Histories

History of Epidemics in China

Some Reflections on the Role of Animals

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Abstract

The global pandemic of COVID-19 as a zoonotic disease invites new reflections on the human-animal relationship in the history of epidemics. Historians have explored medical concepts, social impacts, and other aspects of epidemics in China at different geographical and temporal scales. Relevant research significantly enriches historical understanding, yet animals seldom occupy the center of attention despite the fact that a variety of human infectious diseases such as plague are zoonotic in origin. This article suggests the need for a reappraisal of epidemics in Chinese history, with particular consideration of historical information on the multifold involvement of animals in human infections and anticontagious measures. Rethinking historically the interactions between humans and animals within the epidemic context helps to raise our awareness that Chinese medical thinkers were sensitive to the possibility of zoonotic infection, and prompt new analyses of how they understood the human-animal boundary and beyond.

Keywords

epidemic – COVID-19 – medical history – Chinese medicine – zoonosis

Over the past century some scholars, such as Imura Kōzen, Li Wenbo, Zhang Zhibin, and Gong Shengsheng, have combed a large quantity of Chinese historical sources for information about epidemic outbreaks.¹ The latest large-scale statistical analysis by Gong Shengsheng and his collaborators reveals that there were 880 epidemic years in the territory of present-day China from 220 BCE to CE 1949. The periods when epidemics occurred at a relatively high frequency ranged from the third to the sixth centuries, and from the eleventh to the mid-twentieth centuries. In particular, epidemics broke out almost annually during the period from the mid-fifteenth to the mid-twentieth centuries. And epidemic years in the southeastern region significantly exceeded that in the central or northwestern region, especially in the last three centuries.² This quantitative characterization provides new and important historical insights. But noteworthy, due to issues related to territorial changes and textual recording and preservation, the varied richness of extant relevant records in different regions and periods does not exactly mirror the actual geographical and chronological features of the epidemics rampant throughout Chinese history. Moreover, the complex interplay of medical, environmental, organizational, cultural, political, and economic factors underlying these abstract numbers can hardly be elaborated through quantitative historical approaches.

Histories of Disease

Within a broad historiographical framework, Marta Hanson identifies the “naturalist-realist” and “historical-conceptual” approaches to the history of disease. The former treats past disease experience on the basis of present understanding; while the latter situates disease concepts within their historical contexts.³ The two approaches, often blended together, are common in recent monographic studies in the history of epidemics in China from chronological, thematic, and geographical perspectives. Zhang Jianguang and Deng Tietao provide two general histories of infectious diseases and anticontagious measures.⁴ Both reveal a naturalist-realist inclination. Other authors have explored medical knowledge, transmission, social influence, and state control of infectious diseases in Jiangnan (a region south of the Yangtze River), Lingnan (the region south of the Nanling Mountains), and other regions in the imperial,

1 Imura 1936–37, 263–75, 316–25, 366–76, 414–22, 459–67, 505–7, 550–55, 30–39; Li 2004; Zhang 2007; Gong 2019.

2 Gong, Xie, and Chen 2020, 719–22. Cf. Gong 2003, 870–78.

3 Hanson, forthcoming.

4 Zhang 1998; Deng 2006.

republican, and early communist periods. They more or less take notice of the importance of a historicized and contextualized understanding of disease concepts. Meanwhile, the difficulties in interpreting Chinese disease concepts from a biomedical perspective have to some extent caused the recent increasing emphasis on the social aspects of epidemics in Chinese history. Lai Wen and Li Yongchen trace the temporal-spatial changes in epidemic outbreaks and related social responses in Lingnan from the end of the Tang dynasty to the end of the Qing dynasty.⁵ Yu Xinzong pays attention to Jiangnan and other regions, offering social studies of public health and the prevention and treatment of local epidemics.⁶ Han Yi does not focus on specific regions but concentrates on the period of the Song dynasty, probing how epidemics were understood by different communities and individuals and treated in different contexts and at national, regional, and other levels.⁷ With respect to epidemics in Republican China, Zhang Taishan's research places emphasis on different social reactions and the shaping of public health.⁸ John R. Watt considers epidemics in the context of medical reforms in wartime China (1928–45), pointing to their stimulating effect on the construction of modern healthcare systems.⁹ Li Honghe, on the other hand, turns to the social impact of epidemics in the first decade of the People's Republic of China, highlighting the positive role of government in epidemic control.¹⁰

In view of specific categories of epidemics, Zhou Qiong probes into a group of diverse infective agents named “miasmatic qi” (*zhangqi* 瘴氣) and their roles in social evolution, environmental exploitation, and ethnic stigmatization in Yunnan in the Qing dynasty.¹¹ Angela Ki Che Leung offers a meticulous survey of leprosy in China from the last centuries BCE to the twentieth century, correlating leprosy, lepers, and medical treatment with sociopolitical transformations.¹² Marta Hanson traces the dynamic concepts of “warm (infectious) diseases” (*wenbing* 溫病) back over two thousand years, with particular concerns about geographical imagination and regional differences.¹³ The prevalence of plague and its intersection with social stability, state power, and hygienic modernity in late imperial and modern Chinese society has also received much attention from scholars like Carol Benedict, Iijima Wataru, Jiao

5 Lai and Li 2004.

6 Yu 2003, 2016.

7 Han 2015.

8 Zhang 2008.

9 Watt 2013.

10 Li 2007.

11 Zhou 2007.

12 Leung 2009.

13 Hanson 2011.

Runming, and Cao Shuji and Li Yushang.¹⁴ These representative studies, informative and inspirational, substantially deepen our historical understanding of epidemics themselves as well as biopolitics, intellectual exchange, and power relations. However, they all center on humans, neglecting or marginalizing the relationship between humans and animals except in a few cases of schistosomiasis and the like.¹⁵

Animals and Disease

The global COVID-19 pandemic provokes historical reflection on the role of animals in human infectious diseases. According to John S. Mackenzie and David Williams, “More than 60% of human infectious diseases are caused by pathogens shared with wild or domestic animals, and over 75% of emerging diseases are zoonotic in origin.”¹⁶ In addition to more than 150 zoonoses caused by certain bacteria, viruses, parasites, fungi, and prions, there are also dozens of reverse zoonoses.¹⁷ Such contemporary biomedical information does not rationalize a positivist history of epidemics, but it suggests a reappraisal of many medical records that usually fall within the remit of the history of veterinary and livestock husbandry.¹⁸ Jared Diamond stresses that smallpox, flu, plague, and some other infectious diseases which became the major killers of human beings actually evolved from animal diseases, in concert with the rise of agriculture.¹⁹ COVID-19 as a new zoonotic disease prompts medical historians to take an interdisciplinary approach, and to treat with caution the epidemics which were generally termed, for example, *yi* 疫 (epidemics) but in some cases might have zoonotic origins.²⁰ This thereby invites more consideration of potential etiological factors and human-animal interaction in the history of epidemics.

It is necessary to be aware of the loose boundaries between humans and animals in premodern Chinese conceptions of the world.²¹ The old text *Classic of Mountains and Seas* (*Shanhai jing* 山海經, c. fourth century BCE) describes

14 Benedict 1996; Iijima 2000; Jiao 2011; Cao and Li 2006.

15 Gross 2016; Zhou 2020, 72–101.

16 Mackenzie and Williams 2020, 3.

17 Colville and Berryhill 2007, 3; Messenger, Barnes, and Gray 2014, e89055.

18 Wang 1958, 107–16; Xie 1985, 90–91; Zou et al. 1994, 247–62; Nong and Chen 1996, 96–100; Han 2015, 280–373.

19 Diamond 1999, 195–214.

20 See Joshua Capitanio's study of *yi* in Buddhist writings in this issue (Capitanio 2021).

21 For the relationship between humans and animals in early China, see Sterckx 2002, 123–63.

a number of strange creatures such as a bird with a human face and a beast with horse's hooves and human hands.²² The *Book of Master Zhuang* (*Zhuangzi* 莊子, c. fourth century BCE) contends that horses can produce humans.²³ According to Sima Qian 司馬遷 (145 BCE to c. 86 BCE), a woman swallowed an egg dropped by a black bird, and then gave birth to Qi 契, the progenitor of the Shang people.²⁴

The obscure human-animal distinction created some common ground between understandings of human and animal physiologies and diseases. The *Divine Husbandman's Classic of Materia Medica* (*Shennong bencao jing* 神農本草經, c. first century BCE) and other similar works of later periods, which are usually taken for granted as herbals for merely humans, actually include some veterinary information (e.g., bovine diseases), as did much of the recipe literature recovered in manuscript texts.²⁵ Perhaps more intriguingly, the physician Zhang Ji 張機 (c. 150–219) claimed that the meat of the cattle which had eaten snakes could kill persons.²⁶ Chao Yuanfang 巢元方 of the Sui dynasty (581–619) further explained that cattle that had mistakenly eaten venomous snakes or grass stained with snake venom would die; its meat then also became “poisonous” (*du* 毒) to humans.²⁷ He described a transfer of poison from venomous snakes to cattle and then human eaters in the food chain; and the human body was basically as sensitive to snake venom as cattle were, despite being affected in an indirect way. Extending the theme of veterinary medicine, a ninth-century treatise on equine medicine enumerates over seventy acupoints in the horse and related acutherapies. The acutherapies often involved puncturing one or more needles into certain acupoint(s) in order to let blood.²⁸

Animal *Du*

Infectious diseases were often associated with diet and the concept of *du* (poison/poisonous, etc.), and while not a primary focus, they were also considered to be transferrable between animals and humans.²⁹ Of the food prohibitions listed by Zhang Ji in the third century, one was eating cattle which died of

22 Anonymous 1980, 15, 30.

23 Zhuang 1985, 625.

24 Sima 1959, 91.

25 Niu 1989, 82–84; Xie 2005, 78–106. For example, see Anonymous 1995, 378–79.

26 Zhang 1990, 244.

27 Chao 1980, 742.

28 Li 2001, 19–28.

29 For the concept of *du* (poison/poisonous) in Chinese medicine, see Liu 2015a and 2015b, 89–97.

infectious diseases, whose eyes turned red or yellow. Furthermore, the flesh of cattle which died of infectious diseases could sicken the eater, causing diarrhea or indigestion; livestock which died this way were considered poisonous and thus inedible.³⁰ Chao Yuanfang also warned about the toxicity of the flesh of animals killed by infectious diseases.³¹ Both Zhang and Chao implied the transmissibility of certain infectious poison from animals to humans through diet. The Daoist physician Ge Hong 葛洪 (283–343) used the term “warm (plague) poison” (*wendu* 溫毒) or “plague poison” (*yidu* 疫毒) to describe the toxicity of epidemics to humans; despite no mention of animals, Ge is among the earliest to articulate an explicit theory of intrahuman disease transmission.³² The notion of plague poison later circulated among wide audiences, and was sometimes considered to materialize as “smallpox” (*dou* 痘), as reported in the *Essential Discourses on Investigating Things Regarding Smallpox* (*Douzhen gezhi yaolun* 痘疹格致要論) by the Ming physician Wan Quan 萬全.³³ Plague poison also appeared in the well-known treatises on human epidemics by Wu Youxing 吳有性 (1582–1652) and Dai Tianzhang 戴天章 (1644–1722).³⁴ Wu alleged that an internal structure named the “membrane area” (*moyuan* 膜原) was where plague poison from outside first incubated in the human body.³⁵ In the eighteenth century, an imperial medical text explained Zhang Ji’s thinking about livestock which died from infectious diseases as follows: the plague poison could kill livestock, so the meat of such livestock must have plague poison and thereby could not be eaten.³⁶ To be sure, such an assertion seems to aim at the health of individuals and dietetic hygiene rather than large-scale epidemic prevention. But clearly it illustrates a chain of infection that directly links animals with humans.

Plagues as a Category of Animal Husbandry

Epidemics of humans and livestock (*renchu juyi* 人畜俱疫) were often mentioned in the context of astro-divination.³⁷ While such divination often is not

30 Zhang 1990, 238–239, 243.

31 Chao 1980, 741–44.

32 Ge 2000, 37, 53; Ge (c. 320) 2010, 225.

33 Wan 2002, 386.

34 Wu 1990, 33, 39–40, 44, 67–68, 70, 89; Dai 1992, 9, 14–15. Wu also mentioned *wendu* (warm [infectious] poison); see Wu 1990, 105.

35 Wu 1990, 1–9.

36 Wu 1997, 297.

37 Li 2002, 174; Li 1619, 137; Ni 1956, 36.

taken seriously today, it may have been derived from empirical observation of historical events. Due to their important role in human life, livestock and their health and illnesses raised concerns of not only diviners but also physicians, historians, and literati. Cattle epidemics are mentioned a number of times in the *History of the Latter Han Dynasty* (*Houhan shu* 後漢書), and a Tang dynasty text excavated in Turfan records a recipe for cattle epidemic.³⁸ A tenth-century physician recommended using black beans to remove plague poison in cattle and horses.³⁹ This method may have roots in early apotropaic rites which used beans against plague demons.⁴⁰

The import of historical records of epidemics that sickened and/or killed both humans and livestock was by no means confined to astro-divination. A Ming dynasty prescription text describes how many butchers and others who cut up and thereby touched (sick and) dying horses and donkeys were themselves killed by the poisonous qi from the animals.⁴¹ Some scholars have treated this and some other accounts as evidence of anthrax infection.⁴² Elsewhere, Shen Defu 沈德符 (1578–1642) once noted that in 1502 lots of humans and livestock died of epidemics in Jingdong, Yunnan.⁴³ At least some of such records may suggest the possibility of zoonotic epidemics. In the spring of 1894, Jin Wuxiang 金武祥 witnessed the ravage of “rat plague” (*shuyi* 鼠疫) in eastern Guangdong. He interpreted the deaths of many rats and around ten thousand people in the following way: the plague (*yi* 疫) emerged from earth qi (*diqu* 地氣), and thus first struck rats in underground caves; local inhabitants came across the plague qi from the infected rats, and then fell ill and died.⁴⁴ Medical historians have confirmed the outbreak of plague in Guangzhou and neighboring areas in 1894, which roughly preluded the third bubonic plague pandemic.⁴⁵

Jin’s interpretation of the etiology of plague reflects the influence of indigenous intellectual traditions. Of course, understandings of epidemics in Chinese society had never been homogenous. In the late Ming dynasty, Wu Youxing attributed the emergence of epidemics among humans, cattle, goats, chicken, and so forth to the invisible “miscellaneous qi” (*zaqi* 雜氣) from the ground, stating that such infectious qi could not shift across species (e.g., from

38 For example, see Fan 1965, 132, 137; Anonymous 1985, 537–38.

39 Rihuazi 2005, 224.

40 von Glahn 2004, 105.

41 Zhu 1983, 923–25.

42 Feng and Feng 2003, 291, 294; Liu 2005, 344–48.

43 Shen 1997, 739.

44 Jin 2002, 242.

45 Benedict 1996, 131–49; Lai and Li 1999, 207–10; Echenberg 2002, 429–49.

cattle to goats, or from humans to livestock).⁴⁶ Nevertheless, Zhang Zongfa 張宗法 (fl. eighteenth century) saw fit to cite a record in his agricultural work, *Annals of the Three Farmers* (*Sannong Ji* 三農紀), which discussed interspecies disease transmission, while not stretching as far as a zoonotic theory (the theory that animals can communicate disease to humans). It argues that human plague affects humans, and livestock plague affects livestock, because plague spreads among living beings that are similar in appearance. Further, probably because in the eyes of the author, living beings within the category of livestock are similar, swine plague can spread to cattle, and vice versa.⁴⁷

Animal Flesh: Prophylactic, Portent, or Precipitant

In addition to the above scattered references to mentions of either animal plague or possible zoonotic infection, we also see theories of animal flesh being used as a prophylactic against, a portent of, or a precipitant of epidemic disease. The mystical geographical work *Classic of Mountains and Seas* recounts a variety of early Chinese legends and animals, plants and minerals in different regions. In terms of the eastern mountains (*dongshan* 東山), those who ate a local fish called *zhenyu* 箴魚 (possibly a Japanese halfbeak, or needlefish, *Hyporhamphus sajori*) could thus avoid epidemics. When a bird called *jiegou* 絜鉤 appeared in a given country, it mostly portended the forthcoming of epidemics.⁴⁸ In medieval times, otter meat was considered suitable to treat both human and equine epidemics. The sixth-century agronomist Jia Sixie 賈思勰 instructs readers in *Essential Techniques for the Welfare of the People* (*Qimin yaoshu* 齊民要術), a mixed text of agricultural techniques, culinary recipes, and general advice for farm management, that they should boil otter excrement and then feed it to infected cattle and horses; otter excrement is recommended when one cannot obtain otter meat and liver which are actually more effective.⁴⁹

The physician Sun Simiao 孫思邈 (d. 682), discusses otter meat in his encore magnum opus, the *Supplementary Prescriptions Worth a Thousand in Gold* (*Qianjin yifang* 千金翼方), in a section on the medicinal properties of different drugs. Here he states that otter meat can treat plague qi and warm (infectious) diseases.⁵⁰ By contrast, where otter flesh was considered a cure, beef was

46 Wu 1990, 58–59.

47 Zhang 1989, 585.

48 Anonymous 1980, 102, 110.

49 Jia 1982, 286.

50 Sun 1998, 62.

considered by some to attract infectious diseases when consumed on ritually significant days. In his work on folk customs relating to special days or periods of a year, the thirteenth-century author Chen Yuanjing 陳元靚 noted a belief that families who did not eat beef on the fifth day of the fifth lunar month would not be visited by “plague spirits” (*wenshen* 瘟神).⁵¹ The fifth of the fifth, known commonly as the festival of *Duanwu* 端午, occurs at the height of summer, and was widely considered to be a dangerous time when humans and crops were particularly subject to the influence of spirits, vermin, insects, and plagues, and apotropaic recipes, talismans, rites, and decorations were widely used. The prohibition on beef at this period drew from an old antipathy toward meat generally in religious rites expressed in an emergingly wide new focus on beef in the Song-Yuan period.⁵²

Within more focused medical literature the renowned herbalist Li Shizhen 李時珍 (1518–93) recorded in his monumental work, the *Compendium of Materia Medica* (*Bencao gangmu* 本草綱目) that eating salted and dried rooster meat at the beginning of spring could prevent human epidemics (*piyi* 辟疫). In a more ritual vein, burying a rat in one’s residence on the first day of the first lunar month could also prevent the same.⁵³ These aside, Li was also aware of the potential for wild animals to cause disease to humans, and argued against wild foods.⁵⁴ Repeatedly in his description of wild animals, whether peacocks, crows, geese, mallards, mandarin ducks, rhinoceroses, wild horses, bears, otters, snakes, pangolins, and more, he methodically portrays specific fevers, aches, rashes, boils, and other ailments that they can produce. These latter were conceived from the perspective of how the properties of the animal flesh interacted with human bodies, rather than the transmission of a contagious disease which inhabited both the animal and the human.

Transgression and the human-animal boundary is further reflected in the imagination of late imperial Buddhist pantheons. Among the “five plague envoys” (*wuwen shizhe* 五瘟使者) depicted in a Yuan-Ming mural in the Buddhist Qinglong Temple in Jishan, Shanxi, only one has a human appearance; while the other four are composite creatures with human bodies and animal heads.⁵⁵ Based on the somewhat damaged mural, the four animal heads can be tentatively identified as that of a tiger, a crow, a chicken, and a horse. The title of this mural, as written on the wall, is “All the Five Plague Envoys” (*Wuwen shizhe zhong* 五瘟使者眾). Besides this title, there are no other words

51 Chen 1939, 271.

52 Kleeman 1994, 185–211; Goossaert 2005, 237–48.

53 Li 2008, 104, 1897.

54 Stanley-Baker 2020.

55 Ping and Su 2001, 18.

in the mural. The image of these plague envoys probably originated from early Chinese beliefs about spirits spreading plague among humans.⁵⁶ In these images we see the crossing or conflating of the human-animal boundary as a generative point for reflecting on the potent power of plagues. While the medical imagination was largely constrained to managing their crossing of human-to-human boundaries through rapid transmission, the religious imagination stretched wider, and considered plagues to also conflate the boundary between the human and the animal.

Conclusion

The profoundly influential germ theory of disease that spread to Chinese society from the end of the nineteenth century helps to provide a diachronic and noncoherent historical treatment of the human-animal relationship in epidemics in Chinese culture and history. It did not merely function as another explanatory framework for contagion but materialized, visualized, and differentiated between infectious agents, and eventually transformed public understanding of epidemics in twentieth-century China.⁵⁷ Particularly, it underlay the pursuit of more concrete, precise, diverse, and controllable routes of infection between individuals of the same or different species. This gave rise to a new human-animal relationship that brings about intriguing questions such as how the traditional Chinese concept of qi encountered biomedical ideas, and to what extent they, especially in comparison with germ theory, contributed to epidemic control.⁵⁸

We see in the above a number of ways in which the relationships between humans, animals, and disease have been considered through a wide variety of literary genres. From myths and legends to ritual practices, agricultural treatises, and culinary manuals, these snatches of cultural representations enable us to look into Chinese history beyond the recipe texts and *materia medica*, also referenced here, that make up the standard fare of medical historians. We can see that the human-animal boundary not only inspired the imagination of pantheons but was also borne out of empirical experience of animal husbandry as well as actual zoonotic outbreaks. While no consistent theory of zoonotic transmission captured the imagination of medical writers

56 Cheng and Sun 2020, 110–20.

57 For the transmission of germ theory in modern China, see Andrews 1997, 114–57.

58 Such questions are being researched and still await further exploration. For recent relevant contributions, see Leung 2010, 25–50; Pi 2019.

over the ages as a central conceptual frame, it was clearly not beyond the limits of imagination, and occurred in incidental references and occasional recipes. Although scholars often talk of a far-reaching “paradigm change” with the coming of biomedicine, some of the reasoning of the premodern world is consistent with modern biological explanations. Disease could be transmitted through eating animal flesh, which either infected bodies directly spreading a common plague across species, through ritual rationales, or through disagreement of the fleshly properties and human physiology. Such ideas and images enable a richer understanding of human-animal interaction, mythology, folk customs, religions, rituals, medical practice, and so on. How they developed out of Chinese culture and affected social responses to epidemics remains a thought-provoking but insufficiently explored topic of historical research.

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