ERADICATION AGAINST AMBIVALENCE

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The problem with eradication is that it is an all-or-nothing affair, and the problem with all-or-nothing affairs is that they lead to impoverished thought.

Here is what I mean. When the French structuralist Claude Levi-Strauss famously wrote that animals are “good to think,” he meant that we need animals, in all their categorical diversity—the domesticated, the companionate, the hunted, the sacrificial—in order to make sense of the world (Levi-Strauss 1963, 89). What follows is *not*, Reader be assured, a structuralist argument against eradication, but it does seem worth noting that the value of human action is more accurately measured by asking what humans do *with* the world than what they do *to* the world (see e.g. Haraway 2008; Beisel 2010).

One less species walking, swimming or buzzing around the Earth is one less species to “think.” With just one less species to think—no matter how unsavoury or dangerous or repulsive that creature may be—humans will be left with fewer political, social and ethical possibilities. Reflecting on my own ethnographic work around mosquitoes, I want to make the case that thought—compound, distributed, interspecies, ecological thought—has public health value. Such thought is anathema to all-or-nothing certainty (Morton 2010). Looking across a variety of mosquito-borne disease control projects, I submit that killing mosquitoes is good for public health not because of the certainty of thought it evinces in humans but because of the ambivalence it produces.

Before moving any further with that provocation, let me clarify that *species eradication* is categorically different from *disease eradication*. There is a fundamental distinction between the social and cultural categories of illness (the experience of ill health) and disease (the pathology that occasions that experience). For example, just a few years ago, the world became briefly consumed with the spread of the mosquito-borne Zika virus, but as long-term anthropological work with Zika-affected families has shown, the illness was anything but indiscriminate. Poor

Black women and children in Brazil fared far worse than others, both during the epidemic and in the years that followed (Diniz 2017). Zika infection causes a range of long-term complications in children born to infected mothers, and while the cost of confronting the epidemic in its acute phase was high, research with affected families in Brazil's northeast reveals how parents of children born with congenital Zika syndrome (CZS) continue to struggle to marshal resources to care for their loved ones (Williamson 2020). A similarly uneven pattern of both morbidity and social suffering emerged for COVID-19, a disease whose eradication seems too far off to contemplate just now. In the United States, data on the race or ethnicity of people with cases of coronavirus show that the rate of death among Black Americans is three times the rate among whites.¹

Although viruses, arguably, are not species, animal vectors are. Mosquitoes, the most prominent among such vectors, are not charismatic. They occupy an unusually negative niche in the human imagination, just about everywhere. That said, mosquitoes are fascinating creatures, and the ones that transmit diseases among humans are uniquely adapted to the environments humans occupy or build, from rivers to sewers, savannahs to garbage dumps.

What kind of a thought, then, is the thought of eradication? How might it differ, for example, from the thought of extinction? In the popular imagination, the current era of extinction, known as the Sixth Extinction, is frequently understood as a tragic side effect of human–nonhuman encounters: the collateral damage of mass human migration, fossil-fuel burning and logging (Kolbert 2014). Extinction is presented as the practical consequence of human action, less as a thought than as an afterthought. As Thom Van Dooren explains, the purpose of hunting passenger pigeons was not to eradicate them from the Earth, but by 1914, the last passenger pigeon had died (Van Dooren 2014). There are interesting evolutionary biological arguments about the precise mechanism that led to that particular extinction, but it did become a touchstone in nascent conservation and environmental movements. The ethical question that energized those early movements, and which continues to drive many varieties of environmentalism today, concerns what to do about the human capacity to destroy ecosystems, species by species, and how that capacity might be curtailed in the name of sustainability and even health.

If extinction is a side effect and eradication is a purposive endeavour, then it is only the intentionality of the act of killing that seems to distinguish eradication from extinction. Alternatively, we might say that the difference has less to do with what the killer intends than with how the killer reacts. Many humans have reacted to extinction with a combination of horror and sadness—or at least a degree of wistfulness. The human agents of eradication, on the other hand, tend to look on their works with a troubling sense of triumphalism (Stepan 2011).

But neither the mourning that follows extinction nor the anticipatory triumph of eradication are innocent. As Juno Salazar Parreñas (2018, 12) describes, anti-extinction activists view their efforts to save threatened species

in decidedly “moral,” if mostly secular, terms. A veritable cottage industry of conservation tourism has grown up around efforts to protect endangered orangutans, whales and turtles. Tourists are drawn to exotic locales to participate in conservation because they feel compelled to take responsibility for the harm done to these creatures by extractive industries such as logging or drilling. To an extent, they recognize that the agent of extinction is not humanity writ large, but a particular historical slice of it.

Meanwhile, attempts to eradicate so-called invasive plants and animals (including some mosquito vectors) may hinge on a kind of eco-moralism. In the interest of keeping ecosystems “pristine,” or of maintaining landscapes in a form that reflects a valued historical heritage, environmentalists in the United States, for example, have convinced state and federal governments to essentially criminalize the propagation of nutria, Asian carp, kudzu and fire ants. That US environmentalist anxieties about invasive species have arisen alongside right-wing anxieties about the racial and ethnic purity of European and American states is, as Hugh Raffles (2011) argues, more than a historical accident. The landscapes supposedly threatened by invasives are not, of course, “pristine.” They are products of white-settler colonialism and the attempted eradication of indigenous people. As Frances Roberts-Gregory (2020) has written, drawing on her environmental research and activism in Southeast Louisiana, spaces of conservation in the United States remain explicitly and implicitly coded as white spaces.

Attempts to both stave off the tragedy of extinction and achieve the triumph of eradication are products of a white, Western and enduringly colonial attitude to the non-human world, in which experts of a certain colour and gender style themselves as the stewards of nature.² Such attitudes, to paraphrase Parreñas again, too often cast blame for biological crisis on the very people who interact most intimately with—who often have cultivated a capacity to *think* with—invasive or threatened species (Parreñas 2018, 13). Thinking *with* leads to a renewed appreciation not only of the uniqueness of particular creatures but also of the richness of the ecologies humans and other species create together (see Beisel and Wergin this volume).³

***Aedes Aegypti*, for example**

The species of mosquito that has buzzed around much of my anthropological research, *Aedes aegypti*, is a creature whose existence and form as seen from the vantage of evolution looks rather indistinguishable from its existence and form as seen from the vantage of human history. *Ae. Aegypti* is best known as the vector for urban yellow fever, dengue and Zika viruses, but its status as an arbovirus vector *par excellence* is intimately tied to its envelopment in historical events caused and shaped by humans. Human settlement, traffic in enslaved people, wars and colonial trade and agriculture acted as evolutionary drivers in this mosquito’s story.

The dengue virus probably originated in Southeast Asia as a “sylvatic” pathogen circulated among primates by *Ae. albopictus* mosquitoes. As human settlements encroached on the forest, peri-sylvatic transmission, in which humans could acquire the virus from apes but weren’t particularly good at passing it to one another, became more common. Cases of dengue in humans were probably isolated, rarely resulting in widespread transmission (Gubler and Kuno 1997). Meanwhile, in eastern Africa another peri-sylvatic mosquito, *Ae. aegypti*, slowly began to change its habits, settling in villages and towns and feeding exclusively on humans. Trade in and out of Southeast Asia brought more people to ports, and as the region urbanized, *Ae. aegypti* thrived. As it turned out, the African *Ae. aegypti* was a highly competent carrier of Southeast Asian dengue—even more competent than its cousin *Ae. albopictus*. As people moved from place to place, *Ae. aegypti* moved, too. Already accustomed to laying eggs in gourds and ceramic bowls, it travelled along caravans and trade routes, stowing away on slave ships, drifting to the Indies, back to Africa, and eventually over to the Americas (Endy et al. 2010). By the mid-eighteenth century, at the height of the slave trade, dengue epidemics were occurring regularly in port cities around the world (Slosek 1986).

Through the nineteenth and early twentieth centuries, dengue remained a relatively minor epidemiological problem. World War Two was a watershed moment. The Pacific theatre was the site of road building, airstrip construction and shipping. The bombing and clear-cutting of Southeast Asian landscapes permitted mosquitoes and viral strains to spread as never before. Then, in the years after the war, there was a massive campaign against malaria, yellow fever and dengue mosquitoes, with the insecticide DDT as its centrepiece. That campaign showed some success for a certain period of time. By 1970, the wonder chemical had helped eradicate *Ae. aegypti* from most of the Western Hemisphere. It took just 20 years, however, for the mosquito to return. This return coincided with the era’s structural adjustment policies. Implemented at the urging of the World Bank and the International Monetary Fund, structural adjustment policies gutted spending for health and public works. When these austerity measures intersected with intensified global transportation and trade in the late 1980s, dengue emerged as a serious health problem (Castro et al. 2010). Today, the *Ae. Aegypti* mosquito continues to develop resistance to locally applied pesticide regimes (Nading 2017).

Talk of mosquito eradication frequently appeals to the expertise of (mostly Northern, mostly white) entomologists and epidemiologists (Stepan 2011). Many of these scientific experts have cultivated their own capacity to think with mosquitoes, and they frequently share an appreciation of their diversity and even their beauty (see Hawkes, this volume). I still recall listening to one expert, an entomologist, reproduce the perfect pitch of beating mosquito wings with her own voice. Morrison and Lemke in this volume make the convincing case that non-expert publics can learn to think with the mosquitoes that surround them through participation in creative art installations.

Thinking with mosquitoes in Nicaragua

There is another group of people who have cultivated a deep sense of what it means to think with mosquitoes. I am referring to mosquito control workers in Nicaragua who, until recently, relied on organophosphate larvicides to kill *Ae. Aegypti*, but who are now switching to the biological toxin *Bacillus thuringiensis israelensis*, or *Bti*. These mosquito control workers view themselves as eliminators, not eradicators. They are in the business of killing mosquitoes, but not of ridding the Earth, or even their neighbourhoods, of them. This is a difference that makes a difference.

It turns out that it matters how you kill mosquitoes, not just in terms of the chemical you apply but also in the thought you bring to the act. It is of course possible to eliminate lots of mosquito larvae with either organophosphates or *Bti*. Doing so would not take much more thought than crushing a single adult mosquito with the palm of your hand. Mosquito control workers, however, encounter mosquitoes over and over again, in a variety of microhabitats, from upturned cookie jars to chicken troughs to bottle caps. For many of them, this repetition does not make killing rote or mindless. On the contrary, under these circumstances, the labour of killing induces a thoughtful appreciation of the complexity of the worlds shared and shaped by people, insects and microbes.

Mosquito control in Nicaragua is mostly done by low-paid community health workers (CHWs). During my fieldwork outside Managua, most of these CHWs were women who had little formal background in either science or public health (Nading 2014). Like the indigenous inhabitants of Malaysia's Sarawak described by Parreñas (2018), these women are precisely the kinds of people whose perspectives on human–insect relations are too often overlooked in policy. And like the mosquitoes themselves, it is mostly women—who are figured as responsible for managing the domestic spaces where most urban arbovirus vectors breed—who bear an inordinate share of the blame for the persistence of epidemics. If mosquitoes are not killed in high-enough numbers, and if rates of mosquito-borne disease are *too* high, this will be portrayed as a failure of women's domestic labour. Much as the conservationist ideas of nature I discussed above are frequently coded as white, the notion of hygiene in Nicaragua is frequently gendered female.

In brief, the job of the CHW in mosquito control is to think *with* mosquitoes, particularly female mosquitoes, about where to lay eggs. It is in the small, usually domestic bodies of water that harbour *Ae. aegypti* eggs where human and mosquito habitats meet. These might be in palm fronds, bromeliads, washbasins or old automobile tyres. The shared domestic or “interior” lives of humans and mosquitoes are difficult to replicate artificially (Kelly and Lezaun 2017). And it is not enough to “think like a mosquito,” for a mosquito never thinks on its own. Mosquitoes move about the world by transducing physical vibrations into nervous-system signals. Their thoughts, then, are inseparable from their surroundings. They are inseparable from the thought that householders bring to

FIGURE 12.1 A Nicaraguan community health worker discussing the *Aedes aegypti* life cycle with a householder. Photograph by Alex Nading.

the arrangement of decorative flowers or the care of domestic animals. To think with mosquitoes is to think with one's kin and neighbours, human and otherwise (Figure 12.1).

One of the things CHWs report over and over again is that they find themselves unable to stop looking for mosquitoes and their breeding grounds, whether at their home, at the homes of others, or elsewhere. They have developed a version of what philosopher Timothy Morton (2010) calls “the ecological thought,” the recognition of a deep interconnectedness between beings and things. For Morton, once ecological thought has been planted, it is inescapable. Such thought is neither naive nor unconscious. It entails a recognition of the vast scale of entangled life. Nor is ecological thought a fancy term for New Age fantasy. In the ecological thought, intimacy is as important as vastness and, as Kath Weston (2017) reminds us, intimacy is not always pleasant. Even when we acknowledge that the kind of intimacy between humans and mosquitoes is “full of ambiguity and darkness,” it does not follow that the next step is to sever that relationship (Morton 2010, 100).

In the 1960s, the US Department of Agriculture took just this sort of step, justifying its attempts to eradicate fire ants with DDT based on a Cold War-inflected nationalism (Buhs 2004: 385). The view that the “invasive” ant was a threat to the idealized American landscape was opposed by, among others, Rachel Carson, who believed that ecological relations could not be neatly mapped onto the borders of human communities. *Ae. aegypti*, too, has been denigrated as an invasive creature by its self-styled enemies (Nading 2015). As an act that severs some relationships, eradication is simultaneously an act that preserves others. Latent in the discourse of eradication is the notion of a common good.

Who better to carry out the project of eradication, then, than the *community* health worker?

Though he advocates an environmental philosophy rooted in the inescapable relationality of life, Morton rejects the “ecology of community” as a Romantic fallacy (2010, 101; 127). Whereas Carson opposed place-based or nation-based action as inadequately attentive to the scalar dynamics of changing ecosystems, Morton is more concerned with the ways that place-based or nation-based action elides the ambiguity that undergirds all ecological relations. For Morton, community is too clean a term to encompass forms of intimacy like viral transmission or chemical exposure.

Nicaraguan CHWs speak frequently of “community” (*comunidad*). If they are Romantics, they are not rosy-eyed Romantics. *Comunidad* is not so much centred on the geographical place from which they operate (as in the local clinic, or a pandemic’s “front-lines” of action) as it is the animating purpose of their mosquito control work. *Comunidad* is a form of becoming, a way of making sense of one’s social, professional and environmental surroundings, not a geographical demarcation. Indeed, when presenting themselves to householders around Managua, community health workers would often say, “This *is* community.”

In Nicaragua, the figure of the CHW has its origins in the country’s 1979 popular Revolution, which was preceded by the 1978 Alma Ata Declaration on primary health care. The Alma Ata Declaration advocated for a horizontal approach to healthcare provision, and it saw low-level figures like CHWs as the actors best positioned to ensure a form of care that was holistic and integrated, rather than targeted and disease-focused. After Alma Ata, the presence of active CHWs in developing countries became a proxy for the political empowerment of underserved populations. After the Revolution, Nicaragua was among the most successful at putting these recommendations into practice. In the early Revolutionary period, roughly from 1979 to 1984, Nicaragua’s CHWs styled themselves as *multiplicadores* (multipliers) of public health. They were influenced by a Freirean critical pedagogy, which favoured a dialogical and collaborative approach to learning about and confronting social problems (Freire 1970). Instead of styling themselves as “experts,” CHWs banded together to learn *with* their neighbours about health problems and their relationship to underdevelopment. After decades of dictatorship in which most health services had been systematically denied to the majority of Nicaraguans, their hope was that demands for better care would emanate from the grassroots to the centres of political power. Evidence suggests that their advocacy led to improvements in roads, sewers, gutters and potable water systems (Nading 2014).

Among the CHWs with whom I worked between 2006 and 2011, there was a shared sense that hunting for and eliminating (rather than eradicating) mosquitoes in their domestic breeding grounds could double as a fruitful way of doing *comunidad*, of forging solidarity among human neighbours. Peri-urban Managua remains a context of entrenched poverty and low-grade violence. Under these conditions, CHWs, who hail from the same communities in which

they hunt for mosquitoes, understand that doing *comunidad* has a public health value on its own. Though their work is closely audited by the Ministry of Health, CHWs are not overly concerned with bureaucratic accounting of how many insects they have killed. To put it pithily, it's the thought that counts. People are more likely to report threats to health and actively monitor the quality of their shared environments if they have regular, meaningful contact with representatives of the public health service. The act of thinking within an ecology—of witnessing and intervening in the intimate relations between humans and mosquitoes (and chickens and dogs and palms and plastic bottles)—yielded public health benefits that did not appear in dengue control records. CHWs regularly confronted householders who would blame neighbours for the presence of dengue and mosquitoes, but they also frequently would expect to relay questions and complaints back to the Ministry of Health, even about health problems beyond dengue. According to the CHWs, effecting a “quality” mosquito control visit meant taking extra time to listen to neighbours’ problems and to help solve them. This was the most fulfilling part of their job. *Comunidad* connoted an ecological thought.

Though at first glance it would appear that the presence of mosquitoes was a mere pretence for discussing other health-related matters, Nicaraguan CHWs were not just instrumentalizing the mosquito’s presence for a larger purpose. Getting people’s attention required attending to—and getting the attention of—mosquitoes (Kelly and Lezaun 2017). The indeterminacy of the encounter (a dengue intervention? a social call? the consciousness-raising work of a Freirean pedagogue?) was the source of its value (Redfield 2016). Finding and destroying the mosquito’s breeding ground was also a pathway to fostering solidarity. Mosquitoes were never fully eradicated, just as *comunidad* was never fully realized. This meant that for CHWs, the repetitive, never-quite-complete job of killing mosquitoes was not a chronic failure but a continuous form of sociality. Openness came not from the anticipated triumph of eradication but from the ambiguity and darkness of human–mosquito intimacy. As Morton (2010, 100) summarizes, “If we edit out the ambiguity and darkness, we achieve nothing but aggression.” The mosquito could not be abstracted from *comunidad*. The grave threat of mosquitoes had to be confronted as a part of a larger suite of problems (Figure 12.2).

Beyond mosquito killing

The ecological thought that the CHWs call *comunidad* is not limited to mosquito-related endeavours. It resonates through other human–insect encounters. Consider, for example, human encounters with bedbugs, the pests that infest cities around the world, including in the USA, where I live and work. E. Summerson Carr (2015) studied how social workers dealt with bedbugs in a residential facility for homeless people suffering from mental illness and addiction. Carr emphasizes that these social workers do not see their job as one of

FIGURE 12.2 A community health worker “hunting” for mosquitoes in a domestic house lot. Photograph by Alex Nading.

eradication. Rather, they are constantly (if sometimes frustratingly) doing battle with bedbugs with no simple expectation of triumph. Despite repeated fumigation, the circulation of people and objects through the centre makes total elimination unlikely. For the social workers, “the bedbug infestation provides ... fertile grounds to formulate ideas about the nature, limits, and possibilities of human agency and responsibility, in ways that ultimately bolster”—rather than compromise—their “professional practice.” For the social workers, doing a good job means not being “a more *intentional* actor” but rather “a more *attentive* one” (Carr 2015, 264–265). As Ann Kelly and Javier Lezaun explain with regard to mosquitoes, attention “describes ... a double movement: granting attention to and capturing the attention of” (2017, 388).

It may therefore be the partiality and ambiguity of mosquito killing, not its totality, that can translate into a sustained commitment to public health. Here, I use the term “public health” in its broadest sense, not only as a project of managing specific diseases such as malaria and dengue fever, but also as project of improving infrastructure, reducing crime and providing access to food and water, among other things. All current approaches to *Ae. aegypti* control, from systematic house-to-house larviciding, to genetic modification, to *Wolbachia* application, are incomplete successes. Evidence shows that the common thread across these approaches is not a sense of triumph but one of ambivalence (Reis-Castro 2012; Kelly and Lezaun 2014; Sims forthcoming).

Here Morton’s planetary environmental philosophy can be linked to propositions like those of Peter Redfield (2016) and Maria Puig de la Bellacasa (2017), who suggest that the best we may hope for when it comes to implementing

technologies is that they reignite our sense of care and attention each time we deploy them. In their clunkiness and imperfection, mosquito-killing technologies, particularly the organophosphate larvicides that my CHW friends deployed against Nicaraguan *Ae. aegypti*, do just this: they encourage care and attention towards fellow human beings as well as fellow creatures. As with dangerous mosquitoes, our relationship to the technologies that kill them is ambiguous (Morton 2010). There are many reasons to dislike these insecticides (they are poisons, after all) but they remain meaningless until they are deployed. They, too, are tools for enriching ecological thought. Even when a householder in Nicaragua refuses to let a CHW treat her water receptacles with larvicide, the chemical opens up space for what Redfield (2016) calls a “practice of community.” As Redfield notes, “The one advantage of uncertainty, doubt and ambivalence is an imperative to pause and consider them” (Redfield 2016, 177). A mosquito-killing technology that kills too efficiently—even if it may produce a welcome outcome such as the reduction or eradication of disease—is not a thinkable public health approach because it eliminates ambivalence.

Ambivalence can be built into mosquito control work. Rosie Sims (forthcoming) has carried out recent ethnographic studies within the World Mosquito Program (WMP), the Australia-based project that seeks to curb *Ae. aegypti*’s ability to spread dengue by infecting mosquito populations with *Wolbachia* bacteria (Sims forthcoming). Even wildly successful *Wolbachia* infection programmes will not mean the end of dengue or Zika once and for all. In fact, the *Wolbachia* project has a limited (50-year or so) horizon of efficacy. Tellingly, the WMP does not style *Wolbachia* as a “magic bullet.” Its approach is quite different from that of projects with the goal of curbing mosquito populations through, for example, genetic modification (Nading 2015). WMP organizers seem quite aware that their work will produce as much ambivalence towards mosquitoes as it eliminates. As Sims argues, the project reverses the elimination model by asking the public to consider what it might mean to live and think differently with mosquitoes. It provides no clear answer to the question of what living and thinking with mosquitoes might look like.

Eradication fails as a public health measure precisely because it forecloses the possibility of ambivalence. Ultimately, the goal of mosquito eradication does not make good policy, not because it is categorically unethical or ecologically catastrophic, but because it artificially insulates public health from the messy realities of a life lived, and a thought thought.

Notes

- 1 For updated data see: <https://www.apmresearchlab.org/covid/deaths-by-race>
- 2 This is far from an original point. For more on this idea, see Carter 2018; Finney 2014.
- 3 A similar variety of white Euro-American moralism is evident in the Global Polio Eradication Initiative, a public-private partnership that joins the WHO with non-governmental partners like the Rotary Club to promote vaccination in those parts

of the world where polio remains a problem. Critical studies of this initiative have noted that while the push to eradicate polio garnered huge support from Northern donors, enthusiasm for vaccination is less appealing in places like Karachi, Pakistan, where polio remains. One reason for this is the perceived link between eradication and neo-colonial power (Closser 2012).

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