CHAPTER TWO

Monitoring Animals, Preparing Humans: An Ethnographical Study of Avian Influenza

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What are the conditions for carrying out an ethnography of avian influenza? The anthropologist who studies this phenomenon must simultaneously follow the rules of what George Marcus has termed "a multi-sited ethnography in/of the world system" and engage in what Stefan Helmreich has described as "multispecies ethnography."[1] The study of flu viruses and of the microbiologists who hunt them does indeed entail crossing biological (in moving from one cell or animal species to the next) and political borders (in moving from Paris to Geneva, Mexico City to New York, Guangzhou to Hong Kong, and Tokyo to Phnom Penh). I have chosen to employ the ethnographic "I" in order to gather these actors of varying sizes and ontologies, who together constitute what I call a "world with flu."[2] This does not mean that this world is solely an artifact of the ethnographical study itself; in fact, it first emerged a half century ago concomitantly with the flu virus surveillance networks that were set up around the world in anticipation of a return of the 1918 pandemic. Hong Kong, where I carried out my fieldwork, had the particularity of being the place where H5N1, a very lethal virus that moves from birds to humans, was first identified in 1997. With the advent of H1N1 in 2009, an eventuality for which the territory had spent the preceding 15 years preparing, Hong Kong thus seemed to offer an excellent vantage point for taking an informed look at the global mobilization to fight the virus. I thus studied how flu viruses transformed the "life world" via sociotechnological dispositifs,

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drawing for this purpose upon an ethnography conducted in close proximity with the actors concerned: humans, birds, and microbes.

While the ethnographer thus plays, in Marcus' phrase, the role of "circumstantial activist," he cannot content himself with simply observing the many reconfigurations of this world at the risk of being "complicit" with the experts who move in pursuit of viruses.[3] The pandemic caused by the H1N1 virus in 2009 and the vaccination campaign with which the international health authorities responded to it leads one to ask the following question: did the pandemic disaster really take place or did this "world with flu" remain virtual? As it happens, avian influenza blurred the usual distinctions between "risk" and "disaster," between knowledge and the real, to the benefit of that third space, the virtual, in which the actors moved. The virtual in this way had real effects. The ethnographer thus plays the role of the "sociologist of critique,"[4] observing the gap between reality as it is described by institutions and the proliferation of a life world that challenges it. In the event, the American-origin H1N1 virus, which was at once less severe and more contagious than predicted, confounded the pessimistic scenarios that had been established for the Asian-origin H5N1 virus. An ethnography faithful to its object thus leads one to track flu viruses while preserving the uncertainty as to whether or not they will ultimately assume disastrous proportions. While it cannot be said that the pandemic remained merely virtual (it did in fact have biological and political effects), neither can one say that it was a "real" disaster (it did not achieve the scale foreseen by risk management plans).[5]

One way to remove this difficulty is to observe the rationalities that entered into tension at the time of avian influenza. By "rationality," I mean the collection of logical arguments that rely upon a technological dispositif to act upon what they define as a reality. Three rationalities enter into play when a virus moves from animals to humans. Prevention consists in monitoring animals and in destroying them when they become host to the flu; precaution outlines a space of deliberation regarding external risks; preparedness leads humans to participate in simulations designed to identify points of vulnerability.[6] These rationalities have distinct genealogies that intersected with one another in the emergence of the H5N1 virus in Hong Kong, crystallizing a complex collection of heterogeneous fears around it. By retracing the history of these rationalities, the ethnographer acts as an ethnologist and anthropologist, returning to the general principles of the human condition.

It can thus be said that, while there was no pandemic disaster for humans (to this day, there have been 300 victims of avian flu in the world), such a disaster did indeed take place for tens of millions of slaughtered poultry. Avian influenza thus allows one to ethnographically observe what Foucault called the "threshold of modernity," passing from the sovereign power to "make die or let live" to a "biopower" aiming to "make live or let die."[7] It is indeed striking that, to fight a human disease that has killed 300 people since 1997, humans are "made to live" in the expectation of a pandemic that may kill 60 million people while other humans are "let die" from neglected diseases such as malaria, and tens of millions of poultry are "made to die." It thus becomes clear that some actors choose to "let animals live" by removing them from the market economy in which their diseases develop. By subverting the "world with flu" from within, such actors allow the ethnographer to escape from the fate of the "circumstantial and complicit activist" and become a sociologist of critique. The anthropological turn is thus not an escape toward generality but rather the necessary condition for examining critical processes in the field.

The French Food Safety Agency: From Mad Cow Disease to Avian Influenza

I discovered "emerging infectious diseases" while observing expert discussions at the French Food Safety Agency (AFSSA), which was established in 1999 following the "mad cow" crisis. In 1996, the transmission to humans of Bovine spongiform encephalitis (BSE) made Europeans aware of what international health authorities had known since 1976: new infectious diseases emerge as a result of transformations in relations between humans and animals. The HIV/AIDS virus and Ebola had thus appeared among African monkeys at the end of the 1970s as a result of deforestation; prions were probably transmitted from sheep to cows due to reliance on meat and bone meal and a lowering of the temperature at which these recycled products were manufactured.[8] International experts thus sounded the alarm concerning these "disasters caused by the crossing of species barriers."[9] While infectious agents are continuously in a state of endless mutation, certain mutations produce discontinuous effects when they allow these agents to jump from one species of animal to another, since the behavior of an infectious agent in a new species is unpredictable.

In the case of BSE, this disastrous mutation took a slow and diffuse form. Like nuclear radiation, the prion invisibly contaminates through food and its effects only become apparent 20 years later through a sort of chain reaction within the brain, which takes the form of a sponge. As the behavior of this infectious agent was unknown (it was not a virus but rather a simple protein), the principle of precaution required that all cows suspected of being contaminated be withdrawn from the food chain. Hence the spectacular measures recommended by AFSSA in 1999, including an embargo on British beef and slaughtering the entire herd once a single cow tested positive for BSE.[10]

AFSSA experts were responsible for applying this principle of precaution to other food safety questions and, in the course of their deliberations, I saw them address questions as diverse as GMOs, Omega-3s, and obesity. The evaluation of "nutritional and health risks"—a notion forged to extend the concerns resulting from the mad cow crisis to the entire food chain[11]—aimed to establish the danger represented by each new food product for consumers depending on their degree of exposure. In the words of its coordinators, AFSSA was a "cocoon," where questions regarding new food technologies were submitted for evaluation by academics and researchers from the life sciences. It was not a "hybrid forum" in which the complaints of producers could enter into controversy with consumer demands, but rather a site of categorization where the frontiers between pure and impure asserted at the time of the mad cow slaughter was reformulated.

Avian influenza disrupted this organization of scientific labor. In September 2005, the United States launched a vast campaign in the aftermath of hurricane Katrina to prepare for avian influenza, which had left Asia and was at the doors of Europe. In February 2006, the H5N1 virus was discovered at a poultry farm in the Dombes area of France, following infection by a wild duck: the farm was put under quarantine and the poultry slaughtered.[12] AFSSA experts had to include this new risk in their evaluation, for while the virus did not threaten consumers—it only survived on living animals—it did pose a danger to poultry farmers. For AFSSA, which had been created to assess food risks "from the pitchfork to the fork," it can be said that mad cow disease was closer to the fork and bird flu to the pitchfork.

Yet H5N1 did not appear to be analogous to BSE as a risk. While the risk of BSE resided in its incubation period (and therefore in the number of infected animals that had entered the food chain), the risk of H5N1 stemmed from its mutation mechanisms (and therefore the number of animals among which the virus circulated through

mutations and reassortments). A benign virus suddenly became very dangerous, leading to analogies with terrorist attacks. As Marc Savey, a veterinarian who had been in charge of assessing prion disease, and who was initially a member of the Dormont Committee, explained to me:

> Being a mad cow expert is like watching a film in slow motion; when you know the beginning, you know the end. If there was a risk in terms of public safety, that risk had already been taken. For avian influenza, it's like a classic science fiction film: you know each amino acid but you don't know how they will combine. Hence the role of wildlife, where the combinations take place, and the risk can be assessed when one knows which animals are involved. As Avian influenza advances very rapidly, we must stay very calm when people talk of virus bombs; mad cow advances very slowly, it is very inert, and we must think more rapidly.[13]

In other words, mad cow was a slow risk (closer to a mistake) and avian influenza a rapid risk (closer to an apocalypse). Food risk evaluators shifted between these two extremes in a speed gradient.[14]

The rapidity with which avian influenza was addressed disrupted the routine of expertise. While expert committees assessed food risks with an eye on the accumulation of data (by appointing a working group responsible for producing a monthly summary of the state of knowledge regarding an at-risk product), avian influenza was entrusted to an Emergency Collective Expertise Group that was expected to react in real time to mutations of the virus, and enjoyed a direct line to the agency's leadership. Maps were shown charting the progress of the virus from Asia to Europe, and ornithologists were invited to discussions of animal health experts in which the risk of contamination among migratory birds was examined.[15] There, they debated the following question: "can birds sick with flu fly?"

Above all, avian influenza led to a reorganization of animal and human health experts within AFSSA. For veterinarians, who had until then been in charge of monitoring farm animals under the aegis of the Ministry of Agriculture, the response to mad cow disease was constituted encroachment on their domain on the part of doctors: following the contaminated blood scandal, the latter wished to defend public health, and suspected veterinarians of protecting the interests of farmers and the agro-food industry.[16] Avian influenza, by contrast, provided an occasion for veterinarians to reassert their competencies in

defending farmers, for the latter were in the first rank of those exposed to the risk of H5N1. Outside of AFSSA, avian influenza also allowed the Paris-based International Office of Epizootics to gain influence vis-à-vis the World Health Organization (WHO), leading it to rename itself the World Organization for Animal Health.

The world of veterinarians was itself nevertheless divided by avian influenza. Some defended a classic rationality of risk prevention and held that H5N1 was less dangerous than other endemic diseases in Europe, such as tuberculosis and brucellosis, which imposed real economic costs on farmers. Others thought that avian influenza was an opportunity to hold farmers accountable by imposing "biosecurity" rules that would prevent a disastrous chain reaction capable of causing a pandemic from taking place on French farms.[17] This latter group of veterinarians defended a rationality of preparedness at the level of farmers, allying themselves with other groups that deployed this same rationality in other social spaces. When I left for new field research in Hong Kong, I thus sought to follow the genesis of this rationality of preparedness at the avian level.

Hong Kong as a Health Sentinel

Studying avian influenza from the perspective of Hong Kong entailed adopting a new point of view. Until then, I had only encountered H5N1 through expert discussions in which the participants saw themselves as intermediaries between producers and consumers within a national framework protected by the principle of precaution. Going to Hong Kong afforded me a global perspective on the goods that, in circulating the planet, spread potential epidemics. Like AFSSA, Hong Kong was a "cocoon" in which the activities of the external world were recast in the form of speculation regarding future threats. Inside this cocoon, however, one could freely move from laboratory to farm, visiting poultry markets and hospitals along the way, where the fears of the rest of the world concerning what was happening in this little territory were reflected.

Since its retrocession to China in 1997, Hong Kong has taken on the role of "health sentinel," warning the world of the dangers that emerge in this densely populated zone. Formerly a financial market where goods manufactured in China passed through English law to enter the capitalist world (a role that Shanghai has gradually come to assume), Hong Kong exercised the freedom of expression guaranteed

it by its status as a Special Administrative Region to issue warnings regarding the excesses of Chinese development.

This new function was largely the creation of Kennedy Shortridge, who founded the Hong Kong University Department of Microbiology in 1972. Trained in the Australian school of microbiology, Shortbridge confirmed Robert Webster's hypothesis according to which the influenza virus mutates in an animal reservoir of aquatic birds before moving through swine—as the receptors of their respiratory tracks are compatible with those of both aquatic birds and humans, they are considered the "intermediate carrier"—to reach humans. He claimed that southern China is an "influenza epicenter" due to its intensive agricultural systems in which aquatic birds, swine, and humans live in close proximity. And, indeed, this is where the H2N2 and H3N2 influenza viruses responsible for the pandemics of 1957 and 1968 emerged.[18] In the 1970s, Shortridge began to collect a large number of avian viruses in southern China in order to identify the next pandemic virus and produce a vaccine. When the H5N1 virus killed 5000 poultry and 8 humans in 1997, the vaccine could not be used as it was manufactured via chicken embryos. Shortridge thus advised the director of the Health Department, Margaret Chan, to slaughter all poultry living on the territory. He subsequently recruited Malik Peiris and Guan Yi to set up operations to monitor Hong Kong's domestic and wild bird stocks. Each of them succeeded in identifying the SARS virus, which, starting in Hong Kong, infected 8000 people across the world in 2003, and was transmitted from bats to humans by way of the masked civet, a rodent highly valued in traditional Chinese medicine.[19]

The SARS crisis in 2003 thus served to confirm Hong Kong's role as health sentinel as Shortridge had conceived it in 1997.[20] But it also produced a strange disconnection between avian influenza and other perceived disasters elsewhere in the world. With nurses dying after coming into contact with their patients and virus carriers travelling by airplane, infecting widely dispersed cities in the space of a single day, SARS was presented as an "Asian September 11th." The extensive funds invested in avian influenza and SARS research came from the American government's fight against bioterrorism.[21] In one of their most cited articles, Shortridge, Peiris, and Guan skillfully appropriated the vocabulary of preparedness for a terrorist-type disaster to justify their efforts to monitor the birds of Hong Kong. "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."[22] The

leitmotiv of international health authorities after 2003—that "nature is the greatest bioterrorist threat"—found very concrete application in the case of Hong Kong: in an experiment that served as a model for the rest of the world, an entire territory was submitted to the logic of preparedness for an avian influenza pandemic.

Arriving in Hong Kong at the end of this story involved changing my point of view on avian influenza. While my experience of AFSSA, informed by the mad cow crisis, led me to adopt a skeptical stance on H5N1, in Hong Kong I found myself caught up in a complex of fears where Asia and America entered into collision via the accelerated mediation of the influenza virus. This fear crystallized around a frontier that continued to be present in the discourse of Hong Kong's inhabitants, although it had ceased to operate politically: the frontier separating them from China, crossed by birds and humans carrying H5N1.

Indeed, two episodes indicated that I had myself succumbed to the fear of a pandemic. Upon returning from a visit to the Mai Po ornithological reserve, located on the frontier between Hong Kong and Shenzhen, I came down with a fever, and for an entire night I believed that I would be placed in quarantine before awaking in perfect health the next morning. During my first trip to Guangzhou, where I had seen the famous wild animal markets described by the Hong Kong experts as the source of new epidemics, I dreamed that my hotel building collapsed under a mass of animals, which then took flight at the appearance of the radiant face of Anson Chan, one of the leaders of Hong Kong's Democratic Party.[23] I had partaken of the prevailing discourse, according to which the defense of Hong Kong society involved the fight against avian influenza. In so doing, I had myself become a guardian of the health sentinel.

In contrast to the enquiry in the AFSSA, the fieldwork I carried out in Hong Kong did not take place in the framework of the rationality of risk. I was unable to study the expert committees that had been established in the aftermath of SARS at the Food and Environmental Hygiene Department's Centre for Health Protection. These expert committees were influenced by the director of the University of Hong Kong's Department of Microbiology, Kwok-Ying Yuen, whose activities were shrouded in mystery, and they rarely met. Rather than citing the activities of expert committees, media reports directly quoted microbiologists, who were presented as heroes in the fight against avian influenza. I had the opportunity to observe these microbiologists at various sites in the territory where they monitored the bird population,

including farms, markets, customs posts, and ornithological reserves. I also participated in exercises simulating the arrival at hospital of a patient infected with avian influenza. These were intended to identify "points of vulnerability" and "gaps in knowledge" in preparation for the pandemic. I also met many individuals responsible for "contingency planning" in business and administration who competed with one another in the purchase of masks and antivirals. This was less a matter of evaluating risk than of preparing for disaster.

Critiques of Poultry Slaughters

The anthropology of disaster shows that a multiplicity of discourses and practices enter into competition with one another, giving meaning to events that break the continuity of everyday life.[24] As elsewhere, Hong Kong's preparedness dispositif for avian influenza came up against a collection of practices that led many to question its relevance. The logic of these practices, most of which were religious in nature, placed the emergence of avian influenza in the context of other disasters for which preparedness was required.

The first critique was that of the Buddhists. The slaughter of 1.5 million poultry in 1997 had remained present in the memories of the inhabitants of Hong Kong as an act of violence that assumed political meaning in the context of the former British colony's handover to the People's Republic of China; each of the slaughters that took place once H5N1 was found in the poultry stock recalled this traumatic episode. Margaret Chan is today still known in Hong Kong, less for her role in overseeing the WHO, to which she was elected in 2006 with the support of China, than as the person who in 1997 told the media: "I eat chickens, you can eat them too." In response to her remarks, the Buddhist community, which advocates vegetarianism, reactivated Buddhist thinkers' traditional critique of ritual sacrifice in the celebration of dynastic succession as it had been conceived in Confucianism.[25] In 1997, the Buddhist Association of Hong Kong held a week of prayer for the souls of the slaughtered poultry, and its president, Master Koh Kwong, traveled to all points of the frontier to spiritually purify the territory. The massive slaughter of poultry was generally seen by the Buddhists of Hong Kong as proof that the consumption of meat brought bad karma. From this perspective, the true disaster was not avian influenza but the eating of meat and the organization of a meat industry.[26]

"Ordinary" Buddhists, on the fringes of the official Hong Kong Buddhist Association, expressed a more radical critique. They practiced the release of living animals, traditionally known in China under the name *fangsheng*. They visited the markets where they bought animals, which they then set free in a nature reserve after saying prayers. The aim of this practice was to increase the merit (*gongde*) of those who freed them. It could take place alone or as part of a group, and no Buddhist monk was needed to oversee it. On the Internet, many sites were to be found where followers of this practice published their photos and arranged to meet. The Hong Kong Buddhist Association criticized this popular appropriation of the official religion, emphasizing that *fangsheng* means "to purify the heart," not "release life." Above all, it condemned the release of birds, for ornithologists had shown that most of the wild birds carrying H5N1 were found near the Mong Kok bird market. These birds, it is true, had been transported, often illegally, from China in small cages in which stress favored contamination and mass bird graves were often discovered near the places where the ceremonies took place.

I observed a group of *fangsheng* practitioners who met every Saturday afternoon in Tsuen Wan to buy fish, crabs, shellfish, and frogs with the intention of releasing them into the harbor before sharing a vegetarian meal. They knew that it was forbidden to free birds and had found an available substitute in these aquatic animals. Daniel Lo, a former insurance agent turned water recycler, organized this activity. "I know that people think we're crazy," he told me. "But there is so much suffering in this market. We cannot free all of the animals but we can reduce a little of their suffering and increase our merit."

A more traditional reaction was codified in the terms of the Taoist religion. The importance of Taoism in popular religion was pointed out to me by a Hong Kong anthropologist, Tik-Sang Liu, who had studied the religious practices of a village of migrants whose principal economic activity consists in raising poultry.[27] "If you want to know how the people of Hong Kong protect themselves from diseases," he told me, "go to the Taoist festival of Lam Tsuen." This festival (called *jiao*) takes place every ten years in a village famous for its "wishing tree." That year, it brought together five thousand people from the four corners of the world, and the committee had spent five million Hong Kong dollars to finance the organization of performances and vegetarian meals. Under a giant bamboo canopy, actors continuously performed Cantonese opera in order to entertain the ghosts, for whom fruit was laid out alongside the stage, and to draw them away from the

altars devoted to Taoist divinities, to which priests said prayers on the opposite side. A rooster's throat was slit at the start of the festival and its blood was poured throughout the village in order to repel aggressive energies, a practice that had been forbidden due to avian influenza. The Taoist festival presented itself as the inversion of the traditional meal of the Chinese New Year, in the course of which nine meats are consumed in the temple of the ancestors and a soup containing an entire chicken represents the unity of the familial clan. The territorial organization of the villages by Taoist priests, who are more sensitive to geodesic influences, contests the division into family clans practiced under the Confucian tradition of the cult of the ancestors.[28] According to the Taoists, avian influenza was caused by a clan-based organization of the territory that appropriated its vital energies rather than allowing them to regulate themselves internally.

The Taoist framework allows one to interpret popular reactions to the measures taken against avian influenza, particularly in poultry markets. While it was common for the citizens of Hong Kong to possess farmyard poultry 20 years ago, they were obliged to give up this practice after 1997, and now must go to the market to purchase living poultry (*huoji*). Living poultry is a preferred plate to offer guests for reasons of both flavor and hygiene: one can verify a bird's state of health before it is killed. In the market, poultry merchants are separated from other shops by a corridor where posters remind consumers that, due to avian influenza, they are not allowed to bring a living bird home with them. After having chosen a bird, the client continues shopping while the bird's throat is cut and it is plucked in the rear of the shop. Merchants are forbidden from keeping alive any poultry that remains at the end of the day, which obliges them to sell pieces cut up the night before alongside living birds. As a merchant of "Kamei" chicken, a species raised in Hong Kong, that is twice as expensive as chicken from China, told me: "We are always stressed out, it's hard. The government threatens to take away our permits. Some protest against the government, some have even thrown themselves into the sea." In Chinese, the term *xiahai* designates both the act of throwing oneself into the sea and the privatization of an activity. In fact, poultry merchants effectively threw themselves into the sea in June 2009 to protest against the reduction in the number of living chickens that could be sold, thereby dramatizing their demand to be freed from the constraints imposed on their activity by avian influenza.

While preparedness for pandemic disaster thereby mobilizes many forms of discourse and practice involving relations between humans

and nonhumans, one may wonder how to describe the action of ornithologists. The latter speak the scientific language of virus monitoring but they explain avian influenza by reference to the excessive action of the human species on its environment. They can thus play the role of intermediary between globalized scientific networks and local communities expressing demands in a religious-type discourse. For these environmental defense groups, there is no need to refer to the suffering of animals or the disruption of life cycles; it is enough to show the effect stress has upon animal diseases and to relate it to large commodity flows. This may be why the ornithologists were the most active interlocutors in my study: while microbiologists only offered partial information, ornithologists immediately gave me a complete presentation of the issues at stake in avian influenza. My work with the ornithologists allowed me to understand that monitoring animals is not just one among several measures for fighting avian influenza in a complex of security fears. It can also be employed as a critical tool against the commodification of the living in the context of other environmental mobilizations.

The Metamorphoses of Influenza

The twofold function of animal monitoring became clearer to me with the emergence of a new type of pandemic influenza, the H1N1 virus of 2009. The 2009 pandemic could be described either as a victory for the coordination of vigilance networks (it allowed one to observe in real time how the new virus spread, from the infection "patient zero" to its dilution in the global population) or instead as a failure of risk assessment and management (the virus proved less dangerous than anticipated and, as a result, the international vaccination campaign that was quickly launched met with resistance from the citizens concerned).[29] In the perspective that I have adopted—that of the health disasters resulting from the crossing of species barriers—it above all meant a new step in my understanding of the possibilities of the influenza virus within the animal reservoir and therefore new considerations concerning what animal monitoring means for human preparedness.

The H1N1 virus that emerged in the Veracruz village of La Gloria (Mexico) resulted from a reassortment of human viruses with swine and bird viruses that had found a pathway to enter human cells. This village was located near a high-intensity hog farm belonging to the American company Smithfield, which had already been widely criticized by

environmentalist groups.[30] The alarm, however, was only sounded on April 27, 2009, when the Mexican health authorities identified a large number of severe respiratory ailments in the country capital, most of which subsequently proved not to be caused by H1N1.[31] In the space of a few weeks, this new virus spread across the planet, soon replacing the H3N2 seasonal influenza, for which a vaccination campaign had already been organized. On June 11, the WHO therefore declared this pandemic virus, launching a new vaccine campaign. France and Switzerland, where the largest flu vaccine-producing pharmaceutical companies (Sanofi-Pasteur and Novartis) are based, ordered two doses of vaccine per person. The People's Republic of China fabricated its own vaccine and was the first to vaccinate its population on the occasion of public rallies to celebrate the regime's sixtieth anniversary on October 1.

Having crossed the species barrier, this virus did not kill poultry or swine, but it did threaten to kill nonimmunized humans. That is why, in contrast to the H5N1 virus, it was possible to produce vaccines by using chicken embryos. When hogs were slaughtered, notably in Egypt, where they are raised by the Coptic Christian community, it thus served no purpose. It has been shown, however, that the H1N1 virus is a variant of the H1N1 that caused the "Spanish influenza" pandemic of 1918, which disappeared from the human population in 1958 and passed back into swine in 1976 after having escaped from a Soviet laboratory.[32] The long history of H1N1 over the course of the twentieth century, with the virus crossing back and forth between species and continents, explains why it was less dangerous than anticipated: in February 2010, 18,000 people died of it, fewer than the number who die each year from seasonal influenza. The elderly—the main victims of seasonal influenza—were less affected by H1N1 and it was above all pregnant women and the obese who experienced a comparatively high death rate.[33]

When H1N1 emerged in Mexico, I found myself in Buenos Aires for a series of courses and conferences. "This must be for you," I was told by one of the people who had invited me. In fact, I had modified my course on "biopolitics" to include this event, which had given a new direction to global preparedness for pandemic disease. I had the feeling that it was only in terms of the local conjuncture in which it appeared that such an event had meaning, and I rapidly tested this hypothesis by reading the Argentine press and discussing the matter with students. The Argentine government had for several months been struggling with dengue fever, an emerging disease in Latin America

transmitted by an African mosquito. By firmly responding to the influenza pandemic and in particular by stopping all flights to Mexico, it could respond to those who blamed it for the progress of dengue fever. But the media rapidly denounced the apparent Peronism of the government's effort, insinuating that warnings of an influenza epidemic were the product of a North American plot led by the manufacturers of Tamiflu. Online videos pointed out that Donald Rumsfeld was a shareholder in Roche, and drew connections between the apocalyptic discourse of the WHO and statements regarding the "war on terrorism." In the end, Argentina was among those countries most heavily affected by the H1N1 influenza in the course of summer 2009 and had to suspend leisure activities and legislative elections.

Back in France, I was struck by rumors that influenza experts were in a "conflict of interest" with the pharmaceutical industry as well as by the abandonment of the term "swine flu," which was used in most other countries. France thus replayed the scenario of the mad cow disease. But since the pork farming lobby had succeeded in deflecting accusations targeting its activities, suspicions turned toward the pharmaceutical industry, which had until then seen the emerging infectious diseases market as unpromising. By speaking of the "A(H1N1) flu" and decreeing a military-style mobilization, with health personnel ordered to gymnasiums selected by the police, the French government showed itself incapable of explaining to the general public the real issues at stake in the pandemic. While citizens concerned about the conditions under which the vaccine had been produced drew upon the principle of precaution, the government relied upon the principle of equal access to vaccination as it had been asserted by the National Consultative Committee for Ethics. Pandemic contingency plans, which had been drafted in expectation of the H5N1 virus, for which no vaccine existed, had not anticipated that the vaccination campaign would fail. Rather than concentrating on the work of defining which segments of the public were first in line for receiving vaccination, the authorities soon had to deal with the management of excessive stocks of vaccine.

When I returned to Hong Kong in late 2009, I was present for a farcical reprisal of the SARS crisis: a Mexican man carrying the virus had stayed in Wan Chai's Metropark Hotel and all of the hotel's clients were placed under quarantine for a week. Was this because the name of the hotel resembled that of the Hotel Metropole, where "patient zero" from the 2003 SARS epidemic had stayed? For a week before the hotel's 283 guests were released without the trace of a symptom, the people of Hong Kong were witness to their antics, as if watching a

reality TV show. The farce took a sinister turn when the first victims of H1N1 proved to be Philippine workers, with the government proposing sequestration measures that threatened to stigmatize this already dominated population. The vaccine purchase campaign took so many precautions that, by the time a reliable vaccine was finally available to doctors—it was sold by Sanofi-Pasteur—the WHO had declared the pandemic over.

This survey of the world of pandemic flu confirms the teachings of the anthropology of disaster: to wit, that an event only assumes meaning in terms of the crises that preceded it, whether they be the September 11 attacks in the United States, the mad cow crisis in Europe, or the SARS epidemic in Asia. Such crises structure the organization and perception of the framework in which the event appears. As each of the countries that I passed through prepared for the pandemic in keeping with their memory of these earlier crises, the surprising behavior of H1N1 could only be interpreted through this memory.

What seemed to me the best position—that is, the closest to what actually happened—was occupied by a team of young microbiologists at the University of Hong Kong. On June 11, 2009—the very day that the WHO declared the virus a pandemic—their team published a genetic analysis of the evolution of the H1N1 virus in the animal population. Trained by Guan Yi, an Australian and two Indian scholars sketched the phylogenetic trees of the virus on the basis of sequences available from online digital databanks. They began by applying this method to mushrooms. In 2003, they extended it to SARS and H5N1 and, finally, H1N1 in "real time." Their article showed that a "twin" virus of H1N1 circulating among humans had been detected on pigs in Hong Kong in 2004 and shared seven of eight genes with the Mexican virus. The conclusion was as follows: "Movement of live pigs between Eurasia and North America seems to have facilitated the mixing of diverse swine influenza viruses."[34] The American Department of Agriculture drew upon this article to claim that the H1N1 virus had not passed through American pigs but rather through Asian ones. Although they acknowledged that it was difficult to verify this "hypothesis," they advanced a speculative "scenario" according to which a human being from Asia introduced the virus to America and then passed it on to swine, from whence it once again returned to humans.[35] In response, the microbiologists stated that their study must not lead one to blame Asian swine in the same way that Chinese chickens had been singled out as the source of avian influenza. On the contrary, the North American health authorities were to be blamed for not having monitored animal stocks

as intensively as their counterparts among the Hong Kong researchers, for they might otherwise have identified the pandemic virus before it emerged. The article concluded in this way: "Yet despite widespread influenza surveillance in humans, the lack of systematic swine surveillance allowed for the undetected persistence and evolution of this potentially pandemic strain for many years."

This position gave new meaning to Hong Kong's role as a "sentinel." When Kennedy Shortridge proposed this expression, he was using it to refer to an "epicenter" where a pandemic disaster emerges before spreading to the rest of the world. This reflected a "tropical medicine" approach that detected diseases in the "densely populated" tropics before they made their way to "developed countries." In 2009, Shortridge, then in retirement, had indeed sounded an alarm of this type, declaring, "It is probably in the tropical countries more than in the countries of the South that this virus will experience the contortions of reassortment in the coming months."[36] But the position of Gavin Smith and his colleagues was different: it implied that the circulation of animals had become so intense and rapid that pandemic disaster could break out anywhere. As a result, monitoring must be as intense and rapid as the globalization of trade itself. Monitoring thus became a tool of critique. Indeed, these young microbiologists were vegetarians and very concerned about atmospheric pollution. From their perspective, the sentinel was no longer a way of turning the disadvantages of the tropics into an advantage. Rather, it is a critical actor in a globalized world where humans and nonhumans circulate ever more rapidly.

Biosecurity: From Farm to Laboratory

Most of the fieldwork that I have described up to this point consisted of brief and rapid trips. Above all, I observed microbiologists in the various places where they monitored animals in order to see how humans entered into (or were absent from) their vision of the "world with flu" and chart the various critiques that emerged vis-à-vis measures to prepare for the flu. The prospect of pandemic disaster allowed the very heterogeneous places variously concerned by such a disaster to be linked together. I will conclude by considering two longer periods of fieldwork in which I immersed myself in places where humans live in day-to-day contact with viruses. The experts I observed evaluated the risk of influenza from the perspective of future disaster. Yet, though constantly exposed to the threat of virus, they did not fear it.

These two places are the laboratory of Hong Kong University's Pasteur Centre, which hosted me as a visiting scholar for one year, and a Yuen Long poultry farm, where I worked for one week as a laborer. These two places are comparable, in my opinion, because they implemented rules of biosecurity that are often mentioned by experts as the main dispositif in the fight against avian influenza. Biosecurity involves considering a farm or laboratory in the same light; that is, as spaces characterized by the circulation of biological material capable of transmitting infectious agents.[37] Consequently, I propose to carry out an ethnography of biosecurity, that is, a study of what it means to live with viruses on a daily basis.[38]

Wang Yichuan's farm is one of thirty poultry farms still operating in Hong Kong. The government encourages farmers to abandon poultry farming, which was judged excessively dangerous under a Voluntary Surrender Act that provided compensation for farmers who agreed to retire. On December 9, 2008, this farm was hit by the H5N1 virus, which killed two hundred chickens. Among them, half were sentinel birds that had not been vaccinated in order to rapidly signal the virus—the Chinese term is *shaobingji*, which literally means "whistling soldier bird." As this example shows, the rhetoric of the war against viruses is very much in effect here. By virtue of their activity, farmers are in the front lines of this war; they can "surrender" and retreat but they can also rely on sentinels to detect danger. These warlike metaphors were adopted by the media, who presented Wang Yichuan's operation as a "model farm" (*mofang nonchang*). By this, they meant that the farmer communicated well with the government and journalists. The term, however, is the same as that used in the People's Republic of China to refer to a good soldier or worker. In fact, Wang Yichuan was the president of a poultry farmers' union and was committed to a policy of transparency. He readily collaborated with the Department of Agriculture officials who killed the 70,000 poultry on his farm and stayed in quarantine with his wife for a month in order to clean it. "Not a single feather remains," he proudly told me.

When I asked Wang Yichuan whether I could work on his farm, he readily agreed. He wanted me to witness the strength of his business and spoke to me of the Chinese expansion in Africa; he himself possessed another farm across the border, and spent most of his time managing these various commercial activities. I was nevertheless a little surprised by the run-down character of the equipment on his model farm. The poultry was crammed into a pyramid of cages in two metal buildings aerated by large ventilators. Biosecurity tools were present

but little used; a wheel dip at the entrance to the farm (to clean the tires of vehicles as they entered and left) and foot baths (often skipped by workers) in front of each building. Rolls of metal netting had been purchased but not laid around the buildings, and sparrows were often to be seen entering the farm (rumors had attributed the farm's infection to these sparrows). Four laborers worked on the farm—two men maintained the building, another fed and cleaned the poultry, and a woman looked after chicks and eggs. She also vaccinated the poultry and prepared the men's meals.

Carting away the masses of waste produced by a poultry farm—the counterpart of the large quantity of food that is administered to birds—entails sharing farmers' habits and concerns.[39] While chickens are regularly found dead of stress and trampled by their fellow creatures, virus is less often a concern than the quality of their food; cockroaches had infested the grain bags and they needed to be removed; the vaccine had aged and had to be changed. To test their fear of contagion, I asked the workers whether they ate poultry. The woman slaughtered the poultry but only prepared it for the evening meal once the workers had cleaned off. This little break was necessary so that the chicken could pass from a living creature to food. At the end of the week, merchants came at nightfall to pick up a thousand birds. Mr. Wang's farm was located next to a container warehouse on which one could read the slogan, "We carry, we care." This expression nicely applies to the activities of the farm—a transit point in the circulation of living goods where they are also cared for.

It can thus seem odd to compare a poultry farm to a laboratory in which cells are cultivated. Yet in both cases, the avian influenza virus seems to reveal vital circulations, and the threat of pandemic is brushed aside in the interest of attention to life in its particular conditions. Under the scientific leadership of Malik Peiris, the laboratory of the Pasteur Centre developed cell culture methods in a way that complemented the phylogenic techniques employed by Guan Yi at the University of Hong Kong. On a scale running from one to four depending on the dangerousness of the infected virus, the laboratory possesses level two biosecurity. Indeed, living viruses are not directly injected into cells; rather "pseudo-viruses" are fabricated by attaching a dangerous virus' entry and exit proteins to the shell of a less dangerous one. This means that one observes the entry and exit of the virus in the cell without infecting it—that is, without replicating the virus' genetic material.

As Jean Millet, currently completing a doctorate on the entry proteins of the SARS coronavirus, explained, the aim of biosecurity is less

to protect the experimenter than to protect the experiment. It allows the experimenter to ensure that the experiment can be read, that is, it cannot be contaminated by other infectious agents. After having reserved the time slot for two hours, the experimenter must go through a decontamination chamber where he/she wears a smock, overalls, a mobcap, protective glasses, and two pairs of gloves. He or she then puts on shoe covers and crosses a line traced on the floor in such a way that shoes remain in contact with the decontamination chamber while the shoe covers are only in contact with the laboratory. In the hoods, a constant flow of air prevents the infectious agents present in the air from penetrating the experiment. Finally, all of the material is cleaned and a large portion of it is run through an autoclave. "I need to feel clean," says Jean. "You have to imagine the virus on the ground. It's true that a laboratory is not an ecological site, a lot is thrown away, but we thereby gain time relative to old material that had to be washed for long periods."

The coronavirus was kept in a refrigerator together with the monkey epithelial cells into which it had been injected. The use of refrigerators in the laboratory allows one to slow down and synchronize the life cycle of viruses and cells, just as is done in the case of the artificial insemination techniques that had been established in the farms over the course of the 1950s.[40] These frozen viruses still bear the name of the person who carried them (like Carlo Urbani, a doctor working in Hanoi who was the first to warn the international community of SARS and subsequently died from it). After having carried out the infection, Jean put it under the electronic microscope to render visible the colocalization of the virus proteins and the cell by fluorescence. His hypothesis was that the coronavirus succeeded in appropriating the action of the dendritic cells, which were the first to turn toward the infectious agents to contribute their antigens to the immune system. Jean described these cells as the organism's sentinels. Microscope imagery showed the manner in which the cells died after absorbing the virus: some entered into "apoptosis," a "clean death," in which the cell digests the virus as if recycling waste, while others were in "necrosis," with the viruses exploding them from within, thereby multiplying and infecting other cells.

Observing the viruses' activities in cells under the gaze of a microbiologist allows one to see avian influenza in a different light than that provided by expert evaluations of the risk of pandemic. If viruses are part of the cycles of living things, only transformations in the manner in which they circulate can cause disaster for humans. In

particular, the work of Malik Peiris shows that the exceptional lethality of H5N1 was due to a "cytokine storm"—that is, a disturbance of the immune system when confronted with a virus that, because it comes directly from birds, is too distant from the human organism.[41] Biosecurity thus no longer aims to eliminate viruses as enemies but rather to establish the appropriate distance between living things to ensure that their interaction remains possible. One may thus employ the term that stood out in my study of the farm. There is care in the laboratory, that is, attention given to the particular conditions of living things in order to allow them to reproduce while revealing their constitutive relations.

With the term biosecurity, the anthropology of avian influenza therefore finds a point of both entry and exit. At the macroscopic level, the notion of biosecurity refers to a collection of heterogeneous sites where preparations are made for pandemic disaster in a strange alliance between the military and sanitary domains, animal medicine, and human medicine. But it also covers practices that render visible at the microscopic level relations between living beings. When these relations are interrupted, they can lead to disaster. Care and attention are needed if they are to be maintained. Monitoring animals simultaneously involves subjecting them to security oversight under threat of pandemic and taking care of them in the diversity of settings in which they live. Sentinels thus appear as salient points where the possibilities and threats of living beings are more visible. By sounding the alarm at various levels of living things—from the cell in the laboratory to the political territory and the farmer's chicken—they represent particularly interesting sites for the study of the "world with flu."

Notes

1. George Marcus, "Ethnography in/of the World System: The Emergence of Multi-Sited Ethnography," *Annual Review of Anthropology*, vol. 24 (1995): 95–117; Stefan Helmreich, "The Emergence of Multispecies Ethnography," *Cultural Anthropology*, vol. 25, no. 4 (2010): 545–576.
2. Frédéric Keck, *Un monde grippé*, Paris: Flammarion, 2010.
3. George Marcus, "The Uses of Complicity in the Changing Mise-en-Scene of Anthropological Fieldwork," *Representations*, no. 59 (Summer 1997): 85–108.
4. Keck, *Un monde grippé*.
5. On this point, I do not agree with Jean-Pierre Dupuy's claim that the disaster must be posited as real "in another possible world": the issue is to grasp the real effects of a virtual disaster. See Frédéric Keck, "Bergson dans la société du risque,"

in Camille Riquier and Frédéric Worms (eds.), *Lectures de Bergson*, Paris: PUF, 2011, pp. 164–184.

6. Andrew Lakoff, "Preparing for the Next Emergency," *Public Culture*, vol. 19, no. 2 (2006): 247–271, and "The Generic Biothreat, or How We Became Unprepared," *Cultural Anthropology*, vol. 23, no. 3 (2008): 399–428.
7. Michel Foucault, *Lectures on the Will to Know (Lectures at the College De France 1970–1971 and Oedipal Knowledge)*, Basingstoke: Palgrave Macmillan, 2013, and "*Society Must Be Defended": Lectures at the Collège de France, 1975–1976*, New York: Picador, 2003.
8. François Moutou, *La vengeance de la civette masquée. SRAS, grippe aviaire . . . D'où viennent les nouvelles épidémies?* Paris: Le Pommier, 2007.
9. Albert Osterhaus, "Catastrophes after Crossing Species Barriers," *Philosophical Transactions of the Royal Society of London*, vol. 356, no. 1410: 791–793.
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11. Martin Hirsch, *Ces peurs qui nous gouvernent. Sécurité sanitaire, faut-il craindre la transparence?* Paris: Albin Michel, 2002, and Cécile Lahellec, *Risques et crises alimentaires*, Paris: Lavoisier, 2005.
12. Vanessa Manceron, "Les oiseaux de l'infortune et la géographie sanitaire: La Dombes et la grippe aviaire," *Terrain*, no. 51 (2008): 160–173.
13. Interview, February 2007. See also M. Savey, "Les leçons de la vache folle," *Esprit*, no.11 (1997): 107–120.
14. Frédéric Keck, "Risques alimentaires et catastrophes sanitaires. L'Agence française de sécurité sanitaire des aliments, de la vache folle à la grippe aviaire," *Esprit*, vol. 343 (2008): 36–50.
15. Frédéric Keck and Vanessa Manceron, "En suivant le virus de la grippe aviaire, de Hong Kong à la Dombes," in Sophie Houdart and Olivier Thiery (eds.), *Humains, non-humains. Comment repeupler les sciences sociales*, Paris: La Découverte, 2011, pp. 65–74.
16. Frédéric Keck, "Conflits d'experts. Les zoonoses, entre santé animale et santé publique," *Ethnologie française*, vol. 39, no. 1 (2009): 79–88.
17. Frédéric Keck, "From Mad Cow Disease to Bird Flu. Transformations of Food Safety in France," in Stephen Collier and Andrew Lakoff (eds.), *Biosecurity Interventions. Global Health and Security in Question*, New York: SSRC-University of Columbia Press, 2008, pp. 195–225.
18. Kennedy Shortridge and C. H. Stuart-Harris, "An Influenza Epicenter?" *Lancet*, vol. 2 (1982): 812–813.
19. Thomas Abraham, *Twenty-First Century Plague: The Story of SARS, With a New Preface on Avian Flu*, Hong Kong: Hong Kong University Press, 2007, and Frédéric Keck, "Une sentinelle sanitaire aux frontières du vivant. Les experts de la grippe aviaire à Hong Kong," *Terrain*, no. 54 (2010): 26–41.
20. This was also the case during the crisis of melamine-contaminated milk, which I was on the scene to observe during my 2008–2009 stay in Hong Kong: Frédéric Keck, "L'affaire du lait contaminé," *Perspectives chinoises*, vol. 1 (2009): 96–101.

21. Jeanne Guillemin, *Biological Weapons. From the Invention of State-Sponsored Programs to Contemporary Bioterrorism*, New York: Columbia University Press, 2005.
22. Kennedy Shortridge, Peiris J. S. Malik, and Yi Guan, "The Next Influenza Pandemic: Lessons from Hong Kong," *Journal of Applied Microbiology*, vol. 94, no. s1 (2003): 70.
23. On moments where the ethnographer is "taken" in its object, see Jeanne Favret-Saada, *Les mots, la mort, les sorts: la sorcellerie dans le bocage*, Paris: Gallimard, 1977.
24. Sandrine Revet, *Anthropologie d'une catastrophe. Les coulées de boue de 1999 au Venezuela*, Paris: Presses de la Sorbonne nouvelle, 2007.
25. Vincent Goossaert, *L'interdit du boeuf en Chine. Agriculture, éthique et sacrifice*, Paris: De Boccard, 2005.
26. I tried to vary what I called "the Buddhist critique" of avian influenza by studying the forms it took in Japan and Cambodia, that is, the opposing geographical extremes of East Asia; see *Un monde grippé*, Ch. 4.
27. T. S. Liu, "Custom, Taste and Science. Raising Chickens in the Pearl River Delta, South China," *Anthropology & Medicine*, vol. 15, no. 1 (2008): 7–18.
28. Cf. David Faure, *The Structure of Chinese Rural Society: Lineage and Village in the Eastern New Territories*, Hong Kong, Oxford: Oxford University Press, 1986.
29. Antoine Flahaut, Jean-Yves Nau, *A(H1N1), Journal de la pandémie*, Paris: Plon, 2009.
30. Mike Davis, "Global Agribusiness, SARS and Swine Flu" Available at http//japanfocus.org/-Mike-Davis/3134 (Accessed on June 24, 2014). Mike Davis is the author of a book on avian influenza in which he extends his analysis of natural disasters linked to the globalization of trade: *The Monster at Our Door: The Global Threat of Avian Flu*, New York: Henry Holt, 2006.
31. Jon Cohen, "Out of Mexico? Scientists Ponder Swine Flu's Origin," *Science*, no. 324 (May 8, 2009): 700–702.
32. David M. Morens, Jeffery K. Taubenberger, and Anthony S. Fauci, "The Persistent Legacy of the 1918 Influenza Virus," *New England Journal of Medicine*, vol. 361, no. 3 (2009): 225–229; Shanta M. Zimmer and Donald S. Burke, "Historical Perspective: Emergence of Influenza A (H1N1) Viruses," *New England Journal of Medicine*, vol. 361, no. 3 (2009): 279–283.
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35. Donald McNeil, "Swine Flu May Have Come from Asia," *New York Times*, June 24, 2009; "New Theory Sees Asia as Swine Flu Source," *International Herald Tribune*, June 25, 2009.
36. Declan Butler, "Swine Flu Attention Turns to the Tropics," *Nature*, no. 459 (May 28, 2009): 490.
37. Steve Hinchliffe and Nick Bingham, "Mapping the Multiplicities of Biosecurity," in Andrew Lakoff and Stephen J. Collier (eds.), *Biosecurity Interventions: Global*

Health and Security in Question, New York: SSRC/Columbia University, 2008, pp. 173–193, and C. Caduff, "Anticipations of Biosecurity," in Lakoff and Collier (eds.), *Biosecurity Interventions*, pp. 257–277.

38. This ethnographic material was discussed at greater length in "Nourrir les virus. La biosécurité dans les fermes et les laboratoires," *Réseaux*, no. 171 (2012): 21–44.
39. On the problems involved in the ethnography of animal production for consumer purposes, see Steve Striffler, *Chicken: The Dangerous Transformation of America's Favorite Food*, New Haven: Yale University Press, 2005, and J. Porcher, *Eleveurs et animaux, réinventer le lien*, Paris: PUF/Le Monde, 2002.
40. Hannah Landecker, *Culturing Life: How Cells Became Technologies*, Cambridge, MA: Harvard University Press, 2007, p. 157.
41. J. S. Malik Peiris, Menno de Jong, and Yi Guan, "Avian Influenza Virus (H5N1): A Threat to Human Health," *Clinical Microbiology Review*, vol. 20, no. 2 (2007): 243–267.

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