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FRÉDÉRIC KECK

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As viruses mutate silently in animal reservoirs before emerging among humans, this book is the product of a long maturation among several host institutions and a few public outbreaks.

My work on pandemic preparedness has been initiated by the research project launched by Stephen Collier, Andrew Lakoff, and Paul Rabinow on biosecurity. I have been illuminated by discussions with Carlo Caduff, Lyle Fearnley, Stephen Hinchliffe, and Limor Samimian-Darash on the implications of avian influenza in this emerging field. The workshop we organized with Christopher Kelty and Andrew Lakoff on sentinel devices was a catalyzing moment in my reflection.

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Prior versions of some of the material for this book appeared in the following articles: "A Genealogy of Animal Diseases and Social Anthropology (1870–2000)," *Medical Anthropology Quarterly* 33, no. 1 (2018): 24–41 (chapter 1); "L'alarme d'Antigone: Les chimères des chasseurs de virus," *Terrain* 64 (2015): 50–67 (chapter 2); "Avian Preparedness: Simulations of Bird Diseases in Reverse Scenarios of Extinction in Hong Kong, Taiwan and Singapore," *The Journal of the Royal Anthropological Institute (incorporating Man)* 24, no. 2 (2018): 330–47 (chapter 5); "Stockpiling as a Technique of Preparedness: Conserving the Past for an Unpredictible Future," in *Cryopolitics: Frozen Life in a Melting World*, ed. Joanna Radin and Emma Kowal, 117–41 (Cambridge, MA: MIT Press, 2017) (chapter 6).

INTRODUCTION

An influenza pandemic is one of the events that raise concerns at the global level. The cyclical character of flu pandemics—the 1918 "Spanish flu," the 1957 "Asian flu," the 1968 "Hong Kong flu"—leads experts to think that a new pandemic is imminent and that it would kill millions of people.[1] The question, according to global health authorities, is not when and where the pandemic will start, but if we are prepared for its catastrophic consequences. Pandemics disrupt social life not only because they kill individuals but also because contagion triggers panic and mistrust. Hence the need to be prepared for pandemics to mitigate not only their human casualties but also their social aspects.

Pandemics start when new pathogens infect a nonimmunized human population. It is considered that microbes mutate across animal species, developing usually without symptoms in their "animal reservoirs" before jumping to humans, in which they cause infection and contagion. Influenza viruses mutate and reassemble among birds, particularly waterfowl considered as "sane carriers" because they transmit the virus without being infected by them, and pigs, described as "mixing vessels" because they have receptors in their respiratory tracts that bind to bird viruses and human

viruses. When microbiologists follow pathogens in their animal reservoirs to anticipate their emergence among humans and understand how they shift from "low pathogenic" to "high pathogenic," they introduce animals into the social.

This book asks, with the methods of social anthropology, how techniques to prepare for influenza pandemics have transformed our relations to birds. Billions of poultry have been killed all over the world to eradicate potentially pandemic pathogens from jumping over the species barriers. Migratory birds have been monitored to understand the spread of flu viruses outside of their place of emergence. Wild waterfowl have moved from the nature pages of magazines and newspapers to the front pages of major news coverage, depicting bird flu outbreaks as if they were terrorist attacks, while images of chickens in slaughterhouses have invaded the public space to ambivalently reassure consumers that chicken meat is safe to eat.[2] If the deadly pandemic bird flu virus still remains to come, its anticipation has already modified the world in which humans live with animals, wild and domestic.

Bird flu is described as a "zoonosis," an infection caused by a pathogen that jumped from nonhuman animals to humans. The concern for zoonoses, which constitute the main part of emerging infectious diseases, has grown in the last forty years with the fight against Ebola hemorrhagic fever (1976), transmitted from bats to monkeys, mad cow disease (or Bovine Spongiform Encephalopathy, 1996), transmitted from sheep to cows, and SARS (Severe Acute Respiratory Syndrome, 2003), transmitted from bats to civet cats.[3] While the link between pathogens and their environment has always been at the heart of public health, this series of emergences in the last forty years was explained by the dramatic changes in urbanization, deforestation, industrial breeding, and global warming.

Social anthropology, as it produces knowledge about the similarities and differences between humans and other animals, can take these pathogens crossing barriers between species as a starting point for an inquiry about transformations in our relationships with nonhuman animals. The connection between human/animal relationships and public health measures is twofold: new relations between humans and animals (such as the increase of livestock for human consumption) has produced new risks of emergence, but the techniques to mitigate these risks (such as the massive culling of poultry or the use of sentinel chickens) have also changed the way humans relate to other animals.

This book is based on an ethnographic research conducted in Hong

Kong, Taiwan, and Singapore between 2007 and 2013.[4] As these three territories have been affected by the SARS crisis in 2003, they invested in techniques to prepare for an influenza pandemic. Hong Kong was my main site of research because, being the location where the last flu pandemic had officially started in 1968, it had been equipped to detect the next pandemic virus among birds. But these three territories were concerned with an avian influenza virus coming from China, where the number of domestic poultry had dramatically increased in the last forty years. Hong Kong, Taiwan, and Singapore are three hubs for the Chinese diaspora, who could identify with the migratory birds accused of spreading influenza across the globe. One of the arguments of the book is that these three territories on the borders of China and in a distanced connection to Australia found with avian influenza a language to talk about the problems they have with mainland China, considered as an emerging power whose conditions of life and emerging threats lacked transparency. In these three settings, microbiologists have allied with veterinarians and birdwatchers to follow the mutations of flu viruses between wild birds, domestic poultry, and humans. I have increasingly spent more time with birdwatchers because I was intrigued by a question: can we see pathogens from the perspective of birds themselves? I thus came to share birdwatchers' passion for bird species and microbiologists' curiosity for viral mutations rather than becoming versed in Chinese genealogies and kinship systems, because I found in viruses a way to enter into the relations between humans and birds in the geopolitical context connecting China, Hong Kong, Taiwan, and Singapore.

In 2003, in the aftermath of the SARS crisis, three microbiologists working at Hong Kong University wrote, "The studies on the ecology of influenza led in Hong Kong in the 1970s, in which Hong Kong acted as a sentinel post for influenza, indicated that it was possible, for the first time, to do preparedness for flu on the avian level."[5] This quotation has provided the impulse for the reflection developed in this book. What does it mean to practice preparedness at the animal level? How does it differ from doing it at the human level? What does it change in the relations between humans and other animals? Is there something specifically Asian in the way preparedness has been implemented? And what can we learn about the way Asian societies have practiced preparedness "at the avian level"?[6] In short: what do "avian reservoirs" reveal for anthropologists working in Asia? Or: what do birds with flu viruses reveal about the position of Asia in the global economy?[7]

The notion of "avian reservoir" could be criticized for suggesting that

Asian populations live in too much proximity with their chickens and pigs[8]; and indeed, "avian reservoirs" sounds like a stigmatization of "Asian people" as a "reservoir for viruses" in a new version of what Claude Lévi-Strauss called "les tropiques bondés," by contrast with the "tropiques vides" of Amazonian forests.[9] But I want to take a cynegetic view of avian reservoirs to conceive them precisely as an Amazonian forest—that is, as a space where human and nonhuman animals are connected by invisible entities called "microbes" that can be captured, classified, and mapped. I will show that the notion of "avian reservoir" involves a mix of techniques I will call "pastoralist," in that they monitor birds as sheep in a flock, and techniques I will call "cynegetic," in that they follow birds as prey in the wild.

In this book, I want to reflect on the alliance between microbiologists and birdwatchers using concepts from the anthropology of hunter-gatherers. As most of my inquiry was made with ornithologists and microbiologists, I decided that the complementarity between their two perspectives on bird flu and their difference with other actors of pandemic preparedness would become my object of research. What does it change to take seriously the idea that microbiologists are "virus hunters" and "collectors of samples"? How is the imperative to be prepared for an influenza pandemic embedded in the practices of microbiologists and birdwatchers when they see relations between humans and birds through the pathogens they share in common? The anthropology of hunter-gatherer societies has shown that these groups have developed a capacity to perceive the environment through the eyes of the animals they prey on. Microbiologists and birdwatchers refuse to kill the birds they observe, or defer the moment of killing, because they need to catch something of their perspective on the environment. In contrast, public health management of the threat of avian influenza involves killing birds to protect humans without taking on their perspective; for public health officials, bird diseases are signals that something has gone wrong in the world and requires human intervention. These two different perceptions of animals' death can be called "preparedness" and "prevention." Most of the book is dedicated to clarifying this distinction.

This book thus combines a theoretical argument in social anthropology with an ethnography of human/animal relationships and public health techniques, to describe the surveillance of avian reservoirs in specific territories in Asia. It is divided into two parts: one is more theoretical and discusses the stakes of preparedness for social anthropology, while the other is more empirical and describes relations between humans and birds engaged in specific techniques of preparedness. In part I, I reflect on my position

as an anthropologist trained in the French structuralist tradition, working with microbiologists in a European project and with curators in a museum. In part II, I describe my observations in Hong Kong, Singapore, and Taiwan referring to the anthropology of hunter-gatherers.

Chapter 1 discusses how anthropology has referred to animal diseases in order to think about the social. It shows that the conceptual apparatus of social anthropology, which has historically relied on the distinction between nature and society to build concepts of causality reflecting modes of intervention, has changed in parallel with transformations in the public health management of animal diseases. Claude Lévi-Strauss's diagnosis of mad cow disease is read as a more ecological approach to animal diseases, based on the techniques of anticipation of hunter-gatherers, than the views of anthropologists from Herbert Spencer to Émile Durkheim, borrowed from the observations of pastoralist societies. This chapter clarifies historically and genealogically the distinctions among prevention, precaution, and preparedness that have been used to diagnose the emergence of bird flu in Europe.

Chapter 2 looks at a recent controversy on mutant flu viruses to raise questions on the linguistic slippages of microbiologists when they are dealing with unstable entities, hypotheses, and models. Following the discussions between virologists and epidemiologists on the adequate techniques to prepare for a pandemic, it raises questions on the possibility to anticipate in the laboratory viral mutations that will emerge in nature. The notion of lure allows me to connect biosecurity concerns with techniques from hunter-gatherers.

Chapter 3 describes prevention and preparedness as different techniques to conserve the past in order to anticipate the future. It relates the emergence of virology and ornithology to the places where samples are accumulated and classified. It then traces the role of anthropology in museums where cultural artifacts are conserved to reflect on the possible interactions between microbiologists, birdwatchers, and anthropologists in the field. It also asks questions about the position of China as an empty space in the global collections of museums.

In these three theoretical chapters, preparedness is thus described as a mode of causality (justifying governmental interventions), a technique of language (connecting nature and the laboratory), and a form of visibility (producing accumulation and classification). In the next, more ethnographic chapters, I describe three techniques of preparedness as they are implemented in Hong Kong, Singapore, and Taiwan. Each of these ter-

ritories provides me with the vignette that opens the chapter, which leads me to speculate how far each one of these territories preparing for disasters coming from China could be best described through each of these three terms: Hong Kong as a sentinel post, Singapore as a technological space for simulation, Taiwan as a storing repository.

In chapter 4, on sentinels, I show that relations between self and other are configured in sites where early warning signals are produced at different levels: the globe (environmental sentinel), the sovereign territory (sentinel post), the farm (sentinel chicken), and the organism (sentinel cells). In these different settings, I ask how sentinels can fail or be lured and how early warning signals are produced in situations of uncertainty, relying on ornithologists' views on sentinel behaviors. Starting from the mobilization of Hong Kong to prepare for a bird flu pandemic, I ask what it means to be a successful sentinel and what is the cost of this mode of signaling.

In chapter 5, on simulation, I analyze the performance of public health actors enacting scenarios of the coming pandemic. Asking how animals can be included in these scenarios and how these simulations become digitalized, I discuss notions of ritual, performance, play, and fiction, taking seriously the idea that virologists and bird watchers act as contemporary hunters-gatherers. The argument of this chapter is that scenarios of a bird flu pandemic allow actors to play with human/animal relationships in a reverse mode, thus anticipating their future uncertainties.

In chapter 6, on storage, I look at forms of accumulation (antivirals and vaccines) to prepare for pandemics, and I explore ethnographically their distinction with more classical forms of storage. I rely on anthropological debates about gift and exchange to cast light on the production of value in the world of microbiologists and birdwatchers. This chapter argues that the accumulation of samples and vaccines mixes preparedness and prevention, producing ambivalent debates about precaution, sovereignty, and equity.

In a style that can be called philosophical-anthropological (or fieldwork in philosophy),[10] I consider prevention and preparedness as concepts and not just as techniques—that is, I extract them from the spaces in which they can be observed to generalize them as modes of relations between humans and their environment, which I think of as cynegetic and pastoralist; but I don't want to consider these ideal types as abstract essences, and I describe how they can be mixed in actual public health practices. Similarly, I don't engage with the anthropologists of hunter-gatherers and pastoralist societies ethnographically, for this would require an attention to the diversities of forms of life that is outside the scope of this book, but

I borrow from them concepts of myth, ritual, and exchange that I use to describe contemporary techniques of preparedness. However, this doesn't mean that I refer to hunter-gatherer societies as a literary metaphor or as a romantic worldview to think about relations between humans and birds; rather, I take as seriously the ontological claims of virus hunters and bird-watchers in China as ethnographers do when they study hunter-gatherers in Siberia, Amazonia, Africa, or Melanesia.

My attraction for concepts as tools to capture relations between humans and their environment (an attraction I may share with hunter-gatherers) leads me to valorize triadic relations between concepts (a view I may share with pastoralist societies).[11] However, this doesn't mean that these concepts work in a dialectic to produce a Hegelian synthesis; nor do they correspond with each other in a systematic framework. The aim of conceptual distinctions is to do a critical work—that is, to make a difference in debates that are often confused about pandemic preparedness and thus open alternatives to securitizing views of relations between humans and their environment. Anthropology's main distinction between hunting and pastoralist societies on the threshold of domestication allows me to be critical when observing contemporary relations between humans and animals as they are engaged in pandemic preparedness. In part I, I define prevention (which can also be named "securitization") as the management and control of populations in a territory through the use of statistics, and preparedness (which can also be named "mitigating") as the imaginary enactment of disasters in a community where humans take the perspective of nonhumans.[12] I then define precaution as a mix between prevention and preparedness, since it is an injunction to protect oneself when the state doesn't control a defined territory. In part II, I show that sentinels, simulations, and storage, considered as cynegetic techniques of preparedness and described in the three ethnographic sites of Hong Kong, Singapore, and Taiwan, can also be described as pastoralist techniques of prevention when they are conceived as sacrifice, scenarios, and stockpiling. If this book may be summarized through the distinction among three P (prevention, precaution, preparedness) and three S (sentinel, simulation, stockpiling), it doesn't mean that these three terms follow each other dialectically; rather, the two P's divide each of the three S's in a diabolic mode that reflects the subversive potential of avian reservoirs.

NOTES

INTRODUCTION

1. Osterholm, "Preparing for the Next Pandemic"; Davis, *The Monster at Our Door*; Greger, *Bird Flu*; Kilbourne, "Influenza Pandemics of the 20th Century"; Tambyah and Leung, *Bird Flu*; Sipress, *The Fatal Strain*.

2. Scoones, *Avian Influenza*.

3. Garrett, *The Coming Plague*; Osterhaus, "Catastrophes after Crossing Species Barriers"; Quammen, *Spillover*; Wallace, *Farming Human Pathogens*.

4. Most of the interviews were done in English; sometimes they were done in Chinese *putonghua* with translation; they were done fewer times in Chinese without translation.

5. Shortridge, Peiris, and Guan, "The Next Influenza Pandemic," 79.

6. Ethnographies of pandemic preparedness in China—Kleinman et al., "Avian and Pandemic Influenza"; MacPhail, *Viral Network*; Manson, *Infectious Change*—have relied on other experts than Shortridge, Guan, and Peiris and therefore didn't notice the specificity of what they call "doing preparedness at the avian level." For an approach of pandemic preparedness in Asia from political sciences, see Enemark, *Disease and Security*. For a review of the history of epidemic diseases and their management in East Asia, see Peckham, *Epidemics in Modern Asia*. For an ethnographic description of pandemic preparedness from the perspective of Singapore, see Fischer, "Biopolis," and Ong, *Fungible Life*.

7. This book is an attempt to follow the transformations of "birds with flu" from places where they are produced to spaces where they are consumed, describing their entanglements and disentanglements when they are captured by scientific experts, public health planners, and company businessmen. This method is parallel to what Anna L. Tsing did with "pinetrees with mushrooms" when she and her collaborators followed the transformations of matsutake from Japan to Oregon, Yunnan, and Finland. Immune cells as mediators of communication play a role in this book that can be compared to what Tsing describes about spores and nematodes. The concept of sentinel is therefore a contribution to an anthropology of the frictions of globalization, endeavoring to unscale the projects of capitalism or pastoralism; see Tsing, *Friction*, and *The Mushroom at the End of the World*.

8. On the stigmatization of human populations by the notion of animal reservoirs, see Lynteris, "Zoonotic Diagrams." On the shift in the conceptions of animal reservoirs with the turn to biosecurity and the anticipation of emerging infectious diseases, see Keck and Lynteris, "Zoonosis."

9. See Lévi-Strauss, *Tristes tropiques*, 163, and Keck, "Lévi-Strauss et l'Asie."

10. The term is borrowed by Paul Rabinow from Pierre Bourdieu: see Rabinow, *Anthropos Today*, 84–85.

11. I borrow this definition of concepts from Viveiros de Castro, *Cannibal Metaphysics*, and the taste for ontological distinctions from Descola, *Beyond Nature and Culture*.

12. I borrow this distinction from Andrew Lakoff: see Lakoff, *Unprepared*. On cynegetic power, see Chamayou, *Manhunts*.

CHAPTER ONE: CULLING, VACCINATING, AND MONITORING CONTAGIOUS ANIMALS

1. For a general overview of the history of veterinary practices and their contribution to public health—an approach now called "One Health"—see Bresalier, Cassiday, and Woods, "One Health in History."

2. Stirling and Scoones, "From Risk Assessment to Knowledge Mapping"; Catley, Alders, Wood, "Participatory Epidemiology"; Gottweiss, "Participation and the New Governance of Life."

3. Karsenti, *Politique de l'esprit*.

4. Becquemont and Mucchielli, *Le Cas Spencer*.

5. Spencer, *Study of Sociology*, 1–4.

6. Wilkinson, *Animals and Disease*; Fisher, "Cattle Plagues Past and Present."

7. Evans-Pritchard, *The Nuer*. Evans-Pritchard observed that the devastating effect of cattle plague led the Nuer to turn to fishing. The Nuer told him that cattle plague had entered their land fifty years before; see Spinage, *Cattle Plague*, 619–20.