

GLOBAL HEALTH IN AFRICA

Historical Perspectives on Disease Control

Edited by Tamara Giles-Vernick and
James L. A. Webb, Jr.

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PEOPLE, GREAT APES, DISEASE, AND GLOBAL HEALTH IN THE NORTHERN FORESTS OF EQUATORIAL AFRICA

TAMARA GILES-VERNICK AND STEPHANIE RUPP

Cross-species transmissions—that is, when pathogens infecting one species “jump” to infect another species¹—pose considerable challenges to global health.² As the consequence of complex, dynamic, ongoing interactions between pathogens, people, other mammals, and forest ecologies, cross-species disease transmissions are not unusual in human history; indeed, many human pathogens have animal origins.³ Moreover, some zoonoses and human diseases of animal origin have developed into devastating global pandemics through the centuries. Consider, for instance, the bubonic plague pandemics, facilitated by global mobility and trades, that ravaged populations from China to Europe from the thirteenth and fourteenth centuries, and wreaked havoc in the late nineteenth century.⁴

But over the last several decades, cross-species transmissions have acquired a singular importance as a major source of “emerging infectious diseases.”⁵ Studies tell us, for instance, that emerging infectious diseases have increased since 1940, and that more than 60.3 percent of these events are zoonoses.⁶ Such alarming reports have only bolstered what Andrew Lakoff and Stephen Collier have described as “a growing perception . . . that new biological threats challenge existing ways of understanding and managing collective health and security.”⁷

Public health planners perceive the cross-species transmissions that generate new human illnesses as a threat to biosecurity, a preoccupation with securing health that commentators identify as one of global health’s central features.⁸ Experiences of SARS and other coronaviruses and avian and H1N1 influenza demonstrate all too compellingly that disease transmission between animals and human beings, facilitated by the intensified circulation of people, capital, animals, pathogens, and technologies, are a recurrent aspect of life on earth, often in highly uneven and unpredictable ways. But this alarm may have more to do with contemporary politics of biosecurity preparedness and the exigencies of preparing for the worst possible scenario than it does with genuinely new health threats.⁹ Anticipating through surveillance or managing a future threat is patently impossible, inherently incomplete, and extraordinarily

costly.¹⁰ But some biomedical researchers and their funders still find that the promise of identifying uncertain future threats justifies funding for research on host shifts.¹¹

Central Africa has acquired a notable role in contemporary biomedical analyses, as a site of pathogen sharing, infectious disease emergence, and potential threat to global health security.¹² In central Africa, people, great apes, pathogens, and their broader ecologies have all been significant actors in a dynamic, complex evolutionary history that has produced some of the most devastating pathogens to human beings and nonhuman primates alike. Many diseases afflict both people and great apes, including retroviruses (HIV and SIV), but also hemorrhagic fevers (Ebola and Marburg viruses), falciparum malaria, yellow fever, shigella and salmonella, tuberculosis, filariasis, polio, and anthrax.¹³

Some biomedical researchers, conservation and public health planners, and funding institutions have contended that the threat of cross-species transmissions between people and apes has escalated with intensified “contact” from the early twentieth century—primarily in the form of “anthropogenic change” (more intensive hunting and other forest exploitation practices, population increase, and urbanization), which renders human beings all-powerful (and self-destructive) and great apes defenseless. A historical, anthropological analysis modifies this claim: it shows that “contact” has changed in different ways over time.

This essay examines the implications for global health of integrating longer-term perspectives and local narratives with biomedical understandings about human–ape disease transmission in equatorial Africa’s northern forest. It presents evidence that the northern forests where great apes live and where some notable host shifts have occurred have had a lengthy history of human mobility, settlement, trade, and forest exploitation. This history reveals the complexity, variability, and nonlinearity of human–great ape and human–environmental relations. These dynamic processes are at odds with the unilinear assumptions embedded in biomedical and global health analyses of host shifts and epidemic outbreaks in equatorial Africa. These historical patterns underscore the limitations of global health initiatives in predicting and controlling cross-species transmissions. Moreover, northern forest narratives show that “contact” with great apes has been fluid and multifaceted. In contrast to biomedical and global health narratives, not all contact is pathogenic.

This essay is organized in two sections. The first critically evaluates the temporalities used by biomedical (virological, epidemiological, and primatological) researchers and conservation planners, who focus on the uniqueness of recent anthropogenic change in order to project an increased risk of future

cross-species transmissions and escalating global circulation of pathogens and epidemic disease.¹⁴ The second section analyzes the narratives of people–great ape relations by Africans of the northern forest.

Cross-Species Transmissions, People, and Great Apes

Virologists, primatologists, evolutionary biologists, and epidemiologists have investigated the transmission of pathogenic agents between humans and great apes in the equatorial African forest.¹⁵ A 2010 study identifies Central Africa as a “hotspot” of pathogen sharing and infectious disease emergence, a region where people, chimpanzees, and gorillas engage in frequent, close contact.¹⁶ Some pathogens have shifted from nonhuman primate reservoirs into human populations and vice versa; other infectious diseases have emerged from other animal reservoirs but then infected human and/or nonhuman primates. The role of human–ape contact in provoking cross-species disease transmission is widely debated. According to some evolutionary biologists, virologists, and epidemiologists, contact between people and apes is one factor among many that facilitates disease emergence. Pedersen and Davies, for instance, enumerate three “drivers,” all of which *could*, but do not necessarily, implicate human beings: “(1) an increase in host population density and contact rates, (2) environmental changes that effect host quality and demography, and (3) changes in host mobility and behavior.”¹⁷

For pathogens with nonhuman primate origins, some biomedical researchers have placed considerable weight on recent anthropogenic change and emphasize the destructive and deadly consequences of human interventions that facilitate closer contact between people and apes in the equatorial forest, even when they lack compelling virological, epidemiological, or historical evidence of increased encroachment of people on primate habitats. One group of ecological and primatological researchers asserted that “within the last several decades, humans have been responsible for massive, irrevocable changes to primate habitats. . . . As anthropogenic habitat change forces humans and primates into closer and more frequent contact, the risks of interspecific disease transmission increase.”¹⁸ Similarly, biomedical researchers studying the origins of HIV have used molecular clocks to suggest that the simian ancestor (SIVcpz) of the pandemic strain of HIV first infected human beings in the early twentieth century.¹⁹ They explain HIV’s emergence by identifying “historical” developments occurring at the same time: colonial rule, increased hunting of all game, but especially chimpanzees and gorillas, intensified urbanization, and human migration.²⁰

A similar temporality is found in some virological and primatological explanations of Ebola hemorrhagic fever. Wolfe and colleagues cite the escalation of twentieth century hunting and butchering of wild animals (including chimpanzees and other nonhuman primates) as a contributing factor to Ebola transmission and outbreaks in the first decade of the 2000s, observing that

during the 20th century, firearms increased the efficiency and frequency of hunting. Both subsistence and commercial hunting with wire snares and firearms are widespread activities through the forests of central Africa. . . . In addition, road networks and increasing opportunities for transporting hunted game have led to an increase in sales and the rate of hunting.²¹

Nonetheless, virologists conducting a phylogenetic analysis of the Ebola viruses circulating among people and great apes in previous outbreaks have presented models of “multiple independent emergence” of the virus lineages.²² The authors suggest that complex patterns of mobility and contact within the animal reservoir (fruit bats), but also movement and contact of “susceptible species” (great apes, people, or other susceptible animals) triggered these outbreaks.²³ In this view, nonanthropogenic change may have contributed to or triggered Ebola’s emergence.

The degree to which human action contributes to the spread of Ebola hemorrhagic fever outbreaks once they have erupted in human populations is unclear. Multiple modes of transmission sustain these outbreaks. Human contact with meat or bodily fluids of great apes (and other forest animals) in contexts of hunting, trapping, and butchering is an important risk factor, but scientific research also brings human beings in proximity to apes and can facilitate virus transmission. In addition, human contact with sick patients in health care settings and with the deceased during funerary rites is especially risky.²⁴

Some researchers have projected uncertainties about contemporary host shifts, emergence, and transmission and projected them into future threats. They argue that understanding the dynamics of any cross-species transmission is of critical *future* importance, since it permits insight into the emergence of new viruses and provides the impetus for epidemiological surveillance to detect them.²⁵ Bio-medical researchers have used these arguments to rally popular support for their research. Primatologists have worried in the pages of the journal *Nature* that these host shifts threaten the future of chimpanzee and gorilla populations in Africa.

Fundamentally, such arguments about unidirectional disease transmission between apes and humans rest on erroneous historical and cultural assumptions.

By focusing on twentieth-century changes to the equatorial African rain forest, such analyses presume that colonial rule violently wrested the entire forest and its population from a precolonial equilibrium, and that hunting of great apes has escalated steadily ever since.

Long-Term Historical Change in the Equatorial African Forests

Human–great ape contact has a very long history in equatorial Africa. Human habitation of the equatorial African rain forests extends as far back as 40,000 to 35,000 B.P., and development and growth of forest villages and agriculture in present-day southern Cameroon date to the mid-to-late second millennium B.C.E.²⁶ The forest–farming complex, which included forest disturbance through fire and clearing, provided a habitat conducive to breeding of *Anopheles gambiae*, the mosquito “complex” most heavily involved in falciparum malaria transmission in Africa.²⁷ Some groups of forest-dwelling peoples practiced sedentary lives, whereas others were more mobile, but Kairn Klieman finds linguistic evidence of much larger human settlements that came with the cultivation of yams, bananas/plantains, and flourishing regional trade developing in the equatorial African rain forest between 1500 and 500 B.C.E.²⁸ This evidence, though distant from contemporary debates, highlights that mobility, hunting, trade, settlement, and forest disturbance have a very long history in the equatorial forests.

Viewing African history over the *longue durée* also offers insight into an earlier host shift between human beings and nonhuman primates. The nonhuman primate origins of *Plasmodium falciparum* (malaria) have come under scrutiny in the past several years, with researchers debating whether falciparum malaria crossed from western lowland gorillas, chimpanzees, or bonobos to people or through contact with other non-ape primates.²⁹ Despite controversy over methods and interpretations of results, these studies attest to very long term, intensive contact between human and nonhuman primates, with the significant host shift of falciparum malaria from nonhuman primates to people. The date of this shift remains the subject of ongoing research and debate, with hypotheses as of 2013 ranging from 50,000 years ago, when human beings left Africa; to between the second and first millennia B.C.E., with the expansion of plantain/banana cultivation and of larger human settlements in the rainforests; to between 112,000 and 1,036,000 years ago (median 365,000 years ago).³⁰

Even in more recent centuries, human mobility, settlement, trade, and contact with great apes were all features of this dynamic forest region. In the nineteenth century, pressures on northern equatorial forest inhabitants came

from the north, south, and east, precipitating a period of intensive warfare, flight, and slave raiding, as well as hunting and trade in food crops and forest bark products for bodily adornment.³¹

During the nineteenth century, some social groups within the Sangha basin forests and further south hunted chimpanzees and gorillas.³² In the nineteenth century, big game hunting and trapping were sufficiently effective to supply a dynamic regional and international trade in ivory and meat, and in some parts of central Africa to deplete elephant populations.³³

This brief historical sketch suggests that late twentieth-century political ecological changes are part of a much longer history. The “scientific” assumption that human beings had little or no contact with great apes in the equatorial forests prior to the twentieth century is naive and uninformed.

People and Apes: Narratives from the Northern Equatorial African Forests

African narratives reflect on the interactions between people and apes over at least the past century and a half in the northern forest societies of equatorial Africa.³⁴ In contrast to biomedical assumptions presuming that “contact” comes only in the form of destructive “anthropogenic change” with inherently devastating consequences, northern forest narratives suggest a greater range of and fluidity in human interactions with apes and some monkeys. These narratives reveal great apes and some monkeys as simultaneously part of and distinct from human worlds; the narratives elicit a sense of familiarity with great apes and monkeys, recount recollections of a distant shared past, and reveal exchanged knowledge of forest spaces and resources, but they also evoke fierce competition for forest resources, and sometimes the risk of illness and death.³⁵ The equatorial African narratives suggest that people-ape contact is intimate and of long standing.

In this analysis, “northern forest societies” refer to a region of northern Gabon and the Sangha River basin that has long been peopled by a mosaic of interacting language groups (including Bantu A.80 and C.10 groups as well as the Bangando-Ngombe subgroup of the Gbaya branch of Ubangian languages). In the nineteenth century, these groups shared patterns of political and social organization: they were small-scale, geographically scattered, highly mobile collectivities (frequently patrilineal), often organized around an open shelter (council house) where male kin would gather, allocate labor and food from a constellation of wives’ kitchens, and adjudicate disputes. They developed close relations with neighboring communities, leading to sustained economic, linguistic, agricultural, and cultural exchanges that interwove this complex cultural

mosaic. Prior to the mid-nineteenth century, middle and upper Sangha basin peoples engaged in small-scale trade, concluded blood brotherhoods and marriages, exchanged different varieties of maize, cassava, and yams, and shared other forms of cultural expressions.³⁶ After midcentury, increased competition for slave labor and forest resources precipitated small-scale flight among upper and middle Sangha basin peoples. Oral and explorers' accounts attest to warfare, shifting alliances, and mutual enslavement among Mpiemu and Bakwele, Gbaya, Bangando, and Kako speakers within the Sangha forests—relations that both divided and brought communities together in complex, dynamic consociation.

GREAT APES AND HUMAN ORIGIN STORIES

The northern forest narratives portray past dynamics of collaboration, competition, exchange, and expropriation between people and great apes, and the varied consequences of ape-human contact. Bulu and Beti peoples living in southeastern Cameroon in the early twentieth century invoked a distant, undated past in which people and gorillas were connected by kin ties and mutual rights and obligation and occupied the same domestic spaces. Families included both people and apes, and relatives were expected to behave according to rules of respect, sharing, and mutual support. One gorilla's rapacity for meat and women, however, ruptured this peaceful cohabitation between people and gorillas. The gorilla demanded more than his share of family resources, staking a claim to the prized head of a killed elephant and sleeping with one of his human uncle's wives, when he had rights only to the meat or the woman. His voracious appetite sparked hostilities between people and gorillas and resulted in human banishment of gorillas to the forest.³⁷

Baka forest peoples, also living in the southeastern Cameroon and northern Gabon, similarly populated their origin stories with gorillas and chimpanzees. They contended that among the original Baka ancestors was Chimpanzee (*seko*), whose "crazy" behavior offended all: "He acted out of control. He lashed out in every direction, broke everything, climbed everywhere, cried out for no reason, jumped everywhere, without being aware of the dangers."³⁸ When he abducted the baby girl of the Baka deity Komba, the deity punished him, relegating him to the level of animals. Although this origin story again reflects on the common origins and social lives that people and great apes once shared, it also comments on the rapacity and lack of restraint of chimpanzees and gorillas in order to explain their exile from human society. Even after Chimpanzee's exile, Baka human ancestors continued to interact with the neighboring village of "fur-bearing primates," which included Chimpanzee (*seko*), Gorilla

(*ebobo*), and Monkey (*kema*). This story, too, reveals a fluidity between human and animal worlds. In contrast to the previous narrative, a deity—not people—wielded the authority to cast Chimpanzee from human society because of his rapacity and lack of restraint. But that exile was incomplete, because the human-ape interactions continued.

Great apes also appear as powerful actors in human history. Bangando peoples of southeastern Cameroon have recounted their nineteenth-century migrations, when their ancestors were subject to violence precipitated by the Sokoto Caliphate's centralization and ensuing competition for slaves and trade in forest resources in the grasslands north of the forest zone. The Caliphate's activities exerted pressures on savanna and northern forest societies, which in turn engaged in mutual slave raiding and competition for forest resources. Oral historical testimonies recount that Bangando clans fled through the forest-grassland mosaic of the Sangha River region, moving deeper into the forest of the Congo River basin. Members of the *bo dawu* clan (clan of primates) recount that their ancestors were rescued by chimpanzees, which heard the people's calls of distress. From their vantage point high in the forest canopy, the chimpanzees were able to guide Bangando ancestors away from the invaders, leading them to safety deep in the forest. *Bo dawu* clans members still abstain from eating the meat of all monkeys and great apes, citing continuing respect for the ancestral chimpanzees that rescued their vulnerable forebears.³⁹

Some northern forest societies have expressed respect for great apes' knowledge of forest plants and trees. In both southwestern Central African Republic, Mpiemu healers contended in the 1990s that they would observe the behavior of gorillas and chimpanzees to learn about the locations and properties of foods and medicinal plants in the forest.⁴⁰

Societies in the northern forest have sought to appropriate great ape power, but this time to bolster male authority. During the 1960s, Fang people in northern Gabon symbolically integrated gorillas' power into men's council houses, the sites of male reproduction, by placing gorilla skulls on the central support poles. This central support served as a spatial and symbolic anchor for ceremonies; people entering or leaving the council house would lay a hand on the pole, hoping to appropriate some of the gorilla's power.⁴¹ The integration of gorilla body parts into social and symbolic spaces echoes human domination of gorillas described in biomedical narratives. Violence undergirded this appropriation of power: the skull was an object of power, but the gorilla itself was dead. This practice is not isolated to northern Gabon: the anthropologist Axel Kohler, working in nearby southern Congo in the early 2000s, observed

that gorilla skulls in council houses served as a display of political authority and to highlight a hunter's prowess.⁴²

Interactions between great apes and human beings also came with the threat of dangerous, even disastrous consequences, including violence and death. One account from northern Gabon explored the potential for interspecies collaboration, even as it quarried human (and perhaps simian) fears of interspecies contact. In this story, a mother could not undertake work in her garden day after day because her sobbing, inconsolable baby required constant and undivided attention. An empathetic gorilla, however, emerged from the forest and offered to care for the baby so that the mother could finish her work. But the gorilla warned the woman, "Never tell anyone [of my help] . . . or else bad things will happen to you and your child. Death does not come from the forest, but from the village."⁴³ The gorilla comforted the woman's baby throughout the day, allowing the woman to work in her field. That night, unable to resist telling her husband of the extraordinary events, she confided in him. The man surreptitiously followed his wife to the field the following day, to find the gorilla calming the baby in her arms, just as his wife had described. Gripped by the fear that the gorilla would harm the baby, the husband fired his rifle at the gorilla, accidentally killing his own child. By highlighting the gorilla's capacity for empathy and the woman's capacity for trust, the tale suggests that people and apes shared qualities that made interspecies intimacy and cooperation possible. However, the tale's tragic conclusion emphasizes that despite these shared capacities, ultimately people and apes simply could not engage in such close interactions, which would result only in violence, destruction, and tragedy.

Fears about the mingling of humans and great apes may also reflect and be buttressed by long-term material struggles between people and apes over forest spaces and resources. In the middle Sangha river basin forest, stories of gorillas becoming ensnared in hunting nets and then attacking and injuring hunters have circulated for many decades, among Swedish missionaries in the 1930s and '40s and among hunters and trappers in the 1990s. In southeastern Cameroon in the late 1990s, Bangando peoples explained a particular instance of interspecies competition. During the short, dry season, the ripening bush mangoes (*Irvingia excelsa*) attract apes and smaller monkeys but also bring Bangando and Baka families into the forest to harvest them. To prevent direct contact between people and apes, parents exhorted their children to sing songs, dance, and play games rambunctiously while they lived in forest camps, frightening the apes away. People expressed considerable urgency in keeping gorillas

and chimpanzees at a safe distance from the stands of mango trees, not only because these apes posed competition for food but also because in the context of contemporary ape (and other bushmeat) hunting, parents feared gorillas' aggressive attacks on their families.⁴⁴ Like some of the preceding narratives, this one portrays human beings and great apes alike as powerful actors in a competition for food and forest spaces, and it reflects an abiding anxiety over the potentially violent consequences of this competition.

GREAT APES AND INFECTIOUS SPACES

A sense of anxiety and danger manifested itself in certain narratives that linked space and resource competition between people and great apes with human illness. Some of the evidence from naturalist and missionary archives in the 1930s and '40s, and from ethnographic accounts in the late 1990s and 2000s, indicate that contact with great apes can sometimes bring nefarious health consequences, ranging from persistent coughs and dysentery to sleeping sickness. At other times, such interspecies contact may affect human health but for reasons that have less to do with destructive human "contact" with apes and more to do with active competition among people, or between people and great apes. We explore here the logic behind these etiologies by examining sleeping sickness in the 1930s and '40s and Ebola virus in the first decade of the 2000s.

From the early twentieth century through the 1940s, parts of the northern equatorial African forest experienced persistent epidemics of sleeping sickness.⁴⁵ In 1929, Henry Raven, a curator for the American Museum of Natural History and a zoology lecturer at Columbia University, traveled to the forests of Lomié, Dja, and Abong Mbang in southeastern Cameroon to collect gorilla and chimpanzee specimens for the museum. In one chapter of *In Quest of Gorillas* titled "Gorillas, Men and Sleeping Sickness," Raven maintained that gorillas and Africans competed for the same ecological spaces, but that the introduction of firearms and Western medicine to control sleeping sickness gave human beings an advantage over gorillas:

As the native population increased, new villages would be formed and more clearings made. Then epidemics would occur, killing off great numbers of natives, and their gardens would be neglected to run into secondary growth. The gorillas, with a constitution so nearly like that of man that they can find more food in human plantations than in the virgin forest, would move into these deserted clearings. There with an abundance of food they thrive and congregated, to such an extent

eventually that if only a few natives remained they were actually driven out because of their inability to protect their crops against gorillas. But with the advent of the white men's government, with the distribution of firearms among the natives, preventive medicine and the treatment for epidemic and infective diseases, man has the upper hand at present in this age-long struggle.⁴⁶

Raven thus celebrated the triumph of colonial medicine and technology over disease, and of human dominion over animals. But this triumph was seemingly undercut by another dynamic, described by African assistants to the expedition and to villagers visiting Raven's camp: the ravages of sleeping sickness and shifting frontiers of gorilla and human habitation.⁴⁷ Raven's central African assistants alerted him to these patterns of sleeping sickness and gorilla and human colonization of forest sites. Indeed they warned him not to investigate a part of the forest with high gorilla population densities because

people that went there died of sleeping sickness. I had been told that there were no inhabitants. . . . When we reached there I found a deserted hut by the roadside, but all about was the densest type of jungle and the remains of a great many native houses that had tumbled down. (Emphasis added)⁴⁸

What then happened must have convinced Raven's assistants that their fears were well founded. The day after arriving in the forest inhabited by gorillas, Raven fell sick with a host of illnesses, including sleeping sickness.⁴⁹ It appears, however, that the assistants' etiology of sleeping sickness differed from Raven's. Raven contended that people and great apes competed for specific forest spaces, but then sleeping sickness epidemics ravaged human populations, so that they could no longer cope with an advancing frontier of gorilla settlement. But his assistants suggested something different: that people traveling to particular sites with high gorilla densities could fall ill from sleeping sickness. Whether the site was "sick"—or whether the presence of gorillas made it so—is unclear.

This linkage between human-ape competition for habitable spaces and illness was echoed on the other bank of the Sangha river, in southwestern Ubangi-Shari (now Central African Republic). According to the Catholic priest Monseigneur Sintas, gorillas far outnumbered people in the upper Sangha basin forest, and these great apes "love[d] to amuse themselves by terrorizing women and children."⁵⁰ Commenting on the ravages of sleeping sickness and the consequent human depopulation of the forests, Sintas observed, "For hundreds of kilometers, one encounters no other inhabitants except for gorillas and chimpanzees, who

establish their habitats among the old villages and old plantations of those who were once called the Mbimous.”⁵¹ Sintas’s writings suggest that his assistants and Catholic followers influenced considerably his perceptions, although we can only speculate whether they suggested that sleeping sickness cleared these spaces of human habitation, leaving them open for recolonization by gorillas.

Hence, whereas Raven optimistically highlighted the role of weapons and medicines in giving humans an ultimate upper hand in the competition for forest resources, Sintas, writing a decade later, emphasized the receding frontier of human habitation, and a concomitant wave of gorilla colonization as the result of sleeping sickness epidemics. Although their assistants’ and followers’ influence remains murky, it appears that in both cases, gorillas were clearly the more powerful agents of change, possibly by “infecting” spaces or by reaping the rewards of human mortality from repeated epidemics.

Sleeping sickness epidemics in the Sangha basin waned in the 1950s, but have reemerged in recent decades.⁵² No biomedical studies to our knowledge link gorillas and sleeping sickness, but ethnohistorical research may nonetheless prove useful. It would be possible, for instance, to investigate these sites heavily populated by gorillas. Is there something about the tsetse vector and local ecologies, for instance, that facilitates trypanosomiasis transmission? Such a study might permit researchers to study further the complex and changing relations between forest ecologies, tsetse vectors, and changing gorilla and human use of these zones.⁵³ Such questions, however, involve a radical decontextualization of this “local knowledge,” extracting a single claim from a variegated body of knowledge about gorillas and other great apes. If we isolate this single claim (gorillas compete with people to inhabit particular “sick” landscapes) from a broader range of conceptions of great apes, we risk losing sight of other equally important concerns: people’s shared but ruptured histories with great apes, as well as people’s anxieties about competition for forest resources with apes.

A second example addresses Ebola hemorrhagic fever outbreaks, which many epidemiological and virological studies have traced to contact with infected great apes.⁵⁴ The sole published ethnographic studies of equatorial Africans affected by these outbreaks in the 2000s are by medical anthropologists Barry Hewlett and Bonnie Hewlett. We draw heavily from their work below to show how great apes figure into local etiologies of outbreak, but in ways that differ substantially from evaluations by virologists and epidemiologists.⁵⁵

The place that equatorial Africans attributed to great apes in Ebola virus outbreaks varied across the region and over time. In southeastern Cameroon where Stephanie Rupp conducted field research, hunters were aware of the

1999 outbreak in Gabon through a shortwave radio broadcast of an international news report, but expressed doubt that contact with bodily fluids of infected chimpanzees and gorillas could make them sick. Nevertheless, when the Hewletts were conducting “outbreak ethnography” in the Republic of Congo in 2003 and northern Gabon in 1997⁵⁶ (where the outbreak’s origins began with hunters exposed to the infected flesh of gorillas or antelopes), informants did recognize that great apes were also afflicted by Ebola virus.⁵⁷ Moreover, in the Gabonese outbreak, they had detailed knowledge of the index case—a hunter who had found a dead gorilla in the forest and had brought it back to his village to share it with others.

But the Hewletts’ informants in Gabon and Congo explained the illness in diverse ways, although we focus here primarily on great apes.⁵⁸ In Gabon, *ezanga* (“bad human-like spirits that cause illness in people who accumulate [things] and do not share”) figured prominently in explanations. As the Hewletts explained, “Persons who are jealous of the material wealth or sociopolitical power of others can secretly send *ezanga* to eat their internal organs, making them sick or die.”⁵⁹ Significantly, *ezanga* “can also transform people into chimps, gorillas, or elephants—agents that can cause sickness in others.”⁶⁰ Hence, we see again a much older fluidity between human and ape realms, wherein human contact with a dead ape can cause devastating illness, but the agent of that illness is neither a chimp nor a gorilla, but rather another (envious) person. In Congo the researchers found that explanations shifted over a relatively short period of time. Some informants began to argue against sorcery or other supernatural explanations, arguing that the outbreak was caused by an *ekono*, an illness caused by contact with polluted people or substances, or more gravely, by an *opepe*, an epidemic in which the infective substances is transmitted by air or wind.⁶¹ As Barry Hewlett and Melissa Leach later observed, these explanations for Ebola combine local cultural models for the infection and disease—contact with pollution and transmission by malevolent wind—with biomedical models of hemorrhagic fevers as spread by contact with contaminated body fluids of great apes.⁶²

Specific claims about gorilla or great ape involvement in transmitting a particular illness are part of a broader, complex, and varied body of knowledge (and practice) about great apes in the northern equatorial forest. It may be possible to extract specific claims, for instance, about gorillas and diseased spaces, to be investigated by specialists exploring changing disease ecology. But this effort would also isolate a single claim from a complex and sometimes contradictory body of knowledge of these nonhuman primates. It would elide the deep ambivalence that northern forest peoples appear to express—their

anxieties over the risky and potentially treacherous consequences of contact, but also the shared histories and the promise of social and material benefits. This decontextualization would thus suppress the range of rich social, cultural, and historical understandings of great apes.

Nevertheless, the Hewletts do identify numerous important contributions that “outbreak anthropology” can make to efforts at outbreak control.⁶³ Although people normally eat dead animals found in the forest, they did not object to avoiding dead gorillas and chimpanzees during outbreaks. Complete bans on game meat consumption, however, posed huge difficulties because of a dearth of affordable protein; in the Republic of Congo, it also fanned mistrust of game park officials. Among their many recommendations, the Hewletts argued for continuing a ban on chimpanzee and gorilla consumption, but not outlawing all game meat consumption during outbreaks. We would add here that public health workers could mobilize this long-standing ambivalence about great apes; they could communicate the risks of contact with infected apes by drawing on the past and present stories that people tell about gorillas and chimpanzees. And over the longer term, these understandings could help initiate local and national reflection about great ape hunting in equatorial African forests and its control, particularly now that gorilla and chimpanzee populations have been decimated by Ebola virus.⁶⁴ To be sure, ministry officials, local authorities, antipoaching patrols, and conservationists all attest to the difficulty of controlling great ape hunting, particularly when hunters come from outside of these forest regions and are so heavily armed. Allocating resources not just for antipoaching efforts but also for developing alternative economic opportunities could lighten hunting pressure on great apes. But most important, the multifaceted narratives about contact with great apes could draw attention away from stigmatizing criticisms of equatorial African hunting practices, and instead focus attention on the poverty and political marginalization that populations in the northern forest face.⁶⁵ At the very least, international investment in local health infrastructures and personnel could make a major difference in the precarious health of northern forest populations.



This chapter offers some ethnographic and historical perspectives on human-ape contact as the source of host shifts, infectious disease epidemics, and mortality. We show that biomedical researchers have asserted that in the recent past anthropogenic change has provoked host shifts that have

devastated human and great ape populations alike; from these assertions, they project an uncertain future of further host shifts, epidemics, and dwindling great ape populations in the equatorial African rain forests. This imagined future has critical global health implications, for it justifies additional funding for future research, and it is used to exert political pressure on central African states to suppress great ape hunting.

The foreshortened time frame is deeply misleading. It fails to consider twentieth-century human mobility and great ape hunting in the context of longer historical continuities. A longer-term historical perspective casts doubt on these suppositions of an early twentieth-century watershed in people-ape relations. It can also signal other important changes contributing to cross-species transmission: climatic and environmental changes, shifting land uses, local institutions, poverty, and changing health care resources and personnel.⁶⁶ Investigating these changes is important because it may well lead to more nuanced, locally contextualized understandings of patterns of host shifts and infectious disease outbreaks. At the same time, global health efforts to predict and control host shifts will invariably fall short; these shifts are too complex, too varied, and too unpredictable to manage.

Some northern equatorial forest societies have understood their interactions with great apes as characterized by long-term material and sociocultural exchanges and expropriations. Northern forest peoples have emphasized that they share much with apes: histories of origin and kinship, cohabitation, and forest knowledge, but they also have long engaged in competition fraught with anxiety and danger. Their narratives express a deep ambivalence about gorillas and chimpanzees, because these animals are active agents in human lives, capable of making their actions felt in human worlds. Etiologies of infectious diseases, including sleeping sickness and Ebola virus, seem to draw from these foundations.

Such insights can be integrated into global health interventions. People living in the forests in proximity to great apes and near sites of outbreaks frequently know much about local ecologies and epidemiologies. Such local claims should also be understood in the terms through which they are expressed, as part of a broad, varied body of knowledge about great apes. We have suggested above some productive ways that this knowledge may be used to communicate the risks of zoonotic disease transmission, to raise debates about hunting practices within the northern forest, or to deflect attentions from these practices to genuinely pressing concerns about woefully inadequate health care infrastructures in this region.

Notes

1. “Zoonotic diseases,” which infect a particular animal population but then leap directly to infect human populations, are but one type of cross-species transmission. Rabies, Ebola virus, and influenza are examples of zoonoses. Not all host shifts are considered zoonoses; instead, they require some form of adaptation in order to be transmitted between people. Personal communication, François Simon, September 2012; P. A. Marx, C. Apetrei, and E. Drucker, “AIDS as a Zoonosis? Confusion over the Origin of the Virus and the Origin of the Epidemics,” *Journal of Medical Primatology* 33, no. 5–6 (2004): 220–26.

2. Many definitions of global health explicitly or implicitly rely on Yach and Bettcher’s characterization of the globalization of public health in terms of a “process of increasing political, economic, and social interdependence and global integration that occurs as capital, traded goods, people, concepts, images, ideas and values diffuse across national boundaries.” D. Yach and D. Bettcher, “The Globalization of Public Health,” *American Journal of Public Health* 88, no. 5 (1998): 735–38; quoted in T. Brown, M. Cueto, and E. Fee, “The World Health Organization and the Transition from ‘International’ to ‘Global’ Public Health,” *American Journal of Public Health* 96, no. 1 (2006): 62–72; L. Gostin and E. Mok, “Grand Challenges in Global Health Governance,” *British Medical Bulletin* 90 (2009), 7–8; C. Janes and K. Corbett, “Anthropology and Global Health,” *Annual Review of Anthropology* 38 (2009), 167–83. Some historians have roundly criticized the ahistoricity of this definition, contending that these processes of interdependence and integration have existed for centuries (see F. Cooper, “What Is the Concept of Globalization Good For? An African Historian’s Perspective,” *African Affairs* 100, no. 399 [2001]: 55–71). Adams, Novotny, and Leslie have noted some genuinely new features that characterize global health: “the changing environment of funding for health development, particularly the growth in non-governmental structures alongside traditional multilateral and bilateral organizations; . . . an increase in pharmaceutical and clinical research in global health; the emergence of new concerns for ‘biosecurity.’” V. Adams, T. Novotny, and H. Leslie, “Global Health Diplomacy,” *Medical Anthropology* 27, no. 4 (2008): 315–23.

3. J. O. Lloyd-Smith et al., “Epidemic Dynamics at the Human–Animal Interface,” *Science* 326, no. 1362 (2009): 1362–67; N. D. Wolfe et al., “Bushmeat Hunting, Deforestation, and Prediction of Zoonotic Disease Emergence,” *Emerging Infectious Diseases* 11, no. 12 (2005): 1822–27; S. S. Morse, “Factors in the Emergence of Infectious Diseases,” *Emerging Infectious Diseases* 1, no. 1 (1995): 7–15.

4. M. Echenberg, *Plague Ports: The Global Urban Impact of Bubonic Plague, 1894–1901* (New York: New York University Press, 2008).

5. Morse, “Emergence,” 7.

6. K. E. Jones et al., “Global Trends in Emerging Infectious Diseases,” *Nature* 451, no. 7181 (2008): 990–93.

7. S. Collier and A. Lakoff, “The Problem of Securing Health,” in *Biosecurity Interventions: Global Health and Security in Question*, ed. A. Lakoff and S. Collier (New York: Columbia University Press, 2008), 8.

8. WHO/FAO/OIE, 2004; Adams, Novotny, and Leslie, “Global Health.”

9. A. Lakoff, “Preparing for the Next Emergency,” *Public Culture* 19, no. 2 (2007): 246–71.

10. For an influential analysis of “biosecuring” (“attempts to manage the movement of . . . diseases” and the “unfinished business of making safe”), see S. Hinchliffe and N. Bingham, “Securing Life: The Emerging Practices of Biosecurity,” *Environment and Planning A* 40, no. 7 (2008): 1535–42.

11. T. MacPhail, “A Predictable Unpredictability: The 2009 H1N1 Pandemic and the Concept of ‘Strategic Uncertainty’ within the Concept of Global Health,” *Behemoth* 3, no. 3 (2010): 57–77.

12. A. G. Pedersen and T. J. Davies, “Cross-Species Pathogen Transmission and Disease Emergence in Primates,” *EcoHealth* 6, no. 4 (2010): 496–508; P. Wald, *Contagious: Cultures, Carriers, and the Outbreak Narrative* (Durham, NC: Duke University Press, 2008).

13. S. Calattini et al., “Simian Foamy Virus Transmission from Apes to Humans, Rural Cameroon,” *Emerging Infectious Diseases* 13, no. 9 (2007): 1314–20; C. A. Chapman, T. R. Gillespie, and T. L. Goldberg, “Primates and the Ecology of Their Infectious Diseases: How Will Anthropogenic Change Affect Host-Parasite Interactions?” *Evolutionary Anthropology* 14 (2005): 134–35; R. Prugnolle et al., “African Monkeys Are Infected by *Plasmodium falciparum* Non-Human Primate Specific Strains,” *Proceedings of the National Academy of Sciences* 108, no. 29 (2011): 11948–53; W. Liu et al., “Origins of the Human Malaria Parasite *Plasmodium falciparum* in Gorillas,” *Nature* 467, no. 7314 (2010), downloaded 31 March 2011, www.nature.com/nature/journal/v467/n7314/full/nature09442.html; more broadly, see Lloyd-Smith et al., “Epidemic Dynamics.”

14. N. D. Wolfe et al., “Exposure to Nonhuman Primates in Rural Cameroon,” *Emerging Infectious Diseases* 10, no. 12 (2004), 2094–99; Wolfe et al., “Bushmeat Hunting”; P. D. Walsh et al., “Catastrophic Ape Decline in Western Equatorial Africa,” *Nature* 422, no. 6932 (2003): 611–14; Jones et al., “Global Trends.”

15. Pedersen and Davies, “Cross-Species Pathogen”; Lloyd-Smith et al., “Epidemic Dynamics”; Calattini et al., “Simian Foamy Virus.”

16. Pedersen and Davis, “Cross-Species Pathogen.”

17. *Ibid.*, 497; see also Morse, “Emergence.”

18. Chapman, Gillespie, and Goldberg, “Primates,” 134.

19. D. M. Tebit and E. J. Arts, “Tracking a Century of Global Expansion and Evolution of HIV to Drive Understanding and to Combat Disease: Review Article,” *Lancet Infectious Diseases* 11, no. 1 (2011): 45–56; J. D. de Sousa et al., “High GUD Incidence in the Early 20th Century Created a Particularly Permissive Time Window for the Origin and Initial Spread of Epidemic HIV Strains,” *PLoS One* 5, no. 4 (2010): e9936; M. Worobey et al., “Direct Evidence of Extensive Diversity of HIV-1 in Kinshasa by 1960,” *Nature* 455, no. 7213 (2008): 661–65.

20. T. Giles-Vernick is working with Guillaume Lachenal, William Schneider, and Didier Gondola to write a fuller, more historically grounded context in which to situate the emergence of HIV/AIDS. J. Takehisa et al., “Origin and Biology of Simian Immunodeficiency Virus in Wild-Living Western Gorillas,” *Journal of Virology* 83, no. 4 (2009): 1635–48; Worobey et al., “Direct Evidence”; Wolfe et al., “Bushmeat Hunting”; Wolfe et al., “Exposure”; A. Chitnis, D. Rawls, and J. Moore, “Origin of HIV Type 1 in Colonial French Equatorial Africa?” *AIDS Research and Human Retroviruses* 16, no.

- 1 (2000): 5–8; B. H. Hahn et al., “AIDS as a Zoonosis: Scientific and Public Health Implications,” *Science* 287, no. 5453 (2000): 607–14.
21. Wolfe et al., “Exposure”; see also Walsh et al., “Catastrophic Ape Decline.”
22. T. J. Wittmann et al., “Isolates of Zaire Ebolavirus from Wild Apes Reveal Genetic Lineage and Recombinants,” *Proceedings of the National Academy of Sciences* 104, no. 43 (2007): 17125.
23. Wittmann, “Isolates,” 17126; P. D. Walsh et al., “Potential for Ebola Transmission between Gorilla and Chimpanzee Social Groups,” *American Naturalist* 169, no. 5 (2007): 684–89.
24. M. Leach and B. Hewlett, “Haemorrhagic Fevers: Narratives, Politics and Pathways,” in *Epidemics: Science, Governance and Social Justice*, ed. S. Dry and M. Leach (London: Earthscan, 2010), 43–69; B. L. Hewlett and B. S. Hewlett, *Ebola, Culture, and Politics: The Anthropology of an Emerging Disease* (Belmont, CA: Thomson Wadsworth, 2008); E. M. Leroy et al., “Multiple Ebola Transmission Events and Rapid Decline of Central African Wildlife,” *Science* 302, no. 5656 (2004): 387–90; B. S. Hewlett and R. P. Amola, “Cultural Contexts of Ebola in Northern Uganda,” *Emerging Infectious Diseases* 9, no. 10 (2003): 1242–48.
25. See N. D. Wolfe, C. P. Dunavan, and J. Diamond, “Origins of Major Human Infectious Diseases,” *Nature* 447, no. 7142 (2007): 279–83. This argument, undergirded by what MacPhail has called a “strategic uncertainty” offers compelling reasons for institutions to support this research, although one virologist admitted to me that he thought that his own research on simian viruses had “no public health implications.” But many researchers argue that the poorly understood nature of cross-species transmission and the future threats that they pose amply justify funding. A consortium of researchers from the United States and the UK has made a similar argument, receiving some £1.8 million to study the emergence of HIV in Uganda during the 1970s, on the grounds that the study will illuminate “how retroviruses are maintained in primate populations” and how human practices and beliefs may facilitate retrovirus host shifts between red colobus monkeys and people. MacPhail, “Predictable Unpredictability”; “£300,000 for New Study into the Origin of AIDS,” University of Bristol, 13 September 2011, <http://bristol.ac.uk/news/2011/7892.html>.
26. See A. Holl, “Cameroun,” in *Aux origines de l’Afrique Centrale*, ed. R. Lanfranchi and B. Clist (Libreville: Centre culturel français, 1981), 149–54, 193–96, cited in Kairn Klieman, “*The Pygmies Were Our Compass*”: *Bantu and Batwa in the History of West Central Africa, Early Times to c. 1900 C.E.* (Portsmouth: Heinemann, 2003), 40.
27. See James L. A. Webb, Jr., *Humanity’s Burden: A Global History of Malaria* (Cambridge: Cambridge University Press, 2009) for an extended discussion of how forest agriculture facilitated the transmission of falciparum malaria.
28. Klieman, *Pygmies*; see also Webb, *Humanity’s Burden*.
29. Liu et al., “Origins”; Prugnolle et al., “African Monkeys.” See also Loretta A. Cormier, *The Ten-Thousand Year Fever: Rethinking Human and Wild-Primate Malaria* (Walnut Creek, CA: Left Coast Press, 2011), 63–70.
30. K. Tanabe et al., “*Plasmodium falciparum* Accompanied the Human Expansion out of Africa,” *Current Biology* 20, no. 14 (2010): 1283–89; Webb, *Humanity’s Burden*; Cormier, *Ten-Thousand Year Fever*, 55–70; J. M. Baron, J. M. Higgins, and W. H. Dzik,

“A Revised Timeline for the Origin of *Plasmodium falciparum* as a Human Pathogen,” *Journal of Molecular Evolution* 73, no. 5–6 (2011): 297–304.

31. Congo river trading activities that developed in the seventeenth and eighteenth centuries encompassed part of the Sangha basin during much of the nineteenth century, with a highly active exchanges in guns, local slaves, ivory, foods, and other commodities. Riverine societies along the Sangha, Alima, and Likouala Rivers were major providers of manioc and palm oil, which fueled these long- and short-distance trades. The Sangha basin supplied enormous quantities of ivory for the Congo trade during this period. Some riverine societies along the lower and middle Sangha banks took advantage of trade networks to accumulate firearms and to provoke the flight of neighboring forest peoples whom they sought to enslave. S. Rupp, *Forests of Belonging: Identities, Ethnicities, and Stereotypes in the Congo River Basin* (Seattle: University of Washington Press, 2011); T. Giles-Vernick, *Cutting the Vines of the Past: Environmental Histories of the Central African Rain Forest* (Charlottesville: University of Virginia Press, 2002); E. Copet-Rougier, “Political-Economic History of the Upper Sangha,” in *Resource Use in the Trinational Sangha River region of Equatorial Africa: Histories, Knowledge Forms, and Institutions*, ed. H. Eves, R. Hardin, and S. Rupp, Bulletin Series, Yale School of Forestry and Environmental Studies, no. 102 (1998), 41–84; R. Harms, *Games against Nature: and Eco-cultural History of the Nunu of Equatorial Africa* (Cambridge: Cambridge University Press, 1987); R. Harms, *River of Wealth, River of Sorrow: The Central Zaire Basin in the Era of the Slave and Ivory Trade, 1500–1891* (New Haven: Yale University Press, 1981).

32. T. Giles-Vernick and S. Rupp, “Visions of Apes, Reflections on Change: Telling Tales of Great Apes in Equatorial Africa,” *African Studies Review* 49, no. 1 (2006): 51–73.

33. J. MacKenzie, “Chivalry, Social Darwinism, and Ritualized Killing: The Hunting Ethos in Central Africa up to 1914,” in *Conservation in Africa: People, Policies, and Practice*, ed. D. Anderson and R. Grove (Cambridge, Cambridge University Press, 1987).

34. Giles-Vernick and Rupp, “Visions of Apes.”

35. In addition to chimpanzees and gorillas, pangolins, crocodiles, leopards, and elephants have also occupied an important place in the practices and imaginations of equatorial Africans. M. Douglas, “Animals in Lele Religious Thought,” *Africa* 27, no. 1 (1957): 46–58; N. R. Hunt, *A Colonial Lexicon of Birth Ritual, Medicalization, and Mortality in the Congo* (Durham, NC: Duke University Press, 1999); J. Fabian, *Remembering the Present: Painting and Popular History in Zaire* (Berkeley: University of California Press, 1996); C. Gray, *Colonial Rule and Crisis in Equatorial Africa: Southern Gabon ca. 1850–1940* (Rochester, NY: University of Rochester Press, 2002); D. Joiris, “Baka Pygmy Hunting Rituals in Southern Cameroon: How to Walk Side by Side with the Elephant,” *Civilizations* 41, no. 2 (1993): 51–82.

36. See G. Balandier, *Sociologie actuelle de l’Afrique noire* (1955; Paris: PUF, 1992); M. Mveng-Ayi, “Rapport du synthèse: Echanges précoloniaux et diffusion des plantes au Sud-Cameroun,” in *Contribution de la recherche ethnologique à l’histoire des civilisations de Cameroun*, ed. C. Tardits (Paris: CNRS, 1981), 587–91; S. Bahuchet, *Les pygmées Aka et la forêt centrafricaine* (Paris: Peeters, 1985); E. Copet-Rougier, “Les Kakas,” in *Contribution de la recherche ethnologique à l’histoire des civilisations de Cameroun*, ed. C. Tardits (Paris: CNRS, 1981), 511–16; Klieman, *Pygmies*. Generally, see J. Vansina, *Paths in the*

- Rainforest: Toward a History of Political Tradition in Equatorial Africa* (Madison: University of Wisconsin Press, 1990).
37. P. Laburthe-Tolra, *Les seigneurs de la forêt: Essai sur le passé historique, organisation sociale, et les normes éthiques des anciens Bèti du Cameroun* (Paris: Publications de la Sorbonne, 1981).
 38. R. Brisson, *Mythologie des pygmées Baka* (Paris: SELAF, Editions Peeters, 1999), 144.
 39. Rupp, *Forests of Belonging*.
 40. Giles-Vernick, *Cutting the Vines*; elsewhere, see O. Ebiatsa-Hopiel, *Les Tèke: Peuples et nation* (Montpellier, 1990).
 41. J. Fernandez, *Bwiti: An Ethnography of the Religious Imagination in Africa* (Princeton: Princeton University Press, 1982).
 42. A. Kohler, "Of Apes and Men: Baka and Bantu Attitudes toward Wildlife and the Making of Eco-Goodies and Baddies," *Conservation and Society* 3, no. 2 (2005): 407–35. See also D. Peterson, "Great Apes as Food," *Gastronomica: The Journal of Food and Culture* 3, no. 2 (2003): 64–70.
 43. J. B. Abessolo-Nguema et al., *Contes du Gabon* (Paris: Éditions Fernand Nathan Afrique, 1985), 52.
 44. These anxieties over contact and competition with apes intensified as conservation interventions in some parts of equatorial Africa protected apes from hunters. It may be that this protection has enabled great apes to roam more freely without fear of being hunted, but their mobility may have simultaneously increased their contact with people living in the forest. Rupp, *Forests of Belonging*; R. Ruggiero, "Phantom of the Forests," *Wildlife Conservation* 103, no. 5 (2000): 50–55.
 45. G. Lachenal, "Le médecin qui voulut être roi: Médecine coloniale et utopie au Cameroun," *Annales: Histoire, sciences sociales* 1 (2010): 121–56; Giles-Vernick, *Cutting the Vines*; R. Headrick, *Colonialism, Health and Illness in French Equatorial Africa, 1885–1935* (Atlanta: African Studies Association, 1994); J.-P. Dozon, "Quand les Pastoriens traquaient la maladie du sommeil," *Sciences sociales et santé* 3, no. 3–4 (1985): 27–56.
 46. W. K. Gregory and H. C. Raven, *In Quest of Gorillas* (New Bedford, MA: Darwin Press, 1937), 229.
 47. H. C. Raven, "Meshie, the Child of a Chimpanzee," *Natural History Magazine* (1932), www.naturalhistorymag.com/picks-from-the-past/16178/meshie-the-child-of-a-chimpanzee?page2.
 48. Gregory and Raven, *In Quest of Gorillas*, 223.
 49. It is likely that Raven had been incubating some of these pathogens prior to his arrival at this site.
 50. Quoted in Giles-Vernick, *Cutting the Vines*, 178.
 51. Sintas referred here to a linguistic and ethnic group, currently identified as Mpiemu, who lived in large concentrations in the upper Sangha basin and who had been particularly affected by twentieth-century sleeping sickness epidemics. A. Sintas, "Extrait du rapport de visite pastorale de Mgr Sintas en pays Mbimou du 8 au 16 octobre 1944," personal archives of Père G. de Banville, Congrégation Spiritaine, Chevilly-la-rue (France); Giles-Vernick, *Cutting the Vines*.

52. F. Chappuis et al., "Human African Trypanosomiasis in Areas without Surveillance," *Emerging Infectious Diseases* 16, no. 2 (2010): 354–55.

53. Leach and Hewlett, "Haemorrhagic Fevers."

54. P. Formenty et al., "L'épidémie de fièvre hémorragique à virus Ebola en République du Congo, 2003," *Médecine tropicale* 63, no. 3 (2003): 291–95; A. J. Georges et al., "Ebola Hemorrhagic Fever Outbreaks in Gabon, 1994–1997: Epidemiologic and Health Control Issues," *Journal of Infectious Diseases* 179, Supp. 1 (Ebola: The Virus and the Disease) (1999): S65–S75. See also S. Lahm et al., "Morbidity and Mortality of Wild Animals in Relation to Outbreaks of Ebola Haemorrhagic Fever in Gabon, 1994–2003," *Transactions of the Royal Society of Tropical Medicine and Hygiene* 101, no. 1 (2007): 64–78.

55. In 2012, two distinct Ebola outbreaks took place in Uganda and the Democratic Republic of Congo.

56. The Hewletts also conducted research in Uganda in 2000–2001.

57. Hewlett and Hewlett, *Ebola, Culture, and Politics*; B. S. Hewlett et al., "Medical Anthropology and Ebola in Congo: Cultural Models and Humanistic Care," *Bulletin de la Société de pathologie exotique* 98, no. 3 (2005): 230–36.

58. Still other important explanations centered on certain individuals' manipulation of supernatural powers, either by outright sorcery or through membership in the Rose Croix, a mystical Christian organization, with the aim of accumulating wealth and political authority. Struggles over political, economic, and environmental control also figured into these explanations, as informants reflected on their circumstances of political powerlessness, economic impoverishment and stymied opportunities. Hewlett and Hewlett, *Ebola, Culture, and Politics*; B. L. Hewlett and B. S. Hewlett, "Providing Care and Facing Death: Nursing during Ebola Outbreaks in Central Africa," *Journal of Transcultural Nursing* 16, no. 4 (2005): 289–97; Hewlett et al., "Medical Anthropology."

59. Hewlett and Hewlett, *Ebola, Culture, and Politics*, 6.

60. *Ibid.*, 7.

61. Hewlett and Hewlett, "Providing Care," 292; see also Hewlett and Hewlett, *Ebola, Culture, and Politics*.

62. Leach and Hewlett, "Haemorrhagic Fevers."

63. See particularly Hewlett and Hewlett, *Ebola, Culture, and Politics*.

64. Walsh et al., "Catastrophic Ape Decline."

65. Leach and Hewlett, "Haemorrhagic Fevers"; Hewlett and Hewlett, *Ebola, Culture, and Politics*.

66. Leach and Hewlett, "Haemorrhagic Fevers."

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