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LATE IMPERIAL EPIDEMIOLOGY, PART 1

From retrospective diagnosis to epidemics as diagnostic lens for other ends, 1870s to 1970s

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The beginning of the 1640s marked a precipitous fall into chaos. In the wake of rebellions (Parsons 1970) and war, locusts and famine, floods and epidemics, husbands left their wives, parents abandoned their children, and worse. Under the 'Omens and Anomalies' (*xiang yi* 祥異) section of the *Gazetteer of Tongxiang County*, the scholar Chen Qide 陳其德 provided an account of the local situation in 1641 titled 'Record of Disasters and Famines' (*Zaihuang jishi* 災荒紀事). He wrote, 'If not from war, one died from famine. If not from famine, one died from epidemics'.[1] Responses to epidemics around this time varied by sectors of society. The government sometimes set up centres to distribute medicines, using the model of grain stations for famine relief (Will 1990) that harkens back to Mencius who argued that blaming poor harvests rather than governance for famine was no different from blaming the weapon rather than its bearer for killing someone (Lau 1970: 52). Some temples organised ceremonies every three years to appease the epidemic gods (Schipper 1985) or carried out community rituals to expel epidemic-carrying demons (Katz 1995). During the waning years of the Ming dynasty, local elites responded to long-term imperial neglect of actual medical relief during epidemics by increasing privately supported efforts at the local level (Leung 1987: 139, 1997). Officials continued to tabulate epidemics across the country (Imura 1936–37), while some local scholars recorded what they observed in more detail.

Chen further wrote, for example, that 'previous famines could usually be counted by the prefecture or by the province, [but] this [one] severely affected not only Zhejiang and the southern capital [Nanjing], but also as far north as the capital [Beijing] and as far south as Guangdong'. Chen proposed two causes for this catastrophe. The first appealed to a concept of divine population control: 'Is it that Heaven created too many people, so it spread this fierce scourge'? The second blamed human greed: 'Or is it because the people have already consumed so much that Heaven hates and discards them to such a degree'. Human indulgence, Chen concluded, had caused the people to stray from the correct way – the ultimate cause of the famine and epidemics of 1641. If only they could 'always regard rice as they do pearls, and wood as they do cassia' he pondered, 'then the bad qualities in their hearts would never develop'.[2]

Famine and war were the only environmental elements Chen recognised as contributing to the rise of epidemics; he did not mention poor living conditions, polluted water, the

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weakened constitutions of the impoverished, or the greater susceptibility of one group of people compared to another. Chen's explanation and solution remain within a conventional cosmo-moralistic framework in which Heaven sends floods, droughts, famines, and epidemics as justified divine retribution for excessive human indulgence and corrupt court politics (Hanson 1997: 117–22).

A man known only as Mr. Shen also wrote about the early 1640s epidemics in Zhejiang province.[3] Instead of the broader political-moral context, he focused on the steady decline in the local economy and social order in Gui'an County from 1640 up through the autumn of 1643.[4] First, there was flooding from a serious downpour in July, whereupon 'hoodlums' (i.e. refugees) banded together in groups of three to five demanding food. The local economy shut down as neighbourhoods discontinued markets and villagers closed their doors. Finally, a new County Magistrate captured the leader of the bandits (i.e. refugees) and calmed the people. However, the fields were still too wet to plant new rice sprouts until the end of July. During this time, the cost of a 'picul' (*dan* 石) of rice, or about 60 kilograms, reached 1 tael 5–6 copper cash, the equivalent of just over 2 ounces of silver.[5] The following year [1641], the village of Huangmei suffered a drought. It did not rain that spring or summer until July 16th. Only one to two tenths of the total crop of rice was planted, but the shoots planted after the July rain did not survive the cold of the fall and an early frost. A picul of rice jumped to more than twice the price of the previous year, to 3 tael 5–6 copper cash, almost 5 ounces (4.7–4.9 oz.) of silver.[6] Shen recorded that at this point people began to die of starvation or resort to cannibalism to survive.

A big snowstorm on the first day of the next year [1642] was taken initially as a good omen for the next year's harvest. Instead, a major epidemic swept through the region. Shen estimated that by the summer solstice, the epidemic had affected eight of ten households and sometimes wiped out entire families. Meanwhile, the government made the lives of the people worse by refusing to give them tax relief. Although in 1643 crops were successfully planted, when the farmers were about to plant their second crop, a massive flood turned the leveed areas into ponds. The gazetteer entry directly following Shen's account records that the famine in that year was so severe that people again resorted to cannibalism. In the spring of 1644, another major epidemic struck similar to the one two years before, but this time with victims vomiting blood before they died.

In contrast to Chen's moral-political interpretation, Shen located the cause of the epidemics in severe famines, worsened by excessive government taxes. As was the convention, he used the price of rice to gauge the severity of the famine and attributed these disasters to taxation, on the one hand, and crop failure due to vicissitudes of nature, on the other. His concluding questions – 'Who will pay the state taxes this year? And how will the debts be paid?' – reflect the primary concerns of the rural elite whose views he represented.

In the autumn of 1642 in neighbouring Jiangsu province, the physician Wu Youxing 吳有性 (c. 1582–1652) substantiated Chen Qide's account of the same year: that the epidemic had spread throughout the country both north and south. In the preface to his *Treatise on Febrile Epidemics* (*Wenyi lun* 瘟疫論, 1642), Wu wrote that the epidemics worsened in the fifth and sixth lunar months of 1641, until '[everyone in] entire households infected each other'.[7] The epidemic the previous year had swept through Shandong, Zhejiang, Hebei, Northern Zhili (Beijing region), and Southern Zhili (Nanjing region). Wu, however, did not speculate about moral or cosmological causes like Chen or political or economic causes like Shen. Rather, he sought a natural cause in the environment.

Wu also did not look back to the 1580s and 1630s epidemics across China, which had probably contributed to the crisis about which he was writing. Instead, he criticised conventional medical treatments:

> During the initial onset, fashionable practitioners erroneously used Cold Damage methods to treat the disorder. I never saw a case of theirs that did not get worse. Some patients and their families mistakenly heeded the claims that by the seventh or fourteenth day it would heal itself. Because of this they were not treated. Some died from not being treated in time, or not taking the medicine in time. Others wrongly took drastic formulas, and by not following the normal sequence for attacking and then replenishing, died.
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> *(Hanson 2011: 91)*[8]

If some doctors were too aggressive, Wu thought others were too timid, using mild slow-working drugs for acute symptoms, prolonging the suffering. These inadequacies prompted him to attack the focus on climate that dominated traditional Chinese epidemiology up to that time with an argument that deviant qi (戾氣), pestilential qi (*liqi* 癘氣), and other non-climatic factors caused these epidemics (Qi 1981; Xiao 1987). Starting from the first sentence of the preface to his *Treatise*, Wu moved from the traditional medical view of correspondence between seasonal cycles and human illness to his new view of a specific kind of *anomalous qi* (*zaqi* 雜氣) separate from normal changes in seasonal *qi*.

> The pathology of Warm epidemics is not that of Wind, Cold, Summer-Heat, or Damp [*qi*]. Rather it is stimulated by a type of anomalous *qi* in Nature [lit. 'Heaven and Earth,' *tiandi* 天地]. There are nine stages of transmission; these are the critical junctures for treating epidemic disorders. Why is it that from antiquity to the present no one has ever discovered (*faming*) this?
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> *(Hanson 2011: 94–5)*

Wu then argued that while his medical colleagues thought they were seeing cases of 'Cold Damage' (*shanghan* 傷寒), in fact, they were mostly dealing with what he called epidemics of 'Warm diseases' (*wenbing* 溫病). Warm disease is an umbrella term comparable to the modern-day concept of acute febrile diseases in that it encompassed a range of symptoms and epidemiological phenomenon, such as an illness spreading broadly and indiscriminately throughout a large population, that today would fall under acute infectious diseases. This Chinese disease concept, however, was first defined during the Han dynasty (202 BCE–220 CE) within a *configurationist* perspective that emphasised that something in the environment had become pathogenic.

Generally, this perspective means that something in the environment – a configuration of cold or hot air, weather, climate, mists, etc. – caused the outbreak, thus accounting for the fact that many people became sick at the same time with comparable symptoms. In classical Chinese medicine, the external causes were seasonal pathogenic factors such as Cold or Hot seasonal *qi* (Hanson 2011: 16–17). This is in contrast to a *contaminationist* perspective that emphasises human-to-human transmission via some kind of pathogen or contaminant. Both perspectives depended on a third *predispositionist* perspective that explained why some people do not become sick, others do but recover, and still others perish (Rosenberg 1992a: 195–6).

Because literate Chinese physicians were trained to think in terms of macro-microcosm relationships, one scholar has argued that they were more weather-conscious than contagion-conscious (Kuriyama 2000), though conceptions of contagion certainly circulated among the populace at the same time and had a complex history within classical Chinese medicine as well (Leung 2010; Lu 2021, Chapter 14 in this volume). Nonetheless, while the characteristic febrile symptoms of what were called Warm-factor epidemics (*wenyi* 瘟疫) did not

change much over time, interpretations of their etiology, best therapeutic interventions, and appropriate institutional responses changed dramatically from the pre-modern period up through the 2002–2003 SARS epidemic (Hanson 2010).

What was the disease?

Although there is no question that widespread epidemics occurred in the early 1640s, the question about what caused them remains. From Chen's moral argument and Shen's political-economic analysis to medical debates about whether the epidemics were actually Cold Damage or Warm diseases or due to pathogenic climatic *qi* or as yet unidentified anomalous *qi* not related to the weather, it is clear that contemporaries had wide-ranging opinions on the subject. Over 400 years later, although medical historians concur that the end-of-Ming epidemics contributed to the Ming's fall (Zhao 2004), they still remain divided on what caused them, albeit on very different conceptual foundations and in the context of the broader epidemiology of infectious diseases in the Ming-Qing period (Fan Ka-wai *et al.* 2005). While one historian concluded that their cause was a mystery (Elvin 1973), others argued that mostly bubonic plague, and in some causes even pneumonic plague, was definitely the main cause (Cao 1997; Cao and Li 2006), though others noted that dysentery, typhoid, and malaria were also present (Mei and Yan 1996). Still others insist that bubonic plague cannot be conclusively determined in a context within which not only were other diseases occurring simultaneously but also at a time when historical actors' concepts of disease did not neatly fit one-to-one correspondences with modern-day disease concepts (Dunstan 1975; Benedict 1996a, 1996b, 1996c; Hanson 1997, 2011).

So what caused the late Ming epidemics? The present chapter on late imperial epidemiology in China, Part 1, uses this question as a heuristic device to write a broader historiography of epidemics in China and traditional Chinese epidemiology up through the 1970s. First, I present two diametrically opposite approaches to the history of disease that have emerged since the 1970s in the medical history practised in European-American institutions. One scholar has coined the terms 'naturalist-realist' and 'historicalist-conceptualist' to represent the two sides of the broader historical debate (Wilson 2000). Since these two approaches have also largely shaped the medical historiography of China from the late nineteenth century up to the present, next I sketch a historiography of the naturalist-realist method of retrospective epidemiology that dominated treatments of the historical evidence of epidemics in China from the 1870s to the 1930s. Third, I classify scholarship on epidemics in China between the 1940s and 1970s into two disciplinary trajectories: on the one hand, economic and social historians largely concerned about epidemics with respect to demographic transformations in the past and, on the other hand, anthropologists focused on current social and religious responses to epidemics. Despite the different questions scholars sought to answer based on extant records of past epidemics, or their observations of contemporary Chinese responses to them, both types of scholars nonetheless crafted answers to their questions within a shared natural-realist framework.

Two approaches to the history of disease

Answering the question of what caused the late Ming epidemics thus depends on how one approaches them. Should we cast out Chen's human greed and Shen's excessive taxation along with Wu's anomalous *qi* in favour of a list of modern biomedical disease categories that could have caused these epidemics? To do so requires drawing retrospective diagnoses, based

on modern disease concepts, from historical sources on epidemics recorded within very different linguistic realms and cultural frames. Here, the distinction in cultural anthropology between emic and etic viewpoints is instructive: the emic view is the insiders' perspectives, how subjects perceive things, and so whatever distinctions are meaningful within their society; the etic view is the outsiders' perspectives, how observers analyse things in another culture, and so whatever analytical concepts they find meaningful to interpret any given society. The emic view, for example, would value the responses of Chen, Shen, and Wu within their historical milieus; the etic view, by contrast, would use the sources they wrote as evidence to make retrospective diagnoses of the cause of the epidemics according to modern disease concepts. Both approaches are valuable.

Historians have dealt with this fundamental contradiction between past and present interpretations of disease experience in different ways. The medical historian Adrian Wilson summarised the two abovementioned opposing approaches to the history of disease: the *naturalist-realist* and the *historicalist-conceptualist* (Ibid.). Efforts to make retrospective diagnoses of past disease experience based on present understanding exemplify what Wilson termed the naturalist-realist approach. What he designated as the historicalist-conceptualist approach, by contrast, represents scholarship that takes disease concepts themselves – past and present – as objects of historical analysis. From here on, we will refer to this approach more simply as 'historical-conceptual' and borrow from another scholar's shorthand reference to practitioners of the former as 'realists' and of the latter as 'historicists' (Packard 2016).

The realists take the modern disease concept as equivalent to 'natural reality' and thereby seek to connect historical sources about past disease experiences with the present-day modern consensus on disease etiologies. Historicists, by contrast, start from the premise that all knowledge (medical as well as scientific and humanistic) is socially constituted, socially maintained, and dynamic. Knowledge about diseases therefore changes over time depending on the social consensus that surrounds the phenomena the disease concepts refer to at any given time and place, and constitutes the most reliable kind of information about them. The naturalist-realist position also considers scientific and medical knowledge as transcending social context, whereas the historical-conceptual position assumes that even the most stable consensus on somatic disease concepts today have complex socially embedded histories. The naturalist-realist perspective considers that the only relevant past meanings of historical disease concepts are those that fit into a clear trajectory progressing towards a present definition. The historical-conceptual perspective, by contrast, examines the consensus-building process that stabilised past (as well as current) disease concepts. The historicist thus considers historical disease concepts relevant on their own terms with their own histories and logic separate from possible modern correlates (Duffin 2005; Packard 2016).

Randall Packard (2016) argued in his article '"Break-Bone" Fever in Philadelphia, 1780: Reflections on the History of Disease' that, although both approaches have been the basis of a rift within the medical history profession in the West since the 1970s, each approach can make distinct contributions to the history of disease. The influential social historian of American medicine, Charles Rosenberg, famously used the nineteenth-century cholera epidemics in the US as a heuristic device to illuminate major social, political, religious, and economic transformations (Rosenberg 1962). His essay 'Toward an Ecology of Knowledge' moved the field even more towards the sociology of medicine and science (Ibid. 1979). Just over twenty years later, his co-edited volume *Framing Disease* established the position that historicising disease concepts can be just as illuminating of present-day disease concepts that have been conventionally understood within what Wilson later termed the naturalist-realist position (one which Wilson equally considered a cultural construction) by situating

them as emergent and changing as well within specific places, institutions, and time frames (Rosenberg and Golden 1992; Packard 2016).

As one of Rosenberg's students, I was also inspired by another one of my advisors who wrote the essay 'Topics for Research in Ch'ing History' (Naquin and Rawski 1987) and raised epidemics as an important new topic to pursue. It was from this socio-intellectual milieu that my dissertation 'Inventing a Tradition in Chinese Medicine' emerged (Hanson 1997). I also integrated into my analysis of Chinese disease concepts for febrile diseases, however, Andrew Cunningham's critique of retrospective epidemiology: the modern laboratory had so fundamentally changed the identity of infectious diseases, such as plague, that any one-to-one correspondence between modern and past disease concepts was not only futile but even worse, distorted the past (Cunningham 1992). David Harley followed suit along these lines in his article on 'Rhetoric and the Social Construction of Sickness and Healing' (Harley 1999). Taking the opposite position, Roger Cooter argued in '"Framing" the End of the Social History of Medicine' for what was lost in the shift from the social to cultural history of disease through the 'framing disease' metaphor especially related to pragmatic research on medical disparities and justice issues (Cooter 2004).

Since 2007, however, Rosenberg's 'Biographies of Disease' series (Johns Hopkins University Press monographs) fully represents both sides of this academic spectrum. Speaking of his own book in the series, Packard noted that *The Making of a Tropical Disease: a short history of malaria* (Packard 2007) took the *naturalist-realist* position arguing that malaria had existed for centuries as a distinct biological entity, whereas Steve Peitzman's *Dropsy, Dialysis, Transplant: a short history of failing kidneys* (Peitzman 2007) traces a historical-conceptual history of disease concepts on kidney failure. In 2011, I positioned my first book, *Speaking of Epidemics in Chinese Medicine*, firmly on the *historical-conceptual* side of the spectrum (Hanson 2011). In the same year, the paleopathologist and physical anthropologist Piers Mitchell published an influential essay that acknowledged the methodological limitations of a retrospective epidemiology that relied on completely different disease concepts from the past. Yet, he also argued that this approach is viable when researchers seek not to equate current disease concepts uncritically with past ones but rather seek to understand the micro-organism itself, how it spread, and who it infected through careful use of historical sources and archeological evidence (Mitchell 2011: 81–8; Packard 2016: 200).

Later, I published an article on the *naturalist-realist* approach to late imperial Chinese epidemiology through a history of the first fifty years of Western medical maps of diseases in China (Hanson 2017). I neither embraced the *naturalist-realist* position in analysing these disease maps nor applied Mitchell's recommendations for studying the transmission paths of micro-organisms that these same disease maps were often intended to visualise. Rather, I attempted both to situate the maps within the socio-historical milieu of the authors and publications that produced them and to interpret their range of rhetorical functions and how these changed over time revealing new political regimes and intended audiences.

Inspired by the scholars synthesising both sides of the realist-historicist divide in this chapter, I argue, however, that when done judiciously both approaches to past disease concepts can be productive for understanding late imperial Chinese epidemiology. Each perspective illuminates very different dimensions of Chinese medical history. *Historical-conceptual* methods are most useful for understanding the social, cultural, and religious contexts within which historical actors' categories and their own disease concepts made sense. However, *natural-realist* methods, when used judiciously, can be productive for answering questions about political-economic, ecological, and demographic transformations.

Packard wrote about his own work on diseases in colonial and postcolonial Africa, for example, that he 'employed the history of disease as a way of illuminating the complex ecological relationships that link social, economic, and biological processes together to produce disease states' (Packard 2016: 200). Taking a natural-realist approach also allows historians to follow the historical movement of a disease entity across boundaries by controlling for characteristic symptoms, such as the buboes of plague, despite multiple and multivalent disease concepts within one culture and even more variation cross-culturally (Hymes 2014). The modern genetic determination of the *Yersinia pestis* in combination with a scientific analysis of the remains of plague victims, for example, has opened new pathways of historical and scientific collaboration on the global transmission of plague (Green 2014).

In terms of the historiography of late imperial epidemiology in China, authors applied the *naturalist-realist* method of retrospective epidemiology well before they applied the *historical-conceptual* approach to analysing historical actors' categories on their own terms. Part I of this essay thus reviews the history of the former, whereas Part II addresses the history of the latter.

Historiography of retrospective epidemiology in China

Western physicians began to define the 'Diseases of China' from the mid-1800s according to their own medical training in the newly emergent laboratory-based approach to disease – the method that has most informed the *natural-realist* approach. Some notes on epidemics of this period can be found in the letters of the British official Robert Hart (1835–1911) while he was Inspector General of the Imperial Maritime Customs Service (IMCS) from 1868 to 1907 (Fairbank *et al.* 1975). He used the new infrastructure of the Customs Service as a clearinghouse for medical reports of disease among foreigners and Chinese alike across China. Some of the earliest examples of the *naturalist-realist* approach to interpreting epidemics can therefore be found in the forty years of *Medical Reports* in the *Customs Gazette* published from August 1871 to 1911 (Gordon 1884). For the first time, European and American physicians based in China and Japan had a central place to publish their medical observations without limitations in length. The Scottish physician John Dudgeon (1837–1901) based in Beijing and Tianjin during the last forty years of his life wrote several of the earliest medical reports between 1871 and 1875 (Dudgeon 1871a, 1871b, 1872a, 1872b, 1875). He also wrote the first book focused on *The Diseases of China: their causes, conditions, and prevalence contrasted with those of Europe* (Dudgeon 1877). This book illustrates well a transition period when British physicians and their Chinese counterparts had more in common conceptually than divided them, especially regarding disease etiology (Rogaski 2004). Dudgeon even argued, for instance, that the Chinese had a more moderate and healthier diet that Europeans should consider adopting to remedy their dietary and drinking excesses (Li 2010a).

In the late 1870s and early 1880s, the deepening Western medical consensus on disease classification (nosology), new developments in laboratory science in the direction of isolating causative agents, and related developments in medical statistics helped strengthen a *natural-realist* interpretation of China's disease concepts (Hanson 2011: 151–2; 2017). Attempts to understand the epidemics spreading across Yunnan in the 1870s particularly exemplify the earliest natural-realist lens through which Western observers filtered their observations of China's epidemics. Even before Alexandre Émile Jean Yersin (1863–1943) for the first time identified under a microscope the specific *bacillus* that caused plague in his field laboratory during the 1894 bubonic plague epidemic in Hong Kong, a French official of the Imperial Chinese Maritime Customs, Émile Rocher, wrote, 'Notes sur la Peste au Yün-nan' about his

observations of epidemics of the 1870s during the Muslim-led multiethnic Panthay rebellion (1856–1873) in Yunnan (Rocher 1879).

Recognising the significance of Rocher's account for bubonic plague studies, Sir Patrick Manson (1844–1922), considered the founder of tropical medicine based on research he largely did while living in China (Li 2002, 2004, 2012, 2018), translated into English most of Rocher's 'Notes sur la Peste' in his contribution to the *Medical Reports*. Manson also included the first map of the 1871–73 plague epidemics in Yunnan (Manson 1879); a coloured version of this map also appears in Rocher's book published the following year. What local Chinese called *Yangzi bing* 癢子病 – a disease characterised by severe itching of skin or *pruritus* – both Rocher and Manson, by this time, confidently identified as bubonic plague. Their consensus that the 1870s Yunnan epidemics were one thing – namely, bubonic plague even without laboratory confirmation – also contributed to their ability to map them. The following fifty years of Western maps of the diseases of China ranging from plague and cholera to beriberi and apoplexy (stroke) further represent this *natural-realist* approach (Hanson 2017).

The first edition of *The Diseases of China, Including Formosa and Korea*, for example, exemplified the scientific transformations in medicine over the turn of the nineteenth century and included national maps of the major diseases of the period according to Western disease classification (Jefferys and Maxwell 1910). Although the second edition no longer included maps, it brought the first edition up to date with new developments in the *natural-realist* understanding of disease concepts (Jefferys 1928). Another early representative of the *natural-realist* approach from the 1930s is in Wong and Wu's summary of China's historical epidemiology of plague during the 'Period 1894–99' in chapter ten of their *History of Chinese Medicine: being a chronicle of medical happenings in China from ancient times to the present period* (Wong and Wu 1936: 506–37).

Titled 'Describing (a) the spread of plague in China leading to the Great Outbreak at Canton and Hong Kong in 1894 and (b) further consolidation of medical efforts', the authors synthesised the primary sources they relied on to sketch an early history of plague in China. Noting that 'the chroniclers do not differentiate between the diseases met with', they first make the following clarification: 'Treating the subject with our present knowledge of epidemics in China, we can rule out a number of these pestilences as having nothing to do with true plague – especially those following in the wake of war, famine, floods and other catastrophes, which were in all probability typhus and relapsing fever – disease apparently rampant in China from the earliest time'. To determine what were true plague cases, they then followed two criteria: 'A smaller group of outbreaks on the other hand, seem to have been plague visitations, either because they occurred simultaneously with an established plague pandemic (e.g. the Black Death) or because they took place in regions where afterwards the existence of frequent plague epidemics or even endemicity was established (e.g. Mongolia, Shansi)' (Wong and Wu 1936: 506–7).

Because Yunnan no longer had plague by the time they wrote their history of Chinese medicine, Wong and Wu acknowledged the problem of using these earlier sources on the Yunnan epidemics for their history of plague. Because Yunnan was one of the 'regions now entirely free from plague but in the past suspected to have been endemic centres', they justified focusing on the region 'to reconstruct the course of events leading to the 1894 outbreak at Canton and Hongkong' (Wong and Wu 1936: 507). They thereby relied on the earliest accounts by Rocher and Manson discussed above in their retrospective epidemiology of plague in China. Wu Lien-teh's other publications on cholera in 1934 (Wu *et al.* 1934), plague in 1936 (Wu 1936a, 1936b), and his autobiography of 1959 similarly represent this *natural-realist* approach to the history of disease in China (Ibid., 1959). Wu was also the first to propose that

the even earlier late-Yuan epidemics (1344–45, 1356–60, 1362) were plague, despite scarce evidence (Brook 2013: 65).

Also in the 1930s, the Japanese scholar Imura Kôzen published tabulations of epidemic diseases listed in local gazetteers for the Ming dynasty (Imura 1936–37). He thereby established a solid primary source foundation for carrying out retrospective epidemiology as Wong and Wu and their predecessors had exemplified. Because his tabulations preserved all the original disease concepts as they were recorded in the often very terse entries in the local gazetteers, he also made valuable source material more easily accessible for scholars who sought to understand traditional Chinese epidemiology on its own terms using historical-conceptual methods.

Functionalist anthropology and natural-realist demography

In the 1940s to 1960s, one sees a related divergence in how scholars interpreted the history of epidemics in China. On the one side, the anthropologist Francis Hsu wrote a functionalist interpretation of the medical and religious responses that townspeople in Yunnan province took to cholera epidemics in 1942 (Hsu 1952). At that time, Hsu could assume the identity of the epidemics as cholera (natural-realist) in his otherwise more contextual (albeit not historical) analysis of religious and scientific responses to the epidemic. Following what had become by then a well-established *natural-realist* line of reasoning, historians of China also started to refer to epidemics in their narratives of major demographic transformations during the first to eighth centuries (Bielenstein 1947) and the mid-fourteenth century through mid-twentieth century (Ho 1959).

Within China, researchers published *A Glossary on the Names and Symptoms of Ancient Disease* (Yu 1953) and *The Intellectual History of Preventive Medicine in China* (Fan 1955). From a *naturalist-realist* perspective, both scholars attempted to make one-to-one translations of historical disease concepts in line with modern ones, stripping away older meanings in the process. Yet because of the Chinese primary source material provided, their books can be used to understand late imperial Chinese epidemiology from either side of the spectrum. Another Chinese historian using the *naturalist-realist* perspective focused on *The Study of Contagious Diseases in China* (Shi 1956) and thus considered the late Ming physician, Wu Youxing quoted above, as a Chinese expert of contagious disease whose 'deviant *qi* doctrine' was comparable to modern germ theory (Ibid. 1957). Wu's deviant *qi* concept, though, was based within a *configurationist* not *contaminationist* perspective and so incommensurable with germ theory. Furthermore, all three examples of 1950s Chinese scholarship on late imperial epidemiology are themselves best understood as scholarly responses to the early PRC politicising of public health, disease prevention, and control of communicable diseases (Scheid 2002: 67–72; Rogaski 2004: 285–7).

Developing these 1950s Chinese precedents, Joseph Needham and Lu Gwei-djen published an article on 'Hygiene and Preventive Medicine in Ancient China' (Needham and Lu 1962) and a chapter on 'Records of Diseases in Ancient China' for a book on *Diseases of Antiquity* (Ibid. 1967). Both publications also fall on the *naturalist-realist* side of the spectrum, yet also provide useful primary source material for the *historical-conceptual* side. Meanwhile, the Song historian Robert Hartwell integrated records of epidemics and related demographic trends as essential dimensions of his analyses of social and economic transformations during the Song (Hartwell 1967, 1982).

An outlier in this 1960s scholarship, but no less influential, historian Carl Nathan published a book on *Plague Prevention and Politics in Manchuria, 1910–1931* (Nathan 1967). This

book set the foundation for further analyses of the relationship between public health, epidemics, and politics through the example of Penang-born, Cambridge-University-educated, bacteriologist, and self-described 'Plague Fighter', Wu Lien-teh, whom we have already met as an author. Wu had established China's first public health system in response to the Manchurian pneumonic plague epidemic of 1910–11, a historical thread scholars have picked up again since the early 1990s (Benedict 1993; Flohr 1996; Fisher 1995/1996; Gamsa 2006; Lei 2010; Summers 2012; Lynteris 2016). He is also credited with having co-authored the first English *History of Chinese Medicine* published in 1936 (Wong and Wu 1936; Luesink 2009), though by that time they could rely on a foundation of earlier histories of Chinese medicine in Chinese (Xie 1935).

In the 1970s, new developments in ecological and medical history inspired historians of China to turn their attention to what caused the late Ming epidemics. In an ecological reinterpretation of late imperial Chinese history, Mark Elvin succinctly summarised the end-of-Ming epidemiological crisis as follows: 'In 1586–89 and 1639–44 China suffered from the two most widespread and lethal epidemics in her recorded history, although their medical nature remains a complete mystery' (Elvin 1973: 310). Based on Imura's data (1936–37), Elvin sketched the disaster's scope: ninety-two prefectures and counties across thirteen provinces were affected in the 1588–1592 epidemic; seventy-nine prefectures and counties across ten provinces were affected in 1641, the worst year of the 1640s epidemics; of the densely populated provinces, only Sichuan and Guangdong escaped.

Inspired by Elvin, Helen Dunstan attempted to identify the types of epidemic diseases that spread episodically across China during the last six decades of the Ming following the *natural-realist* approach of retrospective diagnosis (Dunstan 1975). Although she questioned whether it was possible to make a positive diagnosis, she nonetheless endeavoured to make one-to-one correspondences between Chinese disease concepts such as *wenyi* 瘟疫 ('febrile epidemics'), *wenbing* 溫病 ('warm disease'), and *shanghan* 傷寒 ('cold damage') and modern Western disease concepts, such as bubonic plague, meningitis, and typhoid. She also expressed scepticism that this was a viable approach with the following question: 'Making the perhaps rather large assumption that all these references from the early seventeenth century to the twentieth are to the actual disease entity, is it possible to arrive at any diagnosis?' (Ibid.: 26). Dunstan was the first historian to begin to analyse Wu Youxing's *Treatise on Febrile Epidemics* (1642) through a more historical-conceptual lens in order to explore the main issues in traditional Chinese epidemiology.

Meanwhile, Francis Hsu, the anthropologist who had previously examined what people actually did in response to the 1942 cholera epidemics in Yunnan province (Hsu 1952), was by 1975 taking notes during a plague prevention ritual that had been held every ten years since the 1870s in Shatin, Guangdong province. Hsu found that the analytic separation between religion and science then current in academic anthropology did not exist in practice. As late as the mid-twentieth century, Chinese responded equally in religious and scientific ways to protect themselves from cholera in 1942 and prevent plague in 1975 (Ibid. 1983). Hsu's functionalist analyses of how ordinary Chinese responded to cholera provided a model for studying epidemics anthropologically comparable to William McNeill's demonstration of the demographic impact of epidemics as he integrated the role of infectious disease as a key player in shaping world history in *Plagues and Peoples* (McNeill 1976). McNeill unified the ecological and cultural dimensions of human experience from the perspective of ecological determinism that supported, for example, his argument that infectious diseases (what he called 'microparasites') greatly facilitated one civilisation (i.e. 'macroparasite') conquering another, as he argued was the case with the European conquest of the Americas. Alfred Crosby developed this ecological determinism further in his *The Columbia Exchange* (Crosby 1972) and *Ecological Imperialism* (Crosby 1986).

With respect to China, McNeill also adopted Wu Lien-teh's earlier claim that plague was the cause of the late Yuan epidemics to support his argument that the Mongolian steppe was the origin of fourteenth-century's Black Death in Europe (McNeill 1976: 132–75; Brook 2013: 65). In one version of McNeill's hypothesis, the Mongol passage through Yunnan in the 1250s was crucial for the plague's transmission to Europe (McNeill 1976: 143–45; Hymes 2014: 287). The 'China origin of plague' hypothesis immediately engaged historians in debate, starting with Michael Dols' demonstration that even Middle Eastern accounts of plague assumed that it came from the East (Dols 1977). Norris took issue with this view (Norris 1977, 1978; Dols 1978). Both sides of this debate nonetheless remained within the *naturalist-realist* epistemology in that neither raised issues with the method of making retrospective diagnoses of plague for past epidemics with a more complex multi-causal epidemiology.

As for historians of China, Denis Twitchett evaluated the effect of epidemics on the population in his analysis of the uneven records for historical demography during the Tang dynasty (Twitchett 1979). While Dunstan could rely on local gazetteers of the Ming for her analysis of sixteenth- through seventeenth-century epidemics across large geographic distances, there were no comparable Tang local gazetteers. Instead, Twitchett had to rely on contemporary registered population records along with the Tang dynastic history's *Treatise on the Five Agents* (*Wuxing zhi* 五行志), where epidemics were listed along with other natural disasters. He used these sources to interpret fluctuations in the population as indicative of one of three things: varying administrative efficacy, changing methods of registration by the state (which were highly variable over time), and disasters of war, famine, and pestilence. In some cases, he argued that it was difficult to tell whether the decreased records of disasters, including epidemics in extant sources, reflected accurate records of fewer natural or manmade disasters or rather problems in the Tang administration's capacity to collect data about their occurrence. He concluded that this discrepancy in the historical records was most likely a combination of both factors. Within a decade, Chinese historical demographers integrated the then current knowledge of China's historical epidemiology with a broad historical overview of China's demography into *The History of Population in China* (Zhao and Xie 1988). This historical synthesis of Chinese demography may be productively understood within the broader 1980s socio-political context of the one-child policy, which was first introduced in 1979 as a means to control population growth in China (Greenhalgh 2008).

Conclusion

In the century following the 1870s, when lab-based bacteriology began to transform concepts of infectious disease in a way that improved tracking their transmission, to the 1970s, when records of epidemics themselves became useful for tracking other types of change, the *natural-realist* approach to late imperial Chinese epidemiology developed and came to dominate the interpretation of historical evidence as well as contemporary experience of epidemics. Even before germ theory transformed laboratory medicine, during the Panthay Rebellion of the 1870s in Yunnan, the diplomat Émile Rocher and English physician Patrick Manson had already agreed on a disease concept of plague that was based mostly on clinical symptoms, and that could facilitate determining its etiology and transmission pathways. Over the next forty years, academics and scientists such as Manson, Western physicians writing 'Medical Reports' for China's *Customs Gazette*, and the co-editors Jefferys and Maxwell of *The Diseases of China* (1910), also made some of the earliest attempts to translate the more multivalent Chinese disease concepts into the more narrowly defined Western medical equivalents.

For the next thirty years, the self-styled 'Plague Fighter', Wu Lien-teh, dominated scholarship on late imperial epidemiology. He had had a key role in first controlling the Manchurian pneumonic plague epidemic in 1910–11 and in managing cholera during the 1930s when he was the Director of the National Quarantine Service, helping track the transmission paths of the plague and cholera epidemics he was charged with controlling, his *natural-realist* perspective facilitated the first retrospective historical epidemiology of plague stretching back to the Yuan dynasty. This interpretation later became influential through McNeill's contested argument about the Chinese origin of the Black Death.

In the next thirty years from the early 1940s to the late 1960s, scholars began to study the history of epidemics in China as a tool for yet other ends. Hsu leveraged his analyses of a contemporary cholera epidemic to challenge the false separation of science and religion in anthropology. The historians Bielenstein, Ho, and Hartwell integrated historical records of epidemics to reveal other social, economic, and demographic transformations in Chinese society. Carl Nathan used the Manchurian plague epidemic as a lens to see how national political crises and global geopolitics intersected in the opening decade of the twentieth century.

In the 1970s, scholarship on late imperial Chinese epidemiology started to become more sceptical about making one-to-one translations between traditional Chinese and modern disease concepts. Following Elvin's doubts about being able to identify the late Ming epidemics based on primary sources, Dunston questioned whether this was even a viable approach. Nevertheless, she suggested that the epidemics were most likely a combination of plague, typhoid, dysentery, and meningitis. Tang records of epidemics were no more illuminating for equating ancient with modern disease concepts, but Twitchett used them effectively to speculate about varying administrative capacities, changing methods of state registration, and fluctuations in population.

Just as many modern-day scholars have used historical records of epidemics as a tool for other ends so too did some pre-modern Chinese commentators. The two accounts of the late Ming epidemics that began this chapter – Chen Qide's political-moral assessment and Mr. Shen's social-economic analysis – were rhetorically comparable to what anthropologists and historians began to do from the 1940s through the late 1960s. Both Chen and Shen, for instance, found the late Ming epidemics of their lifetimes to be useful means to illuminate what they perceived to be the underlying social, moral, political, and economic factors, fissures, and failures that gave rise to them.

Even physician Wu Youxing's criticism of how his predecessors and contemporaries defined febrile epidemics (*wenyi*) as Cold Damage (*shanghan*) rather than Warm diseases (*wenbing*) is rhetorically analogous to the *natural-realist* efforts to match past Chinese disease concepts with new biomedical interpretations. The latter translation strategy characterised one of the most important dimensions of the history of late imperial Chinese epidemiology just over two centuries later from the 1870s through the 1970s. Part II picks up the baton in the 1980s when the *historicist-conceptual* approach to the history of disease and epidemics started to develop within the scholarship of medical historians. This new approach shifted historians' attention to changing meanings of Chinese disease concepts and the therapeutic responses they legitimated both on their own terms and within unique histories deeply embedded within Chinese history. Many of these same disease concepts persist in present-day Chinese medical practices, namely because healers as well as patients continue to find them useful to frame illness experience and determine appropriate therapeutic responses.

Notes

1 *Zaihuang jishi* 災荒紀事 (Record of Disasters and Famines) by Chen Qide 陳其德 in *Tongxiangxian zhi* 桐鄉縣志 (Gazetteer of Tongxiang County), 20.9a.
2 For evidence of blaming human moral failures for widespread epidemics in Daoist thought of the late Han to early medieval period, see ch. 2 on 'Demonology and Epidemiology' in Strickmann (2002). For evidence of this in European medical history, see Rosenberg (1992a, 1992b).
3 For Mr. Shen's account of the epidemics in context of broader decline of the economy and social order from 1640 to 1643, see *Guianxian zhi*, 27.16b–17a.
4 For a punctuated version of this text, see appendix in Chen (1958: 289–91). Primary text in *Guianxian zhi*, 27.16b–17a.
5 A picul of rice equalled about 133.3 pounds or 60.4 kilograms. A tael of silver equalled about 1.3 ounces or 37.6 grams. One copper cash equalled a string of 100 copper coins. Although from about 1500 to 1645 the exchange ratio of copper coin to tael fluctuated between 500 and 750, the ratio skyrocketed after 1640 when in Beijing, and especially the Yangzi Delta, it rose above 1,000 to 2,000 copper coins per tael by 1645. For 1640, the exchange ration was 800 copper cash/tael (von Glahn 1996: 160).
6 This figure is also calculated on the 800 copper coins/silver tael exchange ratio with 1 tael to 1.3 ounces.
7 This quotation and those following by Wu Youxing come from his preface to *Wenyi lun*. See *Wenyi lun pingzhu*, 2; or *Wenbingxue quanshu*, 981.
8 This and the following translation come from Wu Youxing's preface to the *Wenyi lun*. See *Wenyi lun ping zhu*, 1–2; and *Wenbingxue quanshu*, 981.

Bibliography

Pre-modern sources

Guianxian zhi 歸安縣志 (Gazetteer of Guian County) 1882, Li Yixiu 李昱修 and Lu Xinyuan 陸心源 (eds) (1970), Taipei: Chengwen chubanshe. For Mr. Shen's account of the epidemics in context of broader decline of the economy and social order from 1640–1643, *juan* 27, 16b–17a.

Tongxiangxian zhi 桐鄉縣志 (Gazetteer of Tongxiang County) 1887, Yan Chen 嚴辰 (ed.) (1970), Taipei: Chengwen chubanshe.

Wenbingxue quanshu 溫病學全書 (Complete Works on the Studies of Warm Disorders), Li Shunbao 李順保 (ed.) (2002), 2 vols., Beijing: Xueyuan chubanshe.

Wenyi lun 瘟疫論 *Treatise on Febrile Epidemics*, 1642, Wu Youxing 吳有性 (c. 1582–1652), Critical edn. by Meng Shujiang 孟淑江 and Yang Jin 楊進. Beijing: Remin weisheng chubanshe, 1990.

Wenyi lun ping zhu 瘟疫論評注 (Critical Notes and Annotations on the 'Treatise on Febrile Epidemics'), Liu Fangzhou 劉方舟 (ed.) (1709), first reprint (1977), second reprint (1985), Beijing: Renmin weisheng chubanshe.

Zaihuang jishi 災荒紀事 (Record of Disasters and Famines) 1641, Chen Qide 陳其德 in *Tongxiangxian zhi* 桐鄉縣志 (Gazetteer of Tongxiang County) 1887, Yan Chen 嚴辰 (ed.) (1970), Taipei: Chengwen chubanshe, *juan* 20, 8a–9a.

Zaihuang youji 災荒又記 (Another Record of Disasters and Famines) 1642, Chen Qide 陳其德 in *Tongxiangxian zhi* 桐鄉縣志 (Gazetteer of Tongxiang County) 1887, Yan Chen 嚴辰 (ed.) (1970), Taipei: Chengwen chubanshe, *juan* 20, 9b–10a.

Modern sources

Bauer, W. (ed.) (1979) *Studia Sino-Mongolica: Festschrift für Herbert Franke*, Wiesbaden: Franz Steiner.

Benedict, C. (1988) 'Bubonic plague in nineteenth-century China', *Modern China*, 14.2: 107–55.

——— (1993) 'Policing the sick: plague and the origins of state medicine in late imperial China', *Late Imperial China*, 14.2: 60–77.

——— (1996a) *Bubonic Plague in Nineteenth-Century China*, Stanford, CA: Stanford University Press.

——— (1996b) 'Framing plague in China's past', in G. Hershatter *et al.* (eds) *Remapping China: fissures in historical terrain*, Stanford, CA: Stanford University Press, pp. 27–41.

——— (1996c) 'Epidemiology and history: an ecological approach to the history of plague in Qing China', *Chinese Environmental History Newsletter*, 3.1: 6–11.
Bielenstein, H. (1947) 'The census of China during the period 2–742 A.D.', *Bulletin of the Museum of Far Eastern Asia*, 19: 125–63.
Boroway, I. (ed.) (2009) *Uneasy Encounters: the politics of medicine and health in China 1900–1937*, Frankfurt: Peter Lang.
Brook, T. (2013) *The Troubled Empire: China in the Yuan and Ming dynasties*, Cambridge, MA: Belknap Press of Harvard University Press.
Brothwell, D. and Sandison, A.T. (eds) (1967) *Diseases in Antiquity: a survey of the diseases, injuries, and surgery of early populations*, Springfield: Thomas.
Cao Shuji 曹树基 (1997) 'Shuyi liuxing yu Huabei shehui de bianqian' 鼠疫流行与华北社会的变迁 (1580–1644) (Plague epidemics and social transformations in North China) *Lishi yanjiu* 历史研究 (Historical Research), 1: 17–32.
Cao Shuji 曹树基 and Li Yushang 李玉尚 (2006) *Shuyi: zhanzheng yu heping: Zhongguo de huanjing yu shehui bianqian, 1230–1960* 鼠疫: 战争与和平: 中国的环境 与社会变迁 (1230–1960) (Plague: war and peace: environmental and social transformations in China, 1230–1960), Ji'nan: Zhongguo huabao chubanshe.
Chen Hengli 陳恆力 (1958) *Bu nongshu yanjiu* 補農書研究 (Research on the 'Supplement to the Treatise on Agriculture'), Beijing: Nongye chubanshe.
Conrad, L.I. and Wujastyk, D. (eds) (2000) *Contagion: perspectives from pre-modern societies*, Aldershot: Ashgate.
Cooter, R. (2004) '"Framing" the end of the social history of medicine', in F. Huisman and J.H. Warner (eds) *Locating Medical History: the stories and their meanings*, Baltimore, MD: Johns Hopkins University Press, pp. 309–37.
Crombie, A.C. (ed.) (1963: 2nd edn 1977) *Scientific Change*, London: Heineman.
Crosby, A. (1972) *The Columbia Exchange: biological and cultural consequences of 1492*, Contribution to American Studies, no. 2, Westport, CT: Greenwood Press.
——— (1986) *Ecological Imperialism: the biological expansion of Europe, 900–1900*, Cambridge: Cambridge University Press.
Cunningham, A. (1992) 'Transforming plague: the laboratory and the identity of infectious disease', in A. Cunningham and P. Williams (eds) *The Laboratory Revolution in Medicine*, Cambridge: Cambridge University Press, pp. 209–44.
Cunningham, A. and Williams, P. (eds) *The Laboratory Revolution in Medicine*, Cambridge: Cambridge University Press.
Dols, M. (1977) *The Black Death in the Middle East*, Princeton, NJ: Princeton University Press.
——— (1978) 'Geographical origin of the Black Death: comment', *Bulletin of the History of Medicine*, 52.1: 112–13.
Dudgeon, J. (1871a) 'Report on the health of Peking for the half year ended 31st March, 1871', *Customs Gazette, Medical Reports*, No. 1, April–June, 6–15, Shanghai: The Customs Press. Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020.
——— (1871b) 'Report on the physical conditions of Peking and the habits of the Pekinese as bearing upon health, first part', *Customs Gazette, Medical Reports*, No. 2, July–September, 73–82, Shanghai: The Customs Press. Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020.
——— (1872a) 'Report on the health of Peking for the half year ended 30th September, 1871', *Customs Gazette, Medical Reports*, No. 3, January–March, 7–9, Shanghai: The Customs Press. Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020.
——— (1872b) 'Report on the physical conditions of Peking and the habits of the Pekinese as bearing upon health, second part', *Customs Gazette, M* Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020. *Medical Reports*, No. 4, April–September, Shanghai: The Customs Press, pp. 29–42.
——— (1875) 'Report on the health of Peking for the half year ended 31st March, 1875', *Customs Gazette, Medical Reports*, No. 9, October–March, 34–44, Shanghai: The Customs Press. Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020.

——— (1877) *The Diseases of China: their causes, conditions, and prevalence contrasted with those of Europe*, Glasgow: Dunn and Wright. Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020.

Duffin, J. (2005) *Lovers and Livers: disease concepts in history*, the 2002 Joanne Goodman lectures, Toronto, ON: University of Toronto Press.

Dunstan, H. (1975) 'The late Ming epidemics: a preliminary survey', *Ch'ing-shih wen-t'i*, 3.3: 1–59.

Elvin, M. (1973) *The Pattern of the Chinese Past: a social and economic interpretation*, Stanford, CA: Stanford University Press.

Fairbank, J.K., Bruner, K.F. and Matheson, E.M. (eds) (1975) *The I.G. in Peking: letters of Robert Hart Chinese maritime customs 1868–1907*, Cambridge, MA: The Belknap Press of Harvard University Press.

Fan Ka-wai, Yu Xinzhong, Cheung Hok-ming and Lao Sze-nga (2005) 'Studies on Ming dynasty infectious diseases', *Ming Qing Yanjiu*, Napoli, Italy: 133–50.

Fan Xingzhun 范行準 (1955) *Zhongguo yufang yixue sixiang shi* 中國預防醫學思想史 (The Intellectual History of Preventive Medicine in China), Beijing: Renmin weisheng chubanshe.

Fisher, C.T. (1995/1996) 'Bubonic plague in modern China: an overview', *Journal of the Oriental Society of Australia*, 27 and 28: 57–104.

Flohr, C. (1996) 'The plague fighter: Wu Lien-teh and the beginning of the Chinese public health system', *Annals of Science*, 53: 361–80.

Gamsa, M. (2006) 'The epidemic of pneumonic plague in Manchuria 1910–1911', *Past and Present*, 190 (February): 147–83.

Gordon, C.A. (1884) *An Epitome of the Reports of the Medical Officers to the Chinese Imperial Maritime Customs Service, from 1871 to 1882: with chapters on the history of medicine in China; materia medica; epidemics; famine; ethnology; and chronology in relation to medicine and public health*, London: Bailliere.

Green, M.H. (ed.) (2014) *Pandemic Disease in the Medieval World: Rethinking the Black Death*, TMG Occasional Volume 1, Kalamazoo; Bradford: Arc Medieval Press.

Greenhalgh, S. (2008) *Just One Child: science and policy in Deng's China*, Berkeley: University of California Press.

Hanson, M. (1997) *Inventing a Tradition in Chinese Medicine: from universal canon to local medical knowledge in south China, the seventeenth to the nineteenth century*, PhD thesis, Department of the History and Sociology of Science, University of Pennsylvania.

——— (2001) 'Robust northerners and delicate southerners: the nineteenth-century invention of a southern *wenbing* tradition', in E. Hsu (ed.) *Innovation in Chinese Medicine*, Cambridge: Cambridge University Press, pp. 262–92.

——— (2010) 'Conceptual blind spots, media blindfolds: the case of SARS and traditional Chinese medicine', in A. Leung and C. Furth (eds) *Health and Hygiene in Chinese East Asia: publics and policies in the long twentieth century*, Chapel Hill, NC: Duke University Press, pp. 369–410.

——— (2011) *Speaking of Epidemics in Chinese Medicine: disease and the geographic imagination*, London: Routledge Press.

——— (2017) 'Visualizing the geography of the diseases of China: Western disease maps from analytical tools to tools of empire, sovereignty, and public health propaganda, 1878–1929', *Science in Context*, 30.3: 219–80.

Harley, D. (1999) 'Rhetoric and the social construction of sickness and healing', *Social History of Medicine*, 12: 407–35.

Hartwell, R. (1967) 'A cycle of economic change in imperial China: coal and iron in northeast China, 750–1350', *Journal of Economic and Social History of the Orient*, 10: 102–59.

——— (1982) 'Demographic, political and social transformations of China, 750–1550', *Harvard Journal of Asiatic Studies*, 42.2: 365–442.

Ho Ping-ti (1959) *Studies in the Population of China 1368–1953*, Cambridge, MA: Harvard University Press.

Hsu, E. (ed.) (2001) *Innovation in Chinese Medicine*, Cambridge: Cambridge University Press.

Hsu, F.L. (1952; 2nd edn 1973) *Religion, Science, and Human Crises: a study of China in transition and its implications for the West*, London: Routledge and Kegan Paul; repr. Westport, CT: Greenwood Press.

——— (1983) *Exorcising the Trouble Makers: magic, science, and culture*, contributions to the Study of Religion, No. 11, Westport, CT: Greenwood Press.

Huisman, F. and Warner, J.H. (eds) (2004) *Locating Medical History: the stories and their meanings*, Baltimore, MD: Johns Hopkins University Press.

Hymes, R. (2014) 'Epilogue: a hypothesis on the East Asian beginnings of the Yersinia pestis polytomy', in M.H. Green (ed.) *Pandemic Disease in the Medieval World: rethinking the Black Death*, Kalamazoo; Bradford: Arc Medieval Press, pp. 285–308.

Imura Kôzen 井村哮全 (1936–37) 'Chihôshi ni kisaiseraretaru Chûgoku ekirei ryakkô', 地方志に記載せられたる中國疫癘略考 (Brief Study of Records of Chinese Epidemics in Local Histories), 8 parts, *Chûgai iji shimpô* 中外醫事新報 (*New Journal of Chinese and Foreign Medicine*), no. 1232, pp. 5–17; no. 1233, pp. 12–21; no. 1234, pp. 14–24; no. 1235, pp. 20–28; no. 1236, pp. 25–33; no. 1237, pp. 25–28; no. 1238, pp. 28–33; no. 1239, pp. 30–39.

Jefferys, W.H. (1928) *The Diseases of China, including Formosa and Korea*, 2nd edn, Shanghai: A.B.C. Press.

Jefferys, W.H. and Maxwell, J.L. (1910) *The Diseases of China, including Formosa and Korea*, Philadelphia, PA: P. Blakiston's Son.

Katz, P. (1995) *Demon Hordes and Burning Boats: the cult of Marshal Wen in late imperial Chekiang*, New York: State University of New York Press.

Kim, Yung Sik and Bray, F. (eds) (1999) *Current Perspectives in the History of Science in East Asia*, Seoul: Seoul National University Press.

Kiple, K.F. (ed.) (1993) *The Cambridge World History of Human Disease*, Cambridge: Cambridge University Press.

Kuriyama, S. (1993) 'Concepts of disease in East Asia', in K.F. Kiple (ed.) *The Cambridge World History of Human Disease*, Cambridge: Cambridge University Press, pp. 52–9.

——— (2000) 'Epidemics, weather, and contagion in traditional Chinese medicine', in L.I. Conrad and D. Wujastyk (eds) *Contagion: perspectives from pre-modern societies*, Aldershot: Ashgate, pp. 3–22.

Lau, D.C. (trans) (1970) *Mencius*, Harmondsworth: Penguin.

Lei Hsiang-lin S. (2010) 'Sovereignty and the microscope: constituting notifiable infectious disease and containing the pneumonic plague in Manchuria', in A. Leung and C. Furth (eds) *Health and Hygiene in Modern Chinese East Asia: policies and publics in the long twentieth century*, Durham, NC: Duke University Press, pp. 73–106.

Leung, Angela Ki Che [Liang Qizi 梁其姿] (1987) 'Organized medicine in Ming-Qing China: state and private medical institutions in the lower Yangzi region' *Late Imperial China*, 8.1: 134–66.

——— (1997) *Shishan yu jiaohua: Ming Qing de cishan zuzhi* 施善與教化:明清的慈善組織 (Bestow Charity and Transform via Education: charitable institutions in the Ming and Qing), Taipei: Lianjing chuban shiye gongsi.

——— (2010) 'Evolution of the idea of *chuanran* contagion in imperial China', in A. Leung and C. Furth (eds) *Health and Hygiene in Chinese East Asia: policies and publics in the long twentieth century*, Durham, NC: Duke University Press, pp. 25–50.

Leung, A. and Furth, C. (eds) (2010) *Health and Hygiene in Chinese East Asia: policies and publics in the long twentieth century*, Durham, NC: Duke University Press.

Li Shang-Jen 李尚任 (2002) 'Natural history of parasitic disease: Patrick Manson's philosophical method', *Isis*, 93.2: 206–28.

——— (2004) 'The nurse of parasites: gender concepts in Patrick Manson's parasitological research', *Journal of the History of Biology*, 37.1: 103–30.

——— (2010a) 'Discovering "the secrets of long and healthy life": John Dudgeon on hygiene in China', *Social History of Medicine*, 23.1: 21–37.

——— (2010b) 'Eating well in China: diet and hygiene in nineteenth-century treaty ports', in A. Leung and C. Furth (eds) *Health and Hygiene in Chinese East Asia: policies and publics in the long twentieth century*, Durham, NC: Duke University Press, pp. 109–31.

——— (2012) *A Physician to Empire: Patrick Manson and his founding of British tropical medicine*, Taipei: Asian Culture Publishing.

——— (2018) 'Visualisation in parasitological research: Patrick Manson and his Chinese assistants', in V. Lo and P. Barrett (eds) *Imagining Chinese Medicine*, Leiden: Brill, pp. 457–66.

Lo, V. and Barrett, P. (eds) (2018) *Imagining Chinese Medicine*, Sir Henry Wellcome Asian Series, Volume 18, Leiden: Brill.

Lu, D. (2021) 'History of Epidemics in China: Some reflections on the role of animals', *Asian Medicine: Journal of the International Association for the Study of Traditional Asian Medicine*, 16.1.

Luesink, D. (2009) 'Wu Lien-teh and the history of Chinese medicine: empires, transnationalism and medicine in China, 1908–1937', in I. Boroway (ed.) *Uneasy Encounters: the politics of medicine and health in China 1900–1937*, Frankfurt: Peter Lang, pp. 149–76.

Lynteris, C. (2016) *Ethnographic Plague: configuring disease on the Chinese-Russian frontier*, London: Palgrave Macmillan.

Manson, P. (1879) 'Dr. Manson's report on the health of Amoy for the half-year ended 31st March 1878', *Customs Gazette, Medical Reports*, 2 (January–March 1878): 25–27. Chinese Imperial Maritime Customs Service (1871–1911) *Customs Gazette, Medical Reports*, https://www.hathitrust.org/, accessed 27/3/2020.

McNeill, W.H. (1976; 2nd edn 1998) *Plagues and Peoples*, New York: Anchor Books.

Mei Li 梅莉 and Yan Changgui 晏昌貴 (1996) '*Guanyu Ming dai chuanranbing de chubu kaocha*' 關於明代傳染病的初步考察 (A preliminary study of infectious disease in the Ming), *Journal of Hubei University*, 5: 80–88.

Mitchell, P. (2011) 'Retrospective diagnosis and the use of historical texts for investigating disease in the past', *International Journal of Paleopathology*, 1: 81–88.

Naquin, S. and Rawski, E.S. (1987) 'Topics for research in Ch'ing history', *Late Imperial China*, 8.1: 187–203.

Nathan, C.F. (1967) *Plague Prevention and Politics in Manchuria, 1910–1931*, Harvard East Asian Monographs, Cambridge, MA: Harvard University Press.

Needham, J. (1970) *Clerks and Craftsman in China and the West: lectures and addresses on the history of science and technology*, Cambridge: Cambridge University Press.

Needham, J. and Lu Gwei-djen (1962) 'Hygiene and preventive medicine in ancient China', *Journal of the History of Medicine and Allied Sciences*, 17, reprinted in J. Needham (1970), pp. 340–78; and J. Needham and N. Sivin (2000), pp. 67–94.

——— (1967) 'Records of diseases in ancient China', in D. Brothwell and A.T. Sandison (eds) *Diseases in Antiquity*: *a survey of the diseases, injuries, and surgery of early populations*, Springfield: Thomas, pp. 222–37; republished as 'Diseases of Antiquity in China', in K.F. Kiple (ed.) (1993), pp. 345–53.

Needham, J. and Sivin, N. (ed.) (2000) *Science and Civilization in China, Vol. 6, biology and biological technology, part VI: medicine*, Cambridge: Cambridge University Press.

Norris, J. (1977) 'East or West? The geographic origin of the Black Death', *Bulletin of the History of Medicine*, 51.1: 1–24.

——— (1978) 'Response' [to M. Dols (1978)], *Bulletin of the History of Medicine*, 52.1: 114–20.

Olson, A. and Voss, J. (eds) (1979) *The Organization of Knowledge in America 1860–1920*, Baltimore, MD: Johns Hopkins University Press.

Packard, R. (2007) *The Making of a Tropical Disease: a short history of malaria*, Baltimore, MD; London: Johns Hopkins University Press.

——— (2016) 'The fielding H. Garrison lecture: "Break-Bone" fever in Philadelphia, 1780: reflections on the history of disease', *Bulletin of the History of Medicine*, 90.2: 193–21.

Parsons, J. B. (1970) *Peasant Rebellions of the Late Ming Dynasty*, Tucson: University of Arizona Press.

Peitzman, S. (2007) *Dropsy, Dialysis, Transplant: a short history of failing kidneys*, Baltimore, MD; London: Johns Hopkins University Press.

Qi Tao 祁濤 (1981) 'Wu Youxing 'liqi shuo' qiantan' 吳有性' 戾氣說' 淺談 ('A superficial discussion of Wu Youxing's doctrine of deviant *qi*'), *Yunnan zhongyi xueyuan xuebao* (The Journal of the Yunnan College of TCM), 4: 7–8.

Rocher, Émile (1879) *La Province Chinoise du Yün-nan* (The Chinese Province of Yunnan), Paris: E. Leroux.

Rogaski, R. (2004) *Hygienic Modernity: meanings of health and disease in treaty-port China*, Berkeley: University of California Press.

Rosenberg, C.E. (1962) *The Cholera Years: the United States in 1832, 1849, and 1866*, Chicago, IL: University of Chicago Press.

——— (1979) 'Toward an ecology of knowledge: on discipline, context, and history', in A. Olson and J. Voss (eds) *The Organization of Knowledge in America 1860–1920*, Baltimore, MD: Johns Hopkins University Press, pp. 440–55.

——— (1992a) *Explaining Epidemics and Other Studies in the History of Medicine*, Cambridge: Cambridge University Press.

——— (1992b) 'Framing disease: illness, society, and history', in C.E. Rosenberg and J. Golden (eds) *Framing Disease: studies in cultural history*, New Brunswick: Rutgers University Press, pp. xiii–xxvi.

Rosenberg, C.E. and Golden, J. (eds) (1992) *Framing Disease: studies in cultural history*, New Brunswick: Rutgers University Press.

Sandison, A.T. (ed.) (1967) *Diseases in Antiquity*: *a survey of the diseases, injuries, and surgery of early populations*, Springfield: Thomas.

Scheid, V. (2002) *Chinese Medicine in Contemporary China: plurality and synthesis*, Durham, NC; London: Duke University Press,

Schipper, K. (1985) 'Seigneurs royaux, dieux des épidémies', *Archives de Sciences Sociales des Religions*, 59.1: 31–40.

Shi Changyong 史常永 (1956) *Zhongguo chuanran bing xue* 中國傳染病學 (The Study of Contagious Diseases in China), Shanghai: Shanghai weisheng chubanshe.

——— (1957) 'Shilun chuanranbing xuejia Wu Youke ji qi liqi xueshuo' 試論傳染病學家吳又可及其戾氣學說 ('An essay on the scholar of infectious diseases, Wu Youxing, and his doctrine of deviant *qi*'), *Yixueshi yu baojian zazhi* 醫學史與保健雜誌 (Journal of Medical History and Health), 9.3: 180–6.

Strickmann, M., edited by B. Faure (2002) *Chinese Magical Medicine*, Asian Religions and Cultures, Stanford, CA: Stanford University Press.

Summers, W.C. (2012) *The Great Manchurian Plague of 1910–1911: the geopolitics of an epidemic disease*, New Haven, CT: Yale University Press.

Temkin, O. (1963; 2nd edn. 1977) 'The scientific approach to disease: specific entity and individual sickness', in A. C. Crombie (ed.) *Scientific Change*, London: Heineman, pp. 629–47; republished in O. Temkin (1977), pp. 441–5.

——— (1977) *The Double Face of Janus and Other Essays in the History of Medicine*, Baltimore, MD: Johns Hopkins University Press.

Twitchett, D.C. (1979) 'Population and pestilence in T'ang China', in W. Bauer (ed.) *Studia Sino-Mongolica: Festschrift für Herbert Franke*, Wiesbaden: Franz Steiner, pp. 35–68.

von Glahn, R. (1996) *Fountain of Fortune: money and monetary policy in China 1000–1700*, Berkeley: University of California Press.

Will, P. (1990) *Bureaucracy and Famine in Eighteenth-Century China*, Stanford, CA: Stanford University Press; translated by E. Forster, originally published as *Bureaucratie et famine en Chine au 18e siècle* (1980), Paris: École des Hautes Études en Sciences Sociales; Hague: Mouton.

Wilson, A. (2000) 'On the history of disease concepts: the case of pleurisy', *History of Sciences*, 38: 271–319.

Wong, K.C. and Wu Lien-teh (1936) *History of Chinese Medicine: being a chronicle of medical happenings in China from ancient times to the present period*, Shanghai: National Quarantine Service.

Wu Lien-teh (ed.) (1936a) *Manchurian Plague Prevention Service Memorial Volume: 1912–1932*, Shanghai: National Quarantine Service.

——— (1936b) *Plague: a manual for medical and public health workers*, Shanghai: Weishengshu National Quarantine Service.

——— (1959) *Plague Fighter: the autobiography of a modern Chinese physician*, Cambridge: W. Heffer.

Wu Lien-teh, Chun, J.W.H., Pollitzer, R. and Yu, C.Y. (1934) *Cholera: a handbook for the medical profession in China*, Shanghai: National Quarantine Service.

Xiao Defa 肖德發 (1987) 'Shilun Wu Youke *Wenyi lun* de zhuyao xueshu guandian', 試論吳又可瘟疫論的主要學術觀點 ('An essay on the principal scholarly views of Wu Youxing's *Treatise on Febrile Epidemics*'), *Jiangxi zhongyi yao*, 2: 1–3.

Xie Guan 謝觀 (1935; 2nd edn 1970) *Zhongguo yixue yuanliu lun* 中國醫學源流論 (On the Origins of Medicine in China), Taipei: Jinxue shuju.

Yu Xinzhong (ed.) (2004) *Wenyi xia de shehui zhengjiu: Zhongguo jin shi zhong da yiqing yu shehui fanying yanjiu* 瘟疫下的社會拯救:中國近世重大疫情與社會反應研究 (Social Salvation during Epidemics: studies of serious modern epidemics and social responses in China), Beijing: Zhongguo shudian.

Yu Yan 余嚴 (Name Given as Yunxiu 雲岫) (1953) *Gudai jibing ming hou shu yi* 古代疾病名候疏義 (Glossary on the Names and Symptoms of Ancient Diseases), Beijing: Renmin weisheng chubanshe.

Zhao Wenlin 赵文林 and Xie Shujun 谢淑君 (1988) *Zhongguo renkou shi* 中国人口 史 (The History of Population in China), Beijing: Renmin chubanshe.

Zhao Xianhai 趙獻海 (2004) 'Mingmo da yi yu Ming wangchao di miewang' 明末大疫 與明王朝滅亡 (Epidemics at the end of the Ming and the fall of the Ming empire), in Yu Xinzhong (ed.) *Wenyi xia de shehui zhengjiu*瘟疫下的社會拯救 (Social Salvation during Epidemics), Beijing: Zhongguo shudian, pp. 49–101.