum occurrence of shortages in mid eighth- through mid tenth-century Europe. While consideration, in 2.4.2, of mid eighth- through mid tenth-century written evidence for shortages non-Carolingian and early Ottonian areas of Europe, as well as written evidence for extended periods of extreme weather and natural proxies of past climate, provides some insight, we simply

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<sup>978</sup> Of course, in focusing on conflict oriented shortages, these authors overlooked peacetime shortages that others reported.

cannot know for certain how common shortages were in these poorly documented Carolingian and early Ottonian decades.

#### 2.4.2 Carolingian and early Ottonian famines and lesser food shortages in time and space

The intention here is to map mid eighth- through mid tenth-century food shortages in time and space as best as possible. Explicit and plausible references to shortages in Carolingian and early Ottonian sources, as well as contemporary sources from outside of Carolingian and early Ottonian Europe, are employed. Written and material evidence for extreme weather and short-term climatic anomalies is also drawn upon,<sup>979</sup> and an attempt is made to discern famines from lesser food shortages following the criteria outlined in 2.2.1.1 and 2.2.1.3. A few observations should be made, before we articulate shortages one-by-one, about the organization of this section, what we can hope to gain from the use of non-Carolingian and early Ottonian sources, and what information relevant to Carolingian and early Ottonian subsistence crises we can hope to glean from trees, ice and glaciers.

Shortages are not considered here thematically but in chronological order. The rationale for this is rather straightforward. For instance, conflict-related and peacetime crises are not considered in isolation, as shortages of both categories are sometimes reported in the same year and it cannot be said definitively, in any instance, that conflict and peacetime shortages that are reported in the same year or close sequence were unrelated. What we may deem ‘poorly documented’ and ‘well documented’ shortages are also not addressed in isolation from one another, as to do so would be to further strip crises shortages of their individuality, blur their unique features and prevent us from establishing what further information about their temporal and spatial contours we can glean from the primary sources. The spatial and temporal contours of most mid eighth-through mid tenth-century shortages, as noted in 2.4.1.1, are vaguely reported to begin with. Lastly, shortages identified as ‘famines’ and shortages identified as ‘lesser shortages’ are not considered in isolation of one another, as to do so would risk implying that the categorization of a crisis as a lesser shortage has more to do with what happened

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<sup>979</sup> What trees, ice and glaciers, for instance, can tell us about Carolingian and early Ottonian climate regimes, short-term climatic events and weather has been addressed in 0.1.5.1.

on the ground than with the quantity and nature of the extant written evidence. As observed in 2.2.1.3, our discussion of the temporal and spatial extent of food shortages is limited to what the primary evidence reveals and we should not, consequently, advance claims about the scale of any shortage that are based foremost on silences in the written record.

In regard to the use of non-Carolingian and early Ottonian sources, it need be noted that our understanding of mid eighth- through mid tenth-century subsistence crises is not significantly extended by bringing in textual evidence from areas outside *Francia* and *Germania*.<sup>980</sup> To begin, few non-Carolingian and early Ottonian texts document food shortages: only in the *Chronicle of Ireland* and Bar Hebraeus' *Chronography* do we encounter shortages nearly as often as we do in Carolingian and early Ottonian sources. Not only do several of the shortages encountered in these texts not align well with those recorded in Carolingian and early Ottonian texts, but Byzantine, English, Italian, Spanish and Welsh texts very infrequently report subsistence crises, and nothing is available for eastern Europe, Scandinavia or Scotland. Secondly, when texts from inside and outside *Francia* and *Germania* contemporaneously document a shortage it is rarely certain whether the shortages were related to one another. Though we may on occasion speculate about the occurrence of pan-European subsistence crises, we must remain wary of any definitive claims about the existence of pan-European shortages, especially considering

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<sup>980</sup> For a full list of the non-Carolingian and early Ottonian sources consulted see the primary sources section of the bibliography. Unfortunately, two major texts for the ninth and first half of the tenth century in Byzantium, the *Theophanes Continuatus* and *Synopsis historiarum* of John Skylitzes, could not be consulted. Texts from beyond Europe and the Middle East have not been considered, as the evidence base is too slight to permit speculation about intercontinental food shortages encompassing regions of Europe, the Middle East and Asia. For instance, Farris identifies many shortages in early medieval Japan that transpired in years Carolingian and early Ottonian texts mark as crisis years, but there is no corresponding written or material evidence that allows us to firmly link crises in such disparate regions. Prior to the tenth century, Farris articulates Japanese shortages in 770, 780, 785, 790, 791, 809, 812, 823, 824, 826, 832, 833, 834, 835, 836, 837, 840, 862, 863, 864, 865, 866, 870, 876 and 893: (1985), pp. 158-61. 24 per cent of these crises temporally correspond to crises documented by Carolingians. Elsewhere, Farris illuminates twenty-eight widespread food shortages in the eighth century alone, twenty-five in the ninth century, and three in the tenth: (2007), pp. 276, 281-83. While he here draws attention to widespread shortages in the early 760s and c.805, as well as in the early 820s, early 840s and early 870s, that is five of the crisis-dense periods in Carolingian history described below, he speaks of many other widespread shortages that do not align with the Frankish and early Ottonian record of hunger and some of the major shortages of mid eighth- through mid tenth-century continental Europe, such as those of the early 790s and c.940, do not appear in his record. While we should not, naturally, expect all major Carolingian and early Ottonian shortages to crop up in Japanese sources, we have no reason to assume that the temporal correspondence of some shortages in European and Asian texts is anything but coincidence.

the scantiness and ambiguity of the evidence in terms of the temporality and spatiality of crises. That said, there is more reason to believe that shortages reported in England, *Germania* and *Italia*, which can each be tied to extreme weather, represent a pan-European crisis, than outbreaks of disease reported in the same areas represent a pan-European pestilence, as we can, at least occasionally, establish a common cause of shortages reported in different areas. However, it must be noted that there are many years in which shortages appear in non-Carolingian and early Ottonian texts but not in Carolingian and early Ottonian texts,<sup>981</sup> and it may be sheer coincidence when reports of disease from inside and outside *Francia* and *Germania* temporally correspond.

It is important to acknowledge that there are notable gaps in the recording of subsistence crises in texts from outside *Francia* and *Germania* as there are in Carolingian and early Ottonian texts. For example, the *Chronicle of Ireland* provides neither explicit or plausible references to shortages in the eighth century outside of 760s nor the first quarter of the ninth century but seven between 825 and 900 (C.3.18, 23, 27, 28, 59, 62, 73, 81, 88, 93, 95).<sup>982</sup> Similarly, the *Anglo-Saxon Chronicle* contains no plausible or explicit references to shortages before 793, between 793 and 894, between 894 and 918, or after 918. Naturally, whether these gaps indicate an actual absence of subsistence crises or the purview of annalists is uncertain. As indicated here, however, the latter seems more likely. Though we should not think all shortages would have been documented, that other insular texts, as noted on a case by case basis below, record shortages these texts do not implies that the authors and compilers of the *Chronicle of*

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<sup>981</sup> The *Annals of Ulster*, *Chronicle of Ireland*, *Chronography of Bar Hebraeus*, *Historia of Andreas of Bergamo*, *A History of the Kings of England* of Simeon of Durham and *Liber pontificalis* report food shortages in 721, 760, 772, 836, 856, 858, 877, 879, 899, 900, 945 and 964 that do not align with the Carolingian and early Ottonian record (C.3.10, 18, 30, 31, 32, 62, 70, 73, 79, 81, 93, 107, 114, 115). In his brief assessment of early medieval Irish shortages, Ó Corráin speaks of several subsistence crises – in 760, 773, 777, 826, 858 and 912 – and hard winters that may have damaged harvests – in 855 748 and 855 for example – in Ireland but that are not documented in Carolingian texts: (2005), pp. 574-76, 584. Likewise, Bulliet identifies hard winters that likely spawned shortages in the northern Middle East, which do not align well with the Carolingian record, in 855, 904, 920 and 926: (2009), pp. 70-1, 76. McCormick speaks of an Italian food shortage in 776: (2001), pp. 626, 877. How general that shortage was, let alone whether it occurred in 776, is unclear: in the sole known source for the shortage, a letter from Pope Hadrian I to Charlemagne dated to 776, the Pope notes only that the Lombards sold many families into slavery ‘at a time when famine was pressing them,’ see Loyn and Percival (1982), p. 129. Nevertheless, there is no evidence for a crisis in Frankish lands in the mid 770s then. McCormick also identifies a subsistence crisis in *Italia* in 773/74 that does not correspond to any shortage reported in Carolingian evidence: (2001), p. 878.

<sup>982</sup> As such, the *Chronicle of Ireland* is of use in Part 2 of this thesis exactly when it is not of use in Part 1: see 1.4.2.

*Ireland and Anglo-Saxon Chronicle* did intentionally overlook several mid-eighth through mid tenth-century subsistence crises.

Lastly, some brief notes on what trees and ice cores, the two primary types of palaeoclimatic evidence employed below, can tell us about Carolingian and early Ottonian weather will help to illuminate the accounts of discrete crises. Tree rings provide continuous and high (annual) resolution indications of past climate. To date, most of the information gleaned from trees about past climate has concerned tree-ring width.<sup>983</sup> While the high temporal resolution possible of dendrochronology makes the science particularly valuable and attractive for the study of the environmental contexts of specific food shortages, tree-ring chronologies are not available for most parts of Carolingian and early Ottonian Europe, all reconstructed chronologies have not been published, and many of those that have been published have not provided ring-widths analyses.<sup>984</sup> There are, in fact, very few chronologies that extend back to the early Middle Ages.<sup>985</sup> Tree-ring series for southern and eastern Europe in particular are lacking, primarily on account of the growth periodicity of southern European trees and, perhaps, a lack of financial backing for dendrochronology.<sup>986</sup> Ring-width chronologies from early medieval France and Germany are also wanting.<sup>987</sup> Most available dendrochronological ring-width series relevant to our period stem from northern Europe, Scandinavia and Ireland in particular, as well as Mongolia and Siberia.<sup>988</sup>

The interpretation of ring widths too is not altogether straightforward. Generally, wider growth rings are an indication, in central and northern Europe, of heavy rains in the

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<sup>983</sup> Though we stand to gain much still from densitometric, chemical and isotope studies Jones et al (2009), pp. 5-7.

<sup>984</sup> See, for example, Baillie (1977), Fletcher (1977), Hillam (1980, 1981), Friedrich et al (2004) and Thun (2005). Most published tree-ring scholarship seems to focus on the establishing, or 'synchronizing,' of regional and interregional chronologies for the purposes of radiocarbon dating archaeological finds. For some comment on these issues see Baillie (1982) and Pilcher et al (1984).

<sup>985</sup> Jones et al (2009), p. 7.

<sup>986</sup> While southern European tree-ring series extending back to the early Middle Ages may be a long way off, eastern European data should be available in the near future: Baillie pers. correspond. 14 October 2010; also Jones et al (2009), p. 7; Haneca, Cufar and Beeckman (2009), p. 3. Though oaks, a climatically sensitive species commonly used in dendrochronology, has had a wide geographical distribution in northwestern Europe, including much of France, northern Italy and Basque Spain, as well as eastern Europe, oak chronologies have so far only been reconstructed for Ireland and Germany, though some recent work on oak chronologies in Slovenia, which extend back about 500 years, has appeared: *ibid* (2009), p. 3.

<sup>987</sup> As indicated in a wide variety of studies, including those of the Intergovernmental Panel on Climate Change, see Osborn and Briffa (2006).

<sup>988</sup> Perhaps by necessity, as it appears climatically sensitive or extreme regions produce more reliable ring-width chronologies: Garcia-Suarez, Butler and Baillie (2009), p. 183.



spring and summer months (May, June and July specifically), and thin rings below average temperatures in winter, and/or spring and summer droughts. South of the Alps and around the Mediterranean, both low winter temperatures and above average temperatures in the spring and summer can generate narrow rings.<sup>989</sup> However, every species reacts slightly differently to the same conditions and some species are, consequently, better indicators of winter or summer temperatures, and some of dry and wet conditions.<sup>990</sup> Generally, as demonstrated below, all ring-width series provide an indication of poor growth years. Extremely narrow rings, ‘frost rings,’ are often taken as a sign of a major volcanic event.<sup>991</sup>

For our purposes, ice cores are of interest because they contain records of volcanic fallouts. Major explosive volcanic eruptions inject large amounts of ash and SO<sub>2</sub> into the stratosphere where it is oxidized into H<sub>2</sub>SO<sub>4</sub>, transported via winds to the poles and deposited in snowfall in ice. Once uncovered in cores, the trapped sulphuric acid can then be dated with high temporal resolution, often within a few years of the event that produced the sulphur dioxide.<sup>992</sup> Often the H<sub>2</sub>SO<sub>4</sub> signal, or horizon, from a single eruption will appear for several consecutive or near-consecutive years in a core, though signals close to one another may indicate multiple eruptions that occurred in close sequence. A variety of factors, however, affect the reading of acid spikes visible in ice, including the scale of the eruption and its proximity to the site of the ice core, much fallout can be lost as the H<sub>2</sub>SO<sub>4</sub> is transported to the poles. It is for this reason that acid horizons of Icelandic eruptions often appear exaggerated in Greenlandic ice cores. How many signals a core turns up, and how representative those signals are of the scale of the eruption is also determined by the amount of precipitation the core site receives, and thus,

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<sup>989</sup> Haneca, Cufar and Beeckman (2009), p. 3. Ring widths of individual trees can be conditioned by several factors. as Garcia-Suarez, Butler and Baillie point out, ‘the unique location of the tree, its age and its management’ can affect ring width, complicating attempts to construct long series from numerous samples: (2009), p. 183.

<sup>990</sup> Wide oak rings, for instance, are generally a sign of heavy rain in the fall of the previous year, while narrow rings are a sure sign of cold winters: Haneca, Cufar and Beeckman (2009), p. 3; Garcia-Suarez, Butler and Baillie (2009), p. 186. Moisture-sensitive Scots pines, conversely, provide a clearer record of summer conditions: Briffa et al (1990), p. 434; also Helama, Merilainen and Tuomenvirta (2009), p. 175. For more discussion on these matters from a Fennoscandian perspective see Linderholm et al (2010), p. 94.

<sup>991</sup> LaMarche and Hirschboeck (1984); Hammer, Clausen and Dansgaard (1980). Freezing in the growing season causes visible ‘cellular irregularities:’ D’Arrigo et al (2001), p. 240.

<sup>992</sup> LaMarche and Hirschboeck (1984), pp. 121, 123; Hammer, Clausen and Dansgaard (1980), pp. 230-31. A delay, naturally, occurs as the ash makes its way from the site of the eruption to the poles.

its elevation.<sup>993</sup> This study draws upon the Greenlandic ice cores of Dye 3, located in southern Greenland, Crete, in south-central Greenland, and GRIP (aka Summit) and GISP 2, which are some 30 km apart in central Greenland.<sup>994</sup> Most acid signals exhibited in Greenlandic ice are from the northern hemisphere, and most signals in antarctic ice from the southern hemisphere, though major eruptions can leave a mark at both poles.<sup>995</sup> In general, large eruptions produce a stratospheric veil of very fine ash and sulphur aerosols that reduce radiation, cool the lower troposphere and lower temperatures. Their impact can be regional or hemispheric in scale.<sup>996</sup> Ash clouds vary greatly in size and their spread depends much on circulation. When signals in polar ice match up with poor growth rings in trees, however, we can be relatively certain that the volcanic event was significant and that at least the area between the trees and ice was affected by an aerosol cloud. As noted below, several hard winters here appear in polar ice and trees from various areas of northern Europe, Siberia and Mongolia. In these cases, in particular, we can be sure that we are dealing with a major event.

752

The first shortage in our sources is encountered in 752 in the *Chronicon Moissiacense* (C.1.17). The annalist specifies that Spain was affected, but says nothing else. This portion of the *Chronicon* is thought to have been composed at Ripoll and to provide a unique southwestern Carolingian perspective. It is likely, as such, that at least parts of northeastern Spain and southwestern France were afflicted by dearth in the early 750s. The text, as we know it, was put together in the late tenth century, but there is no reason to question the dating of this passage or the general placement of the shortage in *Spania*. We know little more, however, as possibly relevant written evidence for a crisis or extreme weather in the early 750s does not appear in other Carolingian or non-Carolingian texts, and no palaeoclimatological evidence can be mustered to corroborate

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<sup>993</sup> See Clausen et al (1997); Cole-Dai et al (2000); Castellano et al (2005). Ice cores can also speak to general climatic regimes as isotope analyses of the composition of the water trapped in ice act as proxies for atmospheric circulation patterns. In some instances, the thickness of 'melt layers' can also serve as a proxy for summer temperatures of an annual resolution, though I know of no studies of this nature relevant to the early Middle Ages: Jones (2009), pp. 13-6.

<sup>994</sup> For a map see Clausen et al (1997), pp. 26708,

<sup>995</sup> Clausen et al (1997), p. 26708.

<sup>996</sup> Zielinski (1995), p. 20940; LaMarche and Hirschboeck (1984), pp. 122-23; Hammer, Clausen and Dansgaard (1980), p. 310.

the written evidence for a major shortage in the early 750s.<sup>997</sup> While written evidence is undoubtedly thin in the early 750s, and the available palaeoscientific evidence for southern Europe less abundant than that for northern Europe, the temporal and spatial contours of the shortage are nevertheless quite vague. That ice cores do not exhibit an acid horizon in the early 750s likely indicates that the crisis was not volcanic in origin. Whether it was the product of a hard winter or heavy rain, or extreme weather of any form, is unclear. There are no grounds on which to consider the shortage a famine.

762/64

Our next shortage is also found in the *Chronicon Moissiacense*. In 762, the *Chronicon* reports that a ‘great frost’ killed many olive and fig trees in *Gallias*, *Illyricum* and *Thracia*, and produced a food shortage the following year which ‘overwhelmed’ these regions and brought death to many (C.1.18). The ‘frost’ appears to have occurred early in the winter of 762/63, and we may safely conjecture, considering the area in which the text was compiled and the regions the passage addresses, that southern Carolingian Europe was affected. That the locale around Ripoll was affected, along with southern *Gallia* and the Balkans as the annalist indicates, is confirmed by other contemporary sources. Several texts from northern Carolingian Europe document the hard winter of 763. The *Annales regni francorum* documents a ‘hard winter’ (C.1.19) and the *Annales Iuvavenses* ‘the strongest winter’ (C.1.20), while the *Einhardi annales* notes that the severity of the winter was incomparable to earlier winters (C.1.24) and the *Annales Xantenses* that the ‘frost’ began early in December 762 and persisted until February 763 (C.1.25). The *Annales sancti Emmerammi*, *Annales Weissemburgenses* and *Annales Laurissenses* too record the hard winter of 763 but these entries appear to be derived from the *Annales regni francorum* (C.1.21, 22, 23). The *Annales regni francorum*, composed in close proximity to the court, may refer to harsh conditions in the locale of Aachen, or perhaps, around Longlier, roughly 1100 km north of Ripoll, where Pepin is said to have wintered and celebrated Christmas and Easter. The *Annales Iuvavenses*, on the other hand, may refer, like the *Chronicon Moissiacense*, to conditions in southeastern Carolingian Europe and

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<sup>997</sup> That said, it is not totally implausible that this shortage had something to do with a volcanic event that registers in the Dye 3 core c.755, the GRIP core c. 757 or the GISP 2 core c.757. An event is also discernible in northern European trees in the mid 750s. See 2.4.4 for more discussion of these signals.

the *Annales Xantenses* to the locale in the north around Lorsch, roughly 300 km east of Longlier.<sup>998</sup>

Several texts document another hard winter in 763/64.<sup>999</sup> Interdependent passages in the *Annales sancti Amandi*, *Annales Petavianorum continuatio* and *Annales Alamannici* reports that ‘frost’ began in mid December and persisted until mid March (C.1.26, 27, 28), while the *Annales Laurissenses minores*, *Annales Nazariani*, *Annales Guelferbytani* and *Annales Alamannici* write simply of a hard winter (C.1.28, 29, 30, 33). The *Annales Weissemburgenses* records another hard winter in 766, though this may be misdated (C.1.34). No Carolingian text documents both of the hard winters of 762/63 and 763/64,<sup>1000</sup> and notice of shortage conditions appears in only one text. Nevertheless, there is good reason to label this crisis a famine: the *Chronicon* reports mortality across a large region and severe weather, which could have damaged winter harvests and shortened the growing season for the spring harvest, appears to have persisted for two back-to-back years, at least in some areas. Moreover, several non-Carolingian texts record the harsh conditions of the early 760s. Byrhtferth’s *East Anglian Chronicle* records a severe winter in 762/63 (C.3.20). Though compiled at Ramsey Abbey, it has been suggested that this passage comes from the *Rouen Annal* and may, as such, reflect conditions in Normandy. The Parker and Laud versions of the *Anglo-Saxon Chronicle* both label the winter of 763/64 ‘hard’ (C.3.21), and the *Chronicle of Ireland* records heavy snowfall for three months in early 764 followed by a food shortage and a drought (C.3.22, 23, 24).<sup>1001</sup> The *Historia Regum*, perhaps composed by Simeon of Durham in the twelfth century from earlier documents pertaining to England’s northeast, also documents ‘deep snow’ and ‘ice’ from the beginning of the winter of 763 to ‘mid spring’ 764 (C.3.26). The hard winter of 763/64 is also documented in Byzantine texts. The Balkans and a large area

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<sup>998</sup> On the composition of these texts see (C.1.20, 25) and Appendix 4.5.

<sup>999</sup> In their study of cold winters in early and high medieval central Europe, Pfister et al label the winter of 763/64 ‘one of the most outstanding cold episodes in the last 2000 years.’ (1998), p. 541; also Grove (2002), p. 316. There appraisal, however, may have more to do with the quantity of available source material than the actual winter. McCormick, Dutton and Mayewski also address this winter in their study of volcanic forcing in Carolingian Europe: (2007), pp. 878-81.

<sup>1000</sup> If the *Annales Weissemburgenses* passage (C.1.34) is misdated then it would be the sole text to document the consecutive hard winters.

<sup>1001</sup> Ó Corráin seems to indicate that this hard winter was that of 764/65: (2005), pp. 574-76.

around the Black Sea is said to have been affected. In fact, large parts of that sea are said to have frozen over, particularly the northwestern portions.<sup>1002</sup>

It appears, then, that northern Europe was hit by two successive hard winters in the early 760s. Whether southern Europe was also hit twice is uncertain, though not improbable. As McCormick, Dutton and Mayewski have highlighted, the GISP 2 ice core provides evidence that the hard winter of 763/64 was volcanic in origin. An acid spike in the core, the most notable of the eighth century, has been dated to 767, plus/minus two years.<sup>1003</sup> This acidity signal in Greenlandic ice seems to corroborate the written evidence and signify that the winter of 763/64 was a major event. A minor acid horizon in the Dome C core of Antarctica *c.*765 may be a sign that the eruption of the mid 760s and the hard winter of 763/64 were truly major events unlike others in our period, though this is uncertain.<sup>1004</sup> Tree-ring evidence from central Siberia, northern Norway, Sweden and Finland, which indicates a cold period in the early 760s, may be far more relevant here, while still underscoring the magnitude of this event.<sup>1005</sup>

#### 779 and 789

Five texts, the *Annales Laureshamenses*, *Annales Augienses*, *Annales Sangallenses maiores*, *Chronicon Moissiancense* and *Annales Colonienses*, document a food shortage in 779 (C.1.37, 38, 39, 40, 41). Passages in the first four of these texts, which are likely interrelated, succinctly document a *magna fames* and *mortalitas*. The latter text makes no note of the mortality, only of a shortage. As noted in 1.4.1.2, the root source here for the first four of these passages is likely the *Annales Laureshamenses*, which is thought to have been composed at the abbey of Lorsch. If these four passages do stem from the *Annales Laureshamenses*, we might speculate that the 779 shortage affected, at the very

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<sup>1002</sup> For comment see Pfister et al (1998), pp. 541-42; also McCormick, Dutton and Mayewski (2007), pp. 880-81.

<sup>1003</sup> McCormick, Dutton and Mayewski (2007), p. 881; Zielinski et al (1994), p. 949. As Mayewski notes, the temporal resolution of the GISP 2 core is plus/minus two years on either side of the proposed date. Zielinski has suggested that this signal is better dated to 768: (1995), p. 20939.

<sup>1004</sup> Castellano et al (2005), p. D06114. This Dome C signal does not appear in the Plateau Remote core in eastern Antarctica, though this need not mean that it was not the product of significant, but distant, eruption. See discussion of the 889 Dye 3 acid signal below. It has been suggested that for volcanic events detected in Greenlandic and Antarctic ice to be considered possibly contemporaneous, they need to appear within fifteen years of one another: Cole-Dai et al (2000), p. 24439.

<sup>1005</sup> Kirchhefer (2005), p. 219; Naurzbaev and Vaganov (2000), p. 7323; Grudd et al (2002), p. 663; Helama, Merilainen and Tuomenvirta (2009), p. 176; Briffa et al (1992), p. 117.

least, the area around Lorsch in central Germany, though we should perhaps not assume that the *Annales Laureshamenses* annalist wrote of events that occurred in his vicinity. The *Annales Colonienses* passage may too stem from this text, though this is very much uncertain. No other Carolingian text refers to a shortage in the late 770s and only one non-Carolingian text, the *Chronicle of Ireland*, provides some possibly relevant information (C.3.38). It documents a heavy snowfall in April 780. Whether the shortage mentioned in Carolingian texts was the product of a hard winter or whether the shortage persisted into 780, however, is unclear. If the crisis was generated by a hard winter we could assume that the winter was that of 778/79, considering that the crisis is dated to 779. The evidence is scant, the shortage appears not to have lasted successive years, and there is no relevant palaeoscience, but it seems, considering the evidence for mortality in the context of the crisis, that this shortage was a famine, though one possibly restricted to central Europe. Admittedly, the diagnosis of this shortage as a famine is far weaker than that of 762/64.

In 789, the *Annales sancti Amandi* briefly documents a hard frost and *Annales Flaviacenses* a food shortage (C.1.49).<sup>1006</sup> Both texts do not speak to the spatial contours of the crisis, and the *Annales Flaviacenses* does not address the cause of the crisis. Only the *Chronicle of Ireland* provides additional information.<sup>1007</sup> As in 779, it reports, in 789, a heavy snowfall in April (C.3.44). Whether the 789 shortage documented in the *Annales Flaviacenses* was the product of a hard winter in 788/89, however, is unclear. That two texts, one from northern Carolingian Europe (*Annales sancti Amandi*) and the other from insular Europe, refer to hard conditions certainly implies that the winter of 788/89 was harsh in the north, and this seems to be supported by Briffa's northern high-latitude tree-ring chronology constructed from trees from central Sweden, and western and central Siberia.<sup>1008</sup> Naurzbaev and Vaganov's chronologies from Taymir and Putoran (Siberia) too indicate a cold year in the late 780s, as does Kirchhefer's northern Norwegian

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<sup>1006</sup> The relevant entry in the latter text is actually dated to 790, but the editors suggest that the passage should be assigned to 789, see (C.1.49).

<sup>1007</sup> In a prophetic 'sermonette' contained in his short *vita* of Gratianus (bishop of Ravenna c.786-89), Agnellus of Ravenna writes of a 'great famine and much devastation,' that the 'earth will not give forth its fruit' and 'edible fruit will be lacking,' and that 'many will groan sustaining great penury, and the bodies of many will fail because of the need of hunger:' (2004), pp. 292-94. This account of a shortage, or impending shortage, may be an independent, though non-contemporary (Angellus wrote the *Liber pontificalis ecclesiae Ravennatis* in the 830s or '40s), reference to shortage conditions in 789 in the region of Ravenna.

<sup>1008</sup> Briffa (2000), p. 89; Briffa et al (1992), p. 113.

chronology.<sup>1009</sup> Still the evidence does not permit a famine diagnosis. Rather, in the late 780s we appear to be dealing with a northern European shortage, a year in duration.

791/94

A wide array of textual evidence refers to crisis conditions in the early 790s. The *Annales sancti Dionysii* writes of the ‘greatest food shortage in *Francia*’ in 791 (C.1.52), and the *Annales Mosellani* documents a food shortage in 792 and 793 (C.1.53, 54). In 793, the *Annales S. Quintini Veromandensis*, *Annales sancti Germani minores*, *Annales Laureshamenses*, *Annales Laurissenses minores* and *Chronicon Moissiancense* document a widespread crisis (C.1.55, 56, 57, 58, 59). The first of these, which appears to be independent, writes simply of a shortage, while the latter three are clearly interdependent, at least to a degree: all write of Pippin and Louis’ march into Benevento and of harvest failures in *Italia*. The similarity in form and content between passages in the *Annales sancti Dionysii* and *Annales sancti Germani minores*, which appears to be non-contemporary, suggests that the latter is derived from the former and that both of these passages speak to conditions in 791.<sup>1010</sup>

Ardo Smaragdus, in his *Vita Benedicti abbatis Anianensis* written in the early 820s, also provides a record of a subsistence crisis in the early 790s (C.1.60). Though the shortage is not dated, it is said to have taken place ‘at the same time’ as Felicianism, a heresy that arose c.789/93. Ardo speaks of extreme shortage conditions in the locale of Herault near Montpellier in southern *Francia*. In his *Gesta Karoli magni imperatoris* written in the early 880s, Notker Balbulus also writes of a food shortage in the early 790s that gripped ‘*antiqua Francia*,’ presumably *Francia* west of the Rhine (C.1.61). Neither the *Annales regni francorum* nor the revised version of the text record the shortage, though as noted, the first section of the former, which runs until the mid 790s, provides no record of any food shortage, and the latter only reports disasters which are not found in the original *Annales regni francorum* but which can be closely tied to the ruling elite.<sup>1011</sup> As such, the reviser writes only of heavy rains in 793 ruining Charlemagne’s attempt to

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<sup>1009</sup> Naurzbaev and Vaganov (2000), p. 7323; Kirchhefer (2005), p. 227.

<sup>1010</sup> Curschmann suggested that this *Annales sancti Germani minores* passage be assigned to 793, though the editors of the text date it to 791, see (C.1.56).

<sup>1011</sup> See the discussion of the 791 equine pestilence in 1.4.2.2.

construct a channel between the rivers Rednitz and Altmühl (C.1.62). In the *Capitulare Francofurtense* and *Synodus Franconofurtensis* of 794 we also find indications of shortage conditions (C.1.63, 64). In the former, Charlemagne sets price controls for barely, oats, rye and wheat, as well as for loafs of bread, and asks that lords ensure that their servants ‘do not die of hunger’ and that grain not be hoarded but sold at the set prices. In the *Synodus Franconofurtensis*, which dates to June 794, we simply find notice of a ‘hard food shortage’ and loss of crops. Lastly, the *Annales Mosellani* records a ‘great drought’ in 794, which did, this annalist specifies in contrast to the other evidence for 793/94, not harm the harvest (C.1.65).<sup>1012</sup> Outside of Carolingian Europe, we find a rare early medieval notice of a subsistence crisis in the *Anglo-Saxon Chronicle*. The text briefly documents a ‘great food shortage’ (C.3.46).

This crisis was undoubtedly a famine. Shortage conditions may have set in as early as 791 and persisted until 794, and northern and southern Carolingian Europe were clearly affected: while some texts, such as the *Annales sancti Dionysii*, *Annales sancti Germani minores* and Notker’s *Gesta Karoli magni imperatoris*, speak vaguely of shortage conditions in *Francia*, the *Annales Laureshamenses*, *Annales Laurissenses minores* and *Chronicon Moissiancense* reveal that central and northern *Italia* was also affected, and the *Annales Laureshamenses* specifies that *Burgundia* was also hit. The *Chronicon Moissiancense* additionally observes that *Gothia* and *Provincia* were affected. Though the *Annales Laureshamenses* and *Chronicon Moissiancense* specify that only ‘certain regions’ of *Francia* were involved, there is reason to believe that much of Carolingian Europe was involved. The *Annales Mosellani* was composed contemporarily in the early 790s at either Metz or Cologne and would have presumably reported on conditions in one of those regions. Moreover, the *Capitulare Francofurtense* and *Synodus Franconofurtensis* concern events around Frankfurt and the Frankish heartlands in the north, and Ardo reported on events in Herault, some 1000 km to the southwest. Though the cause or environmental trigger(s) of the shortage are not documented, we may suspect that rain was a factor, considering the reviser’s report in 793. If rain was a primary trigger, we may tentatively infer that shortage conditions prevailed in the southeast, the

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<sup>1012</sup> This annalist’s emphasis on the good health of the harvest may be an indirect indication of a return of good harvests in 794 and, thus, the poor health of the harvest of the previous years. After all, the *Annales Mosellani* does record shortages in 792 and 793.



locale the reviser states was hit by ‘*iugis pluvia*.’ In conjunction with the evidence for shortage condition in central *Italia*, the passage in the *Anglo-Saxon Chronicle* certainly indicates that the shortage was spatially vast. As observed, the absence of any notice in the *Chronicle of Ireland* of a shortage or extreme weather in the early 790s should not be taken as an indication of the event’s limited scope, or that Ireland was not affected, as Irish annals fail to document any eighth-century shortages outside of the 760s and Irish annalists showed no concern for crises between 769 and 825. Though specific spatial and temporal contours are not clear, and though there is little direct evidence for mortality, the early 790s undoubtedly witnessed a pan-European shortage multiple years in duration.<sup>1013</sup> Little plausibly relevant palaeoclimatic evidence could be assembled, though tree-ring chronologies from Taymir and Putoran (central Siberia) imply wet and warm conditions there in the early 790s.<sup>1014</sup>

805/07, 809 and 813

Like the crisis of the early 790s, that of the first decade of the ninth century does not appear in the *Annales regni francorum*.<sup>1015</sup> Instead, we hear of the crisis in capitularies and a letter. The *Capitulare missorum in Theodonis villa datum secundum generale* given at Thionville and dated to 805, documents a food shortage in that year and requires grain not be sold at exorbitant prices or outside of *Francia* (C.1.73), while the *Capitula per episcopos et comites nota facienda*, which likely dates to 805,<sup>1016</sup> asks that dependents be given grain in times of want (C.1.75), and the *Capitulare missorum Niumagae datum*, given at Nijmegen and dated March 806, speaks of a ‘very strong food shortage in many places,’ sets grain prices again, and asks that those with excess grain neither hoard nor sell it at inflated prices, but at prices set in the capitulary (C.1.76). The *Memoratorium de exercitu in Gallia occidental praeparando* given at Aachen in 807, also tells us that because of a food shortage, military training ought to be carried out ‘beyond the Seine,’

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<sup>1013</sup> There may additionally be some evidence for a shortage in the eastern Mediterranean in the early 790s: McCormick (2001), p. 880.

<sup>1014</sup> Naurzbaev and Vaganov (2000), p. 7323.

<sup>1015</sup> The reviser’s RFA comes to a close in 801.

<sup>1016</sup> Though 805 seems like the most reliable date, this capitulary has also been vaguely dated to 805/08: see *MGH CAP I* (1883), p. viii. In any event, it likely to the same shortage discussed here.

which seems to indicate the region between the Seine and the Loire (C.1.77).<sup>1017</sup> Additionally, in a letter dated to 805 and addressed to Gerbald, Bishop of Liège, Charlemagne writes of the ‘*terrae sterilitas*’ as well as intemperate weather that was ‘greatly unfavourable to crops,’ and the imminent threat of a food shortage (C.1.74).

Charlemagne spent most of 805 around the region of Lorraine and the towns he is known to have seen in that year are located somewhat close to one another.<sup>1018</sup> The area in which crops were troubled, then, may have been limited to west-central France, at least in 805. Of course, it is unlikely that the area around Liège was hit by a shortage, at least by the time Charlemagne wrote, as Charlemagne would not have had to inform a Bishop of a subsistence crisis in his own territory. That the only other notice of shortage conditions in 805 comes from Thionville, some 60 km north of Lorraine, also implies that the crisis was a rather spatially limited event in 805. However, notice of shortage conditions in 806 in Nijmegen, some 350 km north of Thionville signifies that the crisis grew or was already a general (but undocumented) affair of northeastern *Francia* in 805. That said, notice of the crisis at Aachen, between Nijmegen and Thionville,<sup>1019</sup> in 807 and the indication in the *Memoratorium de exercitu in Gallia occidental praeparando* that harvests had not failed west of the Seine seems to indicate that the crisis was spatially restricted to the northeast.

This may be supported by the absence of any report of a food shortage in the southwestern *Chronicon Moissiancense*, which as we have seen, documents several food shortages (and human mortalities) prior to 810. The omission of a shortage in the *Annales regni francorum*, however, should not impact our assessment of the shortage’s spatial or temporal contours, as *Annales regni francorum* annalists do not provide an explicit reference to *fames* prior to 820. Similarly, the absence of any shortage in the early 800s in the *Chronicle of Ireland* or the *Anglo-Saxon Chronicle* should not be taken as an indication that the crisis was spatially restricted, for reasons noted above. Nevertheless, while it appears that this crisis was not common to much of Carolingian Europe, it does seem that it was severe, especially considering its duration of multiple back-to-back years. Furthermore, human mortalities recorded in 807 in eastern Carolingian lands,

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<sup>1017</sup> For ‘beyond the Seine’ see Nelson (1991), p. 28 n. 1.

<sup>1018</sup> See the discussion of the 805 pestilence in 1.4.2.1.

<sup>1019</sup> Aachen lies roughly 150 km south of Nijmegen and 200 km north of Thionville.

around Fulda (350 km east of Aachen), may be tied to this crisis (C.1.78. 79). These human deaths may be a proxy for the shortages central and eastern Carolingian scope and severity.<sup>1020</sup> There is reason, thus, to consider this shortage a famine. Though the cause or trigger of the shortage is not specified – we hear only of ‘unstable’ and ‘intemperate’ weather and *terrae sterilitas* – both Briffa and Grudd’s northern tree-ring chronologies signify that these years were some of the coldest in our period, and Eronen et al’s Finnish series, as well as Kirchhefer’s Norwegian series, also appear to identify the very early 800s as a poor growth period.<sup>1021</sup> This coupled with the dearth of acid horizons in polar ice indicate that the event may have been induced by an outbreak of Siberian winds into the northeast.<sup>1022</sup>

Next, the *Capitulare missorum Aquisgranense primum* delivered at Aachen in 809, mentions a food shortage in that year (C.1.83). The text, however, is vague and there is no further evidence for a crisis in 809 or 810, other than the Poeta Saxo’s *gesta* of Charlemagne written in the late ninth century at Corvey (C.1.86). Yet neither the *Capitulare* nor the Saxon poet provide temporal parameters to the shortages they mention, and it is uncertain whether they refer to single crisis. The poet speaks of sterile vineyards, but gives no indication of their location. There is no indication of bad weather or shortage conditions in other Carolingian or non-Carolingian texts c.809, though the *Annales sancti Amandi* seems to refer to a major inundation or heavy rains in late 808, presumably in the locale of St. Amands (in modern province of Antwerp, some 150 km west of Aachen), which might have resulted in a shortage in that area. Clearly, there are no grounds to label any shortage that may have occurred in 809 a famine. Little can also be said about the *inopia* and *famis* reported in the *Capitula e canonibus excerpta* of 813 (C.1.96). No spatial parameters are assigned to the crisis, the causes of the shortage are not specified, and nothing relevant appears to crop up in the palaeoclimatic record. That the capitulary calls for lords to assist their dependents and for bishops to distribute foods

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<sup>1020</sup> See the discussion of the evidence for pestilences in 807 and 808 in 1.4.2.1. Whether the mortalities reported for 808 were also a related, indirectly or not, to this subsistence crisis is impossible to tell (C.1.80, 81, 82).

<sup>1021</sup> Briffa (2000), p. 89; Briffa et al (1990), p. 437; Briffa et al (1992), p. 111; Grudd (2008), p. 853; Eronen et al (2002), p. 678; Kirchhefer (2005), p. 230; also see Helama et al’s Lapland series (2009), p. 452.

<sup>1022</sup> Siberian winds are discussed in 2.4.4.

from their storehouses implies that the shortage was significant, but we have no reason to provide a famine diagnosis.

820/24

The *Annales regni francorum* reports failed grain (*frumenta*) and legume/vegetable crops (*legumina*), and a poor grape harvest in 820 (C.1.101). The annalist attributes the poor grain and legume harvests to heavy rain and humidity and the poor grape harvest to a dearth of warm weather. No temporal or spatial parameters are adhered to these harvests, though we may suspect that they were poor at least in the locale of Aachen, where the passage was likely composed. Considering the close relation of the *Annales regni francorum*'s composition to the court, we may suspect that the annalist was informed of poor harvests in other regions of the empire. Of course, we have no way of knowing which – if any – of the regions addressed in the 820 entry were affected. While the *Annales regni francorum* annalist does not report any human mortality in the direct context of the crisis, he does speak of a pestilence of humans and cattle, and we may speculate that this mortality was tied to the condition of the harvest, particularly considering the role of disease in food shortage mortality discussed in 2.2.1.1.2. Three passages in the *Annales Sithienses*, *Annales Fuldenses* and *Herimanni Augiensis chronicon*, which appear to be interdependent and related to the *Annales regni francorum*'s 820 entry, also report the shortage (C.1.102, 103, 104). All of these texts speak of a great crisis produced by heavy rains, yet none provide a clearer picture of the shortage's contours.<sup>1023</sup> Unlike the *Annales regni francorum*, the *Annales Sithienses* and *Herimanni Augiensis chronicon* do speak explicitly of a food shortage in 820.

In 821, the *Annales regni francorum* again documents heavy rains, which the annalist observes prohibited fall sowing, as well as a winter 'so long and cold' that parts of the rivers Danube, Rhine and Seine froze over in addition to 'other rivers in *Gallia* and *Germania* that flowed into the ocean' (C.1.105).<sup>1024</sup> This winter, that of 821/22, is also marked as being harsh in the *Annales Xantenses* (C.1.106). The entry in the *Annales*

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<sup>1023</sup> The *Annales Sithienses*, *Annales Fuldenses* and *Herimanni Augiensis chronicon* may all rely on the *Annales Regni Francorum*.

<sup>1024</sup> Pfister et al also briefly draw attention to this winter in their assessment of cold early and high medieval winters: (1998), p. 542; also Grove (2002), p. 316. McCormick, Dutton and Mayewski, on the other hand, draw attention to this winter and that 823/24: (2007), pp. 881-84.

*Colonienses* for 822, which appears to be independent from the *Annales regni francorum* and the *Annales Xantenses* (which appears here to rely on the *Annales regni francorum* for its 821 entry), specifies, unlike other texts, that the winter generated *fames* (C.1.107). As in 820, none of these texts assign any temporal or spatial parameters to the crises they address. However, in 823 the *Annales regni francorum* again comment on the state of the harvest, noting that a hail storm destroyed ‘the produce of many regions’ (C.1.108). What ‘regions’ exactly we do not know, though we may conjecture that crops in the locale around Aachen were hit. That said, this notice of failed crops is followed by a report of another pestilence among humans that spread ‘throughout’ *Francia*, which may indicate that the shortage, by 823 at least, had become a spatially general affair. The *Annales sancti Emmerammi*, which might provide an independent account from the locale of Regensburg, label the winter of 822/23 ‘hard’ and observe that it was followed by a drought and a food shortage (C.1.109), and in 824 the *Annales regni francorum* report that the winter of 823/24 was hard and that Lothar had to postpone his 824 campaign into Brittany until August on account of shortage conditions (C.1.111, 112).<sup>1025</sup>

No other Carolingian text is known to address the shortage,<sup>1026</sup> and little information relevant to shortages in the early 820s is encountered in non-Carolingian texts. In Genesios’ *On the reigns of the emperors*, however, we do find something (C.3.54). Genesios refers vaguely to ‘droughts and heat waves’ that affected cities and the ‘entire countryside’ in Leo V’s short reign of 813 to 820; if the food shortages reported in Carolingian sources were indeed spatially vast we may suspect that this Byzantine reference in the same period is related, though this may be a stretch, considering the apparent dearth of evidence for extreme weather or shortage conditions in Carolingian southern Europe.<sup>1027</sup> In the north, however, the Byrhtferth’s *East Anglian Chronicle*

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<sup>1025</sup> Whether a crisis gripped Brittany or regions of *Italia* in 824 is unclear.

<sup>1026</sup> That Louis’ biographers, the Astronomer, Ermold Nigellus or Thegan, do not report the crisis should not be taken as a sign of the crisis’s limited significance considering the low priority these authors gave to outbreaks of disease, hunger and extreme weather. The Astronomer’s account of natural disasters in the early 820s, which neglects to mention this crisis but observes the weather and pestilences, demonstrates this point well (C.1.110). We might speculate that the ‘frequent’ storms the Astronomer relates were primarily notable on account of their impact on agriculture and, consequently, that the Astronomer does indeed provide an additional reference to failed crops in the early 820s. The continual shortages mentioned in the *Hludowici et Hlotharii epistola generalis* dated to December 828, may also refer to the shortages of the early 820s (C.1.115): cf. discussion on the human and cattle pestilences mentioned in this general letter in 1.4.2.1 and 1.4.2.2.

<sup>1027</sup> Though see (C.1.112) for an indication that a crisis affected *Italia* in the early 820s.

documents a ‘great food shortage’ and the *Chronicle of Ireland* documents freezing of rivers in 822 (C.3.57, 58). As noted, this East Anglian passage may actually reflect events in Normandy, around Rouen, some 1000 km west of Regensburg. Then, in 825 the *Chronicle of Ireland* documents a ‘great hunger and lack of bread’ (C.3.59). As noted, the absence of any report of a shortage prior to 825 in this text should not be thought of as telling of an actual absence of shortage conditions in Ireland or the northwest. Likewise, the omission of dearth in the early 820s in the *Anglo-Saxon Chronicle* should also not be accepted as proof that England was then ‘shortage-free.’<sup>1028</sup>

Regardless of the ambiguity surrounding the temporal and spatial contours of food shortages in the early 820s, it appears that at least northern Carolingian Europe was affected for multiple back-to-back years, as it was in the early 790s. Considering what we know of this shortage, which was clearly more spatially vast than that of 805/07, we can safely identify it as a famine. Support for this is gained from the GISP 2 ice core. As historians McCormick and Dutton, and palaeoclimatologist Mayewski, demonstrate, the highest ninth-century H<sub>2</sub>SO<sub>4</sub> concentration in the GISP 2 core dates to 822 and 823, plus/minus two years, and another acid spike appears in 827, indicating that volcanic aerosols were ejected into the stratosphere for successive years in the 820s.<sup>1029</sup> This independent line of evidence corroborates the written record and signifies that the winters of the early 820s may have been truly significant, as contemporaries suggest. Briffa’s northern high-latitude tree-ring chronology too appears to indicate that the early 820s were cold,<sup>1030</sup> and another central Siberian dendrochronology exhibits cold years in the early 820s as well, so too Grudd’s Tornetrask (northern Sweden) chronology, Eronen et al’s Finnish series, Helama et al’s Lapland chronology and D’Arrigo et al’s Mongolian chronology.<sup>1031</sup> Helama et al’s series from northern Finland also identifies 824 as the coldest year of the first millennium CE,<sup>1032</sup> and Kirchhefer’s Norwegian ring series also

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<sup>1028</sup> The material evidence discussed below certainly supports this observation. Also see the discussion at the outset of 2.4.2.

<sup>1029</sup> McCormick, Dutton and Mayewski (2007), p. 883; Zielinski et al (1994), p. 949; Zielinski (1995), p. 20939.

<sup>1030</sup> Briffa (2000), p. 89.

<sup>1031</sup> Naurzbaev and Vaganov (2000), p. 7323; Grudd (2008), p. 853; Grudd et al (2002), p. 663; Eronen et al (2002), p. 678; Helama et al (2009), p. 452; Helama et al (2002), p. 684; D’Arrigo et al (2001), p. 544.

<sup>1032</sup> Helama et al (2002), p. 686.

isolates 824 as being a particularly cold year, the third coolest between 320 and 1994.<sup>1033</sup> Additional palaeo evidence is found in the small, and consequently highly sensitive, Grindelwald Glacier. This Alpine climate archive exhibits an advance in the early 820s, indicating that cold and wet conditions then prevailed.<sup>1034</sup> The early 820s were clearly a difficult period.

841/45

We again in the early 840s possess a selection of passages pertaining to shortages and extreme weather. In his *Historiarum libri iiii*, Nithard documents the flooding of the Seine in March 841 and remarks that the summer of 841 was particularly cold, that crops were, consequently, harvested late, and that there was a heavy snowfall toward the end of 841 (C.1.129, 130); he then reports that the winter of 842/43 was ‘cold and long’ and ‘harmful to agriculture’ (C.1.131). Though Nithard assigns no temporal or spatial parameters to these extreme weather events, it is probable that they apply to the northeastern regions of *Francia*, where Charles the Bald was active.<sup>1035</sup> In 843, the *Annales Bertiniani*, which provides a contemporary record of events from the early 830s, reports people throughout *Gallia* being forced to consume bread made from earth on account of the lack of grain (C.1.133). However, when in 843 and where in *Gallia* food was insufficient is uncertain. Yet we may be able to draw some vague contours around this shortage. Prudentius, the annalist, is known to have written in Troyes. This, together with his tying of the shortage not to extreme weather but to brigands, and his placement of this passage after his notice of a conflict in *Aquitaina*, which took place in late May, and before his notice of the Viking capture of Nantes, which is thought to have occurred in late June, allows us to speculate that the dearth Prudentius relates was, at the very least, an affair of western *Francia* that set in during the spring. How pivotal armies were in causing this shortage is uncertain, however, as the hard winter of 842/43, Nithard specifies persisted until late March, when heavy snowfalls were still occurring (C.1.134).

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<sup>1033</sup> Kirchhefer (2005), pp. 227-28.

<sup>1034</sup> Some low resolution sources for past climate, such as glaciers, occasionally provide more temporally precise data. Dry and warm conditions promote glacial recession, while cold and wet conditions promote glacial advances, and smaller glaciers, which are more sensitive to short-term climatic anomalies, have been shown to provide proxies of past climate conditions of high temporal resolution. McCormick, Dutton and Mayewski (2007), pp. 874, 884.

<sup>1035</sup> See Nithard in the discussion on the human and cattle pestilences of 842/43 in 1.4.2.1 and 1.4.2.2.

Moreover, shortage conditions are reported in the letters of Lupus of Ferrières in north-central *Francia*, roughly 450 km east of Nantes. In a letter written in either August or September 843, Lupus laments a scarcity of fruit for wine (pear wine specifically) and a poor grain harvest that ‘threatened’ a scarcity of beer (C.1.135).<sup>1036</sup>

Prudentius then notes that the following winter, that of 843/44, was mild until February (C.1.137). Following this brief respite, however, Prudentius documents a very hard winter in 844/45 and later in 845 a ‘great food shortage’ that consumed the western regions of *Gallia* and killed ‘*multa hominum milia*’ (C.1.138, 139). Lupus also refers to the poor harvest of 845 in a letter dated to November (C.1.141) and the *Annales Lausannenses* too appears to provide an independent reference to the hard winter possibly in central Europe where the text was composed (C.1.142). The *Annales Blandinienses* then labels the winter of 845/46 ‘the hardest winter’ (C.1.143), and Prudentius documents a windstorm that ‘lashed’ (*acerrimus*) crops until May 846 (C.1.144).<sup>1037</sup> Other Carolingian texts are not known to speak to extreme weather or shortage conditions in the early 840s. That the *Annales Xantenses*, which provides a contemporary account of events in the 840s from Ghent, does not mention a crisis, should not be taken as a sign of the crisis’ limited scope as the *Annales Xantenses* annalist(s) who took up the text in the early 830s and carried it through to the early 850s fail to explicitly report any subsistence crisis or to tie poor weather to the quality of the harvest.<sup>1038</sup>

Neither the winter of 845/46 nor this windstorm are said to have harmed crops or caused a food shortage, though we may suspect that that is precisely what made them notable. Information possibly relevant to these Carolingian texts is found in several written sources. Bar Hebraeus, in his thirteenth-century *Chronography* based on earlier contemporary sources, reports a ‘severe food shortage’ in the Middle East, quite possibly southeastern Turkey, in 842 (C.3.64), Erchempert in his *Historia Langobardorum Beneventanorum*, composed at Monte Cassino in the late 880s, records a food shortage in Benevento in 843 (C.3.65), and the *Liber pontificalis* reports a very unusual heavy snowfall over Rome in early 844 and the flooding of the Tiber in November of that year (C.3.66, 67). The *Chronicle of Ireland* does not provide a direct or plausible reference to

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<sup>1036</sup> Though, he is careful to note, they then enjoyed peace from enemy incursions (C.1.136).

<sup>1037</sup> Pfister et al likewise mention this winter in brief: (1998), p. 542; also Grove (2002), p. 316.

<sup>1038</sup> On the composition of the *Annales Xantenses* see (C.1.25).



a shortage between 825 and 858, and we may suspect that Irish annalists were in the mid ninth century simply not interested in documenting hunger. The same could be suggested for the *Anglo-Saxon Chronicle*, which reports only one shortage in the ninth century, in 894. Of course, whether any of the non-Frankish passages pertain to the Carolingian record of extreme weather and food shortage is uncertain. Like Prudentius, Erchempert ascribes the shortage he documents in Benevento to warfare, not weather, and this Italian crisis may, as such, be quite distinct from that recorded in western and northern *Francia* in 843. Moreover, while the author of the *Liber pontificalis* reports a heavy snowfall in early 844, the *Annales Bertiniani* speaks of a mild winter. The flooding of the Tiber too may have no connection to events in Carolingian Europe. Though a considerable distance away, Bar Hebraeus' report of a crisis in the Middle East in 842 might be the most relevant. No Greenlandic ice core furnishes evidence for a volcanic origin of the hard winters of the early 840s, though a 'large' acid horizon has been dated to 847 in the Antarctic Plateau Remote core.<sup>1039</sup> Of course, that an eruption would cause a hard winter in Europe and appear only in South Pole ice is quite unlikely. We may presume, as such, that the winters of the early 840s were not volcanic in origin. Notable events in trees are also not forthcoming.<sup>1040</sup> Though we may in the early 840s be looking at multiple crises, there is reason to believe that this period of shortage in the early 840s was indeed a true famine.

#### 850 and 852/53

Our most verbose account of a shortage is found in the *Annales Fuldenses* in 850 (C.1.149). The passage, likely written at Mainz in or near to the year it addresses, documents a severe food shortage in *Germania* and the high prices, migration of the poor and human mortality that followed in its wake. The annalists speaks specifically of shortage conditions in Mainz, the diocese of Winkel (situated between Mainz and Bingen on the Rhine), and the locale of Grabfeld to the southeast of Fulda. It is implied that the locale of Thuringia was not affected. The *Annales Bertiniani* and *Annales Xantenses* provide no explicit references to shortage conditions in 850. However, the *Annales*

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<sup>1039</sup> Cole-Dai et al (2000), p. 24435.

<sup>1040</sup> Though Kirchhefer refers to 845 as one of the warmest years of the last 1700 in Norway: (2005), p. 227.

*Bertiniani* entry for 850 is uncharacteristically short and we should not think that the absence of any shortage in the text in the early 850s is an indication that western Carolingian lands were not affected or that the 850 crisis was restricted to *Germania*. Moreover, the *Gesta abbatum s. Bertini Sithiensium*, compiled by Folquin of St. Bertin in the mid tenth century from earlier documents at St. Bertin, reports that the winter of 849/50 was severe and that a harsh subsistence crisis followed in its wake (C.1.150), and the *Annales Xantenses*, which appears to have been composed at Ghent until 852, does report heavy rains in the winter of 850 and a drought the following summer (C.1.151). The *Annales Xantenses* annalist's vague observation that the rains 'harmed the human race' (*humanum genus affligebat*) may be an indication that they damaged crops and caused hunger or, on the other hand, that they saw to flooding, which may have also brought on human deaths directly as well as indirectly via the medium of crop failure.<sup>1041</sup>

This shortage may have afflicted a fairly wide area. Ghent lies some 130 km from St. Bertin, which is roughly 600 km northwest of Mainz, which is 375 km southwest of Winkel and 260 km west of Grabfeld. Nevertheless, no other Carolingian or non-Carolingian text is known to provide additional information about this crisis, and it is relatively uncertain whether this shortage was indeed a famine.<sup>1042</sup> That our prime source for the dearth is laden with motifs and biblical instruction (high prices of grains are given in shekels, people are driven to consume carrion and, for instance, a small child is said to have died at his mother's breast), that evidence for mortality is minimal, and that the shortage appears not to have persisted for multiple successive years forces the conclusion that this was not a famine but a lesser food shortage, despite its possible wide breadth.

Shortly following this crisis, however, the *Annales Xantenses* documents shortages in 852 and 853 (C.1.152, 153). The first shortage is not assigned spatial parameters of any sort and it is uncertain if these two crises were one and the same, despite the annalist's distinct division of the two. It is probable that these two passages

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<sup>1041</sup> The *Annales Xantenses* is thought to provide a contemporary record of events around Ghent from the early 830s to 852. The *Annales Xantenses* does not, prior to 852, speak directly of failed crops in the wake of bad weather. On several occasions between the early 830s and 852, however, the *Annales Xantenses* annalist, possibly Gerward (Einhard's successor as librarian of the palace), reports flooding and rain storms that he vaguely writes caused 'harm' and 'misfortune' to the human race, see, for instance, (C.1.121, 123, 127, 148).

<sup>1042</sup> There is some indication the Venetian Lagoon froze over in 850, but Camuffo's identification of a frozen Venice in 850 might in fact be better dated to 852 or 860: (1987), p. 57.

were composed shortly after the *Annales Xantenses* was taken up in Cologne and that these reports of shortage concern areas in that locale. The second shortage is said to have occurred in *Saxonia* (which itself indicates the eastward movement of the *Annales Xantenses*'s composition) and to have forced the people there to consume equine flesh. The trigger of this crisis is not specified, though a drought is said to have brought on shortage conditions in 852. No other Carolingian or non-Carolingian text is known to refer to extreme weather or a subsistence crisis in 852/53, and since neither passage refers to mortality, and the spatial and temporal contours of both crises (if we are in fact dealing with two crises) are quite uncertain, we have no reason to consider this shortage a famine. However, the GISP 2 core does exhibit a H<sub>2</sub>SO<sub>4</sub> horizon c.853 that possibly stemmed from an eruption of Fumas (Azores),<sup>1043</sup> and some northern European dendrochronologies indicate that the early 850s were dry and cold.<sup>1044</sup> Though a hard winter is not noted for the early 850s, it is feasible that a volcanic event could have produced the aforementioned drought. Whether these material signals had anything to do with the shortage, though, is uncertain.

#### 859/61

There is next some indication of a shortage c.860. Lupus of Ferrières refers to a poor harvest in an area of north-central *Francia* in a letter dated to August 859 (C.1.161), and the *Annales Bertiniani* and *Annales Fuldenses* document a hard 859/60 winter (C.1.162, 163).<sup>1045</sup> Though neither the *Annales Bertiniani* nor the *Annales Fuldenses* record a food shortage, the former asserts that the winter lasted from November to April and the latter observes that the winter damaged trees and crops and was so severe that the Venetian Lagoon froze. The *Annales Fuldenses* additionally documents blood rains, possibly Saharan sands, in 860, though the annalist does not directly tie this phenomenon to the

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<sup>1043</sup> Zielinski et al (1994), p. 949; Zielinski (1995), p. 20939.

<sup>1044</sup> For instance, Helama et al (2009), p. 452. These northern series may, however, refer to the c.855/56 event noted in 2.4.4.

<sup>1045</sup> Pfister et al too call our attention to this winter, though they do so in passing: (1998), p. 542; also Grove (2002), p. 316; and McCormick, Dutton and Mayewski (2007), pp. 884-86. Camuffo provides a number of plausible references to the freezing of the Venetian Lagoon in this winter: (1987), p. 57.

state of the harvest.<sup>1046</sup> Neither the *Annales Bertiniani* nor the *Annales Fuldenses* ascribe spatial parameters to the winter, though we may speculate that the winter was severe around Troyes and Mainz, some 450 km apart, where the texts were respectively composed.<sup>1047</sup> The *Annales Alamannicorum continuatio Sangallensis prima*, *Annales Weingartenses* and *Annales Sangallenses maiores* also document the hard winter of 859/60 (C.1.165, 166, 167), though all are not independent of one another, as does the *Annales Colonienses brevissimi* and the *Annales Xantenses* (C.1.168, 169). The root source of the first three of these texts was likely composed in central Europe, at either Reichenau or St. Gall (a mere 50 km apart),<sup>1048</sup> while the *Annales Colonienses brevissimi*, which may not be contemporary, appears to have been composed at Cologne. The *Annales Xantenses* likely provides a contemporary and independent source of the winter in the locale of Cologne. The hard winter, thus, appears to have been fairly general event, at least across much of northern Carolingian Europe perhaps affecting areas as disparate as those of Troyes, Cologne, Mainz and St. Gall/ Reichenau.

Not surprisingly, then, several texts document a food shortage in 861. The *Annales Alamannicorum continuatio Sangallensis prima*, *Annales Weingartenses* and *Annales Sangallenses maiores* all reference a *fames valdissima* in that year (C.1.170, 171, 172). As before, all three of these passages likely stem from a common central European source, and though none of these texts provide spatial contours to the crisis, what we likely have here is a single reference to a food shortage composed at Reichenau/St. Gall. That the *Annales Bertiniani*, *Annales Fuldenses* and *Annales Xantenses*, which all provide an independent and contemporary record for the 860s from Troyes, Mainz and (possibly) Cologne respectively, do not document a shortage c.860 may reflect the narrow scope of the crisis to the area around either St. Gall or Reichenau, and, consequently, the inability

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<sup>1046</sup> Blood rains were quite possibly the falling of red sands collected from the Sahara desert and carried over Europe by southerly winds: on early medieval blood rains and Saharan sands see Dutton (2008), pp. 172-73.

<sup>1047</sup> As noted in Appendix 4.5, it is generally thought that Hincmar, Bishop of Rheims, took over the *Annales Bertiniani* in 862. That this entry was composed at Mainz in 860, or added later in 862, is unlikely considering the similarity between it and other *Annales Bertiniani* reports of extreme weather composed by Prudentius. On many occasions, for instance, Prudentius reports extreme weather events but does not comment on what, if any, impact they had on the harvest, see (C.1.123, 124, 126, 137, 138, 155, 157, 160). Only on two occasions, he vaguely documents the impact extreme weather had on crops (C.1.144, 145) and his two explicit reports of a food shortage (C.1.133, 139) are not assigned to weather.

<sup>1048</sup> On the composition of these texts, see the discussion of the 860 non-human animal mortality in 1.4.2.2.

of the 859/60 winter to produce a general pan-Carolingian shortage. Though it is not impossible that a dearth failed to capture the interests of the annalists of these texts, the *Annales Bertiniani*, *Annales Fuldenses* and *Annales Xantenses* each document multiple shortages in the 850s and '60s, and it may be regarded as unlikely that the authors of each would simultaneously choose to neglect to mention a shortage c.861.<sup>1049</sup> The *Annales Bertiniani* does, however, refer to peoples besieged on the island of Oissel in the river Seine who had to surrender on account of *fames* (C.1.173). Of course, whether this shortage was restricted to the area of conflict or a part of a more spatially general affair produced by the hard winter of 859/60 is uncertain. We may suspect that the annalist would have indicated if the hunger of the besieged was common to *Francia*.

Of non-Carolingian texts, Byrhtferth's *East Anglian Chronicle*, like the *Annales Bertiniani*, documents a 'deep frost' from late November 859 through early April 860 (C.3.74), and Andreas of Bergamo, in his *Historia*, reports heavy snowfall and severe frost in early 860 that affected the following harvest (C.3.75). The first of these, as noted, may tell of conditions in Normandy, not East Anglia.<sup>1050</sup> Both furnish proof that the winter of 859/60 was severe and affected much of northern and southern continental Europe. Both also support the idea that the winter only resulted in a subsistence crisis in central Europe, and considering the *Historia*'s reference, Italy. Lupus' reference to poor yields in the summer of 859 may owe to a regional weather restricted to north-central *Francia*, or, though perhaps unlikely, this letter may be misdated.<sup>1051</sup> Considering the written evidence available, it seems that the crisis of 861 was not a famine, as defined here, but a lesser food shortage. That said, the GISP 2 again provides some insight as to the cause and scale of the hard winter of 859/60. McCormick, Dutton and Mayewski propose that sulfate spikes dated to 854, 856 and 858 in the Greenlandic ice sheet suggest that a major eruption occurred in the mid 850s, and saw not only to this cold winter but that documented in texts in 855/56 (C.1.155). The higher acid deposits are assigned to the

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<sup>1049</sup> See, for instance, (C.1.149, 152, 153, 178, 183, 184, 191, 192). Whether Prudentius or Hincmar penned the *Annales Bertiniani* entries for 861 should not alter this observation, as both appear not to have neglected subsistence crises: for Prudentius see (C.1.139), for Hincmar (C.1.184). That said, the early 860s represent a transitional phase in the writing of the *Annales Bertiniani*, and it is possible that an 861 shortage was simply lost in the transition. On the composition of the *Annales Bertiniani* see Appendix 4.5.

<sup>1050</sup> Despite the similarity between 860 entries in the *Annales Bertiniani* and *East Anglian Chronicle* in terms of the dates fixed to the duration of the hard winter, there is no reason to think that Byrhtferth's later text here depends, directly or indirectly, on the *Annales Bertiniani*.

<sup>1051</sup> As Regenos indicates, this letter might be affixed a later date: Lupus of Ferrières (1966), p. 153.

856 and 858 layers, plus/minus two years, indicating that the winter of 859/60 may have been more severe than that of 855/56.<sup>1052</sup> Briffa's northern chronology too appears to furnish evidence for a brief cold period c.860, as does Grudd's Tornetrask series, Helama et al's Lapland chronology and Kirchhefer's Norwegian dendrochronology.<sup>1053</sup> Baillie and Brown's Irish chronology too exhibits a cooling period in the late 850s, so too a central-southern English series.<sup>1054</sup> Though this material evidence cannot override the silence in some key texts about any shortage in 861, it does signify that this lesser food shortage may have very well been a famine. The lesser shortage diagnosis may be regarded as weak.

### 867/69

In 867, the *Annales Xantenses* reports that an edict was published requiring the observance of a three-day fast on account of the imminent threat of a food shortage (C.1.178). In the same year, the *Annales Lemovicenses*, which possibly provides an independent account of events in western *Francia*, records a great subsistence crisis (C.1.182). The *Annales Alamannicorum continuatio Sangallensis prima*, *Annales Weingartenses* and *Annales Sangallenses maiores* document heavy rains in 867, presumably around St. Gall/Reichenau (C.1.179, 180, 181), and in 868 the *Annales Fuldenses* recounts heavy rains, the flooding of many springs and rivers and a food shortage in *Germania* and *Gallia* (C.1.183). Hincmar, in the *Annales Bertiniani*, also records a food shortage in 868 (C.1.184). Though the *Annales Fuldenses* and the *Annales Bertiniani* do not fix specific spatial parameters to the crisis they record, both stress that the shortage brought about an immense loss of human life. We may suspect that crops were damaged at least in area of Rheims and Mainz, where the texts were penned. The *Annales Alamannicorum continuatio Sangallensis prima*, *Annales Weingartenses* and *Annales Sangallenses maiores* also record a crisis in 868 plausibly at St. Gall/Reichenau (C.1.185, 186, 187), and the *Annales Colonienses*, *Annales sanctae Columbae Senonensis* and *Annales Engolismenses* too document shortage conditions in 868 (C.1.188, 189, 190).

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<sup>1052</sup> McCormick, Dutton and Mayewski (2007), p. 886.

<sup>1053</sup> Briffa (2000), p. 89; Briffa et al (1990), p. 437; Briffa et al (1992), pp. 114, 117; Grudd (2008), p. 853; Helama et al (2009), p. 452; Helama et al (2002), p. 684; Kirchhefer (2005), pp. 228, 230.

<sup>1054</sup> Baillie and Brown (forthcoming).

The first of these may refer to shortage conditions in the locale of Cologne, and the latter in the locale of Angoulême. The *Annales sanctae Columbae Senonensis*, however, not only asserts that almost the whole *inperium Francorum* was affected, but refers specifically to failed harvests and hunger in the regions of *Aquitania* and *Burgundia*, and speaks directly to the area around Sens. We may safely suspect, consequently, that the *Annales Fuldenses* annalist was not exaggerating when stating that *Germania* and *Gallia* were affected: shortage conditions appear to have gripped most of Carolingian Europe in 868.

The crisis also seems to have persisted into the next year. In 869, the *Annales Bertiniani* notes that Charles the Bald travelled to Cosne at an ‘inconvenient time’ as the weather was bad and there was a severe food shortage (C.1.191), and the *Annales Xantenses* record heavy rains and a harsh food shortage in *Burgundia* and *Gallia* (C.1.192). That these texts do not refer to a crisis in 869 in the eastern regions of Carolingian Europe, despite the fact that they were composed at Rheims and (possibly) Cologne, may indicate that shortage conditions did not continue in *Germania*. The absence of a report of a crisis in the *Annales Fuldenses* in 869 may support this observation. As we have seen however, this text fails to report a cattle pestilence that appears to have disseminated through *Germania* and into *Francia* in 869 and we may suspect that an eastern 869 shortage simply fell through the cracks as a new annalist took up the *Annales Fuldenses* c.870.<sup>1055</sup> Of non-Carolingian texts, the Byrhtferth’s *East Anglian Chronicle* reports a ‘great food shortage’ in 868 and a great food shortage and human mortality in 869 (C.3.76, 77). As before, this text might reference conditions in northwestern Carolingian Europe, not southeastern England. We are clearly dealing with a famine in the late 860s: conditions seem to have been severe across much of Carolingian Europe from late 867 through 868, and to have persisted into 869 in at least some regions of *Francia*. However, the triggers of the crisis are unspecified and no palaeoclimatic data has been found to pertain to this event.<sup>1056</sup>

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<sup>1055</sup> See the discussion of the 868/70 animal mortality in 1.4.2.2.

<sup>1056</sup> Note that Kirchhefer’s remark that his Norwegian dendro series draws attention to a short but exceptionally cold period c.866 may be a typo: (2005), p. 219. On p. 227, Kirchhefer refers to 886 as a particularly cold year, not 868.

The *Annales Fuldenses* and *Annales Xantenses* provide contemporary and independent reports of heavy rains and hail storms that destroyed crops in the summer of 872 (C.1.197, 198). Neither text assigns specific spatial parameters to the storms or damaged crops, nor speaks of human hunger, though the former does note that ‘many places’ were affected and records the storms immediately prior to a reference of a lightning shower at Worms, which may indicate that the locale of Worms was hit. Considering the place of composition of each text, we may suspect that the general areas of Mainz and Cologne were involved. The following year several texts document a locust swarm, which appears to have spread across much of continental Europe. Hincmar, in the *Annales Bertiniani*, notes that the locusts poured through *Germania*, *Galliae* and *Hispania* (C.1.199), while the *Annales Fuldenses* reports locusts in *Italia* and *Germania*, especially in the locale of Mainz (C.1.200) and the *Annales Xantenses* records locusts affecting many places ‘though not everywhere’ (C.1.202). The *Annales Vedastini*, which provides a contemporary record of events from 873 to 900, also documents the swarm (C.1.203), and Regino, in his *Chronicon* composed in the early tenth-century, writes of locusts devastating *Gallia* and spreading as far north as the English Channel in 873 (C.1.204).<sup>1057</sup> Additionally, the *Annales Xantenses* documents flooding, especially along the Rhine, that killed people and damaged crops late in the winter of 872/73 (C.1.201), and the *Annales Fuldenses* records blood rains in northern *Italia*, in the locale of Brescia specifically, in 873 (C.1.200).

While the *Annales Bertiniani* and *Annales Vedastini* do not tie the locust swarm to damaged crops and human hunger, the *Annales Fuldenses*, *Annales Xantenses* and Regino’s *Chronicon* do. The *Annales Fuldenses* asserts that a great shortage gripped *Italia* and *Germania* in 873 and the *Annales Xantenses* reports that the swarm harmed crops, while Regino asserts that they devoured crop fields. The *Annales Fuldenses* annalist and Regino also refer explicitly to human mortality in the wake of the locusts. The former observes that many people died on account of food scarcity in 873 and the latter, as discussed in 1.4.2.1, documents an epidemic in 873, which he implies was

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<sup>1057</sup> This marks a very rare instance when all of these major sources for the history of Carolingian Europe provide a contemporary and independent record of a single event relevant to this study.



restricted to northern *Francia*. Regino does not, however, associate the disease to hunger, but the stench of rotting locust carcasses. In that year, he also observes that the army of Charles the Bald's army was 'worn out' on account of a *fames* and *pestilentia*, when laying siege to Angers (C.1.205). While he attributes this hunger and disease to the length of the attack, it is not implausible, especially considering the evidence collected here and that those laying siege were affected (and not merely the besieged), that this food shortage and outbreak of disease were a part of the general crisis of 873.

Shortage conditions did not end in 873. As the *Annales Xantenses* annalist notes, several scourges plagued Carolingian peoples (C.1.202). The *Annales Xantenses*, *Annales Bertiniani* and *Annales Fuldenses* all identify the winter of 873/74 as being particularly hard (C.1.202, 206, 208).<sup>1058</sup> The first of these reports that the winter began in early November, lasted until late February, and saw much snowfall, the second also emphasizes the magnitude of the snowfall, and the third notes that snow was constant and heavy from early November until the vernal equinox (21 March), that humans and animals died on account of the cold, and that rivers Rhine and Main froze over. In the summer of 874, Hincmar also documents a drought, though it is uncertain what area was primarily affected. Several texts then report a subsistence crisis in the wake of the hard winter and, possibly, the drought: the *Annales Fuldenses* observes that much of *Germania* and *Gallia* were weighed down by hunger and that 'nearly a third of population was destroyed' (C.1.209), the *Gesta abbatum s. Bertini Sithiensium* records a 'great food shortage' and human mortality in the wake of a pestilence (C.1.210), and the *De miracula sancti Benedicti* writes of a 'grave and universal' shortage in *Galliae* (C.1.211).

What regions of *Germania* and *Gallia* the *Annales Fuldenses* annalist was specifically referring to is uncertain, though we can suspect that at least the locale around Mainz, where the text was written, was hit. Folquin of St. Bertin, who wrote his *gesta* in the mid tenth-century at St. Bertin and seems to have used documents from the region to fill out his text, may refers to shortage conditions and human mortality in northern *Francia*. Adrevald of Fleury, who very likely provides a contemporary reference to the shortage in his *vita* of St. Benedict, possibly refers to a shortage in the locale of Fleury.

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<sup>1058</sup> This winter is also isolated by Pfister et al as one of the most severe of the ninth century: (1998), p. 542; also Grove (2002), p. 316; and McCormick, Dutton and Mayewski (2007), pp. 886-87.

The omission in the *Annales Vedastini* of a shortage in the either 873 or 874, should not be thought to be indicative of the good fortune of the area around Arras in north-central *Francia* where the text was written, as the text's annalists fail to document any peacetime shortage prior to 892.<sup>1059</sup>

Non-Carolingian texts do not appear to document the food shortage of 873 or 874, or the heavy rains of 872/73, the hard winter of 873/74, or the drought of 874. However, there are possibly multiple references to the locust swarm in Italy. In his *Historia* written in 877, Andreas of Bergamo's explicitly documents the locust swarm 'ravaging' crops across Italy in 873, from Vicentia to Bresiana to Cremona to Laudensis, and all the way to Milan (C.3.78). Though Erchempert does not recount the swarm in his *Historian langobardorum beneventanorum*, he does refer to Carolingians in Benevento in 787 as 'warriors in the manner of locusts, fiercely gnawing away down to the root' and we may suspect that this reference, considering that he wrote in central Italy (Monte Cassino) in the 880s, drew upon his experience of the 873 locust plague.<sup>1060</sup> Lastly, the *Liber pontificalis* observes that Romans suffered many problems, in the time of Pope Hadrian, on account of the devastation brought on on by locusts, which 'consumed the entire country,' as well as drought and hunger (C.3.83, 84). What Hadrian this passage refers to, however, is unclear. The editor of the *Liber pontificalis* tentatively infers that the early medieval compiler addresses Hadrian III, pontiff from 884 to 885, though it is not entirely implausible, particularly considering the how rarely locust plagues are recorded in early medieval sources, that the passage actually refers to Hadrian II, pontiff from 871 to late 872. While the swarm appears only in 873 in Carolingian sources, it is possible that *Liber pontificalis* compiler, who would have written his *vita* after the events the death of the pontiff, confused dates. That the locust plague reported in the *Liber pontificalis* occurred in a time of drought and food shortage certainly supports the idea that this is indeed another reference to the 873 swarm.<sup>1061</sup>

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<sup>1059</sup> Though they record several conflict-oriented crises are recorded (C.1.223, 231, 234). For the 892 shortage: (C.1.239, 240).

<sup>1060</sup> For this passage see (C.3.78). Erchempert also reports that Saracen ships were destroyed in a storm in 873. Naturally, this storm may have little to do with the general climate conditions of that year or the early 870s.

<sup>1061</sup> That said, this hunger may be associated to that documented in Bar Hebraeus' *Chronography* in 884 (C.3.82). This text, however, does not specify the cause of the shortage let alone speak of a swarm of locusts.

It is clear that shortage conditions afflicted much of northern and southern Carolingian Europe in the early 870s, and that this crisis, or complex of crises, can be identified as a famine. That the winter of 873/74 could have spawned a major crisis itself, without the preceding locust plague, is suggested by a range of palaeoclimatic evidence. As McCormick, Dutton and Mayewski observe, the GISP 2 core provides evidence of a high H<sub>2</sub>SO<sub>4</sub> deposit in 875/76, plus/minus 2.5 years.<sup>1062</sup> Notable acid horizons in the Dye 3 and GRIP cores in the early 870s seem also to speak to the winter of 873/74 and subsequent drought,<sup>1063</sup> and Briffa and Grudd's northern chronologies exhibit a cold year in the early 870s followed by a particularly dry episode.<sup>1064</sup> A similar pattern is also discernible in Naurzbaev and Vaganov's chronology from central Siberia, and Baillie and Brown's Irish series as well as a south-central English dendrochronology.<sup>1065</sup> Furthermore, both Eronen et al's Finnish Scots pine series and Kirchhefer's Norwegian Scots pine chronology appear to evidence severe poor growth years in the early 870s.<sup>1066</sup>

880/81, 882, 885, 886 and 888

Several poorly documented crises are encountered in the 880s. The *Annales Fuldenses* observes that a harvest failure and food shortage affected *Germania* in 880, particularly, the annalist specifies, the counties of Worms and Nidda (C.1.219). A hard winter in 880/81, which the *Annales Fuldenses* notes was 'very long and bad for animals,' appears to have been made the shortage worse. We learn nothing else about this crisis from other texts and the crisis should not, consequently, be considered a famine. While the *Annales Xantenses* only runs until 873, that the *Annales Bertiniani* does not document the shortage shines little on the crisis' spatiality, as the text itself concludes in 881 and provides no comment on the quality of harvests after 874. Material evidence for an event c.880 was not found.

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<sup>1062</sup> Zielinski et al (1994), p. 949; Zielinski (1995), p. 20939; McCormick, Dutton and Mayewski (2007), p. 887. The source was possibly Japan's Kaimon, which erupted in 874, and/or Iceland's Veidivotn, which erupted in c.876.

<sup>1063</sup> Clausen et al (1997), pp. 26714, 26721. These authors too suspect an Icelandic source.

<sup>1064</sup> Briffa (2000), p. 89; Grudd (2008), p. 853. In her 2000-year Sierra Nevada pine chronology, Scuderi also identifies 874 an extremely dry year: (1993), p. 1435.

<sup>1065</sup> Naurzbaev and Vaganov (2000), p. 7323; Baillie and Brown (forthcoming).

<sup>1066</sup> Eronen et al (2002), p. 678; Kirchhefer (2005), p. 228.

In 882, we encounter our first of four episodes of intentionally inflicted starvation in the 880s. The *Annales Vedastini* reports that Vikings devastated *Francia* up to the river Oise and killed many (indirectly) through hunger (C.1.223). No other text records this *fames* or any information directly or in some way indicative of extreme weather. That the Bavarian continuation of the *Annales Fuldenses*, which provides a contemporary record of events in Bavaria from 882 to the early tenth century, or the *Annales Fuldenses* do not record any crisis may mean that the hunger the *Annales Vedastini* does document was indeed quite limited to areas of northwestern *Francia*. The *Annales Fuldenses* reports besieged Vikings in the locale of Hesbaye in 885 surrendering on account of *fames* (C.1.225). There is no indication in any Carolingian or non-Carolingian text that this food crisis was anything but an episode of intentionally inflicted starvation.<sup>1067</sup> In contrast, the scarcity of food at Paris in 886, which the *Annales Vedastini* documents in the context of the Viking attack on the city (C.1.231), may not have stemmed entirely from the siege. The *Annales Fuldenses* and its Bavarian continuation, as well as the *Annales Vedastini*, document heavy rains and flooding in the late winter, spring and early summer of 886 (C.1. 228, 229, 230). These texts specify that the Rhine, Seine, Po and along with other rivers in Bavaria flooded, and the *Annales Fuldenses* observes that this flooding destroyed crops in many places. While it is uncertain whether crops failed in the immediate locale of Paris, we clearly have grounds to speculate that the food shortage in that city was not wholly the outcome of the Viking assault. Other texts do not shine more light on the shortage, though the *Annales Fuldenses* also notes that eastern Franks sent to combat the Vikings in February at Paris suffered ‘not inconsiderable’ losses of equines on account of flooding and sudden cold (C.1.227).<sup>1068</sup> The *Liber pontificalis* might furnish an additional, albeit indirect, reference to the harsh conditions of 886. In a passage dated to 885 contained in the *vita* of Pope Stephen V, it is said that there was then a threat of a ‘serious food shortage’ (C.3.85). Neither heavy rains, nor the cause of the potential shortage are mentioned. In 888, the *Annales Vedastini* provides yet another account of

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<sup>1067</sup> The shortage Bar Hebraeus reports in Baghdad in 884 cannot reasonably be associated to this crisis, or any other reported in Carolingian sources in the 880s (C.3.82).

<sup>1068</sup> Notably, Abbo of Saint-Germain-des-Pres’ account of this Viking attack on Paris, the *Bella Parisiacae urbis*, mentions neither a food shortage nor extreme weather, but a sizable mortality within the city: (2007), pp. 72-3. That the *Annales Fuldenses* does not specifically refer to a food shortage in the wake of the heavy rains may signify that a food shortage did indeed not occur, as the text’s authors regularly reported shortages in the 870s and 880s.

conflict-oriented subsistence crisis (C.1.234). This time we are told of Carolingians, besieged by Vikings in Meaux, who suffered want of food and disease. Like the episode of intentionally-inflicted hunger of 885, this shortage cannot be tied to any phenomena common to a wider area of Europe. There are no grounds on which to suggest that this crisis was anything but limited to those inside the central Frankish town. Palaeoclimatic evidence plausibly relevant to any of these crises is wanting.

#### 889/90 and 892/93

The Bavarian continuation of the *Annales Fuldenses* provides a contemporary account of peacetime shortage in the late 880s. The annalist observes that hail storms destroyed crops and caused an exceptionally bad and ‘unexpected’ shortage in 889 (C.1.235). He also refers to heavy rains and flooding, though he does not tie these phenomena to the condition of the harvest. In the same year, the Richer of Rheims too refers to shortage conditions in his *Historiarum libri III* written in the late tenth century, and he appears not only to document a food crisis in the locale of St. Rheims, but in *Aquitania* (C.1.236). Uniquely, Richer seems to associate the crisis, at least partially, to conflict and the destruction of agricultural land. While other texts, Carolingian and non-Carolingian, do not speak of a shortage c.889, the *Annales Alamannicorum continuatio Sangallensis prima* and *Annales Laubacenses* both report a mortality of humans in 890 that may have stemmed from shortage conditions. Though the absence of any *fames* in the *Annales Vedastini* c.889 should not, as noted, be taken as an indication of the lack of shortage conditions or mortality in northern *Francia*, the absence of any mention of dearth or human mortality in the early 890s in the Bavarian continuation of the *Annales Fuldenses* may be a sign that *Bavaria*, at least, was not affected for multiple years.<sup>1069</sup> Considering the extant evidence, there is little reason to consider this shortage a famine. As far as we know, the shortage was a year or less in duration and limited to central *Germania*, *Bavaria* specifically. The human mortality recorded in the *Annales Laubacenses* and *Annales Alamannicorum continuatio Sangallensis prima* may not have in any way been related to the shortage. It is plausible, however, that the *Continuatio Sangallensis prima*

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<sup>1069</sup> That said, the Bavarian continuation of the *Annales Fuldenses* annalist may not have felt the need to detail the impact of the events, which he had already described in 889, in 890.

entry stems, directly or indirectly, from the *Annales Laubacenses*, which appears to be contemporary, and that this mortality, consequently, took place in the locale of Lobbes, where the *Annales Laubacenses* was composed, and thus some distance from Regensburg where the Bavarian continuation of the *Annales Fuldenses* was penned.<sup>1070</sup> Of course, if the *Historiarum libri III* does provide a reliable witness to shortage conditions in northern *Francia*, we would have more grounds to assert that the *Annales Laubacenses* does indeed refer to a shortage-related mortality.<sup>1071</sup> If, on the other hand, the *Annales Laubacenses* was dependent on the *Annales Alamannicorum continuatio Sangallensis prima* we may suspect that these texts refer only to a human mortality in central Europe, at least in the locale of St. Gall. Nevertheless, there are no grounds to diagnose this shortage a famine.

Little more is known about our next subsistence crisis. In 892, the *Annales Vedastini* observes a *sterilitas terrae* and a food shortage severe enough to force people to leave their lands, presumably for food and work (C.1.239). The annalist note that ‘their’ lands were affected indicates that the locale of Arras was affected as the text was written in monastery of St. Vaast in Arras. The *Annales Vedastini* annalist also later reports that a Viking army was forced to retreat from the locale of Leuven, and northern *Francia*, in general on account of the food shortage (C.1.240). No other text refers to a crisis in 892 and we have no reason to believe that this shortage affected areas outside of northeastern *Francia*. While the Bavarian continuation of the *Annales Fuldenses* observes that the winter of 892/93 was particularly hard in *Bavaria* and caused damage to vineyards, as well as sheep and bee stocks (C.1.241), the annalist does not mention harm done to crops. No non-Carolingian text provides any additional insight. It appears that we are looking at two shortages in the early 890s, one confined to the northeast of *Francia* and limited, temporally, to 892, and a second possibly restricted to *Bavaria* and limited, temporally, to 893. That any major shortage occurred in Bavaria, however, is questionable, though if vineyards and livestock were affected, we may suspect grain was too. Of course, the scantiness of the aggregate body of evidence available for the early 890s may skew our

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<sup>1070</sup> Cf. discussion of the 889 human mortality in 1.4.2.1.

<sup>1071</sup> Why the *Annales Laubacenses* and *Annales Alamannicorum continuatio Sangallensis prima* would not refer to the shortage if a shortage did indeed occur is unclear, as both texts do later refer to a crisis and the *Continuatio Sangallensis prima* especially, as we have seen, regularly refers to shortages in the second half of the ninth century: see (C.1.170, 185, 244, 245, 246, 247).

articulation of these crises. That the *Annales Vedastini* neither records the cause of the 892 shortage, nor specifies when it set in within that year complicates attempts to associate its account of a crisis to that the Bavarian shortage. Though a large acid horizon found (only) at the Dye 3 core c.889 in Greenland may provide an independent line of evidence for the hard winter of 892/93, we can only claim, on the basis of the available evidence, to have two lesser food shortages in the early 890s, not a single famine. The winter reported in Bavarian continuation may have indeed been severe and not have been limited to central Europe, but evidence for successive years of shortage and excess human deaths is lacking.<sup>1072</sup>

### 895/97

Two years later we hear of another subsistence crisis in *Bavaria*. In 895, the Bavarian continuation of the *Annales Fuldenses* reports that a ‘great food shortage’ consumed all of Bavaria and that ‘people died’ in many places (C.1.243). The *Annales Laubacenses* and *Annales Alamannicorum continuatio Sangallensis prima* too document a shortage in 895 and appear to attribute it, at least partially, to hail storms (C.1.244, 245). In the following year, these two texts again document a shortage, though in this year they emphasize the crisis’ magnitude, labelling it *validissima* (C.1.246, 247). These texts are interdependent in 895 and 896, as they were in 890, though it is not entirely certain which text is dependent on which. The *Annales Laubacenses* may be the root source.<sup>1073</sup> In addition, the *Annales Augienses* and *Annales Colonienses* record a crisis in 896 (C.1.248, 249). The former writes specifically of shortage conditions, and associated human mortality and cannibalism, specifically on Reichenau Island in Lake Constance, and the latter too records a food shortage and cannibalism, though does not affix any spatial parameters to the crisis.<sup>1074</sup> In his *Gesta Senoniensis ecclesiae*, written in thirteenth century, Richer of Sens also refers to shortage conditions in 896 (C.1.252). This reference appears to be

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<sup>1072</sup> The H<sub>2</sub>SO<sub>4</sub> signal is one of the most pronounced of the early Middle Ages in the Dye 3 core. Why it appears only in this core is uncertain, though it may have something to do with the nature or composition of the dust cloud or its transport. Clausen et al (1997), p. 26714. Of course, for all we know, the size of the deposit may owe to the near proximity of the eruption site and the tropospheric transport of aerosols.

<sup>1073</sup> See the discussion above of the c.889/90 shortage, and the 889 mortality in 1.4.2.1.

<sup>1074</sup> The same passage is also found in the *Annales Besuenses* under the year 893 (C.1.242), though this passage is clearly misdated, as the passage refers to Arnolf’s crowing as Caesar in Rome, which did not occur until 896, as the *Annales Colonienses* correctly indicates.

independent from other extant sources consulted here and may furnish evidence for the shortage in central *Francia*. Like the *Annales Augienses* and *Annales Colonienses*, Richer reports cannibalism but unlike these texts he observes that both grass and crops failed. Then, in 897, the Bavarian continuation of the *Annales Fuldenses* again refers to a food shortage that spread throughout all of Bavaria (C.1.253). It is possible, however, that this passage is a doublet of the similar entry in the same text in 895.<sup>1075</sup>

It appears that in the mid 890s another famine hit Carolingian Europe. However, though shortage conditions seem to have persisted for multiple back-to-back years and caused human deaths, the crisis may have primarily been a central European affair. Whether Richer of Sen provides a reliable witness to shortage conditions in the locale of Sens may be questioned, and the *Annales Laubacenses* may depend on the *Annales Alamannicorum continuatio Sangallensis prima*. If so, we might not possess a reference to shortage conditions or human mortality outside of central Europe. This observation is supported by the absence of any indication of a dearth in the *Annales Vedastini* in the mid 890s.<sup>1076</sup> Of non-Carolingian texts, the *Anglo-Saxon Chronicle* documents an episode of intentionally afflicted starvation in Devon in 894, which supposedly drove Vikings to consume their equines (C.3.87), the *Chronicle of Ireland* reports a heavy snowfall and ‘great scarcity’ in 895 (C.3.88), and the *Brut Y Tywysogion*, likely compiled at Strata Florida (Wales),<sup>1077</sup> asserts that a pest – perhaps rodents or a swarm of locusts – destroyed crops in Ireland (C.3.89).<sup>1078</sup> Yet none of these passages may be of any relevance to the shortages reported in Carolingian texts in the mid 890s: the shortage reported for 894 appears to have been limited to a specific arena of conflict in eastern England, there is neither record on the continent of a hard a winter in 894/95 or a shortage outside of Bavaria in 895 which we may associate to the Irish text,<sup>1079</sup> and it has been suggested that the report of a plague of locusts or rodent pests in the Welsh text is misdated and assigned

<sup>1075</sup> Cf. the discussion of human mortalities in 895/97 in 1.4.2.1.

<sup>1076</sup> As observed, the later annalist(s) of this text, unlike the initial annalist(s), did not restrict his purview to conflict-oriented shortages. Shortages are recorded in the early 890s.

<sup>1077</sup> On the composition of this text see the discussion of the 809/10 cattle pestilence in 1.4.2.2.

<sup>1078</sup> More is said about these ‘Irish’ pests in 2.4.4.

<sup>1079</sup> If the *Annales Alamannicorum continuatio Sangallensis prima* is dependent on the *Annales Laubacenses*, we would have more grounds to relate the Irish crisis to the continental crisis.



to the wrong area.<sup>1080</sup> That said, a reference in the Anglo-Saxon Chronicle in 897 to a three-year shortage that reportedly affected much of England from 895 to 897 fits neatly with the Carolingian record and may indicate that the shortage of the mid 890s reported in continental texts were indeed a part of a pan-European event (C.3.91). If so, we may suspect that the reference in 895 to a shortage in Ireland was associated to the Carolingian crisis, and that the *Annales Alamannicorum continuatio Sangallensis prima* may indeed depend on the *Annales Laubacenses*. That we are dealing with a spatially vast shortage in the mid 890s would also strengthen the proposition that Richer does provide a reliable witness for shortage conditions in the locale of Sens.

Though nothing crops up in the GISP 2 core for the mid 890s, both the Dye 3 and GRIP cores show medium-range acid horizons at c.895 and c.898 respectively.<sup>1081</sup> A southeastern Finnish dendrochronology and Briffa et al's Swedish series also seem to indicate that the mid 890s were particularly dry, and Baillie and Brown's Irish series tells of poor growing conditions for oaks.<sup>1082</sup> While no hard winter is reported outside of Ireland in the mid 890s, we have some reason to believe, considering this evidence, that the shortage of mid 890s was partially triggered by one.

910, 919, c.925, 933 and 936

In the twenty-seven years spanning 910 to 936, we encounter five poorly documented shortages. The first of these is encountered in the *Annales sanctae Columbae Senonensis* in 910. The text, composed at Sens, records the 'greatest food shortage' throughout all of *Gallia* (C.1.254). How widespread the shortage was is uncertain, though we may suspect that central *Francia* and the area around Sens were affected.<sup>1083</sup> This is, however, ultimately uncertain, and we have little reason to consider this crisis a famine, as information plausibly relevant to this shortage is not encountered in any other early Ottonian or non-early Ottonian texts, though it is possible that the GISP 2 acid spike of

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<sup>1080</sup> Thorton observes that the passage may in fact refer to the 873 continental locust infestation. He also suggests that the placement of this locust swarm in Ireland may be incorrect: (1996), pp. 52-3. There is no supporting evidence for locusts or any vermin in insular Europe in the mid 890s. That these vermin were locusts too appears to have been assumed.

<sup>1081</sup> Clausen et al (1997), p. 26714.

<sup>1082</sup> Helama and Lindholm (2003), p. 177; Briffa et al (1990), pp. 437-48; Briffa et al (1992), p. 113; Baillie and Brown (forthcoming).

<sup>1083</sup> While we should not assume that the annalist refers to events that occurred in his own vicinity, the other record of a shortage in this text speaks specifically to central *Francia* and the area around Sens (C.1.189).

c.913 had something to do with this shortage, whose cause is not specified.<sup>1084</sup> We know slightly more about the shortage of 919. In that year, Flodoard of Rheims reports hail storms and a dearth of wine in the locale of Rheims; presumably hail damaged vineyards in that area (C.1.257). The *Annales sancti Germani minores* also recounts a great hail storm that destroyed trees and ‘reduced crops to nothing’ in 919 (C.1.258). While Flodoard does not address the state of the grain harvest, and though neither text ties human mortalities to the harm storms did to crops, the *Annales sancti Germani minores* does imply that the storm itself killed humans and animals, and we may suspect that some of these deaths in fact stemmed from a food shortage.

What area(s) the *Annales* refers to is uncertain, though we may speculate that it documents shortage conditions in northern *Francia*. Regardless, no other texts report a shortage in 919 and there are not sufficient grounds to diagnose this shortage a famine. The GISP 2 core shows a small acid horizon c.915 possibly sourced by the Japanese Towoda eruption of that year, which may furnish evidence for a hard winter in the mid or late 910s in Europe.<sup>1085</sup> A similarly minor acid signal is found in Antarctica’s Dome C core in 926, which may be indicative of an equatorial eruption sometime c.920.<sup>1086</sup> That any global event was behind the shortages of 910 or 919, however, is very uncertain. The evidence is far too circumstantial at present to make any strong claims. That a hard winter or drought had anything to do with these shortages is also unclear, after all the sources refer specifically to hail storms.<sup>1087</sup>

In or around 925 we encounter our first of three conflict-related shortages reported in a period of roughly twelve years. Sometime in the mid 920s, Widukind, in his *Res gestae Saxonicae* documents King Henry I’s capture of Slav-occupied Brandenburg, in

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<sup>1084</sup> Zielinski et al (1994), p. 949.

<sup>1085</sup> Zielinski et al (1994), p. 949; Zielinski (1995), p. 20939.

<sup>1086</sup> Castellano et al (2005), p. D06114. That said, an acid signal does not appear in the mid 920s in the Plateau Remote ice core of east Antarctica: Cole-Dai (2000), p. 24435. Though this itself need not mean that the horizon in Dome C was not the product of a significant eruption some distance from the core site. As we have seen, a large acid spike is found in the Dye 3 core c.899 that does not appear in other Greenlandic cores.

<sup>1087</sup> The signals recorded in Greenland and, perhaps, Antarctica may have had more to do with the drought Flodoard describes in 921 (C.1.259). Evidence in some northern European trees for notable warmth c.920 may lend credence to the idea that a drought partially accounted for the 919 shortage, though this may also have more to do with Flodoard’s 921 drought. For the trees see Briffa et al (1990), pp. 437-48. That Flodoard did not record a hard winter in these years may have more to do with his purview than the physical past, as all of his accounts of extreme weather prior to 964 centers on storms (C.1.257, 259, 266, 289, 294). Flodoard clearly looks over several hard winters, heavy snowfalls and droughts.

northeastern *Germania*, via an episode of intentionally-inflicted starvation (C.1.261). The passage is loosely dated in the text to *c.*925, though Widukind's reference to severe cold during the siege, which he implies worsened the shortage conditions, may signify that the city was taken in 927 or 928, which other texts specify were remarkably cold in central Europe.<sup>1088</sup> In 933, Widukind documents the defeat of an Avar force in *Saxonia* and *Thurgundia*, and the wasting of those Avars that survived through hunger (C.1.268). Nothing else is known about this shortage. The experience of hunger appears to have been limited to the broken Avar force. Then, in 936, Flodoard documents an episode of hunger in King Hugh's army as it marched on Rome (C.1.270). We are simply told that while en route to Rome, Hugh's force was afflicted by *fames* and a loss of horses in *Italia*. Whether this food shortage was confined to Hugh's troops is uncertain. Reference in Liuprand of Cremona's *Antapodosis* to a drought in southern Europe in this year may be an indication that the shortage was a more general affair, though supporting palaeoclimatic evidence is lacking.<sup>1089</sup> Nonetheless, there is clearly no reason, on the basis of the extant evidence, to consider this crisis a famine.

939/44

Our last crisis takes place *c.*940. In 939 the *Annales Colonienses* documents a 'strong winter' (C.1.271), and in 940 Widukind reports a severe winter and, in its wake, a food shortage (C.1.272). Both of these texts may refer to the winter of 939/40, as there is no indication that the winter of 938/39 was a difficult one. The short and vague *Annales Colonienses* entry may have referred to the early onset of the 939/40 winter in the fall of 939. The *Annales capituli Cracoviensis*, *Cronicon Suevicum universale* and the *Herimanni Augiensis chronicon*, the latter of which appears to be dependent on one of the former two, also record a severe winter in 940, in reference, undoubtedly, to the winter of 939/40 (C.1.274, 275, 276), and the *Annales Sangallenses maiores* annalist writes that 940 was a 'hard year deficient in grain' (C.1.273).<sup>1090</sup> The *Annales Leodienses* reports a food shortage in 941 and another central European text documents a 'very great' crisis in

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<sup>1088</sup> See (C.1.927, 928).

<sup>1089</sup> For this passage see (C.1.270).

<sup>1090</sup> Pfister et al address this winter in brief and label it one of the most severe of the tenth century: (1998), p. 542; also McCormick, Dutton and Mayewski (2007), pp. 888-89.

the same year (C.1.277, 278). The epigram of Bishop Rumold of Munster too refers to a ‘horrendous famine’ in 941, presumably around Munster (C.1.279). Uniquely, the epigram also refers to locusts and blood rains as triggers of the crisis. In 941, Widukind might reference a dust veil or some sort of solar-clouding phenomena when stating that the sun was reduced to nothing and appeared blood-red (C.1.280).<sup>1091</sup> In 942, the *Annales S. Quintini Veromandensis* ever so briefly mentions a food shortage (C.1.283), Flodoard, in his *Annales*, writes that a food shortage afflicted all of *Francia* and *Burdundia* (C.1.284). The *Annales Iuvavenses* and *Annales Lobienses* also succinctly document a food shortage in 943 (C.1.287, 288). While the entry of the latter text may be, considering the evident similarity in form and content between the texts, dependent on the *Annales Leodienses*’ passage for 941 and misdated to 943, the *Annales Iuvavenses*, which emphasizes the great scale of the crisis, appears to provide an independent reference. Flodoard again reports ruined crops in 944, though this time in the locale of Paris (C.1.289).

Few of these texts assign spatial parameters to the shortages or extreme weather they report. Nonetheless, it is clear that all the evidence for the hard winter of 939/40 and shortage conditions in 940 and 941 seems to stem from texts composed in central Europe and we may suspect, on the basis of the available evidence, that until 942 the shortage was primarily a central European affair.<sup>1092</sup> In 942, we hear of shortage conditions in *Francia* and *Burgundia*, and in 944 around the locale of Paris. That Flodoard does not specifically mention a crisis in the region where he wrote his text (Rheims) c.944, may indicate the shortage’s western focus then. In 942 we also encounter a flood and in 944 notice of heavy rain (C.1.286, 290), though the spatial contours of these extreme weather events are likewise unknown. While there is no evidence of damaged crops or human hunger in 945 or 946, there is also some sign that the winter of 945 was hard.<sup>1093</sup> We appear here in the early 940s to have another famine, possibly restricted to central Europe in 940 and 941 and then western Europe in 942. In both regions the crisis was multiple years in duration.

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<sup>1091</sup> Though this may also be another reference to blood rains in central Europe.

<sup>1092</sup> That Flodoard, who routinely documents food shortages in *Francia*, does not mention a crisis in that region in 939, 940 or 941, supports this observation. See the discussion of the 939/42 cattle pestilence in 1.4.2.2 and the human mortalities of 941/42 in 1.4.2.1.

<sup>1093</sup> See (C.1.291).

Evidence from beyond early Ottonian Europe emphasizes the scale of this crisis. In his *Antapodosis*, Liuprand of Cremona documents a subsistence crisis in *Italia* shortly after 939 that caused ‘lamentable havoc’ (C.3.103),<sup>1094</sup> the *Annals of Ulster* imply that the winter of 939/40 was hard (C.3.105), and Bar Hebraeus, in his *Chronography*, records a ‘great scarcity of food’ characterized by high prices of food stuffs and human mortality in 940 in Baghdad (C.3.104). The *Annals of Ulster* again imply that the winter of 943/44 was hard (C.3.107), and Bar Hebraeus documents another food shortage characterized by inflated prices of basic goods in 945 (C.3.107). Bulliet has also identified the winters of 941/42 and 943/44 as being particularly severe in the northern Middle East, Iran specifically.<sup>1095</sup> The exact progression of this crisis in time and space remains somewhat unclear. Where the shortage was most severe and how long it persisted in each affected area is likewise uncertain. Notice of a hard 939/40 winter in Ireland, for instance, may be an indication that the shortage was not limited to central Europe in 940. Certainly, Liuprand and Bar Hebraeus imply that the crisis affected regions to the south and east.

Palaeoclimatic evidence supports the claim that the *c.*940 subsistence crisis was a major event. Multiple Greenlandic ice cores show sulphur signals in the mid and late 930s. In addition to the GISP 2 evidence for acid levels at 936, 938 and 940, each plus/minus 2.5 years, which McCormick, Dutton and Mayewski draw attention to, we find a massive acid horizon at 934, plus/minus two years, at the Crete core as well as a significant signal at 934, plus/minus 3 years, at the GRIP core at Summit.<sup>1096</sup> There is also some evidence for an acid horizon in the mid and late 930s at the Dye 3 and Camp Century cores.<sup>1097</sup> In the GISP 2 core, the signals of 930s are the highest of our period; the reading of the 938 horizon is more than double the largest signals of the ninth century, those of the early 820s. The 930’s acid signals in Dye 3 and GRIP cores are also massive, some of the largest of the Holocene.<sup>1098</sup> It has been suggested that the magnitude of the

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<sup>1094</sup> This shortage is said to have happened ‘at the same time’ as king Hugh’s leaving Rome, which took place in 932. However, the food shortage is placed immediately following notice of Ramiro II’s winning of the battle of Simancas, which took place in 939, and Liudprand implies both Ramiro’s victory and the food shortage occurred in the same year. Considering the number of references to shortage conditions in *c.*940 we may assume that the food shortage noted in the *Antapodosis* did indeed take place in 939, not 932.

<sup>1095</sup> Bulliet (2009), pp. 80, 84.

<sup>1096</sup> Hammer et al (1980); Hammer (1984); Zielinski et al (1994); Zielinski (1995), p. 20939; Clausen et al (1997), p. 26714; McCormick, Dutton and Mayewski (2007), pp. 888-89.

<sup>1097</sup> Stothers (1998), p. 717.

<sup>1098</sup> Clausen et al (1997), p. 26721.

acid signals in this and other Greenlandic cores is due to the close proximity of the suspected source, Iceland's Eldgja. It has been proposed that ash was transported tropospherically from Iceland to Greenland without, necessarily, much consequence for other parts of the globe.<sup>1099</sup> While the high acid signal may owe to a tropospheric transport, the volcanic aerosols undoubtedly reached the stratosphere, considering the written evidence for hard winters in the early 940s, and, importantly, written evidence for hard winters and food shortages in the early 940s not only the Middle East, but, as Fei and Zhou have demonstrated, Mongolia and China *c.*940.<sup>1100</sup> Furthermore, trees from Taymir and Putoran (central Siberia) and Solongotyn Davaa/Sol Dav (Mongolia) exhibit frost rings and evidence for hard winters in the late 930s,<sup>1101</sup> and rings from southeast Finland indicate that the summers of 939 and 943 were two of the three driest between 874 and 1985.<sup>1102</sup> Helama et al's Lapland chronology also exhibits a cool period *c.*940, so too Kirchhefer's Norwegian Scots pine series and Briffa et al's north Swedish chronology.<sup>1103</sup> Baillie and Brown's Irish chronology and a south-central English chronology also exhibit exceptionally poor ring growth in the early 940s.<sup>1104</sup> With this evidence in mind, it is quite plausible, despite the dearth of explicit written reports of shortage conditions, that the shortage of the early 940s was indeed common to much of central, western and northern Europe in 940, 941, 942 and 943. The eruption in the 930s appears to be the closest we get in the Carolingian and early Ottonian periods to anything like the massive 536/44 event.<sup>1105</sup>

### 2.4.3 The frequency of famines and lesser shortages

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<sup>1099</sup> McCormick, Dutton and Mayewski (2007), pp. 888-89. An unusually high quantity of sulphate, ejected into the troposphere not stratosphere, may have made its way to Greenland, resulting in the high acid spike.

<sup>1100</sup> Fei and Zhou (2006).

<sup>1101</sup> D'Arrigo (2001), p. 243; Naurzbaev and Vaganov (2000), p. 7323.

<sup>1102</sup> Helama and Lindholm (2003), p. 177. The summer of 944 was the seventeenth driest of this period.

<sup>1103</sup> Helama et al (2009), p. 452; Kirchhefer (2005), p. 228; Briffa et al (1992), p. 113.

<sup>1104</sup> Baillie and Brown (forthcoming).

<sup>1105</sup> This so-called 'Dust Veil' or 'Mystery Cloud' of the mid sixth-century appears in several contemporary and independent texts from the eastern Mediterranean, ice cores from both poles, and trees from Europe, Asia, Australia, and North and South America. It was one of, if not the most, profound short-term climatic anomaly of the last two thousand years: see Larson et al (2008); Baillie (1994); idem (1995b); idem (1995a), pp. 109, 112; idem (1991), pp. 233-38; Stathakopoulos (2003), pp. 251-255; Arjava (2005); Stothers (1984); Stothers and Rampino (1988), pp. 6357, 6362-363, 6367, 6369; Stothers and Rampino (1983), p. 412; Budyko, Golitsyn and Izrael (1988), p. 15.

Ten famines – in 762/64, 779, 791/94, 805/07, 820/24, 841/45, 867/69, 872/74, 895/97 and 939/44 – and twelve lesser food shortages – in 752, 789, 809, 813, 850, 852/53, 859/61, 880/81, 889/90, 892/93, 910 and 919 – have been identified in 2.4.2.

Additionally, we have highlighted eight conflict-oriented shortages. The frequency with which Carolingian and early Ottonian food shortages occurred, as argued in 2.2.1.2, should, where possible, be established solely via the available written evidence and not in any way through modern theories of famine frequency. The case-by-case assessment of crises in 2.4.2 demonstrates that the ‘famine’ tallies of Bonnassie, Devroey, Gottfried, Herlihy and Verhulst are inconceivable.<sup>1106</sup> The assessment above indicates that only thirty shortages are discernible in Carolingian and early Ottonian sources, and of these thirty, only twenty-two were peacetime shortages. While some have suggested that one ‘famine’ occurred every 2.5 years in the ninth century, it is more probable, if we accept that twenty-two peacetime shortages occurred over the our entire period, that one shortage occurred every 9 years on average. However, not every shortage was of the same severity and major shortages, defined here as famines, can only be said to have occurred at least once every 20 years. Lesser shortages, on the other hand, transpired at least once every 17 years on average.

As indicated in 2.4.2, some of the shortages defined here as single periods of crisis, may be better understood as multiple periods of crisis: the shortage of 791/94 may in fact be better understood as two crises, one temporally confined to 791 and the other to 792/94; the shortage of the early 840s may have been three individual crises, one of the northeast in 841, followed by a more general crisis in *Francia* and *Germania* in 842/43 and then a strictly western Frankish shortage in 844/45; the shortage of 892/93 may in fact been two, one of northern *Francia* and another of *Bavaria*; likewise, the subsistence crisis of 939/44 may too have been two, one of 939/41 spatially confined to *Germania* and another of 942/43 confined to *Francia*. If these ‘single’ shortages were in fact multiple shortages, as many as twenty-seven peacetime shortages may have marked our period, that is, one shortage about every 7 years.

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<sup>1106</sup> The assertion that sixty-four ‘famines’ occurred between 700 and 1000, or one shortage every 4.5 years on average, is unsupported: see 2.1.1. Only a Malthusian lens would allow one to squeeze so many famines into such a short period of time.

As far as we can tell, the southwest appears to have been hit no more than five times, while some regions of northern and central *Francia* may have been struck as many as eighteen times, or once every 11 years, and *Germania* thirteen times, or once every 15 years. Naturally, this spatial discrepancy may owe more to the greater number of texts that were composed in the Frankish heartlands of northern continental Europe; *Gothia* and *Provencia*, for example, are gravely underrepresented.<sup>1107</sup> Shortages also do not appear to have occurred uniformly over time. While at least five peacetime shortages are recorded in the last half of the eighth century and six in the first half of the ninth century, eight are recorded in the last half of the ninth century, when our evidence base is most dense, and only three in the first half of the tenth century, when it is perhaps least dense.

Likewise, at least three famines occurred in the last half of the eighth century, the first half of the ninth century and the last half of the ninth century, but only one is known to have taken place in the first half of the tenth century. It is also probable that many lesser shortages went unrecorded: that nearly as many famines appear in our evidence base as lesser shortages may indicate that our authors were primarily concerned with extreme crises.<sup>1108</sup> On the other hand, Carolingian and early Ottonian populations may have been able on most occasions to prevent lesser food shortages from developing into famines; famines may have been at least in part, as Garnsey and Dodgshon have suggested of Greco-Roman and early modern shortages, a result of the failure of the measures normally employed to buffer shortages.<sup>1109</sup> Mid eighth- through mid tenth-century populations, as such, may have only been affected by truly severe crises generated by a complex of natural world anomalies. In any event, as argued in 2.2.1.2, we should not assume that famines occurred less frequently than lesser shortages. To do so is to assume that our period was characterized by an upward demographic trend.

Too much emphasis on average intervals between shortages can blur the irregularity with which crises took place as well as cycles of shortages. In these regards,

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<sup>1107</sup> This may explain why droughts seem to play such an insignificant role in Carolingian and early Ottonian shortage causation. For the role of droughts in historical Mediterranean shortages see 2.2.2.3. For all we know, southern Europe may have been more regularly racked by shortage in our period than northern Europe.

<sup>1108</sup> It certainly seems that our authors possessed a certain sensitivity to extreme events and, consequently, let more common and regular events slip through the cracks. Cf. Zhongwei, Alexandre and Demaree's comments on hard winters (1997), p. 510; and Dutton's remarks on blood rains (2008), p. 173.

<sup>1109</sup> cf. Dodgshon (2004).



the mid eighth- through mid tenth-century experience was similar to that of high medieval, late medieval and early modern Europeans. Not only did shortages occur irregularly, but the evidence permits the identification of several cycles of shortage, decades in duration. Subsistence crises of all kinds appear to have regularly racked Carolingians and early Ottonians between 790 and 815, 850 and 860, 865 and 885, and 890 and 910. 790 to 805 and 865 to 875 were especially famine-dense.

#### 2.4.4 The causation and perpetuation of food shortages

As observed above, most of our authors who speak directly of the cause of food shortages, assign dearth to bad weather. A couple annalists also ascribe subsistence crises to the locust swarm of 873 and two authors ascribe shortages to the work of demons. A few others indicate that crises were caused, in large part, by sin.<sup>1110</sup> As noted in 2.4.1.1, several shortages are confined to the context of a siege and two shortages, are implied to have been caused by armies on the march (C.1.133, 184). The foregoing case-by-case assessment of mid eighth- through mid tenth-century shortages allows for more comment. While the triggers of several shortages, including those of 752, 779, 813 and 910 for instance, are unknown, something can be said about the environmental context of most Carolingian and early Ottonian shortages.

The shortage of 762/64 was the product of back-to-back hard winters, that of 789 appears to have stemmed from another hard winter, and the major crisis of the early 790s may have been the result of heavy rains, though it is difficult to tell. The crisis of the early 800s seems to have stemmed from a non-volcanic hard winter and drought, the shortage

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<sup>1110</sup> On bad weather, demons and sin see comments on causation in 2.4.1.1. Several writers also indicate that shortages were predicated by various supernatural, preternatural and natural signs (portents). We must be careful to note, however, that these authors do not imply that these signs caused the crisis but that they simply foreshadowed it: see, for instance, (C.1.183, 185, 186, 187, 192, 257, 288). A letter, addressed to Louis the Pious and dated to 837, explicitly makes this point: Thatcher and McNeill (1971), pp. 59-60. For some, shortages and pestilences were portents themselves of awful things to come: for example, (C.1.115). There also appears to have been a widespread belief, held by elites and peasants alike, that damage to crops could be incurred by storm makers who generated storms in order to damage crops. Agobard of Lyon discusses some pagan storm makers in his *De grandine et tonitruis* and storm makers were condemned in the 829 Council of Paris. Hrabanus Maurus also addresses them in his work on magic, as does Regino of Prüm in a religious treatise, and several early medieval penitentials refer to them. For comment, Dutton (1995), pp. 112, 118. While pagan storm makers are not reported to have caused any of the crises articulated here, we may suspect that commoners and elites, outside the Christian institutions where our texts were penned, attributed shortages to storms brought on by such pagan magicians.

of 809 heavy rain, while the shortage of the early 820s was clearly the product of a complex of factors: heavy rains in 820 and 824, successive hard winters in 821/22 and 822/23, and a drought and hail storms in 823. The crisis, or crises, of the early 840s were too, or so it appears, the product of multiple phenomena: heavy rains in 841 and hard winters in 842/43 and 844/45. Heavy rains and a drought seem to have brought on the crisis of 850 and a drought too seems to have brought on the shortage of 852/53. Another hard winter, that of 859/60, possibly in conjunction with a dumping of Saharan sands, appears to have triggered the crisis of 859/61. The general crisis of 867/69 seems to have been at least partially induced by heavy rains and flooding, while a complex of factors clearly generated the shortage of the early 870s: we hear of hail storms and heavy rains in 872, a pan-European locust swarm in 873, a hard winter in 873/74, a drought, and another dumping, at least in northern *Italia*, of Saharan sands in 874. The initial trigger of the 880/81 crisis is unknown, though the hard winter of 881/82 appears to have made the shortage worse. Shortages in 882 and 885 appear to have been nothing more than spatially limited episodes of intentionally inflicted starvation, while the conflict-oriented crisis of 886 may have been intensified by the heavy rains that characterized much of that year. The shortage of 888 was also siege-related and spatially restricted, it appears, to the city of Meaux. Hail storms, heavy rains and flooding appear to have generated the peacetime shortage of 889/90,<sup>1111</sup> and a drought and hard winter (that of 892/93) the crisis of 892/93. The crisis of the mid 890s was brought on by hail and another hard winter in 894/95. Flodoard and the *Annales sancti Germani minores* attribute the 919 shortage to hail and shortages of c.925, 933 and 936 are all conflict-oriented, though the former may have been worsened by severe cold and the latter by drought. Our last crisis, that of 939/44, appears to have been induced and perpetuated by a string of hard winters c.940, and heavy rains and some flooding in 942 and 944. Blood rains and locusts in central Europe at least may have also played a role.

Hard winters and heavy rains, and accompanied flooding, were clearly the principal identified environmental causes of food shortage in Carolingian and early Ottonian Europe. Fifteen hard winters, and ten periods of heavy rain, can be associated to food shortages. Meanwhile five droughts, four hail storms, and three Saharan showers can

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<sup>1111</sup> As noted there is some indication that warfare helped engender the crisis in western *Francia* (C.1.236).

be linked to subsistence crises. Other than conflict, the only other source of shortage to appear in our texts is the 873 locust swarm.<sup>1112</sup> We do not encounter bird pests, rodent infestations or crop diseases,<sup>1113</sup> and while Carolingian and early Ottonian authors do record wind storms they did not associate them with food shortages.<sup>1114</sup> Even the winds associated with the tornado of 839, documented in the *Annales Xantenses*, do not appear to have brought on crop failures, though the subsequent floods may have damaged crops in the Low Countries where the text was composed (C.1.127).<sup>1115</sup> Mild winters and unusually humid periods too are not linked to shortage conditions (see, for example, C.1.42, 68, 80, 81, 82, 98, 123, 195). Evidence for a particularly intense period of warmth in northern European and Mongolian trees in the mid 810s too does not resonate with Carolingian texts,<sup>1116</sup> and the drought Flodoard records in 921 which may be linked to several strands of palaeoclimatic evidence seems not to have produced a crisis.<sup>1117</sup>

Not all of these identified ‘environmental’ triggers of mid eighth- through mid tenth-century food shortages exercised the same agency over the quality of the harvest. For instance, while seven of the ten periods of heavy rain (70 per cent), and ten of the fifteen hard winters (67 per cent), can be linked to famines, only two of the five droughts (40 per cent) and two of the four hail storms (50 per cent) can be ascribed to famines. Two of the three reports of blood rains can be associated to famines, but in 873 the red sand is only reported to have hit *Italia* and in 941 it is known only to have affected some regions of *Germania*. In both instances, thus, it can hardly be considered a major trigger

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<sup>1112</sup> Though again locusts may have had something to do with the c.940 shortage. Dutton implies that particular types of weather would have been more detrimental to Carolingian society than others. He draws attention to flooding and hail storms: Dutton (2008), pp. 168, 170. Dutton earlier emphasized the role of hail (1995).

<sup>1113</sup> We might suspect whether passages that speak of ‘false crops,’ ‘empty crops’ and crops that ‘came forth’ but could not be ‘consumed’ refer to diseases of crops: (C.1.54, 64, 125). In any case, it is unlikely that crop disease would have caused a major shortage. Like birds, they would have chipped away at available food supplies at a local or regional level. Jones has suggested that birds may have done more aggregate damage to food supplies than rodents or locusts: (1972), pp. 108-09.

<sup>1114</sup> Prudentius does refer to a wind storm lashing crops in 846, however (C.1.144). For more windy episodes see (C.1.122, 123, 154, 169, 196, 262, 289), also (C.3.61, 109).

<sup>1115</sup> The *Annales Bertiniani* also documents the flood in the Low Countries in 839: (C.1.124). Also see the rather perplexing reference, contained in this text in 839, to a ‘vision’ of shortage that a ‘certain pious priest’ had in England, which might indicate actual shortage conditions c.839 (C.1.125). There is, however, no firm evidence to support the existence of any subsistence crisis in the late 830s. The envisioned shortage may refer to the crisis of the early 840s.

<sup>1116</sup> Kirchhefer (2005), p. 225; D’Arrigo et al (2001), p. 544. The year 816 is the warmest in the entire Mongolian series which runs from 262 to 1999.

<sup>1117</sup> See the discussion on the 919 crisis above.

of the shortage.<sup>1118</sup> We may also question how important blood rains were in causing the shortage of 859/60; the hard winter then may have been a more significant factor.

Moreover, the third episode of Saharan sands reported in our period can be linked neither to damaged crops nor food shortages (C.1.46, 47). Hard winters and periods of heavy rain are more regularly tied to shortages and they more regularly caused famines when they occurred.<sup>1119</sup>

As observed in 1.4.1, neither human nor livestock mortalities can be firmly isolated as a cause of any of our food shortages, though many human deaths, from disease and hunger, clearly occurred in the wake of shortages. Though several livestock mortalities can be associated with subsistence crises, untangling their relationship to failed crops is exceptionally difficult on account of the nature of the extant evidence. Cattle pestilences correspond in time and space to the shortages of 820/24, 841/45, 859/61, 867/69 and 939/44, though in no instance can we assert with much confidence that the mortality precipitated any of these crises. Moreover, several cattle pestilences, including those of 877 and 887, cannot be linked to a food shortage; even the pan-European cattle panzootic of 809/10 does not align spatially or temporally to a poor harvest, let alone widespread hunger. Nevertheless, as discussed in Part 3, we can suspect that livestock deaths greatly compounded or accelerated shortages when they occurred in their midst and that stock mortalities which occurred outside of shortages would have

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<sup>1118</sup> Despite the attestation in Rumold's epigram that it did indeed cause the famine (C.1.279). The epigram, after all, also associates the Saharan sands to a pestilence.

<sup>1119</sup> Of course, as far as our limited evidence sample indicates, when spatially vast locust swarms took place they brought on famine. No other large swarm of locusts, other than that of 873, is recorded in our sources, though we may possess three references to lesser swarms, one in Germany, another insular Europe and another in Italy (C.1.279), (C.3.83, 84, 89). That said, the Welsh and Italian passages may be misdated references to the 873 swarm. Moreover, what pest the *Brut Y Tywysogion* refers to in Ireland in 895 is quite uncertain. The text refers to vermin which were mole-like in form, had two teeth, and fell from heaven. Thorton (1996), along with other scholars of early medieval insular texts, seems to have assumed this was a reference to locusts, but we may here be dealing here with rodent-related crop damage. That other insular texts report a food shortage in that year, for instance (C.3.91), but not locusts, may indicate that the rodents were simply one of a complex of factors that brought shortage in Ireland. The annalist's remark that they fell from the sky may have simply been meant to indicate that they appeared suddenly, as if from nowhere. Moreover, it was not totally uncommon for early medieval annalists to write of various objects suddenly dropping from the sky: Dutton (2008), p. 171. The Italian reference to a swarm, which may refer to the 873 locust plague or another regionally confined swarm in the 880s, is discussed above in reference to the famine of the early 870s. There is also no supporting evidence for a locust swarm in *Germania* c.940 in any of the texts that commented on the environmental context of the shortage of 939/44. Plagues of locusts, which do not appear to have made it to Europe, though the evidence is too thin to really know, are also reported in the Middle East for 721 and 957 (C.3.10, 111).

made human populations more vulnerable to crisis.<sup>1120</sup> The equine pestilence of 791 does not fit neatly with any report of dearth and that of 896 is unlikely to have contributed to harvest failure of the mid 890s, considering that horses were not used as traction or relied upon for manure.<sup>1121</sup> Similarly, many human pestilences chronicled in 1.4.2.1, cannot be linked to poor harvests or shortages, though an epidemic could have accelerated shortage conditions.<sup>1122</sup>

There were, thus, no standard causes of shortage. No phenomenon routinely generated poor harvests and human hunger; neither hard winters nor heavy rains, nor droughts were synonymous with subsistence crises; nor human or cattle pestilences.<sup>1123</sup> Most of the extreme weather reported in Carolingian and early Ottonian texts, in fact, cannot be aligned to damaged crops or subsistence crises. Indeed, one hundred and eighteen passages have been assembled in Catalogue 1 that refer to extreme weather but not to poor harvests or human hunger.<sup>1124</sup> Several hard winters, periods of heavy rain and flooding, and droughts are recorded that cannot be aligned to food shortages.<sup>1125</sup> Three sources even emphasize that extreme weather did not cause a poor harvest (C.1.65, 67, 130). Most of the major crises of our period, including those of 762/63, 820/24, 841/45, 872/74, 895/95 and 939/44, were clearly the product of a complex of factors.<sup>1126</sup> Likewise, not all possibly volcanically-induced winters caused shortages, let alone famines. As McCormick, Dutton and Mayewski's work demonstrates, several of the hard

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<sup>1120</sup> Cf. Stathakopoulos (2004), p. 162.

<sup>1121</sup> If the mortality was not limited to northern Italia, as it appears to have been, we may suspect that a horse mortality would have disrupted the distribution of food, considering the role they place in transporting not only people but foodstuffs in Frankish Europe.

<sup>1122</sup> Sudden and drastic declines in agricultural labor would have made societies more vulnerable to shortage: Cf. Stathakopoulos (2004), p. 164.

<sup>1123</sup> Food shortage was also not a common companion of conflict: most conflicts reported in Carolingian sources are not associated to dearth. Hunger also did not universally characterize sieges. Sieges could be called off for a variety of other non-political reasons, however, including disease and poor water: cf. Squatriti (1999), p. 37.

<sup>1124</sup> (C.1.1, 2, 4, 6, 7, 8, 9, 10, 11, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 42, 43, 44, 45, 46, 47, 48, 62, 66, 68, 80, 81, 82, 84, 90, 93, 94, 97, 98, 99, 106, 110, 111, 113, 117, 118, 120, 121, 122, 123, 124, 126, 127, 129, 134, 137, 138, 142, 143, 146, 148, 151, 156, 157, 158, 160, 162, 165, 166, 167, 168, 169, 174, 179, 180, 181, 196, 206, 208, 213, 216, 220, 221, 227, 229, 230, 232, 233, 250, 251, 255, 256, 259, 262, 264, 265, 266, 267, 271, 274, 275, 276, 280, 286, 290, 291, 293, 294, 295, 298, 304). Though these passages refer only to extreme weather, some refer to extreme weather that were clearly at the root of food shortages.

<sup>1125</sup> For instance, (C.1.42, 43, 93, 94, 97).

<sup>1126</sup> The crisis of 805/06 too may have been the product of multiple factors, but the sources are too thin to tell.

winters addressed above temporally align to acid spikes in the GISP 2 ice core, which may indicate that these winters – those of 763/64, 821/22, 823/24, 859/60, 873/74 and 939/40 – were the product of an eruption, or eruptions, that ejected ash into the stratosphere and limited solar radiation.<sup>1127</sup> Yet not only are there many hard winters in Carolingian and early Ottonian sources that do not align to acid horizons in this ice core, including some that caused or contributed to food shortages (such as those of 788/89, 842/43, 880/81 and possibly *c.*886), but several acid spikes do not find resonance in Carolingian and early Ottonian sources.<sup>1128</sup> The GISP 2 contains acid deposits, for instance, *c.*757, *c.*855/56, *c.*900/02 and 913/14, that is, years in which no subsistence crisis is documented.<sup>1129</sup> While McCormick, Dutton and Mayewski propose that the acid deposits dated in the GISP 2 core to 854, 856 and 858 indicate that a major eruption occurred in the mid 850s, and while two hard winters are documented in the 850s, only one, that of 859/60 can be associated to a food shortage in Carolingian Europe:<sup>1130</sup> the possible volcanic winter of 855/56 did not cause a recorded shortage. Of course, a variety of phenomena, other than the reduction of solar radiation caused by volcanic eruptions, can produced hard winters and droughts, such as, for instance, exceptionally strong and regular Siberian winds.<sup>1131</sup>

Naturally, other lines of material evidence furnish evidence for extreme events that do not align well with the Carolingian and early Ottonian record for extreme weather or hunger. Both the Dye 3 and GRIP cores, like the GISP 2, produce a signal that does not register with events reported in mid eighth- through mid tenth-century continental sources. The former shows an acid horizon *c.*755 and the latter *c.*757.<sup>1132</sup> Briffa's northern high-latitude tree-ring chronology too seems to furnish evidence for a cold

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<sup>1127</sup> McCormick, Dutton and Mayewski (2007).

<sup>1128</sup> Note that two of the six hard winters that Pfister et al identify in our period did not result in failed crops. For instance, the 'hard winters' they discern in 810/11 and 845/46 do not appear to have generated a shortage: (1998), pp. 541-42.

<sup>1129</sup> Zielinski et al (1994), p. 949; Zielinski (1995), p. 20939; McCormick, Dutton and Mayewski (2007), pp. 884, 887-90.

<sup>1130</sup> Ibid (2007), p. 886. Camuffo (1987), pp. 57-8, indicates that the Venetian Lagoon may have frozen over in the mid 850s.

<sup>1131</sup> As McCormick, Dutton and Mayewski themselves note: (2007), pp. 870, 889. The coldest air mass in the Northern Hemisphere, which can affect Europe's climate, is found in Siberia.

<sup>1132</sup> Clausen et al (1997), p. 26714.

period in the mid 750s, as does Helama, Merilainen and Tuomenvirta's Finnish series.<sup>1133</sup> There is a chance that these climate proxies refer to harsh environmental conditions behind the shortage documented in the southwest in the early 750s. The appearance of acid signals in the mid 750s at three independent Greenlandic sites, as well as northern European trees, may indicate that the poorly documented subsistence crisis of 752 was a much larger event than we are aware of. A significant food shortage, generated by hard winter(s) produced by a volcanic eruption, may have affected a wide area of Europe in the early and/or mid 750s.<sup>1134</sup> Conversely, these proxies may point to an event totally untraceable in the written record in the mid 750s that afflicted the northern reaches of the early Carolingian period. Furthermore, the *c.*855/56 GISP 2 acid signal may also match well with Briffa and Grudd's northern high-latitude tree-ring chronologies, as well as Helama et al's Lapland series and D'Arrigo et al's Mongolian chronology, and the *c.*900 GISP 2 acid signal also resonates with signals both in the GRIP and Dye 3 cores as well as Briffa's northern chronology, Baillie and Brown's Irish dendro series, D'Arrigo et al's Mongolian Siberian pine chronology and even Bristlecone pines in the western US, which indicates that the event was hemispheric in scale.<sup>1135</sup> In these years too, despite the dearth of written evidence, shortages may have gripped regions of Carolingian and early Ottonian Europe. The *c.*900 event, in particular, appears as though it could have caused significant damage to harvests at least in some northern areas of our concern.<sup>1136</sup>

These natural world anomalies – from hard winters, to blood rains to locusts – may best be considered, following Deveurex, 'triggers' of shortages, not inherent causes of hunger. A variety of underlying issues may have been at work, including Malthusian pressures on resources, a variety of entitlement failures, associated market or pull failures, in addition, of course, to underlying socio-economic structural issues that made early

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<sup>1133</sup> Briffa (2000), p. 89; Helama, Merilainen and Tuomenvirta (2009), p. 176; also see Helama et al (2002), p. 684.

<sup>1134</sup> A signal in the Plateau Remote core of eastern Antarctica *c.*742 may also speak to this eruption, though this is highly uncertain. As noted, for signals in both poles to be possibly related to one another they need occur within 15 years: Cole-Dai et al (2000), pp. 24435, 24439.

<sup>1135</sup> Briffa (2000), p. 89; Briffa et al (1992), p. 113; Baillie and Brown (forthcoming); Grudd (2008), p. 853; Helama et al (2002), p. 684; D'Arrigo et al (2001), p. 544; Salzer and Hughes (2006), p. 63; Helama, Merilainen and Tuomenvirta's Finnish dendro series too appears to exhibit a dry phase in the mid 850s: (2009), p. 176. Baillie and Brown label the *c.*900 event a 'period of global environmental instability.'

<sup>1136</sup> The *Chronicle of Ireland* records shortage conditions in 899, a scarcity for animals in 900, and heavy rains in 899 and 900 (C.3.92, 93, 94, 95). Admittedly, these notices of heavy precipitation are a bit puzzling, as the material evidence indicates that this period would have been profoundly cold and dry.

medieval society vulnerable to food shortages to begin with.<sup>1137</sup> Grasping the place of any of these issues in the Carolingian and early Ottonian periods, however, is particularly difficult, especially considering our inability to establish reliable estimates of human population density or distribution across Europe at any point throughout our period, let alone yield ratios or aggregate agricultural output. This is not to say that no mid eighth- through mid tenth-century shortage was more FED than FAD, or, for that matter, that no shortage was FED-induced, as some, particularly episodes of intentionally inflicted starvation and shortages associated to armies on the march, clearly were. This is also not to say that Carolingian and early Ottonian shortages were universally agricultural catastrophes. As we have seen, such an explanation would be too simple, as failed crops cannot account for the complete shortage experience. However, while we may suspect that most mid eighth- through mid tenth-century shortages were FAD and FED in nature – as we have seen the two categories are intrinsically linked – we should not ignore the fact that the vast majority of mid eighth- through mid tenth-century shortages were clearly triggered by anomalies in the natural world. Our evidence might exhibit a bias for FAD, over FED,<sup>1138</sup> and our definition of famine too might favor FAD over FED, particularly considering the inability of FED, as proposed below, to generate a spatially and temporally vast shortage in an early medieval economy, but we need not doubt our sources: disruptions to agricultural production were at the root of Carolingian and early Ottonian shortages. The possible roles of Malthusianism and FED now require more attention.

As highlighted in 2.1.1.1, the dominant perspective in modern interpretations of Carolingian and early Ottonian food shortage causation is Malthusian. It seems quite unlikely, however, that most Carolingian and early Ottonian food shortages were true Malthusian positive checks, as Verhulst, Devroey and others propose; at the very least, evidence supporting the supposedly dominant role of Malthusianism in mid eighth- through mid tenth-century subsistence crises is wanting. Most scholars seem to suggest that Carolingian and early Ottonian shortages occurred not because of an environmental shock to agricultural production, or even a harvest failure, but because the number of

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<sup>1137</sup> These are discussed at greater length in Part 3.

<sup>1138</sup> As emphasized below, the mass majority of our evidence for shortage concerns FAD, harvest failures, not FED, or the decline of entitlements.



mouths suddenly exceeded the available grain supply.<sup>1139</sup> As discussed in 2.2.2.1, most subsistence crises, whether Malthusian or not, ultimately stem from sudden shocks to agrarian production, not sudden increases in the number of people.<sup>1140</sup> This fits, of course, with the Carolingian and early Ottonian evidence. That most early medievalists to touch upon mid eighth- through mid tenth-century crises have thought that the underlying causes were endogenous, or internal, to the rural society and economy, and that most have only addressed the famines *c.*800, and briefly at that, has encouraged a Malthusian perspective, as Malthusianism requires no exogenous agency and the extreme weather of the famines of the early 790s and early 800s is very poorly documented.

There are multiple problems with the early medieval Malthusianism already advanced. First, Malthusian interpretations have rested heavily on the idea that severe food shortages occurred more regularly following the onset of population growth in the Carolingian period, particularly *c.*800. This assumes that food shortages did not occur prior to the Carolingian period, that fewer shortages occurred in the last half of the eighth century than the first half of the ninth, and that the number of shortages encountered in pre-Carolingian texts reflects the infrequency with which crises actually occurred before 750 and not a dearth of sources or literate observers interested in shortages. It also assumes that the famines of the early 790s and early 800s only afflicted the densely populated areas of Carolingian Europe, that is, northern *Francia* (the Ile de France specifically) and the Po Valley. Not only were the famines *c.*800 not restricted to these areas, especially that of the early 790s, but, as shown in 2.4.3, nearly as many crises occurred in 750/800 as 800/850. Second, Malthusian interpretations have rested heavily on the idea that severe food shortages were restricted in time to sub-periods within the Carolingian and early Ottonian periods that saw considerable population growth. As we have seen, Verhulst among others thought shortages declined in frequency and severity over the ninth century as population declined. But food shortages continued to occur throughout the ninth century, long after the supposed decline of population in the 820s, '30s or '50s. In fact, as demonstrated, more shortages took place in the second half of the

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<sup>1139</sup> This also applies to Wickham: (2004), p. 550. He implies that a famine could result once a population reached its 'Malthusian ceiling.'

<sup>1140</sup> As O Grada has stressed, true Malthusian 'positive checks' are undoubtedly rare, if they occur at all: O Grada (2008), n. 2. More is said on this in 2.2.2.1.

ninth century than the first, and cycles of shortages, which have been considered indicative of extreme population pressure, were not confined to the first half of the ninth century. Third, all of this depends on the idea that population began to climb in the Carolingian period in the first place, which is, as detailed in 0.1.4.1, a particularly difficult idea to support. Human pressure on food supplies may have compounded crises or made mid eighth- through mid tenth-century populations more vulnerable to shortages in some regions, but it cannot be considered a leading cause of shortage. That shortages occurred irregularly over our period, as shown in 2.4.3, certainly underscores the role of natural world anomalies in shortage causation, while downplaying the role of population pressure. Neo-Malthusian interpretations concerning increased carrying capacity and higher rates of land partitioning too do not hold up, as the only evidence for these phenomenon comes from the polyptychs, especially, as observed, those of northern *Francia*, and neither lesser shortages nor famines were limited to this area.

Though early medievalists have yet to draw upon the ideas of Sen in explaining subsistence crisis causation, food entitlement decline is as unlikely as Malthusian pressures to have caused shortages. We may imagine that FED, like Malthusianism and Neo-Malthusianism (not to mention the low labor inputs described Seavoy), would have contributed to Carolingian and early Ottonian vulnerability to shortage and the perpetuation of shortage conditions once FAD set in, but aside from episodes of intentionally inflicted starvation, in which the entitlement to food of the besieged declines, there is little evidence for FED in our evidence base. Notker, the *Annales Fuldenses*, *Annales sanctae Columbae Senonensis*, *Richeri historiarum libri III* and several capitularies refer to high prices of foodstuffs in famines and lesser shortages and the *Capitulare Francofurtense* indirectly documents hoarding (C.1.61, 63, 73, 76, 150, 189, 236). Though these passages furnish evidence for food entitlement decline, all speak to conditions following harvest failures. Indeed, all this FED evidence – of profiteering namely – is post FAD.<sup>1141</sup> Other evidence for food entitlement decline, namely the consumption of famine foods (from bread mixed with earth to equines, canines, carrion

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<sup>1141</sup> For more Carolingian evidence of FED in the wake of FAD see (C.1.114, 116). These texts, the *Concilium Parisiense* and *Episcoporum ad Hludowicum imperatorem relation*, imply that usurious lending often, on an individual or family level, reduce people to starvation and forced them to leave their property. Such lending would have compounded a crisis, as noted in Part 3, but would not have, triggered or caused a subsistence crisis outright.

and people) and migration for food or work, is also post FAD. Recourse to ‘extra-legal’ entitlements – crime – too signifies a decline in food entitlement in the wake of harvest failures (C.1.184).<sup>1142</sup> That landlords were repeatedly requested, in capitularies, to take care of their dependents, to not hoard, and to sell their surpluses also, naturally, demonstrates the disparity in entitlement to food.<sup>1143</sup> But these requests too come in the wake of FAD.

That the causes of shortages are not always explicitly recorded, but the majority of those shortages that are ascribed to something are ascribed to extreme weather, may further stress the minute role FED played in shortage causation. That we never encounter profiteering, hoarding or, for example, the collapse of markets,<sup>1144</sup> as a cause of dearth, but are told, for example, on thirty-five occasions that crops failed and even that sin and demons were at the root of some shortages, implies one of two things: first, that FED-induced crises were extremely rare if they occurred at all, or, second, that FED-induced crises were simply beyond the purview of our authors. The latter option here is more likely. FED-induced crises, like seasonal scarcities, may have simply been too insignificant in terms of impact, and temporal and spatial scale, to attract the interest of our authors.<sup>1145</sup> For all we know, some shortages, primarily those that cannot be associated to extreme weather with much certainty (the crises of 752, 779, 813 and 910 for instance) may have been intrinsically FED events and our authors may have simply chosen not to document widespread episodes of hoarding or profiteering. However, it seems far more plausible that the lack of clear FED-induced crises is caused by the scale of shortage that food entitlement decline could have conceivably produced in the Carolingian and early Ottonian periods. As observed in 2.2.2 and 2.2.2.2, true FED famines, in modern contexts at least, require the mismanaging of resources at high levels of government, which necessitates considerable governmental control over the production and distribution of resources, something that did not exist in the early Middle Ages. That Carolingian and early Ottonian elites did not possess any overarching control over the

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<sup>1142</sup> The ‘demons’ and ‘sin’ referred to in some reports of shortage (see 2.4.2), may have stood in for the profiteering, hoarding and usurious loaning that appears to have been common in times of want, see 3.3.

<sup>1143</sup> See 3.3 for discussion.

<sup>1144</sup> On markets in our period see 3.1 and 3.3.

<sup>1145</sup> We possess no references to the ‘gap between harvests’ that may have affected lower strata on an annual basis.

production, distribution and sale of foodstuffs in individual regions, let alone across regions, certainly signifies that if FED-induced shortages did occur that they would have indeed been local and seasonal.<sup>1146</sup> A high degree of collaboration between elites across regions, and thus some interregional infrastructure for the policing of grain production, as well as the storing and moving of grain, would have been necessary to generate a significant FED-induced crisis in our period. That elites appear to have taken advantage of lower social strata when crops did fail, however, implies that FED crises, result of profiteering and hoarding, may have been somewhat common, if only local and seasonal.

Like Malthusianism and FED, overarching climatic regimes seem to have had little impact on shortage causation. As observed in 0.1.4.1.4, the Carolingian period is often said to correspond to the end of the EMCA and the onset of the MWP and some scholars have suspected that this transition would have resulted in fewer subsistence crises. Of course, the severity and contours of the EMCA are still being teased out and it is too early to define of any general trends in early medieval climate across Europe. Most of the area of our concern is not covered by palaeoclimatic studies and the reconstruction of climatic regimes from written evidence is methodologically flawed, as the observation and documentation of weather is too intrinsically human.<sup>1147</sup> Though only some idea of

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<sup>1146</sup> That prices had to be repeatedly set, as evidenced in the capitularies, indicates that the marketing and distribution of foodstuffs were regularly carried out without any overarching authority on part of the ruling elites. FED crises may have been a more likely event of the ancient and late antique worlds, not to mention the more urbanized Middle East. Cf. (C.3.30).

<sup>1147</sup> As Bulliet recently observed, extreme weather reported arbitrarily in texts cannot be held to represent general trends in climate but the interests or prerogatives of authors: Bulliet (2009), p. 72; also, Dutton (2008), pp. 168-69. Dutton suggests that more ‘complaints’ about weather may owe to greater vulnerability than to extreme weather: (1995), p. 119; idem (2008), p. 170. Nevertheless, several scholars have used written evidence to speak to climatic regimes. For instance, following an assessment of eighth- through fourteenth-century written evidence for hard winters, Pfister et al propose that the tenth century saw fewer severe winters than the ninth, and, consequently, that the ninth century was generally cooler than the tenth: Pfister et al (1998), pp. 535, 541-42. This approach, however, carries the assumption that all hard winters were documented and that weather conditions were recorded systematically and neutrally rather than randomly and subjectively; their assessment reveals more for certain about the number of sources that survive and speak to winter weather conditions than actual winter conditions over long periods of time. Zhongwei, Alexandre and Demaree’s attempt to reconstruct warm/cold variations in western Europe from 708 to 1426 is likewise troubled. Their identification of a ‘severe cold stage’ in the early ninth century and another ‘cold stage’ in the late ninth century tells us more about patterns of recording keeping than anything else (as their inability to characterize the early tenth century also indicates): Zhongwei, Alexandre and Demaree (1997), p. 514. That these authors came to the same conclusion as Pfister et al is revealing of the similar evidence base each team employed, not the accuracy of their results. Shabalova and van Engelen’s articulation of a cold period from the late ninth century through to the early eleventh century should likewise be treated with caution. Shabalova and van Engelen (2003), p. 236. So too Ó Corráin’s characterization of the 450 years spanning 750 to 1200 CE a ‘climatic optimum:’ (2005), p. 575; and

the general Carolingian and early Ottonian climate can be established at present, it seems quite clear that any general trends in climate exercised little influence over the shortages described here.

In general, there is evidence that much of Europe got warmer over our period, especially midway through the ninth century. Alpine glaciers indicate that the eighth century was particularly warm: the Gorner Glacier was ‘small’ from *c.*750 to the late thirteenth century, signifying a the onset of a warm period roughly in line with the onset of Carolingian rule, the Grosser Aletsch Glacier also recessed notably between *c.*700 and *c.*900, indicating that the eighth and ninth centuries were warmer than those immediately before and after, and the smaller Lower Grindelwal Glacier too demonstrates a ninth century retreat.<sup>1148</sup> It has also been suggested that the GISP 2 provides some indication that the northern hemisphere experienced one its warmest phases of the last two millennia in the ninth century.<sup>1149</sup> Ogilvie et al have employed ice core evidence, marine sediments analyses and documentary data from Iceland to argue that the North Atlantic experienced a warm period *c.*800 to *c.*1100,<sup>1150</sup> and Gunnarson, Borgmark and Wastegard, using tree-ring chronologies, as well as a peat and pollen stratigraphy of the Stomyren bog (south-central Sweden) have identified 750/900 as one of the warmest and especially wet 150 year period between the fifth and sixteenth centuries, and a multi proxy assessment of a sediment core from an Austrian mountain lake indicates that warming occurred there prior to 1000.<sup>1151</sup> Several dendrochronologies from northern Europe and Siberia also indicate that long-term warming took hold of Europe in the ninth century.<sup>1152</sup>

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Edwards claim that favourable climate set in Ireland as early as the early third century CE: (2005), p. 296; and Kerr, Swindles and Plunkett’s articulation of a climatic downturn in eighth- and ninth-century Ireland (2009), pp. 2871-872. Bulliet’s articulation of the ‘Big Chill’ in the northern Middle East from the early 900s, and a ‘sharp cold period’ spanning 920 to 943, founded on written and material evidence, is more reliable: Bulliet (2009), pp. 84, 93.

<sup>1148</sup> Grove (2002), pp. 316-17; McCormick, Dutton and Mayewski (2007), pp. 873-74.

<sup>1149</sup> Meeker and Mayewski (2002), pp. 257-66.

<sup>1150</sup> As discussed in Brázdil (2003), p. 207; also Brázdil et al (2005), p. 391

<sup>1151</sup> Schmidt (2002), p. 114; Gunnarson, Borgmark and Wastegard (2003), pp. 348, 355-57. An analysis of a core taken from a bog central Ireland also implies warm and dry conditions from the late ninth century: Hall and Mauquoy (2005), p. 1086.

<sup>1152</sup> Kirchhefer has shown that Norwegian Scots pines exhibit a cool period between 765 and 820 and a warm period between 820 and 957: (2005), p. 219; Linderholm and Gunnarson have used their Scots pine chronology to label the tenth century the warmest century of the Middle Ages (400-1500 CE) in central Fennoscandia: (2005), p. 235; using a tree-ring width chronology from Norwegian and Finnish Lapland, Helama et al have also established that the period spanning 930 to 1180 was particularly warm: as discussed by Linderholm et al (2010), p. 99; two dendrochronologies from central Siberia identify a cold period

We need not cover all the available palaeoscience here, however, as it is quite clear that neither the severity nor regularity of shortages in the Carolingian and early Ottonian periods appears to have been affected by any overarching ninth-century warming trend that crops up across Europe. The ninth century seems to have seen far warmer temperatures than the eighth, first in southern and, perhaps, central Europe, and then, from the 820s or 850s, in northern and western Europe. But this agriculturally benign trend appears to have had no affect on subsistence crises. In fact, as we have seen, slightly more crises are known to have occurred in the first half of the ninth century (6) than the last half of the eighth (5) and more shortages are reported in the second half of the ninth century (8) when conditions seem to have been warmer throughout Europe than they had been for several centuries.<sup>1153</sup> Moreover, crises cannot be assigned more often to hard winters in the ‘cold period’ pre 820/50 or droughts in the ‘warm period’ post 820/50. In Carolingian and early Ottonian Europe, subsistence crises occurred irregularly on the heels of anomalies.

Finally, we can stress the minute role warfare appears to have played in Carolingian and early Ottonian shortages. The vast majority of our crises occurred in lieu of conflict and the most siege-induced crises appear to have been restricted to the besieged. Armies on the march appear not to have regularly caused shortages in civilian populations, or to have so severely disrupted food production, or lines of supply and distribution, as to generate a crisis significant enough to be picked up by one of our authors. In fact, only two sources explicitly tie food shortages to non-siege conflict (C.1.133, 236) and there is considerable written and material evidence in both instances that these shortages were primarily generated by extreme weather. The emphasis,

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between 700 and 820, and a subsequent warm period from 820 to 1150: Naurzbaev and Vaganov (2000), p. 7323; Grudd’s Tornetrask chronology presents similar results: (2008), p. 853; Helama, Merilainen and Tuomenvirta’s dendro series from Finland demonstrate that 720 to 930 were generally cool and wet: (2009), p. 176. Huntley et al have also identified a particularly cold period in the Norwegian Sea between 700 and 850 as well as glacial advances in Sweden between 750 and 850, which were followed by a warmer period: (2002), p. 2851; and Grove too has observed the advances of two southern Scandinavian glaciers between 650 and 860: (2002), p. 316. Far to the south, a study of Nile flood levels identifies the periods of 760 to 820 and 940 to 1030 as low flood periods characterized by a dryer climate, and the intervening period of 820 to 940 as being typified by a warmer period of heavier precipitation: Fraedrick and Bantzer (1991), p. 168. This is a small selection of material data for the ninth-century European warming trend.

<sup>1153</sup> It is probable that a decline in the quantity of extant written evidence and a greater lack of concern from annalists and historians for dearth accounts for the reporting of only three shortages in the first half of the tenth century. As we have seen, for instance, it is quite likely a major event occurred c.900 that went unrecorded.

observed in 2.1.1.1 and 2.2.2.4, that modern theorists and historians of modern and early medieval hunger have placed on warfare does not find any resonance in Carolingian or early Ottonian Europe. Like FED, conflict was not a prime driver of shortage in our period.<sup>1154</sup>

## 2.5 Summary

We have surveyed the historiography of Carolingian and early Ottonian subsistence crises and chronic hunger in 2.1, and the methods necessary to define, diagnose and establish the frequency of famines and lesser food shortages in mid eighth- through mid tenth-century Europe in 2.2. Here the main theories employed by modern famine theorists and historians of hunger for shortage causation, from agricultural catastrophes to food entitlement decline, have also been explored. In 2.3, an attempt was made to articulate the current of chronic hunger underlying episodic famines and lesser shortages, and anaemia and osteoporosis were proposed to have been common metabolic diseases of our period; the latter was common of both humans and their livestock. Rickets and scurvy may have been common in humans and stock in particular environmental and subsistence contexts. Relatively low statures in both humans and livestock (by modern European standards in concerns to humans, and Roman and early modern livestock for stock) too indicate a rather high prevalence of chronic hunger. In 2.4, the language and method of documenting food shortages in Carolingian and early Ottonian Europe is surveyed and individual passages are shown to lack much individuality, which, it was suggested, affects how we reconstruct the temporal and spatial contours of shortages in 2.4 and interpret their impact in Part 3. Ten famines and twelve lesser food shortages were identified from the sources collected in Catalogues 1 and 3, via the methods discussed in 2.2.1.3. The vast majority of these subsistence crises were said to have been caused, or triggered, by anomalies in the natural world, extreme weather in most instances. Several famines were clearly caused by a complex of environmental shocks and on many occasions natural archives of past climate, mainly acid horizons in polar ice and Eurasian ring-width

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<sup>1154</sup> We may suspect that the lack of any major sustained battles within Carolingian Europe accounts, at least partially, for this. As Charlemagne noted, warfare was generally restricted to borderlands (C.1.74).

dendrochronologies, corroborated textual evidence of hard natural conditions at the root of failed harvests. Shortages occurred at least once every 9 years, famines once every 20 years and lesser crises once every 17. Not only would the temporal and spatial contours of famines and lesser shortages have ranged widely, but the same areas/populations were not always affected. A preliminary assessment of the ramifications of these crises and the underlying current of hunger is presented in Part 3.



### **Part 3**

#### **Disease and hunger in Carolingian and early Ottonian Europe: Towards a history of impact and response**

With the temporal and spatial contours of mid eighth- through mid tenth-century pestilences and shortages mapped, the frequency of both established, the triggers of the latter identified, and the underlying current of non-pestilential disease and chronic hunger articulated (if only provisionally), we may consider the impact of, and response to, disease and hunger. In 3.1, the written evidence for the impact of Carolingian and early Ottonian human disease is put forward, some contexts of disease considered, analogies drawn and working diagnoses advanced and assessed. In 3.2, the same is done for livestock disease and in 3.3 the written evidence for the impact of food shortages and chronic hunger is put forward, some contexts of hunger assessed and analogies drawn. In 3.4, we consider the aggregate impact of episodic pestilences and shortages. Directions for future research are then presented in 3.5.<sup>1155</sup>

Across the board, texts reveal little about the impact of disease in humans or livestock (non-pestilential or pestilential) or hunger (chronic hunger or food shortages). The laconic character of our source material and the lack of attention mid eighth- through mid tenth-century writers gave to the consequences of disease and hunger may partially account for the minor role Carolingian and early Ottonian disease and hunger have been regulated in modern historiography. As demonstrated below, however, we should not let the succinctness of our authors mislead us: disease and hunger had real ramifications for Carolingian and early Ottonian populations. Of course, in turning from the written and material evidence for the extent of disease and hunger to the impact of disease and hunger, we turn from attempting to establish hard facts to weighing probabilities. While the results are not definite or precise, they are more reliable than any understanding of the impact of Carolingian or early Ottonian disease and hunger chiefly that depends on ideas about population that are in turn extrapolated, often implicitly, from presumed trends in agricultural productivity, the extent and impact of the EMP, what we can glean from polyptychs, and the extent and impact of the EMCA.

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<sup>1155</sup> For definitions of ‘impact’ and ‘response’ see 0.1.2, n. 14.

### 3.1 Human disease

Little is said in Carolingian and early Ottonian texts about the impact of epidemics. In most instances, no consequences other than the demographic are mentioned and these demographic consequences are always recorded with extreme brevity. We are often only told that a *pestilentia* or *mortalitas* occurred, though some passages provide very rough mortality estimates: for instance, the *Annales regni Francorum* tells us that a ‘considerable part’ of the force stricken with a gastrointestinal disease near the river Drave in 820 succumbed (C.1.100) and that ‘countless people of both sexes and all ages’ died in a epidemic in 823 (C.1.108); likewise, the *Fragmentum chronicon Fontanellensis* tells us that ‘many’ people died in the epidemic of the early 840s (C.1.132), the *Annales Bertiniani* records that a *magna pars hominum* was lost in the epidemic/pandemic of the mid 850s (C.1.155, 157), and the *Annales Bertiniani* and Regino document that Lothar II lost ‘many’ men to disease and watched ‘heaps’ of them die in 869 (C.1.193, 194). Of course, little can be made from these or other non-specific estimates of mortality.<sup>1156</sup> As demonstrated in 1.4.1, we should neither assume, on account of the language employed in these passages, that these pestilences were more mortal than those whose mortality is not in some vague way ‘quantified,’ nor that the seemingly more precise tallies, such as that given in the *Annales Fuldenses* of a mortality in the range of 33 per cent in the early 870s, can be taken at face value, but rather as an signifier of how great the loss of human life then was perceived to be.

Other than rough accounts of mortality, we are told that the aforementioned outbreak of the late 830s among Lothar’s men forced, together with the coming of winter, the emperor to abandon his campaign, and disease is considered on three occasions a pretext for the conclusion of a siege (C.1.205, 221, 234). Further details about the socio-economic or political impact of epidemics are not given, and nothing is said about the measures Carolingians and early Ottonians took to escape pestilences, absorb human

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<sup>1156</sup> The *Annales Bertiniani* also reports that ‘some’ died and ‘some’ survived the outbreak of disease among Lothar’s army in 839 near Brive-la-Gaillarde (C.1.126) and the *Annales Fuldenses* documents the loss of one third of the population of *Gallia* and *Germania* in 874 (C.1.210) and the deaths of ‘many’ more in an epidemic in 877 (C.1.214). Additionally, Flodoard tells us that very few Magyars survived the *dissenteria* outbreak in *Gothia* in 924 (C.1.260) and that an epidemic stole *in cunctas gentes Germaniae Galliaequae* in 927 (C.1.263). We also read of a pestilence killing ‘many’ in the early 940s (C.1.279).

losses or curb the spread of disease. An alternative route to assess the mortality of individual epidemics would be to consider the working diagnoses advanced in 1.4.2.1.1 and the means by which Carolingian and early Ottonians may have curbed the spread of diseases, and how diseases may be transmitted. Long before the advent of systematic quarantines and vaccination, it may be presumed that human intervention did not in any major way hinder the dissemination of infectious diseases spread between humans.<sup>1157</sup> Indeed, that disease was thought to emanate from the smell of decomposing bodies and sin, as our sources observe (C.1.74, 114, 115, 200, 202, 204, 221) (C.2.44, 45),<sup>1158</sup> conveys the idea that pestilences would have progressed through populations relatively unchecked in our period.<sup>1159</sup>

Epidemics like those of 786, 801, 803, 805, 807/08, 856/58, 882, 889/90, 927 and 934, which were not restricted to an arena of conflict and which do not appear to have been endemic to the areas affected or tied to food shortages, were likely caused by diseases spread via the respiratory tract, such as influenza, measles and smallpox.<sup>1160</sup> These pathogens could have spread between regions and communities along regular routes of communication, trade and travel, royal highways, lesser roads, rivers and seaways.<sup>1161</sup> Though it has been suggested in some histories of disease and medicine that

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<sup>1157</sup> Evidence discussed in 3.2 for the cleansing of livestock stalls following epizootics may indicate that the homes and possessions of sick people too were disposed of; there is no reason to suppose though that such measures were, or could have been, taken pre-emptively.

<sup>1158</sup> However, that disease was universally thought to be the result of sin is unlikely: in their examination of early medieval conceptions of disease etiology, Kroll and Bachrach's argued that disease was not unanimously, or even commonly, thought of as a product of sin, though they considered few Carolingian and early Ottonian examples and focused predominantly on non-pestilential disease: (1988); Horden has also suggested that sin was not often considered the actual cause of sickness in early medieval Greek lands: (2008a), p. 687. As these passages in Catalogues 1 and 2 indicate, however, at least some peoples of Carolingian and early Ottonian Europe attributed not only epidemics but non-pestilential disease in humans, epizootics, food shortages and locust swarms to sin. Einhard's concentration on the 'sweet' and 'alluring' scents emanating from churches and towns before cures of non-pestilential disease took place may be a further indication of the infective and harming properties people attributed to opposing smells of rotting matter: for example, Einhard (1998a), pp. 87, 98. 'Sweet and marvelous' fragrances, in fact, are not infrequently tied to the relics and remains of the Holy. Alcuin, for instance, notes that they emanated from church in the monastery at Echternach where St. Willibrod was buried: (1954), p. 19.

<sup>1159</sup> As several scholars have suggested, for example: Benedictow (2004), p. 40.

<sup>1160</sup> The epidemics of 842/43, 889 and 927, which were characterized by a cough, may have been outbreaks of the former.

<sup>1161</sup> On these routes of communication and trade see Halfond (2009), pp. 1556-558; Verhulst (2002), pp. 93-4. Cf. Stathakopoulos (2004), p. 173. Armies are often thought to have trafficked diseases, spread between humans, long distances, but there is little evidence for this in our sources. The Bavarian continuation of the *Annales Fuldenses* hints that a pestilence broke out in *Bavaria* in 882 after a Bavarian force had returned from *Francia* to *Bavaria*, but the army is not strictly said to have introduced the epidemic to region

population levels in early medieval Europe (until 1000) were unable to support outbreaks of acute infectious diseases,<sup>1162</sup> epidemics of mortal disease clearly occurred in the Carolingian and early Ottonian periods and the spatial contours of some pestilences, such as those possible pandemics of 807/08 and 856/58, were likely quite vast. Yet without solid data on population distribution and density it is difficult to determine how ubiquitous any infectious disease could have been. As demonstrated in 1.4.1.1, most reports of epidemics refer to affected regions and territories, not towns or other settlements, implying epidemics were phenomena not only of urban but rural environments.

The lack of reference to urban environments may be only natural though, as Carolingian and early Ottonian Europe was – unlike late antique Europe, Byzantium, the Middle East or North Africa – predominantly rural. Towns were small and not numerous.<sup>1163</sup> Connections between them, however, were clearly regular enough, and the density of rural populations sufficient, to facilitate and maintain the spread of pathogens between humans.<sup>1164</sup> It has been estimated that one could travel 40 km a day on average on horseback in our period,<sup>1165</sup> and some centers were not too small: Rome, for instance, has been estimated to have numbered 25,000 in our period and some of the emporia, such as Dorestad or Wolin, are thought to have numbered between 1,000 and 8,000.<sup>1166</sup> Considering their international character, the emporia that populated the coasts of the Baltic and North Seas, and the English Channel, may have ensured the interregional spread of disease.<sup>1167</sup> Northern emporia may have facilitated the dissemination of

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(C.1.222). The majority of our epidemics occurred in periods of peace or shortage. That conflict regularly disseminated disease, however, may be overstated: Mark, for instance, notes that ‘armies are commonly assumed to be likely human vectors for the spread of diseases, even if little or no evidence supports such an assumption:’ (2002), p. 285.

<sup>1162</sup> These scholars, as we have seen in 1.1, have viewed the early medieval period (especially post EMP) as being ‘healthy.’ For instance, Todd asserts that the appropriate demographic conditions for bubonic and pneumonic plague, typhus, smallpox and scarlet fever existed in Roman Britain, even as late as the fifth century, but not after: (1977), p. 324.

<sup>1163</sup> Verhulst (2002), p. 21. For a history of the sort of towns that did exist see Verhulst (2000).

<sup>1164</sup> If they were not, epidemics would not appear in the sources.

<sup>1165</sup> McCormick (2001), pp. 477-79. Distances of 70 km per day were possible, though likely uncommon.

<sup>1166</sup> Verhulst (2002), pp. 100, 106; Broich (2001), pp. 187-88.

<sup>1167</sup> Known are Le Panne in Belgium, Quentovic in France, Domburg/Walacria, Dorestad, Medemblik, Westenscjouwen and Wilt in the Netherlands, Emden, Hamburg, Hedeby and Reric in Germany, Dankirke and Ribe in Denmark, Wolin in Poland, Staraya Ladoga in Russia, Aahus ‘I’ and ‘II,’ Birka, Helgo, Loddekopinge, Paviken and Vastergarn in Sweden, and Kaupang in Norway. For an overview on the material and written evidence for these sites see Hill (2001a), pp. 106-10. The size of these settlements

pestilences between continental Europe and England and Scandinavia, while southern emporia, and still functioning ports along the Mediterranean, may have served to transmit disease between continental Europe and the eastern Mediterranean, Middle East and North Africa.<sup>1168</sup> As comparatively densely settled sites with mobile communities, emporia themselves may have been hot spots of infection. Infectious diseases would have also presumably achieved higher rates of prevalence in towns and communities built up around religious centers, as here too contacts between shifting populations of people would have been more regular and constant. Like emporia, interregional fairs may have been gateways for the spread of disease. Presumably, emporia, towns and fairs could have acted like epicentres of infection from which surrounding rural areas were affected, while in rural communities markets may have aided pathogens along.<sup>1169</sup>

Generally speaking, the more densely populated areas would have seen larger losses in respiratory epidemics, again as crowding and higher frequencies of contact between peoples would have facilitated the spread of disease. Towards the upper end of the scale were the Ile de France around Paris, the Po Valley around Milan, and Frisia. The latter, for instance, is thought to have contained 30,000 people.<sup>1170</sup> Larger estates in northern *Francia* also appear to have been densely populated: St. Germain des Prés, for instance, has been estimated to have numbered 39 people per square km and St. Bertin between 20 and 34 people per square km. These areas were uncommon, however, most had densities of between 4 and 12 people per square km.<sup>1171</sup> Still, the population of Carolingian and early Ottonian Europe likely numbered in the tens of millions.<sup>1172</sup>

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varied widely: Hedeby was about 24 ha in the tenth century and Emden about 250 m by 50 m in the ninth century, while Dorestad was about 246 ha. On the international character of these sites see, for instance, Hill (2001b), pp. 80-1. On emporia in the Po Valley in our period: Gelichi (2008). Numerous emporia, which date to our period, have been uncovered in Anglo-Saxon England, and early medieval Ireland and Orkney as well: see Cowie et al (2001) and Hill et al (2001).

<sup>1168</sup> On emporia and their role in international trade see Verhulst (2002), pp. 91-2.

<sup>1169</sup> Rural markets often took place on a weekly basis. Though larger, fairs occurred less frequently. On the rural nature of most markets see Verhulst (2002), pp. 89-91, 97. Unfortunately, as indicated in 1.4.2, we cannot ascertain whether any epidemics or epizootics were pulled to the North and Baltic Sea coasts, or English Channel coast, where emporia existed in great number.

<sup>1170</sup> For these estimates see Verhulst (2002), pp. 100, 106. Population concentrations in these regions have long been emphasized, for instance, Lopez (1976), p. 28.

<sup>1171</sup> Verhulst (2002), pp. 27-8.

<sup>1172</sup> Estimates for the population of Carolingian Europe have ranged between 5 and 26 million: Reuter (1991), p. 94; Herlihy (1974), p. 14. Lot proposed a figure of 15 million for western *Francia* in the reign of Charlemagne. He based his figure on the statistics available in the polyptych for St. Germain and assumed that all of *Francia* would have possessed equal population density. Herlihy surmised that Carolingian

Influenza, measles and smallpox, which are not so acute as to be self limiting like pneumonic plague, could have been spread widely between people and seen to high death tolls.<sup>1173</sup> Though less likely, these diseases could have also been spread indirectly via clothing, bedding and goods, and in some cases, as with influenza and measles, prior to the onset of symptoms.<sup>1174</sup> In populations chronically malnourished by modern standards, like Carolingian and early Ottonian Europe, some diseases, such as influenza and measles, would have also seen higher rates of death, particularly among children. While we should not expect aggregate death tolls in mid eighth- through mid tenth-century epidemics to have been similar in scale or even proportionate to those of ancient and late antique pestilences, on account of smaller concentrations of people and fewer contacts between settlements, a context undoubtedly existed in which infectious diseases could spread in Carolingian and early Ottonian Europe.

If the seventh and eighth centuries had been characterized by an upward demographic swing, we may suspect that a surplus of labour, waiting to fill the void created by an epidemic, existed. As we have seen in 0.1.4.1, however, we can hardly be certain about even general early medieval demographic trends and we have no reason to suppose that the losses sustained in epidemics were easily repaired. This is particularly so if the same areas and populations were repeatedly hit. As we have seen, peacetime pestilences occurred at least once every 6 years and some regions of *Francia* and *Germania* would have been hit at least once every 12 and 18 years respectively. It is impossible to ascertain exactly what regions were affected or how often the same region was afflicted, but it is likely that the populations of many regions were not infrequently eroded by epidemic disease. Peacetime epidemics of primarily non-opportunistic diseases such as influenza, measles or smallpox, moreover, may have been particularly difficult to

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France, on average, likely contained a mere five million people, noting that ‘large, crowded and impacted’ settlements, like that of St. Germain, were uncommon and separated by ‘vast stretches of uncultivated land.’ (1974), pp. 13-4; idem (1982), pp. 139-40. Bachrach summarizes more recent work and argues that Charlemagne’s empire as a whole (not merely what is now modern France but also western Germany, northern Italy, northeastern Spain and much of the Balkans) was populated by 20 million people: (2002), pp. 351-52. Adopting this position allows Bachrach to suggest that Charlemagne could annually raise an offensive army numbering 100,000: (2002), pp. 352-53.

<sup>1173</sup> [www.who.int/mediacentre/factsheets/fs286/en/](http://www.who.int/mediacentre/factsheets/fs286/en/); [www.who.int/mediacentre/factsheets/smallpox/en/](http://www.who.int/mediacentre/factsheets/smallpox/en/); [www.who.int/mediacentre/factsheets/fs211/en/](http://www.who.int/mediacentre/factsheets/fs211/en/).

<sup>1174</sup> Presumably contact with visibly sick peoples would have been avoided, and once severe disease set in people are unlikely to have travelled the distances they regularly travelled or made as many contacts with people as they normally would.

rebound from, more so certainly than the mortalities incurred during subsistence crises, which were Darwinian. If most of the epidemics listed above were like that reported in the *Annales regni Francorum* in 823 – which is said to have cut through *Francia*, killing the ill, old and young, as well as those in the prime of their lives – recovery would have been difficult (C.1.108).

Conflict-oriented pestilences – outbreaks of disease in armies on campaign and at sieges – are a different matter. As suggested in 1.4.2.1.1, these are more likely to have been the result, of ‘modern’ diseases,<sup>1175</sup> of cholera, dysentery, typhoid or typhus, than the chiefly respiratory diseases discussed above. Most of these are food- and water-borne diseases, or in the case of typhus, louse-borne, that spread effectively through populations in kept close quarters and under stress. Diseases such as cholera and dysentery, transmitted via water or food polluted with fecal matter, can cause exceptionally high morbidity and mortality rates. Upwards of 80 per cent of those affected can die and higher rates can be expected among children and throughout a population generally if it lacks previous exposure.<sup>1176</sup> The extremely virulent *Vibrio cholera* can kill ‘within hours’ after the appearance of symptoms. The bacterium is shed, however, for upwards of two weeks prior, allowing for the contamination of water supplies and food, and, subsequently, outbreaks.<sup>1177</sup> In fact, cholera’s course is so severe that 75 per cent of modern cases do not develop symptoms. Typhoid, if untreated, too can spread easily through food and water, as it has recently in Haiti and the Democratic Republic of the Congo, and cause a large number of deaths.<sup>1178</sup> Carried in the gut of the louse, excreted in its feces and spread to the human who scratches the louse bite and contaminates the bite with the feces, typhus is less morbid and mortal, killing an estimated 20 per cent of the infected.<sup>1179</sup> It is probable, considering the mortality rates associated to most of these diseases – the prime candidates known to modern science for the conflict-oriented epidemics of 820, 834, 882, 888 and 924 – that many, as Carolingian and early Ottonian authors relate, would have indeed died in conflict

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<sup>1175</sup> For a definition of modern disease see 1.2.

<sup>1176</sup> Bartlett (2008), pp. 353-54; [www.cdc.gov/ncidod/dbmd/diseaseinfo/cholera/ch3.pdf](http://www.cdc.gov/ncidod/dbmd/diseaseinfo/cholera/ch3.pdf)

<sup>1177</sup> [www.who.int/mediacentre/factsheets/fs107/en](http://www.who.int/mediacentre/factsheets/fs107/en).

<sup>1178</sup> [www.who.int/topics/typhoid\\_fever/en](http://www.who.int/topics/typhoid_fever/en); [www.who.int/csr/don/archive/disease/typhoid\\_fever/en](http://www.who.int/csr/don/archive/disease/typhoid_fever/en).

<sup>1179</sup> [www.who.int/csr/don/archive/disease/louseborne\\_typhus/en](http://www.who.int/csr/don/archive/disease/louseborne_typhus/en).

pestilences. Morbidity and mortality rates would have been much higher in siege or campaign oriented epidemics than in peacetime pestilences.<sup>1180</sup>

Available responses to epidemics, we should suspect, would have done little to offset the dissemination of disease. As in late antiquity and or later medieval periods, early medieval populations are unlikely to have intentionally or effectively curbed outbreaks of infectious disease. Pre-modern medicine was also of little value in the face of acute disease.<sup>1181</sup> The best measure would have been flight, though flight may have exacerbated some epidemics by spreading them. We have no documented cases of this in our source base, which may reflect how common or ubiquitous the response was, at least, we should expect, considering evidence from earlier and later pre-modern periods.<sup>1182</sup> Flight may have been limited to the elite, though that commoners often migrated for food in the midst of subsistence crises (see below), indicates that they too could flee towns, settlements and rural communities once people started dying.<sup>1183</sup> Additionally, we may suspect some degree of economic and socio-cultural deterioration, the looting of the property of the dead, and the disruption of agricultural activity, the distribution of food and the operation of rural markets for instance.<sup>1184</sup> Such disruptions may have been minimal, however, for as we have seen no peacetime epidemic can be said to have triggered a famine let alone a lesser shortage on its own. Losses to productivity, in any event, may have been balanced by a decline in demand.

In the midst of pestilences, people may have often practiced charity and fasted, and the elite may have given alms, as they are known to have in the midst of late antique epidemics.<sup>1185</sup> There are some indications of this in the *Capitulare missorum in Theodonis villa datum secundum generale*. There it is said that one should seek God's mercy through prayer immediately following the outbreak of a pestilence. Likewise, in his *Vita Hludovici pii* the Astronomer tells us that Louis the Pious requested 'frequent

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<sup>1180</sup> Though this would have had a negligible effect on the population as a whole, because armies and the areas involved in the conflicts were small: Halsall (2003).

<sup>1181</sup> Horden (forthcoming); Stathakopoulos (2004), p. 146.

<sup>1182</sup> Late antique texts often record social elites fleeing cities and towns following the irruption of disease: Stathakopoulos (2004), pp. 146-47.

<sup>1183</sup> Destitution and hunger were behind migrations in periods of shortage, however, and people may have been less motivated in epidemics to flee if they did not understand diseases to have been spread between people.

<sup>1184</sup> Stathakopoulos (2004), pp. 153-54.

<sup>1185</sup> Idem (2004), pp. 153-54.



fasts,’ ‘continuous prayers’ and ‘generous alms’ to placate God and quell the pestilences of the early 820s (C.1.110), and the *Annales Xantenses* writes of an edict in 867 that called for a three-day fast as a pestilence was then imminent (C.1.178). In his *Annales*, Flodoard too tells us of a secular elite donating food on a daily basis in the midst of the epidemic of 945 (C.1.292).<sup>1186</sup> Elites and commoners would also have presumably turned to doctors, holy persons and relics once epidemics irrupted, as both Lupus of Ferrières and Flodoard indicate (C.1.147, 292), and as they often did to combat non-pestilential disease in our period, and as elites and commoners in late antique and earlier early medieval centuries are known to have.<sup>1187</sup>

Of course, one necessary response was the handling of the dead. We hear little in our sources about the handling or burying of the dead in the wake of large mortalities. This too may reflect how typical the mass burials were following epidemics, not to mention subsistence crises.<sup>1188</sup> The Bavarian continuation of the *Annales Fuldenses* reports the burying of two bodies in individual graves in the epidemic of 882 and the *Annales sanctae Columbae Senonensis* reports that there were not enough living to bury the dead in the famine of the late 860s (C.1.189, 222). The burying of multiple people in individual graves and the inability of the living to handle the dead are both motifs, though ones Carolingian and early Ottonian authors uncommonly employed. We should not assume, however, that two or more bodies were not on occasion set into a grave usually meant for one, or that managing the dead was not on occasion a challenging logistical task. A concern for the infective effluvia and disease-emitting properties of decaying bodies may have encouraged peoples to have dealt with the dead quickly. Presumably people would have been hired to depose of the dead and we may suspect that the church took a leading role in the clean up after epidemics and shortages, as it seems to have since

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<sup>1186</sup> In a letter dated to 837 and addressed to Louis the Pious we learn that ‘terrible events’ can be averted through repentance and prayer: Thatcher and McNeill (1971), p. 60.

<sup>1187</sup> For doctors, holy persons and relics in earlier early medieval centuries see n. 315 in Part 1; for late antiquity see Stathakopoulos (2004), p. 152. Doctors may have very well only made matters worse, or so our sources, which favor the powers of holy persons and relics, indicate. For instance, Eigil reports a commoner whose sickness was made worse following the administering of a ‘potion:’ (1954), pp. 191, 201; and a man from a royal estate near Aachen, suffering a bowel disease was about to be ‘cauterized’ by a local physician, before he was cured by Einhard’s relics. Einhard notes, doctors administered herbs and incantations in vain: Einhard (1998a), pp. 105-06, 109-10.

<sup>1188</sup> The dead, after all, had to be dealt with somehow.

the late fourth century.<sup>1189</sup> In the wake of spatially vast pestilences, possibly like those of the early 800s, early 820s and mid 850s, not to mention the ten famines of the Carolingian and early Ottonian periods, mass burials must have been carried out.<sup>1190</sup> In addition to such pits, we can suspect, if late antique and early Byzantine evidence can be used as proxies, that storage facilities and homes would have been filled and boarded up.<sup>1191</sup> Otherwise, the unburied may have been consumed by dogs, as Bar Hebraeus reports in his *Chronography* for the famine of the early 940s (C.3.107), and as cattle were following the epizootic of 878 (C.1.215).<sup>1192</sup>

We know a little bit more about the impact of non-pestilential disease. Circumscribed periods of illness in elites forced political and/or military inactivity (C.2.14, 51, 64, 78), the delay of travel (C.2.13, 47, 72, 77),<sup>1193</sup> premature surrendering (C.2.6), and the adoption of monastic life (C.2.24). Elites also regularly sought aid from doctors (C.2.33, 36, 43, 45),<sup>1194</sup> as did the lower social strata,<sup>1195</sup> and both, as we have seen in 1.3, regularly turned to holy persons and relics for healings.<sup>1196</sup> Also noteworthy are Einhard's passing references to the commoners banding together to help the chronically ill; time and again he tells us of kin and friends carrying the ill, on their backs, in carts or on horseback, to the relics of Marcellinus and Petrus.<sup>1197</sup> Merchants too seem to have volunteered and been employed to bring the ill and paralyzed to these relics.<sup>1198</sup>

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<sup>1189</sup> Stathakopoulos (2004), p. 150.

<sup>1190</sup> Noteworthy, however, is the dearth of archaeological evidence for mass burials in our period, though see Part 2 n. 2. Of course, the problems of dating human remains in the Carolingian and early Ottonian periods (discussed in 0.1.5.1) may also be factor here.

<sup>1191</sup> More verbose late antique and early Byzantine accounts of pestilences mention mass burials somewhat regularly: Stathakopoulos (2004), pp. 148-49; also, (C.3.14). This need not mean, however, that mass burials were then more regularly undertaken.

<sup>1192</sup> Reports of dogs consuming the dead (humans and livestock) are not uncommonly encountered in ancient and medieval texts. On carrion-consuming dogs as a motif in pre-modern European literature, see Simoons (1994), pp. 223-24. It appears as though reports of dogs consuming the dead in the Carolingian and early Ottonian periods may have served two purposes.

<sup>1193</sup> In his translation, Einhard also tells us twice of non-pestilential illness delaying or preventing travel: (1998b), pp. 141, 144, 152.

<sup>1194</sup> Charles the Fat also presumably visited a doctor when letting blood from his head: (C.2.56).

<sup>1195</sup> Eigil (1954), pp. 191, 201; also, for instance, Einhard (1998a), pp. 105-06, 109-10, 114-16.

<sup>1196</sup> The emphasis put on Christian healings in our sources, however, may indicate that people most often turned to secular doctors for aid: cf. Stathakopoulos (2004), pp. 150-51.

<sup>1197</sup> Einhard (1998a), pp. 82, 87, 105, 109, 112, 114, 123, 125.

<sup>1198</sup> Though the documenting of this sort of behavior may have simply been meant to encourage it: idem (1998a), pp. 95-6, 129.

While other authors from our period provide similar accounts,<sup>1199</sup> we learn little more about the impact of the undercurrent of disease from written sources.<sup>1200</sup>

In towns, communities built up around monasteries or cathedrals, and emporia, where population density was highest, tuberculosis, which is infectious but for epidemic, as well as endemic intestinal diseases, such as cholera and dysentery would have likely been most common.<sup>1201</sup> These would have taken a regular toll on human lives, accounting for the idea that urban settlements, no matter how small, were population sinks in pre-modern Europe. On a regular basis, losses from diarrheal diseases would have been less than they were during sieges or when settlements were crowded in periods of shortage. The weight loss, fatigue, loss of appetite and fever associated to active tuberculosis, which was plausibly quite common to many Carolingian and early Ottonian rural and urban sites, as we have seen in 1.3, would have undoubtedly limited the mobility and productivity of sick.<sup>1202</sup> Non-pestilential disease resulting in paralysis or tightened tendons, of course, would have also presented extreme limitations to manual work, so too osteoporosis, arthritis. Visual and auditory impairment would have limited one's capacity to fulfill the regular demands of rural labour, and leprosy, though likely less prevalent than *constrictus nervus* or paralysis, with its permanent disability, weakness and atrophy too would have limited one's work capacity.<sup>1203</sup> Like the non-pestilential disease behind the blindness, paralysis, tightened tendons and 'mill hands,' some of which appear to have been quite common in rural Carolingian and early Ottonian Europe, the underlying current of *M. tuberculosis*, *M. bovis* and *M. leprae* would have posed constant demographic constraints.

So too the possibly malarial fevers reported in mid eighth- through mid tenth-century texts, though how significant a factor these possibly malarial fevers were in

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<sup>1199</sup> For example, Alcuin (1954), p. 20; Gregory of Tours (1988a), p. 98.

<sup>1200</sup> Though epidemics are a different issue, in that Einhard and others address family or community care for the chronically ill, we may extrapolate that there were deeply embedded social norms of care for the sick which would have been simply intensified when disease broke out on a larger scale. Presumably, however, this banding together would have done little to curb the spread of disease. Indeed, it may have ensure the transmission of infectious disease between kin.

<sup>1201</sup> Many works promoting this view have been addressed in 1.1; Hays (1998), p. 18, is characteristic.

<sup>1202</sup> [www.who.int/mediacentre/factsheets/fs104/en](http://www.who.int/mediacentre/factsheets/fs104/en).

<sup>1203</sup> [www.who.int/topics/leprosy/en](http://www.who.int/topics/leprosy/en).

northern *Italia* or along the Rhine is impossible to tell.<sup>1204</sup> Considering that large outbreaks repeatedly occurred in our period when individuals and armies passed through northern *Italia* and that fevers appear to have been endemic to the region or at least parts of it, some environments, known by locals to be infected, may have been generally avoided or left unsettled.<sup>1205</sup> If fevers in this region were caused by malaria, we should suspect some degree of immunity to have built up, at least in adults, in local populations which would account for a lower death rate and less severe disease.<sup>1206</sup> However, in the unexposed, higher death rates and more severe cases can be expected. A lack of exposure may account for the four epidemics of fevers in Frankish or early Ottonian forces in northern *Italia* and the feverish deaths of elites noted in 1.3. If the disease did spread along the Rhine and was new there in our period, death tolls may have been particularly high there too, whether *P. falciparum* or *P. vivax*; if the former, death is likely to occur within days, if the latter severe anaemia and respiratory distress can be expected. Relapses could occur for weeks or months. Naturally, both *P. falciparum* or *P. vivax* would have represented demographic constraints, if only locally in areas where the disease was endemic.<sup>1207</sup>

The written and material evidence is minimal, but there is good reason to believe that epidemic disease and the current of non-pestilential disease underlying it represented significant shocks to Carolingian and early Ottonian economy and demography. The sources imply that debilitating, endemic and epidemic diseases regularly affected the lives of many in our period, and some consideration of the contexts in which these diseases occurred, analogies with other periods and working diagnoses, indicates strongly that the diseases of mid eighth- through mid tenth-century continental Europe can no longer be ignored.

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<sup>1204</sup> Over fifty years ago, Rostovtzeff noted that the patchiness of the evidence for malaria in antiquity prevents us from really knowing if late antique depopulation in *Italia* was 'due chiefly to malaria or whether the spread of malaria was due to depopulation:' (1957), p. 740 n. 19. Carolingian and early Ottonian Europe is struck by a similar dearth of evidence.

<sup>1205</sup> That said, Cheyette has suggested that a feature of the reorganization of the countryside, at least in southern *Francia* in Late Antiquity was the movement of communities to the shores of marshes, where birds and fish were available: (2008).

<sup>1206</sup> According to modern population exposure to the disease in Africa: see the following note. Presumably *falciparum* would have been mortal for all.

<sup>1207</sup> [www.who.int/mediacentre/factsheets/fs094/en](http://www.who.int/mediacentre/factsheets/fs094/en).

### 3.2 Livestock disease

As with epidemics, texts report little more about epizootics than the year in which they occurred. On occasion, however, Carolingian and early Ottonian authors do reveal a touch more about the consequences of animal pestilences. Still, most of the attention given to the impact of animal deaths concerns rough estimates of their demographic toll: for instance, the reviser of the *Annales regni Francorum* tells that hardly 10 per cent of Charlemagne's horse survived the equine epizootic of 791 (C.1.50); the Poeta Saxo writes that all cattle died in the panzootic of 809/10 (C.1.86), the *Annales regni Francorum* reports that nearly all animals died in that same pestilence and Notker describes the loss of one hundred oxen that a single bishop sustained (C.1. 87, 92). Of course, it is hard to make much of out these or other vague judgments on mortality.<sup>1208</sup> Moreover, we should not, considering the survey of the form and content of Carolingian and early Ottonian reports of epizootics in 1.4.1, read too much into these 'estimates' or assume that other epizootics not specified to have killed 'many' animals were less mortal. The multiple independent references to large scale bovine mortalities in the 809/10 panzootic, however, strongly implies that many animals did indeed die then. Seemingly more precise estimations should not be taken matter-of-factly: the reviser's claim that about 90 per cent of Charlemagne's horses were lost, Notker's tally of 100 oxen, and claims regarding the complete or near complete loss of bovine stocks across a region or territory should be taken as indications of the severity of the loss, not the exact or even near exact, tallies of dead stock. In the early 1300s, several texts report that all, or nearly all, cattle died of disease, though manorial accounts tell us quite clearly that about 63 per cent of cattle died.<sup>1209</sup>

In addition to these rough estimates of the demographic toll of epizootics, four texts comment on the impact of epizootics on campaigns: the reviser tells us that the 791

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<sup>1208</sup> The *Annales Fuldenses* also tells us that almost no cattle or sheep 'were left alive' following the mortality of 887 (C.1.232), the Bavarian continuation of that text implies that all, or nearly all, of Louis the Younger's horses were lost in the equine epizootic of 896 (C.1.250), and Flodoard reports that few cattle survived the bovine pestilence of the early 940s (C.1.284).

<sup>1209</sup> Newfield (2009). As we have seen, pre- and post-Carolingian texts report stock mortalities in terms quite like those used by the reviser and speak of the death of nine tenths of the afflicted animal. We should not, as such, take the reviser at face value: see n. 237 and 238 above. Like reports of 100 per cent mortalities, reports of 90 per cent mortalities, are mere indications that the mortality was high.

equine epizootic did not derail Charlemagne's campaign against the Avars (C.1.50); the *Annales regni Francorum* observes that the cattle panzootic stripped a Frankish army of its food resources in 810 (C.1.87); Notker also notes that Charlemagne had to call off his northeastern campaign of 810 on account of the bovine mortality (C.1.92); and the Bavarian continuation of the *Annales Fuldenses* reports that foodstuffs had to be carried 'unaccustomedly' on the backs of oxen following the epizootic of 896 (C.1.250). Outside of this military context, the Poeta Saxo reports that the stalls of diseased and dead cattle were cleaned thoroughly after animals were dragged out to fields and that some sick were put out of their misery, killed with a sword, in 809/10 (C.1.86). In his *Historiarum libri iiiii*, Nithard also implies that cattle deaths in the early 840s damaged agricultural production (C.1.131), and the *Annales Fuldenses* tells us that the cattle pestilence of 868/70 caused 'irretrievable loss to many' (C.1.195), presumably in reference to the loss of capital and decline in the aggregate production a pestilence of cattle entailed. Nothing more is said about the impact of stock disease, let alone human responses to epizootics. However, by considering contexts and working diagnoses, and drawing parallels with later epizootics, we can circumvent this dearth of written evidence.

As proposed in 1.4.1.2, the mass of the epizootics reported in Carolingian and early Ottonian texts affected cattle, and as noted in 1.4.2.2.1 we can suspect that the rinderpest virus (RPV) and contagious bovine pleurapneumonia (CBPP), of 'modern' diseases of stock, were behind these pestilences. Though RPV and CBPP can be spread between animals through infected bedding, blood, feces, fodder, semen, tears, water waste and other excretions, both are respiratory diseases, spread most effectively through contact between like animals. RPV and CBPP are capable of infecting a large number of animals in relatively short periods of time, though CBPP is less contagious and less virulent. Rinderpest is thought to have spread across eighteenth century on at least three occasions taking with it an estimated 200 million bovines.<sup>1210</sup> In concerns to contagion, RPV is second only of stock diseases to the foot-and-mouth disease virus (FMDV).<sup>1211</sup> As most modern outbreaks of RPV and CBPP have occurred following the introduction of live, sick cattle into healthy populations, it is essential to consider how interconnected

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<sup>1210</sup> Broad (1983); Faber (1962).

<sup>1211</sup> On RPV see Barrett and Rossiter (1999); on CBPP see ter Laak (1992).

cattle populations were in the Carolingian and early Ottonian periods. Not much has been done in way of early medieval livestock movements to market, patterns of transhumance or interregional cattle trades, let alone early medieval vaccaries. Certainly, continental movements of cattle like those seen in the late medieval and early modern periods were not in place.<sup>1212</sup> Moreover, cattle did not in Carolingian and early Ottonian Europe hold the place they once had in late antiquity and the earliest centuries of the early Middle Ages.<sup>1213</sup> Generally speaking, as mixed farming and cerealization took hold, cattle raising became less common, and the domestic bovine less relied upon for meat and milk than it had been in the Merovingian period or late antique *Gallia* and *Germania*. In our period, pigs and sheep were by far the most numerous stock kept, and pigs the chief supply of meat.<sup>1214</sup>

That said, cattle appear to have been consumed and traded extensively at some emporia in the Carolingian and early Ottonian periods, having been trekked in from the wider region of emporia and, perhaps, interregionally. At most western emporia, in fact, cattle remains account for the vast majority of the animal bones unearthed and in most eastern emporia they are a close second after pigs.<sup>1215</sup> The people of Dorestad, for instance, obtained most of their food from cattle, and Ribe is known to have been a quasi interregional cattle market.<sup>1216</sup> Livestock trade is also known to have been carried out across the eastern Frankish frontier,<sup>1217</sup> and most trade in bulk goods involved two- and four-wheeled oxen-drawn carts.<sup>1218</sup> Throughout the countryside, moreover, bovines were an essential ingredient to arable agriculture, supplying traction and manure, and Campbell has speculated that few medieval arable farmers would have reproduced their own stock

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<sup>1212</sup> Blanchard (1986); Hoffmann (2001), pp. 137-40; Appuhn (2010).

<sup>1213</sup> King surveys the zooarchaeological reports of many sites dating to the fifth, sixth and seventh centuries and finds that cattle formed a major part of the diet then in our region: (1999), p. 187.

<sup>1214</sup> Verhulst (2002), p. 66; Doehaerd (1978), pp. 13, 18; Lewitt (2009), pp. 79-80. Large groups of pastoralists certainly did not exist in our period: Wickham (1985).

<sup>1215</sup> For overviews see O Connor (2010); idem (2001).

<sup>1216</sup> Prummel (1982), p. 117. As is typical, the swine and ovicaprines came next; for Ribe, for instance, see Jensen (1991), pp. 21, 47.

<sup>1217</sup> Verhulst (2002), pp. 111-12. As a capitulary addressed below indicates, foodstuffs were traded with regions east of Frankish and Ottonian Europe. What foodstuffs – grain or livestock – was most regularly trafficked east, however, is uncertain.

<sup>1218</sup> Though the popularity of pack animals, horses, in the transport of goods grew over the period: Halfond (2009), p. 1557.

but relied upon local or regional markets for a steady supply of oxen.<sup>1219</sup> Moreover, cattle were regularly brought on campaigns as baggage animals, but more importantly, as a supply fresh meat.<sup>1220</sup> Though major conflicts were not carried out with regularity in Carolingian or early Ottonian Europe, large forces were regularly marched, and large numbers of bovines trekked, across *Francia* and *Germania* to the frontiers.<sup>1221</sup> Vikings also often raided livestock within *Francia*, moving them between regions. Most overland trade too involved two- and four-wheeled oxen drawn carts. Additionally, and most importantly perhaps (considering that many Carolingian and early Ottonian epizootics occurred in times of shortage), famines would have served, as several scholars have speculated, to spread disease between animals.<sup>1222</sup> Clearly, just as a context existed for the spread of human diseases, so too did a context exist for the dissemination of diseases between cattle.

In areas more densely populated with bovines, rates of morbidity and mortality in outbreaks of RPV or CBPP would have been more pronounced as contacts between like animals would have been more frequent and regular.<sup>1223</sup> Some regions, like Frisia and area around Trier,<sup>1224</sup> are known to have raised large numbers of cattle and if cattle numbers rarely exceeded draught requirements on individual farms and estates and draught was regularly resourced off the farm, we should suspect that cattle-dense farming operations, or vaccaries, existed in most areas. Clearly, contacts and population densities were sufficient to allow the wide dissemination of diseases among bovine stocks in Carolingian and early Ottonian Europe, as the panzootic of 809/10 and possible panzootic of 868/70, demonstrate. Consideration of these routes of transmission and some areas

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<sup>1219</sup> Campbell (2000), pp. 132, 135, 139-45. The growth of arable in the Carolingian and early Ottonian periods would have made the oxen more valuable than it had been previously.

<sup>1220</sup> Bachrach (1993), pp. 711-18. As noted in the Bavarian continuation of the *Annales Fuldenses*, horses, mules or donkeys may have been more typical baggage animals: (C.1.250).

<sup>1221</sup> A factor which may have, incidentally, contributed to the spread of human diseases too.

<sup>1222</sup> For instance, Jones (2003), pp. 31-2; Newfield (2009), p. 176; Golkin also implies this: (1987), p. 18. Several scholars have suggested that the extreme weather of bad harvest years itself promoted the dissemination of livestock diseases, but it would seem, rather, that the gestation of epizootics owed to the socio-economic effects of poor harvests. For instance, Brázdil et al suggested a causal relationship between short-term climatic anomalies and epizootics: (2005), p. 403; for other examples see Newfield (2009), p. 177-78, n. 88. Cattle, for instance, may have been trekked greater distances to pastures or markets, or been sold and bought with greater regularity during subsistence crises. Animals may have also been imported from unfamiliar and unaffected regions.

<sup>1223</sup> The farmer with larger herds, as such, stood to sustain more losses.

<sup>1224</sup> Verhulst (2002), p. 66; Doehaerd (1978), p. 12.



more densely populated with bovines than others, such as the northern fringe of Carolingian and early Ottonian Europe, allows us to suspect that large numbers of animals would have indeed died in the pestilences of 801, 809/10, 820, 860, 868/70 and 939/42, had RPV been the cause. Most of the animals infected with RPV would have succumbed, as the disease appears never to have been enzootic to Europe and mid eighth-through mid tenth-century bovines, like fourteenth-century cattle, would not have possessed any immunity.<sup>1225</sup> CBPP would have also made for a noteworthy mortality though ultimately fewer deaths.

As noted, sheep would have been more commonly encountered across much of Carolingian and early Ottonian Europe, though they would not have necessarily trekked long distances to pasture, market or on campaign like cattle. Large populations are thought to have existed in several areas, along the North Sea coasts of the Netherlands and Belgium for instance.<sup>1226</sup> The sole report of the ovine mortality in Catalogue 1 in 887 implies the disease spread over a general area (*Francia*) amongst sheep and that mortalities ran high (C.1.232). While the spatial vastness of the pestilence documented to in *Annales Fuldenses* may have been in reference to the cattle pestilence also documented in that year, especially considering the greater opportunity for bovine diseases to spread widely, we have no reason to doubt that mortality rates in sheep were indeed high. As suggested in 1.4.2.2.1, this may have been, of ‘modern’ diseases, sheep pox. This virus, which can survive in scabs on recovered animals for multiple years, is a respiratory disease spread most effectively via direct contact between sheep and goats, though it can also remain active in wool for upwards to two months. Animals can also fall sick following contact with infected fodder or pasture. Mortality rates are low where the disease is endemic, though they can climb to over 50 per cent in areas where the disease is epizootic.<sup>1227</sup> Other more virulent diseases, including peste des petits ruminants however, may have been at the root of the 887 pestilence. This virus is also spread between like animals, but has a mortality rate approach 100 per cent in previously non-

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<sup>1225</sup> Barrett and Rossiter (1999); Newfield (2009), p. 179. On the suspected RPV diagnosis of the fourteenth century panzootic see idem (2009), pp. 158-59, 176, 179-80, 189; Campbell (2010), p. 289.

<sup>1226</sup> Verhulst (2002), p. 66.

<sup>1227</sup> [www.oie.int/eng/maladies/fiches/a\\_A100.htm](http://www.oie.int/eng/maladies/fiches/a_A100.htm).

afflicted areas.<sup>1228</sup> Either virus could have spread as far as contacts between live animals would have taken them, though the later would have resulted in a greater mortality.

There are, similarly, few grounds on which to diagnosis the equine plagues of 791 and 896 (C.1.50, 250), though we may speculate, as noted in 1.4.2.2.1, that strangles was a primary cause. However, though this disease is highly contagious and spread effectively between healthy and sick horses, donkeys and mules, *Streptococcus equi equi* is considered, like equine influenza, to cause low mortality, unlike, for instance, the pathogen behind the 791 epizootic, at least according to the revised *Annales regni Francorum*.<sup>1229</sup> Of course, in mid eighth- through mid tenth-century Europe, both of strangles and equine influenza may have been more virulent. Considering the dependence in the Carolingian and early Ottonian periods on equines in conflict and for travel and communication, both would have had several means by which to disseminate across a large area of Europe, infecting horses, mules and donkeys.<sup>1230</sup> That the equine ninth-century epizootics appear to have been local in scope, however, complicates our assessment of these diagnoses.

We may suspect that the response to epizootics would have been rather minimal in Carolingian and early Ottonian Europe and that livestock pestilences, like human pestilences, for the most part spread uninterrupted by human intervention.<sup>1231</sup> We hear nothing in the sources of preventive measures, flight, quarantines or culls.<sup>1232</sup> The Poeta Saxo reports the slaughtering of sick animals (C.1.86), but not the culling of the healthy. The slaughtering, as such, was not done pre-emptively to preserve the whole value of animal, its meat or, depending on the nature of the disease, its hide. The dragging of dead and diseased animals from stalls to fields, found in the poet's account of the 809/10 panzootic and the *Annales Fuldenses*' report of the 878 epizootic (C.1.86, 215), also

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<sup>1228</sup> Barrett, Pastoret and Taylor (2006); [www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/56100.htm&word=Peste%20des%20petits%20cruminants](http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/56100.htm&word=Peste%20des%20petits%20cruminants).

<sup>1229</sup> [www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/121309.htm&word=strangles](http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/121309.htm&word=strangles); [www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/121303.htm&word=Equine%20influenza](http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/121303.htm&word=Equine%20influenza)

<sup>1230</sup> The existence of many stud farms for the production of warhorses also ensured that the disease could have in some regions caused extensive mortalities: Hyland (1994), pp. 62-3.

<sup>1231</sup> Cf. Slavin (2010), p. 171.

<sup>1232</sup> We may suspect that it is very unlikely most farmers or landlords would have freely culled their healthy stock without some form of insurance or compensation: Matthews (2005), p. 193. Widespread culls would have, in any case, required extensive human resources, a strong ruling class and quick communication between regions: Jones (1978), pp. 116-18.

points to the fact that animals were not pre-emptively culled, as do, of course, the many reports of widespread disease occurrence.<sup>1233</sup> Indeed, that several pestilences clearly spread over several regions of *Francia* and *Germania* signifies that Carolingians and early Ottonians were generally incapable of curbing the spread of diseases between stock on an interregional scale. Presumably food shortages or outbreaks of disease in human populations, both of which were concurrent to many epizootics in the Carolingian and early Ottonian periods (in, for example, 801, 809/10, 820, 842/43, 860, 868/70, 878, 887 and 939/42), would have complicated attempts to prevent the spread of the disease on a general level.

More success, however, may have been had on a local scale, as snippets of information from high Middle Ages indicate. Albertus Magnus, for instance, stipulated that a rabid dog be kept separate from other dogs to prevent the spread of infection and a late medieval veterinary treatise advised equines afflicted with scab be isolated from like animals for the same reason. Donkin also found that twelfth-century Cistercians in some regions of northwest Europe deliberately folded their sheep in areas where sheep were not suffering disease, and it has been suggested that the deliberate isolation of some herds in the midst of the fourteenth-century panzootic may account for the spatial unevenness of that pestilence's mortality.<sup>1234</sup> Some Roman agricultural and veterinary treatises, such as those of Columella and Vegetius, also provided simple instruction on how to deal with disease outbreaks among cattle (advising one separate the 'diseased' from the 'sound') that were drawn upon in the eighteenth century and later to stamp out outbreaks of what are thought to have been CBPP, FMDV and RPV. But there is no evidence for the implementation of the procedures in antiquity let alone the early Middle Ages.<sup>1235</sup> That later agricultural treatises fail to mention the benefits of isolation altogether may indicate that the ancient advocating for stock quarantines may reached few post-antique ears.<sup>1236</sup>

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<sup>1233</sup> For instance, (C.1.85, 87, 88).

<sup>1234</sup> Albertus Magnus (1987), p. 84; Svinhufvud (1978), p. 109; Donkin (1978), p. 95; Newfield (2009), p. 188; Slavín (2010), pp. 170-71.

<sup>1235</sup> Columella (1955); Vegetius (1903); Wilkinson (1992), pp. 11-5. These texts were transmitted throughout the Middle Ages and copies of at least Columella's text are known to have existed in ninth-century Europe, though they were rare: McKitterick (1989), p. 249; idem (1994), p. 39.

<sup>1236</sup> Walter of Henley's agricultural treatise (written c. 1286), like Petrus de Crescentiis (c. 1300), not to mention the *Seneschaucy* (c. 1270) and *Anonymous Husbandry* (c. 1300), provide no guidelines, or practical procedures, to tackle the spread of communicable disease in livestock. For Petrus' *Ruralia Commoda* see

The Poeta Saxo and *Annales Fuldenses* emphasis on the removal of dead and diseased animals from their stalls and the thorough cleansing of animal stalls implies that mid eighth- through mid tenth-century Europeans were generally concerned about limiting the contact between healthy and sick animals (C.1.86, 215).<sup>1237</sup> Some Carolingians and early Ottonians may have also turned to pre-veterinary medicine, charms, holy persons or relics. Such measures, however, would have done little against the virulent diseases reported in our texts.<sup>1238</sup> Few if any other methods would have been available to offset the impact of communicable disease in stock.<sup>1239</sup>

The impact of livestock mortalities is quite varied, affecting both human economy and human health. Chiefly, in the early Middle Ages livestock were a chief form of capital and moveable wealth, and a loss of stock meant a loss of purchasing power and entitlement to food. More specifically, as noted in 1.4.1.2, mortalities of bovines meant a loss of meat and dairy, as well as the primary source of traction and manure necessary for arable agriculture.<sup>1240</sup> Furthermore, cattle supplied a range of by-products – bones, hides and sinew for instance – that may not have been harvested from animals that died of disease.<sup>1241</sup> In the wake of cattle epizootics, then, people would have suddenly been without the trucks and tractors of agriculture and a large supply of meat and dairy. Both

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Petrus de Crescentiis (1995); for Walter of Henley, the *Seneschaucy* and the *Anonyomous Husbandry* see Oschinsky (1971).

<sup>1237</sup> However, as with outbreaks of disease in humans, outbreaks of disease in stock may have been thought to spread primarily between the effluvia emitted from decaying bodies.

<sup>1238</sup> In the Anglo-Saxon *Lacunga* are found charms for livestock. The first of these reads, ‘if the cattle are dying: into holy water put groundel and springwort, and the laower part of attorlothe, and clivers. Pour into the mouth; soon will they mend’. Also included are remedies for ‘lung-trouble’ in cattle (which involves Holy Water again); remedies for ‘broken down sheep and sudden mortality [presumably in sheep]’; ‘pocks and scab in sheep’; and ‘sudden death in swine.’ Grattan and Singer (1952), pp. 176-79. Also see 1.3 for discussion of some pagan cures and Christian healings of stock sick with non-pestilential disease.

<sup>1239</sup> In the early fourteenth century, there is much evidence, at least in England, for the widespread pre-emptive selling of healthy animals: Slavin (2010), p. 171; Newfield (2009), p. 185. There is no evidence for this prior to 1250, however, and it is uncertain, if such panic selling occurred in the Carolingian and early Ottonian periods, who would have bought large numbers of animals and how such sales would have been carried out.

<sup>1240</sup> Horses may have been employed as draught, but as we have seen in 0.1.4.1, it is uncertain how widespread the padded horse collar and horse shoe, known in antiquity were in the early Middle Ages. Moreover, we should not suspect that a sufficient number of equines were ready and available for ploughing in the immediate wake of a epizootic, or, further, that commoners had access to equines. Sheep dung and legumes and vetches could have been used as alternative fertilizers, but it is uncertain, as discussed in 0.1.4.1, whether the latter were widely grown or available, and we should not suspect that all farms or estates had enough sheep to make up for the loss of cattle manure.

<sup>1241</sup> As the Poeta Saxo and the *Annales Fuldenses* indicate when noting animals were dragged from their stalls and left in fields: (C.1.86, 215).

yields and, more notably, the land brought under the plough would have shrunk, resulting in a decline in the aggregate production of grain.<sup>1242</sup> Cattle mortalities also meant, consequently, a decline in available calories and protein for the human diet, as well as, a decline in the quantity of fodder stocks for surviving animals.<sup>1243</sup> There is little evidence, however, that cattle epizootics or panzootics resulted in harvest failures and shortage conditions on their own in Carolingian or early Ottonian Europe, as observed in 1.4.1.2 and 2.4.4. Though cattle pestilences on several occasions – c.820, c.860, c.869 and c.940 – occurred contemporaneously to food shortages, it is impossible to discern whether cattle died prior to the onset of the shortage or in its wake. Unfortunately, better documented medieval cattle epizootics provide little further insight on this matter.<sup>1244</sup>

In the wake of ovine mortalities, people were without meat, milk and several byproducts, wool most importantly, and equine mortalities prevented serious constraints to military mobility, as Gillmor has shown, and normal communication and travel.<sup>1245</sup> That people ate animals that died of disease is uncertain, though we may suspect not improbable in periods of shortage.<sup>1246</sup> Again, the abandoning of dead animals in fields for dogs to consume implies that the flesh of diseased animals was not generally consumed.<sup>1247</sup> In the early fourteenth-century cattle panzootic, there is also some indication that people did consume the bodies of the dead animals: while *Johannis de Trokelowe* and *Edmund of Dynter* refer to humans refraining from the consumption of the meat of cattle that succumbed to the infection, the *Chronicon Lanercost* and, together

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<sup>1242</sup> Stathakopoulos suspected that cattle mortalities would have brought lower yields, though the reduction of the area of cultivation in lieu of oxen likely accounted for a more significant hit to agrarian agriculture: (2004), p. 162; Newfield (2009), pp. 156-57.

<sup>1243</sup> Protein in the form of dairy and meat: see Slavin's reckoning of some high medieval data: (2010), pp. 172-74.

<sup>1244</sup> Whether the fourteenth-century panzootic resulted in harvest failures is uncertain. Though the spread of disease then was temporally and spatially restricted to the period and area affected by the GEF, it is uncertain whether the pestilence began prior to the onset of the famine in central Europe and, thus, if it contributed to the dramatic harvest failures of the early years of the GEF. That harvests failed across central, northern and northwestern Europe c.1315/17 despite the fact that the pestilence, by 1317, had only made it as far west as the Low Countries, indicates that the decline in bovine stocks was not fundamental for the initial harvest failures. However, once the pestilence irrupted into England, where manorial accounts allow for a more detailed reconstruction of its dissemination and agrarian impact, yields and arable acreage did indeed fall for consecutive years: Slavin (2010), pp. 170-71, *passim*; Campbell (2010), pp. 288-291, 293.

<sup>1245</sup> Gillmor (2005), pp. 44-5.

<sup>1246</sup> We may suspect that at least pigs could have ate the bodies of animals that died from disease: cf. Simoons (1994), p. 74; Jordan (1996), p. 55; O Connor (2010), p. 7.

<sup>1247</sup> See above note.

with high and late medieval laws forbidding the selling of ‘diseased meat,’ give an opposing view.<sup>1248</sup> While the *Annales regni Francorum* indicates that diseased animals were not consumed when noting that the 809/10 panzootic stripped Charlemagne’s army of its supply of meat (C.1.87), the *Capitulare de Villis* signifies that commoners may have regularly ate diseased animals, when noting that the elite would not eat diseased stock.<sup>1249</sup> Whether the sick animal died naturally of disease or were slaughtered may be the chief issue here, as the consumption of carrion was forbidden.<sup>1250</sup> At least one scholar has suggested that diseased animals were normally consumed if they were slaughtered in the high medieval period,<sup>1251</sup> and in this light the Poeta Saxo’s emphasis on the slaughtering of sick animals may be an indication that the ill that were indeed killed so that they could be consumed (C.1.86).

Compounding the initial loss of stock was the problem of restocking. We should not imagine that herds would have been replaced rapidly. As Slavin’s assessment of high medieval manorial accounts indicates, in large mortalities of cattle in pre-modern Europe, it could take five to twenty years to restock after a mortality in the range of 60 per cent.<sup>1252</sup> If the epizootics of the Carolingian and early Ottonian period were RPV or CBPP, we can suspect that animals of all ages would have died, as these diseases, like influenza or smallpox in human populations, cut through bovine populations affecting the young, old, ill and healthy near equally. Biologically, cattle restocking would have been time consuming. The gestation period of a cow today is roughly 9.5 months, though we may suspect that in a period in which cattle sustained some degree of chronic hunger and non-pestilential disease, and in which cattle may have regularly suffered epidemic malnutrition,<sup>1253</sup> that the gestation period may have been longer and premature and still births more common, especially in periods of shortage.<sup>1254</sup> Though a cow can normally be bred fifty days after calving, it rarely produces more than a single calf and a calf does not

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<sup>1248</sup> Newfield (2009), pp. 161-62, 164, 183.

<sup>1249</sup> Dutton (2008), p. 88; also see 1.3 for discussion on the *Capitulare de Villis*.

<sup>1250</sup> On the other hand, the *Annales Fuldenses* treatment of the consumption of carrion in a shortage in 850 (C.1.149), in which the annalist emphasizes the forbidden nature of the act, may indicate that commoners regularly resorted to consuming carrion, and that the eating of diseased animals was not widely disapproved.

<sup>1251</sup> Searle (1974), p. 295.

<sup>1252</sup> Slavin (2010), pp. 179-81.

<sup>1253</sup> In periods of shortage that is: see 3.3 below.

<sup>1254</sup> See 1.3 and 3.3 for more discussion.

reach sexual maturity for a year, meaning that it would be of little value as an effective source of traction before 12 months. Moreover, in the early Middle Ages we may suspect that sexual maturity was delayed and that cows required a longer period of rest between calving and breeding. Sheep on the other hand would have been replenished much more quickly, as their gestation period would have been about 6 months and multiple lambs could be expected per birthing cycle. Horses, though, would have taken some time to replace with a gestation period in the range of a year and twins being exceptionally rare. Compounding one's ability to find replacement stock, would have been high market prices: as supplies plummeted in the wake of epizootics, demand would have escalated, and the purchasing power of many farmers and landlords may have taken a significant hit.<sup>1255</sup> We may suspect that people increased their stocking densities of other animals, poultry and swine for instance,<sup>1256</sup> but the loss of bovines, sheep or horses, would have been difficult still to absorb and mend.

Little can be said about the impact of non-pestilential disease in stock. In general, the reproduction capacity of animals diminished greatly when animals were sick, though the chronically ill may have been slaughtered for food. Endemic diseases, such as *M. bovis* however, could inhibit reproduction, see to more premature and still births, damaged hides, and lower yields of meat and milk.<sup>1257</sup> The chronic joint diseases typical of pre-modern European stock, such as osteopetrosis, could also jeopardize skeletal integrity and like circumscribed periods of illness limit an animal's work capacity. In response, Carolingian and early Ottonians may have turned to charms and relics, traded the sick for other commodities or prematurely slaughtered them for food and byproducts.

The written and material evidence is minimal, but there is good reason to believe that epizootic disease and the current of non-pestilential animal disease underlying it represented significant shocks to Carolingian and early Ottonian economy and, through economy, demography, as losses of domesticates, cattle in particular, meant direct losses to human food and indirect losses to human food production. This, undoubtedly, was what lay behind the *inrecuperabilis damnum* referred to in the *Annales Fuldenses* in an account of the cattle epizootic of 868/70 (C.1.195). The sources imply that epizootic

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<sup>1255</sup> As in the high Middle Ages: Newfield (2009), pp. 157-58; Slavin (2010), p. 175.

<sup>1256</sup> Idem (2010), pp. 177-79.

<sup>1257</sup> Idem (2010), p. 172.

diseases affected the lives of many domesticates in our period, and some consideration of the contexts in which these diseases occurred, working diagnoses, and analogies with other periods indicates strongly that the stock diseases of mid eighth- through mid tenth-century continental Europe should no longer be ignored.

### 3.3 Food shortages

Carolingian and early Ottonian authors reveal much more about the impact of food shortages than epidemics or epizootics. They also provide information about how people, elites and commoners, sought to offset their effects.<sup>1258</sup> As with pestilences of humans and stock, however, the demographic effects of shortages are hard to gauge. The best the primary sources offer are several rough estimations of shortage mortality. For instance, the *Chronicon Moissiancense* tells us that ‘many’ died in the crises of the early 760s and 790s (C.1.18, 59), while Ardo Smaragdus, in his *Vita Benedicti abbatis Anianensis*, documents multiple deaths in the shortages of the early 790s (C.1.60) and Notker writes that the shortage then *orbem universum depopularetur* (C.1.61). The *Annales Bertiniani* also reports that ‘thousands’ died in the crisis of the mid 840s (C.1.), and several texts stress that the mortality of the famine of the late 860s was great: the *Annales Xantenses* reports that ‘many’ died and later that ‘a great number of people enjoyed a bitter death’ (C.1.178, 192), the *Annales Fuldenses* that that shortage caused an ‘immense loss of life’ (C.1.183), the *Annales Bertiniani* that ‘many thousands of people’ died (C.1.184), and *Annales sanctae Columbae Senonensis* that a ‘multitude’ died, fifty-six in a day in Sens (C.1.189). These and like estimates,<sup>1259</sup> provide little room for analysis, though we may be certain, given the number of independent and contemporary references to mass mortalities, that the death toll of the famine of the late 860s was indeed great. As we have seen in 2.4.1.1, most of the emphasis placed on the mortality in these texts is typical of shortage reporting and not necessarily indicative of the particularly extreme nature of any

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<sup>1258</sup> The relative wealth of data on the impact of, and responses to shortages indicates that shortages were more complex events than epidemics and that a greater array of coping strategies was available to early medieval peoples in times of want than in times of disease.

<sup>1259</sup> In addition to these rough estimates, the *Annales Fuldenses* reports that ‘many’ died and later that ‘nearly a third of the population’ succumbed in the crisis of the early 870s (C.1.200, 209), and the Bavarian continuation of that text twice documents ‘many’ deaths in the shortage of the mid 890s (C.1.243, 253).



of these crises. Certainly other crises, famines and lesser shortages alike, that are not said to have resulted in ‘many’ or ‘a considerable number’ of deaths should not be sidelined as not especially mortal events.

As noted with respect to epidemics, had the century or centuries prior to the Carolingian been demographically positive we may suspect that there was a surplus of human resources waiting to fill the void subsistence crises generated, at least in the short-term, but we can hardly be certain about such matters. That the famines of Carolingian and early Ottonian Europe are likely to have had major short-term demographic repercussions, as did other pre-modern European periods of food crisis, and that famines occurred regularly in the Carolingian and early Ottonian periods, signifies that the human resources any century-long period of population growth could have furnished would have been eroded. Studies on modern developing world shortages, and even high medieval, late medieval and early modern European shortages, have shown that famines represent complex demographic impacts.<sup>1260</sup> The famine profile these studies illuminate may help us illuminate the Carolingian and early Ottonian experience.<sup>1261</sup> In the first instance, increased incidence of non-opportunistic epidemic diseases, both of the respiratory tract, and food- and water-borne pathogens, characterize famine mortality and result in excess deaths. Unusual crowding and movements of populations for food and work are routinely associated to the spread of non-opportunistic infectious diseases, such as smallpox, in times of famine, so too the wider circles of trade that typically generate in the wake of failed harvests.<sup>1262</sup> Crowding and the increased intensity of poor hygiene also contribute to more deaths from food- and water-borne diseases, such as cholera and dysentery. Many modern developing world shortages, over the nineteenth and twentieth centuries, have been marked by smallpox, cholera and dysentery.<sup>1263</sup> As we have seen in 3.1, these diseases on their own can take a significant demographic toll. When coupled with starvation and malnutrition, which can result, through the inhibition of the immune function, in more severe disease and higher rates of morbidity and mortality in non-

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<sup>1260</sup> As we have studied, when defining famine and lesser shortages, in 2.2.1.

<sup>1261</sup> Many theorists and historians regard this ‘profile’ as universal to the famine experience, see citations below.

<sup>1262</sup> See 2.2.1.1.2. Carolingian and early Ottonian evidence for crowding and migrating in times of shortage is addressed below.

<sup>1263</sup> Mokyr and O Grada (2002), pp. 29, 38; Maharatna (2002), p. 118; Jannetta (1992), p. 433.

opportunistic diseases, as well as opportunistic and metabolic diseases, including rickets, scurvy and tuberculosis, which may become epidemic in famines, famines can produce profound excess mortality.

Famines also, however, result in steep declines in fecundity and fertility, which normally persist throughout the shortage.<sup>1264</sup> Declines in fecundity, the biological capacity to reproduce, stem directly from dearth: with calorie starvation, sperm mobility and longevity decrease, and women stop menstruating and ovulating. Amenorrhea and atrophy owe both, however, to acute nutritional stress and physiological effects of famines produce.<sup>1265</sup> The overall decline in fertility, on the other hand, results both from the decline in fecundity and from the effect famine has on marriage and intercourse rates.<sup>1266</sup> Lethargy can be widespread in crises resulting in a decline in libido and less frequent copulation, and migrations for food serve to separate couples and reduce rates of marriages. Voluntary fertility control through abortion and abstinence too are common in modern developing world food shortages, though we have no way of knowing whether such measures were practiced in the early Middle Ages. For the ninth months after the cessation of shortage conditions, fertility often takes a dramatic decline. In the Dutch ‘Hunger Winter’ of 1944/45 and Bangladeshi famine of the mid 1970s, for instance, the birth rate was about 50 per cent below average nine months after the shortage. In some other modern shortages the decline has been more drastic, approaching in some instances 100 per cent.<sup>1267</sup>

Generally speaking, the starvation and opportunistic diseases characteristic of shortages affect infants, children and the old, on account of the poor immune function of these age groups, lower birth weights in regard to infants and, in regard to children, the higher nutrient and calorie demands of the body prior to puberty. Pregnant and lactating women also suffer on account of their higher nutrient and calorie demands.<sup>1268</sup> Moreover,

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<sup>1264</sup> Bongaarts and Cain (1982); Hugo (1984); Bongaarts (1980), pp. 401, 405; Jordan notes this in relation to the GEF: (1996), p. 123.

<sup>1265</sup> Rivers (1988), *passim*; Bongaarts (1980), p. 105; Bongaarts and Cain (1982), p. 48.

<sup>1266</sup> Stathakopoulos comments on this in a late antique context: (2004), p. 161; so too does Campbell in high medieval, late medieval and early modern contexts: (2010), pp. 292, 293-95; *idem* (2009), pp. 23-5; Sella also addresses fewer marriages on account of migrations in early modern Italy: (2008), p. 468.

<sup>1267</sup> Bongaarts (1980), pp. 104-06. At Leningrad the fertility decline approached 100 per cent: Bongaarts and Cain (1982), p. 48. Infant and child mortality also increase dramatically at the height of the crisis: Ashton et al (1984), pp. 614, 616-17.

<sup>1268</sup> Bongaarts (1980), p. 105; Bongaarts and Cain (1982), p. 46.

it is known that famines take a significant toll on children conceived prior to the onset of shortage conditions and born in famines, worse, in fact, than children conceived in famine conditions, when females are under heavy nutritional stress, and born after shortage conditions conclude.<sup>1269</sup> However, while chances of survival may be better in those conceived in famines, many scholars still stress that most famine conceptions result in pre-mature or still births.<sup>1270</sup> Lastly, of healthy adults, men regularly die in greater numbers in shortages than women, which would doubtlessly result in greater losses to agrarian productivity. The reasons for this are many, though it appears nearly all are applicable to Carolingian and early Ottonian Europe.<sup>1271</sup>

These short-term demographic impacts, however, are typically followed in modern developing world shortages by short-term baby-booms, lasting upwards of 2 years.<sup>1272</sup> Though epidemics of non-opportunistic diseases cut through populations in periods of want, affecting the young, old and ill, as well as those in the prime of their life, the mortality associated to opportunistic disease and starvation is, as noted, Darwinian.<sup>1273</sup> Consequently, a population's demographic profile following a shortage is generally more robust than it was prior with more individuals at an age favourable to procreation. Still, these baby booms have proven to be short-lived and not nearly proportionate to the excess deaths incurred in famines.<sup>1274</sup> Considering that the normal birth rate generally returns 2 years after a shortage and that the death rate would have far exceeded the birth rate in the midst of famines, famines would have resulted in significant demographic declines in mid

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<sup>1269</sup> Hart (1993), pp. 43-6; Bongaarts and Cain (1982), pp. 47-8.

<sup>1270</sup> Moreover, the low rates of fertility and fecundity typical of famines make conception far less likely in famine, rather than prior to the onset of shortage conditions.

<sup>1271</sup> Women have higher levels of body fat than men, allowing them to withstand dearth longer; they are smaller and require, as such, fewer calories to maintain physiological function; lastly, they are also less likely to migrate for food or work and are, consequently, less likely to be exposed to disease or conflict. Normal causes of mortality for women also decline in periods of famine. The decline in fertility and fecundity, for instance, reduces the likelihood of dying in childbirth and the nutritional stress put on the pregnant body: Macintyre (2002), pp. 254-56; Adamets (2002), p. 173. How applicable the 'female advantage' is to mid eighth- through mid tenth-century shortages is hard to say. As we have seen, women are often noted in late antique and early medieval accounts of shortage migrations (though this may signify that women migrating for food was exceptional), and some historians of modern subsistence crises warn that this advantage would have only expressed itself in lesser shortages, as the higher body fat stores of women would only offer an advantage for a limit period of time. We may suspect that females did well in comparison to men in lesser shortages, but died proportionately to men in famines. Of course, in outbreaks of non-opportunistic disease famine conditions engendered, males and female were equally vulnerable.

<sup>1272</sup> Bongaarts and Cain (1982), pp. 47-8.

<sup>1273</sup> Rivers (1988), pp. 90-98; Bongaarts and Cain (1982), pp. 47, 49.

<sup>1274</sup> In particular, see the graph in Bongaarts and Cain (1982), pp. 47, 49.

eighth- through mid tenth-century Europe, if this model is wholly applicable to early medieval Europe.<sup>1275</sup> That several Carolingian and early Ottonian famines appear to have been 2 to 4 years in duration emphasizes this point, however: if a 2-year baby boom in the wake of a famine was unable to make up for 1 year of excess famine deaths, as modern theorists argue, a shortage of 2 to 4 years would have presumably taken at least 4 to 8 years to come back from. This estimate appears to be in line with recovery rates assigned to other pre-modern European shortages, as well as pre-modern shortages in Japan, which are thought to have seen death tolls in the range of 10 to 20 per cent.<sup>1276</sup>

Shortages may have also had significant effects on livestock, especially those stall-fed over winter.<sup>1277</sup> When harvests failed in pre-modern Europe we should also imagine that the food supplies available to livestock, like those available to humans, declined. Poor harvests meant not only poor supplies of grain for human consumption but also weaker fodder supplies, and the environmental conditions behind some shortages may have damaged pastures, meadows as well as hay and straw production and the non-cereal vegetation that stock depended on.<sup>1278</sup> The *Annales Xantenses* writes of insufficient fodder in the wake of a harvest failure of the early 850s that was brought on, it seems, by heavy rain and then drought (C.1.152),<sup>1279</sup> and the *Annales Fuldenses* records stock dying of hunger in the wake of a harvest failure brought on by a hard winter in the early 880s

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<sup>1275</sup> On death rates exceeding birth rates in times of famine see 2.2.1.1.2.

<sup>1276</sup> Campbell (2010), pp. 287, 292; Jannetta (1992), pp. 427-29; Jordan (1996), pp. 117-48, 161-62; Appleby (1980); Hybel (2002), p. 281; Watkins and Menken (1988), p. 167.

<sup>1277</sup> We are thus concerned with domestic bovines, equines, ovicaprines and swine. Though some stock would have been slaughtered on an annual basis, most animals would have suffered 'shortage' winters when they occurred: in his survey of deadstock at many sites in northern continental Europe dating to our period, O Connor finds that bovines were normally slaughtered when between 3 and 5 years of age, ovicaprines between the 15 and 27 months, and swine between 12 and 30 months: (2010), pp. 11-2.

<sup>1278</sup> Establishing how severe and protracted the damage would have been, however, is difficult. Attention to the impact of weather conditions would be needed on a regional level, as the tolerance of different grasses and plants to heavy rain and saturated soils, or cold winters, varies, as does the ability of soils to drain, absorb or retain water varies. The reaction of soils and plants to heavy precipitation, flooding or frost depends on their physical and chemical makeup. That soil profiles change overtime only complicates the reconstruction of the impact of extreme weather on non-cereal vegetation. Generally speaking, however, excess water in soil produces oxygen deficiencies that can kill roots as well as nitrogen deficiencies and large quantities of carbon dioxide that can likewise disrupt growth or kill plants. On soil and excess water see Kozlowski (1984); van Toai et al (2002); Kramer (1969).

<sup>1279</sup> Whether the annalist meant fodder crops or grass, however, is uncertain: he refers to *pabula animalium* which can translate as either the grasses of animals or the fodder of animals.

(C.1.219).<sup>1280</sup> This hard winter, it is specified, not only damaged the harvest but the grasses and plants domesticates relied on.<sup>1281</sup>

Work on the GEF provides further insight. In the early fourteenth century, it is quite clear that people ate before their livestock, and that fodder supplies suffered when grain was scarce. Manorial accounts from across much of England reveal that fodder crops (oats and barley) failed along with wheat and rye, that straw and hay supplies were very limited, and that fodder allowances were cut back in the wake of the harvest failures of 1315/17, as harvested oats and barley were directed towards human consumption.<sup>1282</sup> The price of fodder at market, like grains normally bought for human consumption, also clearly escalated, presumably as fodder crops were bought up for human food.<sup>1283</sup> The weather which fostered crop failures also clearly damaged non-cereal vegetation in the early fourteenth century, as chroniclers report water-logged pastures and swamped hay fields across central and northwestern Europe.<sup>1284</sup> With a decline in fodder stocks, pasture, and other natural supplies of food, we may suspect that animals in the midst of Carolingian and early Ottonian shortages experienced a considerable degree of malnourishment and wasting.<sup>1285</sup> Their immune function may have been inhibited, increasing their susceptibility to disease, both to opportunistic and, to a lesser degree perhaps, non-opportunistic.<sup>1286</sup>

The effects shortages and famine mortalities had on human society and economy are only vaguely discernible, though the written evidence does reveal much more about the impact of, and responses to, food shortages, than it does for human or livestock

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<sup>1280</sup> Of course, some conditions adverse to crops may have been beneficial to wild foods some stock depended on. One Carolingian text (C.1.152) reports that pigs did well in the wake of a harvest failure, which was likely precipitated by a heavy rainfall and drought; and in mid eighth- through mid tenth-century Irish texts we read of great mast crops in the context of harvest failures (C.3.18, 28, 62).

<sup>1281</sup> Contrast these reports with Prudentius' observation in the *Annales Bertiniani* that despite the decline in human food supplies, horses had 'plenty of fodder' (C.1.133). These horses, however, appears to be those of a pillaging army. The implication is, thus, that while the food stocks of civilians in the region were destroyed, enemy horses remained well-fed.

<sup>1282</sup> Kershaw (1973b), pp. 14, 109; Slavin (2010), pp. 167, 169

<sup>1283</sup> Kilns, drying ovens and curing houses appear to have been strictly used for unripe grain for human food: Jordan (1996), p. 37.

<sup>1284</sup> Curschmann (1900), pp. 215-17; *Chronicon Regiae Aulae* (1866), p. 379; *Chronica Aegidii Li Muisis* (1841), p. 207; Gray (1907), p. 69; Kershaw (1973b), pp. 14, 84; Jordan (1996), p. 37; Slavin (2010), p. 169.

<sup>1285</sup> Newfield (2009), pp. 176, 185 n. 103.

<sup>1286</sup> Slavin's recent work on the early fourteenth century panzootic, for instance, seems to indicate that bovine losses were greatest in England where fodder supplies were most affected: pers. corresp. 1 October 2010.

disease, reflecting no doubt the greater complexity of the interaction between shortages and human populations. Here we touch upon several universal features of subsistence crises. The sale of basic foodstuffs at inflated prices is one such universal feature, certainly of pre-modern shortages, and one of the first signs of a harvest failure or, in some cases, expected harvest failures.<sup>1287</sup> Eight sources in Catalogue 1 refer to such phenomena. Most often the price of grain is reported: Notker, in his *Gesta Karoli magni imperatoris*, refers to a landlord and bishop selling off surplus grain at high prices in the famine of the early 790s (C.1.61), *Annales Fuldenses* reports high prices of grain at Mainz in the lesser shortage of 850 (C.1.149), and the *Annales sanctae Columbae Senonensis* refers to exorbitant prices of barley, oats, rye and wheat in the famine of the late 860s (C.1.236). The capitularies of Charlemagne's reign also often speak of such basic foodstuffs being sold at exorbitant prices, though they do so indirectly: in the *Capitulare Francofurtense* of 794 prices for measures and loaves of barley, oats, rye and wheat were set, signifying that they were being sold at unreasonable rates (C.1.63); in the *Capitulare missorum in Theodonis villa datum secundum generale* of 805, in the midst of the first famine of the ninth century, it was again demanded that grain not be sold at high prices (C.1.73); and in the *Capitulare missorum Niumagae datum* of 806 prices for barley, oats, rye and wheat were again established, spelt too (C.1.76). As in other pre-modern periods, there is some evidence that the price of other foodstuffs, and goods related to the food preparation, rose following the inflation of the price of basic foodstuffs, as competition for available grain spilled over onto non-cereals.<sup>1288</sup> The *Richeri historiarum libri III* observes high prices of sheep, cattle and roosters in the lesser shortage of the late 880s (C.1.236) and the *Annales sanctae Columbae Senonensis* reports that the price of salt went up at Sens in the famine of the late 860s (C.1.189). The evidence is meagre, but we should expect that the prices of non-staple foodstuffs, such as eggs, meat and vegetables rose in the wake of high grain prices, as they are known to

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<sup>1287</sup> For high prices in late antique, high medieval, late medieval and early modern shortages see Stathakopoulos (2004), p. 57; Jordan (1996), pp. 48-56; Campbell (2010), p. 292; Campbell (2009), pp. 23-5; Post (1984), pp. 3, 14-6; idem (1990), p. 56; Appleby (1975), pp. 1-5, passim; idem (1979); Lucas (1930), pp. 353-54; Hoyle (forthcoming). High prices of course also typify modern developing world shortages: for instance, Maharatna (2002), p. 132.

<sup>1288</sup> As Stathakopoulos observes in late antique sources: (2004), p. 81; and Jordan in high medieval sources: (1996), pp. 55-8

have on several occasions in ancient, late antique and high medieval periods.<sup>1289</sup> As availability and entitlement to primary food declines, competition for subsidiary food sources intensifies. Additionally, we may suspect that if crops failed some vegetables crops did too. Higher rates of livestock slaughtering and consumption, and disruptions to trade and production may account for higher prices of salt.<sup>1290</sup> Other sources from our period but from outside Carolingian and early Ottonian Europe also report like phenomena: Bar Hebraeus' *Chronography*, for instance, records high grain and livestock prices in a shortage of the early 770s (C.3.30), and high grain prices in the famine of the early 940s (C.3.107).

How dramatic rates of inflation were, however, is difficult to gauge, as prices are infrequently recorded, prices documented outside of capitularies may not have been meant as accurate reflections of real prices set or obtained, weights of coins fluctuated and varied spatially and temporally, and general rates of inflation or deflation over short and long periods of time are impossible to gauge.<sup>1291</sup> Yet the prices for grains fixed in the early 790s are in all cases lower than those established in the early ninth century, which may indicate that the rates set in the late eighth century were unreasonable, that the famine of the early ninth century was particularly dear, or that price of grains inflated over time. Nevertheless, the disparity between these prices regulations and the market prices documented in our period is noteworthy: in the *Capitulare Francofurtense*, a measure of oats was sold for 1 denarius, barley for 2, rye for 3, and wheat for 4, and in the *Capitulare missorum Niumagae datum*, issued 12 years later, a measure of oats was sold for 1 denarius, barley for 3, rye for 4 and wheat for 6 (C.1.63, 76). In the famine of the late 860s, however, we are told that a measure oats went for 5 denarii, barley for 6.5, rye for 7.5 and wheat for 8, and at Mainz in the lesser shortage of 850, wheat reportedly reached a price of 10 denarii (C.1.149, 189).<sup>1292</sup> We may suspect that the disparity here is

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<sup>1289</sup> Garnsey (1988), pp. 24-5; Stathakopoulos (2004), p. 57-8; Lucas (1930), p. 352.

<sup>1290</sup> Jordan notes that the weather that brought on harvest failures may have also resulted in a decline in salt reserves: (1996), pp. 52-4. Dust veils and overcast periods of heavy precipitation would have presumably seen lower rates of solar radiation. Salt prices may have also escaped as

<sup>1291</sup> Conversely, Stathakopoulos seems to have accepted the rates of inflation recorded in late antique and early Byzantine sources matter-of-factly: (2004), pp. 57-8.

<sup>1292</sup> The *Annales Fuldenses* employs the Biblical 'shekels' and *Annales sanctae Columbae Senonensis* refers to 'solidus' when they clearly refer to denarius. For Reuter's comments on the use of shekels in the first text see notes attached to (C.1.149). That the *Annales Fuldenses* refers to 'silver' shekels hints that denarius was simply substituted for shekels, as the denarius was the common silver coin.

artificial and that the discordance between set prices and market prices would have been less were our ‘set price data’ and ‘market price data’ from the same decade and locale, but the point remains that prices could rise exorbitantly in the wake of shortages, often, possibly, in the range of 200 to 300 per cent.<sup>1293</sup> Prices of livestock by-products and processed goods, dairy products, eggs, hide, sinew, tallow and wool, would have risen too, presumably.<sup>1294</sup>

As in other pre-modern periods, the secular elite were presumably behind the high prices of basic foodstuffs in Carolingian and early Ottonian Europe:<sup>1295</sup> late eighth and early ninth century capitularies ask landlords not to sell grain at high prices and address elites as though they, in times of shortages, controlled the balance between life and death of their dependents (C.1.63, 75, 76, 83, 95); surpluses, moreover, would have been a phenomena known to elites, not commoners. While inflated prices could have disastrous effects on the lower social strata, elites – at least those with grain, livestock, fish and other foodstuffs available to sell – stood to gain. While the inflation of the price of foodstuffs further limited commoners’ entitlement to food beyond the already existing decline in food availability, we should not think that commoners were wholly priced off the market, as unobtainable prices are unlikely to have been set. Nevertheless, failed harvests, coupled with high prices would have ensured a significant degree of destitution for most commoners, particularly if shortage conditions persisted for multiple years as they did on at least ten occasions in our period. Moreover, many people would have lacked the means to obtain grain at market to begin with. This is demonstrated indirectly through the evidence for other universal features of food shortages: the consumption of alternative and prohibited foodstuffs (‘famine foods’), borrowing and loaning, the selling of property, crime, emigration and, of course, excess mortality.<sup>1296</sup> These, excusing the latter, which we have already touched upon, are dealt with here in order.

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<sup>1293</sup> Jordan notes inflation in grain prices in the range of 800 per cent in the high medieval period: (1996), p. 50.

<sup>1294</sup> As they did in other pre-modern European shortages: Jordan (1996), p. 58.

<sup>1295</sup> For instance, Stathakopoulos (2004), p. 58-61.

<sup>1296</sup> The prices of non-food commodities and services too may have inflated in the wake of significant shortages characterized by human mortality, though we have no evidence for it in the Carolingian or early Ottonian periods. A decline in human resources often precipitates the inflation of the costs of services. Cf. Stathakopoulos (2004), p. 58.



Several passages collected in Catalogue 1 speak to the consumption of alternative or prohibited foods. The *Annales Bertiniani* documents people eating bread made of flour mixed with earth in the lesser shortage of the early 840s (C.1.133), while the *Annales Xantenses* reports the consumption of equine flesh in a lesser crisis of the early 850s and of canine flesh in the famine of the late 860s (C.1.153, 192). The horse eating is specifically said to have been confined to *Saxonia*,<sup>1297</sup> while the dog eating, which too was forbidden, is implied to have been a more general affair.<sup>1298</sup> Several interrelated texts also report the consumption of meat over Lent in the famine of the early 790s (C.1.57, 58, 59), which of course was prohibited, and the *Annales Fuldenses* documents the consumption of carrion (a deer killed by two wolves) in the shortage of 850 (C.1.149), which too was prohibited.<sup>1299</sup> Several authors also speak of cannibalism, both the eating of the dead (necrophagy) and the murdering of people for food. The *Annales Mosellani* reports cannibalism in the famine of the early 790s (C.1.54), as does the *Annales Xantenses* in the famine of the 860s (C.1.192), and four plausibly interrelated texts report the consumption of human corpses in the midst of the famine of the mid 890s. The *Annales Besuenses*, *Annales Augienses* and *Annales Colonienses* stress that the hunger then drove Christians to eat Christians, as if to stress the severity of the shortage, and the *Richeri gesta Senoniensis ecclesiae* observes that humans were forced to eat humans (C.1.242, 248, 249, 252). In the famine of the 860s, the *Annales sanctae Columbae Senonensis* also documents ‘men and women’ killing each other for food and a man in Pont-sur-Yonne who killed a woman, quartered her, preserved some of her flesh with salt and cooked the rest for himself and his sons (C.1.189). The *Annales engolismenses* too reports murdering for food in the same crisis (C.1.190), and the *Annales Fuldenses* tells us of a man on the verge of killing his son in the lesser shortage of 850 (C.1.149).

Other texts from our period but from outside Carolingian and early Ottonian Europe also document the consumption of such alternative foods in periods of crisis. The

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<sup>1297</sup> Whether this was meant as an indication of the severity of the shortage in *Saxonia* or as a critique of the Saxons, or both, is uncertain. In the early eighth century, Pope Gregory II forbid the consumption of horsemeat in *Germania*. Hippophagy seems to have been practiced in eastern and northern Europe, though it is uncertain how common the practice was: see, for instance, Simoons (1994), pp. 168, 187-88; Story (2003), p. 85.

<sup>1298</sup> Simoons (1994), p. 248.

<sup>1299</sup> The consumption of animals that died from natural causes was forbidden: Exodus 22:30; Deuteronomy 14:19.

*Anglo-Saxon Chronicle* observes that a shortage of the mid 890s drove a Viking army to consume their equines (C.3.87), and Bar Hebraeus documents the consumption of grasses and berries in the shortage of the early 940s (C.3.104). He also references people killing people for food in the famine of the early 940s (C.3.107). How should we treat such reports? Though common stock of pre-modern accounts of food shortage, we should perhaps not doubt that cannibalism was practiced in early medieval Europe.<sup>1300</sup> As Marvin has stressed, in her study of two reports of cannibalism in the GEF, reports of cannibalism could serve two purposes, a record of an historical event and an analogue to the historical or biblical past.<sup>1301</sup> Certainly, we should not disregard reported acts of cannibalism because such reports were a part of a long history of famine writing. Moreover, the act did offer a form of sustenance.<sup>1302</sup> Further, as Garnsey, Stathakopoulos and Jordan indicate cannibalism in classical, late antique, early Byzantine and high medieval periods would have only been practiced in truly severe shortages and, as we have seen, all reports of cannibalism in Catalogue 1 correspond to crises diagnosed as famines in 2.4.2. Cannibalism, more specifically survivor cannibalism, may have been practiced in all mid eighth- through mid tenth-century famines, whether documented or not, though, as Stathakopoulos notes, on a small scale.

In antiquity, Garnsey documents the consumption of culturally inferior grains, traction and manure supplying livestock not usually slaughtered for food (oxen, donkeys, horses, mules) and food animals slaughtered out of season, animal fodder (such as acorns, hay and vetches), as well as other natural and non-edible products (bark, leather, leaves,

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<sup>1300</sup> As noted in 2.1.1.2, several modern scholars have taken reports of medieval cannibalism at face value. While Stathakopoulos notes that reports of cannibalism in late antiquity may have been purely rhetorical, and devices meant to indicate the severity of the shortage, he does concede that the consumption of human flesh in shortages was likely practiced. Jordan agrees, noting that reports of cannibalism in high medieval texts should not be too hastily dismissed: (1996), pp. 114, 148-50. Most of the anthropological literature, which seeks to disprove the practice of the eating of human flesh and which emphasizes the second-hand nature of reports of cannibalism, addresses ritual, not survival, cannibalism. Several modern examples of survival cannibalism are well documented, however: Stathakopoulos (2004), pp. 85-7.

<sup>1301</sup> Marvin (1998), pp. 74-8. Thus, even references to cannibalism which closely adhere to Biblical imagery should also not be regarded as fiction. Cf. the *Annales Mosellani* reference (C.1.54) to brothers eating brothers, and mothers eating children, to Deuteronomy 28:57 and II Kings 6 28-29.

<sup>1302</sup> Though Wolberg and Vayda note that limited protein stores are available in human flesh, even for a skillful butcher: Wolberg (1970), p. 106; Vayda (1970), pp. 1462-63. We may suspect that a severely malnourished individual, like most of those that appear to have been consumed in our period, would have offered not much in the way of protein or nutrients. This may explain why the person quartered and butchered in the *Annales sanctae Columbae Senonensis* is said to have been an elite: being well fed, they offered a better meal.

roots and twigs) and, finally, human flesh.<sup>1303</sup> In late antiquity and early Byzantium, Stathakopoulos likewise reports that consumption of culturally inferior grains, livestock not usually slaughtered for food (dogs, donkeys, horses, mules, oxen) or slaughtered out of season, animal fodder (acorns, chestnuts, grass, hay and vetches), other natural products (bark, herbs, nettles, roots, shrubs, twigs and weeds), non-natural products (hides, leather and shoes) and human flesh. Stathakopoulos also documents the consumption of carrion and wild animals (mice), as well as animal and human faeces.<sup>1304</sup> Garnsey proposes that livestock ‘not in ordinary circumstances destined for slaughter’ would have been eaten first, less favoured grains second, animal fodder third, edible natural products (roots) fourth, non-edible products (leather) fifth, and humans sixth. Such a course may have been followed in the wake of Carolingian and early Ottonian crises too, as it appears to have been in other periods, though less preferred grains and animal fodder, not to mention vegetables, would have presumably been consumed prior to livestock relied upon for traction and manure. As we have seen, in mid eighth- through mid tenth-century crises the price of grains not normally or always geared toward human consumption (oats and barley) was fixed alongside preferred grains (rye, spelt and wheat) in the capitularies and inflated alongside preferred grains in shortages reported in the annals.<sup>1305</sup> We may also suspect that wild animals would have been consumed prior to bark or leather, and excreta prior to human flesh, and that all food avenues would have been explored and exhausted before resorting to cannibalism. That Carolingian and early Ottonian authors never mention recourse to berries, fish, nuts or wild plants in the context of food shortages, as other earlier writers did, and focus on extreme dietary changes, may emphasize how commonly wild foods were exploited when crops failed.<sup>1306</sup> Certainly, reports of cannibalism can be read as an indication that all other food avenues had been explored, that vegetables, weeds and traction supplying animals, for instance, had already been consumed.

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<sup>1303</sup> Garnsey (1988), pp. 28-9, 35. Garnsey seems to accept reports of cannibalism in classical texts at face value.

<sup>1304</sup> Stathakopoulos (2004), pp. 81-5.

<sup>1305</sup> So too, of course, in other pre-modern shortages: Jorden (1996), pp. 51-2. As we have seen in the Great European Famine, it is likely that fodder supplies would have often been restricted and redirected towards human consumption when crops failed.

<sup>1306</sup> It may have been so typical that it was not worth mentioning. As shortages occurred relatively often, we may presume that people had established routes for obtaining alternative wild foods.

The irregular consumption of meat too is a sign that grain supplies and vegetables were exhausted.<sup>1307</sup> Unusual or higher rates of meat consumption in periods of crisis are indicated several times in Catalogue 1, though indirectly and never treated as noteworthy, which may again hint of how normal it was to consume stock in periods of shortage. Higher prices of livestock noted for the shortage of the late 880s indicate higher consumption patterns of domesticates (C.1.236), as does, perhaps, the higher price of salt mentioned in the *Annales sanctae Columbae Senonensis* (C.1.189). Benedict of Aniane and a bishop at Munster are also said to have given alms in the form of meat during crises of the early 790s and early 940s respectively (C.1.60, 278); Benedict provided beef, mutton and goat's milk. Though the eating of animals over Lent in the early 790s was noteworthy on account of its prohibition and indicative of the severity of the shortage (C.1.57, 58, 59), we may rightly suspect that animals were regularly consumed at higher rates when grain was unavailable. Of course, we should also not think pre-moderns were too land lubberish in the wake of failed harvests, as a variety of goods – amphibians, birds, fish and plants – could be harvested from waterways and wetlands.<sup>1308</sup> In some shortages, 'rare' items may have been consumed as well. In the midst and wake of the famine of the early 870s, we may suspect that locusts were consumed, and in the shortages of the early 840s, late 860s and early 940s, for instance, cattle that dead of disease would have presumably been eaten.<sup>1309</sup>

Borrowing and loaning, as well as the selling, and ultimately abandoning, of property – land, livestock and agricultural instruments for instance – for food in times of shortage is also fairly well documented in modern developing world subsistence crises and pre-modern European crises, Carolingian and early Ottonian Europe included.<sup>1310</sup> The *Capitulare missorum Aquisgranense primum* of 809, *Concilium Parisiense* of 825 and

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<sup>1307</sup> Jordan describes the gobbling up of food and draft animals in the GEF: (1996), p. 56.

<sup>1308</sup> Fish would have likely been derived very locally, as they appear to have been until the twelfth century. Presumably those along the coasts of the Mediterranean and North Sea would have had a wider range of foodstuffs to draw upon: Hoffmann (2005), p. 23; idem (2008), p. 54. Lucas documents that consumption of toads in the GEF: (1930), p. 370.

<sup>1309</sup> The consumption of locusts was not forbidden, as was the consumption of other pests: Stathakopoulos (2004), p. 83. We are told, in the *Annales Xantenses* and *Liber pontificalis*, that people attempted to capture locusts in boxes and glasses: (C.1.202), (C.3.84). *Capsa*, though, in the *Annales Xantenses* may refer to relics. On the consumption of cattle that died of disease in the early fourteenth century see Newfield (2009), pp. 161-63; Lucas (1930), p. 362.

<sup>1310</sup> Cf. Jordan (1996), pp. 97-101, 111, 154-55; Campbell (2010), p. 292; Hardiman surveys usurious loaning in modern developing world food shortages (1996).

*Episcoporum ad Hludowicum imperatorem relation* of 829 imply that lending at high rates of interest was common and that usurious loaning often forced commoners to leave their lands and give up their property, as commoners are also said to have put up their future harvests as well as their property as sureties (C.1.83, 114, 116).<sup>1311</sup> The *Capitulare missorum Aquisgranense primum* requests relief of loans and debts in times of shortage and the *Concilium Parisiense* specifies on the nature of some usurious borrowing, noting that loans were often set around the price of grain when it was most dear. A measure of grain, it is said, was lent for the price one could normally demand four measures.<sup>1312</sup> In his work on thirteenth- and fourteenth-century credit, Schofield has found that loaning was always aggressive in periods of shortage and that elites regularly took advantage of the poor.<sup>1313</sup> When credit failed or was unavailable, we should expect property was sold or traded. Stathakopoulos has found eight cases of property selling in the wake of shortages in late antiquity, some referring to land and others to livestock, and in high medieval England, Davies and Kissock have shown that property markets were very active in times of crisis, as commoners sold their land and goods in search of food.<sup>1314</sup> The selling of humans, children namely, is also fairly well documented in late antiquity, and debts incurred from borrowing are said to have forced many people into slavery in the late antique and early Byzantine world.<sup>1315</sup> Similar tendencies may have been common in our period, considering the flourishing of the slave trade post 750.<sup>1316</sup> Certainly, in requesting that elites assist the hungry and not bind them to slavery, the *Capitulare missorum generale* indicates that the destitute were being sold into slavery in our period (C.1.71), and, as we have already seen, correspondence between Charlemagne and Hadrian I shows in the mid 770s that people were being sold into slavery in the midst of subsistence crises.<sup>1317</sup> In his *Chronography*, Bar Hebraeus also documents the selling

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<sup>1311</sup> For more early medieval evidence for mortgages see Doehaerd (1978), p. 247. The *Annales Vedastini* may refer to the widespread abandonment of land in the region of Arras in the shortage of the 890s (C.1.239).

<sup>1312</sup> Loans seem to have often occurred in kind, though other early medieval sources indicate that loans of money were not necessarily uncommon. In 789, Charlemagne reiterated that loans in kind should be returned in kind, and loans in money returned in money: Doehaerd (1978), pp. 245-46.

<sup>1313</sup> Schofield (2008), pp. 38, 59-61.

<sup>1314</sup> Stathakopoulos (2004), p. 77; they draw upon feet of the fines, copies of legal agreements regarding land ownership: Davies and Kissock (2004), pp. 218-19, *passim*.

<sup>1315</sup> Stathakopoulos (2004), pp. 77-8.

<sup>1316</sup> On the slave trade in our period see the introduction.

<sup>1317</sup> See 2.1.1.2.

of property for food in the famine of the 940s (C.3.107), and the *Annals of Ulster* parents selling their kids for food in a crisis of the 960s (C.3.114).

In periods of shortage, the destitute often resort to crime. We have little evidence for this in Catalogue 1, however: only the *Annales Bertiniani* reports ‘crimes of all kinds’ and the laying waste of fields in the famine of the late 860s (C.1.184).<sup>1318</sup> Crime is well-documented in other pre-modern shortages, and we may suspect that people did turn to petty theft and looting when crops failed in our period, or, at least, that rates of crime involving foodstuffs increased in periods of shortage.<sup>1319</sup> For instance, the *Liber pontificalis* documents the looting of storage facilities in a late ninth-century shortage (C.3.85), and an ‘avalanche’ of criminal cases are reported in the midst of the Great European Famine, most concerning thefts of foodstuffs and property committed by ‘normally law-abiding members of society.’<sup>1320</sup> Jordan also documents many thefts of grain, livestock, other foodstuffs and salt in the wake of high medieval famines.<sup>1321</sup> Popular protests, urban or rural riots, or ‘popular requisitions’ for a fair price of grain are also not evidenced in our sources, as they are in other periods. It is uncertain whether they would have taken place, though they appear to have been a common companion of ancient, late antique and early modern famines.<sup>1322</sup> We may suspect that some popular discontent was behind Charlemagne’s repeated efforts to alleviate the hunger of commoners in the late eighth and early ninth century and the aforementioned report of ‘crimes of various kinds’ and the laying waste of land may be references to agitated masses.

Emigration too is common in periods of crisis, in mid eighth- through mid tenth-century Europe as well as other pre-modern European periods, not to mention developing

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<sup>1318</sup> The laying waste of fields is not treated in the texts as a cause of shortage conditions but as a consequence. The implication being that the crops that did make it through the adverse natural conditions of the late 860s were stolen in some regions. While the triggers of the famine of the late 860s are uncertain (as discussed in 2.4.2), we should not assume that the laying waste of fields resulted in a shortage that affected such a wide breadth of Europe: cf. 2.4.4.

<sup>1319</sup> Cf. Sella (2008), p. 455. Crime may have been more common, but less notable, than cannibalism and excess mortality for example.

<sup>1320</sup> Hanawalt (1979), pp. 238-60; Campbell (2010), pp. 291-92.

<sup>1321</sup> Jordan (1996), pp. 112-13, 163.

<sup>1322</sup> Post (1990), p. 56; Garnsey (1988), pp. 27, 29-31; Stathakopoulos (2004), pp. 72-5. Garnsey notes that only urban riots appear in classical texts. Jordan addresses several riots in the context of the GEF: (1996), pp. 113, 165-66.

countries in the grips of shortage.<sup>1323</sup> In his *Vita Benedicti abbatis Anianensis*, Ardo Smaragdus tells us that commoners, and widows and orphans in particular, left their homes to seek alms in Aniane from Benedict in the famine of the early 790s (C.1.60). The *Annales Fuldenses* also documents commoners, whole families, migrating between regions for food in a mid ninth-century shortage (C.1.149), and the *Annales Vedastini* reports that the shortage of the early 890s drove people to leave their lands (presumably in the locale of Arras), and Vikings the locale of Leuven (C.1.239, 240). Large numbers of people may be expected to have wandered for food in Carolingian and early Ottonian famines, as in earlier and later periods. In our period, and in earlier and later periods, young men, the elderly, the sick and women with their children are known to have migrated in search of food. Garnsey documents people searching for ‘greener pastures’ and Stathakopoulos finds multiple accounts of out migration to ‘wild areas’ with berries, nuts and other natural foodstuffs could be gathered. He also draws attention to migration to rural monasteries and urban centers.<sup>1324</sup> Jordan too documents migrations through rural areas in search of food and to cities in the high Middle Ages, and Sella suggests that migrations for food was a common response to scarcity in early modern Europe.<sup>1325</sup>

How extended or permanent these migrations were in mid eighth- through mid tenth-century Europe is hard to tell. The people who came to Benedict in the 790s reportedly filled the road and gates of the monastery, building huts for an extended stay. Likely, people would have simply waited shortages out and left with the new harvest. That said, Jordan points to the abandonment of small settlements and entire villages in the Great European Famine, and we may suspect that some people left and never returned.<sup>1326</sup> Of course, in ancient and late antique periods, major cities, notably Constantinople and Rome, could support a large number of refugees for extended periods. In the Carolingian and early Ottonian periods, on the other hand, towns, like smaller ancient settlements, would have been ill-equipped to handle or feed masses.<sup>1327</sup> Of course, our sources might possess a bias for documenting hungry people flocking to monasteries for aid and we

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<sup>1323</sup> In modern developing countries, migrations have characterized the shortage experience. In Namibia, for instance, in the early twentieth century: Gewald (2003), pp. 211, 238-39.

<sup>1324</sup> Garnsey (1988), p. 31; Stathakopoulos (2004), pp. 78-80, 151-52.

<sup>1325</sup> Jordan (1996), pp. 97-100, 112, 131-32; Sella (2008), pp. 455, 462, 468.

<sup>1326</sup> Idem (1996), pp. 97-100.

<sup>1327</sup> There are documented cases of crowds being ejected from smaller urban centers, which were unable to cope with crowds of hungry people, in times of crisis in late antiquity.

might suspect that the secular elites and merchants of early medieval towns and emporia could have supported some people.<sup>1328</sup>

In resorting to alternative foods, borrowing, selling property, resorting to crime and migrating for food, commoners were attempting to alleviate their hunger and absorb crises. Other spiritual methods may have been commonly employed too, as they were in ancient and late antique Europe.<sup>1329</sup> Prayer, for instance, was advocated for relief of shortage conditions in the early 800s in the *Capitulare missorum generale* (C.1.71), and the *Annales Xantenses* observed that Frankish kings requested a three-day fast to offset the impending famine of the late 860s (C.1.178). Mid eighth- through mid tenth-century Europeans also turned to prayer and fasting to combat locust swarms.<sup>1330</sup> As indicated, secular and religious elites offered respite to commoners as well, or attempted to, as they did in other pre-modern periods.<sup>1331</sup> Lower social strata may have regularly been given aid at religious institutions. At Aniane, Mainz and Munster hundreds of people are said to have received foodstuffs in periods of crisis (C.1.60, 149, 278), and in the shortage of 850 the archbishop of Mainz is said to have fed more than 300 in a day. As noted, the royal elite too sought on several occasions to protect the poor from hunger, abuse and destitution. Not only did Carolingian rulers attempt to fix the price of grain, absolve the poor of their debts, protect the poor from usurious loans, and prevent the selling of the poor into slavery, but they repeatedly requested lords to take care of their dependents in times of shortage. In the *Capitulare Francofurtense* landlords were requested to sell and not hoard their surpluses, and to supply their dependents with food so that they not die (C.1.64), and in the *Capitulare missorum in Theodonis villa datum secundum generale*,

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<sup>1328</sup> On merchants dwelling in urban centers and their urban grain storages in the Carolingian and early Ottonian periods see Verhulst (2002), p. 91.

<sup>1329</sup> Garnsey (1988), p. 27; Stathakopoulos (2004), pp. 150-51, 153-54.

<sup>1330</sup> The *Annales Xantenses* reports that priests 'attacked' locusts with crosses (C.1.202), the *Liber pontificalis* tells us that people in Italy prayed for the end of a ninth-century locust plague (C.3.84), and the *Brut Y Tywysogion* documents that the vermin (possibly locusts) were driven away through fasting and prayer (C.3.89).

<sup>1331</sup> As in our period, donations of grain and other foodstuffs, and price fixing were practice in antiquity, though Garnsey suggests that the latter occurred infrequently. Tiberius is known to have set prices for grain in 19 CE. In antiquity, money was often also donated, though we hear little of this in our sources: Garnsey (1988), pp. 26-7. Stathakopoulos notes that the royal elite, bishops and secular elite, including major landowners, sought on occasion to alleviate or terminate shortages, commonly through large donations of grain and other foodstuffs. On occasion, food was also brought in from Egypt. Already in late antiquity, rural peoples came to depend on monasteries, in terms of alms and charity, in times of shortage: (2004), pp. 62-6, 150, 171.



*Capitula per episcopos et comites nota facienda* and the *Concilium Arelatense* landlords were again requested to ensure their dependents not die for lack of food (C.1.73, 75, 95).<sup>1332</sup> In the former, grain was also said not to be sold outside of *Francia*. In the *Capitulare missorum Niumagae datum*, ‘bishops, abbots, abbesses, nobles, counts, vassals’ and others possessing royal benefices and/or church holdings were asked to sell their surpluses at the prices then fixed (C.1.76).

We need ask, however, how effective these attempted measures of relief were. Commoners may have received aid at some religious institutions, but the Church’s storehouses would not have always been freely or fairly opened for the poor, as Notker implies (C.1.61). Of course, in the *Concilium Arelatense* bishops had to be asked to distribute their grains stocks to the poor, assuming they had any (C.1.95). Likewise, that grain prices had to be repeatedly fixed signifies that fixed prices were not often or at all adhered to (as prices recorded in annals indicate),<sup>1333</sup> and that elites were regularly requested to feed and not abuse their dependents indicates that dependents regularly went hungry and were abused. That usurious loaning and aggressive credit lending was routinely lamented and disparaged too certainly implies that it continued uninterrupted throughout our period. The capitularies and *concilia* may have been largely ineffective.<sup>1334</sup> Long ago Lucas suggested that attempts to fix prices in medieval shortages ‘failed completely’ due to the inability of rulers to enforce such measures in periods of pronounced dislocation, unrest and mortality,<sup>1335</sup> and Ganshof and Collins have thought Carolingian rulers unable to establish an ‘administrative apparatus’ that could ensure the transmission, let alone enforcement, of their rule.<sup>1336</sup> We may suspect that outside of the public or ‘legitimate’ markets controlled by the royal elite that price fixing would have indeed been impossible to enforce,<sup>1337</sup> and that clergy, merchants and secular elites would have been free to sell foodstuffs at the private markets, which they founded

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<sup>1332</sup> Also see the *Capitula e canonibus excerpta* (C.1.96).

<sup>1333</sup> That the prices set in the *Capitulare missorum Niumagae datum* of 806 were between 33 and 100 per cent higher than those set in the *Capitulare Francofurtense* of 794 may signify that the prices fixed in the latter were considered unreasonable and not followed (C.1.63, 76).

<sup>1334</sup> That he did not have to repeatedly ask for grain to be sold only within Frankish Europe may indicate that the highest prices were regularly achieved in Carolingian lands, or that the famine of the early 800s severely affected regions east of Rhine too and that higher prices could be obtained there.

<sup>1335</sup> Lucas (1930), p. 370.

<sup>1336</sup> Collins (1998), pp. 171, 173.

<sup>1337</sup> On legitimate markets and the control of prices at legitimate markets see Verhulst (2002), p. 90.

and which permeated rural continental Europe, for any price they could get.<sup>1338</sup> More generally, we may suspect that the requests and demands of the capitularies were never enforced, but simply intended to present a favourable image of the elite, of a ruler concerned for the welfare of his people.<sup>1339</sup>

Clearly, famines and lesser shortages could have had a profound effect on Carolingian and early Ottonian society. Other than the epidemics of non-opportunistic diseases that shortage conditions promoted, however, we may suspect that the demographic, economic and social impact of shortages was largely unequal with commoners taking the brunt of failed harvests. There is little indication in the sources that elites would have suffered much, though shortages clearly impacted the course of political and military events on several occasions.<sup>1340</sup> Moreover, while the storehouses that most elites drew on would have prevented their starvation and destitution, harvest failures would have drained surpluses and weakened elites' ability to withstand another crisis, not to mention shortages, like those of the early 790s or early 820s, that dragged on for many years. In famines marked by excess mortality, especially in the lower social strata, the loss of labor too may have been an important issue. On these occasions we may suspect that the situation of some elites turned dire. Like epidemics, we may suspect that the strain shortages, famines in particular, put on human resources, regularly disrupted military activity, and that the weather that triggered shortages severely limited an army's mobility, as animals relied on fodder and natural foodstuffs, which may have failed alongside crops. Moreover, food reserves to sustain an army would have been harder to come when crops failed and food and non-food animals were consumed more regularly.

The frequency with which lesser shortages and famines occurred in the Carolingian and early Ottonian periods may partially account for some general agricultural features of the period, namely the wider adoption of the three-course rotation

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<sup>1338</sup> On private markets see Verhulst (2002), pp. 89-90, 97; on markets at monasteries: Lebecq (2000), pp. 143-48.

<sup>1339</sup> Cf. Duby (1974), pp. 249, 250.

<sup>1340</sup> In 807, shortage conditions regulated military training to the area between the Seine and Loire which was not then affected by famine (C.1.77); the *Annales regni Francorum* reports the delaying of a campaign in 824 on account of the subsistence crisis then (C.1.112); the *Annales Bertiniani*, *Annales Vedastini* and Widukind report food shortages bringing sieges to a close in 861, 888 and c.925 respectively (C.1.173, 234, 261); a shortage in Paris in 886 is said to have helped the besieging Vikings (C.1.231); and Flodoard refers to besiegers breaking off their attack on Rome in the mid 930s on account of a food shortage (C.1.270).

and the adoption of spelt.<sup>1341</sup> Though the diffusion and practice of the former may have been quite limited, both of these ‘technologies’ would have helped ward off crises and the adoption may have been encouraged by the repeated crises of the period. The three-course rotation, the growing of two crops per year as opposed to one, may have acted as a buffer in the event that one crop failed, though it would have ultimately exhausted the soil without more intensive soil fertility management, and spelt with its double husks could withstand harsher conditions and keep for longer periods of time.<sup>1342</sup> The regular growing of catch crops, like legumes, too would have provided some relief if a harvest failed.<sup>1343</sup> That nearly 50 per cent of the shortages that appear in Carolingian and early Ottonian sources can be diagnosed as famines may indicate that the three-course rotation and spelt, and possibly the growing of legumes, worked effectively to prevent single harvest failures from developing into lesser shortages or famines. That some lesser shortages and most famines were triggered by a complex of natural world anomalies underscores the idea that mid eighth- through mid tenth-century Europeans were often able to cope with short-term failures and prevent minor crises from developing into major events. We should expect that households and communities would have developed a range of coping strategies, as peoples in modern developing countries, to offset minor, even seasonal, shortages, such as the rationing of available foodstuffs.<sup>1344</sup> Commoners too may have banded together following a poor harvest, as Wickham has suggested.<sup>1345</sup> That kin often supported their sick, as evidenced in Einhard’s translation discussed above, implies that in times of emergency families and communities may have banded together.

Nevertheless, it is clear that on at least ten occasions in the two centuries under consideration here that famine devastated large tracts of continental Europe, that prices inflated dramatically, and that people were forced to consume a range of alternative foods, borrow, trade and sell their property, and out migrate for food. Destitution would have followed in the wake of many shortages and, considering the frequency with which

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<sup>1341</sup> These matters have been discussed in 0.1.4.1.1.

<sup>1342</sup> Arnold (1988), p. 26.

<sup>1343</sup> The irregular growing of catch crops in the wake of a failed harvest is not documented in our texts, though such crops may have been attempted, as they were in earlier periods: Garnsey (1988), p. 24. In the wake of a poor harvests, a catch crop could provide sustenance and a valuable product.

<sup>1344</sup> Rationing was a common response at least in the initial stages of a crisis: Vaughan (1985), p. 178; also Corbett (1988).

<sup>1345</sup> For Wickham’s view see 2.1.1.2.

famines and lesser shortages took place and the evidence surveyed above, we may suspect that the subsistence crises of mid eighth- through mid tenth-century Europe, which often put and left commoners in precarious situations, facilitated the spread of manorialism. As in several modern famines in the developing world, harvest failures and subsequent destitution have left large percentages of populations in subordinate political and economic positions.<sup>1346</sup> As shortages may have been common prior to 750, as suggested in 0.1.4.1 and 2.4.4, we should not suppose that post 750 crises to account for the rise of big landownership outright. The articulation of famines and lesser crises in 2.4.2 and of shortage frequency in 2.4.3 however, adds much weight to the suggestion of Fichtenau, Nelson and Rueter that crises could have put peasants in a position of dependence.<sup>1347</sup> As demonstrated here, commoners may have often left or been forced off their lands in periods of crisis for want of food. Certainly, we should not expect that with the first successful harvest after a shortage that normalcy returned; without aid or support, famines may have transformed the socio-economic and political situation of many commoners. The consumption of animal fodder, traction and manure supplying animals and seed corn, moreover, would have negatively affected the aggregate quantity of grain one could have possibly produced once good growing conditions resumed. Migration too, of course, would have adversely affected future harvests, so too, naturally, the selling of children, agricultural instruments, livestock and future harvests. We should suspect, as such, that populations slowly climbed out of shortage conditions and that the horrors of famine were not quickly reversed.

Of course, underlying episodic crises was a current of chronic hunger in both humans and domesticates that may have permeated much of Carolingian and early Ottonian Europe judging from the evidence surveyed in 2.3. Chronic hunger would have represented a constant impairment to demographic growth, impairing fecundity by delaying the age for potential childbearing (menarche), causing premature sterility, and reducing the quality, quantity and mobility of sperm.<sup>1348</sup> In concerns to work, endemic malnutrition can retard and limit physical activity, causing fatigue and in severe cases

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<sup>1346</sup> For a modern developing world example, the Gobo people of Tanzania, see Maddox (1990), pp. 181, 197.

<sup>1347</sup> On the views of these scholars see 2.1.1.2.

<sup>1348</sup> Bongaarts (1980), pp. 401-06.

lethargy. Skeletal integrity is also an important issue in the chronically malnourished, with those without adequate food being more vulnerable to fractures. Weaker immune function too, of course, comes hand in hand with chronic hunger, allowing for more severe disease, and higher rates of morbidity and mortality in both non-pestilential and pestilential disease.<sup>1349</sup> There is some indication, though, that chronic hunger was not entirely bad. Lesser shortages are known to take less severe tolls on populations that suffer from endemic malnutrition. Infant mortality, for instance, may be less than it would have been otherwise in periods of lesser shortage had the population been ‘healthy’ prior to the onset of the shortage.<sup>1350</sup> In stock, endemic malnutrition can reduce meat and milk yields, retard growth and, as such, traction power, delay maturity, lengthen the birth cycle, impede fecundity, prolong gestation, and increase vulnerability to infection to non-pestilential and pestilential disease.<sup>1351</sup>

The written and material evidence is minimal, but there is good reason to believe that famines and lesser shortages, together with the current of chronic disease underlying them, represented significant shocks to Carolingian and early Ottonian economy and demography. The available response to shortages far outweighed that which could be mounted against disease, but the evidence indicates nevertheless that famines would have hit populations hard. The sources are enough to demonstrate that endemic and epidemic hunger regularly affected the lives of many in our period, and some consideration of the contexts in which shortages occurred, and analogies with other periods, indicates strongly that the shortages of mid eighth- through mid tenth-century continental Europe can no longer be ignored or dismissed as weak Malthusian checks.

### **3.4 Disease and hunger in Carolingian and early Ottonian Europe: Synergy, aggregate impact and ways forward**

On several occasions in Carolingian and early Ottonian Europe, shortages, epidemics and epizootics coalesced to produce what were undeniably, if only vaguely discernible, major

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<sup>1349</sup> [www.fao.org/hunger/faqs-on-hunger/en](http://www.fao.org/hunger/faqs-on-hunger/en); [www.fao.org/hunger/en](http://www.fao.org/hunger/en).

<sup>1350</sup> What ramifications the underlying current of hunger may have had for lesser shortages in Carolingian and early Ottonian Europe, however, is uncertain, though in famines it would have made little difference: Goodkind and West (2001), p. 232.

<sup>1351</sup> Davies (2002), pp. 85-6.

demographic and economic shocks. In 762/64, 791/94, 805/07, 820/24, 841/45, 867/69, 872/74, 895/97 and early 939/44, for instance, epidemic disease and epidemic hunger operated synergistically, exaggerating the effects either would have had in isolation of the other. In the early 820s, late 860s and early 940s, epizootic disease too was a factor. The evidence is scarce, but we should suspect that food shortages served to spread outbreaks of disease in humans and livestock, compounding the effects of extreme weather on agrarian production and creating high levels of excess mortality, while perpetuating shortages and delaying the restoration of the agrarian economy. These events, when diseases of humans and stock overlapped with food shortages, were undoubtedly major crises. And as suggested here, intervening periods were not periods of respite.

Though epidemics, epizootics and shortages did not always occur together the frequency with which they did demonstrates clearly that Carolingian and early Ottonian Europe was not the 'healthy,' well-fed and disease-free environment it has been thought to be. Epidemics, tied neither to sieges or subsistence crises, took place at least once every 6 years and epizootics transpired at least once every 20 years, while subsistence crises, neither tied to conflict nor sieges, occurred at least once every 9 years: famines once every 20 and lesser shortages once every 17. In sum, an epidemic, epizootic or shortage occurred at least once every 3 years in Carolingian and early Ottonian Europe.<sup>1352</sup> Of course, not all regions were affected and few of these crises appear to have blanketed the continent. Still, several regions of *Francia* and *Germania* were regularly affected.

Though pestilences and shortages were common companions of mid eighth-through mid tenth-century Europe, their aggregate impact, like that of the underlying currents of non-pestilential disease and chronic hunger, is difficult to gauge and one should not overstate the significance of either. As argued in 0.1.4.1, we need not interpret Carolingian and early Ottonian epidemics, epizootics and shortages against the idea that mid eighth- through mid tenth-century Europe was characterized by an upward demographic trend. Yet as neither excess mortality associated to any epidemic, epizootic or food shortage can be discerned, nor underlying population trends, the best we can do is

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<sup>1352</sup> If we remove from consideration those periods in which the evidence is slim and authors seemingly uninterested in these phenomena, we may speculate that an epidemic, epizootic or shortage transpired closer to once every 2 years.

estimate. It is imperative here to consider whether the demographic shocks major peacetime epidemics and famines produced could have been made up in intervening periods.<sup>1353</sup> Attention is crucial, thus, to the frequency of epidemics and famines and the regions that were affected.

If famines took roughly 4 to 8 years to rebound from, as suggested in 3.2, population growth would have been dependent on shortages occurring at least 5 to 9 years apart. It seems then that populations would have had more than enough time to reach pre-famine levels between most mid eighth- through mid tenth-century famines:<sup>1354</sup> only the famines of the 867/69 and 872/74, which appear to have affected many of the same regions, occurred too close in time to allow recovery.<sup>1355</sup> However, twenty-two lesser shortages, thirty-two pestilences and ten epizootics occurred between these famines and, we may suspect, chipped away at, and in some cases heavily eroded, population recovery. For instance, between the famines of 805/07 and 820/24 we have discerned two lesser shortages, three pestilences and one panzootic, while three lesser shortages, five epidemics and an epizootic have been articulated between the famines of 841/45 and 867/69, and three lesser shortages and three epidemics have been identified between the famines of 895/97 and 939/44.<sup>1356</sup> Moreover, it need be recalled that the epidemics, epizootics and shortages we have articulated from the sources collected in Catalogues 1 and 3 represent only the base minimum occurrence of pestilences and subsistence crises that took place in Carolingian and early Ottonian Europe: outbreaks and shortages may have occurred that were undocumented. Four further observations emphasizing the challenges of demographic recovery in intervals between famines: underlying currents of non-pestilential disease and chronic hunger may have, in general, prevented quick demographic rebounds; several of the crises diagnosed here as ‘lesser shortages’ may have been famines; while most famines may have left populations composed primarily of those at the age of reproduction, many of the peacetime pestilences that occurred between shortages would have cut through populations, taking not only the young and old but

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<sup>1353</sup> Cf. Watkins and Menken (1988), pp. 166-67.

<sup>1354</sup> That is between the famines of the mid 760s and early 790s, the early 790s and early 800s, the early 800s and the early 820s, the early 820s and the early 840s, the early 840s and the late 860s, the early 870s and the mid 890s, and the mid 890s and the early 940s.

<sup>1355</sup> Together these famines may have taken 8 years to recover from. In the early 880s, that is, we may suspect that populations would have reached pre 867 levels in regions affected by both crises.

<sup>1356</sup> As argued in 2.4.4, another shortage may have occurred *c.*900.

those at the age of reproduction; lastly, the two years thought necessary for the recovery every one year of famine may be far below the actual time need for recovery.<sup>1357</sup>

Cycles or periods particularly crisis dense are hard to distinguish, but on the basis of the written and material evidence the periods spanning 790 to 825 (when at least three famines, two lesser shortages, eight pestilences and four epizootics occurred) and the period spanning 840 to 875 (when at least three famines, three lesser shortages, eight pestilences and three epizootics took place) were the most severe. The period spanning 895 to 945 may also be regarded as a disastrous one, considering that two famines, four epidemics and two epizootics are known to have taken place despite the fact that the evidence base for this period is incredibly thin compared to that available before it. If population growth occurred in the Carolingian and early Ottonian Europe, we can suspect that it was minimal, not ‘considerable’ as scholars have suggested.<sup>1358</sup> Of course, we should not imagine that populations across Europe acted in unison, or that rural and urban populations crested or troughed together from the mid eighth through the mid tenth centuries. Rather, populations would have grown, contracted and stagnated at different points in different regions. The long-term or aggregate impact of repeated epidemics, epizootics and famines may have been particularly severe in some regions of *Francia* and *Germania*, and lighter in others, we cannot know.

Disease and hunger, both in epidemic and endemic forms, were clearly common realities for mid eighth- through mid tenth-century continental European populations. Several pandemics and panzootics possibly spread across multiple regions of Europe in this period, and several massive shortages took place. More spatially limited epidemics, epizootics and shortages also took place in great number, while much of the population may have been gripped by an underlying current of non-pestilential disease characterized by tuberculosis, leprosy and possibly, at least in northern *Italia* and maybe along the Rhine, malaria, as well as diseases leading to symptoms commonly reported in texts: visual and hearing impairment, *contractus nervus* and paralysis. An underlying current of chronic hunger characterized by iron-deficiency anaemia, for instance, and evidenced by osteoporosis also seems to have affected many. In articulating and investigating

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<sup>1357</sup> Watkins and Menken suggest that one year of a pre-modern famine may have taken as many as five years to repair: (1988), pp. 166-67.

<sup>1358</sup> See 0.1.4.1.



Carolingian and early Ottonian disease and hunger, this thesis, in 1.1 and 2.1, has evaluated scholarly opinions on the early medieval history of these phenomena, surveyed prevailing notions about the demographic history of the early Middle Ages, and examined how these notions have shaped modern interpretations of Carolingian and early Ottonian epidemics, shortages, non-pestilential disease and chronic hunger. In 1.2 and 2.2, the thesis considered the methodologies intrinsic, yet foreign, to the study of mid eighth- through mid tenth-century disease and hunger in order to provide a foundation for the further study of both phenomena in both their epidemic and endemic forms. It has surveyed a wide range of written evidence collected in Catalogues 1, 2 and 3, and employed this evidence along with material evidence from the palaeopathological, palaeomicrobiological and palaeoclimatic sciences to articulate episodic outbreaks of disease and food shortages, as well as the underlying baseline of disease and hunger. The form and content of reports of disease and hunger have been considered closely to demonstrate the general uniformity in Carolingian and early Ottonian disease and hunger reporting and the danger of reading too much into any individual passage. Lastly, a preliminary look has been given to the impact epidemics, epizootics and subsistence crises, as well as non-pestilential disease and endemic malnutrition, likely had and the measures mid eighth- through mid tenth-century Europeans could have advanced in response.

Much work remains to be done, however. In regard to subsistence crises, more attention could be given to how various classes of dependents could have coped in times of shortage, what methods free, half-free and slaves could have resorted to, and how some regions heavily populated by one class (as *Bavaria* with slaves<sup>1359</sup>) would have, consequently, fared. Attention should also be given to the local or regional dimension of the resourcing of alternative foods, as famine foods may have been more abundant in some environments. Likewise, more concern could be devoted to the regional scope of different modes of farming. In areas where the three-course rotation was not in place, or where mixed farming or animal husbandry ruled, the impact and severity of shortages may have differed considerably. All of this points to the fact that though several famines

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<sup>1359</sup> Hammer (2005). Selling oneself into slavery may have prevented starvation, but how all slaves generally fared in shortages is a different issue worth consideration. On early medieval slavery see 0.1.4.1.

may have affected much of Europe, the ability of populations to respond to crises, like the impact of shortages, would have varied regionally. More concern could also be given to market integration and market access, as well as regional and interregional grain trade, grain storage and the production for market.<sup>1360</sup> In regard to livestock pestilences, further consideration of the movements of animals into and within Carolingian and early Ottonian Europe, not to mention the zooarchaeology of early medieval cattle populations, would help illuminate the possible routes of transmission of diseases spread between like animals as well as the regions that would have been most vulnerable, and widely affected, in the major epizootics of early 800s, early 820s, late 860s and early 940s. Much the same could be done for human epidemics.

Generally speaking, more attention could be given to mid eighth- through mid tenth-century sources from non-Carolingian or early Ottonian Europe in order to better articulate interregional and pan-European pestilences and shortages. Contexts and analogies need also be considered in more depth, and working diagnoses could be explored at greater length. Certainly parallels, or models based on the impact of disease events in later better documented pre-modern European periods, could help us better articulate probable impacts of epidemics and epizootics in mid eighth- through mid tenth-century Europe. The archaeology of settlements, especially of towns and emporia, too should be brought into the fray. Indeed, the evidence collected here for disease and hunger may speak volumes to the apparent decline of urban settlements and the ruralisation supposedly typical of the Carolingian and early Ottonian periods, or even, perhaps, to the decline of particular emporia.<sup>1361</sup> Though epidemics and famines are unlikely to explain the general trends in the decline of emporia, as local economic and

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<sup>1360</sup> Opinions on these matters, however, varies widely in the scholarly literature. In concerns to peasants producing for surplus, for instance, see Innis (2009).

<sup>1361</sup> Henning (2008), p. 50. As Henning has asked, if population started growing after 750, why were old established settlements declining? At a recent meeting of the Medieval Academy of America (19 February 2010), Henning presented a synthesis of archaeological evidence for the decline in urban centers in the Carolingian period, arguing that the ninth century was not one of profound growth but economic stagnation or depression. He demonstrated that in the Merovingian period there was considerable continuity in the occupation of large Roman settlements, and that in the Carolingian period, regardless of how important or pervasive agricultural developments may have been, Roman towns, and settlements generally, contracted. In regards to emporia, most emporia declined sharply after 850, Dorestad included. Though some such as Quentovic, were only then beginning their ascent, the vast majority, in Verhulst's words, 'disappeared from the face of the earth' by 950: Verhulst (2000), p. 111; Hodges (2000), p. 79. See Coupland's recent reappraisal of the Quentovic evidence: (2002), p. 227, *passim*.

political situations no doubt prevailed, the archaeological evidence for the nature of the decline of these sites should be considered on a case-by-case basis with the evidence for repeated shortages and pestilences accumulated here.<sup>1362</sup> The understanding of mid eighth- through mid tenth-century disease and hunger gathered in this study might also be set against the ebb and flow of several early medieval settlements distinct from each other in terms of function, importance and geography in order to help appreciate the range of impacts disease and hunger could have: did the decline of Marseilles, the rise of Metz, the prosperity of Paris, the stability of the Dorestad (until *c.*850), or the permanence of settlements in the Kootwijk area of the Netherlands have anything to do with the presence or absence of epidemic disease and hunger? Individual epidemics, epizootics and shortages could also be considered in the context of Carolingian and early Ottonian military history, as we may suspect, following Gillmor's assessment of the 791 equine epizootic, that most of these events, had they had significant demographic impacts, would have resulted in some degree of military inactivity.<sup>1363</sup>

Equally important, new evidence from the palaeosciences for disease, hunger and climate, which is emerging at an accelerating rate must be gathered and integrated into the discussion. We are in dire need of palaeomicrobiological analyses of 'modern' pathogens in aDNA from Carolingian and early Ottonian remains (human and livestock), and of palaeopathological and palaeonutritional assessments of mid eighth- through mid tenth-century peoples. With the detection of Harris lines, enamel hypoplasia and tibial periostitis in Carolingian and early Ottonian skeletons we could begin to gather material evidence for the extreme nutritional stress shortages plied post 750.<sup>1364</sup> More high resolution proxies for early medieval climate are also needed to help us articulate the temporal and spatial extent and severity of particular shortages, particularly for southern Europe.<sup>1365</sup>

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<sup>1362</sup> As we have seen, the abandonment of settlements and markets is not unknown in the history of pre-modern European epidemics and subsistence crises.

<sup>1363</sup> Gillmor (2005). Moreover, conflict and military matters are comparatively well documented in our period, making them, possibly, an excellent proxy for the severity of individual disease and hunger events.

<sup>1364</sup> See 2.3.

<sup>1365</sup> For instance, speleothems, stalagmites in particular, might soon inform us of early medieval short-term climatic anomalies and varves too might soon tell us something about early medieval climate anomalies, once problems of dating are resolved and more studies are made of varved sediments dating to our period: Jones et al (2009), pp. 18-9. Presently there are few climate reconstructions based on speleothems that

When new data are integrated into the discussion and these steps suggested are taken, we will begin to move beyond the contours of Carolingian and early Ottonian hunger drawn here. The aggregate impact of epidemics, shortages, and epizootics will become clearer yet, as will the extent, impact and human response to specific disease and hunger events, such as the 809/10 cattle panzootic Agobard and several others witnessed and documented. This must only be the beginning.

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extend back more than 500 years. For an example of what varved sediments will eventually offer, see a recent study on Alaska's 'Iceberg Lake.' Loso et al (2006).

## Part 4

### Appendices

#### 4.1

##### Introduction

Three catalogues follow. The first is a collection of all passages or references found in Carolingian and early Ottonian texts (annals, capitularies, chronicles, *concilia*, correspondence, histories, *gestae*, letters and *vitae*) of human and livestock pestilences, food shortages and extreme weather. The second is a compilation of references to the disease-related deaths of Carolingian and early Ottonian elites found in Carolingian and early Ottonian texts, but primarily the *Annales regni Francorum*, *Annales Bertiniani*, *Annales Fuldenses*, Regino of Prüm's *Chronicon*, Adalbert of Magdeburg's *Chronicon*, Flodoard of Rheims *Historia Remensis ecclesiae*, and Widukind of Corvey's *Res gestae Saxonicae*. The third is a collection of passages of mid eighth- through early tenth-century human and livestock pestilences, food shortages and extreme weather found in texts (annals and chronicles mostly) contemporary or near contemporary to the Carolingian and early Ottonian periods from non-Carolingian and early Ottonian Europe: namely, Ireland, Wales, England, Byzantine Europe and the Middle East. I have also included Italy in this Catalogue, though some Italian regions were at times throughout the two centuries under consideration effectively Carolingian, as the Italian texts do not universally refer to Carolingian-ruled regions. It should be noted that the inclusion of passages in Catalogue 1 or 3 is determined by the place of composition. As such, Carolingian and early Ottonian sources addressed in Catalogue 1 may refer to events outside of Carolingian Europe, and that non-Carolingian and early Ottonian sources addressed in Catalogue 3 may refer to events in Carolingian and early Ottonian Europe.

Four matters require attention in regards to Catalogue 1. First, passages are given in their original Latin and in English translation and a bibliographic reference is provided to both the Latin edition and, if existing, English translation. The reference for the English translation is given first, where a translation exists. Reference is given to page numbers of the translation and edition available, never, for sake of precision, books or chapters. The few passages included in Catalogue 1 that could be found only in Curschmann's *Hungersnote im Mittelalter* are marked CURSCHMANN. Second, I have made use of the English translation available for several Carolingian and early Ottonian texts but have in numerous instances made some alterations, as is made evident throughout both catalogues. Third, in cases where basic information regarding the time of year the event in question took place or the peoples involved is not given or is unclear in the passage itself, comment on these matters is provided where possible after the passage. Fourth, more Carolingian and early Ottonian texts have been surveyed for Catalogue 1, and non- and early Ottonian texts for Catalogue 3, then those which are listed in the legend and which appear in the catalogues: not all texts contain information relevant to the following catalogues. For a complete list of the texts consulted, see the 'Primary Sources' section of the bibliography. References throughout the study to Catalogue 1 appear as (C.1.8), (C.1.107); references to Catalogue 2 as (C.2.10), (C.2.14); and to Catalogue 3 as (C.3.35).

Four additional points require attention. First, in regards to both Catalogues 1 and 3, it should be noted that when occurrences of disease, food shortage and extreme weather are recorded in a single passage in a text, that that single passage is left intact: passages are not dissected here and slotted into separate catalogue entries. The phenomena of interest to this study often appear in the written sources in clumps, with a pestilence, cold period and/or food shortage, for instance, recorded in close sequence. Such ‘lists’ appear ‘as is’ in Catalogues 1 and 3. However, when multiple bits of relevant matter are contained in a single annals entry, but are related in isolation from one another and not told in sequence, they appear as individual entries. In this way, the *Annales Bertiniani* produces three individual entries for 839 in Catalogue 1. Second, it should be said that the original language of passages collected in Catalogue 3 is given only if the passage had not previously been translated into English. Third, Catalogue 3, unlike Catalogue 1, is not meant to be exhaustive, but to be a survey of the major sources from the regions addressed (*vitae* and *gestae* from non-Carolingian or early Ottonian regions have not been surveyed systematically). Finally, for efficiency and convenience, each passage included in Catalogues 1 and 3 has been assigned a code that indicates the phenomena the passage addresses: **HM** signifies that the passage concerns a human mortality, whether from disease, hunger or weather. Also included here are the numerous references to pestilences that are not specifically said to have afflicted humans or non-human animals; **AM** signifies a non-human animal mortality, whether from disease or weather. This category primarily concerns livestock, especially cattle; **FD** denotes a food shortage. I have also included in this category those few references to good harvests, as well as to insect invasions, which would have presumably damaged crops, scarcity of pasture for animals, and concern voiced in the texts about future harvests; **W** signifies weather, including flooding; and lastly, **C** denotes that the disease, food shortage or weather, which the passage touches upon, is in some way associated to conflict. Those passages in Catalogue 1 that are not assigned a code, do not refer to specific disease, hunger or weather events, but are relevant in some way to the thesis. They appear in the catalogue under the date in which they were composed.

In addition to these catalogues, a brief summary of what is known about the authorship, date of composition, and place of composition, of each of the principal Carolingian and early Ottonian texts used in this study is included in Appendix D. Information about the composition of texts, which provide little relevant information about disease, food shortage or extreme weather, such as the Astronomer’s *Vita Hludovici pii*, Abbo of St. Germain des Prés’ *Bella Parisiaca urbis*, or the Poeta Saxo’s *Annales de gestis Caroli magni imperatoris*, is given, where possible, in the first (and sometimes only) entry of these texts in the catalogues below. Similarly, information about the composition of the non-Carolingian and early Ottonian texts surveyed in Catalogue 3 is given in the first entry of the text in Catalogue 3.

## Abbreviations:

AA	<i>Annales Alamannici</i>	ASM	<i>Annales Sangallenses maiores</i>
AAC	<i>Annales Alamannicorum continuatio Sangallensis prima</i>	ASQV	<i>Annales S. Quintini Veromandensis</i>
AB	<i>Annales Besuenses</i>	Astronomer	The Astronomer's <i>Vita Hludovici pii</i>
ABB	<i>Annales Blandinienses</i>	ASV	<i>Annales Vedastini</i>
ABH	Andreas of Bergamo's <i>Historia</i>	AT	<i>Annales Tiliani</i>
ACAP	<i>Ansegisi abbatis capitularium</i>	AU	<i>Annals of Ulster</i>
AAU	<i>Annales Augienses</i>	AX	<i>Annales Xantenses</i>
AC	<i>Annales Colonienses</i>	AW	<i>Annales Weingartenses</i>
ACa	<i>Annales Cambriae</i>	AWS	<i>Annales Weisseburgenses</i>
ACb	<i>Annales Colonienses brevissimi</i>	BA	Ardo Smaragdus' <i>Vita Benedicti abbatis Anianensis</i>
ACC	<i>Annales capituli Cracoviensis</i>	BC	<i>Benedicti capitularum</i>
Adalbert	Adalbert of Magdeburg's <i>Chronicon</i>	BHC	Bar Hebraeus' <i>Chronography</i>
Ado	Ado of Vienne's <i>Chronicon</i>	BPU	Abbo of St. Germain des Prés' <i>Bella parisiacae urbis</i>
AE	<i>Annales engolismenses</i>	BYT	<i>Brut Y Tywysogion</i> or the <i>Chronicle of the Princes of Wales</i>
AF	<i>Annales Fuldenses</i>	CA	<i>Concilium Arelatense</i>
AFB	Bavarian continuation of the <i>Annales Fuldenses</i>	CCE	<i>Capitula e canonibus excerpta</i>
AFL	<i>Annales Flaviacenses</i>	CEC	<i>Capitula per episcopos et comites nota facienda</i>
AG	<i>Annales Guelferbytani</i>	CF	<i>Capitulare Francofurtense</i>
Agobard	Agobard of Lyons' <i>De grandine et tonitruis</i>	CI	<i>Chronicle of Ireland</i>
AI	<i>Annales Iuvavenses</i>	CM	<i>Chronicon Moissiancense</i>
AL	<i>Annales Laubacenses</i>	CMA	<i>Capitulare missorum</i>
ALAU	<i>Annales Lausannenses</i>	CMG	<i>Aquisgranense primum</i>
ALD	<i>Annales Leodienses</i>	CMN	<i>Capitulare missorum generale</i>
ALE	<i>Annales Lemovicenses</i>		<i>Capitulare missorum Niumagae datum</i>
ALO	<i>Annales Lobienses</i>	CMT	<i>Capitulare missorum in Theodonis villa datum secundum generale</i>
ALS	<i>Annales Laureshamenses</i>	CP	<i>Concilium Parisiense</i>
ALU	<i>Annales Laurissenses</i>	CS	<i>Chronicon Scotorum</i>
ALM	<i>Annales Laurissenses minores</i>	CSU	<i>Cronicon Suevicum universale</i>
AMO	<i>Annales Mosellani</i>	CT	Theophanes' <i>Chronicle</i>
AMT	<i>Annales Mettenses</i>	EA	<i>Einhardi annales</i>
AN	<i>Annales Nazariani</i>	EAC	Byrhtferth's <i>East Anglian Chronicle</i>
AP	<i>Annales Petaviani</i>	EHl	<i>Episcoporum ad Hludowicum imperatorem relation</i>
APC	<i>Annales Petavianorum continuatio</i>	Einhard	Einhard's <i>Vita Karoli magni</i>
ASA	<i>Annales sancti Amandi</i>	FA	<i>Fragmentum annalium chesnii</i>
ASAc	<i>Annales sancti Amandi continuatio</i>	FF	<i>Fragmentum chronicon Fontanellensis</i>
ASAs	<i>Annales sancti Amandi pars secunda</i>	FG	<i>Folcwini gesta</i>
ASAN	<i>Annales Sangallenses</i>	Flodoard	Flodoard of Rheims' <i>Annales</i>
ASB	<i>Annales Bertiniani</i>	FW	Florence of Worchester's <i>A History of the Kings of England</i>
ASC	<i>Anglo-Saxon Chronicle</i>	GABS	<i>Gesta abbatum s. Bertini Sithiensium</i>
ASCS	<i>Annales sanctae Columbae Senonensis</i>	GR	Genesios' <i>On the Reigns of the</i>
ASD	<i>Annales sancti Dionysii</i>		
ASER	<i>Annales sancti Emmerammi Ratisponensis</i>		
ASG	<i>Annales sancti Germani minores</i>		
ASI	<i>Annales Sithienses</i>		

	<i>Emperors</i>
HA	<i>Herimanni Augiensis chronicon</i>
HH	<i>Hludowici et Hlotharii epistola generalis</i>
HLB	Erchempert of Monte Cassino's <i>Historia Langobardorum Beneventanorum</i>
HLD	Leo the Deacon's <i>History</i>
KG	<i>Karoli ad Ghaerbaldum episcopum epistola</i>
KMC	<i>Karoli magni capitula e canonibus excerpta</i>
LCA	Liuprand of Cremona's <i>Antapodosis</i>
LEI	Walafrid Strabo's <i>Libellus de exordiis et incrementis rerum ecclesiasticarum</i>
LF	Letters of Lupus of Ferrières
LP	<i>Liber pontificalis</i>
LRC	<i>Lex Romana Raetica Curiensis</i>
MB	Adrevald of Fleury's <i>De miracula sancti Benedicti</i>
MeG	<i>Memoratorium de exercitu in Gallia occidental praeparando</i>
Nithard	Nithard's <i>Historiarum libri iiii</i>
Notker	Notker Balbulus' <i>Gesta Karoli magni imperatoris</i>
PB	<i>Petri bibliothecarii historia francorum abbreviate</i>
PS	The Poeta Saxo's <i>Annales de gestis Caroli magni imperatoris</i>
RFA	<i>Annales regni Francorum</i>
Regino	Regino of Prüm's <i>Chronicon</i>
Reviser	<i>Annales qui dicuntur Einhardi</i>
RGS	<i>Richeri gesta Senoniensis ecclesiae</i>
RH	<i>Richeri historiarum libri III</i>
SA	<i>Synodus Aquensis II</i>
SD	Simeon of Durham's <i>Historia Regum</i>
SF	<i>Synodus Franconofurtensis</i>
Thegan	Thegan's <i>Gesta Hludowici imperatoris</i>
Widukind	Widukind of Corvey's <i>Res gestae Saxonicae</i>



## 4.2 Catalogue 1

### Pestilences, food shortages and extreme weather in Carolingian and early Ottonian Europe

1. *W* AS 708: (1826), p. 64. ‘A hard winter.’ / ‘Hiems durus.’ The history and interrelationships of most of the so-called ‘minor’ Carolingian annals, such as the AA, AAc, AG, AL, AN, AP, AS, ASA, and AW, are complex and for the most part obscure. It is clear that most of these annals do not provide an independent or contemporary witness for the most years or to the majority of events they report. In most cases several of the entries in these minor annals are dependent on a common source. This is most evident, in this Catalogue, in entries for the years 708/09/10, 711/12, 722, 763/764, 860, 861, 867, 868, 896, and 897. It is difficult to establish with any certainty, however, which of the surviving minor annals, if any, was the common source for the data relevant to this study that is reported in these years in these minor annals.
2. *W* AAU 709: (1826), p. 67. ‘A hard winter.’ / ‘Hiemps durus.’
3. *W* / *FD* AN 709: (1826), p. 23. ‘Hard and deficient grain.’ / ‘Durus et deficiens fructus.’
4. *W* ASM 709: (1826), p. 73. ‘A hard winter.’ / ‘Hiems dura.’ It is clear that the ASM was a year behind. Its dating is a year or two behind through most of the eighth century.
5. *W* / *FD* ASM 710: (1826), p. 73. ‘A hard year and deficient grain.’ / ‘Annus durus et deficiens fructus.’ Again, the ASM is clearly a year behind.
6. *W* AMT 710: (1826), p. 322. ‘A great flood.’ / ‘[A]quae inundaverunt valde.’
7. *W* AP 711: (1826), p. 7. ‘A great flood and Childebert [III] died.’ / ‘[A]quae inundaverunt valde et Childebertus mortuus est.’
8. *W* ALS 711: (1826), p. 24. ‘A great flood and the death of Childebert [III].’ / ‘Aquae inundaverunt valde et mors Hildeberti’ The *Annales Laureshamenses* are thought to provide an independent record from 785 to 803. Entries prior to 785 are thought to have been composed at the abbey of Lorsch. The common source for these earlier entries of 711 and 722 is uncertain.
9. *W* AA 711: (1826), p. 24. ‘A great flood and the death of king Childerbert [III].’ / ‘Aquae inundaverunt et mors Hildiberti regis.’
10. *W* AN 711: (1826), p. 25. ‘A great flood and the death of Childebert [III].’ / ‘Aqua inundaverunt valde et mors Hildeberit.’
11. *W* ASM 712: (1826), p. 73. ‘A great flood.’ / ‘Aquae inundaverunt valde.’ The ASM was a year behind.
12. *FD* AP 722: (1826), p. 7. ‘There was great fertility...’ / ‘Fuit fertilitas magna...’
13. *FD* ALS 722: (1826), p. 24. ‘Great fertility.’ / ‘Magna fertilitas.’
14. *FD* AA 722: (1826), p. 24. ‘Great fertility.’ / ‘Magna fertilitas.’
15. *FD* AN 722: (1826), p. 25. ‘Great fertility.’ / ‘Magna fertilitas.’

16. **FD** ASM 722: (1826), p. 73. 'Great fertility.' / 'Magna fertilitas.'
17. **FD** CM 752: (1826), p. 294. 'A dire food shortage then subdued Spain.' / 'Dira fames tunc Spaniam domuit.' Though found at Moissac in southwestern France, the CM may have been composed in the tenth-century at the monastery of Ripoll, in Catalonia, from earlier sources. While the chronicle contains a considerable amount of material found in 'minor' and 'major' Frankish annals, it contains unique references to ongoings in Carolingian Spain.
18. **W**/**FD**/**HM** CM 762: (1826), p. 294. 'A great frost weighed down *Gallias*, *Illyricum* and *Thracia*, and many olive and fig trees, wasted away, withered in the frost. Moreover, the harvest's bud withered and in the next year a food shortage grievously overwhelmed the aforementioned regions, so much so that many people died for want of bread.' / 'Gelu magnum Gallias, Illyricum et Thraciam deprimit, et multae arbores olivarum et ficulnearum decoctae gelu aruerunt; sed et germen messium aruit; et supervenienti anno praedictas regiones gravius depressit fames, ita ut multi homines penuria panis perirent.'
19. **W** RFA 763: (1970), p. 44; (1895), p. 22. 'The winter was hard.' / '[F]acta est hiems valida.' It is noted that Pepin wintered and celebrated Christmas and Easter at Longlier. It may have been in this region, thus, that the winter was particularly difficult.
20. **W** AI 763: (1934), pp. 732-33. 'The strongest winter.' / 'Hiemps fortissimus.' The AI was written in the ninth and tenth centuries. Its later entries shed light on events in southeastern Carolingian Europe.
21. **W** ASER 763: (1826), p. 92. 'The winter was great.' / 'Hiemps magnus erat.'
22. **W** AWS 763: (1826), p. 111. 'A hard winter.' / 'Hiems valida.'
23. **W** ALU 763: (1826), p. 144. '[T]he winter was great...' / '[F]acta est hiems valida...'
24. **W** EA 763: (1826), p. 145. 'Such a great and hard winter occurred at that time that it seemed possible to be compared to no winter of previous years on account of the magnitude of the cold.' / 'Facta est autem eo tempore tam valida atque aspera hiemps, ut inmanitate frigoris nullae praeteritorum annorum hiemi videretur posse conferri.'
25. **W** AX 763: (1909), p. 38. 'A great frost the first of December to February. Suddenly stars were seen to have fallen from the sky and everyone was terrified. They thought the end of the world was imminent.' / 'Gelu magnum a Kal. Decemb. usque ad Februar. Stellae subito visae de coelo cecidisse, ita omnes exterruerunt, ut putarent finem mundi imminere.' The earlier portions of the AX closely follow other texts, though in some instances, such as in its entries for the years 763, 810 and 821, it seems to provide additional or different information. The AX may have initially been compiled at Lorsch and then from the 830s by Gerward, the librarian of the palace and Einhard's successor as the supervisor of building. The initial annalist at Lorsch incorporated an abridged version of the

RFA for 797-811 (though as noted the AX does not rely solely on the RFA for this period). The AX is more or less independent from 832 until 873. Gerward, who may have written at Ghent, seems to have carried the text down to 852 at which point the annals were taken up by someone else and carried down to 873.

Gerward's continuator was possibly based at Cologne.

26. *W* ASA 764: (1826), p. 10. '[T]here was very bad frost and it began on 14 December and persisted until 16 March.' / '[F]uit ille gelus pessimus et coepit 19 Cal. Januarii et permansit usque in 17 Cal. Aprilis.'
27. *W* APC 764: (1826), p. 11. '[T]here was great frost from 14 December until 16 March.' / '[G]elus magnus fuit 19 Kalend. Ian. Usque 17 Kalend. Aprilis.'
28. *W* AA 764: (1826), p. 28. 'A great and hard winter.' / 'Hiemps grandis et dura.'
29. *W* AG 764: (1826), p. 29. 'That winter became great.' / '[I]lle grandis hiemps profuit.'
30. *W* AN 764: (1826), p. 29. 'A great and hard winter.' / 'Hiemps grandis et durus.'
31. *W* AS 764: (1826), p. 63. 'Frost began on 14 December and ended on 16 March.' / '19 Kalend. Ian. sic incipit gelus, et finit in 17. Kalend. April.' Another codex of the AS reads 'great winter.'
32. *W* ASM 764: (1826), p. 73. 'A great and hard winter.' / 'Hiemps grandis et dura.' The editor suggests this should be dated to 762, but clearly, considering the other examples collected here, the ASM's own dating of 764 seems fine. This is also clear for the ASM entry for 779 addressed below, which the editors suggest should be understood as 778.
33. *W* ALM 764: (1826), p. 117. 'The winter was great in the year 764.' / 'Facta est hiems valida anno 764.' The editors suggest this entry should be marked 766. However, the temporal limits are given as those for ASA, APC, etc. for 764. The ALM is the only set of annals found at Lorsch that is thought to have actually been composed there.
34. *W* AWS 766: (1826), p. 111. 'A great winter.' / 'Hiemps grandis.' This is possibly two years off.
35. *W?* RFA 772: (1970), pp. 48-9; (1895), pp. 32, 34. 'Capturing the castle of Eresburg, [Charlemagne] proceeded as far as the Irminsul, destroyed this idol and carried away the gold and silver which he found. A great drought occurred so that there was no water in the place where the Irminsul stood. The glorious king wished to remain there two or three days in order to destroy the temple completely, but they had no water. Suddenly at noon, through the grace of God, while the army rested and nobody knew what was happening, so much water poured forth in a stream that the whole army had enough.' / 'Eresburgum castrum coepit, ad Ermensul usque pervenit et ipsum fanum destruxit et aurum vel argentum, quod ibi repperit, abstulit. Et fuit siccitas magna, ita ut aqua deficeret in supradicto loco, ubi Ermensul stabat; et dum voluit ibi duos aut tres praedictus gloriosus rex stare dies fanum ipsum ad perstruendum et aquam non haberent,

tunc subito divina largiente gratia media die cuncto exercitu quiescente in quodam torrente omnibus hominibus ignorantibus aquae effusae sunt largissimae, ita ut cunctus exercitus sufficienter haberet.’ This is reported in several other ‘minor’ annals: see, for example, the AT (1826), p. 220. Charlemagne had departed for *Saxonia* from Worms.

36. *W* Ado 772: (1829), p. 319. ‘Out of that certain current, the largest wave flowed, which suffused the entire army and their draft animals.’ / ‘Ex quodam torrente largissimae aquae emanaverunt, quae sufficerent cuncto exercitui et iumentis eorum.’ Ado wrote his world history c.870. The text, which continues to 869, covers the period relevant to this study only briefly. This is the only passage of Ado’s chronicle (or its brief continuations, which follow Ado’s text in the *MGH SS II*) that is of direct relevance for this study, despite the fact that Ado would have lived through and perhaps witnessed many of the phenomena addressed in this Catalogue. He died late 874. The dating of this passage to 772 is that of the editors.
37. *FD / HM* ALS 779: (1826), p. 31. ‘A great food shortage and mortality in *Francia*.’ / ‘Fames vero magna et mortalitas in Francia.’
38. *FD / HM* AAU 779: (1826), p. 67. ‘A great food shortage and mortality in *Francia*.’ / ‘[F]ames magna mortalitasque in Francia.’
39. *FD / HM* ASM 779: (1826), p. 74. ‘A great food shortage and mortality in *Francia*.’ / ‘Fames magna et mortalitas in Francia.’
40. *FD / HM* CM 779: (1826), p. 296. ‘A great food shortage and mortality occurred in *Francia*.’ / ‘In Francia vero fames magna et mortalitas facta est.’
41. *FD* AC 779: (1826), p. 97. ‘Great food shortage.’ / ‘Fames magna.’
42. *W / HM* ALS 783: (1826), p. 32. ‘The summer was so vehemently hot, that many people died on account of the heat.’ / ‘[F]uit estus tam vehementer calidus, ita ut plurimi homines de ipso calore expirarent.’
43. *W* ALS 784: (1826), p. 32. ‘[T]here was a great flood.’ / ‘[I]nundatio aquarum valida fuit.’ The annals imply that the flood occurred when Charlemagne was in *Saxonia*.
44. *W* RFA 784: (1970), pp. 61-2; (1895), p. 66. ‘[Charlemagne] entered *Saxonia* and went here and there devastating the countryside until he reached Hockeleve [Petershagen]. Because of severe floods he decided to enter the land of Eastphalians from the east by way of Thuringia...’ / ‘Tunc deinde domnus Carolus rex iter peragens Renum 15 transiit ad Lippiaham et ingressus est Saxoniam circuiendo et vastando, usque quod pervenit ad Huculvi. Ibi consilio inito, eo quod nimium inundatio nes aquarum fuissent, ut per Toringiam de orientale parte introisset super Ostfalaos...’ Charlemagne would have encountered these floods in the spring, sometime after Easter at the very least. He had set out to calm Saxon and Frisan rebellions, crossing the Rhine at Lippeham. In the PS (1826), p. 240, we find in the entry for 784, ‘temporis obstabat simul asperitas

hiemalis, atque iugis pluviae cursus vehementer inundas. Ob hoc in Eresburg residens se contulit.'

45. *WRFA* 785: (1970), p. 62; (1895), p. 68. 'The lord king Charles continued the march [into *Saxonia*] as far as Rehme on the Weser at the mouth of the River Were. And because of the severe flood he returned from Rehme to the castle of Eresburg...' / '[D]omnus rex Carolus supradictum iter peragens usque ad Rimee pervenit super fluvium Wisora, ubi confluit Waharna. Et propter nimiam inundations aquarum inde reversus est Eresburgum.' Charlemagne would have encountered this flood in the spring, likely after Easter.
46. *W/HM ALS* 786: (1826), p. 33. '[I]n the month of December such sights appeared in the frightening sky as had never before appeared in our times. Moreover, signs of the cross appeared on the clothing of people, and some said that they saw it rain blood: on account of this, great terror and fear irrupted in the population and a great mortality followed afterwards. And the archbishop Lullus [of Mainz] died.' / '[M]ense Decembois apparuerunt acies terribili in coelo tales, quales numquam antea apparuerunt nostris temporibus; nec non et signa crucis apparuerunt in vestimentis hominum, et nonnulli sanguine dixerunt se videre pluere: unde pavor ingens et metus in populo irruit, ac mortalitas magna postea secuta est. Et Lullus archiepiscopus obit.' The ASM entry for 786, as well as the AI, ASER, ALM and CM entries for that year, includes the notice that 'crosses appeared on clothing,' but mentions nothing else.
47. *W/HM FA* 786: (1826), p. 33. 'In the same year many signs were said to have appeared. Indeed, the sign of the cross appeared on the clothing of people and it rained blood from the ground and from the sky. Moreover, many other signs appeared on account of which great terror and fear irrupted beneficially in the populace so that many corrected themselves. And six days before Christmas great thunder and lightning storms appeared so that it shock churches in Widli and it was heard through nearly all *Francia*, and many people were killed and birds from the sky died on account of the thunder. And a rainbow appeared at night in the clouds; afterwards there was a great mortality and archbishop Lullus moved from this light.' / 'Multa etiam referuntur signa apparuisse eodem anno; signum enim crucis in vestimentis hominum apparuit, ac sanguinem de terra ac de coelo profluere, nec non et alia multa signa apparuerunt, unde pavor ingens ac timor in populo salubriter inruit, ita ut se multi corrigerent. Et sex dies ante natale Domini tonitrua et fulgura immensa apparuerunt, ita ut ecclesias concussit in Widli, et pene per totam Franciam auditum fuit, et multi homines interfecti fuerunt, etiam aves coeli ab ipso tonitruo occisi sunt. Et arcus coeli in nubibus apparuit per noctem. Et postea vero mortalitas magna fuit, et Lullus archiepiscopus migravit de hac luce.' Wildi may refer to Willy, France.
48. *W ASAc* 789: (1826), p. 12. '[T]hat was another very bad frost.' / '[I]lle gelus fuit pessimus alius.'

49. **FD** AFL 790: (1839), p. 90. ‘A food shortage began.’ / ‘Famis exoritur.’ This passage may be better dated to 789, according to the editors. While these annals are not contemporary, this reference is unique and possibly taken from a source no longer extant.
50. **AM / C** Reviser 791: (1970), p. 70; (1895), pp. 89, 91. ‘This campaign was accomplished without any misfortune, except that in the army under the king’s command such a pestilence broke out among the horses that of so many thousands of them hardly the tenth part is said to have survived.’ / ‘Facta est haec expeditio sine omni rerum incommodo, praeter quod in illo, quem rex ducebat, exercitu tanta equorum lues exorta est, ut vix decima pars de tot milibus equorum remansisse dicatur.’ This pestilence is only reported by the so-called reviser of the RFA. The original compiler of the RFA and the contemporary and independent ALS make no note of any horse mortality. The revised RFA, which appear in the MGH as *Annales qui dicuntur Einhardi*, were not likely written by Einhard as once thought. The reviser likely made his revisions soon after Charlemagne’s death, though this is not certain. Some have speculated that the revisions were made shortly after 800. In any case, it is clear that the reviser supplemented the RFA by drawing on other sources available to him. As has been emphasized in this study, the reviser highlights some of the military failures and civil discords, as well as disease and weather episodes, which the original RFA left out. The reviser does not, however, address all of the disease, hunger and extreme weather events that do not appear in the RFA, but which are reported in other contemporary annals, such as a great food shortage of the early 790s.
51. **HM** PS 791: (1826), p. 248. ‘Thus, when a very large part of Pannonia had been despoiled / Far and wide of its riches and consigned to conflagration / The victorious king led back his army unharmed. / For it this whole hostile expedition had clearly been fortunate / No incident in it had gone awry / Except that so great a pestilence devoured with savage disease the cavalry of that legion which the king led / that they say that scarcely a tenth of so many thousands could be led back free from this disaster.’ ‘Thus, he had pillaged a very wide part of Pannonia for his own riches, and surrendered it with flames; thereafter the victor, the king, led back his people unharmed. The complete departure of the enemy was clearly adventagous; in fact it happened without any trouble, except that such a great pestilence consumed, with a horrible disease, the healthy ones of the legion, which the king led, that they surrendered hardly able to lead back a tenth of all his soldiers free of the disease.’ / ‘Sic ubi Pannoniae fuerat pars maxima late / divitiis spoliata suis ac tradita flammis / incolumem victor populum rex inde reduxit / cui fuit hostilis haec tota profectio plane / prospera, res in ea nec contigit ulla moleste / excepto quod tanta lues eius legionis / quam rex duxit aequos morbo consumpsit atroci / ut decimam partem vix de tot milibus huius / expertem cladis tradant potuisse reduci.’ The Poeta Saxo was based at Corvey, though some have also

suggested he was at St. Gall. The former is most certain, as the poet mentions Arnulf as the reigning king and on account of the fact that the work was not widely read in the early Middle Ages but was used by Widulkind of Corvey. Additionally, he focuses predominantly on Charlemagne's efforts to Christianize the Saxons. In any case, it is clear that the poet wrote his account of Charlemagne, in verse, c.890, and that he relied heavily on earlier texts. A substantial part of his text is a versification of the revised RFA. He also made use of Einhard's *Vita karoli magni*. On several occasions, however, the poet clearly drew on other sources, not now known, and perhaps local memories.

52. **FD ASD 791:** (1881), p. 719. 'There was the greatest food shortage in *Francia*.' / 'Fuit fames maxima in Francia.'
53. **FD AMO 792:** (1859), p. 498. 'In the same year at the time of the harvest, such a great food shortage took hold that it increased and is described in the entry of the following year.' / 'Caepit autem eodem anno statim tempore messis tanta famis esse, quae qualiter, vel quousque excreverit, sequentis anni describit ordo.' The AMO is contemporary here. The annals are thought to have been composed at either Metz or Cologne.
54. **FD AMO 793:** (1859), p. 498. 'The food shortage, then, which began the year before, grew to such an extent that it compelled not only other defilements, but even, our sins surfacing, so that it compelled humans to eat humans, brothers brothers, and mothers children. In the spring of the same year, countless false crops that they could see and touch, but no one could eat, appeared in different places: throughout the fields, the woods and the marshes.' / 'Famis vero, quae anno priori caepit, in tantum excrevit, ut non solum alias immundicias, verum etiam, peccatis nostris exigentibus, ut homines homines, fratres fratres ac matres filios comedere coegit. Ostensa autem eodem anno in ipso regno per diversa loca verno tempore falsa annona per campos et silvas atque paludes innumera multitudo, quam videre et tangere poterant, sed comedere nullus.'
55. **FD ASQV 793:** (1859), p. 507. 'Great food shortage.' / 'Fames valida.' The ASQV is not contemporary.
56. **FD ASG 793:** (1841), p. 91. 'There was the greatest food shortage in *Francia*.' / 'Fuit fames maxima in Frantia.' Curschmann dates this passage to 793, though the editors assign it to 791. Since the passage is not contemporary, and considering the other passages collected here for the year 793, Curschmann's dating may be correct, though the similarity between this passage and that of (C.1.52) may mean that this passage should be assigned to 791, especially if (C.1.52) is contemporary or near-contemporary.
57. **FD ALS 793:** (1826), p. 35. 'And in this winter the king sent his two sons Pippin and Louis with an army into Benevento. And the hardest food shortage occurred there, both over the people who were encountered there and over the army who went there, so that a considerable number of them were not even able during the

period of Lent to abstain from eating flesh. That great food shortage also burdened *Burgundia* and *Francia* in certain areas so that many died from that same hunger.’ / ‘Et in ipso hieme transmisit rex duos filios suos Pippinum et Hluduwicum cum hoste in terra Beneventana; et facta est ibi famis validissima, et super populum illum quem ibi inventus est, et super exercitum qui advenerat, ita ut aliquanti nec ipsam quadringensimam se ab esu carniū abstinere poterant. Sed et famis valida in Burgundia et per aliqua loca in Francia incumbebat, ita ut multi ex ipsa fame mortui fuissent.’ The annalist appears to suggest that while Burgundy was widely affected only parts of *Francia* were. The translation may read, ‘That great food shortage also burdened Burgundy and certain areas of *Francia*.’

58. **FD** ALM 793: (1826), p. 119. ‘Charlemagne directed his two sons, Pippin and Louis, to Benevento with an army and there occurred a great food shortage [over the people of the land and over the army] so that no even during Lent did they abstain from flesh.’ / ‘Karlus dirigit filios suos Pippinum et Hluduvigum in Beneventum cum exercitu, factaque est famis valida, [super populum terrae et super exercitum] ita ut nec in quadragesima a carniū esu abstineretur.’
59. **FD/HM** CM 793: (1826), p. 300. ‘[I]n the winter King Charles sent his two sons Pippin and Louis with an army into Benevento and a very great food shortage occurred there over the people who were encountered there and the army which had arrived there, to the extent that a considerable number of them were not even able to abstain from eating flesh during Lent. And also, a great food shortage weighed down *Italia* and *Burgundia* and through some regions of *Francia*. Moreover, there was a hard food shortage in *Gothia* and *Provencia* on account of which many died from that food shortage.’ / ‘[I]n ipsa hieme transmisit rex Karolus duos filios suos Pippinum et Ludovicum cum hoste in terra Beneventana; et facta est ibi famis validissima super populum illum qui ibi inventus est, et super exercitum qui advenerat, ita ut aliquanti nec ipsa quadragesima se ab esu carniū abstinere potuissent. Sed et famis valida in Italia et Burgundia, et per aliqua loca in Francia incumbebat, necnon in *Gothia* et in *Provincia* erat famis valida, ita ut multi ex ipsa fame mortui fuissent.’ *Gothia* would have likely been meant to refer to southwestern France, a region corresponding to the *Roman Septimania*, which represented the western half of Roman province of *Gallia Narbonensis*. *Gothia* would have stretched from the Rhone valley to the Pyrenees.
60. **FD** BA 793?: (1979), pp. 57-8; (1887), p. 204. ‘At the same time, a very severe food shortage occurred. Many poor folk, widows and orphans began to pour upon him and to fill the gates and roads of the monastery. When he saw them languishing for lack of nourishment, almost swallowed up by death itself, he was troubled because he did not know how he could feed such a number. But since nothing is lacking to those who hear God, whatever new fruits they may lay hands on to suffice the brothers he ordered to be set aside separately. He then gave the command to distribute the rest through brothers designated for each day. Meat of



cattle and sheep was given out every day and even goat's milk provided sustenance. They made huts for themselves in suitable places where they could dwell until the new harvests. When food began to fail, Benedict gave another order to measure out what he had commanded to be set aside for the brothers' use. That was done three times. Among the brothers the mood of pity was so strong that they would have weighed out everything if it had been permitted. What each one was entitled to withdraw for himself, he secretly allotted to those consumed with hunger. Even so they were barely rescued from the peril of food shortage, for several times a person was found dead although there was bread in his mouth.' / 'Orta autem fame gravissima per idem tempus, coepit multitudo pauperum, viduarum, pupillorum ad eum confluere ac portas monasterii viasque stipare. Quos ille intuens inedia tabidos, immo ipsa iam pene morte glutitos,angebatur, quoniam, unde tantam pasceret multitudinem, ignorabat. Set quia nichil deest timentibus Deum, quousque fruges adtingerent novas, quae fratribus sufficere possint seorsum iussit reponi, cetera per constitutos fratres per singulos dies precepit largire. Carnes etiam armentorum oviumque dabantur per singulos dies, lac etiam herbicum prebebat auxilium. Siquidem fecerant sibi tuguria congruis locis, in quibus usque ad novas habitarunt fruges. Deficiente cibaria, rursus ea quae in fratrum reponi iusserat usus mensurare precepit; quod factum est ter. In fratribus vero animis tantus inerat affectus misericordiae, ut libenter etiam impenderent, si fas esset, cuncta. Nam quae sibi subtrahere poterat quisque clam deferebat inedia consumptis; sicque vix erepti a famis fuere periculum. Aliquoties enim in ore panem habens mortuus reperiabatur.' This is most likely in reference to the food shortage that occurred in 793, as the food shortage is said to have occurred 'at the same time' as Felicianism, which arose c.789/93: (1979), p. 16. Ardo, who entered the monastery of Aniane at an early age and knew Benedict very well, wrote his life of Benedict shortly after Benedict's death in 822. The monastery was in Herault, which further firms up the proposed date of 793 for this food shortage, as the CM specifies that *Gothia* and *Provencia* were very much afflicted then by food shortage. It is also worth pointing out that Ardo may have been working alongside Benedict during the food shortage, as it is known that he accompanied Benedict to Frankfurt a year later (794), and, consequently, that Ardo may have lived through the food shortage alongside Benedict and witnessed Benedict's attempt to alleviate the suffering of the poor.

61. **FD** Notker 793?: (2009), p. 78; (1969), pp. 118-19; (1959), p. 31. 'And in what is called Old *Francia* there lived another bishop who was stingy beyond all measure. In a certain abnormal year, when the sterility of all the produce of the land depopulated the entire world, this greedy landlord, rejoicing in the extreme necessity of all mortals who were dying, ordered his storehouses to be opened and their contents sold at an very exorbitant price.' / 'In *Francia* quoque, que dicitur antiqua, fuit alius ultra omnem modum tenacitate constrictus. Cum autem sterilitas

omnium terre proventuum quodam anno insolita orbem universum depopularetur, tunc avarus ille negotiator omnium mortalium immo iam morientium ultima necessitate gavisus, repositoria sua praecepit aperiri nimium care venundanda.’ Later, Notker writes of a ‘poor blacksmith’ who succumbs to the whims of ‘a certain devil of the type called hobgoblins’ on account of the fact that he was ‘more afraid of dying of hunger and thirst than he was of the eternal damnation of his soul’ / ‘miser ille plus penuriam metuens corporalem quam eternam anime perditionem, fecit iuxta suasionem adversarii.’ Notker Balbulus, a monk at St. Gall, wrote his account of Charlemagne’s life in the early 880s (c.883) for Charles the Fat, seventy years after the death of his subject. Notker himself was born in the 840s and died in 912. While his work is generally thought to be of little historical value, his stories, as discussed, undoubtedly shine some light on the disease and hunger history of Carolingian Europe. This food shortage, or the crisis that formed the backdrop to this story, presumably occurred in the late eighth century or early ninth, possibly 793, though Notker could have drawn on a crisis closer to his own time. ‘Antiqua Francia’ may refer to the Frankish heartlands, or, more generally, to regions west of the Rhine: Noble (2009), pp. 76 n. 40, 78 n. 41.

62. *W* Reviser 793: (1970), p. 71; (1895), p. 193. ‘The king was persuaded by self-styled experts that one could travel most conveniently from the Danube into the Rhine if a navigable canal was built between the rivers Rednitz/Regnitz and Altmühl, since one of these rivers flows into the Danube and the other into the Main. So he went at once with his entire following to the place, gathered a large number of people, and spent the whole fall on this project. A ditch was dug between these two rivers, two thousand paces long and three hundred feet wide. But it was in vain; for due to continuous rain and because of the swampy ground contained too much water the work that was done did not hold.’ / ‘Ducta est itaque fossa inter praedictos fluvios duum milium passuum longitudine, latitudine trecentorum pedum; sed in cassum. Nam propter iuges pluvias et terram, quae palustris erat, nimio humore naturaliter infectam opus, quod fiebat, consistere non potuit; sed quantum interdiu terrae a fossoribus fuerat egestum, tantum noctibus humo iterum in locum suum relabente subsidebat.’ This, like the equine mortality of 791, is only found in the reviser’s version of the RFA. So-called minor annals generally place this ditch digging in 792, see, for instance, *AW* (1826), p. 65. A similar statement is found in the *EA* (1826), p. 179 and the *CM* (1826), p. 300.
63. *CF* 794: (1906), p. 166. ‘Our most pious lord king has established, with the holy synod in agreement, that no one, lay or ecclesiastical, is ever to sell grain more dearly, whether in a time of abundance or dearth, than the newly established public measure: a measure of oats for 1 *denarius*, 2 *denarii* for a measure of barley, 3 *denarii* for a measure of rye, and 4 *denarii* for a measure of wheat. But if one wishes to sell bread, let him offer 1 *denarius* for twelve wheat loaves, weighing two pounds apiece, 1 *denarius* for fifteen loaves of rye of equal weight,

and likewise twenty barley loaves and twenty oat loaves of similar weight. If a sale is made of the lord king's public grain, two measures of oats for 1 *denarius*, a measure of barley for 1 *denarius*, a measure of rye for 2 *denarii*, and a measure of wheat for 3 *denarii*. And let him who holds our benefice see to it most diligently, insofar as he is able, God granting, that none of the servants belonging to that benefice die of hunger. And let him sell freely in accordance with the prescribed law what remains beyond the needs of his household.' / 'III. Statuit piissimus domnus noster rex, consentienti sancta synodo, ut nullus homo, sive ecclesiasticus sive laicus sit, ut nunquam carius vendat annonam, sive tempore abundantiae sive tempore caritatis, quam modium publicum et noviter statutum, de modio de avena denario uno, modio ordii denarius duo, modio sigalo denarii tres, modio frumenti denarii quatuor. Si vero in pane vendere voluerit, duodecim panes de frumento, habentes singuli libras duas, pro denario dare debeat, sigalatus quindecim aequo pondere pro denario, ordeaceos viginti similiter pensantes, avenatios viginti quinque similiter pensantes. De vero anona publica domni regis, si venundata fuerit, de avena modius II pro denario, ordeo den. I, sigalo den. II, frumento modius denar. III. Et qui nostrum habet beneficium diligentissime praevideat, quantum potest Deo donante, ut nullus ex mancipiis ad illum pertinentes beneficium fame moriatur; et quod superest illius familiae necessitatem, hoc libere vendat iure praescripto.'

64. **FD** SF 794: (1883), p. 76. 'For we learned that in the year in which that hard food shortage stole in, crops sprung up aplenty, but empty, since they had been devoured by demons, and cries of reproach were heard.' / '[E]nim didicimus in anno quo illa valida famis inrepsit, ebullire vacuas anonas a daemonibus devoratas et voces exprobrationis auditas.' This document dates from June 794. This can also be found in CF (1906), pp. 168-69.
65. **FD** AMO 794: (1859), p. 498. 'In this year, there was a great drought, but nevertheless by the grace of God there were abundant goods.' / 'Fuit eo anno siccitas magna, sed tamen largiente Deo et abundantia bona.'
66. **W** AFL 797: (1839), p. 91. 'Rivers and the sea dried up.' / 'Siccata fluminum idem maris.'
67. **W** / **FD** RFA 800: (1970), p. 80; (1895), p. 110. 'On 6 June and likewise on 9 June there was a severe frost which did not, however, harm the harvest.' / '[P]ridie Non. Iul. insolito more aspera pruina erat et VII. Id. Iul. similiter, quae tamen nihil incommoditatis fructibus attulit.' This follows notice of Charlemagne's return to Aachen after passing through Paris and Orleans.
68. **W** / **HM** RFA 801: (1970), p. 81; (1895), p. 114. 'In the same year also, some places along the Rhine, in *Gallia* and in *Germania* shook [sustained earthquakes]. Since the winter was mild a pestilence broke out.' / 'Eodem anno loca quaedam circa Renum fluvium et in Gallia et in Germania tremuerunt. Pestilentia propter molliem hiberni temporis facta est.' This entry succeeds notice of Charlemagne's

departure on 25 April from Rome, where he had been since the following December and where the pope declared him ‘Emperor and Augustus,’ for Spoleto. It also follows a report of a ‘tremendous earthquake’ that reportedly ‘severely shook the whole of *Italia*.’ The earthquake, the annalist specifies, ruined ‘a large part of the roof of the basilica of the blessed apostle Paul’ and caused ‘mountains to tumble on top of cities.’ This is also found in the EA (1826), p. 190, ‘Eodem anno loca quaedam circa Rhenum fluvium et in Gallia et in Germania termuerunt. Pestilentia propeter mollitiem hiberni temporis facta est.’

69. **HM/AM/W** ALO 801: (1881), p. 230. ‘Certain places in *Germania*, *Gallia*, and near the Rhine shook, and there was a great pestilence of humans and cattle on account of the mild winter.’ / ‘In Germania quoque et Gallia quaedam loca propter Rhenum tremuerunt, et pestilentia magna hominum et peccorum propter mollitiem hiemis extitit.’
70. **HM** PS 801: (1826), p. 91. ‘The greatest pestilence of diseases began to occur.’ / ‘Morborumque lues fieri permaxima coepit.’
71. **FD** CMG 802: (1883), pp. 96-7. ‘30. Concerning those whom the lord emperor wishes, with Christ favourable, to have his peace as protection in his realm, that is, those who hasten to his mercy, wishing to make an announcement somewhere, whether they are Christian or pagan, or who seek his assistance out of need or hunger: that no one dare to bind them in slavery, or appropriate them unlawfully, or make them the property of another, or sell them....’ / ‘30. De his quos vult domnus imperator, Christo propitio, pacem defensionem habeant in regno suo, id sunt qui ad suam clementiam festinant, aliquo nuntiare cupientes sive ex christianis sive ex paganis, aut propter inopia vel propter famem suffragantia quaerunt, ut nullus eos sibi servitio constringere vel usurpare audeant neque alienare neque vindere...’
72. **HM** EA 803: (1826), p. 191. ‘In this winter, around that palace and neighboring regions there was an earthquake and mortality followed.’ / ‘Hac hieme circa ipsum palatium et finitimas regiones terrae motus factus et mortalitas subsequuta.’ The palace referred to here was that at Aachen. This one of only two instances in which the EA provides information relevant for this study that is not found in other texts, the other is listed below (C.1.51). Of course, this may in fact related to RFA 802 entry listed above. That Einhard wrote the early ninth-century entries of the so-called EA is uncertain.
73. **FD** CMT 805 (1883), pp. 122-23. ‘4. Concerning this: if food shortage, disaster, pestilence, unstable weather, or trouble of any sort occur, that our edict not be awaited, but God’s mercy be prayed for immediately. And in the present year of the scarcity of the food shortage, that each man help his own family as he is able and not sell his grain too dearly; and that no sustenance be sold outside our empire.’ / ‘4. De hoc si evenierit fames, clades, pestilentia, inaequalitas aeris vel alia qualiscumque tribulatio, ut non expectetur edictum nostrum, sed statim

depraecetur Dei misericordia. Et in praesenti anno de famis inopia, ut suos quisque adiuvet prout potest et suam annonam non nimis care vendat; et ne foris imperium nostrum vendatur aliquid alimoniae.’ This capitulary, given at Thionville, dates to 805. This passage, slightly altered, is also found in ACAP 827: (1883), p. 409-10. ‘112. De fame, clade et pestilentia, si venerit. De hoc si evenerit fames, clades, pestilentia et inaequalitas aeris vel alia qualiscumque tribulatio, ut non expectetur edictum nostrum, sed statim deprecetur Dei misericordia. Et in praesenti anno de famis inopia, ut suos quisque adiuvet prout potest et suam annonam non nimis care vendat; et ne foris imperium nostrum vendatur aliquid alimoniae.’ In 827, Ansegisus (c.770-c.833), abbot of Fontenelle Abbey (or Abbey of St. Wandrille) compiled a compilation of capitularies from the reigns of Charlemagne and Louis the Pious. The passage, again slightly altered, is also found in BC: (1837), p. 59. ‘246. Quid tempore famis ac cuiuslibet tribulationis agendum sit. De hoc si evenerit fames, clades aut inaequalitas aeris vel alia qualiscumque tribulatio, ut non expectetur edictum dominicum, sed statim deprecetur Dei misericordia; ut in praesenti anno de famis inopia, ut suos quisque adiuvet prout potest, et nemo suam annonam nimis care vendat, et ne foras imperium nostrum vendatur aliquod alimonium.’ This passage is found in a forged set of capitularies that were composed by someone calling himself Benedict Levita in mid ninth century (c.847-50). Not all the capitularies were forged, however. Clearly, this passage was taken from Ansegisus. The passage, again slightly altered, is also found in BC: (1837), p. 86. ‘270. De fame vel ceteris tribulationibus. Si venerit fames, clades, aut inaequalitas aeris vel qualiscumque tribulatio, non expectetur edictum dominicum, sed statim depraecetur Dei misericordia. Et in praesenti anno de famis inopia, ut unusquisque adiuvet prout potest, et nemo suam annonam nimis care vendat. Et ne foris imperium nostrum vendatur aliquid alimoniae.’

74. **FD / W / HM** KG 805: (1883), p. 245. ‘...[T]here seems to be, unusually and beyond the norm, a barrenness of the land everywhere and the risk of famine seems imminent; also, there is intemperate weather that is very harmful to crops, pestilence in places, and the wars of the pagan people dragging on continually around our borderlands. And there are many things besides that it would be tedious for us to recount now, and which can be very well known to us through experience, if we wish to recollect them, such kinds of misfortunes do we suffer every day because of what we deserve.’ / ‘...[I]nsolito more et ultra consuetum ubique terrae sterelitas esse et famis periculum imminere videtur, aeris etiam intemperies frugibus valde contraria, pestilentia quoque per loca, et paganorum gentium circa marcas nostras sedentia bella continua, multa praeterea quae et nunc enumerare longum est et nobis experimento possunt esse notissima, si recordare volumus, qualia incommoda singulis diebus propter merita nostra sentiamus.’ This letter, from Charlemagne to Bishop Gerbald of Liège, dates to 805.

75. **FD** CEC 805/808: (1883), p. 141. ‘1. That they strive to help the needy with grain, so that they do not perish from the danger of starvation. ’ / ‘1. Ut indigentibus adiuuare studeant de annona, ita ut famis periculum non pereant.’ This document dates to 805, 806, 807 or 808.
76. **FD** CMN 806: (1883), p. 132. ‘18. Accordingly we have resolved, as in the present year, because the food shortage seems to be strong in very many places, that all the bishops, abbots and abbesses, nobles and counts, or vassals, and all the faithful who are seen to hold royal benefices, both from church holdings and the rest, are one and all to have their household fed from their benefice and to feed their own family from their personal property. And if, God granting, one has grain over and above his own needs and those of his household, either in the benefice or his own property, and wishes to sell it, let him sell it no more dearly than a measure of oats for 2 *denarii*, a measure of barley in return for 3 *denarii*, a measure of spelt in return for 3 *denarii*, if it is separated, one measure of rye in return for 4 *denarii*, and one measure of prepared wheat in return for 6 *denarii*. And let this measure be what has been established for all to have so that each and every person has an equal amount and equal measures.’ / ‘18. Consideravimus itaque, ut praesente anno, quia per plurima loca fames valida esse videtur, ut omnes episcopi, abbates, abbatissae, optimates et comites seu domestici et cuncti fideles qui beneficia regalia tam de rebus ecclesiae quamque et de reliquis habere videntur, unusquisque de suo beneficio suam familiam nutrire faciat, et de sua proprietate propriam familiam nutriat; et si Deo donante super se et super familiam suam, aut in beneficio aut in alode, annonam habuerit et venundare voluerit, non carius vendat nisi modium de avena dinarios duos, modium unum de ordeo contra dinarios tres, modium unum de spelta contra dinarios tres si disparata fuerit, modium unum de sigale contra dinarios quattuor, modium unum de frumento parato contra dinarios sex. Et ipsum modium sit quod omnibus habere constitutum est, ut unusquisque habeat aequam mensuram et aequalia modia.’ This capitulary, given at Nijmegen, is dated March 806. This passage is also found in ACAP (1883), p. 411. ‘126. De hoc si per plurima loca fames fuerit. Consideravimus itaque, quia per plurima loca fames valida esse videtur, ut omnes episcopi, abbates, abbatissae, optimates et comites seu domestici et cuncti fideles, qui beneficia regalia tam de rebus ecclesiasticis quamque et de reliquis habere videntur, ut unusquisque de suo beneficio suam familiam nutrire faciat et de sua proprietate propriam familiam nutriat; et si Deo donante super se et super familiam suam aut in beneficio aut in alode annonam habuerit et venundare voluerit, non carius vendat nisi modium de avena dinarios duos, modium de ordeo contra dinarios tres, modium unum de sigile contra dinarios quatuor, modium unum de frumento parato contra dinarios sex. Et ipse modius sit, quem omnibus habere constitutum est et unusquisque habeat aequam mensuram et aequales modios.’ On Ansegisus see C.1.73.

77. **FD** MeG 807: (1883), p. 134. 'We have ruled that, because of the scarcity of the food shortage, all must wage war/train beyond the Seine.' / '[O]rdinavimus propter famis inopiam, ut de ultra Sequane omnes exercitare debeant.' This is the opening line of the document composed in 807 and given at Aachen. 'Beyond the Seine' appears to have been a common phrase for the region between the Seine and Loire: Nelson (1991), p. 28 n. 1.
78. **HM** ALM 807: pp. 120. 'Greatest mortality at the monastery of St. Boniface.' / '[M]ortalitas maxima in monasterio sancti Bonifatii...'
79. **HM** CURSCHMAN 807: (1900), p. 93. 'Mortality [at] Fulda.' / 'Mortalitas Fulda.' This is likely non-contemporary.
80. **W/HM** RFA 808: (1970), p. 88; (1895), p. 125. 'The winter was extremely mild and there was a pestilence in that time.' / 'Hiemps mollissima ac pestilens fuit in illo tempore.' Scholz and Rogers' translate this as 'The winter was extremely mild and unhealthy,' which does not convey the true sense of 'pestilens.' This entry begins the annalist's account of 808 and precedes notice of Charlemagne's travel to Nijmegen for Easter. It is not explicitly tied to any other events in that year, such as the conflict with the Danes and other peoples who had 'defected' to the Danes.
81. **W/HM** EA 808: (1826), p. 195. 'There was a very mild and, in this way, pestilential winter.' / 'Hiemps mollissima hac pestilens fuit in illo tempore.'
82. **W/HM** AX 808: (1909), p. 3. 'There was a very mild and pestilential winter.' / '[H]iemps mollissima ac pestilens erat.' Here the annalist connects mild winters to a disease outbreak, as Carolingians do not uncommonly.
83. **FD** CMA 809: (1883), p. 151. '24. Concerning past debts of the poor and transacting business before produce can be collected: These things should be completely provided for beforehand: that each and every person in the present year offer his man, free or servant, relief from the scarcity of the food shortage.' / '24. De debitis pauperum anterioribus et negotia facienda antequam fructum collegatur: omnino inantea cavenda. Ut unusquisque presenti anno sive liberum sive servum suum de famis inopia adiutorium prebeat.' This document was delivered at Aachen.
84. **W** ASAs 809: (1826), p. 14. '[T]here was such a great flood of water, as was never before seen in that land. It was its highest on 28 December.' / '[F]uit inundatio aquarum talis, qualis antea nunquam fuit in terra ista visa, et fuit 5 Kal. Ianuarii altissima.'
85. **AM** CM 809: (1826), p. 309. '[A] great mortality of animals came from the east and crossed over all the way to the west.' / '[V]enit mortalitas magna animalium ab oriente et pertransiit usque in occidentem.'
86. **AM/W/FD** PS 809: (1826), pp. 263-64. 'Everywhere the peace of the present year made all the limits of the empire happy, but certain sad things happened in many lands: for an unspeakable pestilence of cattle, more fierce than every

enemy, killed the entire species. For when shepherds left their happy herd and led flocks out in the morning to green meadows, in the evening scarcely the smallest portion returned home [and they were] sick, bearing the signs of the dreadful pestilence and imminent death through their emaciation. But a larger number were lying dead over the expanses of the field, where they [had] exhaled [their] soft spirits into green grasses. And now pastures were stinking with cattle strewn, and when [they were] taken away, stalls [were] cleaned with much labor, then those who seeing that an animal was about to die chose to lay it low with a sword, immediately it [the sword] dripping with putrid matter from the wound brought forth the poison that had collected in the body. Noricus [Noricum] bay is said to have suffered these things in particular, together with the neighbouring regions to it. Thereafter the vines, made sterile at this time, responded to the labor, weighed upon them, with no reward the hope of the eager farmer was frustrated while he observes that ripe vineyards are without their fruit and in vain the useless tree runs wild the vineleaf covers no grape bunches with it spreading shoots / and the extensive vineyards stands empty of fruit / in many parts of the kingdom thus, under this gloomy omen, with not customary loss of wines [wine cups] died away. Surely, for so long a time, although before, that saddist misfortune was already showing that there would be sorrow with August leaving the lands.' / 'Undique praesentis pax laetificaverant anni / Cunctos imperii fines, sed tristia quaedam / Multis contigerant terris: nam seior omni / Hoste nefanda lues pecudum genus omne peremit. / Nam cum pastores agerent armenta gregesque / Mane foras laetos in prata virentia, sero / Aeagra domum rediit vix pars paucissima, dirae / Signa gerens pestis macie mortisque propincae. / At maior numerus campi per plana iacebat, / Qua dulces animas virides efflavit ad herbas. / Iamque cadaveribus foetebant Pascua stratis, / Extractis etiam, praesepia quaeque labore / Purgari multo poterant, tum qui morituum / Cernentes animal magis id prosternere ferro / Eligerent, statim stillans e vulnere tabo / Prodiderat toto concretum corpore virus. / Noricus ista sinus fertur specialiter esse / Prepressus steriles hoc factae tempore vites / Praeterea steriles hoc factae tempore vites / Impenso sibimet nulla mercede labori / Respondent, spes est avidi frustrata coloni / Dum vineta carere suo pubentia foetu / Conspicit, et vane silvescit inutilis arbour / Palmite diffuso nullas dum pampinus uvas / Contegit, et fructu vacua stat vinea lata. / Partibus in multis regni sic omine tristi / Bachica non solito perierunt pocula damno. / Tempore nimirum tanto licet ante, per orbem / Augusto, luctum, terris abeunte, futurum / Iam ostendebat Casus tristissimus iste.' The Poeta Saxo, in some instances, colored events in classical rhetoric and imagery. This account of the c.810 pestilence is clearly unique and it is uncertain what, if any contemporary documents he utilized. His dating of the pestilence to 809, however, may signify that he did not derive his account from the RFA, which dates the pestilence to 810. In the last sentence of this passage, the PS seems to indicate that the crop



problems he discusses would have been known, when they occurred, to spell disaster in the fall, after August. For more introduction to the *Poeta Saxo* see (C.1.51) and McKitterick (2008), pp. 22-7.

87. *AM* RFA 810: (1970), p. 92; (1895), p. 132. ‘On this campaign a pestilence of oxen broke out which was so severe that almost no animals remained to feed such a large army. All perished to the last head. Not only there but in all provinces subject to the emperor the mortality of this kind of animal ran very high.’ / ‘Tanta fuit in ea expeditione boum pestilentia, ut pene nullus tanto exercitui superesset, quin omnes usque ad unum perirent; et non solum ibi, sed etiam per omnes imperatori subiectas provincias illius generis animalium mortalitas inmanissime grassata est.’ The RFA imply that this pestilence would have taken place or begun in the summer of 810. This passage is also found nearly verbatim in many later sources which relied on the RFA. For example, in the EA (1826), p. 198, ‘[T]anta fuit ea expeditio boum pestilentia, ut paene nullus tanto exercitui supperesset, quin omnes usque interirent et non solum ibi sed etiam super omnes iumperatori subiectas provincias illius generis animalium mortalitas inmanissime grassata est.’ Likewise Regino (1890), p. 70. ‘Tanta fuit in ea expeditione boum pestilentia, ut pene nullus tanto exercitui superesset, quin omnes usque ad unum perirent; et non solum ibi, sed etiam per omne imperium huius generis animalia perierunt.’ The *Annalista Saxo* too made use of this passage.
88. *AM* Agobard 810: (2004), p. 233; (1981), pp. 14-5. ‘A few years ago, a certain foolish story spread. Since at that time there was a mortality of cattle, people said that Duke Grimoald of Benevento had sent people with a dust which they were to spread on the fields and mountains, meadows and rivers, and that it was because of the dust that they spread that cattle died. He did this [they said] because he was an enemy of our most Christian Emperor Charles. For this reason we heard and saw that many people were captured and some were killed. Most of them, with plaques attached, were cast into the river and drowned. And, what is truly remarkable, those captured gave testimony against themselves, admitting that they had such dust and had spread it. For so the Devil, by the secret and just judgment of God, having received power over them, was able to succeed over them that they gave false witness against themselves and died. Neither learning, nor torture, nor death itself deterred them from daring to give false witness against themselves. This story was so widely believed that there were very few to whom it seemed absurd. They did not rationally consider how such dust could be made, how it could kill only cattle and not other animals, how it could be carried and spread over such a vast territory by humans. Nor did they consider whether there were enough Beneventan men and women, old and young, to go out from their region in wheeled carts loaded down with dust. Such is the great foolishness that oppresses the wretched world...’ / ‘Ante hos paucos annos disseminata est quedam, stultitia, cum esset mortalitas boum, ut dicerent Grimaldum, ducem

Beneventorum, transmisisse homines cum pulueribus, quos spargerent per campos et montes, prata et fontes, eo quod esset inimicus christianissimo imperatori Karolo, et de ipso sparso puluere mori boues. Propter quam causam multos comprehensos audiuius et uidimus, et aliquos occisos, plerosque autem affixos tabulis in flumen proiectos atque necatos. Et, quod mirum valde est, comprehensi ipsi aduersum se dicebant testimonium, habere se talem puluerem, et spargere. Ita namque diabolus, occulto et iusto Dei iudicio, accepta in illos potestate, tantum eis succedere valebat, ut ipsi sibi essent testes fallaces ad mortem. Et neque disciplina, neque tortura, neque ipsa mors deterrebat illos, ut aduersum semetipsos falsum dicere non auderent. Hoc ita ab omnibus credebatur, ut pene pauci essent, quibus absurdissimum videretur. Nec rationabiliter pensabant, unde fieri posset talis puluis, de quo soli boues morerentur, non cetera animalia, aut quomodo tantus portari per tam latissimas regions, quas superspargere pulueribus homines non possunt, nec si Beneventani viri et femine, senes et iuuenes, cum ternis carris puluere caricatis egressi de regione fuissent. Tanta iam stulticia oppressit miserum mundum...’ Agobard of Lyon composed his text on hail and thunder in the mid 810s, before 820, and likely in Lyon or thereabouts. The events and popular beliefs he describes also likely took place in Lyon, though, as discussed, they would have been experienced and shared in other regions of Carolingian Europe. The dating of the passage here is derived from the RFA. The translation here closely follows that of Dutton (2004), p. 223 with some changes: ‘prata’ may also be translated as large expanses of water or (like Dutton) wells, though Latouche (1961), p. 92, states that *prata* were mowing fields ‘in which the hay was cut then loaded on to carts and kept for fodder during the cold weather.’

89. *AM/HM* ALM 810: (1826), p. 121. ‘The greatest mortality of oxen almost across all of Europe and, moreover, of many people...’ / ‘Mortalitas bovum maxima pene in tota Europa nec non et hominum plurimorum...’
90. *AM/W* AX 810: (1909), p. 4. ‘[T]here was a great mortality of oxen and other animals in that year and the winter was very hard.’ / ‘[M]agna mortalitas boum et aliorum animalium erat in ipso anno, et hiemps valde dura.’ The additional notice of the difficult winter is unique.
91. *AM* ASER 810: (1934), p. 739. ‘There was a great mortality of animals.’ / ‘Magna mortalitas animalium fuit.’
92. *AM* Notker 810: (2009), p. 107; (1959), pp. 75-6. ‘The unconquered Charles came back and tried to invade their territory by the land route, although it was very tight and without roads. But either the providence of God stopped him, as according to the Scriptures, “these served to put Israel to the test,” or our sins got in the way, but every one of his attempts failed. For example, one night, to the disadvantage of the whole army, fifty pairs of oxen belonging to one abbot were struck dead by a sudden disease. Therefore Charles, the wisest of men, gave up what he had begun, so that he would not disobey Scripture: “Do not try to rush against a

flowing stream.” / ‘[I]nvictissimus Karolus itinere terrestri, quamvis multum angusto et invio, domi eos invadere molitus est. Sed vel Dei providentia prohibente, ut secundum scripturas in his experiretur Israhalem, vel peccatis nostris obsistentibus, cuncta illius temptamenta in irritum deducta sunt in tantum, ut ad incommoda totius exercitus comprobanda de unius abbatis copiis in una nocte quinquaginta boum paria repentina peste numerarentur extincta. Sapientissimus igitur virorum Karolus, ne scripture inobediens contra iactum fluvii conaretur, destitit ab incepto.’ Prior to this passage, Notker tells us that Vikings were causing ‘a great disturbance for the Franks and Gauls.’ The dating for this passage is derived from the RFA. In 810, Charlemagne had attempted to ‘invade’ the territory of the Vikings, that is, the area northeast of the Elbe.

93. *W* RFA 811: (1970), p. 93; (1895), p. 134. ‘The peace announced between the emperor and Hemming, the king of the Danes, was only sworn on arms because of the severity of the winter, which closed the road for traveling between the parties. Only with the return of spring and the opening of the roads, which had been closed because of harsh frost, did twelve magnates of each part and people, that is, of Franks and Danes, meet on the river Eider [at Heiligen] and confirm the peace by an exchange of oaths according to their customs.’ / ‘Condicta inter imperatorem et Hemmingum Danorum regem pax propter hiemis asperitatem, quae inter partes commeandi viam claudebat, in armis tantum iurata servatur, donec redeunte veris temperie et apertis viis, quae inmanitate frigoris clausae fuerunt, congregientibus ex utraque parte utriusque gentis, Francorum scilicet et Danorum, XII primoribus super fluvium Egidoram in loco, qui vocatur...[this gap is in the text] datis vicissim secundum ritum ac morem suum sacramentis pax confirmatur.’
94. *W* ALM 811: (1826), p. 121. ‘Winter was the very hard and lasted until the end of the month of March.’ / ‘Hiemps fuit durissima, perdurans usque ad finem Martii mensis.’
95. *FD* CA 813: (1906), p. 252. ‘XIII. On account of the shortage caused by the subsistence crisis, each and every person should strive to govern/help his dependents and those belonging to him. 12. That each and every bishop be permitted to distribute food from the Church’s store to the poor in accordance with the canons with witnesses.’ / ‘XIII. Ut unusquisque tempore famis aut quarumlibet necessitatum ad se pertinentes pro viribus suis gubernare studeat, quia scriptum est: Beati misericordes, quoniam ipsi misericordiam consequentur, et iterum: Date et dabitur vobis, dimittite et dimittetur vobis.’ This document dates to 10/11 May 813.
96. *FD* CCE 813: (1883), p. 174. ‘XIII. On account of the shortage caused by the subsistence crisis, each and every person should strive to govern/help his dependents and those belonging to him. 12. That each and every bishop be permitted to distribute food from the Church’s store to the poor in accordance

with the canons with witnesses.’ / ‘11. Ut unusquisque propter inopiam famis suos familiares et ad se pertinentes gubernare studeat. 12. Ut unicuique episcoporum liceat de thesauro ecclesiae pauperibus erogare nutrimentum secundum canones cum testibus.’ This document dates to 813. It is also found as KMC (1906), p. 296.

97. *W* AX 813: (1909), p. 224. ‘A very hard winter.’ / ‘Hiemps nimis dura.’
98. *W* RFA 815: (1970), p. 99; (1895), pp. 141-42. ‘The emperor commanded that Saxons and Obodrites should prepare for this campaign, and twice in that winter the attempt was made to cross the Elbe. But since the weather suddenly turned warm and made the ice on the river melt, the campaign was held up. Finally, when the winter was over, about the middle of May, the proper time to begin the march arrived.’ / ‘Iussum est ab imperatore, ut Saxones et Abodriti ad hanc expeditionem praepararentur, temptatumque in illa hieme duabus vicibus, si Albia transiri posset, sed mutatione subita aeris emolliti glacie fluminis resoluta negotium remansit imperfectum, donec tandem hieme transacta circa medium fere Maium mensem oportuna proficiscendi tempus adrisit.’ Travel, and certainly campaigns, was generally limited to the spring and summer, as is made clear through Carolingian annals. See, for instance, the entry for 813 in the RFA where Charlemagne sends envoys to Constantinople only after the ‘mild season of spring set in.’ In the RFA entry for 801 we hear of Charlemagne’s envoy being held up in October Porto-Venere, unable to cross the Alps on account of the snow. In the RFA entry for 820 we read that only ‘when winter was over and the grass could provide fodder for the horses’ that three armies set out to curb Ljudovit’s rebellion. This entry is also found in the EA (1826), p. 202.
99. *W* RFA 815: (1970), p. 100; (1895), p. 143. ‘The Rhine, swollen by rain in the Alps, caused an unusual flood.’ / ‘Rhenus fluvius Alpinis imbribus auctus ultra solitum exundavit.’ This report immediately follows notice of ‘severe earthquakes’ in August in Constantinople and Saintes (in *Aquitania*). More generally, the report of the flood succeeds notice of the breaking of a three-year peace with the Saracens and the resumption of war between the Saracens and Franks. It also precedes notice of the death of Pope Leo and a revolt in *Italia*.
100. *HM/C* RFA 820: (1970), p. 107; (1895), p. 153. ‘But when the armies had united they ravaged almost the whole land with fire and sword and they returned home without suffering any serious losses. But the army which marched through Upper Pannonia suffered a misfortune when crossing the Drave. From the unhealthy land and water, it was severely stricken by a loosening of the bowel, to which a considerable part of it succumbed.’ / ‘Exercitus vero, postquam in unum convenerunt, totam pene regionem ferro et igni devastantes haud ullo gravi damno accepto domum reversi sunt. Is tamen, qui per Pannoniam superiorem iter fecerat, in transitu Dravi fluminis ex locorum et aquarum insalubritate soluti ventris incommodo graviter adfectus est, et pars eius non modica hoc morbo

consumpta est.’ In the spring of 820, three armies set out against Ljudovit. They had been recruited, the annalist writes, from *Saxonia*, East *Francia*, *Alamannia*, *Bavaria* and *Italia*. One of the three forces had come by way of the Alps, another through the province of Carinthia and another through *Bavaria* and Upper *Pannonia*. It was the later, as the annalist specifies, that was afflicted when crossing the Drave. This contingent, of course, had been forced to cross the Drave twice. The initial crossing, we are told, had slowed its arrival. Indeed, it appears that the army was affected by disease and sustained losses while en route to Ljudovit. That the army continued and was still, at least to some extent, effective, alongside the other contingents, forces us to question how many of those forced to cross the Drave actually died. This passage is also found in the EA (1826), p. 207, ‘Is tamen, qui per Pannoniam superiorem iter fecerat, in transit Dravi fluminis ex locorum et aquarum insalubritate solute ventris incommodo graviter adfectus est, et pars eius non modica hoc morbo consumpta est.’

101. *W/HM/AM/FD* RFA 820: (1970), p. 108; (1895), p. 154. ‘In this year great disasters occurred on account of continued rain and the excessive humidity. A pestilence affecting both men and oxen raged far and wide so that hardly any part of the entire Frankish kingdom could be found immune from this pestilence or untouched by it. Grain and legumes were rotting away in the persistent rains or could not be gathered or, when gathered, were spoilt. Little wine was produced this year, and what little there was turned out tart and sour since there was not enough warm weather. In some places water from the flooded rivers did not run off low-lying areas, and this flooding prevented seeding in the fall, so that almost no grain was sown before the warm spring season. There was an eclipse of the moon on 28 January in the second hour of the night.’ / ‘Hoc anno propter iuges pluvias et aerem nimio humore resolutum magna incommoda contigerunt. Nam et hominum et boum pestilentia tam inmane longe lateque grassata est, ut vix ulla pars totius regni Francorum ab hac peste immunis atque intacta posset inveniri. Frumenta quoque et legumina imbrium adsiduitate corrupta vel colligi non poterant vel collecta computrescebant. Vinum etiam, cuius parvus proventus eodem anno fuit, propter caloris inopiam acerbum et insuave fiebat. In quibusdam vero locis de inundatione fluminum aquis in plano stagnantibus autumnalis satio ita impedita est, ut penitus nihil frugum ante verni temperiem seminaretur. Luna defecit VIII. Kal. Decembr. hora noctis secunda.’ This also appears in the EA (1826), p. 207.
102. *W/FD* ASI 820: (1881), p. 38. ‘On account of the excessiveness of the rain, the air was corrupted and there was a great food shortage.’ / ‘Propter nimietatem pluviarum aer corruptus, et famis valida.’
103. *W/HM/AM/FD* AF 820: (1891), p. 22. ‘On account of the excessiveness of the rain, and after the air had been corrupted, a pestilence of humans and oxen

- spread far and wide. Hardly any part of the Frankish kingdom was left untouched by this pestilence. Also, crops either were not able to be collected or they rotted. Additionally, on account of the heat, wine was bitter and sour.’ / ‘Propter nimietatem pluviarum aere corrupto hominum et boum pestilentia longe lateque ita grassata est, ut vix ulla pars regni Francorum ab hac peste immunis posset inveniri. Fruges quoque vel colligi non poterant vel collecta putruerunt. Vinum etiam propter caloris inopiam acerbum et insuave fiebat.’
104. **W/HM/FD** HA 820: (1844), p. 102. ‘On account of the inundation of rain, there was a great pestilence and a food shortage.’ / ‘Ex inundatione pluviarum nimia pestilentia magna et fames facta.’ The HA was composed by Hermann von Reichenau in the mid eleventh century.
105. **FD/W** RFA 821: (1970), p. 110; (1895), p. 157. ‘Sowing was prevented in the fall in several areas because of continuous rain. This fall was followed by a winter so long and cold that not only brooks and rives of medium size were covered with thick ice but even the biggest and most important streams, such as the Rhine, Danube, Seine as well as other rivers in *Gallia* and *Germania* that flowed into the ocean. For more than thirty days heavy wagons crossed over the rivers as if they were bridges. When this ice melted, it did grave damage to the villages along the Rhine.’ / ‘Autumnalis satio iugitate pluviarum in quibusdam locis impedita est. Cui hiems in tantum proluxa successit et aspera, ut non solum minores rivi ac mediocres fluvii, verum ipsi maximi ac famosissimi amnes, Rhenus videlicet ac Danubius Albisque ac Sequana caeteraque per Gralliam atque Germaniam oceanum petentia flumina, adeo solida glacie stringerentur, ut tricenis vel eo amplius diebus plaustra huc atque illuc commeantia velut pontibus iuncta sustinerent; cuius resolutio non modicum villis iuxta Rheni fluentia constitutis damnum intulit.’ This is also found in the EA (1826), p. 208.
106. **W** AX 821: (1909), p. 6. ‘The winter was very hard.’ / ‘[H]iemps erat valde dura.’
107. **FD** AC 822: (1826), p. 98. ‘A great food shortage.’ / ‘Fames valida.’
108. **W/FD/HM/AM** RFA 823: (1970), pp. 114-15; (1895), pp. 163-64. ‘In many areas the produce of the fields was destroyed by a raging hail storm and in a few places real stones of tremendous weight were seen to fall with the hail. Houses are also said to have been struck by lightning, and everywhere men and animals were killed with unusual frequency by strokes of lightning. There followed a great pestilence and mortality of humans which raged furiously throughout *Francia*, carrying away by violence countless people of both sexes and of all ages.’ / ‘[I]n multis regionibus fruges grandinis vastatione deletae atque in quibusdam locis simul cum ipsa grandine veri lapides atque ingentis ponderis decidere visi; domus quoque de caelo tactae hominesque ac caetera animalia passim fulminum ictu praeter solitum crebro exanimata dicuntur. Secuta est ingens pestilentia atque hominum mortalitas, quae per totam Franciam inmaniter

usquequaque grassata est et innumeram hominum multitudinem diversi sexus et aetatis gravissime seviendo consumpsit.’ This passage is preceded by an account of an earthquake ‘in the palace of Aachen,’ the ten month fast of an ‘about twelve-year old’ girl, lightning strikes in *Saxonia*, and other, what the annalist calls, ‘prodigies.’ Another fast (this time three years in length) carried out by a girl, who is also said to have been twelve years old, is found in the entry for 825 in the RFA. We may infer that the pestilence of 823 took place in the summer or fall, as it is said to have occurred after the produce of the fields was destroyed. This passage is also found in the EA (1826), pp. 211-12.

109. *W/FD* ASER 823: (1826), p. 93. ‘A great winter, similarly a huge drought and great food shortage.’ / ‘Hiemps magnus, similiter siccitas grandis et famis valida.’
110. *W/HM/AM* Astronomer *c.* 823 (2009), p. 266; (1995), pp. 420, 422. ‘[S]trange signs and omens stirred up the emperor’s spirit, especially an earthquake at the palace of Aachen, weird sounds at night, a certain girl who fasted for twelve months, virtually abstaining from food, frequent and unusual lightning, stones falling with hail, and pestilences of people and animals. On account of these remarkable occurrences, the pious emperor urged that frequent fasts and continuous prayers and generous alms be offered through the priestly office to placate God, saying on his own behalf that on account of these prodigies an enormous future catastrophe was in store for the human race.’ / ‘[P]rodigiosa signa apparentia animum imperatoris sollicitabant, precipue terrę motus palatii Aquensis et sonitus inauditi nocturno sub tempore, et puelle, cuiusdam ieiunia XII mensibus omni penitus cybo abstinentis, crebra et inusitata fulgura, lapidum cum grandine casus, pestilentia hominum et animalium. Propter quae singula piissimus imperator crebro fieri ieiunia, orationumque instantia atque elemosinarum largitionibus divinitatem per sacerdotium monebat offitium tium placandam, certissime dicens, per haec portendi magnam humano generi futuram cladem.’ The Astronomer, so named for his interest in astronomical matters evident in his biography of Louis the Pious, wrote his biography in the early 840s, possibly 840/41, shortly after Louis’ death. He was particularly aware of, or concerned with, the on goings of the south and southwest, though he is not often thought to have been from the region. He is commonly viewed as an elite who knew and accompanied Louis, particularly when the latter travelled to the south. The Astronomer was likely, as he himself asserts, an eye witness to many of the events he describes, though it is clear he made use of the RFA for the first half of Louis’ reign. Of course, he may have also witnessed some of the events of the late 810s and ‘20s. This passage, excluding Louis reaction to the phenomena reported, may have been derived from the RFA’s entry for 823.
111. *W/AM/HM* RFA 824: (1970), p. 115; (1895), p. 164. ‘The winter was cold and very long. The extreme cold killed not only animals but some people too.’ /

- ‘Hiemps aspera valdeque proluxa facta est, quae non solum caetera animalia, verum etiam homines quosdam inmanitate frigoris extinxit.’ This entry is immediately followed by the report of a 5 March lunar eclipse and notice of the death of the duke of Spoleto. This is also found in the EA (1826), p. 212.
112. **FD** RFA 824: (1970), p. 116; (1895), p. 165. ‘Lothair embarked for *Italia* after the middle of August to carry out his father’s order. But because the food shortage persisted, the emperor postponed the campaign he had planned against Brittany until the beginning of autumn.’ / ‘Et ille quidem ad haec exsequenda post medium Augustum in Italiam profectus est, imperator vero iter, quod in Britanniam facere paraverat, propter famem, quae adhuc praevalida erat, usque ad initium autumnus adgredi distulit.’ This is also found in the EA (1826), p. 212.
113. **W** RFA 824: (1970), p. 117; (1895), pp. 166-67. ‘A few days before the summer equinox of this year, when a sudden change in the air whipped up a storm, an enormous chunk of ice is said to have fallen with the hail in the country around Autun. It is said to have been fifteen feet long, seven feet wide and two feet thick.’ / ‘[P]aucis ante solstitium aestivale diebus in territorio Augustodunense aere in tempestatem subita mutatione converso ingens fragmentum ex glacie simul cum grandine decidisse narratur, cuius longitudo quindecim, latitudo septem, crassitudo duos pedes habuisse dicitur.’ One should compare this to the entry for 822 in the RFA that speaks of a ‘block of earth fifty feet long, fourteenth feet wide and a foot and a half thick’ been shifted twenty-five feet from its original location. This is also found in the EA (1826), p. 213.
114. **FD** CP 825: (1908), p. 645-46. ‘53. Concerning the many-faceted contrivances of usury. Although there are countless many evils by which God is both affronted and the kingdom of Christians imperiled, one type of greed stands out among the rest as especially cursed and hateful to God. God is doubtless both provoked to wrath by it because through it His commands are resisted, and increases in damnation are prepared for the human wretchedness that transgresses divine commands, namely because certain clerics and laymen, having forgotten the Lord’s command, in which it is said: “You shall not lend money for interest and you shall not demand an over-abundance of profits, I your God, [command],” have blazed into such great madness for profit most foul that they afflict Christ’s poor with countless many sorts of usuries discovered through invention and greed to such an extent that, not taking into account the other oppressions through which they are cruelly tormented to the outrage of God, many of them, worn out by hunger and want die because of this particular evil, and also, unavenged, are forced by this oppression, to abandon their own holdings and seek out foreign lands to inhabit. Besides, in a time of food shortage, when any peaceful person, weakened through want of all necessities, approaches a money-lender as a brother to a brother, who are, it is agreed, redeemed by the precious blood of Christ, asking that the pitiful necessities be



given to him in aid, and that what he needs be supplied by the moneylender, is accustomed to receive the following response: "I don't have wheat or anything else that you want to take as food to lend you, but I have it instead for sale. If you want to buy it, accept the price and take it." The poor man makes this response to him: "I don't have anything valuable," he says, "with which I can buy what I need. But I ask you to take pity on me and lend me in whatever manner you like what I ask for myself so that I don't die of starvation." The moneylender replies in turn: "I am able to sell a measure of my grain now for this many *denarii*, or give me so many *denarii* at the time of the new harvest, or at any rate, supplement their value in full in wheat and wine and other produce of any kind." From this it often happens that for one measure of grain lent in such a way, three or even four measures are violently demanded from the poor at harvest time. This also customarily happens where a measure of wine is involved. There are even other very cruel moneylenders, who wish to give nothing to the poor in a time of need, unless they have given their pitiful harvests, little vineyards, and tiny meadows as surety, under the agreement they lose entirely whatever produce could be harvested in these for the small loan that they have received. This circumstance engenders very dire affliction and poverty among the poor. In addition there are many other sorts of moneylenders' wiles, through which the poor are drained of every resource and are delivered to destitution, but it would be extremely tedious and lengthy to relate them here. For both in the Books of the Prophets and the Laws menacingly and frighteningly does the Lord forbid lending with interest, and yet human presumption, being arrogant, does not fear to perpetrate what has been forbidden by the highest Creator to its own peril. For He says in the *Book of Exodus*: "If you loan money to my pauper, who lives with you, you shall not press him as an debt collector nor overwhelm him with interest;" in the *Book of Leviticus*: "If your brother is weakened and feeble in strength and you take him in as a stranger and foreigner, and he lives with you, take from him neither interest nor more than you have given." / 'Cap. LIII. De multimodis usurarum adinventionibus. Cum multa et innumera sint mala, quibus et Deus offenditur et regnum Christianorum periclitatur, exstat inter cetera unum quoddam valde execrabile Deoque detestabile avaritiae genus, quo indubitanter et Deus ad iracundiam provocatur, quia eo praeceptis eius resultatur et miseriae humanae praecepta divina transgredienti augmenta dampnationis praeparantur, eo quod scilicet quidam clericorum et laicorum obliti praeceptionis dominicae, qua dicitur: Pecuniam tuam non dabis ad usuram et frugum superhabundantiam non exiges, ego dominus Deus vester, in tantam turpissimi lucri rabiem exarserint, ut multiplicibus atque innumeris usurarum generibus sua adinventionem et cupiditate repperitis adeo pauperes Christi adfligant, ut, exceptis aliis oppraessionibus, quibus ad iniuriam Dei atrociter crutiantur, hoc speciali malo multi eorum fame

et egestate confecti pereant, inulti etiam hac oppressione compulsi, propriis derelictis, alienas incolatus gratia terras expetant. Famis praeterea tempore, cum quispiam patiper omnium rerum penuria adtenuatus ad aliquem feneratorem venit, utpote frater ad fratrem, quos constat uno praetioso Christi sanguine redemptos, petens ab eo suas miserabiles necessitates sublevare sibi id, quo indiget, commodari, taliter sibi ab eo solet responderi: 'Non est mihi frumentum aut aliud quid, quod in cibum tibi sumere vis, ad mutuandum, sed magis ad vendendum. Si vis emere, fer pretium et tolle'. Cui pauper: 'Non est mihi', inquit, 'quicquam praetii, quo emere id, quo indigeo, valeam. Sed peto abs te, ut miserearis mei et quomodocumque vis, mihi quod peto, ne fame peream, mutuum porrige'. Fenerator econtra: 'Quot modo denariis possum modium frumenti mei vendere, aut tot denarios tempore fructus novi mihi redde aut certe eorum praetium in frumento et vino et ceteris quibuslibet aliis frugibus ad plenum supple'. Unde evenire solet, ut pro uno frumenti modio taliter mutuato tres aut certe quattuor modii a pauperibus tempore messis violenter exigantur. Quod et de modio vini similiter fieri solet. Sunt etiam alii crudelissimi feneratores, qui tempore necessitatis nihil commodare pauperibus volunt, nisi messellas suas et vineolas et pratella ea ratione in pignus dederint, ut quicquid frugum in his colligi poterat pro parvo, quod mutuum acceperunt, ex asse amittant. Quae res non minimam pauperibus generat afflictionem et penuriam. Sunt et aliae multifariae calliditates quorundam feneratorum, quibus pauperes exhauriuntur et paupertati addicuntur, quas hic enumerare magni est tedii magneque prolixitatis. Dominus quippe et in legalibus et in propheticis oraculis usuram fieri minaciter atque terribiliter inhibet, et praesumptio humana a summo creatore prohibita superbiendo perpetrare ad sui discrimen non metuit. Ait namque in libro Exodi: Si pecuniam mutuam dederis populo meo pauperi, qui habitat tecum, non urges eum quasi exactor nec usuris obprimes; in libro Levitici: Si adtenuatus fuerit frater tuus et infirmus manu, et susceperis eum quasi advenam et peregrinum, et vixerit tecum, ne accipias ab eo usuram nec amplius, quam dedisti.' Later (p. 669) we read, 'Chapter II: Concerning the perpetrators of various evils. There are certainly perpetrators of various evils, whom Divine Law both rejects and condemns. For their various crimes and evil deeds the populace is scourged with food shortage and pestilence and the state of the church is weakened and the kingdom is imperiled. Although they have been sufficiently cursed in Holy Scripture, we, tallying up the heap of their wickedness, have deemed it completely necessary that a warning must be given against them again in our admonitions and exhortations, as indeed there are perpetrators of different defilements that some commit in different ways with males and with herds. These, provoking the peerless sweetness of the most gentle Creator to bitterness, transgress the more egregiously the more they sin against nature.' / '(69). Cap. II. De diversorum malorum patratoribus. Sunt sane

diversorum malorum patratores, quos et lex divina improbat et condempnat, pro quorum etiam diversis sceleribus et flagitiis populus fame et pestilentia flagellatur et ecclesiae status infirmatur et regnum periclitatur. Contra quos nos, eorum malitiam exaggerantes, quamquam in sacris eloquiis satis sint execrati, nos necessarium praevидimus iterum nostra admonitione et exortatione praecaveri omnino oportere, sicut sunt diversarum pollutionum patratores, quas cum masculis et pecoribus nonnulli diversissimis modis admittunt, quae incomparabilem dulcedinem piissimi creatoris ad amaritudinem provocantes tanto gravius delincunt, quanto contra naturam peccant.’ This document dates to November 825.

115. **FD/AM/HM** HH 828: (1897), p. 4. ‘For who would not feel that God has been offended and provoked to wrath by our very wicked deeds when he sees His anger raging with various scourges for so many years in the kingdom entrusted to us by Him, namely, in the constant food shortage, in the mortality of animals, in the pestilences of humans, in the barrenness of almost all produce, and that the people of this kingdom are, so to speak, wretchedly harried and tormented by the various destructions of pestilence and prodigious scarcities and are, in a certain manner, emptied of any abundance of resources? Nor do we doubt that as a direct result of His just vengeance it happens that often in this kingdom scandals rise up at the hands of tyrants who strive to tear apart the peace of the Christian people and the unity of the sovereign power with their depravity.’ / ‘Quis enim non sentiat Deum nostris pravissimis actibus esse offensum et ad iracundiam provocatum, cum videat tot annis multifariis flagellis iram illius in regno nobis ab eo commisso desaevire, videlicet in fame continua, in mortalitate animalium, in pestilentia hominum, in sterilitate pene omnium frugum, et, ut ita dixerim, diversissimis morborum cladibus atque ingentibus penuriis populum istius regni miserabiliter vexatum et afflictum atque omni abundantia rerum quodam modo exinanitum? Nec illud etiam dubitamus ex iusta vindicta illius evenire, quod saepe scandala per tyrannos in hoc regno exsurgunt, qui pacem populi christiani et unitatem imperii sua pravitate nituntur scindere.’ This letter is dated to December 828. This segment may also found in *Concilia quattuor anni 829, praecipue concilium Parisiense*, ed. Albert Werminghoff *MGH CON II.2* (Hanover, 1908), p. 599.
116. EHI 829: (1897), p. 43. ‘(54.) 20. Therefore, because we know that certain clerics and laymen, having forgotten, in their many-faceted contrivances of money lending, the Lord's command, where it is said, “I the Lord your God [command]: You shall not loan your money for interest, and you shall not demand an excessive amount of produce,” have blazed forth into such great disgrace for profit most foul that they afflict, oppress, and drain penniless the poor with countless types of interest discovered though their inventiveness and greed, to the extent that many, worn out with hunger, perish and many seek

foreign lands, having abandoned their own; [and because] we have learned that these things are done everywhere, with weighty protestations we have forbidden it to be done further, heeding what the Lord says in the *Book of Exodus* through the lawmakers: “If you loan money to one of my poor, who lives with you, you shall not press him as a debt collector, not shall you overwhelm him with interest;” also, in the Book of Leviticus it says: “If your brother has become weakened and feeble in strength and you have welcomed him as a foreigner and stranger and he has lived with you, do not take interest from him, nor more than you have given....” / (54.) XX. Quia ergo in multimodis usurarum adinventionibus quosdam clericos et laicos oblitos preceptionis dominicae, qua dicitur: “Pecuniam tuam non dabis ad usuram, et frugum superabundantiam non exiges; ego dominus Deus vester”, in tantum turpissimi lucri labem exarsisse cognovimus, ut multiplicibus atque innumeris usurarum generibus sua adinventionem et cupiditate repertis pauperes adfligant, obprimant et exauriant, adeo ut multi fame confecti pereant, multi etiam propriis derelictis alienas terras expetant; in quibuscumque locis haec fieri didicimus, ne ulterius fieret, cum ingenti protestatione modis omnibus inhibuimus attendentes illud, quod in libro Exodi Dominus per legislatores dicit: ‘Si pecuniam mutuam dederis populo meo pauperi, qui habitat tecum, non urgebis eum quasi exactor, nec usuris obprimes;’ in libro quoque Levitici: “Si attenuatus fuerat frater tuus et infirmus manu, et suscepis eum quasi advenam et peregrinum et vixerit tecum, non accipias ab eo usuram nec amplius, quam dedisti...” This document dates to August 829. It is also found in BC: (1837), p. 135. On Benedict Levita see (C.1.63).

117. *W* RFA 829: (1970), p. 124; (1895), p. 177. ‘A violent storm broke loose. During its course, not only humbler houses were unroofed but even the basilica of the Holy Mother of God called the Chapel lost much of its roof of lead tiles.’ / ‘[V]entusque tam vehemens coortus, ut non solum humiliores domos, verum etiam ipsam sanctae Dei genitricis basilicam, quam capellam vocant, tegulis plumbeis tectam non modica denudaret parte.’ This entry immediately succeeds notice of an earthquake at Aachen. The storm appears to have occurred in the spring. This is also found in the EA (1826), p. 218.
118. *W* / *C* Astronomer 832: (2009), p. 279; (1995), pp. 470, 472. ‘[A] very harsh inclement winter settled in. First of all there was a deluge of repeated downpours, and then the damp earth was gripped by ice-cold stiffness. This was so disagreeable that the horses’ hooves were worn down, and it was rare for anyone to go out on horseback. The army was much afflicted by this unpleasant situation and bore very badly the unforeseen attacks of the Aquitainians, so the emperor decided to come to an estate called Rest to cross the Loire there and go back to *Francia* to spend the winter.’ / ‘[A]sperrima hiemis incubuit inclementia: primo quidem pluviarum inundantia plurimarum, deinde humectationem terrae glaciali astringente rigore; queque adeo noxia fuit, ut subtritis pedibus equinis

rarus quisque foret, qui vectatione equorum uteretur. Fracto ergo multo exercitu laboris incommodo et inproviso excursu Aquitanorum subinde et moleste ferente, statuit imperator ad villam, cuius vocabulum est Restis, venire, ibique Ligeris amne transmeato, in Frantiam hiematum redire.’ Louis the Pious would have left *Aquitaina* sometime mid November 832. The ASB entry for 832 says nothing about the reportedly early winter and little about Louis’ return home. Indeed, the annalist writes simply that Louis ‘delayed’ in *Aquitaina*, but on account of news of the actions of Pippin in *Francia*.

119. *HM/C* Thegan c.834: (2009), p. 217; (1995), p. 250. ‘[L]other headed for *Italia* with his evil associates and immediately Matfrid, who was the particular instigator of all their evils, died, as did not a few of the others. The rest were struck with fever.’ / ‘Hlutharius perrexit in Italiam cum consentaneis suis pessimis, et statim Matfridus, qui erat maximus incentor omnium illorum malorum, mortuus est, et ceteri nonnulli. Hi vero qui remanserant, febre correpti sunt.’ Thegan of Trier wrote his biography of Louis the Pious c.837, roughly thirteen years before he died. The date for this passage is derived from the *ASB*, though it only notes that an expedition had been sent against Lothar and on that expedition that Lambert and Matfrid and ‘other accomplices of Lothar’ were killed.
120. *W* ASB 834: (1991), p. 29; (1883), p. 8. ‘[Lothar] found Pippin already arrived there [Paris] with his army but prevented from crossing the Seine by exceptionally high floodwaters: much flooding of other rivers too and unheard-of bursting of their banks created great difficulties for many people.’ / ‘[I]bique iam Pippinum cum exercitu repperit, Sequanae insolita exuberatione transire prohibitum; nam nimium ceterorum quoque fluminum inundatio et ultra alveos insueta progressio multis non parvum intulit impedimentum.’ According to the *ASB*, this period of flooding would have taken place around late February. Lothar had come from Aachen to Paris and reportedly fled Paris on 28 February.
121. *W* AX 834: (1909), p. 9. ‘[G]reat flood over the land.’ / ‘[A]quae inundaverunt valde super terram.’
122. *W* Astronomer 834: (2009), p. 284; (1995), pp. 488, 490. ‘[T]he exaltation of the people rose to such an extent that even the weather, which seemed to have suffered an injury with him, now recognized in his restoration: for up to that time such powerful winds and driving rains had settled in that a superabundance of water far beyond the norm rose up and the gales of wind rendered the rivers impassable for boats. The elements seemed somehow to have participated in his absolution, such that the harsh winds soon calmed and the face of heaven returned to its old but long unseen serenity.’ / ‘[T]anta exultatio excrevit populi, ut etiam ipsa elementa viderentur et iniuriam patienti compati et relevato congratulari: Etenim usque ad illud tempus tanta incubuerat procellarum vis pluviarumque vehementia, ut extra solitum aquarum excresceret

superhabundantia, flatusque ventorum imperviabiles redderet fluminum alveos; sed in illius absolutione ita quodammodo coniurasse visa sunt elementa, ut mox et venti sevientes mitescerent et celi faties in antiquam et multo tempore invisam serenitatem redirent.’ Louis the Pious’ biographer, like Nithard, interprets natural events as if responding to Carolingian political affairs. The bishops at St. Denis reconciled Louis on 1 March. The flooding appears to have occurred, consequently in late winter and early spring.

123. *W* AX 838 (1909), p. 10. ‘A very rainy and windy winter. On 21 January a thunderstorm was heard and similarly on 16 February a great thunderstorm was heard, and the incredible heat of the sun burned the land, and there was an earthquake in certain parts, and fire in the form of a serpent was seen in the air. In the same year, heretical deviation arose. In the same year on the fifth night before Christmas, the crash of great thunder was heard and lightning was seen and the misery and misfortune of people increased daily in many ways.’ / ‘Hiemps pluvialis et ventosa valde, et mense Ianuario XII. Kal. Februarii tonitruum auditum est, similiterque mense Februarii XIII. Kal. Martii tonitruum est auditum magnum, et nimis ardor solis terram urebat, et [in] quibusdam partibus terrae motus factus est, et ignis forma draconis in aere visus est. Eodem anno heretica pravitas orta est. Eodem anno V. nocte ante natale Domini fragor tonitruum magni auditus est et fulguris visus, et multis modis miseria et calamitas hominum cotidie augebatur.’
124. *W/HM* ASB 839: (1991), p. 42; (1883), p. 18. ‘[O]n 26 December, that is, St. Stephen’s Day, a great flood far beyond the usual coastal tides covered nearly the whole of Frisia. So great was the inundation that the region became almost like the mounds of sand common in those parts which they call the dunes. Every single thing the sea rolled over, men as well as all other living creatures and houses too, it destroyed. The number of people drowned was very carefully counted: 2,437 deaths were reported.’ / ‘Praeterea die septimo Kalendas Ianuarii, die videlicet passionis beati Stephani protomartyris, tanta inundatio contra morem maritimum aestuum per totam paene Frisiam occupavit, ut aggeribus arenarum illic copiosis, quos dunos vocitant, fere coaequaretur, et omnia quaecumque involverat, tam homines quam animalia caetera et domos, absumpserit; quorum numerus diligentissime comprehensus duorum milium quadringentorum triginta septem relatus est. Acies quoque in caelo igneas colorumque aliorum mensis Februariis, sed et stellas igneos crines emittentes crebro videri contigit.’
125. *FD* ASB 839: (1991), p. 43; (1883), p. 19. ‘You’ll recall that this very year, crops came forth in abundance on the land and on the trees and vines too, but because of the sins of men, most of this fruit perished and never came to be consumed or used by anyone.’ / ‘Recordaris, quia anno praesenti fruges non solum in terra, verum etiam in arboribus et vitibus habundanter ostensa sunt, sed

propter peccata hominum maxima pars illarum periit, quae ad usum atque utilitatem humanam non pervenit.’ This is part of the statement that ‘a certain pious priest’ gave in a vision to ‘one of the English,’ which was reported to Aethelwulf of Wessex and which Aethelwulf ‘took pains’ to send to Louis the Pious. The statement was delivered to the Anglo-Saxon after Christmas 838, so the noted abundance would have been of that year.

126. *W/HM/C* ASB 839: (1991), p. 48; (1883), p. 23. ‘They now roamed about in different directions, scattered and seeking flight wherever they could. But the emperor’s army suffered much distress from the prolonged hot weather that autumn and the fierceness of the sun. Most men went down with fever, some died and some got home after a dreadful journey. The seriousness of this situation imposed itself on the Emperor: hampered by the harshness of the winter that was now coming on, he released the rest of his army and withdrew to winter quarters at Poitiers.’ / ‘Verum his in diversa vagantibus sparsimque quaquaversum fugitantibus, imperatoris exercitus continua autumnii serenitate solisque inmentia non parum incommoditatis expertus est. Nam febre maxima ex parte correptus, partim occubuit, partim difficillima regressione reversus est. Qua imperator necessitate compulsus, et asperitate hiemis imminentis detentus, absoluto reliquo exercitu, ad Pictavos in hiberna concessit.’ Disease overcame Lothar’s army after it reached the region of Turenne (near Brive-la-Gaillarde) from Clermont.
127. *W* AX 839: (1909), p. 10. ‘On 26 December, a massive tornado arose on account of which the waves of the sea greatly flooded over the boundaries and seashore and miserably consumed countless crowds of the human race along with buildings located around the villages and farm complexes. Ships, sent spinning, were smashed in the sea and a flame of fire was seen over the whole sea.’ / ‘VII. Kal. Ianuarius ingens venti turbo ortus est, ita ut fluctus maris valde inundabant supra terminos et litus, miserabiliter innumerabilem turmam humani generis in villis et vicis circumpositis simul cum edificiis consumpserunt. Classes enim in mari vertentes disruptae sunt, et flamma ignis supra totum mare visa est.’
128. *LEI* c.840: (1897), p. 513; (1995), p. 185. ‘The Romans usually preformed litanies annually on one specified day, April 25. We call these litanies, that is, public prayers of entreaty, the Major Litanies. Pope Gregory established the, at the beginning of his papacy when an unusual flood caused a disease which attacked the abdomen. It first killed Pope Pelagius, then devastated the Roman people. Pope Gregory then arranged a seven-part litany – as Paul the Deacon records in *The History of the Lombards* – separating those who were going to entreat the Lord into seven groups, to call on the mercy of the Lord in various ways...’ / ‘29. Laetanas, id est rogationes publicas, quas maiores vocamus, Romani una die denominata, id est VII. Kal. Maii, annuatim facere solent, quas

Gregorius papa initio ordinationis suae instituit, dum post aquarum inundationem insolitam inguinaria lues primo Pelagio papa extincto populum vastaret Romanum; qui tunc eo modo septenam ordinavit laetaniam, sicut Paulus in Gestis Langobardorum commemorat, ut precaturos Dominum in septem turmas distribueret, quo pietatem Domini multiplicius implorarent...’ Walafrid’s wrote this little book on the liturgy between 840 and 842.

129. *W* Nithard 841: (1970), p. 147; (1907), pp. 19-20. ‘[The Seine] had flooded so that it could not be forded and those who guarded it had either smashed all the boats to bits or sunk them. Gerard had also destroyed every bridge he found. So crossing the river was not an easy matter and gave no end of trouble to those who wanted to get to the other side. While their minds were busy with plans for dealing with all these difficulties, they learned that merchant ships had been driven from the mouth of the Seine by a violent tide and had drifted ashore near Rouen.’ / ‘Accedebat insuper, quod amnis inundans vada ubique denegaverat, custodes autem fluminis omnes naves aut contriverant aut certe submerserant, Gerardus quoque pontes, quoscumque repperit, destruxit. Igitur supra modum transitus difficilis effectus non modicam transire cupientibus inportabat molestiam. Cum autem tot difficultatibus animi multimodis agitentur consiliis, tandem mercatorum torum naves ab hostio, quo Sequana mare infinit, ferventi estu abductae propterque Rotomacensem urbem expositae nunciantur.’ Where they were crossing the Seine is uncertain. Charles had previously held an assembly at Attigny. After crossing, however, he changed his plans and headed to St. Denis and then St. Germain. Nithard, a grandson of Charlemagne, wrote his histories at the request of Charles the Bald. The second, third and fourth books of his histories, which concern the early 840s, were written contemporaneously and are of the most value for our purposes. The earlier books drew heavily on the RFA, Einhard’s biography of Charlemagne and the Astronomer’s account of Louis the Pious. The flooding reported in this passage occurred in March.
130. *W/FD* Nithard 841: (1970), p. 163; (1907), p. 37. ‘The summer during which the aforementioned battle was fought was extremely cold and all crops were gathered very late. But fall and winter took their natural course. On the very day on which Louis and Charles and the nobles of the people concluded their treaty a great deal of snow fell, followed by a severe cold spell.’ / ‘Aestas autem, in qua praefatum exactum est prelium, fuit frigida nimis, et omnes fruges persero collectae sunt; autumnus vero et hiemps naturalem ordinem peregerunt. Ac eadem die, qua praedicti fratres nec non et primores populi praefatum pepigere pactum, subsequente gelu nix multa cecidit.’ Nithard’s report comes during his depiction of events that took place in February 842. His report undoubtedly, as such, concerns the summer of 841.



131. *W/HM/FD/AM* Nithard 842: (1970), p. 173; (1907), p. 49. ‘This winter, however, was excessively cold and long, full of diseases, and rather harmful to agriculture, cattle and bees.’ / ‘Fuit autem eadem hiemps praefrigida nimis ac diuturna, langoribus insuper habundans nec non et agriculturae peccorique apibusque satis incongrua.’ The winter discussed here is that of 842/43.
132. *HM* FF 842: (1829), p. 95. ‘A powerful cough[ing] followed, on account of which many people died.’ / ‘Secuta est tussis valdissima, de qua multi mortui sunt.’
133. *FD/C* ASB 843: (1991), p. 55; (1883), p. 29. ‘So many and such great disasters followed, while brigands ravaged everything everywhere, that people in many areas throughout *Gallia* were reduced to eating earth mixed with a little bit of flour and made into a sort of bread. It was a crying shame – no, worse, a most execrable crime – that there was plenty of fodder for the horses of those brigands while human beings were short on even tiny crusts of earth-and-flour mixture.’ / ‘Emergentibus igitur hinc inde tot tantisque incessabiliter malis, vastante passim cuncta raptore, coacti sunt per multa totius Galliae loca homines terram mixta paucitate farinae atque in panis speciem redactam comedere. Eratque lacrimabile, immo execrabile nimium facinus, ut iumenta raptorum pabulis habundarent et homines ipsius terrenae admixtionis crustulis indigerent.’ When food was short is uncertain. However, this passage is preceded by notice of a conflict in *Aquitaina* that is supposed to have taken place in late May. It is followed by a report of the Viking capture of Nantes, which is thought to have occurred in late June.
134. *W* Nithard 843: (1970), p. 174; (1907), p. 50. ‘About this time, on 20 March, there occurred an eclipse of the moon. Besides, a great deal of snow fell in the same night and the just judgment of God, as I said before, filled every heart with sorrow. I mention this because rapine and wrongs of every sort were rampant on all sides, and now the unseasonable weather killed the last hope of any good to come.’ / ‘Per idem tempus eclypsis lunae XIII. Kal. Aprilis contigit. Nix insuper multa eadem nocte cecidit meroremque omnibus, uti praefatum est, iusto Dei iuditio incussit. Id propterea inquam, quia hinc inde ubique rapinae et omnigena mala sese inserebant, illinc aeris intemperies spem omnium bonorum eripiebat.’ Prior to this, Nithard writes, ‘From this history, everyone may gather how mad it is to neglect the common good and to follow only private and selfish desires, since both sins insult the Creator so much that He turns even the elements against the madness of the sinner.’ And so Nithard reveals his belief that nature acts in response to Carolingian political events and that nature is controlled, of course, by God. The loss of hope he refers to, is a reference to the treaty of Verdun and the division of the empire in August 843. The eclipse actually occurred on 19 March. Nevertheless, it seems clear that the poor weather Nithard

speaks of is a continuation of the hard winter he mentions in his report for December 842.

135. **FD** LF 843: (1966), p. 46; (1925), p. 94. 'We want Folchric and Maurus to return with that brother, so that they may enjoy with us the pear wine of which they are especially fond, for there is fear of a scarcity of wine this year. But to confess the truth, a shortage of fruits threatens a meager supply even of pear wine, and a low yield of grain threatens a scarcity of beer.' / 'Folchricum et Maure cupimus cum fratre memorato redire, ut piracio, quo unice delectantur (nam hoc anno penuria vini timetur), nobiscum fruantur. Karitas tamen fructuum id ipsum defuturum, ut prodamus veritatem, minatur, cervesiam vero sterilis annonae proventus.' This passage is contained in a letter written by Lupus in either August or September 843.
136. **FD** LF 843: (1966), p. 52; (1925), p. 81. 'We had a very light yield of wine last year. We have an abundance of other things at the present time and through the abounding grace of God, we are enjoying a little peace...' / 'Sterilitatem vini superiore anno passi sumus. Aliis rebus pro tempore habundamus et largiente Dei gratia aliquantula pace fruimur...' This passage is contained in a letter written in July 844, though it clearly concerns the harvest year of 843.
137. **W** ASB 844: (1991), p. 57; (1883), p. 30. 'The winter was a very mild one, made more so by the mildness of the weather's lasting right up to the beginning of February.' / 'Hiems mollissima usque ad Kalendas Februarii quadam temperie modificata.'
138. **W** ASB 845: (1991), p. 60; (1883), p. 32. 'A very bitter winter.' / 'Hiems asperissima.' This brief statement is followed by notice of a Viking attack on Paris in March. The winter was perhaps then over by March.
139. **FD/HM** ASB 845: (1991), p. 61; (1883), p. 32. 'A great food shortage consumed the western regions of *Gallia*, and as it got worse, many thousands of people died.' / 'Fames valida Galliae inferiora consumit, adeo ut multa hominum milia eadem invalescente absumpta sint.' This food shortage seems to have set in, judging from the rest of entry for 845, before June.
140. **HM/C** ASB 845: (1991), pp. 61-2; (1883), p. 33. 'The Vikings went back down the Seine to the open sea. Then they devastated all the coastal regions, plundering and burning. God in his goodness and justice, so much offended by our sins, had thus worn down the lands and kingdoms of the Christians. Nevertheless, so that the pagans should no longer go unpunished in falsely accusing the most all-powerful and most provident Lord of improvidence and even powerlessness, when they were going away in ships loaded with booty from a certain monastery which they had sacked and burned, they were struck down by divine judgment either with blindness or insanity so severely that only a very few escaped to tell the rest about the might of God. It is said that their king Horic was so disturbed when he heard about this that he sent envoys to King

Louis for peace talks, and was ready to release all the captives and make every effort to restore all the stolen treasures.’ / ‘Nortmanni, alveo Sequanae remenso, maria repetunt, cuncta maris loca finitima diripiunt, vastant atque incendiis concremant. Sed licet peccatis nostris divinae bonitatis aequitas nimium offensa taliter christianorum terras et regna attriverit, ne tamen etiam pagani improvidentiae aut certe impotentiae Dominum omnipotentissimum ac providentissimum inopine diutius insimularent, cum a quodam monasterio [Sithdiu nomine] direpto incensoque oneratis navibus repedarent, ita divino iudicio vel tenebris caecati vel insania sunt perculsi, ut vix perpauci evaderent, qui Dei omnipotentis iram ceteris nunciarent. Unde, ut fertur, commotus animo rex eorum Oricus, ad Hludowicum regem Germanorum legatos pacis gratia destinat, captivitatem absolvere thesaurosque paratus pro viribus restituere.’ Vikings had sailed up the Seine in March. This disease outbreak seems to have occurred in or after June.

141. **FD** LF 845: (1966), p. 63; (1925), p. 41. ‘If the king wishes to summon me to the court, tell him, I pray, that I do not have the resources for remaining in his service eight days, and will not have, until the eagerly awaited new crops are harvested unless I steal something from the altar or reduce the brothers to intolerable starvation.’ / ‘Si me evocare voluerit ad comitatum, regi, quaeso, suggerite, quoniam nisi spoliem aliquod altare aut fratres importabili affligam inedia, non habeo? Unde octo dies in eius possim versari servitio, donec novae fruges optatam referant facultatem. Nisi autem absque periculo possitis, militarium hominum nostrorum nolo vos otium deprecari, quamquam et illis quam sit necessarium ultro cognoscitis.’ This passage is contained in a letter written by Lupus in November 845.
142. **W** ALAU 845: (1883), p. 779. ‘In the same year, on 20 November, a light appeared at night and there was a hard winter.’ / ‘Eodem anno 12 Kalend. Decembris lux nocte apparuit, et hiems valida fuit.’
143. **W** ABB 846: (1844), p. 23. ‘A very oppressive winter.’ / ‘Hiemps gravis valde.’
144. **W** / **FD** ASB 846: (1991), p. 62; (1883), p. 33. ‘A terribly fierce north wind lashed the crops and vines during the whole winter almost up to the beginning of May.’ / ‘Ventus aquilo per totam hiemem usque ad ipsa fere Maii mensis initia acerrimus segetibus et vineis incumbit.’ This would have occurred presumably in spring.
145. **W** / **FD** ASB 846: (1991), p. 63; (1883), p. 34. ‘In May of this year, so much rain fell on the community of Autun that the flood waters burst through walls and even bore off barrels full of wine into the River Yonne. And what is even more amazing, the flood took a whole vineyard, with its earth, vines and all its trees completely intact, just as if it was a solid thin, and transported it from one side of the River Yonne and set it down on the other, as if it had grown there in that field quite naturally.’ / ‘Huius anni mense Maio tanta apud Altiodorum civitatem

inundatio pluviarum fluxit, ut parietes penetrans ipsas etiam cupas plenas vini in fluvium Icaunam detulerit, sed et, quod est mirabilius, quandam vineam cum terra, vitibus et arboribus omnibus in nullo disruptam, ita ut erat solidam, a parte Icaunae fluminis in alteram eiusdem fluvii partem transposuerit, acsi in eodem agro naturaliter fuerit.'

146. **W** AL 846: (1826), p. 15. 'On 8 July there was a mighty [occurrence] of extreme thunder, on account of which many people died.' / '8 Id. Iul. Fuit tonitruum ingens ferum, de quo multi homines perierunt.'
147. **HM** LF 847: (1966), p. 81; (1925), p. 68. 'Now our sons, and we hope that you will consider them yours too, are suffering from a physical illness which several of our own doctors have not been able to cure.' / 'Namque et filii nostri, quos et vestros optamus, molestia corporis laborabant; quam aliquot adhibiti apud nos medici propulsare nequiverunt.' This passage is contained in a letter written by Marcward of Prüm in August 847.
148. **W** AX 848: (2004), p. 348; (1909), p. 347. 'On 3 February towards evening, lightning flashed and thunder was heard and the unbelievers as was their custom inflicted injury on Christians.' / 'II. Nonas Februarii ad vesperum fulgur emicuit et tonitruum auditum est, et gentiles Christianis, ut consueverant, nocuerunt.'
149. **FD / HM** AF 850: (1992), pp. 31-2; (1891), pp. 40-1. '[T]he gravest food shortage struck the people of *Germania*, especially those living along the Rhine. At Mainz, one bushel of grain was sold for ten shekels of silver. At that time, Archbishop Hrabanus [of Mainz] was staying in a villa in his diocese, called Winkel, and receiving poor men from all over the place daily fed more than three hundred, quite apart from those who we regularly find in his presence. There came also a certain woman almost dead of starvation with a small child among the others seeking help. Before she could cross the threshold she collapsed from weakness and died. The child tried to pull the breast of his dead mother out from her clothes and suckle, which caused many of those who saw this to groan and weep. At that time also a certain man from the Grabfeld set out for Thuringia with his wife and small son to see if they could find some relief from hunger. On the journey he said to his wife as they were going through a wood: "Surely it would be better to kill the boy and eat him, than that we should all die of hunger?" She refused to allow so great a crime to be committed, but he, driven by hunger, at length seized the son from her arms by force and would have carried out his intention, if God in his mercy had not prevented him. For as he afterwards told to many when he came to Thuringia, when he had drawn his sword to kill his son, and had, vacillating, put off the murder, he saw at a distance two wolves standing on a deer and tearing its flesh. At once he spared his son and hurried to the corpse of the deer, where he drove off the wholes and took away some of the flesh which they had begun to eat, and then returned to his wife with their son unharmed. For before, when he had taken the boy away

from his mother's hands, he had gone off a little way, so that she would not see or hear the dying boy. She, on her husband's return, seeing fresh meat dripping with blood, thought that the boy had been killed and fell almost lifeless. He came to her and comforted her and lifted her up to show her that the boy was still alive. Then she recovered full consciousness and gave thanks to God that she had been allowed to have her son back well; so did he, that God had thought fit to keep him innocent of killing the child. Both, however, were driven by necessity to strengthen themselves by feeding on the meat which the Law prohibits.' / '[G]ravissima fames Germaniae populos oppressit, maxime circa Rhenum habitantes; nam unus modius de frumento Mogontiaci vendebatur decem siclis argenti. Morabatur autem eo tempore Hrabanus archiepiscopus in quadam villa parroeciae suae, cui vocabulum est Winkela, et pauperes de diversis locis venientes suscipiens cotidie plus quam trecentos alimento sustentabat, exceptis his, qui in praesentia illius assidue vescebantur. Venit autem et mulier quaedam inedia pene consumpta cum puerulo parvulo inter ceteros refocillari desiderans, quae, priusquam limen portae transcenderet, prae nimia inbecillitate corruens spiritum exalavit; puer vero mamillam matris mortuae quasi viventis de sinu protrahens et sugere temptans multos intuentes gemere ac flere coegit. Quidam etiam in illis diebus de Grabfeldon cum uxore sua et filio tenero in Thuringiam proficiscens, ut malum inopiae temperare potuisset, uxorem in itinere in quadam silva positus affatus est: "Nonne," inquit, "melius est, ut puerum istum occidamus et manducemus carnes eius, quam omnes inedia consumamur?" Illa vero contradicente, ne tantum scelus committeret, tandem urgente fame filium per vim de brachiis rapuit maternis et voluntatem opere complesset, nisi Deus illum sua miseratione praevenisset. Nam, sicut idem postea in Thuringia positus plurimis retulit, cum evaginasset gladium, ut mactaret taret filium, et in ancipiti positus necem distulisset, vidit eminus duos lupos super una cerva stantes et lacerantes carnes eius, statimque parcens filio ad cadaver cervae cucurrit et lupos inde abigens tulit de carnibus praegustatis et cum incolomi filio ad uxorem reversus est. Prius enim, quando filium tulerat de manibus matris, paululum ab ea declinaverat, ne illa morientem puerum videret vel audiret. At illa veniente marito videns recentes carnes et cruore perfusas putabat filium occisum et cecidit retrorsum pene exanimis. Ille autem accedens consolatus est eam et erigens illam ostendit ei puerum viventem. Tunc illa resumpto spiritu Deo gratias egit, quia filium sanum recipere meruit; nec minus ille, quod euni Deus a liberi interfectione innocuum dignatus est conservare. Ambo tamen de carnibus lege prohibitis necessitate coacti se recrearunt.' The law referred to here, as Reuter points out, is that of the Old Testament which prohibited the consumption of carrion: Exodus 22:31; Deuteronomy 14:21. The reference to shekels is also, of course, biblical. Reuter suspects that *solidus* was simply replaced with shekel, and that the price was ten *solidi*. This whole passage is found only in MS 2.

*Populum Germanicum* here refers to the people of Louis the German's kingdom. The ASB entry for 850 is unusually short and concerns only raids of Muslims and Vikings.

150. *W/FD* GABS 850: (1881), p. 618. 'During this year at this time there was the most severe winter; and after a five year period an intolerable food shortage prevailed too much.' / 'In cuius anni tempore extitit hiemps gravissima valde; atque post quinquennium exoritur fames intolerabilis nimium.' The dating of this passage to 850 is that of the editors of the text. Folquin of St. Bertin wrote his *gesta* in c.962 from a wide range of earlier documents at St. Bertin.
151. *W/HM* AX 850: (2004), p. 349; (1909), p. 17. 'On 1 January on the octave of the Lord, toward evening a great deal of thunder was heard and a mighty flash of lightning was seen. A flood harmed the human race during this winter. And in the following summer the excessive heat burned the earth.' / 'Anno DCCCL. Kalendis Ianuarii, id est octabas Domini ... eodem die ad vesperum tonitruum auditum est magnum, et fulgur nimium visum est, et inundatio aquarum ipsa hieme humanum genus affligebat. Et sequenti aestate calor nimium solis terram urebat.'
152. *W/FD* AX 852: (2004), p. 349; (1909), p. 18. 'The swords of the pagans were red hot. There was excessive heat and a food shortage followed. The fodder for the animals was insufficient but pasturage for the pigs was plentiful.' / 'Ferrum paganorum incanduit; nimius ardor solis, et fames subsecuta est, et pabula animalium defecerunt, et pastus porcorum exuberans.'
153. *FD* AX 853: (2004), p. 349; (1909), p. 18. 'There was a great food shortage in *Saxonia*, so that many were forced to survive on horse meat.' / 'Fames magna in Saxonia, ita ut multi equis alerentur.'
154. *W/HM/FD?* AF 855: (1992), pp. 36-7; (1891), p. 45. 'There are said to have been twenty earth tremors in Mainz. Unusually changeable weather brought loss to many through whirlwinds, storms and hailstorms. Many buildings were burnt by lightning, including the church of St. Kilian the Martyr. The clergy were celebrating vespers when the church was suddenly struck by a bolt and caught fire.' / 'Apud Mogontiacum terra vicies tremuisse perhibetur. Aeris insolita commotio turbinibus ac tempestatibus plagisque grandinum multis damnum intulit. Fulminum ictibus aedes plurimae crematae sunt, inter quas basilica sancti Kiliani martyris Nonis Iuniis clero laudes vespertinas celebrante repentino ictu percussa atque suecensa est.' The annalist continues to note that clergy within the church were also struck by lightning, that the walls of the church collapsed in a storm, and that these events preceded the death of the bishop of Würzburg on 20 September. Lightning strikes of people, animals and buildings, are regularly reported in the *AF*: see the entries for 857.

155. *W/HM* ASB 856: (1991), p. 81; (1883), p. 46. ‘An extremely cold and dry winter. A harsh pestilence carried off a great part of the population.’ / ‘Hiems asperrima et sicca, pestilentia valida, qua magna pars hominum absumitur.’
156. *HM* AX 857: (1909), p. 19. ‘A great pestilence of swollen tumors raged among the people and consumed them with awful festering sores so that their limbs fell off even before they died.’ / ‘Plaga magna vesicarum turgentium grassatur in populo et detestabili eos putredine consumpsit, ita ut membra dissoluta ante mortem deciderent.’ The editors question whether this should rather be slotted into the entry for 856. *Vesicarum turgentium* could also be translated as ‘swelling of the bladder.’ Dutton, like others, suggests this was ergotism.
157. *W* ASB 857: (1991), p. 84; (1883), pp. 47-8. ‘At Cologne, while Bishop Gunther was standing there, a very thick cloud with frequent thunderbolts came down over the church of St. Peter. A flash of lightning suddenly burst through the crypt of the church like a sheet of flame, killing a priest, a deacon and a layman, and then being lost in the bowels of the earth. Again at Trier in August, while Bishop Theuthgaud was celebrating mass with clergy and people, a black, black cloud came down over the church, terrifying everyone with thunderclaps and lightning flashes, threatening the bell-tower and filling the church with such gloom that people could hardly see each other.’ / ‘In urbe Colonia Agrippina, Guntario episcopo adstante, in aecclesia beati Petri nubes densissima desuper crebris fulminibus incubat, cum subito fulgor in modum ignis per subgrundia eiusdem aecclesiae intrans, unum sacerdotem et unum diaconum unumque ex laicis interficit, ac terrae abditis ditis reconditur. In Augusta etiam Trevirorum Teotgaudo episcopo cum clero et populo celebrante, nubes teterrima superincumbens, tonitruis fulminibusque ecclesiam territans, turrem campanarum sonantium comminuit tantaque tenebrositate ecclesiam implevit, ut vix alterutrum sese valerent agnoscere...’ This is followed by a report of a huge dog in the church.
158. *W* AF 857: (1992), pp. 39-40; (1891), p. 48. ‘[T]here had been a terrible storm at Cologne on 15 September and the whole people had taken refuge in fright in the church of St. Peter and rung the church bells, imploring the mercy of God with one voice. Suddenly a powerful lightning bolt like a fiery dragon ripped open the church and penetrated inside. Three out of all the men who were there were killed, standing in different places, but by a single stroke. One was a priest, next to the altar of St. Peter; another was a deacon by the altar of St. Denis; a third was a layman by the altar of St. Mary. A further six were so injured by the same bolt that they were carried away half-dead and barely recovered.’ / ‘[C]oloniae XVII. Kal. Octobr. terribilem valde tempestatem [fuit], populo cuncto prae nimio horrore in basilicam sancti Petri confugiente et signis aecclesiae concrepantibus unanimiter Dei misericordiam implorante, subito fulmen inorme ignei draconis instar basilicam scidis ac penetrasse atque ex omni illa multitudine tres

- homines diversis quidem locis, sed uno ictu in mortem deiecis, presbyterum scilicet iuxta altare sancti Petri, diaconum vero ad altare sancti Dionisii, laicum autem ad altare sanctae Mariae; alios etiam numero sex eodem impetu ita prostravisse ut elati semivivi vix convalescerent.’ The annalist writes that this storm was reported in a letter from the archbishop of Cologne to the bishop of Hildesheim. It was discussed at a synod at Mainz on 1 October.
159. **HM** ASB 858: (1991), p. 85; (1883), p. 48. ‘On the very night of Christmas and on the following day there was a violent and recurring earth-tremor at Mainz and a great mortality of humans followed.’ / ‘[D]ominicae nativitatis festo noctu et interdiu Mogontiae validus et creberrimus terrae motus efficitur; quem etiam valida hominum mortalitas insequitur.’ Nelson had translated ‘hominum mortalitas’ as ‘pestilence.’
160. **W** ASB 858: (1991), p. 87; (1883), p. 50. ‘In May, in the township of Liège where the body of St. Lambert the bishop lies at rest, so great a flood of rain suddenly fell that the water burst forth violently, hurling into the river Meuse houses, stone walls and buildings of all kinds along with people and whatever else it met with in its path right up to the church of St. Lambert itself.’ / ‘Mense Maio in vico Leudico, in quo corpus sancti Landberti episcopi quiescit, tanta subito pluviarum inundatio effusa est, ut domos et muros lapideos seu quaecumque aedificia cum hominibus et omnibus quaecumque illic invenit usque ad ipsam ecclesiam memoriae sancti Landberti violenta eruptione in Mosam fluvium praecipitaverit.’
161. **FD** LF 859: (1966), p. 124; (1925), p. 96. ‘We have put off the purchase of iron because it would have been very difficult to do at this time on account of the harvest...’ / ‘Emptionem ferri, quod propter messem erat difficillima, distulimus...’ This passage is contained in a letter written by Lupus in August 859.
162. **W** ASB 860: (1991), p. 92; (1883), p. 53. ‘A long winter with continuous snowfalls and hard frost from November to April.’ / ‘Hiems diutina et continuis nivibus ac gelu dira, a mense videlicet Novembri usque ad Aprilem.’
163. **SA** 860: (1897), p. 467. ‘After the disease, once revealed, could no longer remain hidden and he himself was unable to bear the burden of so great a disgrace, especially when, hastening about the regions of Burgundy and Italy he was horrified to hear the filth proclaimed and disseminated all too much, he did not allow this case to lie hidden in silence any longer without the bishops’ examination.’ / ‘Postquam autem revelata pestis latere non potuit ac ipse pondus tanti obprobrii ferre nequivit, maxime cum partibus Burgundiae atque Italiae discurrens nimis diffamatam ac divulgatam fedtatem exhorruit, non est passus hanc causam sine episcoporum examine diutius subsilire.’ Later (p. 468) we read, ‘But when any have fallen at different times into this wretchedness, it did not happen from another’s example, but from the ancient deceit of the devil and



a similar impulse of weakness and the heedless downward spiral was fresh, and a new Fall, so to speak. But this type of contagion, which now begins afresh and was unheard of by us beforehand, must be guarded against, lest it transfer to the human race diseased pestilence and incurable pestilence, to the extent that it, that is, the baneful source, be completely eradicated, so that it leaves no example or opportunity for the weak, lest perchance, God forbid, such a practice take root, through which anyone may shun the natural intercourse of consanguinity and fornicate against nature with one's own line, reckoning this evil trivial the more freely one becomes used to it.' / 'Sed cum quilibet aliquotiens in hanc miseriam lapsi sunt, non de exemplo alterius accidit, sed de antiqua diaboli fraude et simili fragilitatis impulsu ac praecipitio recens et quasi nova ruina fuit. Istud autem contagionis genus, quod nunc incipit esse novum et antea nobis erat inauditum, cavendum est, ne morbosam pestem et incurabilem lue[m] generi transmittat humano, ut ita, videlicet origo perniti[ti]osa, funditus exstirpetur, quo nullum exemplum nullamque fragilibus relinquat occasionem, ne forte, quod absit, talis consuetudo inole[scat], qua naturalem consanguinitatis concubitum quis devitet, et fornicari contra naturam in proprio genere leve hoc aestimans malum licentius assuescat.' This synod took place in February 860.

164. *W/FD* AF 860: (1992), p. 46; (1891), p. 54. 'The winter was very hard and longer than usual and there was much damage to crops and trees. It was found that blood-red snow had fallen in many places. Even the Ionian [Adriatic] Sea was so affected by the extreme cold that the merchants, who had never before gone there except by ship, were able to visit Venice with their wares on horses and carts.' / 'Hibernum tempus asperum nimis et solito prolixius erat frugibusque et arborum proventibus pernoxium nix quoque sanguinolenta in plerisque locis cecidisse reperta est. Mare etiam Ionium glaciali rigore ita constrictum est, ut mercatores, qui numquam antea nisi vecti navigio, tunc in equis quoque et carpentis mercimonia ferentes Venetiam frequentarent.'
165. *W/AM* AAC 860: (1826), p. 50. 'Great winter and mortality of animals.' / 'Hiems magna et mortalitas animalium.'
166. *W/AM* AW 860: (1826), p. 66. 'Great winter and mortality of animals.' / 'Hiems magna et mortalitas animalium.'
167. *W/AM* ASM 860: (1826), p. 76. 'Great winter and mortality of animals.' / 'Hiems magna et mortalitas animantium.'
168. *W* ACb 860: (1826), p. 97. 'A strong winter.' / 'Hyems validus.'
169. *W* AX 860: (1909), p. 19. '[T]he winter in this year was very long...' / '[H]iems longissima...' The editors note this would have been the winter of 859/60.
170. *FD* AAC 861: (1826), p. 50. 'The hardest food shortage.' / 'Fames valdissima.'
171. *FD* AW 861: (1826), p. 66. 'The hardest food shortage.' / 'Fames validissima.'
172. *FD* ASM 861: (1826), p. 76. 'The hardest food shortage.' / 'Fames validissima.'

173. **FD/C** ASB 861: (1991), p. 95; (1883), pp. 55-6. 'Meanwhile the other group of Danes with sixty ships sailed up the Seine and into the Tellas and from there they reached those who were besieging the fort, and joined up with them. The besieged were forced by food shortage, general misery and filth to pay the besiegers...' / 'Interea Danorum pars altera cum sexaginta navibus per Sequanam in fluvium Tellas ascendunt indeque ad obsidentes castellum perveniunt et eorum societate iunguntur. Obsessi autem famis inedia et miseriae omnis squalore compulsi...' This fort was built on the island of Oissel. The besieged, like the besiegers, were Vikings. Charles the Bald supported the *latter* with monies, livestock and grain so that they would not pillage his realm.
174. **W** AX c.863: (2004), p. 350; (1909), p. 20. 'In the same year the winter was very severe and changeable with much rain so that the winter was almost entirely without frost as was experienced at the church of St. Victor.' / 'Eodem anno hiemps turbulenta, mutabilis et pluvialis valde, ut pene absque gelu omnino, ut in sequentibus patuit in aecclesia sancti Victoris.' This supposedly refers to the church of St. Victor of Xanten. The editors of the AX suggest that this passage may be properly assigned to 862. What winter this passage refers to (whether 861/62, 862/63, or 863/64) is uncertain, though the latter seems least likely.
175. **FD** AL 863: (1826), p. 15. 'A great food shortage.' / 'Fames valida.'
176. **HM** ASB 865: (1991), p. 129; (1883), p. 80. 'The Vikings who had sacked St. Denis became sick with various ailments. Some went mad, some were covered in scabies, some discharged their guts with a watery flow through their asses: and so they died.' / 'Nortmanni, qui praefatum monasterium depraedati sunt, vario modo infirmantur, et quidam in rabiem versi, quidam autem scabie correpti, quidam intestina cum aqualiculo per anum emittentes, moriuntur.' It is clear that disease set in here amongst these Vikings in late fall, sometime after they sacked the monastery in October. As is made clear in the ASB entry for 866, they were camping on an island in Seine near the monastery. In June 866, they left this island and sailed down the Seine until they found a safe place to make and build new ships. It appears they were suffering illness in December 865.
177. **HM** ASB c.865/66: (1991), p. 136; (1883), p. 85. 'The previous year, inspired by God and taking as a warning the portents and afflictions that befell the people of his realm, the king of the Bulgars had thought carefully about becoming a Christian and had been baptized.' / 'Rex Bulgarorum, qui praecedente anno, Deo inspirante et signis atque afflictionibus in populo regni sui monente, christianus fieri meditatus fuerat, sacrum baptismum suscepit.'
178. **FD/HM** AX 867: (1909), p. 26. 'Then in the autumn an edict came forth from the kings, that a three-day fast be observed generally, since the terror of food shortage and pestilence were imminent, and there was a great earthquake throughout the land to the extent that the despair of human life befell many.' / 'Deinde autumnali tempore *exiit edictum* a regibus, ut ieiunium triduanum

- generaliter observaretur, imminente terrore famis, pestilentiae, et terrae motus magnus per regna, ita ut desperatio humanae vitae plurimis accidit.’
179. *W* AAC 867: (1826), p. 51. ‘An earthquake, pope Nicholas [I] died, and an extraordinary overflow of rain.’ / ‘Terrae motus. Papa Nicolaus obiit. Et nimia superfluitas imbrium.’
180. *W* AW 867: (1826), p. 66. ‘An earthquake, Pope Nicolas [I] died, and an exceptional overflow of rain.’ / ‘Terrae motus. Papa Nicolaus obiit, et nimia superfluitas imbrium.’
181. *W* ASM 867: (1826), p. 76. ‘Earthquake and an exceptional overflow of rain.’ / ‘Terre motus et nimia superfluitas ymbrium.’
182. *FD* ALE 867: (1829), p. 251. ‘A great food shortage.’ / ‘Fames valida.’ This is possibly a misplaced entry for 861.
183. *W* / *FD* / *HM* AF 868: (1992), p. 58; (1891), p. 67. ‘Springs and rivers rose greatly because of the unusually heavy rainfall and did not a little damage to buildings and crops in several places. This curse was followed by a great food shortage with immense loss of life throughout *Germania* and *Gallia*.’ / ‘Fontes quoque et flumina propter nimiam imbrium inundationem crescendo intumuerunt et per diversa loca in frugibus et aedificiis damnum fecere non modicum. Hanc plagam fames etiam magna cum ingenti perniciem humani generis per totam Germaniam et Galliam secuta est.’ This passage is also missing from MS 2. When in 868 the flooding took place is not entirely clear, though the passage is preceded by notice of comets that appear to have been visible in late January.
184. *FD* ASB 868: (1991), p. 143; (1883), pp. 90-1. ‘[S]o many evil deeds were done – churches broken into, poor folk oppressed, crimes of all kinds committed and the land laid waste – that there are too many to list here: as is proved by the fact that many thousands of people died of food shortage because of that devastation.’ / ‘[T]anta mala et in ecclesiarum confractio fractione et in pauperum oppressione atque in omnium flagitiorum commissione atque terrae devastatione commissa sunt, ut dici ore non possint, sicut multorum milium hominum fame mortuorum pro ipsa depopulatione attestatio demonstravit.’ These events occurred in Berry and were committed by, or the result of, the annalist stresses, Charles the Bald’s attempt to avenge the death of an abbot Egfrid who had made supposedly questionable deals with Charles in the previous year. These events appear to have taken place before March 868.
185. *FD* / *HM* / *AM* AAC 868: (1826), p. 51. ‘A comet. The harshest food shortage, and a mortality of people and animals.’ / ‘Stella cometis. Fames acerrima et mortalitas hominum et animantium.’
186. *FD* / *HM* / *AM* AW 868: (1826), p. 66. ‘A comet. The harshest food shortage, and a mortality of people and animals.’ / ‘Stella cometis. Fames acerrima et mortalitas hominum et animalium.’

187. **FD/HM/AM** ASM 868: (1826), p. 76. ‘A comet. The hardest food shortage and mortality of people and animals.’ / ‘Stella cometis. Fames validissima et mortalitas hominum et animantium.’
188. **FD** AC 868: (1826), p. 98. ‘A hard food shortage.’ / ‘Fames valida.’
189. **FD/HM** ASCS 868: (1826), p. 103. ‘In this year, there was a food shortage and unheard of mortality through almost the whole empire of the Franks, but especially in *Aquitania* and *Burgundia*, so that on account of the multitude of the dying there were not those to bury them. In the city of Sens, fifty-six people were found dead in one day. Also at this time men and women in the same area were discovered to have killed and consumed other humans, for shame! In Pont-sur-Yonne, a certain man killed an honourable woman, which he took up in hospitality, and dividing her up limb by limb he preserved her with salt and he cooked her for himself and his sons to eat. In that city a woman did similarly with a certain young person. In numerous other regions, it was discovered, after the story had spread, that this had happened on account of the want of the food shortage. In the city of Sens, a measure of wheat was sold for 8 solidi, one measure of rye for 7.5 solidi, one measure of barley for 6.5 solidi, one measure of oats for 5 solidi and one measure of salt for 12 solidi. But with divine misery being provident, new grain came up more timely than usual. For on 24 May, evidently the first day of rogation new bread arose at Sens to be blessed, on account of which many people, giving thanks to God, took the eulogies.’ / ‘Exstitit eo anno fames et mortalitas inaudita per totum fere inperium Francorum, sed maxime per Aquitaniam et Burgundiam, ita ut prae multitudine morientium non essent, qui sepelirent. Nam Senonis civitate inventi sunt uno die 56 homines mortui. Inveniuntur etiam ea tempestate in eodem pago masculi et femine pro nefas! homines alios occidisse et comedisse. Nam in Ponto Siriaco quidam onestam feminam ospitio susceptam occidit, membratimque dividens sale condivit, et sibi suisque filiis comedendam coxit. In ipsa urbe quedam femina de quodam adolescentulo similiter fecit. In pluribus etiam locis aliis hoc ipsum ob famis penuriam contigisse fama vulgante compertum est. Igitur mense Maio Senonis civitate modius frumenti venditus est solidis octo, modius sigale solidis septem et dimidio, modius ordeï solidis sex et dimidio, modius avene solidis quinque, modius salis solidis duodecim. Sed divina providente clementia novi fructus temperius solito succurrerunt. Nam 9. Kal. Iunii, primo videlicet die rogationum, panis novus oblatus est Senis ad benedicendum, ex quo plurimi gratias Deo referentes eulogias sumpserunt.’ This passage is immediately preceded by notice of a comet.
190. **FD/HM** AE 868: (1859), p. 486. ‘The scarcity and shortage of bread was so great in nearly all the provinces that it persuaded people of an infinite multitude, of account of hunger, to kill a comparable number and tear them apart as beasts do with their teeth.’ / ‘Tanta inedia in omnium poene fuit provintiarum et

exiguitas panis, ut pro inopia victus homines infinitae multitudinis fuere a conparibus interempti atque bestiarum more dentibus laniati.'

191. *W/FD* ASB 869: (1991), p. 153; (1883), p. 98. '[Charles] then went to the township of Cosne, at an inconvenient time to travel since the weather was bad and there was a very serious food shortage, and met some of the Aquitanians there.' / 'Ipse autem ad Conadam vicum nimis incongruenter et pro qualitate temporis et pro nimietate famis perrexit; ubi quosdam Aquitanos obvios habuit.' Charles the Bald would have reached Cosne (Cosne-sur-Loire) it appears, in January or early February.
192. *W/FD/HM* AX 869: (1909), pp. 26-7. 'In the month of February, thunder claps were heard in the dark, rainy clouds of the sky, and on 15 February, that is the night of the blessed Septuagesima, a comet was seen from the north and west, after which followed a great storm of wind and an immense flood of water in which many people not foreseeing it died. Afterwards, in the summer, a very harsh food shortage followed in many provinces, especially in *Burgundia* and *Gallia* where a great number of people endured a bitter death. It was reported that humans ate the bodies of humans. But some are said to have feasted on the flesh of dogs.' / 'Mense Februario, tenebrosis aquis in nubibus aeris, tonitrua audita sunt, et XV. Kal. Martii, id est nocte sancta septuagesimae, stella cometes visa est ab aquilone et occidente, cui statim nimia tempestas ventorum et immensa inundatio aquarum est subsecuta, in qua multi inprovidi interierunt. Et postea aestivo tempore fames acerrima in multis provintiis subsequitur, maxime in Burgundia et Gallia, in quibus magna multitudo hominum acerbam sustinuit mortem, ita ut homines hominum corpora comedisse feruntur. Sed et canum carnibus aliqui vesci dicuntur.' The editors again think this passage is dated a year late and suggest that the proper date is 868. Septuagesima is the third Sunday before the beginning of Lent.
193. *HM/C* ASB 869: (1991), p. 156; (1883), pp. 100-01. 'Lothar left Rome in high spirits and got as far as Lucca. There he was stricken by fever, and this disastrous sickness spread among his men. He watched them dying in heaps before his eyes. But he refused to recognize that this was a judgment of God. On 7 August he reached Piacenza. He survived through the Sunday, but about the ninth hour unexpectedly became almost unconscious and lost the power of speech. Next day, at the second hour, he died. Those few of his men who survived the disaster committed him to the earth in a little monastery near Piacenza.' / 'Hlotharius vero Roma laetus promovens, usque Lucam civitatem venit. Ubi febre corripitur, et grassante clade in suos, quos in oculos suos coacervatim mori conspiciebat, sed iudicium Dei intellegere nolens, usque Placentiam 8. Idus Augusti pervenit; ibique dominica die superdiurnans, circa horam nonam inopinate exanimis paene effectus est et obmutuit, atque in crastino hora diei secunda moritur, et a paucis suorum qui a clade remanserant in

- quodam monasteriolo secus ipsam civitatem terrae mandatur.’ Why it was unsuitable is not explicitly stated, though, as discussed below, it appears many many Carolingian authors thought of *Italia* as being particularly dangerous or pestiferous in the spring and summer. Lothar II had left Benevento and then Rome for Lotharinga. It is quite clear that Lothar had been travelling through *Italia* in the late spring and summer. He began his journey to the holy city in June, which the annalist deems, earlier in the entry, ‘an unsuitable time.’ Louis the German, who Lothar had met in Benevento, appears to have made his way out of *Italia* without falling sick or sustaining any losses amongst his men.
194. *HM/C* Regino 869: (2009), p. 160; (1890), p. 98. ‘When Lothar left Rome he was gripped by an illness and after arriving in the city of Piacenza he ended his final day on 8 August. There were so many casualties among the king’s followers that it seemed as if an enemy sword rather than a pestilence had cut down the nobility and manliness of the whole realm, which at that time was so rich that it filled the lands of the empire like a packed and sprouting crop-field or a swarm.’ / ‘Porro Lotharius Roma egressus morbo corripitur et Placentia civitate perveniens diem clausit extremum VI. Id. Augusti, Tanta autem strages in prefati regis populo facta est, ut non peste perisse, sed hostili gladio corruiſſe virtus ac nobilitas totius regni videretur, quae eo tempore tantae fecunditatis erat, ut in modum densarum segetum pullulans veluti quodam examine imperii fines repleverit.’
195. *AM* AF 870: (1992), p. 63; (1891), p. 72. ‘There was also a serious pestilence of oxen in many parts of *Francia*, which caused irretrievable loss to many.’ / ‘Boum quoque pestilentia in nonnullis Franciae locis inmanissime grassando multis inrecuperabile intulit damnum.’ This passage is preceded by notice of several, what the annalist refers to as, ‘portents.’ These include a blood-red sky at night, lightning strikes between clouds, two earthquakes, the drowning of many people in the Rhine, and the deaths of two men who died while ‘gathering in the harvest in the district of Worms...because of the heat of the sun which was fiercer than usual.’ When the cattle pestilence took place, and specifically what areas were affected, is uncertain.
196. *W* AC 871: (1826), p. 98. ‘A strong wind.’ / ‘Ventus validus.’
197. *W/FD/HM/AM* AF 872: (1992), p. 68; (1891), pp. 76-7. ‘The whole summer was ruined by hailstorms and other kinds of tempest. The hail destroyed the crops in many places, and terrifying thunder and lightning threatened mortals almost daily with death: it is said that immense bolts killed men and draught animals in various places and reduced them to ashes. The cathedral of St. Peter at Worms was also burnt by heavenly fire and the walls nearly destroyed.’ / ‘Omne tempus aestivum grandinibus variisque tempestatibus pernoxium extitit; nam grando plurima loca frugibus devastavit; horrenda etiam tonitrua et fulmina pene cotidie mortalibus interitum minabantur, quorum ictibus praevalidis homines et

umenta in diversis locis exanimata et in cinerem redacta narrantur. Domus quoque sancti Petri apud Wormatiam igne caelesti consumpta est et muri penitus eversi.’ This passage precedes notice of an earthquake at Mainz.

198. *W/FD* AX 872: (1909), p. 31. ‘[A]n infestation of thunderstorms, rain and hail greatly harmed all people in their crops and buildings.’ / ‘[I]nfestatio tonitruorum et ymbrium atque grandinum humano generi nocuit nimium in frugibus et aedificiis.’
199. *FD* ASB 873: (1991), p. 184; (1883), p. 124. ‘A swarm of locusts poured itself throughout *Germania*, the *Galliae* and especially *Hispania*: it was so large, it could be compared with the plague of Egypt.’ / ‘Multitudo siquidem locustarum per Germaniam Gallias, maxime autem in Hispaniam adeo se effudit, ut Aegyptiacae plagae potuerit comparari.’
200. *FD/HM* AF 873: (1992), pp. 71-2; (1891), pp. 79-80. ‘[T]here was a great food shortage through the whole of *Italia* and *Germania*, and many died of hunger. For at the time of the new crops a pestilence of a new kind and one seen for the first time among the Franks appeared to vex the German people not a little for its sins. For worms, like locusts with six feet and flying on four wings came from the east, and covered all the face of the earth like snow, and ate everything green in the fields and meadows. They had a wide mouth and a long stomach and two teeth harder than stone, with which they were able to gnaw through the toughest bark of trees. Their length and thickness was about that of a man’s thumb, and they were so numerous that in one hour they devoured a hundred plough lands of corn near the town of Mainz. When they flew, moreover, they so covered the sky for the space of a mile that the sun’s rays scarcely appeared to those on earth; some that were killed in various places were found to have whole grains of corn with the seed and chaff inside them. When some had gone on west others came after them, and for two months their flight presented almost daily a horrible spectacle to those watching. It is said that in *Italia* in the county of Brescia blood rained from the sky for three days and nights.’ / ‘[F]acta est fames valida per universam Italiam atque Germaniam, et multi inedia consumpti sunt. Tempore vero novarum frugum novi generis plaga et prima in gente Francorum visa Germanicum populum [peccatis exigentibus] non mediocriter afflixit. Nam vermes quasi locustae quatuor pennis volantes et sex pedes habentes ab oriente venerunt et universam superficiem terrae instar nivis operuerunt cuncta, quae in agris et in pratis erant viridia, devastantes. Erant autem ore lato et extenso intestino duosque habebant dentes lapide duriores, quibus tenacissimas arborum cortices corrodere valebant. Longitudo et (crassitudo) [grossitudo] illarum quasi pollex viri; tantaeque erant multitudinis, ut una hora diei centum iugera frugum prope urbem Mogontiam consumerent. Quando autem volabant, ita totum aerem per unius miliarii spatium velabant, ut splendor solis in terra positus vix appareret; quarum nonnullae in diversis locis occisae spicas integras cum granis

et aristis in se habuisse repertae sunt. Quibusdam vero ad occidentem profectis supervenerunt aliae, et per duorum mensium curricula pene cotidie suo volatu horribile cernentibus praebuere spectaculum. In Italia in pago Brixiensi tribus diebus et tribus noctibus sanguis de caelo pluuisse narratur.’ *Populum Germanicum* here refers to the people of Louis the German’s kingdom.

201. **W/FD/HM** AX 873: (1909), p. 32. ‘At the same time in winter, an unexpected flood, dripping with snow, grew, especially along the Rhine. On account of the much water that fell suddenly, many people perished along with their buildings and countless crops.’ / ‘Eodem hiemis tempore insperatum diluvium nive madens repente inolevit, maxime in litoribus Rheni fluminis. Ex influenza aquarum multarum multitudo hominum cum aedificiis et frugibus innumerabilibus deperiit.’ The author seems to indicate that rapid thawing of the snow brought on this flood.
202. **FD/W** AX 873: (1909), p. 33. ‘In the middle of August, the ancient plague of the Egyptians, that is a countless crowd of locusts, in the custom of bees exiting from a beehive, spread anew from the east through our lands, flying in the air making a subtle sound just like small little birds. And while they were in the air, it was hardly possible to see the sky just as [if looking] through a sieve. In many places, pastors of the church and the whole clergy met these locusts with boxes and crosses, imploring the mercy of God to defend them from this pestilence. Though not everywhere, [the locusts] did damage in places. Again from 1 November until Sexagesima, snow covered the whole surface of the land and the Lord continuously afflicted his people with diverse pestilences and visited their errors with a rod and their sins with beatings.’ / ‘[M]ediante mense Augusto antiqua Egiptiorum plaga, id est locustarum innumerabilis turba more apium de alveo exeuntium, ab oriente nova exorta est per terras nostras, quae in aere volitantes, vocem subtilem velut aviculi parvi dantes. Et dum elevarentur, caelum vix velut per cribram intueri potuit. In plerisque locis vero pastores ecclesiarum et omnis clerus cum kapsis et crucibus occurrerunt eis misericordiam Dei implorantes, ut defenderet eos ab hac plaga. Non tamen ubique, sed per loca nocuerunt. Item in Kalendis Novembris usque ad sexagesimam nix totam superficiem terrae cooperuit, et diversis plagis Dominus assidue populum suum afflixit et visitavit in virga iniquitates eorum et in verberibus peccata eorum.’ Sexagesima is the second Sunday before Ash Wednesday, the first day of Lent. Note that *capsa* may here refer to relics, not boxes.
203. **FD** ASV 873: (1909), p. 40. ‘In these days there was a plague of locusts.’ / ‘In illis etiam diebus plaga locustarum facta.’ Prior to this statement, it is said that Charles was laying siege to Angers. Unlike most other major Carolingian Annals, the ASV was composed at the monastery of its namesake in Arras. Written at the monastery of St. Vaast, the ASV provides an independent and



contemporary account for the years 873 to 900, though it has been suggested that the ASV were composed at once in the tenth century. Like the ASB, the ASV is concerned foremost with western Carolingian Europe.

204. **FD/HM** Regino 873: (2009), pp. 167-68; (1890), p. 105. ‘In the year of the Lord’s incarnation 873, an inestimable multitude of locusts came from the east in the month of August and devastated almost all of *Gallia*. They were bigger than other locusts and had six pairs of wings; and, amazing to say, they flew through the air in distinct units and after landing on the ground made their camp like divisions of an army. With a few others, the leaders travelled one day ahead of the army as if to scout out suitable places for the multitude. Around the ninth hour they settled in the place where the leaders had been the day before, and they did not move from there until sunrise. Then they set out in their squadrons, so that one would think these small creatures had military discipline. They fed on the crop-fields, which were so completely devoured by them that they seemed to have been destroyed by an immense storm. A day’s travelling for them consisted of four or five miles. Covering the surface of the earth, they came as far as the British sea, into which by God’s will they were blown by the violent gusts of the winds and, carried away into its vast expanse, they were immersed. The seething and flooding of the ocean cast them back up and filled the beaches. Such piles of them were made that they were heaped up like mountain peaks. The air was corrupted by their stench and foulness, causing a dire pestilence from which many who lived nearby perished.’ / ‘Anno dominicae incarnationis DCCCLXXIII. locustarum inaeſtimabilis multitudo mense Augusto ab oriente veniens totam pene pervastavit Galliam. Quae maiores erant quam caeterae locustae habebantque sena alarum remigia, et, mirum dictu, ut castrorum acies distinctis ordinibus per aera ferebantur vel terrae incumbentes castra metabantur. Duces cum paucis exercitum itinere unius diei preibant, quasi loca apta multitudini provisuri. Circa horam nonam, ubi duces pridie venerant, insidebant, nec a loco occupato movebantur, quousque sol suum representaret ortum, tunc per turmas suas proficiscebantur, ut in parvis animalibus disciplinam militarem cerneret. Segetibus vescebantur, quae ab eis ita depastae sunt, ut veluti inmani tempestate consumptae viderentur. Spatium diurni itineris quatuor aut quinque milibus extendebatur. Pervenerunt autem usque ad mare Brittanicum superficiem terrae cooperientes, in quo Deo volente violento ventorum flatu impulsae atque in profundum absportatae dimersae sunt. Aestu vero atque refusione oceani reiectae littora maritima repleverunt; tantaque congeries facta est, ut ad instar montium cumulatae coacervarentur: ex earum foetore ac putredine aer corruptus diram pestem finitimis generavit, ex qua multi perierunt.’ Regino’s characterization of the locusts as an army is comparable to Proverbs 30:27, ‘Locusts have no king, yet they advance together in ranks.’

205. **C / FD / HM** Regino 873: (2009), p. 169; (1890), p. 106. 'The immense army was worn down by the long tedium of the siege, by food shortage and by a grave pestilence.' / 'Exercitus inmensae multitudinis cum longe obsidionis tedio, fame et gravi pestilentiae morbo adtereretur.' Early in 873 or late 872, Vikings had taken Angers, supposedly after finding it deserted. Charles the Bald, along with a Breton force, laid siege to the city. The siege was long and Charles' force was weighed down by hunger and disease.
206. **W** ASB 874: (1991), p. 185; (1883), p. 125. 'A long hard winter, with such a tremendous amount of snow that no one could remember seeing anything like it.' / 'Hiems prolixa et fortis, et nix tanta fuit nimietate perfusa, quantam nemo se vidisse meminerit.'
207. **W / FD** ASB 874: (1991), p. 186; (1883), p. 125. 'The long summer produced a drying-up of the grass and a poor harvest.' / 'Aestas longa siccitatem foeni et messium inopiam reddidit.'
208. **W / HM / AM** AF 874: (1992), p. 73; (1891), p. 81. 'The winter was very hard and longer than usual; there were also great falls of snow from 1 November to the vernal equinox [21 March] without intermission, and these caused great difficulty to men wanting to go to the woods to collect fuel. Hence it came about that not only animals but also many men died of cold. The Rhine and the Main were frozen by the intense cold and for a long time would bear the weight of those who set foot on them.' / 'Hiems aspera nimis et solito prolixior; nix quoque inmensa a Kalendis Novembris usque in aequinoctium vernale sine intermissione cadens magnum hominibus fecit impedimentum silvas petere lignaque colligere. Unde aecidit, ut non solum animalia, verum etiam homines plurimi frigore perirent. Sed et Rhenus et Moenus glaciali rigore constricti longo tempore se sub vestigiis incedentium calcabiles praebuerunt.'
209. **FD / HM** AF 874: (1992), p. 75; (1891), p. 83. '[T]hrough the food shortage and pestilence which raged through the whole of *Gallia* and *Germania*, nearly a third of the population was destroyed.' / 'Hoc anno fame et pestilentia per universam Galliam et Germaniam grassantibus pene tertia pars humani generis consumpta est.'
210. **FD / HM** GABS 874: (1881), p. 621. 'In this year, there was a great food shortage and mortality of humans on account of the greatest pestilence. However, wine existed plentifully...' / 'In ipso anno facta est fames magna et mortalitas hominum per pestilentiam permaximam. Vinum autem extitit habundanter...'
211. **FD** MB 874: (1879), pp. 943-44. '...[A] quite grave food shortage seized all *Galliae*...' / '...[F]ames admodum gravis universas occupavit Gallias...' Holder-Egger, in the MGH, assigned this passage to 874, which certainly seems quite plausible, based on the positioning of the passage in the text and the known events of 874: (1887), p. 497. Adrevald is thought to have written this text in the

early 870s and this account of the food shortage is more than likely contemporary. The mentioning of the parcelling up of the kingdom may refer to the Treaty of Mersen of 870. Nonetheless, this passage clearly refers to the shortage other texts document for 874. *Gallia*, naturally, refers to western Carolingian Europe.

212. *W/AM/FD* AF 875: (1992), p. 76; (1891), p. 84. '[A] certain villa in the Niddagau called Eschborn, which has no rivers or streams near it, was almost completely destroyed by a flash flood and eight-eight people of both sexes were killed. For when the people of the place had gone to sleep on 3 July, not suspecting anything, so much rain fell in a moment from the sky that it uprooted all the trees and vines it touched in the villa, overthrew the foundations of buildings and hurled the draught animals and animals with everything which was in the houses to destruction. The church of the villa with its altar was also so completely destroyed that those who now look at the spot can see no sign that there was once a building there. There was a further lamentable sight: as women reached out their hands to their children and husbands to their wives to try to help them, they were seized by the force of the waters and drowned along with those whom they had wished to help. Even corpses long buried were swept from their graves by the force of the waters, along with the coffins which they lay in, and were found within the bounds of another villa.' / '[V]illa quaedam in pago Nitense nomine Asgabrunno a fluminibus et torrentibus longe remota subitanea imbrium inundatione pene deleta est, et octuaginta octo homines utriusque sexus in ea deleti. Dum enim homines eiusdem loci V. Non. Iul. dormitum issent nihil mali suspicantes, tanta pluvia uno momento caelitus lapsa est, ut omnes arbores et vineas, quas tangebant in eadem villa, radicitus extirparet, aedificia funditus everteret, iumenta et animalia cum omnibus, quae in domibus erant, perditioni traderet. Aecclesia quoque eiusdem villae cum suo altari ita deleta est, ut modo cernentibus nullum suae constructionis praebeat indicium. Erat autem ibi videre misera; nam cum feminae liberis et viri coniugibus manum porrigentes subvenire niterentur, impetu aquarum rapti una cum eis, quibus auxilio esse volebant, extincti sunt. Sed et cadavera longo tempore tumultata vi aquarum de sepulchris soluta cum vasculis, quibus inerant, in terminis alterius villae reperta sunt.'
- Eschborn is near Frankfurt.
213. *W* AC 875: (1826), p. 98. 'Much snow.' / 'Nix valida.'
214. *HM/C* AF 877: (1992), p. 84; (1891), p. 90. 'In this year Italian fever and eye pain troubled the German people, especially those living around the Rhine; and a terrible malady followed Karlmann's army on its return from *Italia*, so that many died from coughing.' / '[F]ebris Italica dolorque oculorum Germanicum populum graviter vexavit, maxime circa Rhenum habitantes; pestilentia quoque ingens secuta est exercitum Carlmanni de Italia redeuntem, ita ut plurimi

tussiendo spiritum exalarent.’ *Germanicum* here refers to the people of Louis the German’s kingdom.

215. **AM/HM** AF 878: (1992), p. 85; (1891), p. 92. ‘There was a terrible pestilence of oxen in *Germania*, especially around the Rhine, and this was followed by a mortality of humans. There is a certain villa in the county of Worms, not far from the palace of Ingelheim, called Walahesheim, where a remarkable thing happened. The dead animals were dragged daily from their stalls to the fields, where the village dogs, as is their wont, tore up and devoured them. One day almost all the dogs gathered together in one place and went off, so that none of them could be found afterwards either alive or dead.’ / ‘Boum pestilentia in Germania immanissime grassata est, maxime circa Rhenum; quam cladem non mediocris hominum mortalitas secuta est. Villa quaedam in Wormacense haud procul a palatio Ingelheim sita est, nomine Walahesheim, ubi res miranda contigit: nam dum animalia mortua cotidie de domibus traherentur in agros, canes, qui in eadem villa erant, iuxta morem suum eadem cadavera laniando comedebant; quadam vero die pene universi in unum locum congregati inde discesserunt, ita ut nullus eorum postea neque vivens neque mortuus inveniri potuisset.’ This passage follows notice of a 15 October lunar eclipse and the dimming of the sun on 29 October. This pestilence may have followed these events, though that is not explicitly said.
216. **AM/HM** PB 878: (1826), p. 418. ‘A pestilence of oxen in *Germania*, which followed a destruction of humans. The Slavi, Dalmatae, Soavi, Bohemi are the same.’ / ‘Boum pestilentia in Germania, quam clades hominum secuta est. Slavi, Dalmatae, Soavi, Bohemi idem sunt.’ Whether the text here refers to these peoples of eastern Europe being affected by the pestilence, as those in *Germania*, is unclear. The PB may have been composed in the late ninth century.
217. **HM/AM** FG 878: (1881) p. 622. ‘[G]reat mortality of humans and cattle.’ / ‘[M]ortalitas hominum et pecorum magna.’
218. **W** AF 880: (1992), p. 88; (1891), p. 94. ‘The winter was hard and longer than usual: the Rhine and Main were frozen in the great cold and could be crossed on foot for a long time.’ / ‘Hiems aspera et solito prolixior; nam Rhenus et Moenus fluvii glaciali rigore constricti longo tempore se calcabiles praebuerunt.’ This is in reference to the winter of 879/80.
219. **W/FD/AM/HM** AF 880/81: (1992), p. 90; (1891), p. 96. At the closing of the annalist’s entry for 880 we read that Louis confronted a Viking force at Nimwegen but that he ‘returned without having accomplished much, because of the harshness of the winter and the strength of the fortifications. In this year there was a harvest failure and a general shortage of everything in the counties of Worms and Nidda and in many places in Louis’ kingdom, which affected the German people not a little.’ / ‘propter hiemis asperitatem et loci firmitatem rebus parum prospere gestis reversus est. Hoc anno in Wormacense et in Nitense et in

plurimis locis regni Hludowici sterilitas frugum et omnium rerum penuria Germanicum populum non mediocriter afflixit.’ The entry for 881 then begins with ‘the winter was very long and bad for animals of all kinds. For the earth was still frozen in spring and denied the animals their accustomed fodder, and for the most part they died of hunger and the great cold, especially because of the shortage of the previous year.’ / ‘Hibernum tempus valde prolixum et animalibus diversi generis pernioxium. Nam tellus verno tempore glaciali rigore constricta animalibus solita negavit pascua, et illa fame et frigore maxima ex parte perierunt, etiam propter sterilitatem anni prioris.’

220. *W/HM* Widukind 880: (1949), p. 183; (1935), p. 26. ‘Bruno, after administering for a while the entire dukedom of *Saxonia*, led an army against the Danes, but being surprised by a great flood, and not finding solid ground whereon to fight, perished with all his army, leaving the dukedom to his brother, who, although younger, excelled him in every kind of valor.’ / ‘Ex quibus Brun cum ducatum administrasset totius Saxoniae, duxit exercitum contra Danos, et inundatione repentina circumfusus non habens locum pugnandi periit cum omni exercitu, fratri natu quidem minori, sed omni virtute multo potiori relinquens ducatum.’
221. *W/C/HM* AFB 882: (1992), p. 105; (1891), p. 108. ‘[O]n 21 July in the afternoon a sudden darkness covered the whole of the sun, and with thunder and lightning there was such a hailstorm that no mortal could claim to have seen anything like it before. The hailstones were not, as they usually are, smooth and equal in size, but jagged and unequal and with rough edges, so that they offered to all who beheld them an unusual and extraordinary spectacle. It is remarkable and incredible to relate that they could scarcely or not at all be encircled with one’s thumb and middle finger. The horses were so startled that they uprooted their tethering-posts and tore their bridles and ran around wildly and in fright both inside and outside the camps. A great part of the city which they were besieging also collapsed under the storm, so that a column in formation could have ridden in if the wall which surrounded it had not held them back. Because the siege had gone on for so many days in the summer, the great army began to fall ill and be nauseated by the putrefaction of the many corpses. Those who were trapped inside were no less oppressed.’ / ‘[I]n XII. Kal. Aug. luce postmedia tenebrosa subito caligo tota castra operuit, fulgure et tonitruo concrepente instans talis grando, ut nullus antea mortalium se tale quid videre profiteretur; non, ut solitum est lapides descendere, plana et equali superficie, sed cornuta et inequali et aspera facie omnibus cernentibus insolitum et magnum spectaculum praebuit. Mirabile et incredibile dictu, ut vel vix vel non grossitudo eorum potuit pollice et medio circumdari. Nam et ita equi stupefacti, ut efractis sudibus et habenis partim extra castra, partim in castris errore et stupore versabantur. Civitatis quoque, quam obsederant, propter impetum aeris magna

pars corrui, ita ut una cohors coacervatim posset equitando ingredi, nisi vallo, quod circumierat, suspensa constaret. Igitur per tot dies obsidens tam magnus exercitus, aestivo in tempore propter putredinem cadentium hominum aegritudine correptus ac pertesus est. Nec minus inclusi simili molestia premebantur.’

222. **HM** AFB 882: (1992), p. 106; (1891), p. 109. ‘When the Bavarians had returned home, a great and terrible pestilence broke out in the whole *Bavaria*, so that often two bodies were buried in one grave.’ / ‘In illis diebus redeuntibus Baiowariis domum magna et inmanis pestilentia in tota Baiowaria excrevit, ita ut sepe duo cadavera in unum tumulum sepelirentur.’ The Bavarians had traveled with the Lombards, Alemans and Franks into *Francia* under the command of Charles the Fat. The Bavarians, under Arnulf, had crossed the Rhine at Andernach. They would have made their way back to *Bavaria* in the late summer or fall.
223. **FD / C** ASV 882: (2004), p. 508; (1909), p. 53. ‘From [Conde] [the Vikings] devastated with fire and sword the entire kingdom up to the Oise. Defenses were pulled down, monasteries and churches were demolished and the servants of the [Christian] religion were killed by the sword or food shortage or they were sold abroad, and the inhabitants of the countryside were killed. No one resisted them.’ / ‘Indeque omne regnum usque Hisam ferro et igne devastant, subversis moeniis et monasteriis atque aeclesiis usque ad solum dirutis servitoribusque divini cultus aut gladio aut fame peremptis aut ultra mare venditis et accolis terrae deletis, nemine sibi resistente.’
224. **HM / C** AFB 883: (1992), p. 107; (1891), p. 110. ‘Berenger, a relative of the emperor’s was sent to deprive Wido of his kingdom. This he did in part, and would have completed, if illness and weakness among his army had not forced him to return. And indeed the human race throughout *Italia* was affected by the spread of the sickness to such an extent that the disease even penetrated to the court and among the king’s bodyguard and to the king himself.’ / ‘Perangarius vero consanguineus imperatoris mittitur ad expoliandum regnum Witonis; quod ille quadam parte peregit, ex quadam peregisset, ni per corruptionem morbi ac infirmitatem exercitus sui reverteret. Etiam per totam Italiam humanum genus ita invalescente morbo affligebatur, ut in curtem et inter militiam vel ipsum regem hec miseria perveniret.’ Berenger, the son of the daughter of Louis the Pious, had been sent to topple Wido, count of Tuscany, who had been accused of treason and who had apparently made an alliance with the Muslims. It seems Berenger would have reached Wido, in *Italia* around or at Spoleto, sometime in the late spring or early summer. Despite the losses sustained in 883, the Bavarians again marched on Wido in 884. Since their march in the latter year was decreed in February, we may suspect that they were continuously trying to avoid *Italia*’s pestiferous spring and summer.

225. **FD / C** AF 885: (1992), p. 97; (1891), p. 102. ‘Archbishop Liutbert [of Mainz] and Count Henry and some others came upon them unexpectedly and, having killed many of them, forced the rest to take refuge in a certain small fortification and took them away from them the supplies which they had gathered together. Besieged for a long time and wearied by food shortage, they did not dare to risk open battle and fled one night.’ / ‘Quibus Liutbertus archiepiscopus et Heimrih comes alique nonnulli insperate supervenerunt et plurimis prostratis caeteros in quandam munitiunculam fugere compulerunt, frugibus, quas congregaverant, sublatis. Cumque diu obsessi et fame fatigati manum conserere non auderent, nocte quadam fuga lapsi sunt.’ Liutbert and Henry had attacked the Vikings who were plundering the region of Hesbaye.
226. **HM? / C** BPU c.885: (2007), pp. 72-3. ‘Now all this while the wearied city struck low by the frightful onslaught of carnage suffered the sword without the pestilence within. Alas, so greatly were the ranks of the noblemen thinned out that out hands could provide no fitting place of burial which could serve as sepulchres for all the bodies of the dead...’ / ‘Urbs patitur gladium exterius, loeti quoque pestis / Eheu, nobelium plebes penitus laniabat. / interius nec erat nobis tellus obeuntum / quae praebere sepulturam membris potuisset / comminus...’ Abbo completed his epic about the Viking attacks on Paris of 885 and 886 sometime in 897 or early 898.
227. **W / AM / C** AF 886: (1992), p. 100; (1891), p. 104. ‘In the month of February an army of the eastern Franks was sent into *Gallia* against the Northman, who were near Paris. On the journey they suffered not inconsiderable losses to their horses through floods and sudden cold.’ / ‘Mense Februario exercitus orientalium Francorum missus est contra Nordmannos in Galliam iuxta Parisios consistentes; qui in itinere propter imbrium inundationem et frigus imminens non modicum equorum suorum perpassi sunt damnum.’ This appears to have happened before 9 February.
228. **W / FD** AF 886: (1992), p. 100; (1891), p. 104-05. ‘[I]n May, June and July there was such rainfall day and night without stopping that no one of the present age was able to say that he had seen such abundance of water. As a result rivers swelled in many places and did great damage to all kinds of crops. For the Rhine burst its banks and swept away all the crops, flax, and hay at places close to it from where it rises to the place where it enters the sea. The Po is said to have behaved in a similar fashion in *Italia*.’ / ‘Mense vero Maio, Iunio atque Iulio tanta vis imbrium diu noctuque sine intermissione caelitus lapsa est, ut nullus aevi praesentis tantam aquarum habundantiam se vidisse fateatur. Unde flumina in diversis locis intumescencia frugibus variis extitere pernoxia. Nam Ehenus alveum suum egressus cuncta loca sibi contigua ab ortu suo usque ad introitum maris omnibus frugibus et lino et foeno evacuavit. Padus quoque in Italia similia fecisse perhibetur.’

229. *W* AFB 886: (1992), pp. 112-13; (1891), pp. 114-15. 'In the autumn there was unusual and unexpected flooding. For in the east the rivers burst their banks and surrounded villae unexpectedly and are said to have suddenly swept them away with their inhabitants, men, women and children, so that they could be seen leveled to the ground. In the Alpine regions, moreover, there were such severe floods and landslides that the windings and traces of the roads on the sides of the mountains were rendered completely invisible.' / 'Tempore autumni plus solitum inundationes aquarum excreverunt inestimate. Nam in Oriente erumpentibus per litus fluctibus villae inopinate circumdate subito feruntur, ita ut cum inhabitantibus viris, feminis, infantulis usque in abyssum deletae cernuntur. Inter Alpes vero talis rapacitas aquarum et collisio lapidum fuit, ut flexuras et vestigia viarum per divexa montis latera nullo modo prospici poterint.'
230. *W* ASV 886: (2004), p. 511; (1909), p. 59. 'On 6 February, a grave crisis arose for the inhabitants of the city, since a very serious rise in the water level of the river smashed the smaller bridge.' / 'VIII. Idus Februarii contigit grave discrimen infra civitatem habitantibus. Nam ex gravissima inundatione fluminis minor pons disruptus est.' This river would be the Seine and the city Paris.
231. *FD / C* ASV 886: (2004), p. 512; (1909), p. 60. 'Nevertheless the Vikings daily attacked the city and many people on both sides were killed, many were laid low with wounds and food began to grow scarce in the city.' / 'Nortmanni tamen cotidie non cessant obpugnare civitatem et ex utraque parte multi interficiuntur, plures vulneribus debilitantur, escae etiam coeperunt minui in civitate.' The Vikings were attacking Paris.
232. *W / AM* AF 887: (1992), p. 101; (1891), p. 105. 'The winter was hard and longer than usual; there was an unusually severe pestilence among oxen and sheep in *Francia*, so that almost none of these kinds of animal was left alive.' / 'Hiems aspera et solito prolixior; boum quoque et ovium pestilentia supra modum grassata est in Francia, ita ut pene nulla eiusdem generis animalia relinquerentur.'
233. *W* AAC 887: (1826), p. 51. An earthquake, pope Nicholas [I] died, and an incredible amount of rain.' / 'Terrae motus. Papa Nicolaus obiit. Et nimia superfluitas imbrum.' This passage is misdated. It appears to be a doublet of the AAC entry for 867: cf. (C.1.179, 180, 181).
234. *C / FD / HM* ASV 888 (1909), p. 66. 'Meanwhile, the Normans besieged the city of Meaux, built siege engines, and amassed a rampart to take the city. Count Teutbertus bravely resisted them until he perished along with almost all of his warriors. Accordingly, after the count had died, bishop Sigemundus, terror-stricken, ordered the gates to be secured with stones. Since those who had been shut in the city, bone-weary from the siege, weakened with hunger, and overly tormented by the deaths of their own people, saw that help from no quarter would come to their aid, they began to treat with the Normans through mutual



acquaintances so that they might be allowed to leave alive once the city had been surrendered.’ / ‘Interim Nortmanni Meldis civitatem obsidione vallant, machinas instruunt, aggerem conportant ad capiendam urbem. Quibus viriliter resistit Teutbertus comes, donec interiit cum omnibus prope bellatoribus. Mortuo itaque comite, episcopus Sigemundus timore perculsus iussit lapidibus obfirmari portas civitatis. Cumque hi qui infra civitatem erant inclusi, obsidione pertesi, fame attenuati, mortibus etiam suorum nimis afflicti, cernerent ex nulla parte sibi auxilium adfuturum, cum Nortmannis sibi notos agere coeperunt, ut data civitate vivi sinerentur abire.’

235. **HM / W / FD** AFB 889: (1992), p. 118; (1891), pp. 117-18. ‘A terrible time began in this year. For an Italian fever weighed down many with coughing; there were more floods than usual; civil wars disturbed the regions all around; and pestilence here and there and unexpected food shortage were exceptionally bad. The crops were destroyed by hailstorms and men suffered the lack of crops in misery. But above all else there was a detestable portent in the lands of the Thuringians. For water fell from the heavens not, as usual, in raindrops, but all together like a waterfall, and in three villae the houses were carried away in a moment by the shock and three hundred human corpses were collected after they had been swept on to the fields by the force of the waters.’ / ‘Grave igitur tempus hoc anno incanduit. Nam Italica febris tussiendo perplurimos vexabat, inundationes aquarum plus solito excrevere, civilia bella circumquaque regiones conquassantur, pestilentia sparsim ac fames inopinata ultra modum incubuit. Grandine vero contritis frugibus mortales inopiam frugum cum miseria patiuntur. Sed inter alia execrabile prodigium in regione Thuringorum visum est. Namque e celo aqua, non ut solet pluvia stillatim descendere, sed coacervatim quasi fluens torrens irruit, per tres villas tino momenti ictu eyulsis aedificiis, ter centum cadavera mortuorum impulsione aquarum campo deiecta colligebantur.’
236. **FD** RH 889: (1839), p. 570. ‘A harsh food shortage followed on the heels of the repulsion of these [pirates], since the land has remained untilled for three years. For now a sixteenth of a measure of wheat made a *modium* and went for 10 drachmas. A rooster was bought for 4 drachmas, a sheep for 3/12ths, and a cow for 11/12ths. There was no selling of wine, since, with the vineyards cut down everywhere, there was scarcely any...He himself, withdrawing with the army into parts of Aquitaine, resolved that he would not return before the abovementioned amount of a measure of wheat went for two drachmas, a rooster for a denarius, and, likewise, a sheep was sold for two drachmas, and a cow for three twelfths.’ / ‘Quibus repulsis, fames valida subsecuta est, cum triennio terra inculta remanserit. Iam enim mensura frumenti quae sedeties ducta modium efficit decem dragmis veniebat. Gallinatus quoque quattuor dragmis; ovis vero tribus unciis; atque vacca jabo tollebatur. Vini nulla coemptio erat, cum, vinetis ubique succisis, vix eius aliquid habebatur...Ipse cum exercitu in Aquitaniae

partes secendens, non ante se rediturum proponens, quam supradicta modii frumentarii mensura duabus dragmis venire, gallinatus vero denario atque ovis duabas itidem dragmis, vacca vero tribus unciis venundaretur.’ A monk of St. Remigius, Richer of Rheims wrote in the late tenth century.

237. **HM** AAC 890: (1826), p. 52. ‘An extraordinary mortality of humans.’ / ‘Nimia mortalitas hominum.’ This appears only in the Monza and Verona codices of the AAC.
238. **HM** AL 890: (1826), p. 52. ‘A great mortality of humans.’ / ‘Magna mortalitas hominum.’ Whether this text informs or relies on the AAC here and in other entries below is uncertain.
239. **FD** ASV 892 (1909), p. 71. ‘And then a great food shortage and a sterility of the land attacked us, so that tenants of the land, on account of the magnitude of the food shortage, left their own regions.’ / ‘Indeque fames valida et sterilitas terrae nobis invasit, ita ut accolae terrae prae magnitudine famis sua relinquerent loca.’
240. **FD** ASV 892 (1909), p. 72. ‘Vikings retreated from Leuven, seeing that the whole region was worn out by food shortage, and having left *Francia* behind they crossed the sea in autumn.’ / ‘Nortmanni vero a Luvanio regressi, videntes omne regnum fame atteri, relicta Francia tempore autumnii mare transierunt.’
241. **W** / **FD** / **AM** AFB 893: (1992), p. 126; (1891), p. 123. ‘The winter was fierce and longer than usual, so that in the month of March in some places a foot of snow fell on five consecutive days. As a result of this there was a great shortage of wine throughout *Bavaria* and sheep and bees were lost.’ / ‘Hiemps aspera et plus solitum prolixa extenditur, ita ut mense Mart. nix in quibusdam locis per V dies mensura in profundo unum pedem habere viseretur. Inde per Baiowariam maxima penuria vini facta, oves et apes perditae.’ The winter, it is to be assumed, referred to here is that of 892/93.
242. **FD** / **HM** AB 893: (1829), p. 248. ‘Arnolf was made Caesar in Rome, and the misery of the food shortage, of the mortality, and of Christian peoples eating one another was heard of.’ / ‘Arnulf Rome cesar efficitur. Audita miseria famis ac mortalitatis et christiani hominis alterius carnem comedentis.’ This is a misplaced entry meant for 896. It was likely copied from the AC or AAU entry for 896. The same report of the food shortage and cannibalism is found in these texts in 896, though Arnolf’s crowning as emperor is reported in 897.
243. **FD** / **HM** AFB 895: (1992), p. 129; (1891), p. 125. ‘There was a great food shortage throughout the whole of *Bavaria*, so that in many places people died of hunger.’ / ‘Fames valida per universam Baioariorum provinciam excrevit, ita ut per plurima loca inedia morte consumerentur.’
244. **FD** / **W** AAC 895: (1826), p. 53. ‘A food shortage and hail.’ / ‘Fames et grando.’
245. **FD** / **W** AL 895: (1826), p. 53. ‘A great food shortage, hail.’ / ‘Famis valida, grando.’
246. **FD** AAC 896: (1826), p. 53. ‘A very hard food shortage.’ / ‘Fames validissima.’

247. **FD** AL 896: (1826), p. 53. ‘A very hard food shortage.’ / ‘Famisque validissima.’
248. **FD/HM** AAU 896: (1826), p. 68. ‘On Augia, on account of the misery of the food shortage and the mortality, Christian people ate the flesh of one another.’ / ‘[I]n Augia miseria famis et mortalitatis christiani homines alterius carnem comederunt.’ Augia refers to Reichenau Island in Lake Constance.
249. **FD/HM** AC 896: (1826), p. 98. ‘Arnolf was made Caesar in Rome, and the misery of the food shortage, of the mortality, and of Christian peoples eating one another was heard of.’ / ‘Arnolfus Romae cesar efficitur, et audita miseria famis, mortalitatis, et christiani hominis alterius carnem commedentis.’
250. **W/AM/C** AFB 896: (1992), p. 132; (1891), p. 127. ‘Now the whole army was held up on the cliffs of the mountain tops by violent storms and exceptional rainfall and flooding. It wandered round and about and came through with difficulty. As a result of this there was the greatest pestilence among the horses, more than usual because of the difficulty of the march, so much so indeed that almost the whole army had to transport its baggage in unaccustomed fashion on oxen.’ / ‘Igitur propter nimiam tempestatem aeris et immoderatam effusionem imbrium et ultra modum inundationibus aquarum omnis exercitus per divexa moncium cacumina impediti sunt, passim errando laboriose pervagatus. Unde etiam maxima pestilencia equorum et plus solitum propter difficultatem itineris aggravando excrevit, ita vero, ut totus pene exercitus supellectile suum inconsueto more per sellatos more equitum boves trahebant.’ The army on the march was Louis the Younger’s. In response to the requests of Pope Formosus, Louis gathered a force and marched on Rome to liberate the Formosus from Lambert II of Spoleto. The force was composed, the annalist tells us, of troops (and animals) from *Francia* and *Alemannia*. The Alemans passed through Bologna to Florence, while the Franks crossed the northern Apennines to Turin and then Luni (in Liguria). It was the latter, we are told, that was weighed down by disease. The army set out in October and the Frankish contingent reached Luni by Christmas. After sustaining losses, they reached Rome by late January or early February.
251. **W** CURSCHMANN 896: p. 104. ‘Great flood.’ / ‘Inundatio nimia.’
252. **FD** RGS 896: (1880), p. 273. ‘After this, in the following year, a great shortness of grass, and all other crops, grew strong, on account of which, it is horrible to say, humans were forced to eat humans.’ / ‘Secundo vero anno post hac tanta penuria blade et aliorum alimentorum omnium invaluit, ut, quod auditu est horrible, homo hominem vesci cogeretur.’ Richer of Sens wrote in the mid thirteenth century, yet this passage may be independent of the others collected here.
253. **FD/HM** AFB 897: (1992), p. 137; (1891), p. 130. ‘A great food shortage spread through the whole of *Bavaria*, so that many died of hunger.’ / ‘Fames valida per

universam regionem Baiowariorum incubuit, ita ut multi inedia consumerentur.’  
This food shortage, based on its positioning in the AFB entry for 897, would have set in sometime before June.

254. **FD** ASCS 910: (1826), p. 104. ‘And in the following year, there was the greatest food shortage through all of *Gallia*.’ / ‘Et sequenti anno fames maxima fuit in tota Gallia.’
255. **W** AAU 913: (1826), p. 68. ‘A very great winter.’ / ‘Hiemps magna nimis.’
256. **W** Adalbert 913: (2009), p. 233; (1890), p. 155. ‘A very great winter.’ / ‘Hiemps magna nimis.’ MacLean points out that this entry was likely borrowed from AAU.
257. **W**/**FD** Flodoard 919: (2004), p. 3; (1839), p. 368. ‘...a marvelous hailstone fell at Rheims. It was larger than a hen’s egg and when extended in width it occupied the middle of a person’s palm. However even larger hail was seen to have fallen in certain other places. This year there was no wine in the region of Rheims or much too little.’ / ‘[C]ecidit Remis grando mirabilis, ovum gallinae superans magnitudine; quae vero distendebatur in latitudine, occupabat medium palmae. Sed et grandior per alia quaedam loca visa est cecidisse. Hoc anno nihil vini in pago Remensenisi parum admodum fuit.’
258. **W**/**FD**/**AM**/**HM** ASG 919: (1841), p. 3. ‘In the evening, a powerful storm arose, that not only reduced crops to nothing and ripped trees up by the roots, but also killed men and animals in certain places. Its [hail] stones were reported to be of such immense size that they were larger than goose eggs.’ / ‘Tempore vespertino facta est tempestas valida, quae non solum fruges ad nichilium redeit et arbores radicitus evulsit, sed et animalia et homines in locis quibusdam interfecit, cuius lapides tante ferebantur magnitudinis esse, ut aliquanti ova anserum sua magnitudine superarent.’
259. **W**/**FD** Flodoard 921: (2004), p. 5; (1839), p. 369. ‘In this year there were many storms in different places. Men were killed by lightning and homes were burned. There was great heat during the summer and much hay was produced. There was a great drought for almost three straight months, in July, August and September.’ / ‘Tempestates hoc anno diversis in locis plurimae, homines quoque fulmine exanimati, et domus incensae. Aestus in aestate magnus, et foeni plurimum. Siccitas ingens tribus fere continua mensibus, Iulio, Augusto atque Septembri.’
260. **HM**/**C** Flodoard 924: (2004), p. 12; (1839), p. 374. ‘It was reported that the Magyars who were ravaging *Gothia* suffered a pestilence, which caused *dissinteria* and their heads to swell, and very few survived.’ / ‘Hungari qui Gothiam vastabant, pestem quandam perpessi, dapitum inflatione ac dissinteria pene cuncti, paucis evadentibus, nuntiantur esse consumpti.’
261. **FD**/**C** Widukind c.925: (1949), pp. 210-11; (1935), pp. 49-50. ‘[Henry] suddenly made an incursion against the Slavs who are called Hevelli, wore them down with many battles and finally in the bitterest part of the winter built his

- camp on the frozen ground and captured the city which is called Brandenburg, a city taken as much by reason of food shortage and cold as by sword.’ / ‘[R]epente irruit super Sclavos qui dicuntur Hevelli, et multis eos preliis fatigans, demum hieme asperrima castris super glaciem positis cepit urbem quae dicitur Brennaburg fame ferro frigore.’ Shortly thereafter Henry besieged Jahna, a small town near Meissen, for twenty days before it fell.
262. *W* AI 926: (1934), p. 742. ‘There was a great wind storm.’ / ‘Tempestas ventorum valida fuit.’
263. *HM* Flodoard 927: (2004), p. 16; (1839), p. 377. ‘At Rheims in the month of March on a Sunday morning, a line of fire was seen in the sky. Following that sign a pestilence came, with fever and a cough in a mixed pestilence, which stole all of the peoples of *Germania* and *Gallia*. Bishop Widricus of Metz died.’ / ‘Acies igneae Remis in caelo mense Martio mane quadam die dominica visae; cui signo pestis e vestigio successit, quasi febris et tussis, quae mixta quoque mortalitate in cunctas Germaniae Galliaeque gentes irrepsit.’ It would seem that the bishop died in the pestilence.
264. *W* AAU 927: (1826), p. 68. ‘A very great winter.’ / ‘Hiemps magna nimis.’
265. *W* Adalbert 928: (2009), p. 239; (1890), p. 158. ‘Winter was very harsh.’ / ‘Hiemps magna nimis.’ This appears to have been taken directly from the AAU.
266. *W* Flodoard 928: (2004), p. 17; (1839), p. 378. ‘Different storms struck various places.’ / ‘Tempestates variae diversis locis effusae.’ These ‘storms’ may be the deaths of the holy men Flodoard immediately thereafter notes.
267. *W* Widukind 929: (1949), pp. 212-13; (1935), pp. 52-3. ‘Meanwhile day gave place to night, a night darker than usual, with heavy rain, by the divine will, as though to hinder the pernicious plans of the barbarians.’ / ‘Interea dies transit, et nox solito tenebrosior cum ingenti pluvia adest nutu divino, quatinus consilium pessimum inpediretur barbarorum.’ Widukind writes that a large number of Redarri [a Slavic tribe] revolted and, in response, Bernard laid siege to Lenzen. The weather Widukind reports had disrupted another ‘barbarian’ army that was said to have been approaching Bernard’s force that was busying carry out a siege. Widukind continues, ‘at sunrise, for after the rainstorm the sky was clear, with banners aloft [the Saxons] marched out of camp’ and later that the ‘night’s heavy rain’ had impede the ‘barbarian’ force on account of their lack of horsemen. It seems that this took place in early September. Lenzen is on the right bank of the Elbe near Wittenberge. Later, in 938, Widukind notes that ‘heavy rainfall’ slowed the advance of a Hungarian force.
268. *FD / W / C* Widukind 933: (1949), p. 217; (1935), p. 56. ‘[The Avars] crossed the borders of the Thuringians with a sudden attack, wandering in a hostile manner through that whole territory. There the [Avar] allies began to break up, some wandering to the west while others sought to enter *Saxonia* from the west and south. But the Saxons, united with the Thuringians, sought battle with them,

slew their leaders and scattered the remainder of the western part of their army throughout the whole region. Some of these were wasted through food shortage, others perished with cold, while others, either captured or slain as they deserved, perished miserably.’ / ‘Igitur quam potuerunt repentino inpetu intrant fines Thuringorum, illam totam terram hostiliter pervagantes. Ibiq[ue] divis[is] sociis alii ad occidentem pergebant, ab occidente et meridie Saxoniam quaerentes intrare. Sed Saxones pariter cum Thuringis congregati inito cum eis certamine, caesis ducibus, caeteros illius exercitus occidentalis per totam illam regionem errare fecerunt. Quorum alii fame consumpti, alii frigore dissoluti, alii autem caesi vel capti, ut digni erant, miserabiliter perierunt.’

269. **HM** Flodoard 934: (2004), p. 24; (1839), p. 382. ‘At Rheims, just before the break of day on 14 October, a line of fire was seen in the sky running in different directions, just like a serpent of fire and iron javelins were also seen in the sky. A pestilence followed soon after this afflicting humans with diverse ailments. Adelmarus, a deacon of Verdun, fell ill and was seen to have let go of his spirit.’ / ‘Ignea Remis in caelo acies visae sunt discurrere, et quasi serpens igneus, et quaedam iacula ferri pridie Idus Octobris mane ante lucis exortum. Mox subsecuta est pestis, diversis afficiens humana corpora morbis. Diaconus quidam Viridunenses nomine Adelmarus langore depressus spiritum visus est amisissae.’ Whether Adelmarus died in the this pestilence is uncertain, though we may speculate that Flodoard meant to convey that he did.
270. **FD / AM / C** Flodoard 936: (2004), p. 28; (1839), p. 383. ‘King Hugh of *Italia* exerted himself to take Rome, but his army was afflicted by a food shortage and by the loss of its horses. Hugh then made peace with Alberic, giving him his own daughter as a wife, and he broke off the siege.’ / ‘Hugo rex Italiae Romam nisus capere, afflict exercitu suo fame et equorum interitu, pacta tandem pace cum Albrico, dans ei filiam suam conjugem ab obsidione desistit.’ The LCA (1930), p. 189, notes a hostage Hugh had sent to Cordoba failed to arrive on account of a drought that ‘would’ cause their horses to die of drought. Whether this is in reference to the same incident as that which Flodoard refers to is uncertain.
271. **W / AM** AC 939: (1826), p. 98. ‘A strong winter and mortality of animals.’ / ‘Hiemps valida et mortalitas animalium.’
272. **W / FD** Widukind 940: (1949), p. 310; (1935), p. 89. ‘A most severe winter followed shortly after the deaths of the dukes, and after that winter came a very severe food shortage.’ / ‘Necem ducum asperrima hiemps hiememque secuta est fames validissima.’ The dukes, Eberhard and Giselbert, died in 939. Thus, Widukind implies that the subsistence crisis occurred in 940, after the hard winter of 939/40.
273. **W / FD** ASM 940: (1826), p. 78. ‘A hard year and deficient grain.’ / ‘Annus durus et deficiens fructus.’

274. *W/AM* ACC 940: (1866), p. 15. ‘A hard winter. Comets were seen. A mortality of traction animals.’ / ‘Hyemps valida. Comete vise sunt. Mortalitas iumentorum.’
275. *W/AM* CSU 940: (1881), p. 67. ‘There was a hard winter and a mortality of animals.’ / ‘Hiemps valida et mortalitas animalium facta.’
276. *W/AM* HA 940: (1844), p. 113. ‘The winter was severe in this year and a pestilence of animals followed.’ / ‘Hiems saeva hoc anno facta, et pestis animalium subsequuta.’
277. *FD* ALD 941: (1841), p. 16. ‘A comet appeared and a food shortage followed.’ / ‘Cometes apparuit. Et fames subsequuta.’
278. *FD* CURSCHMANN 941: p. 105. ‘There was a very great food shortage in all the land. And a comet of wondrous size and length was plainly seen. Hereupon Rumoldus gave forty-eight talents with which *zona*, that is, harvest meats to be served in the dining hall, could be bought and given to the brothers, because the various disagreements and food shortage ceased then.’ / ‘[F]uit maxima fames in universa terra. Et visus est cometa aperte mire magnitudinis et longitudinis. Hic Rumoldus dedit quadraginta et octo talenta, cum quibus conparetur et daretur fratribus zona, id est carnes auctumpnales in refectorio dandas, quia tunc diverse dissensiones et fames cessacerunt.’ Bishop Rumold died in 941. *Zona* may refer to purse.
279. *FD/HM/AM?* CURSCHMANN 941: p. 105. ‘In Rumoldus’ time sharp-toothed locusts came forth / They devoured with their teeth corn and seeds / In the sky a comet blazed with flaming tail / And strange water fell bloody from the heavens / Because of it there was a terrible food shortage, it brought a sorrowful dearth of resources, / Because of it a savage pestilence killed many people.’ / ‘Tempore Rumoldi preduro dente locustae / Emergunt, segetem semina dente vorant; / Ardet in coelo flagrante crine cometa, / Et nova lympa polo sanguinolenta cadit; / Hinc horrenda fames ei rerum tristis egestas, / Hinc fera prosternit corpora multa lues.’ This is the Rumold’s epigram. Here ‘*corpora*’ may refer to livestock bodies nor ‘people,’ considering the evidence for a cattle pestilence in the early 940s.
280. *HM/W/AM* Widukind 941: (1949), p. 315; (1935), pp. 93-4. ‘In that year certain portents appeared, namely comets. They were to be seen from the 15<sup>th</sup> day before the Kalends of November until the Kalends. Many men were terrified at seeing them, fearing either a terrible pestilence or at least a change in the kingdom; for prior to the death of King Henry many wondrous signs had appeared, so that out of doors, even though the sky was cloudless, the light of the sun was reduced almost to nothing, and seen from within-doors, through the windows of the house, it appeared blood-red. Also the left hand of a certain man which had been cut off with a knife was, after a lapse of a year, restored almost whole to him while he was asleep, and as a token of this miracle there was

observed on his wrist a blood-red line at the point where the hand had been joined on. But a great flood did follow upon the appearance of the comets, and after the flood came a pestilence of cattle.’ / ‘Eo anno et portenta quaedam apparuere, scilicet cometae. Nam a quinta decima Kalendas Novembris usque in ipsas Kalendas visae sunt. Quibus visis multi mortales territi aut nimiam pestilentiam vel certe regni mutationem metuebant; quoniam quidem ante regis Heinrici excessum multa prodigia monstrata sunt, ita ut solis splendor forinsecus aere absque nubilo pene nullus appareret, intrinsecus autem per fenestras domorum rubeus tamquam sanguis infunderetur. Mons quoque, ubi ipse rerum dominus sepultus est, fama prodidit, quia multis in locis flammas evomeret. Hominis etiam cuiusdam manus sinistra ferroamputata post annum fere integrum restituta est ei dormienti, qui pro signo miraculi sanguinea linea loco coniunctionis notabatur. Sed cometas inundatio nimia inundationemque boum pestilentia subsecuta est.’ Thus, following the comets, which appear to have been seen in late October or late November, Widukind states there was a flood and cattle pestilence. Curschmann dates this passage to 942: (1900), p. 106.

281. **AM** ASM 941: (1826), p. 78. ‘A marvelous sign appeared in the sky and there was a mortality of oxen.’ / ‘Signum mirabile apparuit in coelo et mortalitas boum fuit.’
282. **AM** Adalbert 942: (2009), p. 247; (1890), p. 162. ‘A comet-like star was seen for 14 nights, and a vast mortality among oxen followed.’ / ‘Sidus simile cometae per XIII noctes visum et immensa mortalitas boum secuta est.’ Adalbert’s continuation is, at this point, rather thin. The non-contemporary
283. **FD** ASQV 942: (1859), p. 507. ‘Food shortage.’ / ‘Fames.’
284. **FD** / **AM** Flodoard 942: (2004), p. 37; (1839), p. 389. ‘There was a great food shortage through all *Francia* and *Burgundia*, along with a mortality that struck oxen, and few animals of this type survived in these lands.’ / ‘Fames magna per totam Franciam et Burgundiam mortalitas quoque maxima boum grassata est in tantum, ut valde pauca huiusmodi animalia in his remanserint terris.’
285. **AM** CSU 942: (1881), p. 67. ‘A mortality of animals occurred.’ / ‘[M]ortalitas animalium facta.’ Like Adalbert, the CSU states that this mortality occurred after a comet that ‘appeared’ for fourteen days.
286. **W** CURSCHMANN 942: p. 105. ‘Great flood.’ / ‘Inundatio nimia.’
287. **FD** AI 943: (1934), p. 743. ‘There was a great and extensive food shortage.’ / ‘Fames valida fuit late.’
288. **FD** ALO 943: (1881), p. 234. ‘A comet appeared and a food shortage followed.’ / ‘Stella cometes apparuit, et fames subsecuta est.’
289. **W** / **FD** Flodoard 944: (2004), p. 40; (1839), p. 391. ‘A powerful storm, with very strong winds, struck the settlement of Paris, demolishing the walls of a very old house, built with the strongest cement, which had stood intact for a very long time of Montmartre. It was said that demons in the form of horsemen were also



seen there, which destroyed a nearby church when its beams were thrown against the walls of the house. The demons also uprooted the vines that grew on this hill and they destroyed all the crops.’ / ‘Tempestas nimia facta est in pago Parisiaco, et turbo vehementissimus, quo parietes cuiusdam domus antiquissimae, qui validissimo constructi cemento in monte qui dicitur Martyrum diu perstiterant immoti, funditus sunt eversi. Feruntur autem daemones tunc ibi sub equitum specie visi, qui aecclesiam quandam, quae proxima stabat, destruentes, eius trabes, memoratis parietibus incusserint, ac sic eos subruerint, vineas quoque montis ipsius evulserint, et omnia sata vastaverint.’

290. *W* ASAN 944: (1826), p. 78. ‘There was an earthquake...in the same year the whole summer was turned into rain’ / ‘Terrae motus factus est... eodem anno aestas omnis versa est in pluviam.’
291. *W* ASAN 945: (1826), p. 78. ‘The greatest snow fell on 15 March.’ / Nix maxima idibus Martii cadens.’
292. *HM* Flodoard 945: (2004), p. 43; (1839), p. 393. ‘In the region of Paris and also in various regions thereabouts people were struck in various appendages with wounds of fire. Gradually they were burned up and consumed until at last death finished the punishments. Some of those afflicted sought out many places of the saints and escaped the torments. Many were healed in Paris in the church of Mary, the Holy Mother of God. All those who went there affirmed that they had been saved from that pestilence. Duke Hugh gave them food in daily stipends. Some wished to return to their homes, but there the fire began again and they returned to the church and were again freed of the torment.’ / ‘In pago Parisiacensi, necnon etiam per diversos circumquaque pagos, hominum diversa membra ignis plaga pervaduntur; quaeque [sensim] exusta consumebantur donec mors tandem finiret supplica. Quorum quidam, nonnulla sanctorum loca petentes, evasere tormenta; plures tamen Parisius in aecclesia sanctae Dei genitricis Mariae sanati sunt, adeo ut quotquot illo pervenire potuerint, asserantur ab hac peste salvati; Hugo quoque dux stipendiis aluit cotidianis. Horum dum quidam vellent ad propria redire, extincti refervescunt incendio, regressique ad aecclesiam librantur.’
293. *W* / *C* Widukind 946: (1949), pp. 368-67; (1935), p. 107. ‘Then collecting a band of soldiers picked from the whole army, he attacked the city of the Danes, Rouen, but on account of the difficulty of the terrain, and the approach of a rather severe winter, he made only one big attack upon them; then after three months he returned to *Saxonia*...’ / ‘Exinde collecta ex omni exercitu electorum militum manu Rothun Danorum urbem adiit; sed difficultate locorum asperiorique hieme ingruente, plaga eos quidem magna percussit, incolumi exercitu infecto negotio post tres menses Saxoniam regressus est...’ This severe winter, then, would have been that of 946/47.

294. *W* Flodoard 947: (2004), p. 45; (1839), p. 394. ‘A great storm assailed Rheims for an entire night, with continual lightning and shaking of the earth, so that wells were replenished and many houses were blown down.’ / ‘Tempestas magna Remis effuse est per unius omne noctis spatium cum coruscationibus continuis et terrae motu, adeo ut putei replerentur et domus nonnullae subverterentur.’ This storm occurred sometime late spring or summer before August.
295. *W* Widukind 952: (1949), p. 371; (1935), p. 110. ‘On this occasion a hail of great size was cast down from the sky amid thunder and a turbulent storm, becoming a great source of wonder to the many who saw it.’ / ‘Ibi mirae magnitudinis lapis grandinis tonitru ac tempestate turbulenta de caelo iactus ingens miraculum multis visentibus prebuit.’ This seems to have occurred in early August.
296. *HM* / *C* Flodoard 954: (2004), p. 58; (1839), p. 402. ‘[Magyars] plundered the area severely and, with considerable booty and many captives, they entered Louis’ kingdom (of *Francia*). They then passed through the settlements of Vermandois, Laon, Rheims, and Chalons and entered *Burgundia*. Many of them died, due both to battles and to disease. The rest of them returned to their own land through *Italia*.’ / ‘[N]imisque peracta depredatione, cum praeda magna captivorumque multitudine regnum ingrediuntur Ludowici. Sicque per pagos Veromandensem, Laudunensem atque Remensem, Catalaunensem quoque transeuntes, Burgundiam inrant. Quorum non parva manus tam proeliis quam morbis interiit; ceteri per Italiam revertuntur in sua.’ The Magyars were plundering the lands of Ragenarius III.
297. *FD* / *C* Widukind 954: (1949), pp. 385-86; (1935), p. 120. ‘[T]he long-drawn siege at last compelled those within the city to active measures of tactical warfare. For they thought it worse to suffer in food shortage, should they be forced to this extremity, than to die bravely in battle.’ / ‘Diu tracta obsidio cogit clausos belli negotiis aliquid actitare. Arbitrati sunt enim fame peius torqueri, si ad id cogerentur, quam in acie fortiter mori.’ This siege, which occurred in June, was of Regensburg. Later, Widukind writes that the ‘townspeople were exhausted by frequent battles and also began to be in danger of starvation’ and that ‘all the cattle of the city had been driven off to a grassy place.’
298. *W* / *HM* Widukind c.955: (1949), pp. 393-94; (1935), p. 127. ‘[S]ome unusual portents caused us terror. The churches, which people of both sexes in many localities saw and heard struck with great storms, inspired very great terror; priests were struck down by bolts of lightning, and many other things horrible to relate happened at that time, which it were better for us to pass over in silence.’ / ‘Terrebant nos preterea portenta inusitata. Tempa denique plerisque in locis tempestate valida concussa visentibus et audientibus honorem nimium incussere; utriusque sexus sacerdotes ictu fulminis interierunt, et alia multa illo tempore

contigerunt dictu horrenda et propterea nobis pretereunda.’ These portents are said specifically to have occurred in *Saxonia*.

299. **HM / FD / C** Widukind 955: (1949), p. 400; (1935), p. 133. ‘The army was also vexed by other disadvantages, equally by disease and food shortage.’ / ‘Vexatur autem et aliis incommodis exercitus, morbo pariter ac fame.’ The Saxon army is said here to have been afflicted when Otto led a force against the Slavs sometime in the summer or fall of 955. It is said that the army got as far as the Rechnitz River, where there is said to have been a swamp and marshland, though whether the army was infected once there, earlier or later, is uncertain.
300. **HM** Flodoard 956: (2004), p. 61; (1839), p. 403. ‘Soon a pestilence spread out over *Germania* and all of *Gallia*, with many dying and falling seriously ill with weakness. Archbishop Robert of Trier, Baldricus (bishop of Leige), and two other bishops immediately died of this pestilence.’ / ‘Moxque pestilentia super Germaniam omnemque Galliam effusa, interiere nonnulli, plures gravi sunt langore confecti. Rotbertus Trevirensis episcopus, et Baldericus, et duo alii episcopi ex ea peste sine mora defuncti sunt.’
301. **FD** AI 956: (1934), p. 743. ‘There was peace and a great food shortage.’ / ‘Pax fuit et fames valida.’
302. **HM** Widukind 958: (1949), pp. 405-06; (1935), pp. 136-37. ‘When the slaughter of the barbarians was completed in that same year many portents were seen, namely the symbol of the cross was seen on the garments of many men. When they perceived this, very many were struck with a wholesome fear and dreaded adverse events, and these same amended in large part their vices. There were some also who interpreted the change in the garments as meaning that a later *lepra* would corrupt many mortals. But the wiser ones declared that the sign of the cross refigured safety and victory, to which opinion we also offer our fervent assent.’ / ‘Peracta caede barbarorum eo anno prodigiosae res apparuere, notae scilicet crucis in vestimentis plurimorum. Quibus visis plurimi salubri timore perculsi adversa formidabant, idemque vitia multa ex parte emendaverunt. Fuerunt et qui lepras vestium interpretarentur, eo quod subsequens lepra multos mortales corrumperet. Sapientiores autem signum crucis salutem victoriamque prefigurasse predicabant, quibus et nos fidelem assensum prebemus.’ Curschmann dates this passage to 959: (1900), p. 106.
303. **FD** ASM 959: (1826), p. 79. ‘A harsh year and in many regions there was no grain and many people perished in the food shortage.’ / ‘Annus durus et in multis regionibus deficiens fructus et multi fame perierunt.’ The editors suggest that this passage be moved to 960.
304. **W** Flodoard 964: (2004), p. 67; (1839), p. 406. ‘The winter was very long and harsh until the first of February.’ / ‘[H]iemps magna et aspera valde fuit usque Kalendas Febroarii mensis.’

### 4.3 Catalogue 2

#### Chronic illnesses of elites

1. RFA 755: (1970), p. 40; (1895), p. 12. 'The monk Carloman, however, remained sick at Vienne with Queen Bertrada. He languished there for many days and died in peace.' / 'Carlomannus autem monachus Vienna civitate remansit una cum Bertradane reginae infirmus, languebat dies multos et obiit in pace.'
2. Reviser 756: (1970), p. 42; (1895), p. 15. '[T]he villainous king Aistulf wanted to go back on what he had promised before [to Pippin], desert his hostages, and break his oaths. But one day, when he went hunting, he was smitten by the judgement of God and ended his days. He fell from his horse while hunting and the ailment which he contracted from this accident brought about an end to his life.' / 'Heistulfus autem post abscessum eius, cum meditaretur, quomodo sua promissa non tam impleret, quam dolose ea, quae impleta fuerant, conmutaret, in venatione de equo suo casu pro lapsus est; atque ex hoc aegritudine contracta intra paucos dies vivendi terminum fecit.' Scholz and Rogers (1970), p. 181 nn. 2-3, demonstrate that this passage borrows phrasing from classical authors (Justin and Livy).
3. RFA 759: (1970), p. 43; (1895), p. 17. '[Pepin's son] lived for two years and died in his third.' / '[P]uer inmaturna morte praeventus tertio post nativitatem suam anno decessit.'
4. AL 762: (1826), p. 28. 'Lord archbishop Chrodegang [of Metz] was sick with a great infirmity.' / '[D]omnus Hrodegangus archiepiscopus egrotavit magna infirmitate.'
5. RFA 768: (1970), p. 46; (1895), p. 26. 'While delaying [at Saintes] for a few days [Pepin] fell sick.' / 'Ibique moram faciens aliquod dies aegrotare coepit.' Pepin died later on 24 September.
6. RFA 802: (1970), p. 83; (1895), p. 117. 'Worn out by ill health, Winigis was made to surrender.' / '[Winigisus] praesidio praeerat, adversa valitudine fatigatum obsedit et in deditionem.' Count Winigis had been besieged by Beneventan Duke Grimoald in Lucera.
7. Einhard 814 (2004), p. 45; (1911), p. 35. 'While spending the winter [at Aachen], [Charlemagne] was overcome by a strong fever and took to his bed in January. He immediately decided to abstain from food, as he usually did when had a fever, because he thought that he could overcome the sickness by fasting or, at least, relieve [its symptoms]. But in addition to the fever, he developed a pain in his side that the Greeks call pleurisy. Still he continued his fast and sustained his body with nothing more than an occasional drink. On the seventh day after taking to his bed, he died after receiving Holy Communion. It was nine in the morning on 28 January. He died in the seventy-second year of his life and the forty-seventh year of his reign.' / 'Cumque ibi hiemaret, mense Ianuario febre valida correptus

decubuit. Qui statim, ut in febribus solebat, cibi sibi abstinentiam indixit, arbitratus hac continentia morbum posse depelli vel certe mitigari. Sed accedente ad febrem lateris dolore, quem Greci pleuresin dicunt, illoque adhuc inediam retinente neque corpus aliter quam rarissimo potu sustentante, septimo, postquam decubuit, die, sacra communione percepta, decessit, anno aetatis suae septuagesimo secundo et ex quo regnare coeperat quadragésimo septimo, V. Kal. Februarii, hora diei tertia.’ Einhard, courtier to Charlemagne and Louis the Pious, likely wrote his *Vita karoli magni* in the late 820s. Einhard came from Fulda to Aachen in 791 and would have witnessed, or directly heard of, much of what he recounts in his biography of Charlemagne, though he clearly relied on the RFA at times. Einhard may have had close contact with Charlemagne over his final days and even been at his deathbed. He provides the most detailed account of Charlemagne’s death, though Thegan’s, which makes use of Einhard’s account, is a close second. The RFA, by contrast, says noting but that on 28 January Charlemagne ‘departed this life.’ Nithard simply states that he died at ‘a ripe old age, about the third hour of the day.’ Whether the pain in Charlemagne’s side, which Einhard documents, was related to his fever is uncertain, as is, of course, the cause of the fever.

8. Thegan 814: (2004), p. 161; (1995), p. 186. ‘In the following year [814], which was the forty-sixth of his reign, in the month of January, fever overtook the lord emperor after bathing. His weakness grew worse day by day. Eating and drinking nothing except a small amount of water for the refreshment of his body, after the seventh day he began to struggle much with himself and ordered his most familiar Bishop Hildebald to come to him to give him the sacraments of the Lord’s body and blood to strengthen [him for] his death.’ / ‘Sequenti vero anno, qui est annus regni eius XLVI., mense ianuario, arrepiit domnum imperatorem post balneum febris. Cumque per singulos dies languor ingravesceret, nihil comedens neque bibens, nisi modicum aquae ad recreationem corporis, septimo die postquam laborare nimis secum cepit, iussit familiarissimum pontificem suum Hildibaldum venire ad se, ut ei sacramenta dominici corporis et sanguinis tribueret, ut exitum suum confirmaret. Quod factum, laboravit in infirmitate diem illum et noctem sequentem.’ As noted, Thegan wrote his biography of Louis the Pious, in which this passage is given, in the mid 830s, likely within a decade of Einhard’s composing of his *Vita karoli magni*. Thegan, it seems, made use of Einhard’s text.
9. RFA 818: (1970), p. 104; (1895), pp. 148-49. ‘Queen Irmengardis, [Louis the Pious’s] wife, whom he had left behind sick, died of her ailments two days after his return on 3 October.’ / ‘Irmengardis regina, coniux eius, quam proficiscens ibi aegrotantem dimiserat, duobus diebus postquam ipse ad eam venit, morbo invalescente V. Non. Octobr. decessit.’ The queen died at Angers.
10. RFA 819: (1970), p. 105; (1895), p. 151. ‘When the army returned from Pannonia, Cadolah, duke of Friuli, died of fever in this march.’ / ‘Exercitu vero de Pannonia

reverso Cadolach dux Foroiuliensis febre correptus in ipsa marca decessit.’ Where Cadolah, who was sent to confront Ljudovit, died on the return home is unclear, it may have been in *Italia* or *Pannonia*.

11. RFA 824: (1970), p. 115; (1895), p. 164. ‘[T]he envoys of the Roman pontiff returned to Rome and found the pope in bad health and already near death. In fact, he died within a few days after their arrival.’ / ‘[L]egati Romani pontificis Romam regressi eundem valida infirmitate detentum ac morti iam proximum invenerunt.’ Paschal I died 11 February.
12. RFA 824: (1970), p. 116; (1895), p. 166. ‘Since Suppo had died at Spoleto, as was mentioned, Adalbard the Younger, count of the palace, received the duchy. He died of fever after holding the office for barely five months. Mauring, count of the Brescia, was elected his successor. At the time he received the news of his appointment he was sick and died within a few days.’ / ‘Suppone apud Spoletium, sicut dictum erat, defuncto eundem ducatum Adalhardus comes palatii, qui iunior vocabatur, accepit. Qui cum vix quinque menses eodem honore potiretur, correptus febre decessit. Cui cum Moringus Brixiae comes successor esset electus, nuntio honoris sibi deputati accepto decubuit et paucis interpositis diebus vitam finivit.’ Suppo died in early March 824.
13. ASB 836: (1991), pp. 34-5; (1883), p. 12. ‘There [Louis the Pious] had received annual gifts in the usual way and was awaiting Lothar’s arrival when news came that he had been stricken with fever and could not possibly come. Abbot Hugh and Count Adalgar were immediately dispatched to ask Lothar about his illness, his recovery and his intentions of coming later...’ / ‘In quo cum dona annualia more solito reciperet ac Hlotharium opperiretur, nunciatus est febri correptus nullatenus advenire posse. Ad quem directis denuo Hugone abbate et Adalgaro comite, de infirmitate ac recuperatione eius et voluntate in posterum veniendi quaesitum est...’ Lothar was to have met Louis at Worms in the early fall. He remained ill in *Italia*.
14. Astronomer 836: (2009), p. 289; (1995), pp. 506, 508. ‘[T]he emperor’s command could not be brought into effect, because sickness and fever intervened. Wala indeed died, and Lothar was laid up in bed, where he languished for a long time. The emperor, most merciful by nature, when he heard that his son was seized by strength-sapping illness communicated with him through his most faithful envoys...’ / ‘[N]e mandatum imperatoris ad effectum perduceretur, morbus febrisque intercessit, et Ualam quidem rebus humanis abduxit, Hlotharium vero lectulo deiciens maximo tempore languere fecit. Imperator vero clementissimus natura, ut filium adversa valitudine correptum audivit, per missos fidelissimos...’ Later the Astronomer refers to Lothar’s suffering from a ‘raging illness’ / ‘deseviente languore.’
15. Astronomer 837: (2009), p. 290; (1995), p. 510. ‘When Adrebald arrived at Rome, as he had been order, he found the lord pope Gregory ill, especially with a mild

but continuous flow of blood from his nose.’ / ‘At vero Adrebaldus Romam, ut iussum sibi fuerat, pervenit, domnum Gregorium papam egrotantem repperit et maxime fluxu sanguinis, qui licet sensim continue tamen ex naribus effluebat.’

Louis the Pious had sent abbot Adrebald to Rome.

16. Astronomer *c.*837: (2009), p. 291; (1995), pp. 512, 514. ‘It is awful to say what a mortal disease fell at that time upon the people who followed Lothar, In a short time, from the beginning of September to the feast of St. Martin, the following nobles departed this life: Jesse, formally the bishop of Amiens; Elias, the bishop of Troyes; Wala, the abbot of Corbie; Matfrid, Hugh; Lambert; Gotfred and his son Godfred; Agimbert, the count of Perthois; and the former master of the royal hunt, Burgarit; Richard escaped the illness but died a little later.’ / ‘Ea tempestate quanta lues mortalis populum, qui Hlotharium secuti sunt, invaserit, mirabile est dictu. In brevi enim, a kalendis septembribus usque ad missam sancti Martini, hii primores eius vita excesserunt: Iesse olim Ambianensis episcopus, Helias Trecassine urbis episcopus, Uuala Corbeiensis monasterii abbas, Matfridus, Hugo, Lantbertus, Godefridus, itemque filius eius Godefridus, Agimbertus comes Pertensis tensis, Burgaritus quondam prefectus venatoribus regalibus; sed et Richardus vix evasit, non post multum et ipse moritur.’ The Astronomer, of course, did not view Lothar or his followers in a good light. That all of these nobles died of disease, let alone the same disease is uncertain. Wala died in 836, Hugh and Lambert in 837, Richard in 839. Cf. (C.1.28). The ASB entry for 836 simply notes that ‘Wala died in *Italia*’ and mentions no illness.
17. ASB 840: (1991), p. 49; (1883), p. 24. ‘[Louis the Pious] on the way back from pursuing his son, was stricken by illness. On 26 June, on an island in the Rhine downstream from Mainz, within sight of the palace of Ingelheim, he died.’ / ‘Imperator vero a persequendo filio rediens, correptus morbo, in insula Rheni infra Mogontiam ad prospectum Ingulenheim palatii sita 12. Kalendas Iulii defunctus est.’ This notice is preceded by a report of a solar eclipse on 13 May. Louis had been chasing his son Louis the German east of the Rhine.
18. AF 840: (1992), pp. 17-8; (1891), p. 31. ‘In these days the emperor fell sick and was corrupted with a disease. He went by boat along the Main to Frankfurt, and was brought from there after a few days to a certain island in the Rhine near Ingelheim. His sickness increased and he died on 20 June.’ / ‘Imperator vero illis diebus morbo correptus aegrotare coepit et per Moenum fluvium navigio ad Franconofurt, inde post dies paucos in insulam quandam Rheni fluminis prope Ingilenheim delatus morbo invalescente XII. Kal. Iul. diem ultimum clausit.’ This report is also preceded, as in the ASB, by notice of a solar eclipse on 5 May. The AF specify that Louis had pursued his son through Thuringia ‘as far as the frontiers of the barbarians’ and returned to Salz to celebrate Ascension. Nithard and the Astronomer note that Louis had requested Lothar to come to Worms for 1 July to discuss Louis the German. Thus, it appears that Louis did not become sick

while in Thuringia but when in Salz. In early May, he may not have been deathly ill.

19. Regino 840: (2009), p. 131; (1890), p. 74. '[T]he emperor fell ill while pursuing his son Louis across the Rhine.' / 'Ludowicus imperator, dum filium Lodowicum trans Rhenum persequitur, morbo gravatur.' Regino furthers the idea that Louis did indeed fall ill, at least initially, when across the Rhine. What sources he made use of, however, is certain – perhaps the *Older Annals of Prüm*.
20. Nithard 841: (1970), p. 148; (1907), p. 21. 'Adalbert had by then recovered from the disease which had incapacitated him for almost a year...' / 'Adhelbertus ex infirmitate, qua poene per annum detentus fuerat...' This is Count Adalbert of Metz.
21. ASB 849: (1991), p. 68; (1883), p. 37. 'Louis, king of the Germans, was ill...' / 'Hlodoicus rex Germanorum egrotans...' He did not, however, die.
22. AX 849: (1909), p. 'With king Louis ill...' / 'Infirmante Ludewico rege...'
23. ASB 855: (1991), p. 80; (1883), p. 45. 'Lothar was ill.' / 'Lotharius infirmatur.' Later in the entry for 855 we read, 'The emperor Lothar, worn down by illness and despairing of life, entered the monastery of Prüm in the Ardennes.' / 'Lotharius imperator, morbo correptus vitamque desperans, monasterium Proneae in Arduenna constitutum adiit.' He died, according to the ASB, on 29 September.
24. ASB 861: (1991), p. 94; (1883), p. 54. 'King Charles [the Bald] ordered that his son Lothar, who was lame, should be made a cleric in the monastery of St. John.' / 'Karlus rex filium suum Lotharium claudum in monasterio Sancti Iohannis clericum fieri iubet.'
25. ASB 861: (1991), p. 94; (1883), p. 55. 'Prudentius, bishop of Troyes...exhausted by a long illness...' / 'diutino langore fatigaretur...' This Prudentius was the annalist of the ASB, see Appendix C.
26. ASB 863: (1991), p. 104; (1883), p. 61. 'Charles [the Child], son of the Emperor Lothar [II] and king of *Provincia*, who had long suffered from epilepsy died.' / 'Karolus, Hlotharii imperatoris filius et rex Provinciae, diu epeleptica infirmitate vexatus, moritur.'
27. AF 863: (1992), p. 50; (1891), p. 57. 'In Lothar's kingdom a synod was held at Metz of all his bishops apart from Hungarius of Utrech who was ill.' / 'In regno quoque Hlutharii pro eo...synodus in Mettis collecta est omnium episcoporum eius praeter Hungarium Traiectensem, quem aegritudo detinuit.'
28. ASB 864: (1991), pp. 111-12; (1883), p. 67. 'The Young Charles, whom his father had recently received from *Aquitania* and taken with him to Compiègne, was returning one night from hunting in the forest of Cuise. While he meant only to enjoy some horseplay with some other young men of his own age, by the devil's action he was struck in the head with a sword by a young man called Albuin. The blow penetrated almost as far as the brain, reaching from his left temple to his right cheekbone and jaw.' / 'Karolus iuuenis, quem pater nuper ab Aquitania



receptum Compendium secum duxerat, noctu rediens de venatione in silva Cotia, iocari cum aliis iuvenibus et coaevis suis putans, operante diabolo ab Albuino iuvene in capite spatha percutitur pene usque ad cerebrum; quae plaga a timpore sinistro usque ad malam dexteræ maxillae pervenit.’ In 866 in the ASB (1992, p. 134; 1883, p. 83), we read that ‘Charles’ son, the Young Charles, king of the Aquitanians, had had his brain disturbed by the blow on the head he had received a few years before. He suffered from epileptic hits for a long time and then on 29 September he died at a villa near Buzençais.’ / ‘Karoli filius nomine Karolus et Aquitanorum rex, ex plaga quam in capite ante aliquot annos acceperat cerebro commoto, diutius epelementica passione vexatus, 3. Kalendas Octobris in quadam villa secus Bosentiacas moritur.’

29. ASB 864: (1991), p. 113; (1883), p. 68. ‘[Louis II] went down with a fever.’ / ‘[I]mperator febre corripitur.’ Louis was in Rome.
30. Regino 864: (2009), pp. 143-44; (1890), p. 84. ‘[W]hile [Theutgaud and Gunther] went for a second and a third time to the apostolic see to obtain the grace of restoration and reinstatement, in the end they were overcome by illness in *Italia* and died as exiles and foreigners...’ / ‘Et dum iterum atque tertio sedem apostolicam ob reparationis et restitutionis gratiam adissent, novissime in Italia infirmitate preventi peregrini et exules moriuntur...’ Regino, like it seems most Carolingian writers, clearly did not care for Theutgaud or Gunther, but we should not suppose that he invented their disease-related deaths on account of his disapproval.
31. ASB 866: (1991), p. 129; (1883), p. 80. ‘King Charles [the Bald]’s uncle Rudolf died of a bile complaint.’ / ‘Rodulfus, Karoli regis avunculus, passione collexica moritur.’
32. ASB 866: (1991), p. 134; (1883), p. 83. ‘Aldo, bishop of Limoges, acting as one who “dis-ordered” Wulfad rather than conferred orders on him, was stricken with bowel illness during the very consecration-rite itself and died soon afterwards.’ / ‘Cuius exordinator potius quam ordinator Aldo Lemovicensis episcopus in ipsa ordinatione fibre correptus, in brevi moritur.’ Aldo died, supposedly, while administering orders to Wulfad. The annalist (Hincmar) did not care Wulfad. While the timing of Aldo’s death may have been altered, we should not question whether Aldo did indeed die of an illness around the period in which he administered orders to Wulfad.
33. AF 869: (1992), pp. 60-1; (1891), p. 69. ‘While these things were being done, Louis [the German] was lying at the city of Regensburg in *Bavaria* seriously ill, so much so that the doctors despaired of saving his life.’ / ‘Dum haec in diversis locis gerebantur, Hludowicus rex apud Radesbonam Baioariae civitatem gravi detinebatur infirmitate, ita ut medici illum sanitatem recuperare posse desperarent.’

34. Regino 869: (2009), p. 161; (1890), p. 98. 'Louis [the German], since he had been held up by illness, was lying in bed in the lands of the Bavarians.' / 'Dum haec in regno Lothariis aguntur, Ludowicus rex infirmitate detentus in Baioariorum finibus lecto decumbebat.'
35. AF 870: (1992), p. 61; (1891), p. 70. 'Louis [the German] recovered from his illness...' / 'Hludowicus rex de infirmitate sua convalescens...'
36. AF 870: (1992), pp. 62-3; (1891), p. 71. '[Louis the German] was resting in a certain gallery when the building collapsed and he fell with it and severely bruised his limbs. He feigned good health, however, at his meeting with Charles, at which they divided up Lothar's kingdom, and then he returned to Aachen where he lay ill for many days.' / '[I]n quodam solario positus ruente aedificio et ipse pariter corruit gravem patiens membrorum collisionem. Tamen simulata sanitate cum Karolo colloquium habuit et diviso inter se Hlotharii regno, Aquisgrani reversus est; ibique per plures dies iacuit aegrotus.' Whether Louis was ill with injury or infection is uncertain. The similar fall of Louis the Pious some thirty five years earlier, is not said to have caused illness but injury. In his entry for 870, Regino also records the fall and adds that Louis dislocated or broke some ribs and that he went back to Aachen 'having been overcome by bad health.' At Aachen, Regino writes, '[Louis] rested in bed for two months.' The ASB entry for 870 notes that 'Louis had not given his doctors enough time to cure properly the wound caused by the injury he sustained in falling from the upper story...he had to have rotting flesh cut out by these doctors, which meant that he was laid up at Aachen longer than he had hoped, and indeed his condition there was so nearly hopeless that he only just escaped death.'
37. ASB 874: (1991), pp. 186-87; (1883), p. 126. 'Louis [the German] sent his son Charles [the Fat] with other envoys to his brother Charles [the Bald], with the request that the two kings might hold discussions together by the Moselle. Charles was on his way to this meeting when he went down with a bowel illness and thus detained was unable to appear at the meeting as arranged.' / 'Hludowicus rex Germaniae ad fratrem suum Karolum filium suum Karolum cum aliis missis suis direxit, petens, ut simul loquerentur secus Mosellam. Ad quod placitum cum Karolus pergeret, ventris solutione detentus, ad illud placitum, sicut fuerat conductum, pervenire non potuit.' Which Charles fell sick is relatively unclear, though it appears to have been Charles the Fat.
38. AF 874: (1992), p. 75; (1891), p. 83. 'Queen Emma suffered paralysis and lost the use of her voice.' / 'Hemma quoque regina morbo paralisi correpta usum loquendi amisit.' She died two years later.
39. Regino 874: (2009), p. 173; (1890), p. 109. '[A]fter accomplishing this victory [Wrhwant] was oppressed by illness and dragged into extreme danger. When Pacsweten had heard about his illness, he had re-gathered his force and prepared to wage war against Wrhwant's supporters.' / 'Denique post peractam victoriam

morbo gravatus ad extremum deducitur; cuius invaliditatem cum persensisset Pasquitanus, resumtis viribus fautores eius bello adgredi parat.' Wrhwant, a Breton general, had been battling Vikings in Brittany before he fell ill.

40. ASB 876: (1991), pp. 195, 199; (1883), pp. 131, 134. 'On 28 July, [Charles the Bald] moved from Ponthion and on 30 July reached Chalons, where he stayed until 13 August suffering from some kind of bodily illness. He moved to Rheims in August and from there proceeded by the direct route to Servais.' / '[I]mperator 5. Kalendas Augusti movit a Pontigone et tertio Kalendas venit ad Catalaunis. Ibique propter quandam molestiam corporalem moratus est usque Idus Augusti. Et 19. Kalendas Septembris venit Remi; indeque recto itinere venit ad Silvacum.' Shortly thereafter Charles travelled again (to Quierzy then Aachen then Cologne). Later in winter 876, the ASB annalist reports, 'Then [Charles the Bald] arrived at the villa of Virziniacum, where he became gravely ill with a fever – so ill that his life was despaired of.' / 'Ipse autem ad Virzinniacum villam veniens, graviter passione pleurisis est infirmatus, adeo ut vivere desperaret.'
41. AF 876: (1992), p. 79; (1891), p. 86. 'Louis [the German] fell seriously ill, and grew worse daily. He died on 28 August in the palace at Frankfurt.' / 'Hludowicus aegrotare coepit et crescente cotidie infirmitate V. Kal. Septembr. in palatio Franconofurt diem ultimum clausit.'
42. ASB 877: (1991), p. 199; (1883), p. 134. 'When [Charles the Bald] was staying there, his baby son, who Richildis had delivered when travelling to Anthenay, fell ill.' / 'Ubi dum moraretur, filius eius, qui, antequam Richildis ad Antennacum veniret, in via natus fuerat, infirmatur.' He did die shortly thereafter.
43. ASB 877: (1991), pp. 202-03; (1883), pp. 136-37. 'Charles [the Bald], stricken by fever, drank a powder which his Jewish doctor Zedechias, whom he loved and trusted all too much, had given him to cure his sickness. But he had drunk a poison for which there was no antidote. Carried by bearers, he crossed the Mont Cenis pass and reached a place called Brios. There he sent for Richildis who was at Maurienne, and asked her to come to him, which she did. On 6 October, the eleventh day after he had drunk the poison, he died in a wretched little hut. His attendants opened him up, took out his intestines, poured in such wine and aromatics as they had, put the body on a bier and set off to carry him to St. Denis where he had asked to be buried. But because of the stench they could carry him no further so they put him in a barrel which they smeared with pitch inside and outside and encased in hides, but even this did nothing to get rid of the smell. Only with difficulty did they manage to reach Nantua, a little monastery in the archdiocese of Lyons, and there they committed the body, with its barrel, to the earth.' / 'Karolus vero febre correptus, pulverem bibit, quem sibi nimium dilectus ac credulus medicus suus Iudaeus nomine Sedechias transmisit, ut ea potione a febre liberaretur; insanabili veneno hausto, inter manus portantium, transito monte Cinisio, perveniens ad locum qui Brios dicitur, misit pro Richilde, quae erat apud

Moriennam, ut ad eum veniret; sicut et fecit. Et 11. die post venenum haustum in vilissimo tugurio mortuus est 2. Nonas Octobris. Quem aperientes qui cum eo erant, ablatis interaneis, et infusum vino ac aromatibus quibus poterant et impositum locello, coeperunt ferre versus monasterium Sancti Dyonisii, ubi sepeliri se postulaverat. Quem pro foetore non valentes portare, miserunt eum in tonna interius exteriusque picata quam coriis involverunt; quod nihil ad foetorem tollendum profecit. Unde ad cellam quandam monachorum Lugdunensis episcopii quae Nantoadiis dicitur vix pervenientes, illud corpus cum ipsa tonna terrae mandaverunt.’ Charles reportedly became sick in early October 877 after he had traveled through Orbe, Vercellis, Pavia, Tortona and Maurienne in the summer and early fall.

44. AF 877: (1992), pp. 82-3; (1891), p. 90. ‘Charles [the Bald], the tyrant of *Gallia*, set out for *Italia* in the summer and took up residence in Pavia, from where he made great efforts to prevent Karlmann, who was on his way, from entering the province. But Karlmann came into *Italia* with a great army of Bavarians and various Slav peoples, and prepared to fight against Charles. When Charles learnt this, he took to flight immediately, as was his wont; for all the days of his life, whenever it was necessary to resist his opponents, he either fled openly or else secretly deserted his own soldiers. On this same flight he caught *dissinteria* and perished in great misery. When his bodyguards wanted to take the corpse back to the vault he had prepared for himself at St. Denis, they were forced to bury it at a certain monastery in Burgundy because of the terrible stench of the putrid corpse by which the army was greatly afflicted.’ / ‘Karolus Galliae tyrannus aestivo tempore cum exercitu Italiam petiit et Ticini residens magnopere nesus est, qualiter Carlmanno illuc adventanti aditum in illam denegaret provinciam. Carlmannus vero cum manu valida Noricorum diversorumque Sclavorum Italiam ingreditur contra Karolum dimicare volens. Quod cum Karolus comperisset, ilico iuxta consuetudinem suam fugam iniit; omnibus enim diebus vitae suae, ubicumque necesse erat adversariis resistere, aut palam terga vertere aut clam militibus suis effugere solebat; et in eodem itinere dissinteriae morbo correptus cum magna periit tristitia. Cuius corpus cum sui satellites ad sepulturam, quam ipse sibi apud sanctum Dionisium paraverat, transferre voluissent, propter foetorem nimium putridi cadaveris, quo gravabatur exercitus, in Burgundia in quodam monasterio sepelierunt.’
45. Regino 877: (2009), p. 178; (1890), p. 113. ‘When [Charles the Bald] was concerning himself there with the disposition of public affairs it was suddenly announced to him that Karlmann had invaded the frontiers of the Lombards with a great multitude of armed men. Dissolving into panic, he soon crossed the Ticino and the Po and strove with a great effort to return to *Gallia*. But before he reached the high summits and narrow passes of the Alps he was struck by a fatal illness and death immediately followed. It is rumored, however, that a goblet of death

had been given him by a certain Jew called Zedechias, who was greatly trusted by him because he was said to have unique experience in treating bodily illnesses. But he was a trickster and had deceived the minds of men with magic tricks and spells. Charles then died on 6 October. His body was lifted onto a bier and carried out of *Italia* by his men. But because the intolerable stench coming from the putrid corpse aggravated the bearers, they were forced to commit it to the earth. After a few years, his bones were transported from there and interred with honor at the monastery of St. Denis in Paris.’ / ‘[C]um in disponendis publicarum rerum negotiis animum intenderet, repente nuntiatum est ei, Carlomannum cum ingenti armorum multitudine Langobardorum terminos introisse. Mox pavore solutus, Ticianum Padumque transit et summo annisu in Gallias repedare contendit. Sed priusquam Alpium preminetia iuga angustaque itinera adtingeret, aegritudine pulsatur, quam protinus mors subsecuta finem vitae imposuit. Est autem fama, quod a quodam Iudeo, qui vocabatur Sedechias, poculum mortis ei propinatum sit, qui ei familiarius adherebat, eo quod in medendis corporum passionibus singularem experientiam habere diceretur; porro hic sicophanta erat et magicis prestigiis incantationibusque mentes hominum deludebat. Obiit vero pridie Non. Octobris. Corpus eius levatum in feretro a suis extra Italiam deportatur; sed quia foetor intollerabilis ex putredine cadaveris baiulantes gravabat, compulsi sunt illud terrae mandare. Post aliquantos annos ossa eius translata sunt et Parisius in monasterio sancti Dionisii honorifice sepulta.’

46. ASB 877: (1991), p. 203; (1883), p. 137. ‘Karlmann, so ill that he was almost dead, was carried back home in a litter. After that he lay sick for a whole year, his life despaired of by many.’ / ‘Karlomannus pene usque ad mortem infirmatus et lectica delatus ad propria, per annum ita iacuit, ut a multis fuerit desperatus.’ Karlmann, son of Louis the German, fell sick after pursuing Charles the Bald into *Italia*. He died in 880.
47. ASB 878: (1991), p. 207; (1883), pp. 140, 141. ‘Louis [the Stammerer] reached Tours, and became so ill that they despaired of his life. But by the Lord’s mercy he recovered a little...’ / ‘[V]eniens Hladowicus usque Turonis, infirmatus est usque ad desperationem vitae. Sed miserante Domino aliquantulum convalescens...’ Later, in the same entry, we read, ‘Louis joined the pope at Troyes on 1 September. He had not been able to get there sooner because of being so ill.’ / ‘Et quia propter suam infirmitatem ante non potuit, Kalendis Septembris apud Trecas ad eum venit.’ Louis fell sick in the spring or summer. Louis had celebrated Christmas 877 at Soissons, then travelled to Orville, and then ‘west of the Seine’ before reaching Tours.
48. AF 879: (1992), pp. 85-6; (1891), p. 92. ‘[Louis the Younger] set off into *Bavaria* to see Karlmann, who was *paralysus* with loss of speech.’ / ‘[I]nde in Baioariam profectus est invisere Carlomannum, qui gravi detinebatur infirmitate; nam paralisi morbo correptus usum loquendi amisit.’ usum loquendi amisit

49. ASB 879: (1991), pp. 215-16; (1883), p. 147. 'Louis [the Stammerer] went on to Troyes, because he wanted to get to the region of Autun in order to suppress the rebellion of the Markio Bernard. But his illness grew worse (it is said that he had been poisoned) and he could journey no further...' / 'volens ire in partes Augustiduni ad comprimendam rebellionem Bernardi markionis, usque ad Trecas perrexit. Sed quia ingravescente infirmitate sua – dicebatur enim veneno infectus – longius ire non potuit...' We are told he reached Compiègne 'with great difficulty' / 'cum magna difficultate.' Louis died, however, on 10 April.
50. Regino 880: (2009), p. 182; (1890), p. 116. 'Karlmann ended his last day on 22 March after a decline into paralysis.' / 'Carlomannus rex paralisi dissolutus diem clausit extremum VII. Non. Apr.'
51. AF 881: (1992), p. 91; (1891), p. 97. '[Louis the Younger]'s was seriously ill in Frankfurt and as he could not go himself he sent his army against the Vikings.' / 'Rex apud Franconofurt gravi infirmitate laborabat et, quia ipse non potuit, exercitum suum contra Nordmannos destinavit.' Louis had spent the summer in *Bavaria*.
52. ASB 882: (1991), p. 223; (1883), p. 152. 'Louis [the Younger], son of Louis king of *Germania*, after living with no benefit to himself or to the church or his kingdom, had yielded to death.' / 'Ubi nunciatum est, quia sobrinus suus Hludowicus, Hludowici regis Germaniae filius, inutiliter sibi et ecclesiae ac regno vivens, morti subcubuit'
53. ASB 882: (1991), p. 223; (1883), p. 152. 'Louis III got as far as Tours and there he became seriously ill. He was carried on a litter to the monastery of St. Denis, and in August he died and was buried there.' / '[I]pse ultra Sequanam, acsi recepturus Brittonum principes et bellaturus contra Nortmannos, usque Turonis perrexit. Ubi infirmatus est corpore, et lectica deportatus usque ad monasterium Sancti Dyonisii, mense Augusto ibi mortuus est et sepultus.' Louis was travelling towards Brittany to confront Vikings. On the other hand, the *Annales Vedastini* (2004), p. 504, report that Louis III, in 882, suffered a bad fall from his horse, reportedly when chasing a girl, and later, perhaps as a result of this, became ill and died.
54. AF 882: (1992), p. 91; (1891), p. 97. 'Louis [the Younger]'s illness grew worse and on 20 January he died.' / '[H]ludowicus invalescente morbo XIII. Kal. Febr. diem ultimum clausit.'
55. AFB 885: (1992), p. 111; (1891), p. 113. 'But while the pope was in the middle of his journey he was struck down by a sudden illness and died.' / 'Sed dum ipse papa iam medio itineris spatio foret, correptus celeri infirmitate expiravit.' Pope Adrian III was to meet Charles the Fat at Worms. He died in September.
56. AFB 887: (1992), pp. 113-14; (1891), p. 115. '[Charles the Fat] was afflicted by a severe illness in Alsace. Afterwards he recovered somewhat and set out for Alemannia and coming to the curtis of Bodman he had blood let to relieve the

pain in his head.’ / ‘Imperator Elisacia magna infirmitate adgravatur. Postea param convalescens ad Alamanniam proficiscitur, vergens curtem Podomam pro dolore capitis incisionem accepit’ Later in the entry we read, ‘and soon [Charles the Fat] was struck by a most serious illness.’ / ‘Mox vero caesar gravissima infirmitate detentus est.’ He later died, it is said on 13 January (888). Regino notes only that Charles ‘began to grow ill in body and mind.’ This happened before November.

57. ASV 887 (886): (2004), p. 511; (1909), pp. 3-5. ‘While these things were taking place, [bishop Gauzelin of Paris] fell gravely ill, died and was buried in the city.’ The bishop died on 16 April while the Vikings were attacking Paris and died.
58. AFB 896: (1992), p. 134; (1891), p. 130. ‘Before [Arnulf] arrived at his destination he was held back by a severe illness in the head.’ / ‘[A]ntequam ad locum destinatum pervenisset, gravi infirmitate capitis detentus imperfectum reliquit...’ Arnulf had been in Rome.
59. Regino 896: (2009), p. 220; (1890), p. 144. ‘[Arnulf] was troubled by a paralysing illness, which weakened him for a long time.’ / ‘[P]aralisi morbo gravatur, ex qua infirmitate diu languescit.’
60. AAC 896: (1826), p. 53. ‘King Arnulf became ill.’ / ‘[R]ex Arnolfus coepit infirmari.’
61. AL 896: (1826), p. 53. ‘And [Arnulf] became sick.’ / ‘Et rex coepit infirmari.’
62. AFB 896: (1992), p. 135; (1891), p. 129. ‘At Rome, pope Formosus died on the holy day of Easter, in his place Boniface was consecrated who was attacked by gout and is said to have survived for barely two weeks.’ / ‘Ad Roma Formosus papa defunctus est die sancto pasche; in cuius locum consecratur Bonifacius, qui podagrico morbo correptus vix [XV dies] supervixisse reperitur.’
63. ASV 897 (1909), p. 79. ‘King Odo [of France]...began to grow sick. While his weakness increased each successive day...’ / ‘Odo vero rex...graviter infirmari coepit. Qui dum languor per dies singulos increaseret...’ Odo died early the next year. He was thirty eight.
64. AFB 897: (1992), pp. 136-37; (1891), p. 130. ‘[Arnulf] himself held a general assembly at the town of Regensburg and because of his illness decided to spend the winter in *Bavaria* in hidden places.’ / ‘Ipse vero habito generali conventu urbe Regino propter gravitudinem corporis in Baioaria secretis locis hiemare disposuit.’
65. AFB 899: (1992), p. 139; (1891), pp. 132-33. ‘[I]n the same great public meeting held in the great town of Regensburg [Arnulf] was attacked by paralysis and fell ill; this was because a poison had been administered to the king by men and women so that he should become paralysed by it.’ / ‘Ipso quoque tempore eiusdem magni et communis civitate Regia placiti rex paralisi solutus infirmatus est; secundum autem ut regi nocuum quoddam a viris ac feminis daretur, ut inde paraliticus efficeretur.’ Later, in the AFB entry for 899, we hear we read that Arnulf ‘was tired and sick in body.’ / ‘infirmus corpore fatigaretur.’

66. Widukind 913: (1949), pp. 195-96; (1935), p. 35. '[H]atto, seeing that an end had been made of his scheming, worn out by both sorrow and disease, died not many days later.' / 'Hatho autem videns suis calliditatibus finem inpositum, nimia tristitia ac morbo pariter non post multos dies confectus interiit.' This is reported in codices B and C. Codex A, on the other hand, reports that 'worn out by disappoint and disease' Hatto died 'after a sickness of but a few days.' This is Hatto I, Archbishop of Mainz. He died mid May.
67. Flodoard 924: (2004), pp. 11-2; (1839), p. 374. 'Raoul, the king of *Francia*, held a placitum at Attigny, where he prepared an expedition into Lothar's kingdom. However, he was struck down by a very serious illness. As his strength returned, just as it seemed that he was recovering, he suffered a severe relapse. Many despaired for him and he asked to be taken to [the monastery] St. Rémi at Rheims. Raoul was generous and gave many gifts to monasteries of *Francia* and *Burgundia*, excluding his wife's share of their goods. He remained at St. Rémi for four weeks until his health returned...' / 'Rodulfus rex Frantiae placitum tenuit apud Atiniacum. Tunc inde profectionem parans in regnum Lotharii, gravissimo languore corripitur, cuius vi recidiva, dum iam convalescere putabatur, opprimitur, et pene desperatus a pluribus, Reinis ad sanctum Remigium se deferre petiit. Ubi nonnulla dona largitus, ceterum, praeter uxoris partem, quicquit sibi thesaurorum supererat, per monasteria Franciae Burgundiaeque direxit, et quattuor ebdomadibus apud sanctum Remigium demoratus, tandem redintegrata sanitate...' Before travelling to Attigny, Raoul of France had earlier in the year traveled to Autun.
68. Flodoard 924: (2004), p. 12; (1839), p. 374. 'Henry was in the lands bordering on the Sarmatians when he, like Raoul, fell ill and was delayed for the entire summer.' / 'Heinricus aeque in ipsis Sarmatarum finibus valitudine corporis tota detinetur aestate.' Sarmatian here refers to the Slavs. Flodoard employed a classical term to refer to the peoples east of the Germans.
69. Flodoard 924: (2004), p. 12; (1839), p. 374. 'At Rheims, in the church of St. Mary, on the feast of All Saints, a man who had been crippled for a long time with his calves drawn back to the hamstrings was healed by divine power and he stood up.' / 'Remis in aecclesia sanctae Mariae sollempnitate omnium sanctorum quidam diu contractus, cuius coxae cruribus inhaeserant iunctae poplitum nervis ita retractis, virtute divina solutus et erectus est.'
70. Flodoard 931: (2004), p. 20; (1839), p. 379. '[A] servant of the canons, who was the custodian of the church of Sts. Denis and Tedulfus, was suddenly struck with paralysis. The tendons of his hands and feet contracted and he fell down, with his mouth seeming to stick to the stone of the pavement. A little later he was lifted up, but his hands and feet were drawn up with paralysis and he was carried out, unable to move. Shortly afterwards on a Sunday, the fifth day after this happened, suddenly his hands could move and then at mass his legs, which was on the



fifteenth day. A similar thing had happened to him five years earlier on the day of the Circumcision of the Lord in the same church. And he was able to move again thirty days later on the solemnity of the Purification.’ / ‘Die purificationis beatae Dei genitricis Mariae, Remis in aecclesia ipsius quidam canonicorum famulus, custos aecclesiae sancti Dyonisii et sancti Tedulfi, subito percussus, contractus obriguit nervis tam manuum quam basium, ruentique sibi pavimenti os visum est adhaesisse lapidi; quo paulo post resoluto, tam manibus quam cruribus rigore constrictis, defertur immobilis; atque post quinta die dominica manus ei resolvuntur ad missam, et crura similiter ad missam quintadecima. Cui res similis die circumcisionis Domini ante quinque annos in eadem acciderat aecclesia, et resolutus ibidem post tringinta dies in ipsa purificationis fuerat sollempnitate.’ The servant fell ill on this occasion in 931, we are told, on the day of the Purification of Mary, 2 February. Thus, Flodoard states that this servant fell ill with the same condition at the same time of the year in 931 and 926.

71. Flodoard 932: (2004), p. 22; (1839), p. 381. ‘After a siege of two months, Hugh captured the castle of St. Quentin when the garrison surrendered. On the day after [Hugh the Great] entered St. Quentin, a man who had been crippled was cured in the church.’ / ‘Hugo castellum sancti Quintini postquam duobus mensibus obsederat, oppidanorum tandem deditione capit. In crastinum postquam illud ingressus est, unus contractus in aecclesia ipsa erigitur.’ Hugh had laid siege to St. Quentin for two months, before he captured it. He presumably entered the garrison in the summer.
72. Widukind 943: (1949), p. 221; (1935), p. 59. ‘[H]aving conquered all the peoples on every side, he made up his mind to make the journey to Rome, but being beset by sickness, he gave up the journey.’ / ‘Perdomitis itaque cunctis circumquaque gentibus, postremo Romam proficisci statuit, sed infirmitate correptus iter intermisit.’
73. Widukind 935: (1949), p. 221; (1935), p. 60. ‘When [Henry] felt that he was afflicted with a disease, he called together the entire populace...’ / ‘Cumque se iam gravari morbo sensisset, convocato omni populo designavit...’
74. Adalbert 935: (2009), p. 241; (1890), p. 159. ‘King Henry was struck down by paralysis.’ / ‘Heinricus rex paralysi percutitur.’
75. Flodoard 935: (2004), p. 26; (1839), p. 383. ‘King Raoul’s brother Boso died on an expedition to besiege the castrum of St. Quentin. He was taken to St. Rémi and buried there. King Raoul lay seriously ill throughout the entire autumn.’ / ‘Interea Boso frater regis Rodulfi in expeditione obsidionis castri sancti Quintini moritur; et delatus ad sanctum Remigium sepelitur. Rodulfus rex gravi per totum autumnum decubat aegritudine.’ Whether Boso died of disease is uncertain. He may have fallen to the same illness Raoul was afflicted with in 935. However, while Boso was preparing to besiege St. Quentin, or had already laid siege, Raoul is last encountered in Flodoard’s entry for 935 besieging Dijon a considerable

- distance away. Earlier though, Raoul had frightened the Magyars out of *Burgundia* and into *Italia*. Before that he had been in Vitry, Laon, and Soissons.
76. Flodoard 945: (2004), p. 42; (1839), p. 392. ‘Lord Teotolo, the venerable archbishop of the city of Tours, died. He had been working to make peace between the king and the principles. Occupied with this matter, he returned from Laon and was struck by a bodily illness on this journey. After he had breathed out his last breath, a sign of lights appeared coursing through the sky, which seemed to be about a cubit in length. This light was so bright that it dispersed the shadows of night and those who were carrying his body could perform the task. It was said that by this comfort they gained almost 200 miles and carried his body to the city of Tours.’ / ‘Domnus Theotilo venerandus urbis Turonicae praesul obiit, qui dum de pace inter regem et principes componenda certaret, hisque studiis occupatus a Lauduno rediret, aegritudine corporis in ipso deprimitur itinere. Cumque ultimum iam exhalaret spiritum, apparuit signum quoddam luminis per aera discurrens, cubitum longitudinis habere visum; cuius lumine ad depellendas noctis tenebras sufficienter perfuncti sunt, qui funus eius deducebant; talique potiti solamine per milia fere, ceu fertur, ducenta, Turonicam usque corpus eius perferunt urbem.’
77. Flodoard 948: (2004), p. 51; (1839), p. 398. ‘The legate of Bishop Transmarus of Noyon, a priest, said that his bishop had fallen seriously ill and could not attend the synod, and our bishops who were present attested to this.’ / ‘Adest Transmari, Noviomensis episcopo legatus quidam presbiter astruens eundem praesulem ita gravi langore detentum, ut ad eandem synodum venire non valuerit; id quoque nostrates, qui aderant, attestantur episcopi.’ The synod was at Trier, Transmarus was made bishop of Noyon in 937.
78. Flodoard 951: (2004), p. 55; (1839), p. 400. ‘While [King Louis IV of *Francia*] put off entering *Aquitaina* he fell seriously ill. Letoldus, a Burgundian count who had newly become the king’s man, received Louis and looked after him well in this illness. When the king regained his strength, he returned to *Francia*.’ / ‘Dumque moratur Aquitaniam rex intrare, gravi corripitur infirmitate; quem suscipiens Letaldus, quidam Burgundiae comes, qui tunc etiam suus noviter effectus erat, utiliter eum in ipsa aegritudine observavit. Reparatis igitur sibi viribus, rex in Franciam regreditur.’
79. Flodoard 954: (2004), pp. 58, 60; (1839), p. 402. ‘Louis, the son of the king, died at Laon. King Louis [IV], as he was dying, went to the city of Rheims. Before reaching the river Aisne, a wolf appeared ahead of him. He gave chase to it but when his horse was put to a gallop he fell off. Gravely injured, he was taken to Rheims. He lay ill and weak for a long time and was aggrieved by elephantiasis. He was wasted by the disease and died.’ / ‘Ludowicus, filius regis, Lauduni defungitur. Ludowicus rex egressus Lauduno, Remensem, velut ibi moraturus, repetit urbem. Antequam vero ad Axonam fluvium perveniret, apparuit ei quasi lupus praecedens; quem admisso insecutus equo, prolabitur, graviterque attritus

Remos defertur, et protracto langore decubans, elephantiasi peste perfunditur. Quo morbo confectus, diem clausit extremum.’ Louis died in early September.

80. Widukind c.958: (1949), p. 406; (1935), p. 137. ‘At that time also the emperor began to take sick, but by the merits of the saints to whom he faithfully showed due reverence, and especially through the intercession of the holy martyr Vitus, to whom he opened his mouth in prayer, he was healed of his infirmity.’ / ‘Eo tempore imperator et ipse aegrotare coepit, sed meritis sanctorum, quibus fidele iugiter obsequium prebet, maximeque patrocínio incliti martyris Viti, cui aperuit os suum, de infirmitate convalescit...’
81. Adalbert 959: (2009), p. 260; (1890), p. 170. ‘Hagano, abbot of Hersfeld, was struck by paralysis.’ / ‘Hagano Heresfeldensis abbas paralisi percutitur.’
82. Flodoard 963: (2004), p. 67, (1839), p. 406. ‘Archbishop Odelricus of Rheims summoned the magnates of *Francia* who had occupied certain possessions of the church of Rheims. Therefore, although broken by age and weakened with infirmity, I resigned the ministry of my ecclesiastical dignity in the presence of this bishop.’ / ‘Odelricus Remensis archiepiscopus proceres Franciae, qui possessiones quasdam Remensis occupaverant aecclesiae, vocari fecit. Ego vero, fractus aetate et attritus infirmitate, ministerium abdicavi praelaturae coram eodem praesule.’ Here, Flodoard speaks of his own ailments, though only vaguely.
83. Widukind 973: (1949), p. 422; (1935), p. 153. ‘[Otto] began to be feverish and to grow tired.’ This passage appears in neither of the MGH editions of Widukind’s text.

#### 4.4 Catalogue 3

##### **Pestilences, food shortages and extreme weather in non-Carolingian and early Ottonian Europe, c.750-c.950**

1. **HM** CT 700-701: (1982), p. 69. ‘In this year there was a great pestilence.’ Theophanes’ calendar year spanned 1 September to 31 August. He wrote his chronicle sometime early in the ninth century, likely in the early 810s. It is thought to preserve several lost works.
2. **AM** CI 708: (2006), p. 183. ‘The murrain of cows raged again.’ The *Chronicle of Ireland* (CI) does not exist as an independent text but in its daughter chronicles. Indeed, many of the Irish annals that cover the early medieval period contain similar entries and it has been suggested on several occasions that these extant annals were largely derived from a common source. Charles-Edwards has recently reconstructed this CI and this is the text used here, until 911 when the CI stops. Thereafter, I have made use of the *Annals of Ulster* and the *Chronicon Scotorum*, the latter of which is thought to contain the epitome of the *Annals of Tigernach* for much of the period under study (766-973) here, which is missing in the extant version of the *Annals of Tigernach*. The CI has been reconstructed from the

*Annals of Ulster*, the *Annals of Tigernach*, the *Chronicon Scotorum* and the *Annals of Clonmacnoise* (*Mageoghagan's Book*). From the mid 760s to the early 800s, it is primarily derived from the AU. It is very important to emphasize that the chronology of each of the sets of annals that survey early medieval Ireland, in part or in whole, is difficult to establish. There are discrepancies, for example, between the CI, as put together by Charles-Edwards, earlier editions of the annals he draws upon, such as the AU, and online editions of the Irish annals available on the Corpus of Electron Texts (CELT), available at

<http://www.ucc.ie/celt/published.html>. Most importantly, for our purposes and interest in chronology, all passages from Charles-Edwards reconstruction of the CI that draw upon or make use of the AU, appear a year earlier in Hennessy's paper edition of the AU. Hennessy's edition, for instance, assigns the CI passage for 708 to 707. The *Chronicon Scotorum*, however, lists it in 708.

3. **HM** CI 709: (2006), p. 183. 'A disease called baccach, together with dysentery, in Ireland.' The AU assigns this passage to 708, etc.
4. **W** CI 714: (2006), p. 189. 'A great drought.'
5. **W/AM** CT 716-717: (1982), p. 89. 'The winter was very severe in Thrace, so that for a hundred days crystalline snow covered the earth. A great number of enemy's horses, camels, and other beasts died.'
6. **HM/C** CT 716-717: (1982), p. 90. 'Since the Arabs were extremely hungry, they ate all their dead animals: horses, asses, and camels. Some even say they put dead men and their own dung in pans, kneaded this and ate it. A plague-like disease descended on them and destroyed a countless throng.' The Arabs would have been in the western most regions of Asia Minor, near Nikaia and Nikomedeia.
7. **W** CI 719: (2006), p. 193. 'A dry summer.'
8. **W** CI 720: (2006), p. 193. 'A rainy summer.'
9. **W** CI 720: (2006), p. 193. 'A great sea-flood in the month of October.'
10. **FD** BHC 721: (2003), p. 109. '[T]here was a scarcity of crops. After one year the locusts came and destroyed the crops. After two years there was a pestilence caused by the disease of tumours...' Bar Hebraeus, who wrote in Syriac, compiled his *Chronography* in the thirteenth century from a wide range of earlier sources. His work, which focuses largely on the history of the Syrians, has been regarded as an 'encyclopedia' of Syrian and Middle Eastern history.
11. **HM** CT 726-727: (1982), p. 96. 'There was a pestilence in Syria.'
12. **HM** CT 733-734: (1982), p. 102. '[T]here was a pestilence in Syria and many died.'
13. **HM** CI 742: (2006), p. 214. 'Leprosy in Ireland.'
14. **HM** CT 746-747: (1982), pp. 112-13. '[T]here was a pestilence. It sprang from Sicily and Calabria and, spreading like fire, came to Monemvasia, Greece, and the islands which lie off it. It lasted the entire fourteenth indiction, scourging the impious Constantine and restraining his fury against the holy churches and the

revered icons even if, like Pharaoh of old, he remained uncorrected. The pestilence reached the imperial city in the fifteenth indiction... In the Spring of the first indiction the pestilence got even worse, and in summer it was burning everywhere at once, so that whole houses were shut up and there was no one to help bury the corpses. Because the times were very critical, it was planned to put oblong wooden panniers on beasts of burden so as to carry away the dead; similarly, they were piled one atop the other on wagons. In this way all the cemeteries – both in the city and in the suburbs – were filled, as, in fact, were many dry cisterns and pools. Even many vineyards were dug up, and not only those, but the orchards within the old walls were also pressed into service to bury human bodies. Thus they barely met this need. Every household was harmed by the disaster, which took place because of the attack the rulers impiously made on the holy icons.’ This pestilence is said by Theophanes to have occurred after an earthquake.

15. *W/AM* CI 748: (2006), p. 219. ‘Snow of unusual depth, so that the cattle of almost all Ireland were destroyed, and subsequently the world was burnt up by an unusual drought.’
16. *W* CI 759: (2006), p. 229. ‘A rainy summer.’
17. *W* CI 760: (2006), p. 229. ‘A major snowfall.’ The AU assigns this passage to 759. It reads, ‘Great snow on the fourth of the Nones of February.’
18. *FD* CI 760: (2006), p. 229. ‘Food shortage and great mast-crop this year.’
19. *W* CI 762: (2006), p. 231. ‘The kalends of January. A great snowfall and a dark moon.’ Whether the snowfall and dark moon, possibly eclipse, occurred on the kalends of January is unlikely, as most entries start with ‘the kalends of January.’ The snow fall would have occurred sometime after 1 January in the winter of 761/62.
20. *W* EAC 763: (2006), p. 63. ‘A severe winter.’ It has been proposed that the EAC was compiled in the late tenth century at the abbey of Ramsey by Byrhtferth. The work has been described as ‘highly composite,’ as is noted throughout this Catalogue. Most entries included in this Catalogue from the EAC – including 763, 822, 859, 868 and 869 – may have been taken from the *Rouen Annal*.
21. *W* ASC 763/64: (1975), pp. 50-1. ‘In this year was the hard winter.’ Both the Parker Chronicle and the Laud Chronicle are considered here. Both copies of the ASC appear in ASC (1975). The ASC was compiled in the late ninth century (c. 892); though it has been suggested it was composed in the 840s.
22. *W* CI 764: (2006), p. 232. ‘Kalends of January. Much snow for about three months.’
23. *FD* CI 764: (2006), p. 232. ‘Great scarcity and food shortage.’
24. *W* CI 764: (2006), p. 232. ‘An unusually great drought.’

25. **HM** CI 764: (2006), p. 232. 'A bloody flux throughout Ireland.' Many elites are said to have died from the 'bloody flux' in the late 760s and 770s (see entries for 768, 773, 774, 777, 778).
26. **W/AM** SD 764: (1987), p. 35. 'Deep snow hardened into ice, unlike anything that had ever been known to all previous ages, covered the earth from the beginning of winter till nearly the middle of spring; by the severity of which the trees and shrubs for the most part perished and many marine animals were found dead.'
27. **FD** CI 765: (2006), p. 233. 'A shortage of bread.'
28. **FD/HM** CI 769: (2006), p. 236. 'An earthquake and a food shortage; and the disease of leprosy attacked many. An abundance of oak-mast.'
29. **W** CI 772: (2006), p. 238. '[T]here was lightning and thunder like the Day of Judgment.'
30. **HM/FD** BHC 772: (2003), p. 115. '[A] pestilence broke out in Syria and Assyria and there came a food shortage of excruciating severity. It was not caused by the lack of grain but it arose because not a single zuza [coin] remained with any man. The price of an ox or a donkey was 1 zuza, the price of ten measures of wine was 1 zuza, the price of five bushals of wheat was 1 zuza, and the price of youths and maidens was 5 zuza each.' BHC dates these events to 772 and notes that they occurred during the reign of Constantine V (741-775).
31. **FD** LP c.772: (1992), p. 123. '[S]ince neither archibishop Leo nor the people of Ravenna had any hope of survival in their great want, hunger and need, they sent their envoys, the tribunes Julian, Peter and Vitalian, here to Rome, to ask in their great woe for the holy pontiff to come with such help as he could and try to recapture those cities – they stated that unless those cities were restored there was no way they could survive.' This is reported in the life of Hadrian I. Desiderius had 'stole' the city of Faenza, the dutchies of Ferraea and Comachio. Desiderius had, it is said, 'put the city of Ravenna under constrain on all sides, occupied the homesteads and all the estates of the Ravennates, and stole all their provisions, dependants, property and all that they had on their estates.'
32. **FD** ABH c.774: (1878), p. 224. 'At the same time Desiderius died. Adeclis, his son, prepared with ships, set sail beyond the sea. And there was such great tribulation in *Italia*: some were killed by the sword, others were knocked down by food shortage, [and others] were killed by other beasts, on account of which scarcely few remained in the villages and cities.' / 'Desiderio vero eodem tempore mortuus est. Adelchis, eius filium, navium preparans, ultra mare egressus est; tantaque tribulatio fuit in Italia; alii gladio interempti, alii fame percusi, aliis bestiis occisi, ut vix pauci remanerent in vicos vel in civitates.' Desiderius died in 786. The ABH obviously makes a mistake. Desiderius was exiled in 774 after Charlemagne defeated the Lombards and successfully besieged Pavia where

Desiderius was staying. Andreas wrote his continuation of Paul the Deacon's *Historia langobardorum* in 877.

33. **HM / C** LP 774: (1992), p. 139. 'His excellency Charles king of the Franks returned with his armies to Ticinum to finish the war and the siege of the city of Pavia vigorously. When God's wrath raged furiously against all the Lombards inside the city and many were lost by disease and annihilation, so it was God's will that his excellency the king of the Franks captured the city along with Desiderius king of the Lombards and all his companions and reduced the entire Lombard kingdom into his own power. He took Desiderius and his wife with him to France.' This is related in the life of Hadrian I.
34. **HM** CI 774: (2006), p. 240. 'Eugan, son of Colman, died of the bloody flux and many others died of that same disease.'
35. **AM** CI 776: (2006), p. 242. 'The rabies of the dogs.'
36. **HM / AM** CI 777: (2006), p. 242. 'The bloody flux; many other diseases – almost an epidemic. The great murrain of cows.' The AU assigns this passage to 778. It reads, 'The mortality of cattle ceased not, and a mortality of men from want.'
37. **HM / AM** CI 778: (2006), p. 243. 'The bloody flux; the great murrain of cows.'
38. **HM** CI 779: (2006), p. 244. 'The bolggach throughout Ireland.' Bolggach has been labeled smallpox.
39. **W** CI 780: (2006), p. 245. 'A great snowfall in April.'
40. **HM** CI 783: (2006), p. 248. 'The scamach.' Scamach has been labeled influenzal pneumonia.
41. **W** CI 786: (2006), p. 250. 'A very severe gale in January.'
42. **W** CI 786: (2006), p. 250. 'A flood in Dairinis.'
43. **HM** CI 786: (2006), p. 251. 'The pestilence which is called scamach.'
44. **W** CI 789: (2006), p. 252. 'A great snowfall on 29 April.'
45. **W / FD** LP 791: (1992), pp. 167-68. '[T]he river Tiber left its channel, swelled and spread itself over the plains. In great spate it entered the Gate called Flaminia, overthrowing that Gate to its foundations, and reached the arch called Three Sicles. Meanwhile in some places it even overlapped the walls and it extended itself through the streets beyond St. Mark's basilica after turning a right angle by the Pallacinae portico as far as the Bridge of Antoninus; it overthrew the wall itself to escape and rejoin its own channel; so that on the Via Lata the riverwater rose up to twice a man's height. The waters dispersed themselves from St. Peter's Gate to the Milcian Bridge, and the force of the river took it as far as near Remissa. It overturned houses and desolated fields, uprooting trees and crops and sweeping them away. At that time, the great part of the Romans were not even able to sow; which meant that great trouble was in store. Hearing this, since the river was coursing through the city for three days as if in its own channel, the distinguished prelate bewailed greatly and, prostrate on the ground, continued in prayer; through his prayers God showed his mercy and next day the spate ceased. But for many

days yet the water held Rome in its grip. The distinguished bishop was moved by God's inspiration to use dinghies and supply food for those living on the Via Lata, so they would not die of hunger, as the enormous flooding totally prevented them from leaving their homes. Afterwards, when the water dried up, he comforted everyone in that region of the Via Lata with gifts.' This flood, which is said to have taken place in December 791, is related in the life of Hadrian I. Several floods are related in the LP and many of the descriptions given of the extent and effects of flooding are remarkably similar. It would seem that pre-existing accounts of earlier floods greatly conditioned how authors described floods. See, for example, the second LP entry for 844, as well as the LP entry for 856, below.

46. **W/FD** ASC 793: (1975), pp. 54-7. 'In this year terrible portents appeared in Northumbria, and miserably afflicted the inhabitants: these were exceptional flashes of lightning, and fiery dragons were seen flying in the air, and soon followed a great food shortage and after that in the same year the harrying of the heathen miserably destroyed God's church in Lindisfarnes by rapine and slaughter.' The later SD 793: (1987), p. 42, does not limit the terrible portents to Northumbria. Rather, he states that 'they terrified the wretched nation of the Angles.'
47. **W/AM** CI 799: (2006), p. 260. 'A great fall of snow in which many men and cattle died.'
48. **AM** SD 800: (1955), p. 250. '[A] great destruction of cattle occurred in various places...'
49. **W** CI 801: (2006), p. 262. 'A rainy summer.'
50. **HM** CI 806: (2006), p. 267. 'The kalends of January in which a great epidemic arose in the island of Ireland.'
51. **FD** AHB c.810: (1878), p. 224. 'Although *Italia* had been seized by the want of a food shortage, as soon as Bernard accepted the kingdom [of Italy], *Italia* attained dignity and fertility, and so it was while he ruled.' / 'Qui cum esset penuriae famis Italiae preacupata, subito ut Bernardo regnum accepit, dignitatem ubertatemque advenit, et sic fuit dum ipse regnavit.' Bernard, son of Charlemagne's son Pepin, ruled *Italia* between 810 and 818.
52. **AM** ACa 810: (1965), p. 11. 'A mortality of cattle in Britain.' / 'Mortalitas pecorum in Britannia.' It seems that a copy of the ACa was kept up at the St. Davids, Wales, from the late eighth or early ninth century until the early thirteenth century. This passage, then, may have been recorded contemporarily to the pestilence reported in Wales.
53. **AM** BYT 810: (1969), p. 844. '[T]here was a mortality among the cattle over the island of Britain.' The BYT is a Welsh translation of the *Cronica Principium Wallie*, which was likely composed at Strata Florida. The *Cronica* does not survive but is thought to have been heavily based on earlier Welsh annals, possibly written contemporary to the events they describe. The BYT may have in



this instance been based on the ACa, though later entries in this Catalogue from the BYT (895 and 959) do not appear in the ACa.

54. **HM** / **W** GR c.813-c.820: (1998), p. 24. 'For these reasons, perhaps, there were earthquakes, horrific pestilences, drought, heat waves, and in addition civil strife in both the cities and the entire countryside. These things started at the beginning of his godforsaken reign and lasted for many years...' Genesios (the name Genesios was applied to an eleventh-century manuscript by a fourteenth-century hand) states these phenomena occurred in direct result of Emperor Leo V's actions. Leo's reign began in 813 and ended in 820. Genesios likely wrote his text sometime between 945 and 959, but likely before 950. It is possible that the first portion of the book, covering the period 813-67 (and thus this passage), was written as early as 915.
55. **HM** CI 814: (2006), p. 273. 'Great distress and severe illness.' In his edition of the AU, Hennessy prefers 'great suffering and heavy diseases.'
56. **W** CI 818: (2006), pp. 276-77. 'Unusual ice and much snow lasted from Epiphany until Shrovetide. People crossed the Boyne and other rivers dry-footed; similarly the loughs. Herds and armed companies went across Loch nEchach; deer were hunted. After that the materials for an oratory were brought by a company across Loch nEirne from the lands of Connachta into the land of the Ui Chremthainn; and other novel things occurred this year because of the frost and the hail.'
57. **FD** EAC 822: (2006), p. 67. 'A great food shortage.'
58. **W** CI 822: (2006), p. 280. 'Exceptional ice: the sease and the loughs and the rivers froze so that herds of horses and cattle and loads were brought across them.'
59. **HM** / **FD** CI 825: (2006), p. 283. 'A great pestilence in the island of Ireland [affecting] older people and children and the weak; great hunger and lack of bread.'
60. **HM** CI 826: (2006), p. 284. 'Great terror throughout the whole of Ireland, that is, a warning of pestilence given by Iellan's son from Munster.'
61. **W** / **FD** GR c.829-c.842: (1998), p. 69. 'In truth, during his entire reign there occurred many windy winters, hardships, droughts, and food shortages due to the bad temperament of the air, and earthquakes and eruptions of the earth occurred daily throughout his reign.' Genesios is here speaking of the reign of Theophilos, who ruled from 829 to 843. Note that he does not mention outbreaks of disease.
62. **FD** CI 836: (2006), p. 294. 'A great crop of mast, including both nuts and acorns; and it stopped up the streams so that they ceased flowing.'
63. **W** BHC 840: (2003), p. 138. '[T]here were violent rains and a flood, which wrought great havoc in Harran.' It is implied, based on the positioning of the flood in the text, that the flood took place after a 'red sign' that appeared in the sky in April 840, and before an earthquake in June. Harran lies in what is now southeastern Turkey.

64. **FD / HM** BHC 842: (2003), p. 140. '[T]here came a severe food shortage and a terrible pestilence.' It is implied that these events also took place in what is now southeastern Turkey.
65. **FD** HLB 843: (1995), p. 149; (1878), p. 241. 'And when [Benevento] had grown severely distressed by assault and the pestilence of food shortage, Guido was commanded to hasten to the city immediately.' / 'Cumque telis et lue famis non mediocriter coartaretur, mandatum ilico est Guidoni, ut propertaret urbem.' Erchempert, a monk at Monte Cassino, wrote his text *c.*889. He here is describing the havoc Siconulf of Salerno was causing in Benevento. The food shortage describe seems to be attributed by Erchempert to warfare, not weather.
66. **W** LP 844: (1995), p. 76. 'That same day there was such a heavy snowfall over the city that everyone beheld it white; many were saying this was a token of joy and brightness.' This is related in the life of Sergius II. The snowfall is said to have took place on the day Sergius was elected in early 844.
67. **W / FD** LP 844: (1995), pp. 84-5. '[T]he river called Tiber left its channel and spread over the plains. It swelled in great spate on 22 November in the 8<sup>th</sup> indiction [844], a Saturday, the birthday of St. Caecilia the martyr. It entered the Roman city by the postern called St. Agatha's at the first hour of the days. Meanwhile in some places it even overlapped the city walls and it reached St. Laurence's church called Lucina's. From there it entered God's holy ever-virgin mother's on the Via Lata and then crossed to St. Mark's. It extended itself through the streets, desolated fields, uprooting trees. That night-time removed the water and the river returned to its own channel.'
68. **W** CI 848: (2006), p. 304. 'A great snowfall on the 1<sup>st</sup> of February.'
69. **W** CI 856: (2006), pp. 310-11. 'The kalends of January. There was much ice and frost so that the principal lakes and the chief rivers of Ireland could be crossed by those on foot and by horsemen from the 23 November until 7 January. A stormy (and harsh) year.'
70. **W / FD** LP 856: (1995), pp. 179-81. '[T]he river called Tiber left its channel and spread over the plains; it swelled in great spate in and entered the city of Rome by the postern-gate called St. Agatha's, at the [brief missing section] hour of the day. Meanwhile in some places it even lapped over, and entered the church of St. Silvester, so that of the steps which go up to St. Dionysius' basilica none except the topmost was visible because of the flooding; from there it expanded over the street called Via Lata and entered God's mother St. Mary's basilica there, and the water swelled so much that this church's doors could not even be seen because of the flooding. Then it went up through the streets and byways as far as the Clivus Argentarius. From there it turned a right angle and entered by the portico in from of St. Mark's church, on the 6<sup>th</sup> day of the same month, the Apparition of our Lord Jesus Crhist according to the flesh, i.e. God's Epiphany. Then it made a rush and began to run down into the sewer close to the monastery of St. Silvester and of St.

Laurence the martyr's called Pallacinis. From that day and thereafter the water gradually began to diminish, and after doing much damage the river returned to its channel: it overturned houses, deslotted fields, sweeping crops away and uprooting trees.' This flood, which appears to have taken place in January, is related in the life of Benedict III.

71. **W** CI 857: (2006), p. 311. 'A very great gale and it caused destruction of trees and broke up islands in loughs.'
72. **W** GR c.857: (1998), p. 89. 'These events took place during a harsh winter...' Genesios here may have simply been emphasizing the coldness of the winter in order to emphasize the suffering of the St. Ignatios.
73. **W**/**FD** CI 858: (2006), p. 312. 'A rainy autumn and very harmful to the crops.'
74. **W** EAC 859: (2006), p. 83. 'This year saw a deep frost from 30 November through to 5 April.'
75. **W**/**FD** ABH c.860: (1878), p. 227. 'Then before this rebellion had occurred, so much snow fell on *Italia* that for one hundred days it remained in the level places. The frost was very severe, many seeds were killed, living things dried up through almost all level places, and wine froze inside jars, nothing could escape beyond the hole of thorns, until the ice was broken with a stick in front of the thorn.' / 'Igitur antequam haec rebellatio facta fuisset, tanta quidem nivem Italia cecidit, ut per centum dies in planis locis teneret; fuit gelus gravissimus, multa semina mortua fuerunt, vitae pene omnibus in planis locis siccaverunt, et vinum intra vascula glaciavit, quae aetiam per foramen spinarum nihil exiebat, donec rumperetur ipsa glatia cum fuste ab ante ipsa spina.' Andreas appears to suggest that since wine had frozen in their vessels, thorns and sticks, or a stick with a thorn, had to be use to crack the ice and allow the wine to exit the jar. By level places, Andreas presumably means non-Alpine *Italia*.
76. **FD** EAC 868: (2006), p. 87. 'A great food shortage.'
77. **FD**/**HM**/**AM** EAC 869: (2006), p. 89. 'A great food shortage and mortality of mankind, and a pestilence affecting beasts.'
78. **FD** ABH 873: (1878), p. 244. 'In the following month of August many locusts from the regions of Vicentia arrived in the territory of Bresiana, and then in the territory of Cremona. Next they continued into the territory of Laudensis, or even into Milan. For they were united to the ones already on their way, just as Solomon said: "Locusts do not have a king, but they rise up in swarms." For they ravaged many small grains, that is millet or Italian millet.' / 'Sequenti autem mense August multarum locustarum advenit de Vicentina partibus in finibus Bresiana, deinde in Cremonensis finibus; inde vero perrexerunt in Laudensis partibus, sive etiam in Mediolanensis. Erant enim unates pergentibus, sicut Salomon dixit: "Locustas regem non habent, set per turmas ascendunt." Devastaverunt enim multas granas minutas, id est milio vel panico.' Andreas wrote in 877. Writing in the late 880s at Monte Cassino, Erchempert, on the other hand, makes no note of

this locust swarm in his *Historian langobardorum beneventanorum*. Erchempert, though, writes about few things directly relevant to the focus of this study. He does, however, describe the Carolingians who arrived in Benevento in 787 as ‘warriors in the manner of locusts, fiercely gnawing away down to the root.’ (1995), p. 124; (1878), p. 235. This description may have stemmed from his recollection of the locust swarm of 873, or, on the other hand, a locust swarm that may have infested Italia in the mid 880s (see below). Further, Erchempert notes that in the early 870s that a large number of Saracens besieged Salerno, destroying things on all sides, and that when the left the area in 873 it had ‘become a desert just like in the flood.’ (1995), p. 181; (1878), p. 248. Perhaps the desertification of the area owed in part to the locust swarm of that year.

79. **W / FD** SD 877: (1987), p. 80. ‘[T]he king with his people rejoiced and those of the enemy, who survived, wept with great lamentations on account of the severity of the cold and hunger, and their dread of so powerful a monarch.’ The enemy here is the Viking force defeated by Elfred in Devon.
80. **W CI** 878: (2006), p. 328. ‘A gale and lightning. A shower of blood rained down and clots of gore and blood were found in cultivated areas in Ciannacht, at Duma and Deisis in particular.’ The editor suggests these blood rains were Saharan sands.
81. **FD CI** 879: (2006), p. 329. ‘There was a great scarcity of food for animals in the spring; a great profusion in the autumn.’
82. **HM / FD** BHC 884: (2003), p. 149. ‘[A] violent earthquake took place and it threw down the Great Mosque which was in Egypt, and many large houses. And there was a pestilence in that country and one thousand biers of the dead were counted in one day. And there was also a scarcity of food in Baghdad.’
83. **W / FD** LP c.884/85 (or c.873?): (1995), pp. 298-99. ‘So pope Hadrian of memorable renown, who had succeeded that blessed pope Marius died on the river Scultinna at the villa called Viulzachara; in his time, the Roman citizens had suffered many problems both from devastation by locusts and also from the insufficiency of rain and from want and hunger and they then believed they could be relieved by this cenerable man’s sanctity. By God’s mercy there was a gathering of holy bishops and the whole clerical order and also an assembly of the noble senates and of the illustrious men, and they all cried out, together with the whole population and the multitude of the commons of both sexes: “the lord priest Stephen is worthy of God, we all want him, we all ask and pray that he be our prelate, since we know without dount that through his holiness we can be delivered from the dangers that threaten us.”’ This passage is related in the life of Stephen V. The editor states this Hadrian, mentioned at the onset of the passage, is Hadrian III, who was pontiff in 884 and 885. The compiler of this life, however, may have incorporated information, particularly that regarding locusts, from the life of Hadrian II, who was pontiff from 867 to November or December 872.

Though the great locust plague of the Carolingian era is documented in 873 in most sources, the locusts may have initially appeared in 772. Moreover, no other swarm is mentioned in Carolingian era sources, excusing the BYT reference to locusts in Ireland in 895. The BYT reference, like this reference in the LP, may, however, be confused. Further, the Italian historian Erchempert does not mention any locust plague in the mid 880s, the in which he was writing. That said, he does not, as mentioned above, mention the locust plague of the early 870s, which is mentioned by Andreas of Bergamo, (whose history extends to the 870s).

84. **FD** LP c.884/85 (or c.873?): (1995), pp. 307-08. Later in the LP life of Stephen V, we read more about the locusts of Hadrian's time (whether Hadrian II or III is questionable): 'Now since the disaster of locusts which in his predecessor Hadrian's time had consumed virtually the whole country, with their seed evilly multiplied, had begun to be born and had filled everything, the holy pope had pity on the afflicted people and first of all he announced that anyone who caught a pint of them and brought it to him would received 5 or 6 denarii from him. The people heard this and began to scurry round in every direction to catch them and bring them for the merciful father to buy. But when they were unable to wipe them out by this means, he took refuge in the Lord's mercy, came to St. Gregory's oratory, where his bed is preserved, close to the prince of the spostles church, and tearfully gave himself to prayer. When he had prayed at length, he rose up, blessed water with his own hands, and gave this order to mansionarii: "Take this and given them all a portion; advise them to go round their lands in the Lord's name and sprinkle this water over the crops and vines, and beg for relief from God's support." When this was done, such great mercy ensued from almighty God that wherever this water was sprinkled there remained not a single locust. Hearing this, everyone from the neighborhood all around flooded into the City and begged for help, crying out that the whole land was covered in locusts like dust.'
85. **FD** LP 885: (1995), pp. 300-301. 'So he was deeply touched with grief because, apart from the vestries being looted, the granaries and cellars were found to be empty, and he had nothing to disburse to the clergy and the scholae and lacked anything to use for ransoming captives or feeding orphans and widows in the serious food shortage that threatened. What could he do? He turned to his father, and took the wealth that his distinguished parents had owned; with bountiful righthand he disbursed it to the poor as far as possible, and so by God's mercy it came about that he lightened the need and food shortage by his endeavour.' This is related in the life of Stephen V and concerns that pope, though the stealing of grain and treasures had apparently taken place 'not in his time.'
86. **W** CI 892: (2006), p. 338. 'There was a gale on Martinmas, and it destroyed many trees in the woods and moved the oratories from their foundations and also other houses.'

87. **FD/W** ASC 894: (1975), pp. 86-7. 'When they had been encamped for many weeks on the two sides of the river, the king being occupied west in Devon against the pirate host, they became distressed for lack of food and had devoured most of their horses, the remainder perishing with hunger.' Whether those forced to consume their horses were Vikings or Anglo-Saxons is somewhat uncertain. It seems as though it was the Anglo-Saxons, awaiting Alfred, who fell short on supplies and who were forced to eat their horses. Earlier in the passage for 894, we read that the Anglo-Saxons who had surrounded the Vikings had 'completed their tour of duty and had come to the end of their food.' How many horses the Vikings could have had to consume is questionable, though they may have obtained them through plunder and it is said that the Vikings came to England in 893 'horses and all.' In his chronicle, Florence of Worcester states clearly that the Vikings were forced to eat their horses: (1988), p. 69.
88. **W/FD** CI 895: (2006), p. 340. 'A heavy snowfall and great scarcity.'
89. **FD** BYT 895: (1969), p. 846. 'A year after that and then provision failed in Ireland for vermin of a mole-like form, each having two teeth fell from heaven which devoured all the food and through fasting and prayer they were driven away.'
90. **HM/C** LCA 895: (1930), pp. 55-6. 'From that time everyone in *Italia* regarded Arnulf (of Carinthia) with scorn and contempt. On his arrival at Pavia there was a fierce outbreak and so many of his men were killed that all the sewers – or as they call them "cloacae" – in the city were choked with corpses.' Arnulf took Pavia in October 895. When Arnulf returned to his 'own country,' Liudprand states that 'he died of a disgusting malady' and that 'he was cruelly tormented by tiny worms, which are called lice, and expired in agony.' Whether this is also the illness that afflicted his men is unlikely, as he died in 899; though it may not be entirely implausible that his many likewise suffered from a louse-bourne disease. Liudprand likely wrote in the 960s.
91. **AM/HM** ASC 897: (1975), pp. 89-90. 'The host, by the mercy of God, had not altogether utterly crushed the English people; but they were much more severely crushed during those three years by murrain and pestilence...' From this we may gather that 'murrain and pestilence' spread in England c.894-c.897. Florence of Worcester also reports this murrain: (1988), p. 71.
92. **W** CI 899: (2006), p. 342. 'A rainy year.'
93. **FD** CI 899: (2006), p. 342. 'Shortage of bread.'
94. **W** CI 900: (2006), p. 343. 'A rainy year.'
95. **FD** CI 900: (2006), p. 343. 'A great scarcity for the animals.'
96. **HM** CI 907: (2006), p. 346. 'A year of an epidemic.'
97. **AM** CI 909: (2006), p. 347. 'A murrain of cows.'
98. **W** FW 914: (1988), p. 75. 'The winter of this year was very long and severe.' Whether this is in reference to the winter of 913/14 or 914/15 is uncertain.

99. *W/AM* AU 916: (1887), p. 433. 'Great snow and cold, and unprecedented frost, in this year, so that the chief lakes and rivers of Ireland were passable, which brough great havoc upon cattle, birds and fishes.'
100. *W/AM* CS 917: (1866), p. 161. 'There was great frost in this year and great snow which inflicted destruction on beasts.'
101. *FD/C* ASC 918: (1975), pp. 98, 100. 'They encamped out on the island of Elatholme until the time came that they were very short of food and many men perished of hunger, since they were unable to obtain provisions.' The ASC here refers to a Viking force.
102. *HM* CS 921: (1866), p. 164. 'A great pestilence in Ireland.'
103. *FD* LCA 939/932: (1930), p. 177. '[I]n *Italia* for eight nights in succession a comet of wonderful size appeared, drawing after it a very long fiery trail. This foreshadowed the food shortage destined soon to follow which by its severity caused lamentable havoc in *Italia*.' This is said to have happened 'at the same time' as king Hugh's leaving Rome, which took place in 932. However, the food shortage is placed immediately following notice of Ramiro II's winning of the battle of Simancas, which took place in 939, and Liudprand implies both Ramiro's victory and the food shortage occurred in the same year. Based on the references to food shortage in Catalogue 1 c.940 we may assume that the food shortage noted here did indeed take place in 939, not 932.
104. *FD/HM* BHC 940: (2003), p. 162. '[T]here was great scarcity of food in Baghdad. A kor of wheat was sold for 130 gold dinars and men ate berries and grass. And there came a terrible pestilence which was so deadly that a crowd of dead were buried in one grave without prayer. And the river Tigris flooded and very many houses and palm grooves were destroyed.'
105. *W* AU 940: (1887), p. 461. 'Great frost so that lakes and rivers were passable.'
106. *W* AU 944: (1887), p. 465. 'Great, unusual, frost; so that the lakes and rivers were passable.'
107. *FD* BHC 945: (2003), p. 164. '[T]here was a great food shortage in Baghdad and a kor of wheat was sold for 400 gold dinars and a thousand litres of dates, according to the meure of Baghdad, for 60 dinars. And houses and vineyards, and gardens were sold for joints of meat and cakes of bread. And men used to pick out the grains of barley from the dung of horses and asses and eat them. And many women were arrested and killed because they had roasted their babies in the oven and eaten them. And very many during that food shortage and were devoured by the dogs because there was no one to bury them.'
108. *AM/HM* AU 950: (1887), p. 469. 'A mortality of bees. A great leprosy upon the Foreigners of Ath-cliath and a bloody-flux.'
109. *W* HLD c.950-?: (2005), pp. 55-6. 'Many extraordinary and unusual events have occurred in novel fashion in the course of my lifetime: fearsome sights have appeared in the sky, unbelievable earthquakes have occurred, thunderbolts have

struck and torrential rains have poured down, wars have broken out and armies have overrun many parts of the inhabited world, cities and whole regions have moved elsewhere, so that many people believe that life is now undergoing a transformation, and that the expected Second Coming of the Savior and God is near, at the very gates.’ Leo the Deacon was born *c.*950 and it is uncertain exactly when he died. As Talbot and Sullivan point out, this sort of statement is totally not uncommon in Byzantine historical works. These phenomena may have occurred, if at all, in the final quarter of the tenth century. Leo states that a comet, which is thought to have occurred in the late summer and early fall 975, ushered in ‘food shortages and pestilence’ among other things. Leo claims to have witnessed these events: (2005), pp. 211-12. Later yet, in 989, Leo mentions ‘harsh food shortages and pestilences, droughts and floods and gales of violent winds’ that followed another star, insinuating, perhaps, that the earlier mentioned food shortages and pestilences had already occurred *c.*975. In any event, it does not appear that Leo referred to any pestilences or subsistence crises that occurred in Byzantine Europe *c.*950.

110. *AM* AU 953: (1887), p. 471. ‘A great cow mortality throughout Ireland.’
111. *FD/HM* BHC 957: (2003), p. 165. ‘[T]he locusts came in vast numbers and they destroyed the crops. And a pestilence broke out among men, it was the disease of strangulation.’ The BHC mentions another locust swarm in 1010 and 1018. In 1018, it is said that ‘farmers drove them away from the crops with drums and horns.’ In both 1010 and 1018, the locusts are associated with damaged crops. In 1010, people are said to have eaten ‘dogs and beetles’ (as well as ‘infants and children’ and those who were ‘fat and portly’).
112. *W* BYT 959: (1969), p. 848. ‘[A] great snow happened in the month of March.’
113. *AM/W* CS 961: (1866), p. 184. ‘Cattle suffered a great pestilence, with snow and diseases.’
114. *FD* AU 964: (1887), p. 481. ‘A great intolerable food shortage in Ireland so that the father would sell his son and daughter for food.’
115. *FD* CS 964: (1866), p. 185. ‘Great scarcity and cold and dearth of corn.’

#### 4.5

#### Notes on the composition of the principal Carolingian and early Ottonian texts used in this study

##### Adalbert of Magdeberg’s *Chronicon*

Adalbert wrote his continuation of Regino’s *Chronicon* in the late 960s, completing it in 967 or 968. The work comes to an end in 967. It is known that Adalbert was a monk at Trier before becoming archbishop at Magdeburg at the request of Otto I and his wife Edith of England (who married Otto in 929 and died in 946) before leaving for the Kievan Rus in 961. He returned to Mainz shortly thereafter and was then made abbot at Wissembourg in Alsace. There he wrote his text. It is unknown when he was born, though



he died in 981. Thus, though his record of relevant disease, hunger and weather episodes was not prepared contemporaneously, and though it is clear that he often drew upon annals available to him (see Adalbert (2009), p. 233 n. 9, 239 n. 39), Adalbert would have lived through and possibly witnessed at least some of the phenomena relevant to this study that he records, likely while at Madgeburg.

#### *Annales Bertiniani (ASB)*

The earliest manuscript of the ASB was discovered at St. Bertin, but the annals were not written there. The ASB, which picks up in 830 where the RFA left off, provides a detailed account of the ninth century until 882. It seems to have had three primary authors. The first section, consisting of the entries for 829 to 835 was composed somewhere in Belgium, the second section, spanning 835 to 861, was written by Prudentius, chaplain of Louis the Pious, and bishop of Troyes, and the third, spanning 862 to 881, was written by Hincmar, archbishop of Rheims. Like other annals, the entries of each year were likely written at the end of the year in question or at the beginning of the next. Annalists in general would have relied on their own witness as well as information flowing through their place of writing, whether a court or monastery. Of course, they may have made use of notes that they kept throughout the year when writing at the year's end.

The first section of the ASB was likely written contemporaneously, but at the end of each year. The second section, written by Prudentius (who may have also exercised some control over the first section), was likewise compiled contemporaneously. From 841, the annals were based in and concerned, for the most part, events of western Carolingian Europe, what would become in 843, the kingdom of Charles the Bald. This is because Prudentius wrote the annals at Troyes where he was made bishop in the early or mid 840s. Yet the ASB, like the RFA, were by no means a 'palace product.' Hincmar obtained a copy of Prudentius' annals sometime between 861, the year in which Prudentius died, and 866, and at that point took over the text. Thus, Hincmar's first five entries may not have been written contemporaneously. Writing at Rheims, Hincmar continued to compile the ASB until he died in 882. For more introduction see Nelson (1991) and Scholz and Rogers (1970), pp. 20-1

#### *Annales Fuldenses (AF, AFB)*

The AF is so named on account of the fact that a section of the text has been, with some regularly, ascribed to Rudolf of Fulda, not because the entire text was written at Fulda. Like the ASB, the AF provides an independent account from 830, picking up where the RFA left off. The AF, however, primarily addresses the on goings of eastern Carolingian Europe, and as such, serves to complement the record of the ASB, which provides a predominantly western Carolingian perspective. The AF's history is far more complex than that of the RFA, ASB, ASV or AX. Like these annals, the AF had multiple authors (though the vast majority of the text appears to have been written by two people). But three groups of AF manuscripts survive. The first continues until 882, the second omits much of the non-political information we are concerned with here but carries on to 887, and the third contains a continuation – the Bavarian continuation – that runs up to 901.

Several entries from 838 to 869 appear to have been composed on an annual basis, though some were clearly written in bunches. However, from 869 to 887 the AF was clearly composed annually. It is generally thought that Rudolf of Fulda composed the annals from 838 to 863/5 (864 and 865 are short and confused, potentially on account of

the fact that Rudolf was sick and dying), and it has been suggested that his student Meginhard carried the AF from 865 to 882. However, it has also been suspected, based on the fact that the annals tend to concentrate on Mainz, that from c.860 they were written by, or under the authority of, Luitbert, archbishop of Mainz, who died in 889. In fact, an interest in Mainz is clear from the late 840s and we may, consequently, question whether Rudolf had much to do with the composition of the AF at all. The 'thin' entries for 830 to 838 may have been composed by Einhard.

The third section of the AF, which itself is divided into two subsections, is often referred to as the 'Bavarian continuation' and is labeled here as AFB. The AFB runs from 882 to 901. The section spanning 882 to 896 is thought to have been composed at Regensburg by an unknown author. From 896 to 901 the writing of the text is thought to have transferred to Niederalteich. This Bavarian continuation is so named for the annals strong preference in these years for the southeast. For more introduction see Reuter (1992).

#### *Annales regni Francorum (RFA)*

The earliest manuscript of the RFA was found at Lorsch, but the annals were not likely written there in part or at all. Instead, the majority of the RFA was likely written at the court. It is generally accepted, however, that they were not, as their nineteenth-century title implies, commissioned by the court and that they do not represent an 'official' document. Scholz and Rogers (1970), pp. 2-7, suggest that the first section of the text, encompassing the years 741 to 795, was likely composed by a cleric between 785 and 795 from older annals, continuations of Fredegar and his own observations. As many have noted, this cleric tends to have left out what may be regarded as the less favorable events of the period, including not only military failures and civil discords but also several episodes of disease, food shortage and extreme weather found in other annals. The exceptions, for our purposes, are the annalist's mention of the 'hard winter' of 763/64 and the 'severe floods' of 784 and 785, though these floods are implied to have only occurred in enemy (Saxon) territory. The second section of the RFA, Scholz and Rogers propose, spans 795 to 807. These entries were made contemporaneously though it is uncertain by whom. The third part of the RFA, Scholz and Rogers suggest, encompasses 808 to 829, at which point the ASB picks up the lead, and was written, like the second section, contemporaneously. The author of this section was possibly Einhard but this is anything but firm, as Scholz and Rogers state. This third part may have been made at the royal chapel in Aachen.

However, there are many views on the date of composition and authors of the RFA. McKitterick (2008), pp. 31-56, has recently surveyed much of the scholarship. She summarizes that it is 'generally' accepted that the RFA was written by a few or several anonymous annalists and that most of it was 'not compiled on a year-by-year basis.' Different authors have been proposed for the sections spanning 741 to 788, 789 to 794, 795 to 801, 802 to 805, and 806/7 to 829. Ultimately, McKitterick demonstrates the difficulty in definitively establishing changes in authorship. She proposes a division of the RFA not all that unlike Rogers and Scholz: a first section, spanning 741 to 788, of the RFA was assembled after 788 but before 795. This section, she argues, may have been proposed at St. Denis. The section of 798-806 may have then had a different author. The section encompassing 799/800 to 814, she also suggests, was produced after 814, likely in 817 but no later than 829, thus in the reign of Louis the Pious. This section she hints has a

strong ‘imperial ideology’ and may be more of a true court product than the earlier section. The third section then begins in 815.

Of course, where these authors wrote, how familiar they were with the goings on of Carolingian lands in their time, specifically disease, hunger and weather, is uncertain. It is certain, however, that the majority of the RFA was not composed annually. It seems as though it would have been composed in large chunks at the palace from other sources or notes kept by annalists, and not at the orders of Charlemagne or Louis the Pious. It should be stressed that if a new author is detected in 795, for instance, that does not necessarily mean that the author was writing in 795. He may have begun composing his account of 795 at any point. For all these reasons, the composition of the RFA remains obscure, complex and somewhat mysterious. Attention to the composition and placement of disease, hunger and weather events in the RFA may serve to support and confront earlier suggestions about the RFA’s authorship.

The RFA, or sections of it, served as a source for many Carolingian authors. Einhard drew upon the RFA, and the revised RFA, for his *Vita karoli magni*, as did Nithard for the earlier books of histories, the Poeta Saxo in his account of Charlemagne, and the biographers of Louis the Pious. The RFA likewise informed several ninth-century annals, such as the later sections of the *Annales Mettenses*, and the earlier sections of the *Annales Fuldenses*, the *Annales Vedastini* and the *Annales Xantenses*.

#### Flodoard of Rheims’ *Historia Remensis ecclesiae*

Flodoard was born in the early 890s, likely 893, near Rheims. When in his mid twenties, c.919, he started writing his text. He appears to have written his annals year by year until 966 when they end abruptly. He is also thought to have made use of rich archival materials. His work primarily concerns the area around Rheims. For more introduction see Fanning and Bachrach (2004).

#### Regino of Prüm’s *Chronicon*

Regino died in 915, but likely wrote his chronicle in 908 or perhaps over the years immediately prior. He moved to Trier in 899, after being forced to leave Prüm. It was at Trier that he likely wrote his chronicle. The text relies heavily on earlier materials, including some which appear to have been rather important but which no longer survive, such as, for instance, the *Older Annals of Prüm*. These particular annals are thought to have been contemporary to the events Regino describes until the late ninth century. Though he wrote in the early tenth century, Regino would have witnessed, or heard of directly, the events he reports when they happened. At Prüm, near Aachen, Trier and Metz, he would have been well informed. The imagery he employed in his accounts of particular events relevant to this study, such as his record of a mid ninth-century swarm of locusts, was very much informed by earlier authors and works, notably Justin’s *Epitome of the History of Pompeius Trogus* and Paul the Deacon’s *Historia langobardorum* (see, for instance, Regino (2009), pp. 160 n. 164, 167 n. 195, 168 n. 195). For more introduction see MacLean (2009).

#### Widukind of Corvey’s *Res gestae saxonicae*

Widukind started to compose his *Deeds of the Saxons* no earlier than 962, the year in which Otto I received the imperial title. It appears that Widukind completed writing the majority of the three books in 968. He then added an additional seven chapters to book

III, which brought the work up to 973, the year of Otto I's death. Otto would have been about forty when he wrote the mass of the book in the mid 960s. At about fifteen (c.940), Widukind enter Corvey. There he would have written the mass of his text, doubtless making use of available materials and the accounts of elders. For our purposes, consequently, Widukind's account of disease, hunger and weather are not contemporary. He may have in most instances drawn on other materials, annals mostly, available to him to illuminate such phenomena. Of course, some of those texts may not survive and regardless of his non-contemporariness his references to disease, hunger and weather included in the catalogues below are of considerable value, not only for what they tell us about these phenomena but for what they reveal about how early medieval authors wrote about disease, hunger and weather. For more introduction see Wood (1949).

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Abbreviations:

<i>MGH</i>	<i>Monumenta germaniae historica</i>
<i>AA</i>	<i>Auctores antiquissimi</i>
<i>CAP</i>	<i>Capitularia regum francorum</i>
<i>CON</i>	<i>Concilia</i>
<i>EP</i>	<i>Epistolae</i>
<i>LEX</i>	<i>Leges</i>
<i>SRG</i>	<i>Scriptores rerum germanicarum in usum scholarum separatim editi</i>
<i>SRG ns</i>	<i>Scriptores rerum germanicarum nova series</i>
<i>SRL</i>	<i>Scriptores rerum langobardicarum et italicarum</i>
<i>SRM</i>	<i>Scriptores rerum Merovingicarum</i>
<i>SS</i>	<i>Scriptores</i>
<i>MHB</i>	<i>Monumenta historica britannica</i>
<i>PL</i>	<i>Patrologia latina</i>

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