Pandemics

FRÉDÉRIC KECK, *Centre national de la recherche scientifique, Paris*

Pandemics tend to be defined as large epidemics, i.e. as sudden and widespread rises in disease incidence that occur over a very wide area, cross international boundaries, and affect a great number of people. However, this conventional definition neglects the fact that some diseases that reach a global scale, such as influenza or Severe Acute Respiratory Syndrome (SARS), are usually considered to be pandemics while other diseases that are similarly widespread, such as tuberculosis, are not. It is therefore necessary to investigate how scientific and medical knowledge led experts to frame only some pathogens as actually or potentially pandemic. The history of past pandemics shows the extension of both the human species and its parasitic microbes over the globe, foregrounding that humans and pathogens co-evolved and that immunity is as much a process as it is a state of being. As the Industrial Revolution and the rise of capitalism have accelerated environmental change and caused the emergence of new pathogenic microbes, the medical concept of ‘emerging infectious diseases’ was developed in the 1970s. It relied on the technical possibility to track microbes as they cross borders between species and territories, turning microbes into objects of surveillance under a logic of security and emergency. Preparing for and responding to pandemics has since transferred technologies of anticipation from civil defence to public health, and the collective management of uncertainty associated with pandemic preparedness and response redefined the publics of medical care. Social anthropology improves our understanding of these publics and processes by enlightening the entanglements between species, the co-infections between diseases, and the structural violence of inequalities that drive pandemics, particularly in the Global South. Studying pandemics as fundamentally social phenomena also allows anthropologists to investigate figures such as the prophetic expert or the virus hunter, who question the efficacy of science at a time when infectious diseases become more and more commonplace.

Introduction

The World Health Organization (WHO) has recently defined a pandemic as ‘the spread of an infectious disease over three continents’ (Doshi 2011). This definition was implemented to anticipate the emergence of influenza viruses by global warning systems, and to control their spread through public health measures in nation-states. Since December 2019, the WHO has faced a respiratory disease pandemic caused by the coronavirus SARS-CoV-2, and the number of victims has rapidly and dramatically increased despite strong measures such as population lockdowns and mass vaccination applied worldwide. Anthropologists have been engaged in this and previous pandemic emergencies on both applied and more theoretical levels, trying to understand which public health measures work best, what such measures mean for populations, what long-term conditions enable the emergence and severity of pandemics, and what pandemics themselves can teach us about the human condition (Abramowitz 2017; Higgins, Martin and Vesperi 2020).

Past pandemics have shown that an infectious disease does not just limit itself to a series of individual cases on human bodies but instead questions the very foundations of social life. Pandemic pathogens raise fears about the effects of human contact and contagion because they cross the boundaries of social groups,

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which tend to define people in terms of immunity as well as purity and even moral decency (Farmer 1992). Pandemics also show that the human species does not control its autonomous development in the domestication of nature, but is entangled with other species in unstable ecosystems. This makes pandemics one of the most pressing challenges for the human species, because they reveal the fragile conditions in which we co-evolve with microbes that can become pathogenic (Latour 2020). Investigating the human fabric of pandemics leads anthropologists not only to question how pandemics are configured as global threats but also to study how they emerge at the ecological scale of the planet.

Since anthropology studies the relations between humans and non-humans in local sites (Descola 2013), it can ask how these relations produce pandemics at a global scale, but also how some aspects of these relations are ignored or left aside through, for example, models of calculation and techniques of anticipation. How is an infectious disease configured as a pandemic, and can the notion be extended to non-infectious diseases? What kinds of vulnerabilities do pandemics reveal in the globalised infrastructures of human societies? How does the scale of 'totality' (*pan*-) that pandemics rely on transform what we understand society to be? Are societies defined by the immune protection of different human groups exposed to a disease?

This entry will describe four aspects of pandemics that have been covered in some depth by social anthropology. Pandemics expose vulnerabilities in global connections, they amplify existing social inequalities, they serve as horizons in that they force us to anticipate the future, and they foreground entanglements of relations between human and non-human species.

Vulnerabilities in global connections

The term 'pandemic' was first used to describe the effect of climate at the scale of the planet. In 1862, the British army doctor Robert Lawson invoked 'pandemic waves' to account for global fluctuations in the spread of infectious diseases by a mix of social, hygienic, and meteorological forces (Harrison 2016: 131). When the Ancient Greeks coined the term *epidemic* to describe how diseases moved from one body to another, they did not think that it could spread to the whole human species. The term *pandemos* was used by Plato for a vulgar and pathological form of love extended to all human bodies, in contrast to the intellectual love of ideas, and referred to self-government rather than to the government of the human species (Foucault 2005). Epidemics such as bubonic plague moved from the East to the West, following the movements of persons and commodities across burgeoning cities and spreading empires, and were most often interpreted as divine punishments (McNeill 1976). When humans, animals, and plants circulated massively between the Old World and the New World, smallpox and tuberculosis ravaged the Amerindian population while syphilis came to Europe (Crosby 1976). As epidemics were increasingly related to global trade, discussions on how to control the contagious transmission of diseases were linked to debates on how to regulate flows of commodities and persons (Delaporte 1986).

The development of microbiology as a laboratory science in the nineteenth century led to the replacement of climate as a vague causality for epidemics with a more precise causality: the infection of human bodies by invisible microbes. While Robert Koch discovered the bacteria causing tuberculosis and cholera in land fields and water sources, Louis Pasteur showed that pathogens could be modified in the laboratory and be used to cure diseases. Following Bruno Latour (1993), the strength of Pasteurian medicine, by contrast with public hygiene, was its capacity to displace relations between humans and microbes from the laboratory to another site, the countryside or the colonies. If pandemics are diseases of globalisation, the microbiological response to pandemics is the globalisation of the laboratory as a space where serums and vaccines are made to mitigate their effects (Latour 1983). Society itself was defined by the study of the mechanisms of immunity, separating good microbes from pathogens in their encounter with the human body. Thus, Emile Durkheim (1916) compared what it feels like to live and think in a society to the inoculation of a small amount of pathogens through vaccines, since they allow the body to know what is proper and not proper under a collective form of memory (Esposito 2011). The organisation of public health relied on maps of distribution of infectious diseases and on access to vaccines and drugs, following the principle of solidarity between all participants of a social group.

The First World War confirmed the microbiological revolution while challenging it at the same time. The globalisation of war multiplied contacts between bodies but also standardised military forms of control, leading to the decrease of cholera or yellow fever by simple techniques of hygiene and social distancing. Yet new pandemics appeared with this accelerated form of globalisation. The influenza pandemic of 1918-1919 killed more humans than the war itself, and apparently caused diseases independently from social classes or climates (Crosby 1989). As the search for the microbe that caused it failed, despite the discovery of an associated bacteria by Richard Pfeiffer in Germany, no vaccine could be made (Honigsbaum 2020). While the influenza pandemic moved from America to Europe and Africa through the circulation of soldiers, pandemics of plague moved from Asia to Europe through steamship and railway, revealing the acceleration of global transportation by war and colonialism. The use of surgical masks against pneumonic plague in Manchuria in 1910 was extended to the United States against influenza in 1918, which shows that prophylactic measures could be invented against pathogens for which no vaccine or treatment was available or effective (Lynteris 2016).

It took a century after two global wars to redefine how we understand the relations between humans and microbes in the sociological notion of immunity. If ecosystems in which humans co-evolve with microbes are constantly changing, immunity must be remade by adapting treatments and vaccines to new pathogens and being attentive to their conditions of emergence. This was the foundation of the ecology of infectious diseases, a medical form of thinking illustrated by immunologist Frank Macfarlane Burnet in Australia and bacteriologist René Dubos in the United States, who argued that medical intervention should ‘run’ to keep nature in a state of balance (Anderson 2004). These two prophetic voices were confirmed with the

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emergence of new pathogens in the 1970s, such as Ebola or Lassa, which could spread rapidly through accelerated means of transportation. In 1996, microbiologist Joshua Lederberg declared,

> we come then to social intelligence as our remaining option to counter the evolutionary drive of the microbial world. That intelligence must include a profound respect for the ecological factors that enhance our vulnerabilitity. From this perspective, we have never been more vulnerable (King 2002, 768).

Ledeberg encouraged biologists to 'think from the microbe's perspective' and saw globalisation, with its increasingly rapid connections between distant points of the world, as multiplying opportunities for microbes to thrive. Latour, following the works of James Lovelock and Lynn Margulis, has described relations between humans and microbes through the concept of Gaia, a symbiotic entity conceived at the scale of the planet and its atmosphere. He asks how it is possible to reassemble the social in the 'critical zones' where pathogens signal disruptions and call for attention (Latour and Weibel 2020). Relations between humans and microbes, in that perspective, are sites of vulnerability which require local forms of investigation, rather than a rigid sociological definition of immunity as a kind of border.

Social inequalities, from local causes to global amplifications

If pandemics are caused by microbes spreading globally through human means of transportation, they are also caused by social inequalities, which they amplify. Epidemics are often 'syndemics', as the effects of one pathogenic microbe are added to other social factors of vulnerability, including other infections (Singer 2009). Unequal access to health care is caused by poverty, racism, hierarchy, discrimination, and violence, thus contributing to the emergence and spread of infectious diseases (Nguyen and Peschard 2003). Pandemics produce global inequalities and prejudices, between populations in the Global North who are often protected from these diseases by their governments, and populations in the Global South who are predominantly affected by them and tend to be depicted as the origins of emerging pathogens (Wald 2008). Anthropologists have questioned global health interventions by the WHO or the Bill and Melinda Gates Foundation for example, because when focusing on pandemic pathogens that they want to anticipate, mitigate, or eradicate, they tend to ignore or simplify the social distribution of pandemic pathogens. Here, microbiology must be connected to epidemiology, which studies the differential exposure to infectious diseases, and to social anthropology, which reflects patients' vulnerabilities as well as feelings of suffering and injustice.

The virus causing AIDS (Acquired Immunodeficiency Syndrome), identified in the United States in 1981, spread to a slow pandemic, killing around 30 million people. While it first affected gay urban communities who could mobilise to promote research on medical treatments, it reached poor communities through sexual relations or blood transfusion with little access to a cure (Epstein 1996). Paul Farmer, as a physician

and anthropologist, studied the transmission of infectious diseases in Haiti and the local idioms in which people made sense of their suffering, such as through accusations of sorcery. Refusing to oppose the cultural explanations rooted in belief and the biological causality of the microbe, Farmer followed narratives of illnesses in which AIDS occurred in long-term infections such as tuberculosis (Farmer 1999). For him, the global narrative of AIDS connected places where different and sometimes contradictory idioms to make sense of illness were used. 'The AIDS pandemic is a striking reminder that even a village as "remote" as Do Kay is linked to a network that includes Port-au-Prince and Brooklyn: voodoo and chemotherapy, divination and serology, poverty and plenty' (Farmer 1992, 8). Indeed, these different idioms can enter in tension when a migrant worker from Haiti arrives in New York with AIDS, and seeks medical treatment at hospitals while making sense of the disease in his own concepts.

The contradictions between idioms of illness produce what Paul Farmer calls a 'geography of blame', which traces pandemics to poor territories where they are considered to emerge. AIDS became a target of global health measures a few years after the Ebola virus was detected in Central Africa after 1976. This coincidence raised concerns that Ebola could infect North Americans, thus reinforcing security measures to control its spread on the African continent. Some anthropologists, such as João Biehl and Adryana Petryna, want social anthropology to enter into a critical dialogue with global health. They show that the technologies to detect pandemic emergencies predominantly as a security concern tend to forget the people who are affected and the narratives by which they make sense of their suffering. These aspects should play a role in the mitigation of pandemics:

> Global health players can become impervious to critique as they identify emergencies, cite dire statistics, and act on their essential duty of promoting health in the name of "humanitarian reason" or as an instrument of economic development, diplomacy or national security (Petryna and Biehl 2013, 7)

In his ethnography of AIDS in South Africa, Didier Fassin (2007) analysed the accusations launched by president Thabo Mbeki that the disease was caused by poverty and not by a virus, and that treatments proposed by Northern countries were too costly and non-effective. These claims, portrayed as heresy in the language of global health, were accepted by many South African citizens because the context of the post-apartheid regime made sense of experiences of suffering and inequality. For Fassin, the national accusations of a president captured local experiences of disease in a long history of colonisation and racism, which became public with the Truth and Reconciliation Commission.

When they emerged in China in 1997 and 2003, H5N1 avian influenza and SARS (Severe Acute Respiratory Syndrome) were described as potentially the first pandemics of the twenty-first century, as they revealed the increasing connections between China and the global economy. They were also understood as epidemics of information, because a 'viral network' coordinated by the WHO followed the mutations of

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respiratory pathogens in real-time as they circulated from one country to another, which raised the question of how to distinguish true information from fake news in social networks (MacPhail 2014). Arthur Kleinman and others analysed these diseases with a biosocial approach of inequalities between humans faced with emerging pathogens. In the US, members of the Chinese diaspora were stigmatised by prejudices about wet markets as sites of contagion (Kleinman and Watson 2003). In Southeast Asia, small poultry breeders were replaced by big industrial farms which could implement biosecurity measures (Kleinman et al. 2008). While biological approaches in global health tend to correlate target and response, biosocial approaches take into account the local, national, and global scales that shape the context of the response.

A biosocial approach may question why some diseases are considered as pandemics while others are not, even if they also spread globally and are caused by social inequalities. Thus, obesity and diabetes have been described by global health authorities as epidemics because they followed the globalisation of sugar and Western modes of consumption. And yet they are not objects of mobilisation with the same urgency as infectious diseases, because they do not jump borders rapidly and cannot be expressed in the language of security. Moreover, their causes in the unequal distribution of food are more complicated to target with a standardised distribution of medical treatments (Moran-Thomas 2019; Sanabria 2016; Yates-Doerr 2015). While the origins of obesity and diabetes are apparently more complex than the emergence of a new pathogen, their outcomes are more difficult to model than infectious diseases. Beyond the opposition between biological and social causes of epidemics, anthropologists can thus ask how the notion of pandemics has become a tool to anticipate the future at a global level.

Horizons to anticipate the future

How are experts led to think that a disease will become a pandemic in the future, and how does this mode of reasoning affect relations between living beings? Pandemics have become one of the horizons to generalise a contingent event, resonating with other forms of anticipation in environmental knowledge, such as climate change or nuclear accidents. They are what Charles Briggs and Clara Mantini-Briggs called a ‘chronotope, a narrative device for connecting social, biological and spatial elements and ordering them in temporal sequences and interpretive frameworks’ (2003, 276). Thus cholera, one of mankind’s oldest diseases caused by a bacteria that spreads through water, was described by the WHO in 1961 as a pandemic, and retrospectively six pandemics of cholera were traced to Asia as its region of origin. When it reached Venezuela in the 1990s, the state, ruled by Hugo Chavez, tended to under-report cases to avoid quarantine, in such a way that the voices of the Warao people affected by cholera were unheard in the global discourse of pandemics. Such obstacles to making sense of pandemics have led global experts to anticipate them without relying exclusively or even heavily on national statistics but rather by involving populations in the imagination of pandemics as catastrophic events.

According to Andrew Lakoff, the emergence of infectious diseases in the 1970s has been framed in a new form of anticipation of the future. Infectious diseases such as tuberculosis or cholera were managed by public health experts in the last two centuries through techniques of prevention, based on the calculation of risks shaped by territory and the ability of distributing treatment. Infectious diseases after Ebola and AIDS were described by global health experts as 'events' whose probability cannot be calculated but whose catastrophic consequences can only be mitigated. Pandemics are now imagined through worst-case scenarios as events for which populations must be prepared, in order to contain panic when they do occur. Pandemic planning regulates the distribution of vaccines and treatments that are being stockpiled and secured to avoid looting. Pandemic preparedness is about creating a constant state of vigilance and readiness produced by techniques of anticipation of the future, such as exercises simulating an outbreak of smallpox in the New York City subway. 'Preparedness envisions the future not to predict what is going to happen but to generate knowledge about the vulnerabilities in the present' (Lakoff 2017, 23).

With Stephen Collier (2021), Lakoff has traced the history of techniques of preparedness in the US to the beginning of the Cold War, when civil defence experts identified vulnerabilities in 'vital systems', such as public transportation, the food industry, or banking systems, that could be targeted by a nuclear attack. These experts organised exercises or simulations to imagine such improbable events and mitigate their consequences. After the end of the Cold War, this style of reasoning was transferred from civil defence to national security in order to anticipate 'generic threats', a range of unpredictable events from terrorist attacks to hurricanes and floods. By shifting from national security to global health, pandemic preparedness has become one of the languages to think and act in a world struck by disasters, be they intentional or not, short-term or long-term, by simulating their effects rather than modifying their causes (Samimian-Darash 2009).

Carlo Caduff has studied how pandemic preparedness has transformed the work of microbiologists, particularly in the domain of influenza viruses. Because these viruses are constantly mutating, public health authorities have to anticipate new influenza viruses when a new strain replaces another, as in the cases of the 1918, 1957, and 1968 pandemics. When virologists study viral mutations in the lab, they have to bet which strain will become pandemic, leaving aside other strains considered as not 'potentially pandemic'. This leads some of them to make what Caduff calls 'prophetic claims' by projecting previous pandemics into the future (2015, 7). When the H5N1 avian influenza virus emerged in Hong Kong in 1997, with a high lethality but a low transmissibility (12 persons were infected, out of whom 8 died), virologist Robert Webster warned of a pandemic more severe than the 1918 'Spanish Flu' which had killed around 50 million people. These prophetic claims draw on apocalyptic images when they predict disasters at the global level. However, they are not promises of redemption but rather invitations to act in order to mitigate the disaster they announce. 'At the core of pandemic prophecy is a particular prospect: destruction without purification, death without resurrection - in short, dystopia without utopia' (Caduff 2015, 7).

Edwin Kilbourne, the founder of the department of microbiology at the Mount Sinai School of Medicine in New York City where Caduff did his fieldwork, promoted a policy of stockpiling vaccines for future flu pandemics with the motto: 'better a vaccine without a pandemic than a pandemic without a vaccine' (Caduff 2015, 61). The US Strategic National Stockpile also included masks and antivirals distributed during exercises to test for the allocation of scarce resources during a pandemic. These simulations of pandemics, based on scenarios similar to those used in novels or films, produce a sense of disaster imminence, and engage participants in a presumably realistic course of action. They blur the distinction between reality and fiction in such a way that a pandemic, when it happens, is taken as a simulation of the next one. Hence the 2009 H1N1 pandemic, which killed fewer persons than seasonal flu, could have led to a disengagement in preparedness, but the 'lessons learned' in stockpiling masks have been used, for better or worse, during the Covid-19 pandemic. In China, criticisms for the failure to control SARS in 2003 led public health authorities to take the H1N1 pandemic as an exercise, showing their ability to trace contacts and control its spread better than their US counterparts (Mason 2016).

Pandemic preparedness can be criticised as privileging the future over the present, calibrating faith and reason. Caduff analyses precautionary measures as a way to justify action by betting on the future in a competition between truth-claims about viral mutations where the most catastrophic claim wins over others. The logic of pandemic preparedness defers the present for a future that it indicates or signals. It is not regulated by the opposition between true and false, since no false signal can be criticised for failing to anticipate the pandemic.

> The fact that this form of preparedness is causing too many signals can also be seen as a sign of its sensitivity: it actually constitutes a part of its functionality. The false alarm is a consequence of the exceptional vigilance that is considered necessary to prepare for the inevitable pandemic (Caduff 2015, 135).

This preference for the future in the logic of preparedness has produced new kinds of 'publics' (Prince 2019) in the neoliberal management of uncertainty. Vinh-Kim Nguyen (2010) has studied patient groups anticipating the end of the AIDS pandemic through their participation to clinical research projects. He shows that the possibility to treat HIV/AIDS with antivirals has led global health experts to collect narratives about living with the virus in West Africa, thus operating a triage between those who could receive treatments and those who could not. Although it has colonial antecedents, triage is in part a simulation technique of global health, since it defines priority populations for the administration of treatments in times of pandemics. These populations can become publics, in the sense that they are trained by NGOs and activists to argue reflectively. They institute forms of sovereignty below the nation-state, by referring to themselves as responsible subjects.

If Nguyen is critical of the social boundaries set up by exercises of triage because of the violence they

institute, he is more positive about software simulations of pandemics that retrospectively track emerging viruses. These simulations reflect possibilities of social life. Based on pandemic scenarios, they calculate probabilities of new pandemics and imagine modes of ending existing ones, often through the problematic notion of 'eradication'. Working as a health professional during the Ebola outbreak in West Africa in 2014, Nguyen testifies to the differences between slow epidemics such as AIDS and a fast epidemic such as Ebola: while the origins of HIV/AIDS were traced by phylogenetic analysis to a transmission from apes to humans in Central Africa in the 1920s amplified by human trade, the arrival of Ebola in West Africa by contact between bats and humans in a village in Guinea was much more difficult to prove. Anthropologists are called upon by biologists to speculate on the speed at which viruses travel across global infrastructures, and not only to understand cultural obstacles to public health measures. 'In effect, an anthropology of infectious diseases must be attentive not only to the social drivers of biological emergence but also to the conditions which allow biological events to be detected and made tangible in situ' (Nguyen 2019, 166). Participating in debates about the origins of pandemic viruses allows anthropologists to imagine alternative futures based on ethnographic knowledge, and thus question and improve techniques of preparedness.

Entangled relations between human and non-human species

Concepts such as 'vital systems' and 'interspecies contacts', which play a central role in pandemic preparedness, have led anthropologists to rethink social life not only as shared vulnerabilities in a human collective but also as changing webs of relations in which pathogens emerge. Pandemics are often caused by 'zoonoses', diseases transmitted across species by 'spillover events' (King 2002; Keck and Lynteris 2018). While some infectious diseases are transmitted by mosquitoes, such as malaria or dengue, and others by water, such as cholera, some pathogenic microbes circulate without symptoms among animals before spreading to humans, such as tuberculosis among badgers, coronaviruses among bats, or influenza among waterfowl. To describe these chains of transmission from 'animal reservoirs' to infectious outbreaks, the epidemiological concept of contact is not sufficient, because it presupposes that zoonotic emergence is a unique event. More ethnographic concepts are necessary, such as habit, proximity, and entanglement, to describe long-term relations that condition emergence (Brown and Kelly 2014; Nading 2014; Narat et al. 2017). How humans perceive and treat the animals they live with is a structural factor in the early detection of zoonoses, either in the use of apes and bats as bushmeat, or in the consumption of poultry and pigs as domesticated animals. New modes of human habitat have brought humans closer to mosquitoes and ticks carrying pathogens, whose behaviour has been modified by climate change. Under the concept of 'One Health', reframed and extended as 'planetary health', environmentalists, veterinarians, and physicians share information on relations between human and non-human animals to prepare for and fight against pandemics. If these associations are driven by demands of biosecurity, they can also be attentive to biodiversity, which increasingly appears as a protection against pathogenic emergence (Hinchliffe 2015).

Here again, the anticipation of an avian influenza pandemic has been a field of experimentation for virologists and anthropologists alike. The massive precautionary killings of poultry suspected of carrying influenza viruses has raised concern regarding the shared immunities that have been lost by the globalisation and commodification of the industrial chicken (Haraway 2007). In the Indonesian archipelago, the dispersion of backyard poultry has led villagers to resist biosecurity measures, which can be related to the mode of existence of viruses as 'clouds' of information (Lowe 2010). In Vietnam, the massive vaccination of poultry promoted veterinarians as central actors in a national 'war' against influenza viruses, but raised suspicions about the advantages they offered to industrial farms (Porter 2019). In Hong Kong, unvaccinated chickens were placed as sentinels at the entrance of poultry farms, while birdwatchers monitored the health of wild birds (Keck 2020). In mainland China, the recent scaling up of industrial breeding remained compatible with small poultry farms mixing wild and domestic birds (Fearnley 2020). The global scale of a pandemic affecting humans has led anthropologists to study the different scales at which humans perceive the movements of birds, from farms to markets and migratory flyways.

When they are seen from the perspectives of animal reservoirs in which they mutate, emerging pathogens such as influenza viruses and coronaviruses are not only warning signals of future pandemics but also signs of communication between species in disrupted ecosystems. Christos Lynteris (2019) has proposed to take seriously the idea that pandemics should be understood not only as extending epidemics globally but also as reminding of the potential extinction of the human species. While humanity has caused the 'sixth extinction' by its impact on other species' conditions of life, the multiplication of zoonoses in the recent decades has led many observers to interpret pandemics as a 'revenge of nature'—a popular idea quite different from René Dubos's evolutionary race between nature and humanity. When pandemics reveal the vulnerabilities of infrastructures of social life, leading to the massive interruption of human activity to stop contagion, they question more generally the claim to autonomy which separates humans from other species. 'The pandemic is imagined as striking not simply human populations – or even the human species as a whole – but rather at the heart of humanity as a project for mastery' (Lynteris 2019, 9). Pandemic preparedness can thus be interpreted as a way in which humanity confronts alterity in the process of domesticating nature, either focusing on spillover events on the side of animals or superspreader events on the side of humans. This reversal of apocalyptic time is compared by Lynteris to mythological narratives in Amazonian societies, where humans have been separated from animals by an original conflict which serves to explain the diversity of species (2019).

While the figure of the prophet can be mobilised to understand how experts of pandemics make truth-claims about the future, the figure of the shaman can explain how scientists manipulate past relations between humans, animals, and microbes in new forms of ritual practices. The regular sampling of animals to check if they have potentially pandemic pathogens turns them into allies for global health: if a virus is declared the enemy of humankind, birds or bats carrying this virus offer biologists the possibility to 'take

the enemy's point of view' (Viveiros de Castro 1992). While biosecurity interventions separate subjects of care from sacrificial victims when they cull animals or conduct triage, the attention to biodiversity as a limitation of pandemic risks produces more inclusive forms of surveillance and monitoring. Borders between species and territories have become sites of intense production of knowledge under the horizon of future pandemics. The border between China and Russia was a site of rehabilitation of the knowledge of marmot hunters at the time of the pneumonic plague (Lynteris 2016), and the border between China and Hong Kong was constantly monitored by birdwatchers to prevent outbreaks of avian influenza (Keck 2020). Pandemic preparedness has transformed natural sites into reservoirs of signs of the future perceived by 'virus hunters', who can read microbial mutations to describe continuities and discontinuities between populations and between species.

Conclusion

Pandemics are among the main drivers of the globalisation of knowledge, as they lead experts to follow a pathogen at the scale of the planet and recommend measures to control it. As such, they have had complex and often contradictory impacts on human-animal relations, global social policy, belief in the efficacy of science, and visions of planetary solidarity. Lessons from the past show that pandemics start and end with environmental changes, but they do not provide models on how to anticipate the next pandemic. The technological capacity to detect potentially pandemic pathogens at their early start and to raise alarm has led global authorities to manage pandemics as security issues by targeting microbes as enemies. But the unfolding of a pandemic as a long-term process reveals an entanglement of relations between social groups, non-pathogenic microbes, and animal species that does not follow the logic of eradication, which requires cleaning animal reservoirs and distributing medical treatment. By reaching the scale of the planet, the notion of pandemics can reduce the work of science to globalised networks of surveillance, or enlarge the understanding of diseases to the complex web of causes that interlaces different forms of trouble, from remembering past illnesses to detecting future pathogens, often producing violence and inequality. Social anthropology can contribute to the redefinition of solidarity at the time of pandemics, because it stands at the borders crossed by pathogens between species, territories, and populations. It can usefully ask what kind of experience and knowledge is produced at these borders, how such knowledge travels, and how it can be translated to speak to everyone. Pandemic preparedness could thus become a new language to think about a disrupted planet and fragile environments.

References

Abramowitz, Sharon. 2017. "Epidemics (especially Ebola)." *Annual Review of Anthropology* 46: 421–45.

Anderson, Warwick. 2004. "Natural histories of infectious diseases: Ecological vision in twentieth-century biomedical sciences." *Osiris* 19: 39–61.

Biehl, João and Adriana Petryna. 2013. *When people come first: Critical studies in global health*. Princeton: Princeton University Press.

Briggs, Charles and Clara Mantini-Briggs. 2003. *Stories in the time of cholera: Racial profiling during a medical nightmare.* Berkeley: University of California Press.

Brown, Hannah and Ann Kelly. 2014. "Material proximities and hotspots: towards an anthropology of viral hemorrhagic fevers." *Medical Anthropology Quaterly* 28, no. 2: 280–303.

Caduff, Carlo. 2015. T*he pandemic perhaps: Dramatic events in a public culture of danger.* Oakland: University of California Press.

Collier, Stephen and Andrew Lakoff 2021. *The government of emergency: Vital systems, expertise and the politics of security.* Princeton: Princeton University Press.

Crosby, Alfred. 1976. *The Columbian exchange: Biological and cultural consequences of 1492.* Westport: Greenwood.

———. 1989. *America's forgotten pandemic: The influenza of 1918*. Cambridge: Cambridge University Press.

Delaporte, François. 1986. *Disease and civilization: The cholera in Paris, 1832*. Cambridge, MA: MIT Press.

Descola, Philippe. 2013. *Beyond nature and culture*. Chicago: The University of Chicago Press.

Doshi, Peter. 2011. "The elusive definition of pandemic influenza." *Bulletin of the World Health Organisation* 89: 532–8

Durkheim, Emile. 1915. *Elementary forms of religious life*. Translated by Joseph Ward Swain. London: Allen & Unwin.

Epstein, Steven. 1996. *Impure science: AIDS, activism, and the politics of knowledge.* Berkeley: University of California Press.

Esposito, Roberto. 2011. *Immunitas: The protection and negation of life*. London: Polity Press.

Farmer, Paul. 1992. *AIDS and accusation: Haiti and the geography of blame*. Berkeley: University of California Press.

———. 1999. *Infections and inequalities: the modern plagues*. Berkeley: University of California Press.

Fassin, Didier. 2007. *When bodies remember: Experiences and politics of AIDS in South Africa.* Berkeley: University of California Press.

Fearnley, Lyle. 2020. *Virulent zones: Animal disease and global health at China's pandemic epicenter*. Durham, N.C.: Duke University Press.

Foucault, Michel. 2005. *The hermeneutics of the subject: Lectures at the Collège de France 1981-1982*. London: Palgrave MacMillan.

Haraway, Donna. 2007. *When species meet*. Minneapolis: University of Minnesota Press.

Harrison, Mark. 2016. "Pandemics." In *The Routledge history of disease*, edited by Mark Jackson, 129–46. London: Routledge.

Higgins, Rylan, Emily Martin and Maria D. Vesperi. 2020. "An anthropology of the Covid-19 pandemic." *Anthropology Now* 12, no. 1: 2–6.

Hinchliffe, Steve. 2015. "More than one world, more than one health: reconfiguring interspecies health." *Social Science & Medicine* 129: 28–35.

Honigsbaum, Mark. 2020. *The pandemic century: A history of global contagion from the Spanish Flu to Covid-19*. London: Penguin.

Keck, Frédéric. 2020. *Avian reservoirs: Virus hunters and birdwatchers in Chinese sentinel posts.* Durham, N.C.: Duke University Press.

——— and Christos Lynteris. 2018. "Zoonosis: prospects and challenges for medical anthropology." *Medicine, Anthropology, Theory* 5, no. 3: 1–14.

King, Nicholas. 2002. "Security, disease, commerce: ideologies of postcolonial global health." *Social Studies of Science* 32, nos. 5–6: 76389.

Kleinman, Arthur and James Watson. 2003. *SARS in China: Prelude to pandemic?* Stanford: Stanford University Press.

———, Barry Bloom, Anthony Saich, Katherine Mason and Felicity Aulino. 2008. "Avian and pandemic influenza: a biosocial approach." *Journal of Infectious Diseases* 197: S1–S3.

Lakoff, Andrew. 2017. *Unprepared: Global health in a time of emergency*. Oakland: University of California Press.

Latour, Bruno. 1983. "Give me a laboratory and I will raise the world." In *Science observed: Perspectives on the social study of* science, edited by Karin Knorr-Cetina and Michael Mulkay, 141–70. London: Sage.

———. 1993. *The pasteurization of France*. Cambridge, MA: Harvard University Press.

 ISSN 2398-516X

——— and Peter Weibel. 2020. *Critical zones: The science and politics of landing on earth*. Boston: MIT Press

Lynteris, Christos. 2016. *The ethnographic plague: Configuring disease on the Chinese-Russian frontier*. London: Palgrave Macmillan.

———. 2019. *Human extinction and the pandemic imaginary*. London: Routledge.

Lowe, Celia. 2010. "Viral clouds: becoming H5N1 in Indonesia." *Cultural Anthropology* 4: 625–49.

MacPhail, Theresa. 2014. *Viral network: A pathography of the H1N1 influenza pandemic*. Ithaca: Cornell University Press.

Mason, Katherine. 2016. *Infectious change: Reinventing Chinese public health after an epidemic*. Stanford: Stanford University Press.

McNeill, William. 1976. *Plagues and peoples*. New York: Anchor Press.

Moran-Thomas, Amy. 2019. *Traveling with sugar: Chronicles of a global epidemic*. Oakland: University of California Press.

Nading, Alex. 2014. *Mosquito trails: Ecology, health, and the politics of entanglement*. Oakland: University of California Press.

Narat, Victor, Lys Alcayna-Stevens, Stephanie Rupp and Tamara Giles-Vernick. 2017. "Rethinking human-nonhuman primate contact and pathogenic disease spillover." *Ecohealth* 14, no. 4: 840–50.

Nguyen, Vinh-Kim. 2010. *The republic of therapy: Triage and sovereignty in West Africa's time of AIDS*. Durham: Duke University Press.

———. 2019. "Of what are epidemics the symptom? Speed, interlinkage and infrastructure in molecular anthropology." In *Anthropology of epidemics*, edited by Ann Kelly, Frédéric Keck and Chistos Lynteris, 154–77. London: Routledge.

Nguyen, Vinh-Kim and Karine Peschard. 2003. "Anthropology, inequality and diseases." *Annual Review of Anthropology* 32: 447–74.

Porter, Natalie. 2019. *Viral economies: Bird flu experiments in Vietnam*. Chicago: University Press.

Prince, Ruth. 2019. "Pandemic publics: how epidemics transform social and political collectives of public health." In *Anthropology of epidemics*, edited by Ann Kelly, Frédéric Keck and Chistos Lynteris, 135–53. London: Routledge.

Sanabria, Emilia. 2016. “Circulating ignorance: complexity and agnogenesis in the obesity ‘epidemic’.” *Cultural Anthropology* 31, no. 1: 131–58.

Samimian-Darash, Limor. 2009. “A pre-event configuration for biological threats: preparedness and the constitution of biosecurity events.” *American Ethnologist* 36, no. 3: 478–91.

Singer, Merrill. 2009. *Introduction to syndemics: A critical systems approach to public and community health*. San Francisco: Jossey-Bass.

Viveiros de Castro, Eduardo. 1992. *From the enemy's point of view: Humanity and divinity in an Amazonian society*. Chicago: The University of Chicago Press.

Yates-Dorr, Emily. 2015. *The weight of obesity: Hunger and global health in postwar Guatemala*. Berkeley: University of California Press.

Wald, Priscilla. 2008. *Contagious: Cultures, carriers, and the outbreak narrative*. Durham: Duke University Press.

Note on contributor

Frédéric Keck is a Senior Researcher at the Laboratory of Social Anthropology (CNRS-Collège de France-EHESS). After working on the history of social anthropology and contemporary biopolitical questions raised by avian influenza, he was the head of the research department of the musée du quai Branly between 2014 and 2018.

Frédéric Keck, Laboratoire d’anthropologie sociale, 52 rue Cardinal Lemoine, 75005 Paris. frederic.keck@cnrs.fr