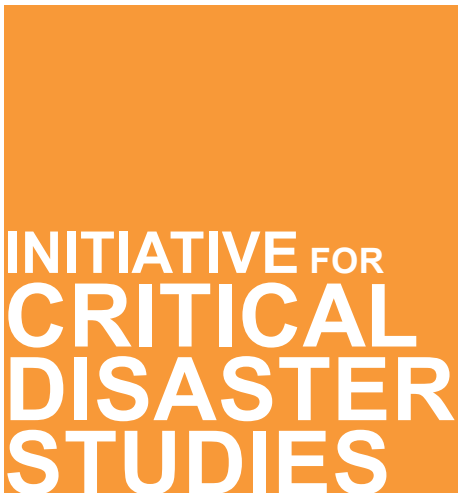

Working Papers in Critical Disaster Studies

Series 1: Historical Approaches to Covid-19

No. 2

Covid-19 as a Zoonotic Moment: Placing the Animal at the Forefront of the History of Pandemics

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Covid-19 as a Zoonotic Moment: Placing the Animal at the Forefront of the History of Pandemics

Nicolo Paolo P. Ludovice

Abstract

The recent Covid-19 pandemic has brought to the fore the capacity of animals to cause disruptions to human affairs in the form of zoonoses, or diseases capable of animal-to-human transmissions. Many historians have documented zoonoses through the portrayal of animals as sources or vectors of disease, relegating the animals' roles into the background of medical and pandemic histories. Yet, it is precisely this tendency that allowed for zoonotic diseases to emerge and be understood as solely attributed to animals, when, in fact, half of the transmission equation is due to anthropogenic activities. This essay seeks to redress this by placing animals at the forefront of histories of pandemics. Focusing on the rinderpest epizootic which had spread rapidly in Southeast Asia and the Philippines in the latter half of the nineteenth century, the essay highlights animals as embedded, transboundary, and historical within human relationships, systems, and structures. While rinderpest is epizootic (i.e., transmitted between animals) and affected only livestock, the disease brought much hardship to colonial economies and rice-based agricultural societies because of the dependence on animals. In this manner, this essay also suggests that more than as sources of diseases, animals ought to be considered as partners in the advancement of medicine and constitutive in understanding human health.

The origins of the virus SARS-CoV-2, which causes the novel coronavirus disease, or Covid-19, are, as of this writing, still a subject of investigation. Based on the large number of patients infected in January 2020, the source of this virus was epidemiologically linked to a seafood and wet market in Wuhan City, Hubei Province, China, suggesting that the virus might have a zoonotic origin.[1] Potential non-human animal reservoirs have been identified, including bats, pangolins, and snakes, all of which were present in the wet market and consumed as food or medicine. The genomic sequence analysis of SARS-CoV-2 indicated that 88% of its identity is from bat-derived severe acute respiratory syndrome (SARS)-like coronaviruses, making mammals the likely source of transmission to humans.[2]

The detection and tracing of coronaviruses underscore its historicity through the epidemiological link between animals and humans. The genomic sequence of coronaviruses had undergone several recombinations that led to coronavirus strains of different pathogenicity, with some outbreaks achieving its historicity (Figure 1). Since its first detection in the 1960s, there

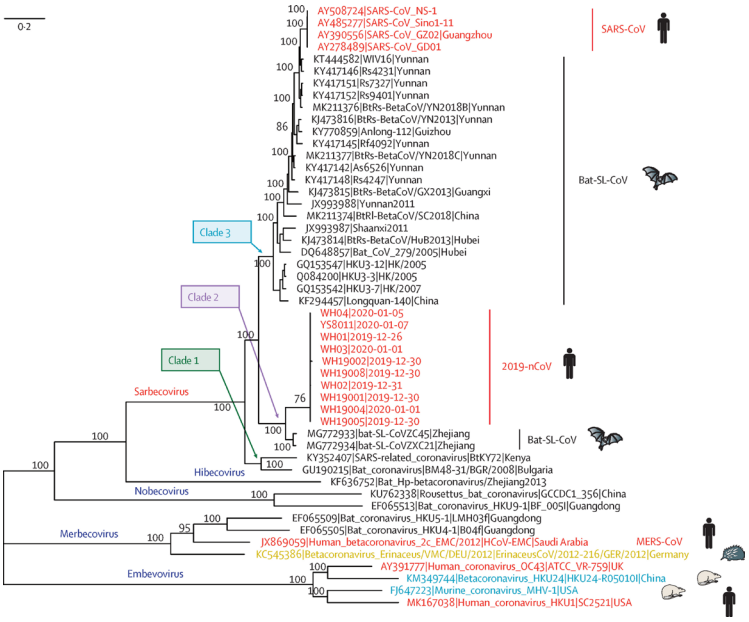

Figure 1. Phylogenetic analysis of SARS-CoV-2.

The evolutionary descent of viruses is represented by this phylogenetic tree, which is useful for organizing knowledge and structuring classifications that occurred during evolution. This phylogenetic analysis suggests that bats might be the original host of the virus SARS-CoV-2 (the virus that causes Covid-19).

Source: Roujian Lu et al., "Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding." *The Lancet* 395, no. 10224 (22 February 2020): 565-74.

1 Hussin A. Rothan and Siddappa N. Byrareddy, "The Epidemiology and Pathogenesis of Coronavirus Disease (COVID-19) Outbreak," *Journal of Autoimmunity* 109 (May 1, 2020): 102433.

2 Wei Ji et al., "Cross-Species Transmission of the Newly Identified Coronavirus 2019-NCoV," *Journal of Medical Virology* 92, no. 4 (2020): 433–40.

were seven identified coronavirus strains, all of which had origins in animals. The SARS epidemic, which was first detected in Guangdong province of southern China in 2002, spread to two dozen countries and had genomic sequences from palm civet cats.[3] The Middle East Respiratory Syndrome (MERS), which was first reported in 2012 in Saudi Arabia, originated from camels.[4] Whether the other coronavirus strains were well adapted or non-pathogenic, all coronaviruses have a zoonotic origin from bats, mice, or domestic animals.[5]

Zoonotic transmissions such as Covid-19 have outlined the historical links of animals to human health. However, animals were conveniently portrayed as purveyors and vectors of diseases.[6] This portrayal is not limited to coronaviruses but with other conditions, such as the avian influenzas, malaria, bubonic plague, and rabies. In doing so, animals are reduced to the diseases that they potentially bear, projecting humans and their affairs as interrupted by these diseases. Similarly, animals' bodies are perceived as sites of investigation and experimentation to investigate human health. While there is a recognition of the biological or epidemiological connection between animals and humans, its outlook and treatment in the history of health, pandemics, and contagions has been uneven.

In recent years, scholarship on health and medicine had steadily included the role of animals. Within the broader health context known as "One Health," animal health was highlighted as profoundly interconnected with human health and environmental health. The perspective highlights not only the biological and medical foundations of this link, but also emphasizes the role of other disciplines including anthropology, political science, disease ecology, and history, giving a more holistic view of health and medicine. As the framework itself allows for these connections to manifest, the political systems, economic structures, and socio-cultural behaviors on animals also emerge, revealing the inequalities and exploitative practices that govern such relations.[7]

This essay seeks to redress this by placing animals at the forefront of histories of pandemics. The essay aims to highlight animals as embedded, transboundary, and historical within human relationships, systems, and structures by focusing on the rinderpest epizootic, which had spread

3 Y. Guan et al., "Isolation and Characterization of Viruses Related to the SARS Coronavirus from Animals in Southern China," *Science* 302, no. 5643 (October 10, 2003): 276–78.

4 Hui-Ju Han, Hao Yu, and Xue-Jie Yu, "Evidence for Zoonotic Origins of Middle East Respiratory Syndrome Coronavirus," *The Journal of General Virology* 97, no. Pt 2 (February 2016): 274–80.

5 Xiang Li et al., "Bat Origin of a New Human Coronavirus: There and Back Again," *Science China. Life Sciences* 63, no. 3 (2020): 461–62; Zi-Wei Ye et al., "Zoonotic Origins of Human Coronaviruses," *International Journal of Biological Sciences* 16, no. 10 (March 15, 2020): 1686–97.

6 See, Alfred W. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, CT: Greenwood Publishing Group, 1972); William Hardy McNeill, *Plagues and Peoples* (Garden City, NY: Anchor Press, 1976).

7 Ronald M. Atlas and Stanley R. Maloy, *One Health: People, Animals, and the Environment* (Washington, DC: ASM Press, 2014); Abigail Woods, "One Health, One Medicine: Reconnecting Humans and Animals within Medical History," *Western Humanities Review* 69, no. 3 (Fall 2015): 148–69; Abigail Woods et al., eds., *Animals and the Shaping of Modern Medicine: One Health and Its Histories* (Cham, Switzerland: Springer Nature, 2018). The collection of Woods et al. is an excellent example of using the One Health framework in the histories of medicine.

rapidly in Southeast Asia and the Philippines in the latter half of the nineteenth century. While rinderpest is epizootic (i.e., transmitted between animals) and affected only livestock, the disease brought much hardship to colonial economies and rice-based agricultural societies because of the dependence on animals. In this manner, this essay also suggests that more than as sources of diseases, animals ought to be considered as partners in the advancement of medicine and constitutive in understanding human health.

The Age of Rinderpest

Also known as "La Epizootia," *peste bovina*, and the cattle plague, rinderpest is from a particular group of paramyxovirus, the genus *Morbillivirus*, which mainly targets many species of large ruminants, especially cattle and carabaos (*Bubalus bubali*, water buffalo).[8] The virus is highly contagious, generally introduced through the importation of live animals, and transmitted through close contact with infected livestock via air droplets, nasal secretions, urine, and fecal excretions. *Morbillivirus* infections commence in the upper respiratory tract, and after an incubation period (3 to 6 days), spread from the lymph nodes to the other lymphatic tissues, then to the upper and lower respiratory tracts, gastrointestinal mucosa, and some cases, the brain. Physical manifestations include mucocutaneous lesions, severe infections of the gastrointestinal tract (i.e., severe bloody diarrhea), destruction of the lymphoid organs, general weakness, and subsequent immunosuppression. Rinderpest epizootics in local livestock populations are considered very severe with mortality rates that can exceed 90%, affecting all ages.[9]

The rinderpest virus has a long history from ancient times.[10] From the nineteenth century, the disease was known to have originated from Central Asia and had spread through Europe via trade and military movement. It caused widespread livestock deaths in the nineteenth century in India, Ceylon, Burma, Siam, Indochina, Dutch East Indies, China, Korea, and Japan. By the 1880s, the rinderpest reached South Africa, which led to the Great African Panzootic resulting in the decimation of almost 90% of the domestic cattle and wild buffalo in the entire continent.[11]

Rinderpest first appeared in the

8 The genus *Mobillivirus* is highly infectious and spreads through the respiratory route and causes profound immune suppressions. Apart from rinderpest, the measles virus is also from this genus and remains a significant cause for childhood morbidity and mortality in humans. Characterized by fever, skin rash, cough, and conjunctivitis, measles can lead to life-threatening conditions including pneumonia and/or gastro-intestinal diseases, relatively similar to the rinderpest virus. Rory D. de Vries, W. Paul Duprex, and Rik L. de Swart, "Morbillivirus Infections: An Introduction," *Viruses* 7, no. 2 (February 12, 2015): 699–706.

9 Tom Barrett, "Rinderpest and Distemper Viruses," in *Desk Encyclopedia of Animal and Bacterial Virology*, ed. Brian W. J. Mahy (San Diego, CA: Elsevier, 2008), 497–504.

10 Clive A. Spinage, *Cattle Plague: A History* (New York, NY: Springer Science & Business Media, 2003); Thomas Barrett, Paul-Pierre Pastoret, and William P. Taylor, eds., *Rinderpest and Peste Des Petits Ruminants* (Amsterdam: Elsevier, 2006); Amanda Kay McVety, *The Rinderpest Campaigns: A Virus, Its Vaccines, and Global Development in the Twentieth Century, Global and International History* (Cambridge, MA: Cambridge University Press, 2018). Spinage's work provides an almost encyclopedic account of the rinderpest campaign from antiquity to the contemporary world.

11 Spinage, *Cattle Plague*, 467–95.

Philippines between 1886 to 1888, at the same time it was raging in French Indochina, the primary source of the Islands' cattle.[12] Government records suggested that on January 16, 1888, the local town officials of Novaliches and San Mateo, around 15 to 20 km north of Manila, had reported large numbers of caraballas (female carabaos) and cattle falling ill. The Veterinary Inspector of the Slaughterhouse noticed how some of the cattle sent from these places had sunken eyes, inability to walk, and continuous diarrhea with blood. By February 1, 1888, the provinces of Pampanga, Bulacan, and Cavite had reported cattle with similar symptoms. At the end of March, almost the entire northern Luzon was affected while livestock from the provinces south of Manila experienced the same symptoms. Within six to twelve days from the onset of infection, bovines no longer could see and move their joints, until they expired in a puddle of blood.[13] By the end of 1888, the epizootic affected at least twenty provinces throughout the island of Luzon and some of the islands in the Visayas.

The cattle and carabao deaths were astounding. Statistical data are absent or highly unreliable, with estimates from 50 up to 90% of the bovine population across the archipelago. Gines Geis Gotzens, the chief military veterinarian of the Spanish army, admitted the difficulty in ascertaining the exact number of infected animals. However, he estimated that if there were 20 provinces affected by rinderpest with more or less 10,000 cattle deaths per province, then it was safe to approximate the bovine mortality at around 200,000 throughout the archipelago.[14]

The bovine deaths severely impacted all aspects of life. Gotzens described that the rinderpest brought greater scourge to the already impoverished and neglected situation of the farmers.[15] Governor-General Valeriano Weyler (1888-91) expressed that the disease was causing a grave crisis throughout the archipelago such that he ordered to limit the slaughtering of cattle in Manila to only 12 per day, which was highly insufficient but needed to feed the city's 250,000 residents.[16] The Philippine Commission reported that the epizootic, together with the problem of locusts that had multiplied since 1896, had prevented farmers from tilling the soul and allowed the growth of tropical vegetation (more specifically, cogon grass) to overrun formerly cultivated areas.[17] The agricultural burdens caused by rinderpest alarmed even the

12 Daniel Doeppers, "Fighting Rinderpest in the Philippines, 1886-1941," in *Healing the Herds: Disease, Livestock Economies, and the Globalization of Veterinary Medicine*, ed. Karen Brown and Daniel Gilfoyle (Columbus: Ohio University Press, 2010), 112–13; Gines Geis Gotzens, *Una epizootia en Filipinas [An Epizootic in the Philippines]* (Manila: Tipo-litografia de Chofre y Compania, 1888), 7.

13 "Expediente sobre nombramiento de una Comision de profesores veterinara que esta...el cual de epizootia que reina en los animales domesticos y de la . . . en los pueblos de Mariquina, San Mateo y otros limitrofes de esta Capital" (Manila: Contaduria de la Direccion General de Administracion Civil, April 6, 1888), Colección de Microfilmes de Documentos Españoles del Archivo Nacional de Filipinas. LABORATORIO MUNICIPAL DE MANILA, 1887-1895. Rollo 7413, Legajo 1, CSIC-NAP.

14 Gotzens, *Una epizootia en Filipinas*, 17.

15 Ibid., 7.

16 "Desde Filipinas," *La Union Catolica*, July 21, 1888, 2, BNE.

17 Division of Insular Affairs, War Department, *Report of the United States Philippine Commission to the Secretary of War for the Period December 1, 1900 to October 15, 1901*, vol. I (Washington, D.C: Government Printing Office, 1901), 49.

imperial officials.

Economies and Relationalities

The rinderpest epizootic, more of a panzootic, demonstrated the emplacement of animals within human economies. Water buffaloes were vital to the tilling of soil for cultivation in the rice economies of East and Southeast Asia. In addition to their draft labor, they assisted rural households in the production of milk, transportation of goods, and in many cases, in debt obligations. The value of water buffaloes was measured beyond the monetary terms: families treated them as one of their own, with the willingness to fight for them even in the courts.[18] During the rinderpest epizootics in the Philippines and Indochina, the price of rice soared in the region, farmers reduced their lands for tillage, with debt obligations seldom repaid which caused the flight of tenants into other provinces or mountains to escape the burden. Others took the opportunity of the crisis by rustling and smuggling carabaos into the black market. As land remained untilled, a shortage of food, especially rice, caused widespread famine.[19]

The expansive reach of epizootics led to a tendency to view animals as the sole subjects of investigation, akin to how a scientist puts a laboratory subject under scrutiny. The medicalization of the epizootic places animals at the center. Yet, in doing so, it solely magnifies them as the problem while neglecting that the spread of these epizootics was both natural and anthropogenic. Epizootic transmissions moved along the networks and intensified with the economic systems constructed by human societies. The nineteenth-century saw a rapid transmission of rinderpest in Europe, Asia, and Africa because of the frequency of trade routes created by the industrialization and growth of capital. As city centers became more populous and specialized, the demand for food also intensified. Southeast Asian cities like Manila were not exceptions. The demands of the global markets for valuable raw materials such as hemp, tobacco, coffee, and sugar compelled many landowners to convert rice fields into cash crop areas. With a limited domestic production of rice, Manila heavily imported rice and carabaos from Siam, Indochina, Batavia, and China to address its domestic consumption while producing the raw materials of the global markets.

In the same vein, the epizootics are contingent on human movement and interaction. As animals become more intertwined and involved in human affairs, animal diseases also move at a rate we cannot foresee. Rinderpest has been in existence for more than a millennia, with episodes recorded in antiquity.[20] Nonetheless, the frequency of moving and interacting with animals for food production, transport of goods and people, and other purposes allows for zoonoses to mobilize as well, not affecting only one species but creating the possibility of transmission from one species to another. At the turn of the twentieth century, American

18 Nicolo Paolo P. Ludovice, "The Carabao and the Encounter of the Law in Nineteenth-Century Philippines," *Society & Animals* 27 (2019): 307–26.
19 Doeppers, "Fighting Rinderpest in the Philippines, 1886-1941."
20 Spinage, *Cattle Plague*.

veterinarians in Manila confirmed earlier suspicions of rinderpest transmissions from cattle to pigs.[21] This finding was essential to understand since livestock and swine commonly share farm spaces. The results pointed out that even with the imposition of quarantine against livestock, pigs posed risks of transmission as they were often traded in the public markets and came into close contact with cattle in slaughterhouses. With pigs and cattle sold and moved from the provinces to the cities, animal diseases moved with them as well.[22] Animals and their diseases do not conform to political boundaries, making them more challenging to predict and control.

Epizootic outbreaks unravel relationships that were often glossed over in history. In writing the history of animal diseases, disease control and interventions by state agents such as public health experts, laboratory workers, and the military comprised the main narratives. These stories are, in part, facilitated by the availability of government documents and scientific publications that were available for public consumption. Rarely do we encounter narratives that were not from official records, expressed by those who worked closely with animals, because these were very sparse. As a consequence, many of the works on rinderpest and other animal diseases were written from the state's perspective. While such views remain essential, human and animal relationships are at times reduced into disease control missions that neglect instances of protest or resistance to forceful and often violent health interventions. Stanton Youngberg, the chief veterinarian in the Philippines during the 1920s, provided a glimpse of these relations in light of the apparent failure of their interventions:

> One of the principal causes of failure was the great sentimental attachment of the Filipino farmer for his carabaos. Even though the animals were desperately ill, the majority of the people much preferred to have them die a natural death instead of being destroyed, and this in spite of the fact that they were being reimbursed their full value. We have seen grown men weep bitterly when their sick animals were taken out and shot. In order to avoid the killing of their infected animals as well as the quarantine of the exposed, but to them apparently harmless individuals, the people began hiding them out much more than they normally would.[23]

By neglecting to comprehend the complex relationships between humans and animals, the government construed any resistance that follows from these interventions as willful ignorance and stubbornness. Economies are intertwined with relationalities on a multispecies level. These connections beg us to reconsider their inclusion in historiography. Even with the lack of historical record, such relations existed and can only be imagined through careful reading and asking about the

21 William Hutchins Boynton, "Rinderpest in Swine with Experiments upon Its Transmission From Cattle and Carabaos to Swine and Vice Versa," *Philippine Journal of Science* XI, no. 5 (September 1916): 215–63.

22 Stanton Youngberg, "The North to South Movement of Animals on the Island of Luzon," *The Philippine Agricultural Review* V, no. 12 (December 1912): 653–59.

23 Stanton Youngberg, "The North to South Movement of Animals on the Island of Luzon," *The Philippine Agricultural Review* V, no. 12 (December 1912): 653–59.

documents' silences.

Animals as Historical Partners of Health

Indeed, the use of historical methods cannot assuredly mediate the problem of zoonoses. Since the laboratory revolution in the middle of the nineteenth century, addressing zoonoses was best seen as handled within the realm of the natural sciences, medicine, and epidemiology. This tendency often reduced the animal to a laboratory subject, hidden from public view. While scientific, medical, and epidemiological studies address the urgencies of disease emergence, they remain insufficient. As we have seen from the rinderpest epizootic, diseases are woven within overlapping political, economic, socio-cultural, and even imperial networks. In my view, the methods of the natural sciences do not necessarily clash with that of the humanities or social sciences. Both are complementary in not only seeking a medical solution to diseases but also in understanding the position of animals in history and health.

What can we learn from positioning animals in the history of diseases and health? First, animals are not the cause of diseases; anthropogenic activities are. Instead of medicalizing animals as vectors of diseases, we should look into animals as closely entangled with human activities and systems. This view allows us to comprehend the epizootic transmissions as continuous invasions or transgressions of animals and their spaces through intensive agriculture, residential and commercial development, resource extraction, and the like. It also enables us to see that disease transmissions did not happen overnight but were years or decades in the making.

Second, the place of animals in histories of health is not limited to the laboratory. Animals, especially guinea pigs, rats, hamsters, rabbits, and primates, are commonly taken in as laboratory subjects because of their quality as "model organisms" because of their physiological similarities with humans (which allow diseases to be transmitted to begin with). But models, as Simon Shaffer has correctly pointed out, take in the politics and mimics artificial or natural systems that are easily controlled and disciplined.[24] In this sense, animals were not only observed and experimented with for diseases; they were disciplined in places of close human and animal interaction. Latour points out that the expansion of Pasteur's laboratory into agricultural areas resulted in the local adoption of laboratory practices like disinfection, inoculation, cleanliness, conservation, and transcription, making France one large social construction.[25] Similarly, slaughterhouses, public markets, dairy farms, poultry farms, piggeries, and even domestic kitchens served as abundant places where livestock, swine, poultry, fish, feral and wild animals are included.

In this connection, animals are also subject to power relations and structures. Often, they are implicated and exploited within economic systems that view them as resources for consumption in the form of meat, milk, hides, leather, grease, fuel,

24 Simon Schaffer, "Fish and Ships: Models in the Age of Reason," in *The Third Dimension of Science*, ed. N. Hopwood and S. de Chadarevian (Stanford, CA: Stanford University Press, 2004), 71–105.

25 Bruno Latour, *The Pasteurization of France* (Cambridge, MA: Harvard University Press, 1993).

draft labor, transportation, entertainment, among other things. From the nineteenth century, animal health has not been all about diseases, but the improvement of their bodies to effect greater productivity, efficiency, or yield through breeding, genetic engineering, and the like. In his investigation of livestock breeding and eugenic policies in the U.S., Gabriel Rosenberg pointed out that the health practices on animals had often been extended to human affairs, shaped racial and gendered categories, and strengthened the capacities of the state.[26] A closer look into how animals are involved in health enables scholars to be conscious of the unjust and imbalanced processes animal had to go through, instead of seeing them solely as the final product.

Finally, animals are historical subjects, contingent on their period and existing at a particular time and space. The water buffalo that was sent to the laboratory in the early twentieth century at the height of the rinderpest experiments may not be the same water buffalo used for cross-breeding or for tilling the soil. Their "namelessness" in history does not invalidate their existence and should not be. After all, humans owed much to them in comprehending the complex nature of health and diseases that, at the very least, is to acknowledge their existence and contribution.

As we teach, write new histories, and make policies about Covid-19, historical zoonoses remind us that we can no longer afford to ignore the involvement and impact of human activities on animals. Rather than enforcing human and animal boundaries that are largely constructed, we ought to see animals as co-producers of medical knowledge, both informing and being informed by our systems and structures of knowledge. Such a partnership leads to two changes in the historical narrative and policy response. First, it enables scientists to look beyond the framing of animals, as Christos Lynteris puts it, as perennial "epidemic villains." Animals in the history of health are thus presented beyond transmitters of disease: as patients, victims, targets, sources of information, producers, and shapers to understand human health.[27] But more importantly, partnering with animals enables the re-evaluation of how we treat disease as an event. The (re) emerging infectious diseases, epizootics, and pandemics, definitely did not occur overnight. Anthropogenic activities have expanded, encroached, and intensified into their environments over time, and more recently, at a rapid pace. Instead of treating the diseases as episodic and reacting only when outbreaks occur, everyday moments are treated as disease-in-the-making moments. This prompts the review of structures and systems that are highly detrimental not only to animals but to those who are part of this ecology. Covid-19 demonstrated to all of us how closely connected we are with animals and the environment, and how the expansion of our exploitative practices impinge on all forms of health and demands urgent attention. As human health finds its roots in animal health, we also see how it is unimaginable to think of human history without animals.

26 Gabriel N. Rosenberg, "No Scrubs: Livestock Breeding, Eugenics, and the State in the Early Twentieth-Century United States," *Journal of American History* 107, no. 2 (September 2020): 362–87.

27 Woods et al., *Animals and the Shaping of Modern Medicine*, 239; Lynteris, *Framing Animals as Epidemic Villains.*

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