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LATE IMPERIAL EPIDEMIOLOGY, PART 2

New material and conceptual methods, 1980s to 2010s

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The previous chapter concluded with two clear themes: (1) historical actors as well as historians, demographers, and anthropologists have wrestled with retrospective diagnosis of epidemic diseases, revealing in the process that disease concepts had complex histories as much in the past as they do today; and (2) historical actors and modern scholars alike have found epidemics to be useful as a diagnostic lens on contemporary problems, whether as fault lines in the moral economy, as fissures in social order, or as failures in governance. While both of these key themes continue into the present, the scholarship on late imperial epidemiology from the 1980s to the present markedly differs from that of the previous century in terms of both conceptual and material methods. ('Material methods' refers to extant primary sources; 'conceptual methods' refers to how people interpret them.) From late nineteenth-century Western physicians to 1970s historians of Chinese demography, for example, the history of late imperial epidemiology was dominated conceptually by a naturalist-realist perspective. From the 1980s onwards, however, medical historians have increasingly explored late imperial Chinese epidemiology from the historical-conceptual side of the spectrum.

As for material methods, historical records of epidemics created by Chinese administrators (from dynastic histories to local gazetteers and jottings), religious leaders (from tracts on doctrines to rituals and liturgy), and medical authorities (from treatises to case records) constituted the primary-source foundation for the former period. From the 1980s onwards, however, geneticists began to develop means to extract human and bacterial DNA (aDNA) from ancient remains, and so bring new evidence into the conversations about the global history of epidemics. The resulting new field of paleomicrobiology since the 1990s has analysed ancient DNA (aDNA) in ways that confirmed, for example, the retrospective diagnoses of a range of infectious diseases from tuberculosis in ancient Egypt to plague in fourteenth-century Europe and influenza in the US during the 1918 Spanish Flu pandemic. Furthermore, scientific research on the history of non-human diseases and even viruses has developed additional evidence that medical historians may both historicise and integrate into new global histories of disease in non-human as well as human populations.

By 1997, one also finds the full range of conceptual methods applied to the history of late imperial Chinese epidemiology, when one medical historian applied retrospective

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epidemiology to argue that the late Ming epidemics were mostly due to plague (Cao 1995, 1997), while I took a more historical-conceptual approach to the same epidemics in my PhD thesis and book (Hanson 1997, 2011).

Finally, this essay reviews the main transformations in scholarship in the past twenty years on both sides of the spectrum. The historical-conceptual side dug deeper into historical actors' categories, while the naturalist-realist side took a definitive genetic turn. Initially, the two approaches were considered incompatible (Wilson 2000); yet more recently, some historians are willing not only 'to wear both hats' (Packard 2016), but also to integrate aDNA isolation of the *Yersinia pestis* in plague victims in Europe into their histories of epidemics in medieval China, where comparable remains have yet to be found (Hymes 2014; Brook 2020). These historians demonstrate how syntheses of both sides of this methodological divide allow medical as well as socio-economic historians to switch judiciously between two sides of the spectrum of conceptual methods: namely contextualising past disease concepts on their own terms and the related responses to epidemics, and also using current scientific criteria not only to identify the infectious cause of past epidemics retrospectively but also for historical ends related to a deeper understanding of social, economic, and environmental transformations.

Historiography of Chinese late imperial epidemiology in the 1980s–1997

Within China during the 1980s, medical historians also began to integrate the history of disease more into general Chinese history, first in *A History of Disease in China* (Chen 1981) and then in the *New Significance of the History of Disease in China* (Fan 1989; on epidemics, see 161–94, 241–4). Both authors began to study the history of epidemics as means to explore questions in social, economic, and demographic history. Following more along the anthropological lines of enquiry about Chinese experiences of epidemics that Francis Hsu initiated from the 1940s to 1980s (Hsu 1952, 1983), Kristofer Schipper described a Taoist (Daoist) ceremony in Taiwan that occurred every three years to protect the community from epidemic diseases (Schipper 1985). While Hsu's work described one community's scientific as well as religious responses to a cholera epidemic in order to reveal problems with a religion-science binary then prevalent in anthropology, Schipper explained how three distinct levels of one Chinese community – the Taoist priesthood, local village chiefs, and the popular or vernacular – attempted to appease the epidemic gods within what he considered to be a coherent religious framework with long historical antecedents in mainland China that persisted in modern-day Taiwan. Both Hsu and Schipper thus explored Chinese epidemic responses in pursuit of other aims, such as demonstrating the inadequacies of Western models to do justice to the social meanings and functions of ritual within Chinese contexts. Their ethnographies furthermore record details of religious and social responses to epidemics that historical documents rarely record and that more naturalist-realist oriented authors largely disregard.

With regard to the history of modern public health in China, Kerrie MacPherson produced a detailed portrayal of the foreign settlement in Shanghai from 1843 to 1893 and the public health infrastructure foreign settlers initiated (MacPherson 1987; Chapter 47 in this volume). She showed that Western medical and sanitary principles were successfully implanted and later fused with Chinese reformist efforts in areas open to Western ideas, especially in Hong Kong and Peking during the 1890s. Taking the epidemiological model developed by British epidemiologist William Farr (1807–1883) as it was carried out in China as one example, and demonstrating that Westerners negotiated with Chinese social reformers, MacPherson refuted previous interpretations that emphasised imperialist exploitation.

Although she applied a symmetric approach to the social negotiation over Farr's model among Chinese and Westerners, she did not entertain the possibility that Chinese disease concepts or public health methods themselves might have been relevant to this interaction.

In the same year, however, Angela Leung published two articles related to China's public health history that did better justice to the *longue-durée* history of Chinese medical governance. The first article traced the transformation from late medieval ideals of state medical governance during the Song-Jin-Yuan period to more privatised medical and charitable institutions during the Ming dynasty in the Lower Yangzi Delta region (Leung 1987). The second article examined the related evolution of smallpox prevention measures in the Ming and Qing dynasties as a way to examine the broader phenomenon of privatisation of medical and charitable institutions (Leung 1987–88). Meanwhile, to explore the conceptual foundations of Chinese medical thought that arguably underlay this history of state and private medical governance, Nathan Sivin translated a 1970s textbook on Chinese medicine in order to analyse how the meanings of core medical terms had changed from classical times to the 1970s China (Sivin 1987).

When Susan Naquin and Evelyn Rawski wrote in their review article that the history of disease and epidemics was an important new research trajectory in Qing history (Naquin and Rawski 1987), they captured a shift in the China field that was well under way. In response to their question 'When epidemic diseases struck, what were the responses of the state and of communities to the crisis?', they proposed that the study of the transmission paths of epidemics in the past could help clarify communication and transport networks, migration routes, and levels of social interaction. This review exemplified how mainstream historians saw value in the natural-realist angle on China's disease history. Just a year later, Carol Benedict (1988) analysed the spread of epidemics of plague from Western Yunnan to the Southeast Coast microregion during the nineteenth century, applying William Skinner's macroregion model, predominantly used within Chinese social and economic history, for the first time to Chinese historical epidemiology (see the Appendix for map). But she also discussed Chinese disease concepts and various treatments for what clinically appeared to be plague, as well as social reactions to Western treatments and draconian quarantines. Published in the same year, the analysis of *The Epidemiological Transition in Hong Kong: Changes in Health and Disease since the Nineteenth Century*, however, took a public health approach to many of the same historical sources to narrate Hong Kong's epidemiological transition from acute infectious diseases, arising out of poverty, food scarcity, and poor sanitation, to predominantly chronic diseases under improved living conditions (Phillips 1988).

Applying instead a political-history perspective, Carney Fisher (1988) evaluated the influence of a 1550 smallpox epidemic on Ming-Mongol relations during the Jiajing 嘉靖 reign (1522–67). He demonstrated how smallpox epidemics influenced the Altan-qaghan's decision to accept tributary status with the Ming government, for instance, and discussed some of the healing methods for, and social taboos created around, smallpox. Chinese, for whom smallpox was an endemic childhood disease that granted immunity to those who survived it, were often asked during this period to help take care of Mongols for whom smallpox was epidemic and thus more deadly for adult Mongols, not previously exposed as were Chinese during childhood. For Fisher, the 1550 smallpox epidemic was an illuminating lens on unique dimensions of sixteenth-century Chinese-Mongol political and social relationships, rather than an occasion to problematise how to identify smallpox in China's past or contextualise how Chinese conceptualised it then.

Other historians nonetheless had grasped the baton of the historical-conceptual method and started to apply it to explain the cultural distinctiveness of Chinese concepts of disease.

Dean Epler analysed 'Cold Damage' (*shanghan* 傷寒) in the first known Chinese disease monograph, the *Treatise on Cold Damage and Miscellaneous Disorders* (*Shanghan zabing lun* 傷寒雜病論), by Han physician Zhang Ji 張機 (150–219 CE). Cold Damage referred to both its general aetiology due to cold (within a configurationist understanding of pathogenic climatic factors) and its major symptoms of excessive heat and cold aversion (Epler 1988). From then on, Cold Damage meant both an ontological cause (cold) and multiple physiological signs (heat and cold aversion). This multivalent meaning of Cold Damage fits well medical historian Owsei Temkin's (1977) famous distinction between disease as a specific entity (ontological) and as an individual's sickness (physiological) (Chapter 14 in this volume).

Several scholars followed suit along these lines of interpretation in the early 1990s with chapters for *The Cambridge World History of Human Disease* that explained East Asian disease concepts on their own terms (Jannetta 1993; Kuriyama 1993; Leung 1993). In a historical survey on 'Sexually transmitted diseases in modern China', another scholar discussed some Chinese terms for, and so understanding of, venereal diseases though within a natural-realist frame (Dikötter 1993). In a comparable vein, Chinese historian Hsiao Fan examined an even wider range of Chinese disease terminology from the early to late medieval period that illuminated how Chinese related the environment to local diseases, sometimes making one-to-one correspondences to modern disease concepts (Hsiao 1993). Medical historian Shigehisa Kuriyama, by contrast, took a fully historical-conceptual approach to the history of disease in his analysis of the earliest Chinese concepts of pathogenic wind, the human body, and an individuated self (Kuriyama 1994).

Continuing the legacies of anthropologists Hsu and Schipper, historian Kenneth Dean included a chapter about a cult to a medical god in *Taoist Ritual and Popular Cults of South-East China* (Dean 1993). Similarly, Paul Katz united disease and social history by situating the cult of Marshal Wen (Marshal of Epidemics) within religious communities of late imperial Zhejiang province (Katz 1995). Combining both the historical-conceptual and the natural-realist perspectives, Chang Chia-feng analysed Chinese 'strategies of dealing with smallpox' (*dou* 痘, lit. 'bean' with an illness radical) as part of a range of religious responses to 'fetal poison' (*taidu* 胎毒), the main Chinese disease concept that overlaps with the symptoms of modern-day smallpox (Chang 1995, 1996a, 1996b, 1996c). But Chinese conceptualised *dou* not as caused by an external infectious agent but rather as a type of congenital 'fetal poison' internal to all humans that needed to be expelled (*shang deng dou* 上等痘) in order for them to survive into adulthood, which made a great deal of sense considering that, for at least the Chinese population it had become a nearly universal childhood disease.

These developments in historical-conceptual approaches continued during the early 1990s alongside natural-realist approaches. Grasping the baton from Naquin and Rawski's proposal to integrate the history of epidemics into Qing history, Carol Benedict argued that the government's responses to plague epidemics during the New Policies period (1900–11) helped establish the first state medical institutions for modern China (Benedict 1993). Meanwhile, French scholars published a naturalist-realist overview of the effect of epidemics of plague, cholera, smallpox, and leprosy on China, which also explained Chinese medical approaches to understanding and treating them (Lu *et al*. 1995). In her book on plague in nineteenth-century China, Benedict approached from a more historical-conceptual perspective the earlier epidemics of late Ming (Benedict 1996a). She cautioned historians of disease not to assign the biomedical category 'bubonic plague' hastily to epidemics for which there was little historical evidence of either bubo-like swellings or death of plague-vector rodents. She combined modern-day scientific evidence of plague reservoirs – animal-based reservoirs of the plague bacillus – with Chinese descriptions of symptoms to determine which epidemics

were likely bubonic plague. Two sources of evidence, one biological and the other theoretical, helped her reconstruct the diffusion of plague from Yunnan in the southwest to Fujian along the southeastern coastline. Developing upon her earlier publications, her book synthesised modern scientific research on natural plague reservoirs in China with G. W. Skinner's regional systems analysis of economic and social change to determine the diffusion patterns of plague in China from the late eighteenth through the early twentieth century.

Benedict (1996b, 1996c) also separately wrote articles on methodological approaches to epidemiology and history in modern China that clarified for medical historians of China the distinctions that Wilson (2000) would later call naturalist-realist and historical-conceptual approaches. During the same period, Carney Fisher reviewed primary sources and secondary scholarship on bubonic plague in China from the 1800s through the 1980s without, however, including Benedict's more nuanced mid-1990s scholarship that cautioned, as already noted, against retrospective diagnoses of bubonic plague without specific primary evidence (Fisher 1995–96).

Naturalist-realist interpretation of the end-of-Ming epidemics as plague

In 1995, the Chinese historian of demography, Cao Shuji, used McNeill's 'China origin of plague' argument to stitch together a narrative from actual Chinese primary sources to place the origin of plague in Mongolia itself and as the cause of the late Yuan epidemics of 1344–45, 1356–60, and 1362 (Cao 1995). Cao followed this article two years later in 1997 with another one that argued that during the late Ming catastrophes of 1587–88, 1639–41, and 1643–44, the widespread epidemics in China were also due to plague (Ibid. 1997). Cao thus reexamined the evidence for identifying the two waves of epidemics of the late Ming as bubonic plague and, in a few cases, pneumonic plague. His scholarship at that time exemplified what the naturalist-realist perspective could contribute to historical epidemiology. First, he argued that these epidemics were either bubonic or pneumonic plague based on accounts in local gazetteers and modern evidence of natural plague reservoirs in Inner Mongolia (Ibid.). Scholars had previously pointed out that it is both biomedically difficult (Dunstan 1975) and theoretically problematic to identify plague without laboratory evidence of the *Yersinia pestis* – the bacterial cause of both the bubonic and pneumonic forms of plague (Cunningham 1992: 211–19; Benedict 1996a: 8–9). Nonetheless from textual, ecological, and historical evidence, Cao argued for the retrospective diagnosis of bubonic plague in the northern provinces. The local gazetteer descriptions of symptoms, such as a 'node' or 'hard lump' (*he* 核), 'swollen neck' (*zhongxiang* 腫項), and boils/swelling disorder (*geda bing* 疙疸病), align with plague (though he included the symptoms of 'enlarged heads' (*datou* 大頭) and 'obstructed throat' (*houbi* 喉痺) that do not), and accounts of mortality rates of 40% to 90% and a two-to-three-day mortality span all suggested to him plague.

Cao used ecological and historical evidence to further support his hypothesis of plague in the north. A natural plague reservoir exists today on the Inner Mongolian Plateau (Benedict 1996a: 6). Cao argued that it spanned a much wider region during the Ming and Qing dynasties: this reservoir included Mongolian pasture lands just north, east, and west of the Great Bend section of the Yellow River and south along the Great Wall at the northern borders of Hebei and Shanxi (Cao 1997: 28). Although the tarbagan (Mongolian-Siberian marmot) also lives across Inner Mongolia, Cao focused on the Mongolian gerbil (*Meriones unguiculatus*) as the more important natural host for the Asiatic flea that carries the plague bacillus in this region (Ibid.: 27–9). Normally, according to Cao, the bacillus, flea, and Mongolian gerbil lived in a symbiotic host–parasite relationship on the Inner Mongolian and Shiliyn Boyd Uul

Plateaus, rarely changing the course of human history. Seen within this broader ecological, economic, and social setting, Cao used a broad brush to attribute the drastic demographic losses from 1580 to 1640 mostly to plague.

Cao pinpointed the beginning of this process of depopulation by disease in the early Jiaqing reign (1522–1566), when there was a large migration of Han settlers to the northern Shanxi region bordering Inner Mongolia from 1533 to 1534. The Han migrants began the extensive transformation of the region's environment from pastureland to agricultural fields that upset the ecological balance of the natural plague reservoirs (Ibid.: 28–9). He did not consider, however, the possibility of concurrent smallpox epidemics (Fisher 1988), to which we will return. A similar process occurred in late eighteenth-century Yunnan when a large influx of migrant workers arrived to mine mineral deposits and so expanded urban settlements, which led to an increase in intraregional trade and encroachment on the natural plague reservoirs. With newly opened agricultural lands came an increase in human settlement on the dry plateau and an expansion of markets.

This commercial expansion ultimately led to plague outbreaks from 1772 to 1830 in Yunnan (Benedict 1996a: 24–9). One hypothesis is that these socio-economic changes in the region combined to disrupt the rodents' normal habitats, forcing them into new interactions or, at least, proximity with humans or their domestic animals, increasing chances that people would come into more contact with plague-carrying rodents. In addition, a significant decline in yearly precipitation and the resulting droughts during the reigns of Wanli (1573–1620) and Chongzhen (1628–1644) led to regular famines that weakened human resistance to disease and further expanded the opportunities for rodent-human contact. In such years of dearth, both animals and humans forage for food in new regions, losing their resistance to disease and spreading it as they migrate. According to modern research, people in Shandong during droughts also dug into the nests of the plague-carrying gerbils seeking the grain they had stored there and, in some cases, even eating the gerbils, thereby increasing their chances of dying (Cao 1997: 29).

Although Cao did not adequately consider the range of disease possibilities, his focus on the effect of the two waves of epidemics in Shaanxi and the North China macroregion (Shanxi, Henan, Hebei, and Shandong) synthesised evidence on the northern origin of the 1580–88 and 1633–44 epidemics that clarified transmission patterns more broadly for epidemics throughout the North China macroregion. By applying a naturalist-realist method of retrospective epidemiology to a wide range of sources, Cao sketched an epidemiological picture in the North China macroregion in the 1580s, and again in the 1630s–1640s, that contributed to the history of epidemics in China. Cao significantly contributed to clarifying transmission pathways, temporal duration, local severity, and range of underlying factors that contributed to the late Ming outbreak epidemics, even if the historical evidence does not yet conclusively support his bubonic-plague hypothesis.

A naturalist-realist critique of the end-of-Ming epidemics as only plague

Clearly, severe droughts and famines, combined with continued Mongol raids, peasant uprisings from 1628 to 1644 (Parsons 1970), and Manchu invasions starting again in 1629 (Atwell 1988), led to a second wave of epidemics in the North China macroregion that were even more complex, widespread, and destructive to the population than the earlier 1588–89 epidemics (Cao 1997: 25–6). Manchu military forces finally broke through the Shanhai Pass on the far eastern shore of Hebei province in December 1629, continued their raids through

the early 1630s, entered the northern Zhili region in the summer of 1636, and so approached the capital in Beijing (Atwell 1988: 629). Despite clear military successes over the previous seven years, the Manchus then suddenly withdrew from the region. There was in 1635–36 an epidemic outbreak at Shanhai Pass. Despite Cao's argument that this too was plague, smallpox was a significant concern within the Manchu military (Chang 2002), as it was also for the Mongols in the previous century (Fisher 1988).

Furthermore, beginning with the initial rise of Manchu power in the 1610s well into the consolidation period after 1644, smallpox played a significant role in Manchu military and political decisions (Chang 1996a: 169–92). Since at least 1613, the Manchus organised their campaigns to avoid contact with smallpox patients; they also distinguished the Mongol and Manchu princes who had survived smallpox from those who had not experienced it. In 1613, the Jurchen chieftain Nurhaci (1559–1626) decided not to withdraw his troops from Usu, a Yehe Manchu city, despite a smallpox epidemic raging there, because he wanted to avoid spreading it to his other troops. In 1627, and again in 1633, the new Jurchen leader Hong Taiji 皇太極 (1592–1643) of the Later Jin dynasty (r. 1626–1636) decided to withdraw Mongol and Manchu princes who had not experienced smallpox from campaigns in both Korea and China (Ibid.: 172, 179).

As for the epidemic in 1636 on the northern Shaanxi border in Yulin prefecture, the following year it spread further south to Yan'an prefecture in north central Shaanxi. Datong in northern Shanxi also had an epidemic in 1637. These prefectures were all sufficiently close to the horse markets along the northern frontier and the natural plague reservoirs on the Inner Mongolian Plateau to have possibly experienced plague outbreaks. For the next three years leading up to 1640, there was a hiatus in epidemics in three of the provinces of the North China macroregion, excluding Shandong. The shift of the peasant rebellions to the southwest in Shaanxi and Sichuan, and south to Henan and Hubei, left Shanxi, Hebei, and Shandong provinces virtually free of rebel activity from 1637 to 1640. The decline in political upheaval that reduced the numbers of dislocated, moving, and homeless people largely explains the break in epidemics (see Maps 10–13 in Parsons 1970: 59, 61, 67, 73).

In 1639, however, another epidemic ravaged the population in Shandong in the region surrounding the provincial capital Jinan. Cao curiously did not discuss this epidemic in his tally of late-Ming plague epidemics. The connection between this epidemic and a Manchu retreat similarly weighs against a plague diagnosis. The epidemic broke out shortly after Hong Taiji crossed the Great Wall in the winter of 1638 and raided Shandong by the first month of 1639. Shortly afterwards, the Manchu armies penetrated deep into the Central Plain and reached Jinan, Shandong, where epidemics broke out in the surrounding region at Qihe, to the northwest of Qihe in Yucheng, and also in Linqing to the east. The historian Frederic Wakeman wrote that it had not been determined 'whether the Manchus brought the illness with them, or turned back because of it' (Wakeman 1985: 143, fn. 171; Dunstan 1975: 27–8; Spence 1990: 24). Yet, he still cited the General Zuo Maodi (1601–1645), who sent a memorial in 1643 from Linqing in Shandong reporting that he estimated 30% died from starvation, 30% from smallpox, and the remaining 40% were forced into banditry in order to survive (Wakeman 1985: 155, fn. 216).

The Manchus thought that smallpox was one of their greatest enemies; as a natural barrier, it proved more formidable than the Great Wall for Ming military forces. The regent Dorgon of the child emperor Shunzhi (r. 1638–1661) went to great lengths to protect the emperor from contact with smallpox. Even before the Manchu victory, the child was made to spend long periods in a pox isolation centre (*bidousuo* 避痘所) to quarantine him from contact with people who had smallpox. Once the Qing forces had settled in Beijing, in 1645,

they forced the Chinese who suffered from smallpox to move a dozen or so miles out of the capital (Chang 1996a: 174; Wakeman 1985: 465–6). Nonetheless, the year after the Manchu entered the capital on June 6th, 1644, a major smallpox epidemic broke out there (Dunstan 1975: 27; Chang 2002). Long familiar with the symptoms of smallpox, the Manchus had policies to protect those in the ruling family and upper military ranks who had not experienced it as children and therefore had not acquired immunity. It was only after their conquest of China, however, that they began to adopt Chinese variolation methods to protect themselves. Despite such precautions against smallpox infection, the Shunzhi emperor died from it in 1661.

As for the Lower Yangzi microregion, the severe epidemic that erupted in 1639 for the first time may have also been due in part to the same smallpox epidemic that hit the Jinan region in Shandong the same year. The 1639 epidemics in Jiangnan do not appear, however, to have been extensions of the northern epidemics of 1633–1637, but rather were the consequence of the combined effects of floods in northern Zhejiang, bad weather in Jiangsu, and locusts in Anhui, all of which contributed to severe famines (Hanson 1997: 350–4). The tax increase during that same summer and dearth of foreign silver bullion since 1636 also made it difficult for peasants to purchase rice, even when it was available (Atwell 1988: 632).

In 1640, another major epidemic hit Shandong, but available primary sources do not specify its nature; nor do they indicate that a smallpox epidemic continued through the following year. An epidemic erupted again the same year in the northwest and central regions of the North China macroregion, with greater virulence than before. This epidemic hit Fengxiang prefecture to the far northwest of Shaanxi, Hejian prefecture to the east of Beijing, Shunde prefecture in southwest Hebei, and Zhangde and Huaiqing prefectures in northern Henan. Instead of coming out of north and central Shanxi, as the Wanli epidemics did, the 1641 epidemic spread out simultaneously from Hebei and Henan provinces. It subsided in 1642, but struck again in Hebei, Henan, and Shanxi provinces from 1643 to 1644 when, coupled with internal warfare and the Manchu invasion, it took its most devastating toll (Cao 1997: 23–7).

The campaigns of rebel-leader Li Zicheng (1605?–1645) in Henan during the spring of 1641 could not have facilitated the spread of the northern epidemics south of Kaifeng prefecture (where there was a severe epidemic) through Anhui to Jiangsu and Zhejiang in the Lower Yangzi macroregion. Although the rebel army, and fleeing Chinese in their wake, may well have spread the epidemic through major thoroughfares in northern provinces, the rebels neither went far enough out of southern Henan, nor deeply enough into northern Anhui, to connect them with the epidemics in the Lower Yangzi macroregion (Atwell 1988: 633).

The records describe buboes-like symptoms in northern provinces during the mid-1640s epidemics: 'boils disorder' in the 1643 epidemic in Beijing and surrounding region to the northwest; and 'hard lumps under the armpits' in the 1644 epidemic in Lu'an prefecture of central Shanxi. The 'enlarged head epidemics' also reached northern Shandong's Binzhou County the same year (Hanson 1997: 358). Although Cao examined the transmission paths of the 1633–1637 epidemics throughout North China, he falsely assumed that once the epidemic arrived by 1641 in northern Henan and southern Hebei, it rapidly spread south to Jiangnan (Cao 1997: 27). Evidence of buboes-like symptoms, for example, does not appear in the primary sources for the Jiangnan region, though other types of symptoms do. Such clinical symptoms are only found in gazetteers from northern not southern provinces. The concentration in the northern provinces of buboes-like symptoms indicates that, if these epidemics were indeed plague, they probably did not spread south to Jiangnan. The range of symptoms described in the local gazetteers indicates that physicians had not reached a

consensus on the character of these epidemics, unlike smallpox and other known diseases. When editors compiled the local gazetteers for each region, they may have borrowed the designation for the epidemic given in an earlier local gazetteer.

Furthermore, several accounts of the 1640–44 epidemics in the southern Zhejiang and Jiangsu gazetteers refer variously to 'Sheep's Wool heat epidemic' (*yangmaowen* 羊毛瘟), 'Sheep's Wool clove-like sores' (*yangmao ding* 羊毛丁), and 'Sheep's Wool papules' (*yangmao zhen* 羊毛疹) – a cluster of disease concepts unique to this time and place that does not appear in any northern records. This phrase appears first in Zhejiang during a 1640 epidemic in Huzhou prefecture south of Lake Tai, and then again in Jiangsu during the 1644 epidemic in Zhenjiang prefecture just northwest of Lake Tai. The gazetteer sources are from Wucheng County in Zhejiang and from Dantu, Danyang, and Jintan counties in Jiangsu (Imura, 1936–37: no. 7, 20–1). The *Gazetteer of Wucheng County*, for example, records: 'In 1640 an epidemic raged; the symptoms were unusual and incomprehensible. It was called Sheep's Wool epidemic. Strands of sheep's wool would suddenly come up out of foods and fruits. All those who accidentally ate [this contaminated food] would immediately get sick and die' (Imura 1936–7, no. 7: 21; Dunstan 1975: 24–7; Hanson 1997: 109–10).

With only these scant textual sources, it is not possible after over 300 years to biomedically identify the Sheep's Wool epidemics in 1640 Huzhou and 1644 Zhenjiang prefectures as plague or any other modern disease category. Nevertheless, clearly contemporaries understood their experience to be unprecedented; nor did they borrow from preexisting medical terms for buboes. We also find that smallpox epidemics clearly raged at the end of the Ming in different regions of China, especially judging from how Manchus made considerable efforts to avoid contact with smallpox victims. Furthermore, in the context of severe famines and far from the natural plague reservoirs in Inner Mongolia, some other possible candidates for the late Ming epidemics in the Lower Yangzi macroregion are also typhus, one of the most lethal famine fevers in human history (Zinsser 1934: 159–60; Cartwright 1972: 18–65), and other water-borne infectious diseases such as dysentery and typhoid.

To sum up, Cao did not apply a macroregional systems analysis to examine the possibility of multiple epidemic diseases as did Carol Benedict (Benedict 1993, 1996a). Nor was he engaged with her scholarship when he published his. Furthermore, Chang's scholarship on the Manchu fears of smallpox provided further evidence that smallpox not plague erupted in Shandong in 1639 and 1643, and then in Beijing in 1645. Cao did not determine whether the same epidemics spread southwards through the cities along the canal and the Yangzi River throughout the Lower and Middle Yangzi macroregions. As we have just seen, smallpox certainly and other possibilities seem more likely (Hanson 1997: 109).

This revised naturalist-realist account of the late Ming epidemics argues that a combination of infectious diseases – smallpox certainly, something that may never be identified associated with 'sheep's wool' in Jiangsu and Zhejiang, and possibly because of the famine and war of the period typhus, dysentery, and typhoid – better explains the range of possibilities for epidemics along the lower reaches of the Yangzi River in the early 1640s. This multifactorial assessment is more complex and convincing than the easier to grasp, but methodologically flawed, retrospective diagnosis of plague for most of the late Ming epidemics. Furthermore, by taking a more historical-conceptualist approach to the primary sources of the period, we can learn a great deal about how southern Chinese wrote about their experience of the 1640s epidemics from cosmo-moralistic judgements to political-economic interpretations. One physician's response, in fact, reveals a crisis of confidence in the conventional cosmology that held together Chinese society as profound as their experience of the political convulsions of the last years of the Ming.

Historical-conceptual perspectives on end-of-Ming epidemics

A switch to a historical-conceptual lens on medical responses to the epidemics from the same period also opens up new avenues of interpretation aiming at very different objectives. As we saw in Part 1, figures like Chen Qide and Mr. Shen had interpreted epidemics in cosmological, social, and moral terms. Their contemporary, the Suzhou physician Wu Youxing, by contrast, took a strictly medical approach to the epidemics of 1641. Instead of interpreting them as manifestations of agrarian crises, excessive taxation, political corruption, moral failures, or the breakdown of the social order, Wu explained them in his preface to the *Treatise on Febrile Epidemics* completely within a naturalist framework. While Chen sought moral solutions and Shen worried about paying off debts, Wu criticised conventional treatment methods, promoted experimentation with new drug therapies, and launched an attack on traditional epidemiology through a new understanding of 'warm diseases' (*wenbing* 溫病), distinct from the Cold Damage framework within which Warm diseases were originally understood to be spring illnesses due to latent cold acquired during the winter.

If we situate his *Treatise* within the social-intellectual issues of his time, Wu Youxing's criticism of traditional epidemiology illuminates aspects of late imperial Chinese social and intellectual history. The broad trend of cosmological criticism since the sixteenth century clearly informed Wu Youxing's critique of traditional medical cosmology in the seventeenth (Henderson 1984: 163–4; Hanson 2011: 92–3). Wu redefined 'febrile epidemics' (*wenyi* 瘟疫), to which 'warm diseases' belonged, as being caused by a kind of 'deviant *qi*' (*liqi* 戾氣) that did not follow normal seasonal cycles of *qi*. While Chinese classical medicine understood epidemics to be the result of anomalies in the seasonal *qi* within a universal, agrarian cosmology based on the cyclical changes of seasons, Wu used 'deviant *qi*' to explain epidemics as the contingent consequence of the local and unclassified *qi* of a particular time and place, independent of predictable seasonal change.

Wu thereby challenged the most basic assumption in Chinese medical theory: the assumption of a system of correspondence between cosmological phases, seasonal cycles, and individual health. His new epidemiology represented a major shift in medical thinking among certain Ming and Qing physicians from a universal-cosmological to a local-environmental framework. While reading his *Treatise on Febrile Epidemics* as a naturalist-realist would find little evidence of bubonic plague beyond mention of the subcategory 'boils/swelling disorder epidemics' (*geda wen* 疙瘩瘟) mentioned earlier in the review of Cao's research, approaching it as a historical-conceptualist opens up many questions about the medical world within which Wu Youxing wrote his *Treatise* in response to the late-Ming epidemics.

For instance, Wu was part of a long historical tradition of medical scepticism towards classical medical texts among his predecessors, who found them spatially and temporally limited. The concept of anomalous disorders proved useful for thinking through problems within traditional cosmological categories. But instead of identifying the epidemics he witnessed with climatic pathogens out of season, due to northern rather than southern climates, or possibly the pathogenic environment of the Far South, Wu newly attributed the epidemics to pathogenic local *qi*.

Furthermore, the chaos of the mid-seventeenth century challenged the intellectual elite, compelling them to re-evaluate traditional cosmology and forcing them to become sceptical towards a regular and comprehensible universe (Henderson 1984: 171). Comparable to the astronomers of the same period, many of whom had read Western astronomical works that had challenged their Chinese training, Wu also thought that there were fundamental imponderables and irregularities in the world that were not simply due to the limitation

of knowledge, though in his case without any known Western exposure (Ibid.: 248). If boundaries such as those which distinguished each season could not contain the activity of pestilential *qi*, then such phenomena simply changed, irrespective of a regular sequence, and were thus temporally and spatially contingent. The order of the universe, according to Wu, was fundamentally varied and unpredictable. Epidemics exposed the weakness of the system of correspondence based on seasonal configuration and opened up the realm of discourse to other ways of explaining epidemics.

Henceforth, for those who followed these new arguments within the febrile discourse, the identity of Warm diseases became tied to that of epidemics and separated from their previous association as a type of Cold Damage. Those who continued to align themselves with the Cold Damage tradition and the 'canonical formula current' (*jingfang pai* 經方派) associated with it, however, never accepted this distinction. They continued to understand Warm diseases as merely one of several possible seasonal transformations of an original underlying Cold Damage disorder. In the eighteenth century, physicians who aligned themselves with 'Han learning' (*Hanxue* 漢學) or the 'Return to antiquity' (*fugu* 復古) movement would, in fact, harden their position as a defence against the spread of the 'contemporary formula' (*jinfang* 今方) or 'modern formula' (*xinfang* 新方) currents of learning with which Wu Youxing would later become associated.

Nonetheless, Wu's conceptualisations of heterogeneous, pestilential, anomalous, and deviant *qi*, as well as his thoughts on the limitations of knowledge, occurred during a period of profound scepticism among educated elites. The traditional medical framework was found to be just as insufficient as the corrupted Confucian classics that formerly legitimated state ideology. Wu's critique of medical cosmology had profound effects on later physicians, because it exposed the limitations of the cosmology generally and introduced a new way of defining diseases, particularly epidemic ones. It thus became the basis for a new discourse on epidemics in the succeeding eighteenth through nineteenth centuries (Hanson 1997, 1998). Asking only natural-realist questions about what caused the late-Ming epidemics not only limits answers to medical causes, despite even contemporary Chinese accounts to the contrary of multiple socio-political-moral causes, but worse, ignores the richer history of Chinese medical scepticism and the broader socio-intellectual trends within which Chinese physicians articulated solutions to perceived limitations within their received medical traditions.

Historical-conceptual scholarship on the history of Chinese medicine 1997 onwards

Several other scholars have contributed to an expanding trend to contextualise historically Chinese disease concepts. French historians Catherine Despeux and Frédéric Obringer published a book analysing concepts of the 'cough' (*ke* 咳, *sou* 嗽) that focused on actors' categories in ancient and medieval Chinese medicine (Despeux and Obringer 1997). In the history of modern medicine in China, Bridie Andrews analysed how Chinese physicians first assimilated as well as questioned germ theory from the 1850s to 1930s through their various translations of the Western disease concept 'tuberculosis' (*fei jiehe* 肺結核 'lung tubercule'), including the Chinese disease concept literally meaning 'exhaustion disorder' (*laobing* 癆病) that corresponded well with the English 'consumption' (Andrews 1997). Angela Leung carried out a historical-conceptual analysis of the changing meanings of the Chinese disease concept 'numbing wind' (*mafeng* 痲瘋), which had many overlapping symptoms with those subsumed under the modern disease concept Hansen's disease or the outdated leprosy (Leung 1999).

The following year, medical historians published a cross-cultural synthesis of concepts of contagion (Conrad and Wujastyk 2000) that included three relevant chapters: one on 'Epidemics, weather, and contagion' argues that although there was 'contagion-consciousness' among ordinary people the scholarly Chinese medical tradition was more weather-conscious because of its broader cosmological frame (Kuriyama 2000); a chapter on the 'Threatening Stranger' (*kewu* 客忤) unpacks a unique concept of contagion in Chinese paediatrics (Cullen 2000); and a third chapter on the concept of 'Dispersing the Foetal Toxin of the Body' demonstrates how this therapeutic strategy was integral to treating smallpox as a congenital not contagious disease (Chang 2000). Furthermore, many contributions to Elisabeth Hsu's (2001) edited volume *Innovation in Chinese Medicine* can be considered representative of historical-conceptual methods. One chapter relates the history of doctrines underlying Chinese epidemiology to Northern-Song intellectual and political history (Despeux 2001). Another presents the history of medical case records as a distinct genre (Cullen 2001), within which physicians also recorded their responses to epidemics. My contribution charted the nineteenth-century development of a new discourse on epidemics in the Qing dynasty that took a regional as well as empirical turn (Hanson 2001).

Meanwhile, Leung cast her net even more broadly to examine local medical treatments (Leung 2001) and the relationship between concepts of disease and concepts of locality (Ibid. 2002). Her later articles on the popularisation of medicine in the Ming-Qing period (Ibid. 2003a), medical learning from the Song to the Ming (Ibid. 2003b), and vaccination in nineteenth-century Canton (Ibid. 2008) were not directly on the history of Chinese disease concepts but essential reading nonetheless for understanding their broader context. A decade after her first article on 'numbing wind', Leung completed *Leprosy in China: A History* (Ibid. 2009). This is a historical-conceptual *longue-durée* 'biography' of the disease concepts 'numbing wind' and 'skin afflictions with ugly sores' *li/lai* 癘 that Leung argued often resembled the symptoms of Hansen's disease but that had their own unique historical trajectories over Chinese medical history. Just as in the nineteenth century, the modern disease concept bubonic plague became equated with the late nineteenth-century neologism 'rat epidemics' (*shuyi* 鼠疫) (Benedict 1996a) and beriberi was equated with the fourth-century 'foot *qi*' (*jiaoqi* 腳氣), despite covering a much wider range of symptoms, since then (Smith 2008a, 2008b); modern leprosy has also found equivalents in the Chinese disease concepts *li/lai* 癘 and *mafeng* 痲瘋, despite their historically more multivalent and complex meanings.

Leung chose to write the opening chapter to the book she co-edited with Charlotte Furth on *Health and Hygiene in Chinese East Asia* (Leung and Furth 2010) on the 'Evolution of the Idea of *Chuanran* Contagion in Imperial China'. With this chapter, she effectively brought insights from her previous biographies of Chinese disease concepts to bear on the *longue-durée* history of *chuanran* 傳染 – the Chinese term chosen in the early twentieth century to translate contagion and infection. Since the early seventh century, the second character used the metaphor 'to dye' to signify 'to contaminate', similarly to infection's roots in *infecire* 'dye'. In the twelfth century, the first character meaning 'transmission' is first found combined with 'dye', first to mean contamination via sexual exchange and then to human-to-human disease transmission. But Leung argues that *chuanran* cannot be reduced to modern 'contagion' because over more than a millennium, it accrued multiple layers of meaning. These include non-human-to-human contamination, contact with pathogenic environmental *qi*, non-epidemic as well as epidemic diseases, and even sexually transmitted diseases. Her historical archeology of *chuanran*'s multivalency uncovers a finely granulated spatio-temporal terrain of how Chinese articulated disease transmission that cannot be reduced to modern-day contagion.

This methodological criticism of one-to-one translations holds as well for the retrospective diagnoses that translate Chinese disease concepts with equally complex historical legacies into modern disease concepts. Yet, major breakthroughs in the genetics of aDNA have forged a new path towards doing just this, opening new avenues of research in the process that have brought scientists and historians together in productive new ways.

Scientific transformations in the history of plague in China since 2011

During the first decade of the twenty-first century, scientists applied new methods to determine the genetics of the plague bacillus, *Yersinia pestis*, work that proved also to transform historical interpretations of the plague's global trajectory. A major genetic turn occurred in the global history of plague with the full gene sequencing of *Y. pestis* in 2011 based on aDNA that was gathered from human remains at East Smithfield (London's Black Death cemetery). This breakthrough solidified arguments that *Y. pestis* was one of the causative factors in the first plague outbreak in London from 1348 to 1350 and transformed historical scholarship on medieval plague thereafter (Green 2014, 2020). It also stimulated new lines of genetic research on the history of plague in China.

Shortly afterwards, Chinese geneticists made more precise claims about the evolution and origin of plague that are particularly important for the 'Chinese origin hypothesis' (Cui et al. 2013). Summing up this research, historian Robert Hymes wrote that their research 'signals a new departure in the cumulative study of the genetics of the bacillus over the preceding fifteen years' (Hymes 2014: 285). Based on genetic evidence, they made bold historical claims that sometime between 1142 and 1339, there was a 'polytomy' (namely, the simultaneous or nearly simultaneous genetic divergence of multiple lineage branches) from which most of today's strains of *Y. pestis* developed. Furthermore, they argued that the Qinghai-Tibet Plateau was where the bacillus originated.

Extending further their research, Hymes argued that the polytomy – some call it the 'Big Bang' – that yielded most of *Y. pestis*'s current strains 'can by placed in space and time in historical sources, too: that the polytomy first manifests itself historically in the long destruction, by the Mongols under Cinggis-Qan (Genghis Khan), of the Xia state of the Mi or "Tangut" people in the early 1200s, and continues with the movement of the Mongols into north China, south China, and much of Eurasia' (Ibid.). Recent hypotheses place the polytomy further west and a bit earlier during the Mongol conquest of Kara Khitai (Kyrgyszstan) (Green forthcoming). The new aDNA methods have strengthened the naturalist-realist approach to the history of plague in China and placed the *Y. pestis* polytomy in the Qinghai-Tibet Plateau between the mid-twelfth and mid-thirteenth centuries.

Hymes synthesised this modern genetic research with thirteenth- to fourteenth-century Chinese historical and medical records of epidemics in Central Asia and China to which he began to apply a historical-conceptual approach to how physicians recorded their experience with what they perceived to be a newly virulent epidemic disease, an angle he has pursued more deeply since (Hymes 2021). By combining arguments from both sides of the natural-realist and historical-conceptualist spectrum, Hymes was able to situate temporally the 'beginnings of the Black Death' – arguably one of the most transformative events for global human history – to the 1210s–1220s period when Mongols repeatedly attacked the Tangut people of the state of Xia and successfully conquered 'a state that sat cheek-by-jowl with what the new genetic evidence is telling us was probably the first home of plague' (Ibid.: 287). Hymes contributed not only an indispensable Central Asian-Chinese perspective to the groundbreaking book on *Pandemic Disease in the Medieval World: Rethinking the Black*

Death (Green 2014) but also an exemplary model of cross-fertilisation between natural-realist and historical-conceptual methods of analysis of the global history of pandemics.

Conclusion

Despite the current resurgence of naturalist-realist approach to history of epidemics in China with recent breakthroughs on genetics of *Y. pestis*, excellent scholarship from the historical-conceptual camp continues to be produced. Hilary Smith's book *Forgotten Disease: Illnesses Transformed in Chinese Medicine*, for example, narrates a long-durée history of the multivalent meanings of the Chinese disease concept 'foot *qi*' (*jiaoqi*) since the fourth century to demonstrate that the nineteenth-century conflation of *jiaoqi* with the modern disease concept beriberi distorts both China's past medical history and its encounters with Western imperialism in the past two centuries (Smith 2017). Smith asks the reader to consider what does unpacking the history of this 'Forgotten disease' Foot *qi* reveal about the social, political, and economic changes that Western imperialism brought to East Asia? The following answer that she provided illustrates the pitfalls of retrospective epidemiology: 'The history of foot *qi* suggests that beriberi outbreaks of the nineteenth century were, in fact, a new phenomenon that reflected the rise of imperialism and industrialisation just as surely as did the large-scale epidemics of smallpox, typhus, tuberculosis, and malaria in the same period'. Reframing beriberi as but one change in foot *qi*'s long story highlights the novelty of those nineteenth-century conditions. In this way, the study contributes to the more complex and more accurate understanding that is currently forming of how the modern distribution of power helped shape the global disease burden and how Western medicine reinforced imperial hierarchies at the same time that it relieved some illnesses (Ibid.: 22).

In other words, the modern experience of beriberi was not a feature of East Asian morbidity waiting to be discovered, as many Western physicians had previously argued, but rather a direct result of the spread of Japanese imperialism in East Asia from 1882 to the mid-1920s. As another historian wrote, 'the history of beriberi in Japan provides a good example of the socio-political issues at stake in the definition of disease' and 'how political contexts shape the production of scientific knowledge about disease, as well as the institutional dynamics that determine policy' (Peckham 2016: 18).

Furthermore, the *Visual Representations of the Third Plague Pandemic* project that Christos Lynteris directed for five years (2013–2018) has resulted in a series of stimulating monographs and edited volumes that combine the history of human with that of non-human epidemics into a new global history of pandemics. The titles alone illustrate their historical and contemporary relevance from the monographs *Ethnographic Plague: Configuring Disease on the Chinese-Russian Frontier* (Lynteris 2016) and *Human Extinction and the Pandemic Imaginary* (Lynteris 2020) to the edited volumes *Histories of Post-Morten Contagion* (Lynteris and Evans 2018), *Framing Animals as Epidemic Villains* (Lynteris 2019), *The Anthropology of Epidemics* (Kelly et al. 2019), and *Plague and the City* (Engelmann, Henderson, and Lynteris 2019). Collectively, these books offer some insights into our pandemic present by contributing fresh perspectives on the history of epidemics in late imperial and modern China while opening up new vistas onto the history of pandemics in the world. The full range of material as well as conceptual methods being applied now to the global history of pandemics, in fact, is as inseparable from the history of epidemics in China as it is likely to be inspirational for even more innovative research into the history of late imperial Chinese epidemiology.

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