



The Viral Creep

Elephants and Herpes in Times of Extinction

CELIA LOWE

University of Washington, Seattle, USA

URSULA MÜNSTER

Department of Social and Cultural Anthropology and Rachel Carson Center, Ludwig Maximilian University Munich, Germany

Abstract Across the world, elephant endotheliotropic herpesvirus is increasingly killing elephant calves and threatening the long-term survival of the Asian elephant, a species that is currently facing extinction. This article presents three open-ended stories of elephant care in times of death and loss: at places of confinement and elephant suffering like the zoos in Seattle and Zürich as well as in the conflict-ridden landscapes of South India, where the country's last free-ranging elephants live. Our stories of deadly viral-elephant-human becomings remind us that neither human care, love, and attentiveness nor techniques of control and creative management are sufficient to fully secure elephant survival. The article introduces the concept of "viral creep" to explore the ability of a creeping, only partially knowable virus to rearrange relations among people, animals, and objects despite multiple experimental human regimes of elephant care, governance, and organization. The viral creep exceeds the physical and intellectual contexts of human interpretation and control. It reminds us that uncertainty and modes of imaging are always involved when we make sense of the world around us.

Keywords Asian elephants, herpes, viral creep, extinction, care, uncertainty, captivity, stress, conservation, multispecies studies

Introduction: The Viral Creep

In June 2007, Hansa, a six-and-a-half-year-old Asian elephant calf and the first born in captivity at the Woodland Park Zoo in Seattle, died of a new strain of elephant endotheliotropic herpesvirus (EEHV). Halfway around the world, Arun Zachariah, a wildlife veterinarian working for the Indian Forest Department, has identified EEHV as a fatal cause of death among free-ranging elephants and orphaned calves living in camps in the forests of South India, a landscape that harbors the largest remaining free-ranging population of Asian elephants (*Elephas maximus*). Meanwhile, in the new Kaeng Krachan Elephant Park at Zoo Zürich, architectural innovations promote elephant

Environmental Humanities 8:1 (May 2016)

DOI 10.1215/22011919-3527749 © 2016 Celia Lowe and Ursula Münster

This is an open access article distributed under the terms of a Creative Commons license (CC BY-NC-ND 3.0).

“wellness,” although zoo director Alex Rübel lives with the constant fear that the virus will kill Omysha, the youngest member of their small herd. Across captive and free-ranging groups of elephants, EEHV is killing juveniles and threatening the long-term survival of the Asian elephant, a species whose numbers have dropped by half in the twentieth century and that is currently facing extinction.¹

Working together as ethnographers of viruses (Lowe) and of elephants (Münster), in this article we explore how herpes “creeps” across three different settings of elephant care: the conventional and contested elephant enclosure of the Woodland Park Zoo in Seattle, USA; the contaminated and violent “wild” spaces of the Wayanad Wildlife Sanctuary in Kerala, in South India; and the carefully designed “household-like” spaces of the new Kaeng Krachan Elephant Park at Zoo Zürich in Switzerland. Each locality is a place where humans care for individual elephants and their collectives, trying to create favorable conditions for them to live and survive. Each site, situated within particular histories and geographies of conservation, environmental governance, and biopolitics, is a place of compromise and debate in times of rapid species loss and extinction. There are no easy solutions for securing elephant well-being and flourishing in the era of advanced capitalism: trauma, harm, and unpredictability exist all across the virus-elephant-human interface. As “matters of concern”² coalesce around viruses, elephants, activism, science, management, architecture, and design, they become “matters of care”³ transforming the everyday practices, perceptions, and affective relationships of a multiplicity of people, scientists, zookeepers, and animal activists with their elephant and viral others.

This article takes multispecies studies into the terrain of microbial ethnography,⁴ a field that looks at the expanding purview of biotechnological and other understandings of newly appreciated microbes while simultaneously emphasizing the scope of their sociality and their engagements with other lively entities. Our ethnography of a virus urges us to look beyond a simpler story of dyadic human-elephant relations. Viruses mutate historically situated ecologies of life and death as they move within and between diverse bodies, sites, and ecologies. Our work in microbial multispecies studies responds to a call for an attentive scholarship that crosses and connects multispecies worlds by linking three stories of human-elephant-viral “intra-action”⁵ within distinct, messy, and contested “emergent ecologies.”⁶ These lively entanglements remind us that neither human care, love, and attentiveness nor techniques of control and creative

1. Baskaran et al., “Current Status of Asian Elephants in India”; International Union for Conservation of Nature, “*Elephas maximus*,” *IUCN Red List of Threatened Species*, version 2014(2), www.iucnredlist.org/details/7140/0 (accessed July 1, 2015).

2. Latour, *Politics of Nature*.

3. Puig de la Bellacasa, “Matters of Care in Technoscience.”

4. Paxson and Helmreich, “Perils and Promises of Microbial Abundance”; Landecker, “Antibiotic Resistance and the Biology of History”; Lowe, “Viral Clouds.”

5. Barad, *Meeting the Universe Halfway*.

6. Kirksey, *Emergent Ecologies*.

management are sufficient to fully secure elephant survival. Viral-elephant-human becomings exceed the physical and intellectual contexts of human interpretation and control.

The family name of EEHV, Herpesviridae, comes from the Greek word *herpein*, meaning “to creep,” described in the *Oxford English Dictionary* as to “occur or develop gradually and almost imperceptibly.” The concept of “viral creep” we introduce here builds upon the description of the “viral cloud,”⁷ the unstable cluster of genomes standing for multiple ontologies transformed amid encounters between viruses, animal hosts, and human institutions in the H5N1 influenza outbreak in Indonesia in the 2000s. While with influenza it was possible to identify the conditions of industrial agriculture where mutations and reassortments created new deadly strains that reworked relations among humans, animals, and microbes, in the case of the herpesvirus we cannot as easily identify the conditions of its emergence. Unlike influenza, too much about the herpes entity and its relations remains hidden from view and “withdrawn”⁸ from human diagnosis and orchestration. The viral creep reminds us, in the words of Deborah Bird Rose, that “mystery” and uncertainty are an “essential element of our lives, a part of thought rather than an enemy to be vanquished.”⁹

Herpes moves silently; it hides and reemerges, staying latent for many years, often without being noticed. In this article, we are not as much interested in the conditions of possibility for viral emergence as we are in inquiring into the ability of a creeping, only partially knowable virus to rearrange relations among people, animals, and objects despite multiple experimental human regimes of elephant care, governance, and organization.

The term *viral creep* reflects the capacity of Herpesviridae to suddenly and violently take control of the life chances of another individual or species under conditions of stress and disturbance, and then just as quickly recede into the background for an individual or a population. Our argument attempts to recognize the interconnected lives of keepers, caretakers, viruses, and elephants and the ability of the elephant and its viruses to exist, act, and connect outside the parameters of human observation and understanding. This is not a return to the naive naturalism of viral allopathy; the virus is not the sole “cause” of elephant deaths from herpes. Nor, we believe, are more naturalism and scientific study all that is called for. Instead, through the technoscientific animism of new materialist and ontological reasoning, we develop an interpretation of the herpesvirus that enters into relations within complex and emerging ecologies. We call this entering into and out of relations, and the agentive power to change and rearrange relationships, the viral creep.

7. Lowe, “Viral Clouds.”

8. Harman, *Towards Speculative Realism*.

9. Rose, *Wild Dog Dreaming*, 46.

The Elephant and the Virus in Times of Extinction

EEHV is a member of *Proboscivirus*, a genus that affects only elephants, in the Herpesviridae family of DNA viruses. EEHV is thought to have branched off from other herpesviruses 100 million years ago and then developed into specific types.¹⁰ The herpesvirus is older than both proboscidians (elephants and their extinct relatives) and our own species, affecting members of the human line long before their split from chimpanzees six million years ago.¹¹ Familiar human strains in the herpes family are herpes simplex virus (the cause of fever blisters and genital herpes), varicella zoster (the cause of chickenpox and shingles), Epstein-Barr virus, cytomegalovirus, and Kaposi's sarcoma-associated herpesvirus. Herpesviruses affect other mammals, fish, mollusks, birds, reptiles, and amphibians. Macaque monkeys transmit a zoonotic herpes B virus that can be fatal to humans, and new research indicates that herpes might be able to jump between species more readily than had previously been thought.¹² Within their diverse hosts, various herpesvirus types cause a range of pathologies despite a similar molecular structure.

The creeping Herpesviridae is both a substance and a potential; herpesviruses are persistent infections that have latent and lytic phases. In the lytic stage, the virus is detectable in specimen samples and is shed into the environment, and symptoms are active. After initial infection, which often has no pathology, the disease becomes latent, hiding out in the body, and is now nowhere to be seen, though antibodies attest to prior infection. Recurring episodes of fever blisters and shingles outbreaks decades after a childhood case of chickenpox are examples of how herpes creates a lifelong infection that moves slowly and quietly in the body, reactivating with viremia (infection in the blood) and renewed pathology only under inexact and often mysterious conditions of immunosuppression. The herpesvirus can also emerge in new parts of the body, causing such trauma as encephalitis in the brain, pulmonary symptoms, or even cancers.¹³

As philosopher of science John Dupré writes about recent insights in virology, "It is beginning to seem possible that, just as microbes are the expert metabolists of nature, so viruses are the leading evolvers,"¹⁴ and molecular biologists speculate that the herpesvirus has played an important role in human and elephant evolution. While the probosciviruses are ancient, with a deep history with pachyderms, clinical observations of herpes in elephants are recent, and the scientific understanding of EEHV is new and substantially incomplete. Because herpes has found new ways to kill elephants, it is sometimes referred to as an "emerging" virus, despite its ancient history as an elephant

10. Leaman, "What Killed the National Zoo's Elephant."

11. "Herpes Infected Humans before They Were Human," UC San Diego Health, June 10, 2014, health.ucsd.edu/news/releases/Pages/2014-06-10-herpes-origins-in-chimpanzees.aspx.

12. Greenwood et al., "Potentially Fatal Mix of Herpes in Zoos."

13. Brody, "Herpes Now Blamed for More Illness than Any Other Human Viruses."

14. Dupré, *Processes of Life*, 92.

companion species.¹⁵ EEHV was first seen in African elephants through inspection of nodules on asymptomatic elephants in the 1970s. The earliest described death from the herpesvirus was a three-year-old Swiss circus elephant named Lohimi in 1988.¹⁶ In the United States, Kumari, a sixteen-month-old calf who died in 1995 at the National Zoo in Washington, DC, is considered the index case, but a retrospective analysis of studbooks and preserved tissues identified six prior cases.¹⁷ By the late 1990s, veterinarians had acknowledged EEHV as a major problem for captive reproduction, and thus for species survival, in both American and European zoo populations.

EEHV pathology may manifest through benign skin lesions but also through the highly fatal pathway of the elephant pulmonary system. When EEHV turns deadly, it causes violent and sudden hemorrhagic symptoms involving shedding of the endothelium, the inner lining of blood vessels and the heart.¹⁸ Baby and juvenile elephants are the most susceptible and can die very rapidly, sometimes in less than a day. It also causes miscarriage in pregnant elephants.¹⁹ Because reactivation of the virus appears, as with other herpesviruses, to be related to stress causing lowered immunity, the contemporary life histories of elephants and knowing what makes an elephant happy are important for efforts to understand and manage the virus.

The story of Asian elephants today is not a happy one, however. Asian elephants have become what they are under conditions of human-animal conflict, violent confinement, and captivity, where they can be bored, maltreated, deprived of social relations, and depressed, though frequently they are also loved and cared for by dedicated keepers, mahouts, and trainers. Asian elephants exist along a spectrum from free-ranging to captive, and all of them are vulnerable to EEHV. In Asia, elephants persist in small patches of forests where they find refuge within densely populated agricultural landscapes.²⁰ In the fragmented and degraded forest landscape of South India, they have lost their traditional ranges and migration routes, and their life now involves interspecies conflicts in which both humans and elephants are injured and killed. In addition, an estimated fifteen thousand Asian elephants around the globe currently spend their lives in some form of captive confinement: in zoos or circuses, with private owners, in temples or elephant camps.²¹

While elephants have lived alongside humans for millennia,²² their current close proximity to humans poses an important obstacle to elephant well-being, reproduction, and species survival. Unlike other close human companion animals, elephants have

15. Haraway, *Companion Species Manifesto*.

16. EEHV Advisory Group, "EEV Info," www.eehvinfo.org/eehv-background/ (accessed July 5, 2015).

17. *Ibid.*

18. Zachariah et al., "Fatal Herpesvirus Hemorrhagic Disease."

19. *Ibid.*

20. Baskaran et al., "Current Status of Asian Elephants in India"; Sukumar, *Living Elephants*.

21. Srinivasaiah, Varma, and Sukumar, *Documenting Indigenous Traditional Knowledge*.

22. Locke, "Explorations in Ethnoelephantology"; Sukumar, *Living Elephants*.

never been selectively bred to suit human needs. Historically, when elephants were employed as timber workers, war animals, or temple elephants, they very rarely mated and reproduced.²³ Instead, free-ranging elephant cows carefully choose their mating partners, “smell-tasting” the available bulls in a complex procedure that biologists call female selection.²⁴ In the company of humans and in situations of captivity, female elephants have limited agency to decide upon their mates, and some cows do not have offspring at all during their lifetime.²⁵ Historically, elephants’ slow growth rate and long birth spacing made it unprofitable for their human keepers to breed them in captivity; across South and Southeast Asia the effort and cost of raising an elephant calf by human nurturing have far exceeded the difficulties of catching free-ranging animals that could be made ready to work in a couple of months.²⁶

Elephants’ long period of immaturity also makes them especially vulnerable to EEHV since most fatal instances of the disease affect baby and juvenile calves that have not yet had a chance to reproduce. Because EEHV affects the young in this way, it is a serious extinction threat.²⁷ Along the continuum from free-ranging to captive, elephant fertility declines in step with human proximity and management. The first-year mortality rate for zoo elephants in Europe and North America is 30–40 percent, somewhat worse than the rate for timber camp elephants in South Asia, which is 24 percent for female calves and 16 percent for male calves,²⁸ and worse still than the rate for free-ranging African elephants.²⁹ Because they have a long life span, most elephants living in zoos, circuses, and South Asian timber camps today were free-ranging individuals captured and “broken” by mahouts and elephant handlers. Capturing free-ranging elephants has been forbidden in India since 1982, and in both Europe and North America it is illegal to restock zoo populations with elephants from free-ranging populations. Thus some biologists and veterinarians predict that in the next few decades the captive elephant population will go extinct.³⁰ No population in captivity is self-sustaining,³¹ so zoos are trying hard to establish breeding programs where assisted reproduction is part of elephant species survival plans.³²

23. Kurt, *Von Elefanten und Menschen*, 25.

24. *Ibid.*, 47; Sukumar, *Living Elephants*, 112.

25. Arun Zachariah reported that many of the free-ranging elephant cows he has dissected show no marks of pregnancies in their uterus; only a few, usually the leading cows and so-called matriarchs in a herd, have offspring. Zachariah, interview by Ursula Münster, Wayanad, Kerala, January 1, 2016.

26. Kurt, *Von Elefanten und Menschen*, 25.

27. Virologist Alex Greenwood, Leibniz Institute for Zoo and Wildlife Research, Skype interview by Celia Lowe and Ursula Münster, Berlin and Munich, July 14, 2015.

28. Mar, Lahdenperä, and Lummaa, “Causes and Correlates of Calf Mortality.”

29. Wittemyer, Daballen, and Douglas-Hamilton, “Comparative Demography of an At-Risk African Elephant Population.”

30. Arun Zachariah, pers. comm. with Ursula Münster, Wayanad, Kerala, January 1, 2016.

31. Kurt, *Von Elefanten und Menschen*, 227.

32. See, for example, Smithsonian Conservation Biology Institute, “Elephant Breeding Report,” nationalzoo.si.edu/SCBI/ReproductiveScience/ElephantBreedRepro/ (accessed July 10, 2015).

The virologists, veterinarians, and disease ecologists we worked with and interviewed believe that to minimize the likelihood of infection and the harm caused by the herpesvirus, elephants need to be otherwise well and free of stress. However, wellness emerges not only from their present conditions of living but also from their historically situated biographies, which necessarily include histories of capture, training, display, and assisted reproduction. Nowadays, elephants learn to live their complex psychological, social, cultural, and gendered lives in close proximity to humans. In the South Indian setting, the “matriarch,” or oldest female elephant leading the herd, teaches the young ones how to live and survive in an anthropogenic landscape. She leads them to the most nutritious and tasty plants that humans grow in their fields. She shows them how to trespass human infrastructure and to outsmart human technology—to jump over trenches, tear down electric fences, and cross well-traveled roads—to continue on their traditional migration routes. The oldest cow also teaches her offspring how to avoid dangerous places, where farmers defend their fields with small shot charges, lay out poisoned bait, or electrocute elephants with improvised high-voltage fences.³³ Some pachyderms have used their abilities to act altruistically, cooperate, feel compassion, and care for each other to survive alongside humans.³⁴ Others, often elephant bulls, have taken advantage of their strength, size, and body power to force their way through and across human-dominated landscapes. While the elephants’ extraordinary ability to learn has enabled them to survive in these changing environments, this same adaptive intelligence has meant that the traumatic effects of violent human-elephant contact and acquired aggressive behaviors against humans can be passed down from generation to generation. It also indicates that elephants possess what anthropologists call “culture,” and the simple ability to biologically reproduce cannot be taken as the only marker of elephant thriving.

In the viral creep, EEHV makes use of elephants’ inability to cope with some aspects of their contemporary conditions of living to become a killer of juveniles and a threat to the Asian elephants’ existence as a species. During our fieldwork, biologists and people working and intimately dwelling with elephants at the forest boundary identified violent encounters with humans as a primary cause of stress for elephants. In South India, older members of a herd remember and embody the trauma of ivory poaching and capture, which continued in the forests until the 1980s. Younger animals encounter violence in what is commonly known as human-animal conflict. In zoo settings, stress might emerge when elephants suffer from the dullness of quotidian life in enclosure, the loss of or separation from their loved ones, and the lack of movement and activity.³⁵ Elephants react to traumatic experiences, such as poaching, culling, violent treatment, or isolation, with grief, depression, antisocial behavior, and heightened

33. U. Münster, “Working for the Forest.”

34. Kurt, *Von Elefanten und Menschen*; Sukumar, *Living Elephants*.

35. Brown, Wielebnowski, and Cheeran, “Pain, Stress, and Suffering in Elephants.”

aggression. They can display symptoms of posttraumatic stress disorder³⁶ and are known to kill keepers and handlers in fits of rage.

Nevertheless, stress itself is an ambiguous category. We cannot know how any particular individual, human or nonhuman, will react to challenging circumstances. Moreover, while many experts we interviewed were concerned by contemporary conditions of living for elephants, no one claimed to be able to identify specific stressors that would inevitably lead to herpes viremia. As with an eruption of canker sores or fever blisters in human herpes infections, the links between stress and immunosuppression in elephants are multivectoral and amorphous. Additionally, “stress” itself can be viewed as a placeholder for all that we do not really understand about the troubled relationships among social life, emotions, and physiology. As anthropologist Jean Langford notes, “When we say stress do we really do anything more than obscurely normalize the way that creaturely well-being is imbricated with social experience and what unfolds when both correlatively go awry?”³⁷

As the virus takes advantage of the contemporary troubles of elephants, creeping past human infrastructure and barriers and across blurred boundaries between wild and domesticated to take elephant lives, other questions arise. It is still unclear whether the virus is evolving into a form with an enhanced capacity to destroy elephant life or if it is a relatively stable entity that our current observational practices and recent technologies newly allow us to identify, study, and describe. Might the newly apparent virulence of EEHV be an effect of our intense scrutiny of elephants? Recent genomic technologies and the ability to identify the virus in all its variants also coincide with the period when new reproductive technologies have been in place for breeding elephants in captivity. How do the two phenomena—technologically assisted reproduction of large captive mammals and the emerging sciences and technologies of virology—intersect? The inscrutability of the virus, then, is a challenge to the anthropocentric assumption that human care is enough to manage and sustain life in times of extinction.

When Elephants Die: Well-Being versus Species Survival at the Woodland Park Zoo

In the 1980s, zoos and other captive elephant regimes began the demanding project of breeding and rearing elephant calves in confinement, where elephants have been most vulnerable to the viral creep. EEHV is responsible for a quarter of all deaths of captive

36. Late elephant ethologist Fred Kurt observed how traumatized adults living in landscapes of human-elephant conflict are incapable of providing the necessary care and schooling for their calves to develop into responsible and social members of the herd; “disturbed socialization” and hyperaggressive behavior are often the result (*Von Elefanten und Menschen*, 68). Elephant psychologist G. A. Bradshaw reports traumatized and emotionally disturbed African elephants that carefully plan “vengeful” attacks on Masai villagers and their cattle in Africa (*Elephants on the Edge*, 144). Geographer Maan Barua speculates that elephants in Assam raid distilleries for alcohol to use as “a sedative that helps them cope with the pain of postcolonial consciousness” (“Volatile Ecologies,” 1473).

37. Jean Langford, pers. comm., December 2015.

juvenile elephants in Europe and North America, and only eight elephants are known to have survived EEHV viremia.³⁸ These days, when an elephant begins to act oddly, herpesvirus is immediately suspected and feared. Many of these elephants are given a human herpes drug, famciclovir, but dosage is difficult, and no one knows whether the drug actually helps. It is also unknown how the virus is transmitted in captivity, with no clear linear chain of transmission. This has caused some to question the ethics of captive breeding programs where juveniles are certain to be infected and have a high chance of mortality.

When a baby was born to the elephant Chai at the Woodland Park Zoo (WPZ) in Seattle in 2000, I (Celia) recall my own “passionate immersion”³⁹ in elephant lives as I repeatedly watched a video of the birth on the WPZ website. In the midst of contemplating motherhood myself, I was drawn to the spectacle of the world’s largest land mammal giving birth to a calf that was bigger than an adult human and incredibly cute. I recall the placental sack breaking and keepers quickly extracting the baby, moving it out from under its mother’s feet to keep it from being trampled. I witnessed the baby’s airway cleared with a mechanical suction hose. I later watched online and in person as the adorable infant ran around her enclosure with her uncontrollable new trunk waving about. And I recall friends’ children sending in prospective Thai language names for the baby, who was eventually called Hansa, meaning “supreme happiness.” I had never heard of EEHV.

Hansa quickly became a draw for the WPZ, which is a paradox of raising elephants in contemporary zoological gardens. While thirty years ago and more zoos were framed as a source of public entertainment, they have now taken on the agenda of conservation and species survival. In addition to ensuring species survival in some minimal form through reproduction, the contemporary conservation rationale for zoos centers on creating affective responses in zoo goers so they will be inspired to help preserve animals in the wild. As WPZ’s deputy director David Bohmke describes it, “We believe we should have elephants in captivity for a lot of reasons, primarily because it educates folks about the plight of elephants in the wild, so that hopefully people can do something about that.”⁴⁰ Some studies have suggested, however, that the educational value of zoos has been exaggerated.⁴¹

It was with supreme sadness and disappointment on the part of zookeepers and the Seattle community, then, that at six and a half years of age, Hansa died. The death was very quick, and initially the cause was indeterminate. Hansa’s medical history and biological samples were sent to the National Elephant Herpesvirus Laboratory in Washington, DC, for epidemiological analysis. Within a month, a new strain of EEHV had

38. Nolen, “Herpesvirus Claims Another Elephant.”

39. Tsing, “Arts of Inclusion,” 14.

40. Friends of the Woodland Park Zoo Elephants video, November 24, 2009, www.facebook.com/FreeEles/videos/220339974687/.

41. Marino et al., “Do Zoos and Aquariums Promote Attitude Change in Visitors?”

been identified. The death of Hansa was part of the larger phenomena of herpes deaths within relatively newly established zoological captive breeding programs. Through assisted reproductive technologies, artificial insemination, and the transport of animals for breeding, baby elephants are now born in zoos. Nevertheless, pregnancy and survival rates for captively bred elephants are low.

The sudden and painful appearance of EEHV in Hansa brought to light the question of affect and the public. Elephants in captivity, and especially the birth of a baby, are intended to bring zoo visitors into emotional contact with elephants. Visitors should be inspired by animals as representatives of their kind; they are not expected to engage with specific animals and their individual physical or psychological histories, however. They are not supposed to bring the capacity of zoo animals to suffer in captivity into the conversation, nor are they expected to take up the questions of rights and welfare in *ex situ* conservation. Matthew Chrulew writes: "Precisely insofar as zoos are biopolitical institutions devoted to the production and nurture of life, they disturb and ignore the role of death."⁴² The death of Hansa could not be ignored, however, and her story became part of an emerging reaction to elephant confinement in the Seattle community.

Friends of the Woodland Park Zoo Elephants (hereafter Friends) was established in 2005 to advocate on behalf of Bamboo, Chai, Watoto, and Hansa, the elephants in the WPZ collection, and to bring to light their suffering in captivity. The death of Hansa and EEHV became a central part of their protest story. Thom van Dooren has illustrated some of the many ways that individual animals suffer for the sake of the larger species entity.⁴³ Like other animal rights groups, Friends argued that it is impossible to keep elephants in zoo captivity without causing serious harm to individual animals and ignoring their histories as individuals.

Through their political agitation, Friends sparked the "queering"⁴⁴ of the scientific management of elephant captivity in Seattle. I witnessed Friends protesters outside the WPZ gates in elephant drag mimicking the swaying and pacing that large mammals display in captivity (called stereotypic behavior). In addition to the boredom and lack of mental stimulation the street theater brought attention to, Friends focused on other forms of suffering: the limited space available to these giant creatures, the foot infections and arthritis the adult elephants experience because of their immobility, the cold climate in Seattle, and the personal incompatibility of Bamboo and Chai leading to stress and conflict.⁴⁵ In contrast to the Friend's advocacy for release of the WPZ elephants to a sanctuary, Deputy Director Bohmke made the heteronormative claim that "giving Chai a baby" was her greatest hope for happiness and fulfillment. Prioritizing

42. Chrulew, "Managing Love and Death at the Zoo," 145.

43. van Dooren, *Flight Ways*.

44. Mortimer-Sandilands and Erickson, *Queer Ecologies*.

45. Friends of the Woodland Park Zoo Elephants video.

species survival, the WPZ could not comment about what repeated attempts to fertilize Chai were like for her (or her sperm donors), her miscarriages, or, after she did finally give birth, her experience of the death of her offspring Hansa.

As stories of elephant suffering crept into the Seattle media, new claims and accusations about Hansa's life and death and her mother's experiences in captivity emerged. To be inseminated, Chai had been sent by the WPZ to the Dickerson Park Zoo in Springfield, Missouri, where she was beaten with an axe handle by keepers. Dickerson was eventually fined by the US Department of Agriculture for their treatment of Chai during her stay.⁴⁶ While WPZ zoo officials called Hansa a "princess" and "a little spoiled," David Hancocks, a former director of the WPZ who resigned over the conditions of the elephant enclosure and who believes elephants cannot be ethically kept in zoos, revealed that Hansa had been beaten as part of her training when only a few months old and was sometimes kept from sleeping with her mother Chai, traumatic conditions for both mother and baby.⁴⁷

Recognizing EEHV as a prevalent cause of elephant mortality, Friends drew a connection that the WPZ and other veterinarians we spoke with did not, linking the viral creep that killed Hansa to the conditions of her confinement. Indeed, while it is impossible to prove that Hansa succumbed to EEHV as a result of stress, stress and viremia appear to be closely associated across the spectrum of herpesviruses. Friends accused the WPZ of irresponsibly breeding Chai, since there was no way to prevent infection in any child of hers. Friends further argued that breeding Chai was unethical given the suffering of artificial insemination she underwent, noting that she had undergone 112 invasive procedures and multiple miscarriages. Under conditions of inevitable exposure to the virus and the unavoidable problems of confinement, they took the position that elephants should not be kept or bred in zoos.

Despite their obvious concern for the Seattle elephants, Friends lacked an equivalent degree of care for the virus, making meaningful errors in their approach to EEHV. Although conclusively refuted by veterinary studies, Friends argued that Chai's viral infection stemmed from housing Asian and African elephants together. They further claimed that the WPZ had "no infection control in place" to prevent herpes,⁴⁸ not recognizing that viable infection control for EEHV does not exist even in elephant sanctuaries, that EEHV is undetectable in its latent phase, and that as yet there is no way to know in advance when a lytic-stage infection will occur. In their activist mode, fighting on behalf of individual elephants, Friends failed to acknowledge the mystery of the viral creep, the fuzziness of the concept of stress, what remains unknown about elephant-virus interactions, and the capacity of the viral entity to withdraw from elephant or human perception.

46. Hancocks, "Hansa's Short Life One of Deprivation."

47. *Ibid.*

48. Friends of the Woodland Park Zoo Elephants, "What's Wrong," freewpzelephants.org/issues/ (accessed July 2, 2015).

Although certainly concerned with the well-being of its elephants, WPZ, like most conventional twenty-first-century zoos, emphasized species survival and the urgency of elephant reproduction, whereas Friends took up the elephant primarily as an individual that could experience pain, loss, and suffering as well as joy and satisfaction.⁴⁹ In accessing different aspects of the elephant, disagreements between Friends and the WPZ centered around contested versions of love and care: while the former emphasized love and care for the individual, the latter emphasized passion for and attention to the species as a whole. While the WPZ staff's love for baby Hansa was evident in their tears when she died, and they insisted on the high quality of their elephant care, Friends argued that the elephants should be sent to the Performing Animal Welfare Society, an elephant sanctuary in California, where they could live out their damaged lives in relative ease. When Friends spoke on behalf of physically and emotionally vulnerable elephants, they were able to access something about elephants as sentient and suffering beings, but they offered little by way of suggestions for the future of the elephant species, which the staff of the WPZ were deeply dedicated, however imperfectly, to conserving. We turn now to the space where the survival of the elephant species has perhaps most frequently and powerfully been fantasized: the "wild."

Postmortem Encounters: Viral Creep in the South Indian "Wild"

My (Ursula's) first encounter with the viral creep was at the laboratory of Arun Zachariah, a wildlife veterinarian and disease ecologist working for the Indian Forest Department at the Wayanad Wildlife Sanctuary in the South Indian state of Kerala. Zachariah draws on necropsy, the fine art of viewing the dead, to render visible the hidden microbial stories of disease and interspecies contact in this ecosystem. After sudden and unusual elephant deaths, he searches the animals' corpses for potentially lethal entities—toxins, viruses, fungi, and parasites—and for such potentially lethal processes as genetic disorders. Knowing the viral creep and how it works within human-disturbed ecologies means becoming an expert in knowing elephants from the inside out, and Zachariah immerses himself in the odors and critters that accompany an already decaying animal. As he demonstrated to me with a series of photographs that turned my stomach, elephant necropsy means literally crawling inside the animal's body in various stages of decay to examine its mucous membranes, teeth, joints, internal organs, and intestinal tract for abnormalities as well as collecting tissue samples from the heart, liver, kidneys, blood, and lymph nodes. If the animal's carcass carries infectious agents that could be transmitted to others or if it shows signs of human poisoning, the doctor and his team burn it in the forest. If the carcass is noninfectious, they leave it in the forest to decay so that other species can feed on it (fig. 1).

49. Similar to the outlook of the WPZ, where the ability to reproduce and ensure species survival gives ultimate value to endangered animal life, Rheana "Juno" Salazar Parreñas attributes an orientation toward reproductive capacity as the highest priority in orangutan conservation in Malaysia; see Parreñas, "Producing Affect." This divide has been similarly explored in Thompson, "When Elephants Stand for Competing Philosophies of Nature."

Figure 1. Elephant carcass at the wildlife sanctuary. Courtesy of Arun Zachariah



Zachariah's viral ontology emerges from laboratory practices as well as from his necropsies. For him, EEHV comes into being through technological advances in molecular biology since the 1980s. Back in his air-conditioned and sterile lab near the wildlife warden's headquarters, PCR diagnostics and DNA sequencing enable Zachariah to detect and render visible the animals' silent cohabitants and genetic particularities. The vet's laboratory work brings into view ancient and endemic herpes strains that have actually coevolved with elephants. Previously, EEHV was only occasionally mentioned in anecdotal stories about elephants in India; the effects of its existence were described through behavioral and morphological symptoms: elephants were reported to suffer from "lethargy, lack of appetite, swelling of the head and around the eyes and blue discoloration of the tongue."⁵⁰ Zachariah and his colleagues cannot fully explain the contemporary spatiotemporal viral creep, and the viral object recedes from view. But it is clear to them that EEHV is killing more and more elephant calves and that these killings seem connected to a long history of human disturbance and ecological destruction in the South Asian "wild."

The Wayanad Wildlife Sanctuary stands in for the wild in this story. In this guise, it appears as a principal space of hope for the Asian elephant species, a place where an estimated eight thousand to nine thousand (relatively) "undisturbed" elephants still roam free. This is the landscape that grounds all the classic stories about how nature works and *should* be: stories about how elephants behave and flourish, stories of matriarchal herds, of abundant genetic diversity, of both the past and the future of wildlife. In these stories, like the ones I heard from Zachariah, a virus like EEHV is part of the "balance of nature": it culls the weak for a species that has, apart from the tiger, few if any predators. And yet these simple stories do not capture the viral-elephant-human becomings that emerge from the actual wild in Southern India. Instead, the sanctuary is a space where EEHV creeps across ecological communities, culling in intense and unexpected ways, refusing distinctions between wild, domesticated, and captive. Rather

50. "Herpes Virus Kills Elephant Calf in Wayanad."

than an untroubled wilderness where elephants are preserved and survive in isolation, the sanctuary emerges as a “wild country, where deeply rooted colonial legacies interact with novel forms of wildness—the ‘dangerous, risky, and out of control,’” just like the emergent ecologies within new regimes of biotechnology that Eben Kirksey, Sarah Franklin, and Jamie Lorimer have powerfully described.⁵¹

Zachariah’s veterinary practices might be understood as enacting and performing the herpesvirus gone wild in the midst of conflict, stress, and imbalance.⁵² His postmortem operations reveal the context of EEHV deaths and the broader bodily effects of traumatic human-wildlife proximity. In Zachariah’s eyes, the observable rise of disease caused by human disturbance is a sign of stress in the South Indian wild. Elephant stress has increased in the last twenty years as this landscape has become a violent contact zone of interspecies clashes. In Wayanad, the herpesvirus lies latent and becomes virulent in relation to a long history of anthropogenic environmental damage—colonial logging, timber extraction, ivory poaching, human migration, and capitalist expansion—that has disrupted and remade the forest’s multispecies assemblages. A growing human population, intensively cultivated agricultural fields,⁵³ roads, dams, railways, power-generating plants, and houses hinder elephants’ ranging behavior.⁵⁴ The habitual migratory corridors of South Indian elephants, who travel up to fifty kilometers a day through different ecological communities, are blocked by human presence and infrastructure. Since 2006, twenty-six people have been killed by attacks from wild elephants. Farmers have submitted almost ten thousand applications reporting the loss of agricultural crops that were eaten or destroyed by wild animals,⁵⁵ and elephant bulls have been electrocuted by homemade high-voltage fences, initially erected by farmers to keep wild boars from their vegetable fields. Some of the elephant carcasses that Zachariah dissects are riddled with buckshot, which would have been painful throughout the elephant’s life.

The viral creep flourishes in these “blasted landscapes.”⁵⁶ Zachariah told me that, similar to the situation in North America and Europe, elephant populations living in the insular and degraded habitats of South India have little genetic variability. They are thus much more vulnerable to the viral creep and eventual extinction. Securing the flow of genetic material between different elephant clans is essential for maintaining a gene pool large enough to ensure a population that can withstand disease epidemics and viral and bacterial infections. Usually, elephant cows communicate via pheromones to identify, attract, and choose suitable mating partners, and they avoid having sex with their close relatives. Nowadays, severe forest fragmentation creates so-called island

51. Kirksey, *Emergent Ecologies*, 107; Franklin, “Ethical Biocapital.”

52. Mol, *Body Multiple*.

53. D. Münster, “‘Ginger Is a Gamble.’”

54. U. Münster, “Challenges of Coexistence.”

55. Government of Kerala, *Report on Man-Animal Conflicts in Wayanad*.

56. Kirksey, Shapiro, and Brodine, “Hope in Blasted Landscapes.”

populations, and female elephants are forced to inbreed. This is very similar to the situation in zoos, Zachariah argues, where female selection has been replaced by the technoscientific arts of human selection. According to the scientist, “nature,” in the form of EEHV, now finds a way to eliminate the genotypes of those individuals who are highly inbred. The viral creep, in his perspective, is part of the ongoing process of evolution.⁵⁷

Zachariah’s scientific practices are transformed by his encounter with the viral creep. His practices are acts of viral care that perform the Anthropocene and have world-making power: through his work, a world of disturbed wilderness is created, a system in crisis where humans emerge as invasive species encroaching upon “nature.” Some of his viral practices have direct biopolitical and material effects, because Wayanad’s forest officials largely rely on his scientific expertise with respect to the forest’s wildlife. He argues that the most important conservation measure is to strictly set apart human and animal domains and to establish elephant corridors that enable the animals to use their habitual migration routes and prevent inbreeding.

Zachariah’s ontological politics play out in a setting where colonial and postcolonial regimes of management, and a long history of separating “nature” from “culture” and humans from wildlife, have left their deep traces in the landscape: setting apart human and animal domains continues to be the most important conservation measure. To make coexistence possible, and to reduce elephant and human stress, the Indian Forest Department has built deep elephant trenches and electric fences to separate forests and fields along the ninety-three-kilometer edge of the sanctuary. In 2013 the Kerala Forest Department also began to relocate more than one hundred indigenous communities’ small hamlets inside the sanctuary.⁵⁸ Despite their legal forest rights, these people’s use of the forest resources continues to be criminalized, and their domestic animals—cattle and goats, potential carriers of diseases and extinction—are denied access to the forest’s grazing land. Ironically, these relocations do not seem to fully reduce elephant stress, especially since growing numbers of tourists are allowed to enter the forest in their noisy jeeps.⁵⁹ The forest’s authoritarian protection regime masks asymmetries, hierarchies, and the diversity of caste, class, and gender in the forest as well as the fact that not all members of the human species are equally responsible for causing degradation, death, and extinction. The sanctuary’s biopolitical interventions have not stopped either the viral creep or elephant raids and killings.

Other imaginative and creative solutions are needed for elephant thriving in this landscape. The monoculture teak plantations that cover the Wayanad landscape are not interesting for elephants. They are dry and contain exotic lantana plants, and cattle compete with elephants for grazing space. Some farmers, forest officials, and environmentalists are already working on this by planting fruit trees and human crops that

57. Arun Zachariah, pers. comm., January 1, 2016.

58. Kerala Forest Research Institute, “Voluntary Relocation of Settlements in Wayanad Wildlife Sanctuary.”

59. U. Münster, “Challenges of Coexistence.”

elephants are fond of, such as jackfruit or mango trees, inside the sanctuary. They also dig elephant water holes in the forest, prohibit tourist vehicles in the core zones of the park, and attempt to reduce sound disturbance, which is important for elephants, who communicate across long distances via infrasound and seismic signals through their trunks and feet.⁶⁰ In the Wayanad “wild,” the multispecies communities inhabited and shaped by elephants and other beings are simultaneously an artifact of human design.

Since this is the case, some want to ask what other landscapes might be possible that are interesting and healthful for both people and elephants. If Herpesviridae creeps across the captive and wild spaces that dominate possibilities for contemporary elephant lives, if neither of these spaces can offer a site for elephant flourishing, then to what or where can we turn? Is it possible to imagine a space that thwarts viral creep, considers species survival, and attends to animal welfare simultaneously? Zoo Zürich is one important site attempting to answer this question.

Mehr Wellness für die Größten: Zoo Zürich's Elephant Spa

In Switzerland we were introduced to Zoo Zürich's Kaeng Krachan Elephant Park by Alex Rübel, the zoo's director. With its motto “more wellness for the largest” (*Mehr Wellness für die Größten*), Kaeng Krachan is putting into place the philosophies of its late director, Swiss zoologist and animal psychologist Heini Hediger (1908–92). The elephant park is part of an effort to create a site of wellness for the seven Asian elephants in the zoo's collection and for the zoo-going public. Among other aspirations for Kaeng Krachan, Zoo Zürich hopes to thwart the viral creep through its architectural innovations.

Together we viewed a video of the birth of Omysha at Zoo Zürich.⁶¹ Omysha's birth was very different from Hansa's at the Woodland Park Zoo. Instead of a lone mother assisted by zookeepers wielding suction hoses, Omysha's mother gave birth in the presence of two elephant aunties who assisted with the birth. In the video, it is elephants and not humans who care for the future generation; the adult females can be seen kicking the baby forcefully after the birth, trumpeting and growling, seemingly to get Omysha out of the placental sack and make sure she is breathing. For Rübel, although zoo elephants will never reenter the wild and become part of the genetic or behavioral diversity found there, the wild provides standards for elephant behavior. Allowing elephants to practice this unassisted birthing behavior is a way for the zoo to create a good environment for elephants.

Rübel was inspired to attend to wellness by his extensive prior experience with elephants who had lived and died in less than ideal ways. He was the clinician who was called to attend to Lohimi, the three-year-old Asian elephant from Circus Knie in Switzerland who, in 1988, was the first identified death from EEHV in the world. Rübel

60. Sukumar, *Living Elephants*, 141; Kurt, *Von Elefanten und Menschen*, 92.

61. Zoo Zürich, “Geburt von Omysha,” www.youtube.com/watch?v=kvxDBw84nc (accessed July 10, 2015).

took Lohimi's case history and observed blood leaking from her eyes and mouth. He did not suspect a virus at the time, he told us; he believed he was witnessing some kind of catastrophic heart failure. Prior to Lohimi's death, herpesvirus in elephants was known morphologically through surface skin lesions and by intranuclear inclusion bodies in the lungs of African elephants. These were understood as signs of the widespread prevalence of herpes infection in African elephants, but there were no known histories of death from herpes, and it wasn't known in Asian elephants. When Rübél was called to tend to Lohimi, she was showing signs of depression and having trouble moving her trunk after performing in a morning parade and eating her lunch as normal. Just two hours after the onset of symptoms, she collapsed and died.⁶²

Zoo Zürich has experienced two deaths from EEHV: Xian in 1999 and Aishu in 2003. But there are other consequential forms of mortality at work here. In 1995, an elephant trainer was killed in an attack by the elephant Komali. When elephants attack, which happens three or four times a year in Europe and North America, the elephant is often euthanized, as Komali was at Zoo Zürich. Kaeng Krachan's innovative architecture was designed to create spaces of well-being in times of loss and extinction, where humans can reestablish their lost bonds with animals, keepers are safe, and elephants can thrive. Perhaps, along the way, the relationship between the elephant and the herpesvirus could be modified so that juvenile elephants survive.

In June 2014, the zoo's new landmark exhibit was inaugurated after five years of planning by renowned architects, landscape designers, zoo curators, and biologists. Its award-winning roof expands like a giant net above the enclosure, designed to resemble the Thai forest canopy. From a bird's-eye view, the spectacular indoor enclosure of Kaeng Krachan resembles Kirksey's "bubble of happiness."⁶³ Within the bubble, however, the experiences of the visitor and the elephant are approached in different ways. The zoo's aim is to cultivate a nature-like (*naturhafte*) atmosphere for the human visitor entering the building. Visitors are invited to experience (*erleben*) animals in a safe and pleasurable environment that resembles the wild. Like the Woodland Park Zoo, Zoo Zürich is a place where visitors are intended to be affected and transformed through multi-sensory encounters across species divides. "The zoo, first of all, needs to be a place where human needs are met," Rübél explained, "so that people feel safe, open up for transformative experiences, and learn about the animals."⁶⁴

While the visitors must feel they are seeing "nature," for Rübél the exhibit is not nature and never will be—it is a highly thought-out space designed to meet the needs of elephants, keepers, and visitors at the same time and, it is hoped, keep the elephants' immune systems strong enough to withstand viral emergences (fig. 2). Although the exhibit is eleven thousand square meters, and the elephants have more space than at

62. Ossent et al., "Acute and Fatal Herpesvirus Infection."

63. Kirksey, *Emergent Ecologies*, 54.

64. Alex Rübél, interview by Celia Lowe and Ursula Münster, Zoo Zürich, June 25, 2015.



Figure 2. The Kaeng Krachan Elephant Park. Courtesy of Zoo Zürich, picture by Jean-Luc Grossmann.

the Woodland Park Zoo, space is not all these large mammals need. Rübel compares the elephant exhibit to a well-appointed household: “We like to have good cupboards and a stereo to fit out our space. Elephants need a good well-appointed space also.”⁶⁵ Rübel has witnessed very large elephant enclosures that he feels are fitted out like bathrooms, with hard surfaces and nothing in them to amuse the elephant. In the Kaeng Krachan exhibit, elephants instead experience what Fred Kurt calls “experiential gastronomy” (*Erlebnissgastronomie*):⁶⁶ at forty different locations in the enclosure, they find various kinds of food at different times, sometimes hidden, sometimes hard to reach, which keeps them walking up to seven kilometers a day. While visitors feel they are under a Thai forest canopy, for the elephants the enclosure offers a diversity of “occupations and employment” (*Beschäftigung*). The exhibit’s most stunning elephant employment is a swimming pool where elephants can dive in and visitors can watch them swim from an underground viewing area.

Rübel sees himself in the tradition of Hediger, director at Zürich Zoo from 1954 to 1973 (fig. 3). Inspired by Jakob von Uexküll’s *Umwelt* theory, Hediger extended the notion of a biosemiotic sphere in which each animal moves, cultivating attention to an animal’s “psychotope,” its living space (*Wohnbereich*) of psychological comfort, where it

65. *Ibid.*

66. Kurt, *Von Elefanten und Menschen*, 256.



Figure 3. Elephant wellness at Zoo Zürich. Courtesy of Zoo Zürich, picture by Jean-Luc Grossmann

feels safe, comfortable, and at ease.⁶⁷ Commenting on this legacy, however, Chrulew argues that “the contemporary biopolitics of zoological care, revolutionised by Hediger and since developed in all manner of enrichments and interventions, may have reduced the incidence of stereotypy and other effects of captivity; but it has a long way to go to truly heal the wounds of the ‘sickly beasts’ procured and produced by zoos.”⁶⁸

Chrulew’s analysis centers on what we know: we know what these wounds are, and they are utterly accessible to our interpretive prostheses. While we do not disagree, the viral creep reminds us that elephants, like herpesviruses, can also be profoundly inscrutable. When elephants kill trainers, for example, it is often completely unexpected and happens to a trainer with a good relationship to an animal. Further, Rübél views stereotypic behaviors as the frustration of a specific need that can often be identified and resolved, not the automatic consequence of confinement. And where, to some, training looks stressful, he believes predictable training can help reduce stress on the animal. Similarly, in our conversation with Alex Greenwood, he argued, “we don’t know if elephants are happy or not.”⁶⁹

As we have noted above, herpes reactivation is highly correlated with stress in all creatures. But even for trained, attentive professionals the stress of captivity, or what

67. Hediger, *Tierpsychologie im Zoo und im Zirkus*.

68. Chrulew, “Managing Love and Death at the Zoo,” 153.

69. Greenwood, Skype interview by Celia Lowe and Ursula Münster, July 14, 2015.

makes an elephant a “sickly beast,” is not an obvious thing. In elephants, herpes viremia can come when they experience what Rübél calls the “hard stress” of being moved. It also often comes at the time of weaning. Pregnancy can cause herpes viremia, leading to spontaneous abortion. These are some things we think we know, but we do not always know what the relevant conditions of stress will be for an elephant or which conditions will create an opportunity for a virus. This complex situation is not as intuitive as animal rights activists like the Friends of the Woodland Park Zoo Elephants want to make it out to be. To understand stress, we need to know more about elephants, about their particular and intersecting *Umwelten* and psychotopes, and about elephants both as a kind and as individuals with complex situated histories. But we also need to recognize that we cannot and will never know all there is to know about these beings who withdraw from the human gaze. At the same time, it is not only elephant ways of being that matter here: the viral creep emerges and takes form at the intersection of diverse *Umwelten*, diverse forms of human-virus-elephant life (alongside, of course, many others). This complex “ecology of selves”⁷⁰ is a definitively multispecies affair.

While finding the question of what makes an elephant happy important, Rübél does not want his keepers to fall in love with their elephants. The new ideal for elephant keepers at Kaeng Krachan is nonaffective labor through a system of “protected contact.” The keeper killed by Komali at Zoo Zürich had been away from the herd for a while and had then tried to come back in and assert control in direct contact with the elephant. In the new system of protected contact, first introduced at the San Diego Wild Animal Park in 1989, humans and elephants never share the same space. This means that keepers must entice elephants to participate in their care and not force them through rank-order dominance or beatings. Elephants come up to the bars to have their feet examined or their ears checked, and they are able to walk away and refuse the care that is being offered. Elephant autonomy may also contribute to elephant well-being.

Rübél was profoundly affected by his first encounter with EEHV. He still remembers Lohimi’s death from when he was a clinician at Zürich University and fears that Omysha might be killed by the virus when she is weaned; the most he can do is fortify her with gammaglobulin injections at the time. But he also hopes it is possible that, within the bubble of wellness at Kaeng Krachan, conditions for living will bring contentment and Omysha can survive to become a permanent part of the multigenerational herd of older female elephants. In Zoo Zürich’s techno-nature-culture, organisms and architecture are “joined together to ground modest hopes,”⁷¹ yet it seems unlikely that these relatively minor innovations in care will offer a complete solution for captive elephants and certainly not for the broader troubles of extinction or suffering in proximity to humans faced by their kin at large.

70. Kohn, *How Forests Think*.

71. Kirksey, *Emergent Ecologies*, 53.

As would be expected, all the elephants at Kaeng Krachan harbor latent herpes infections. Despite the nature-like innovations and the spa-like atmosphere, viral creep might yet disrupt this bubble of wellness. As recent scholars of care and technoscience indicate, “The ways in which we are enjoined to be happy are often normalizing structures,”⁷² in this case normalizing the confinement environment. And yet the Zürich collection of elephants also lives under artificial conditions where, as Greenwood observes, every animal is in constant close proximity to every other and where, when “one animal sneezes it sneezes on the entire food supply, like the hay pile.” Here, mating is planned and not random, and you have an “artificial collection of viruses and elephants.” In short, Greenwood told us: “A zoo is more like a commercial hog farm than you might think.”⁷³ Despite its level of attention to the various elephant *Umwelten* and psychotopes, the Kaeng Krachan is still an enclosure with limited capacity to provide for all of the behavioral and affective dimensions of elephant lives. Around the world, as elephant lives become increasingly frayed and fractured, it is more and more clear how vital these broader contexts have been in enabling elephants to live with, evolve with, and in the past even thrive with their companion viruses.

Ending: When Viruses “Go Rogue”

In our research and writing collaboration we have attempted to acknowledge intense levels of suffering and destruction for people, elephants, and viruses, while holding onto narrow spaces of hope, in three human projects of care. This ethnography of the human-elephant-viral mix among different settings of the Anthropocene explores our contemporary world as a mix of nature, culture, design, and technology, and never purity. Our collaborative natural-cultural ethnography aims to take “our powers of observations,” as Anna Tsing puts it, “back to the world to see what promises and terrors surround us.”⁷⁴

In our story, there is no wild that exists outside the Anthropocene, Capitalocene, Plantationocene, or Chthulucene⁷⁵ to which elephants might joyfully return. The zoo, the “wild,” and the sanctuary are each, in different ways and to different extents, contemporary forms of human-designed care. Despite their differences, these three sites share one feature: none can guarantee elephant futures and flourishing. Zoos attempt to alleviate social isolation, boredom, and stress while keeping the existence of the species in view and striving to suppress the virus. The “wild” provides fleeting resources for genetic diversity, behavioral comfort, and species care but no longer is a “refugia”⁷⁶ that might replenish elephant populations or where elephants might return to lead normal lives. The wild can no longer protect elephants from similarly damaged yet overarmed

72. Murphy, “Unsettling Care,” 721.

73. Greenwood interview.

74. Tsing, “Feral Biologies,” transcribed notes.

75. Haraway, “Anthropocene, Capitalocene, Plantationocene, Chthulucene.”

76. Tsing, “Feral Biologies.”

humans who threaten and terrorize them. And elephant sanctuaries, while offering an ease of living conditions for former circus and zoo animals to live out their remaining days, contribute little to elephant-viral symbiosis or to the future of the Asian elephant as a species. Each designed setting attends to its own limited perspective on elephant and viral being, leaving some vital processes, spaces, and bodies unexamined and uncared for.

Elephants and viruses also bring into view interconnected worldings. “World making,” as Deborah Bird Rose reminds us, “depends on uncertainty. The way of nature is the way of the new.”⁷⁷ EEHV is a deeply ancient elephant companion that has persisted together with elephants over millennia, though something has now changed. In the viral creep, herpes has turned on elephants in a way that may soon prove to be suicidal, since the virus cannot live without its host. We do not know how the herpesvirus engaged the elephant a century ago and more, other than to observe that it did not decimate elephant young. As Greenwood notes, “When viruses go rogue, something has gotten out of balance.”⁷⁸ We do not know these viruses, so we presume they are negative, he told us, but in humans the herpesvirus is a regulator of immunity. He similarly believes that EEHV is at least benign “in nature” and possibly even helpful. Nevertheless, in the contemporary human-elephant-virus assemblage, the virus has become a killer and a threat to species survival. We cannot rely on the positivist realism of reductionist explanations or on what Haraway calls methodological individualism to understand this.⁷⁹ The story of the virus and the elephant shows us that speculative imagination—modes of imaging what cannot be known but is nonetheless very real and consequential—is always involved when we make sense of the world around us.

Human solutions to the viral creep are limited in part because our access to the entities involved is also limited. We act on scientific and linguistic representations, without acknowledging the limitations of these techniques. But elephants and viruses escape human access in either science or language. Symptoms are likewise representations and enactments; the herpesvirus represents itself to the body of elephants as viremia in mild to acute expressions. But then the herpesvirus evades representation-asymptom and withdraws. We still do not know where latent EEHV resides in the elephant body—maybe it is the heart, maybe the lung or nerve endings. And elephants are similarly withdrawn. We can guess and imagine what makes them happy and whether it is possible for them to live meaningful lives deprived of their complex social and cultural relationships and in close proximity to humans. But we do not know exactly what causes them stress, how stress is experienced and manifests in elephants’ bodies, or if stress alone is the reason for this new fragility in elephant populations. It is hard to enact an ethic of care for entities whose needs are so opaque. Human care for

77. Rose, *Wild Dog Dreaming*, 50.

78. Greenwood interview.

79. Haraway, “Anthropocene, Capitalocene, Plantationocene, Chthulucene.”

elephants and their viruses will never be enough. Thus the story we tell of the viral creep helps us to understand the limitations of diverse human orchestrations. It offers a way to unravel the open-ended stories of lively entanglement and world making in settings where human management and care have only limited power to secure the future of valued life forms on our damaged planet.

CELIA LOWE is associate professor of anthropology and international studies at the University of Washington in Seattle. She is author of *Wild Profusion: Biodiversity Conservation in an Indonesian Archipelago* (2006) and is currently writing about the avian influenza outbreak in Indonesia.

URSULA MÜNSTER is a postdoctoral researcher at the Rachel Carson Center for Environment and Society and the Department of Social and Cultural Anthropology at Ludwig Maximilian University Munich. She is currently writing about encounters with South Indian wildlife in times of rapid species extinction.

Acknowledgments

The authors wish to thank Rachel Naomi Lee, Suma Vishnudas, and C. K. Vishnudas for research assistance. We cordially thank Darin Collins, Clarissa Prazeres da Costa, Don Grayson, Alex Greenwood, David Hancocks, Dieter Hoffmann, the late Fred Kurt, Alex Rübél, and Arun Zachariah for sharing insights into viral and pachyderm worlds with us. Special thanks go to Filippo Bertoni, Veit Braun, Thom van Dooren, Graham Harman, Eben Kirksey, Jean Langford, Justine Laurant, Daniel Münster, and two anonymous reviewers for their constructive comments on our work. This article was written with support from the Rachel Carson Center for Environment and Society.

References

- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press, 2007.
- Barua, Maan. "Volatile Ecologies: Towards a Material Politics of Human-Animal Relations." *Environment and Planning A* 46, no. 6 (2014): 1462–78.
- Baskaran, N., Surendra Varma, C. K. Sar, and Raman Sukumar. "Current Status of Asian Elephants in India." *Gajah* 35, nos. 1–2 (2011): 47–54.
- Bradshaw, G. A. *Elephants on the Edge: What Animals Teach Us about Humanity*. New Haven, CT: Yale University Press, 2009.
- Brody, Jane. "Herpes Now Blamed for More Illness than Any Other Human Viruses." *New York Times*, May 4, 1982.
- Brown, Janine L., Nadja Wielebnowski, and Jacob V. Cheeran. "Pain, Stress, and Suffering in Elephants." In *Elephants and Ethics: Toward a Morality of Coexistence*, edited by Christen Wemmer and Catherine A. Christen, 121–45. Baltimore: Johns Hopkins University Press, 2008.
- Chrulaw, Matthew. "Managing Love and Death at the Zoo: The Biopolitics of Endangered Species Preservation." *Australian Humanities Review*, no. 50 (2011): 137–57.
- Dupré, John. *Processes of Life: Essays in the Philosophy of Biology*. Oxford: Oxford University Press, 2014.
- Franklin, Sarah. "Ethical Biocapital: New Strategies of Cell Culture." In *Remaking Life and Death: Toward an Anthropology of the Biosciences*, edited by Sarah Franklin and Margaret Lock, 97–127. Santa Fe: School of American Research Press / Oxford: Currey, 2003.
- Government of Kerala. *Report on Man-Animal Conflicts in Wayanad: North and South Wayanad Divisions*. Kalpetta: Kerala Forest Department, 2012.

- Greenwood, Alex D., Kyriakos Tsangaras, Simon Y. W. Ho, Claudia A. Szentiks, Veljko M. Nikolin, Guanggang Ma, Armando Damiani, Marion L. East, Arne Lawrenz, Heribert Hofer, and Nikolaus Osterrieder. "A Potentially Fatal Mix of Herpes in Zoos." *Current Biology* 22, no. 18, (2012): 1727–31.
- Hancocks, David. "Hansa's Short Life One of Deprivation." *Seattle Times*, June 11, 2007.
- Haraway, Donna. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities*, no. 6 (2015): 159–65.
- . *The Companion Species Manifesto: Dogs, People, and Significant Otherness*. Chicago: Prickly Paradigm, 2003.
- Harman, Graham. *Towards Speculative Realism: Essays and Lectures*. Winchester: Zero Books, 2010.
- Hediger, Heini. *Tierpsychologie im Zoo und im Zirkus*. Basel: Reinhard, 1961.
- "Herpes Virus Kills Elephant Calf in Wayanad." *Times of India*, September 11, 2014. timesofindia.indiatimes.com/city/kozhikode/Herpes-virus-kills-elephant-calf-in-Wayanad/articleshow/42211720.cms.
- Kerala Forest Research Institute. "Voluntary Relocation of Settlements in Wayanad Wildlife Sanctuary." Thrissur, 2010.
- Kirksey, Eben. *Emergent Ecologies*. Durham, NC: Duke University Press, 2015.
- Kirksey, S. Eben, Nicholas Shapiro, and Maria Brodine. "Hope in Blasted Landscapes." *Social Science Information* 52, no. 2 (2013): 228–56.
- Kohn, Eduardo. *How Forests Think: Toward an Anthropology beyond the Human*. Berkeley: University of California Press, 2013.
- Kurt, Fred. *Von Elefanten und Menschen*. Bern: Haupt, 2014.
- Landecker, Hannah. "Antibiotic Resistance and the Biology of History." *Body and Society*, in press (online March 13, 2015). doi:10.1177/1357034X14561341.
- Latour, Bruno. *Politics of Nature: How to Bring the Sciences into Democracy*. Cambridge, MA: Harvard University Press, 2004.
- Leaman, Emily. "What Killed the National Zoo's Elephant." *Washingtonian*, April 18, 2011.
- Locke, Piers. "Explorations in Ethnoelephantology: Social, Historical, and Ecological Intersections between Asian Elephants and Humans." *Environment and Society* 4, no. 1 (2013): 79–97.
- Lorimer, Jamie. *Wildlife in the Anthropocene: Conservation after Nature*. Minneapolis: University of Minnesota Press, 2015.
- Lowe, Celia. "The Viral Clouds: Becoming H5N1 in Indonesia." *Cultural Anthropology* 25, no. 4 (2010): 625–49.
- Mar, Khyne U., Mirkka Lahdenperä, and Virpi Lummaa. "Causes and Correlates of Calf Mortality in Captive Asian Elephants (*Elephas maximus*)." *PLoS One* 7, no. 3 (2012): e32335. doi:10.1371/journal.pone.0032335.
- Marino, Lori, Scott O. Lilienfeld, Randy Malamud, Nathan Nobis, and Ron Broglio. "Do Zoos and Aquariums Promote Attitude Change in Visitors? A Critical Evaluation of the American Zoo and Aquarium Study." *Society and Animals*, no. 18 (April 2010): 126–38.
- Mol, Annemarie. *The Body Multiple: Ontology in Medical Practice*. Durham, NC: Duke University Press, 2002.
- Mortimer-Sandilands, Catriona, and Bruce Erickson, eds. *Queer Ecologies: Sex, Nature, Politics, Desire*. Bloomington: Indiana University Press, 2010.
- Münster, Daniel. "'Ginger Is a Gamble': Crop Booms, Rural Uncertainty, and the Neoliberalization of Agriculture in South India." *Focaal*, no. 71 (2015): 100–113.
- Münster, Ursula. "Challenges of Coexistence: Human-Elephant Conflicts in Wayanad, Kerala, South India." In *Conflict, Negotiation, Coexistence: Human-Elephant Relations in South Asia*, edited by Piers Locke and Jane Buckingham. Delhi: Oxford University Press, forthcoming.
- . "Working for the Forest: The Ambivalent Intimacies of Humans and Elephants in South Indian Wildlife Conservation." *Ethnos*, in press (online November 21, 2014). doi:10.1080/00141844.2014.969292.

- Murphy, Michelle. "Unsettling Care: Troubling Transnational Itineraries of Care in Feminist Health Practices." *Social Studies of Science* 45, no. 5 (2015): 717–37.
- Nolen, R. Scott. "Herpesvirus Claims Another Elephant as Search for Answers Continues." *JAVMA News*, July 15, 2011. www.avma.org/News/JAVMANews/Pages/110715c.aspx.
- Ossent, P., F. Guscetti, A. E. Metzler, E. M. Lang, A. Rübél, and B. Hauser. "Acute and Fatal Herpesvirus Infection in a Young Asian Elephant (*Elephas maximus*)." *Veterinary Pathology*, no. 27 (1990): 131–33.
- Parreñas, Rheana "Juno" Salazar. "Producing Affect: Transnational Volunteerism in a Malaysian Orangutan Rehabilitation Center." *American Ethnologist* 39, no. 4 (2012): 673–87.
- Paxson, Heather, and Stefan Helmreich. "The Perils and Promises of Microbial Abundance: Novel Natures and Model Ecosystems, from Artisanal Cheese to Alien Seas." *Social Studies of Science* 44, no. 2 (2013): 165–93.
- Puig de la Bellacasa, Maria. "Matters of Care in Technoscience: Assembling Neglected Things." *Social Studies of Science* 41, no. 1 (2011): 85–106.
- Rose, Deborah Bird. *Wild Dog Dreaming: Love and Extinction*. Charlottesville: University of Virginia Press, 2011.
- Srinivasaiiah, Nishant M., Surendra Varma, and Raman Sukumar, eds. *Documenting Indigenous Traditional Knowledge of the Asian Elephant in Captivity*. Bangalore: Asian Nature Conservation Foundation, 2014.
- Sukumar, Raman. *The Living Elephants: Evolutionary Ecology, Behavior, and Conservation*. New York: Oxford University Press, 2003.
- Thompson, Charis. "When Elephants Stand for Competing Philosophies of Nature: Amboseli National Park, Kenya." In *Complexities: Social Studies of Knowledge Practices*, edited by John Law and Annemarie Mol, 166–90. Durham, NC: Duke University Press, 2002.
- Tsing, Anna. "Arts of Inclusion, or How to Love a Mushroom." *Australian Humanities Review*, no. 50, (2011): 5–22.
- . "Feral Biologies." Paper presented at the Centre for the Anthropology of Sustainability, University College London, February 13, 2015.
- van Dooren, Thom. *Flight Ways: Life and Loss at the Edge of Extinction*. New York: Columbia University Press, 2014.
- Wittemyer, George, David Daballen, and Iain Douglas-Hamilton. "Comparative Demography of an At-Risk African Elephant Population." *PLoS ONE* 8, no. 1 (2013): e53726. doi:10.1371/journal.pone.0053726.
- Zachariah, Arun, Jian-Chao Zong, Simon Y. Long, Erin M. Latimer, Sarah Y. Heaggans, Laura K. Richman, and Gary S. Hayward. "Fatal Herpesvirus Hemorrhagic Disease in Wild and Orphan Asian Elephants in Southern India." *Journal of Wildlife Diseases* 49, no. 2 (2013): 381–93.