



Living With Parasites in Palo Verde National Park

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ABSTRACT Bruno Latour has tried to bring a parliamentary democracy to the domain of nature. Wading through the swamps of Palo Verde, a national park in the Guanacaste Province of Costa Rica, and wandering onto neighbouring agricultural lands, I failed to find a central place where people were speaking for nature. Departing from a failed attempt to speak for another species (the fringe-toed foam frog), this paper considers how diverging values and obligations shape relationships in multi-species worlds. As spokespersons articulated competing visions of nature on the borderlands of Palo Verde, multiple social and ecological worlds went to war. The haunting specter of capital joined the fray—animating the movements of cattle, grasses with animal rhizomes, rice seeds, and flighty ducks across national borders and through fragmented landscapes. Amidst this warfare, the fringe-toed foam frog was just one tenacious parasite, a noisy agent eating at the table of another, which began to flourish in worlds designed with the well-being of others in mind. Cattails, charismatic birds, and a multitude of insects began interrupting human dreams and schemes. Final solutions to the problem of living with parasites failed in Palo Verde. Humans and parasites, who became para-selves of one another, maintained an abiding presence in the landscape.

'Notebook. Check. Digital recorder, headlamp. Check, check. Shotgun microphone. Check. Thermometer. Check. Boom box. Check.' A team of North American biology graduate students mount an evening expedition into a wetlands in Costa Rica. They are armed with an array of prosthetic sensory devices. The objective of this foray into the swamp is to decipher the calls of fringe-toed foam frogs (*Leptodactylus melanonotus*). The males of this species have distinctive 'fringes' on their thumbs. Females deposit their eggs in foam nests that they make at the edge of the water. During breeding season males gather together to sing a distinctive 'pip-pip-pip-pip' chorus. The research team wants to know if the foam frogs are telling the truth with their calls, or if they are 'bluffing.'

When we follow John Austin in "doing things with words" human speech often functions to convince, persuade, deter, or surprise an audience. Members of the human species are often insincere—someone might say "I declare war", when they do not intend to fight.¹ Communication systems of multiple other animal species can also contain honest, neutral, or dishonest information. Some male frogs have an ability to 'bluff'—they trick other frogs into thinking that they are bigger, better fighters. Effective bluffers, who lower their voices, reportedly lay claim to choice territory.²

¹ John Austin, *How to Do Things With Words* (Oxford: Oxford University Press, 1965), 40.

² Richard Dawkins and John R. Krebs, "Animal Signals," in *Behavioural Ecology: An Evolutionary Approach*, ed. John Krebs and Nicholas Davies (Oxford: Blackwell Scientific Publications, 1978); N. B. Davies and T. R. Halliday, "Deep Croaks and Fighting Assessment in Toads (*Bufo bufo*)," *Nature* 274 (1978): 683-685.



Figure 1 A fringe-toed foam frog (*Leptodactylus melanonotus*), with a close-up picture of the 'fringes' on its front foot (Photograph: © Kristiina Hurme)

After recording the frog calls with their shotgun microphone, and manufacturing a CD with digitally-altered, low-pitched calls, the graduate students think through semiotic theories as they trudge around the swamp with their boom box. Will foam frogs bluff by lowering their voice in response to simulated frog intruders? Mud sucks at their rubber boots and sneakers. They wade in water that reaches up over their knees. Water scorpions sting them. Leeches struggle to find a gap in their clothes. A distant pair of large glowing orbs, 'eye shine,' reflects the light from the students' headlamps and follows their movement around in the water. "This is frog one-oh-one," he says into the mic. "Frog one-oh-one. Recording frog one-oh-one. Day two of our test trials." She notes the temperature of the water and then plays a blast of digitally altered frog calls on the boom box. He stands still in the warm, dark, water with the shotgun mic pointed at frog 101.



Figure 2 Test trials with foam frogs in the wetlands of Palo Verde National Park (Photograph: Eben Kirksey)

Later, back at the lab, they download the recorded frog calls onto a laptop. While the other denizens of the research station dance *merengue* in the dining hall, they analyse spectrographs and run statistical tests—looking for the predicted effect. Did the frogs lower their voices in response to the digital calls? A surprise emerges from the spreadsheets: the frogs were raising, rather than lowering, the pitch of their calls in response to simulated deep-voiced intruders. Were years of research on male-male interactions in frogs wrong? Were the frogs avoiding conflict? A finding like this is the stuff that graduate careers are made of—it might result in a paper in a leading journal. But, these results turn out to be an artifact of sampling. Statistical analysis reveals no significant difference. The frog calls remain unintelligible. They join the dancing.

This failed attempt at decoding the language of another species might be taken as an allegory for issues that arise when humans attempt to speak for nature more generally. Bruno Latour recognises a kinship among ‘spokespersons’—politicians who speak for other people and scientists who speak for nature. A surprising finding might have earned the foam frog a host of new scientific spokespeople. Animals that lie, or communicate about capitulation, are readily brought into conversations about human nature. But, instead of legions of biological scientists, all the fringe-toed foam frog got was me.

Calling on scholars of science and society to bring democracy into new domains, Bruno Latour asks us to explore “millions of subtle mechanisms capable of adding new voices to the chorus.” He has suggested we build “speech prostheses” to “allow nonhumans to participate in the discussions of humans.” Non-humans must be helped to overcome “speech impedimenta,” in Latour’s mind, so that they can be seated in a new parliamentary system alongside representatives of human citizens.³

Following Latour, I initially tried my hand at speaking with and for fringe-toed foam frogs. But I quickly realised that few people were interested in listening. While searching for democracy in Palo Verde National Park, a wetlands in the hinterlands of Costa Rica where I first encountered these boisterous amphibians, I found powerful spokespeople for other species. Looking in vain for an agora, an open place of assembly where all interested parties were patiently waiting their turn to speak, I waded through the swamps of Palo Verde and wandered into neighbouring agricultural lands.⁴ This national park is situated on *la frontera*, the borderlands, where expatriate scientists, Costa Rican farmers, and multiple species meet.⁵ Architectures of apartheid—gates, fences, and infrastructures of informatics—separate these neighbouring communities.⁶ Tracing the flight of multiple species from this frontier zone, across national borders and through fragmented landscapes, I began to search for a central place of political assembly abroad. But, instead of finding an agora I discovered that oblique

³ Bruno Latour, *Politics of Nature* (Cambridge: Harvard University Press, 2004), 67; 69; 231-232; 249.

⁴ For a critique of Latour’s Parliament, see: Peter Sloterdijk, “Atmospheric Politics,” in *Making Things Public: Atmospheres of Democracy*, ed. Bruno Latour and Peter Weibel (Cambridge: MIT Press, 2005), 949.

⁵ Gloria Anzaldúa, *Borderlands: The New Mestiza = La Frontera* (San Francisco: Spinsters/Aunt Lute, 1987).

⁶ For an account of architectures of apartheid, see: Geoffrey Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge: The MIT Press, 1999).

powers, and surprising forms of capital, were actively reworking the soil of this seemingly out-of-the-way place.⁷

Capital is a haunting specter.⁸ This spirit has possessed the minds of people who call themselves capitalists, people who make the expansion of capital through exchange their principal subjective aim.⁹ This promiscuous ghost has also possessed the bodies of multiple species—animating their movements across the landscape, rendering actual organisms as commodities, only to ficklely dance away.¹⁰ Capital has battled with itself in the hinterlands of Costa Rica, taking on a particularly schizophrenic form.¹¹ In a word capital has become a species of *parasite*, feeding beside itself and others with dissolution and glee.¹²

Parasites eat at the table of another, living at another's expense.¹³ In French *parasite* is polysemic—meaning biological or social freeloader in addition to “noise” or “static.”¹⁴ Michel Serres celebrates the productive and creative nature of noise in his playful monograph, *The Parasite*. “The parasite doesn't stop,” writes Serres. “It doesn't stop eating or drinking or yelling or burping or making thousands of noises or filling space with its swarming and din ... it runs and grows. It invades and occupies.”¹⁵ Landowners, capitalists who demand rent, are “macroparasites” according to Peter Brown. He has described the plight of many Latin American farmers in the 1980s, who did not own land, and were “stuck in the middle, between demands from parasites like intestinal flatworms for a portion of their dinner and demands from macroparasites, the landowners.”¹⁶

⁷ For the original source on “oblique powers”, see: Néstor García Canclini, *Hybrid Cultures: Strategies for Entering and Leaving Modernity* (Minneapolis: University of Minnesota Press, 2005).

⁸ Jacques Derrida, *Specters of Marx: The State of the Debt, the Work of Mourning, and the New International* (New York: Routledge, 1994), xx; Pheng Cheah, “Spectral Nationality: The Living on (*Sur-Vie*) of the Postcolonial Nation in Neocolonial Globalization,” *boundary 2* 26, no. 3 (1999): 227.

⁹ Karl Marx, *Capital: A Critique of Political Economy. Volume I, the Process of Capitalist Production* (New York: Modern Library, 1906), 170.

¹⁰ Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 30; Rafi Youatt, “Counting Species: Biopower and the Global Biodiversity Census,” *Environmental Values* 17 (2008); Nicole Shukin, *Animal Capital: Rendering Life in Biopolitical Times* (Minneapolis: University of Minnesota Press, 2009), 24.

¹¹ “Species of Biocapital”, an authoritative review by Stephan Helmreich, explores literature suggesting “that in the age of biotechnology, when the substances and promises of biological materials, particularly stem cells and genomes, are increasingly inserted into projects of product-making and profit-seeking, we are witnessing the rise of a novel kind of capital.” This work by Helmreich *et al.*, influences my understanding of the multiple companion species of capital, whose bodies have been possessed and abandoned by this fickle spirit. If Marx saw commodities as having *exchange value* and *use value*, Donna Haraway adds *encounter value* to the story of lively capital and its companions. “Trans-species encounter value is about relationships among a motley array of lively beings,” writes Haraway, “in which commerce and consciousness, evolution and bioengineering, and ethics and utilities are all in play.” See: Stefan Helmreich, “Species of Biocapital,” *Science as Culture* 17, no. 4 (2008): 463; Donna Haraway, *When Species Meet*. (Minneapolis: University of Minnesota Press, 2008). 46.

¹² Here I am playing with language purloined from: Brian Rotman, *Becoming Beside Ourselves: The Alphabet, Ghosts, and Distributed Human Being* (Durham: Duke University Press, 2008), 104.

¹³ George Marcus, *Para-Sites: A Casebook against Cynical Reason* (Chicago: University of Chicago Press, 2000), 6.

¹⁴ Cary Wolfe, “Introduction,” in *The Parasite*, by Michael Serres (Minneapolis: University of Minnesota Press, 2007), xiii.

¹⁵ Michel Serres, *The Parasite* (Minneapolis: University of Minnesota Press, 2007), 253.

¹⁶ Peter J. Brown, “Mircoparasites and Macroparasites,” *Current Anthropology* 2, no. 1 (1987): 161; 168.

Since the time of Peter Brown's work, patterns of land ownership have shifted in some parts of Latin America. Farmers living on the margins of Palo Verde National Park claimed title to their own fertile plots of land in the 1980s, but tenacious micro and macroparasites have not gone away. Perhaps a final solution to the problem of living with parasites, a state of perpetual peace, is not possible.¹⁷ In the borderlands of Palo Verde I encountered multiple species of parasites that were yelling and burping, making thousands of noises, interrupting human dreams and schemes. Refusing to speak in readily intelligible idioms, refusing to participate in human political institutions, these creatures jumped around, exploiting emerging opportunities in novel circumstances. Some parasites became targets for destruction. Others, like the fringe-toed foam frog, simply enjoyed the ancillary benefits of living in worlds designed with the well-being of others in mind.¹⁸

Ecological Spectacles

Palo Verde National Park is regarded as a living biological laboratory.¹⁹ During my first visit to the park's biological field station in January 2006, after a series of plane-flights that left winter weather behind in the United States, my fellow travelers all piled off our tour bus and began taking snapshots of this picturesque landscape just as the sun was setting. Costa Rican forests are *spectacular*, in a technical sense, according to Luis Vivanco. These landscapes are not simply "collections of images reflective of an eternal and independent natural reality," but have become entangled ecosystems embedded in "social relationships between consumers and producers in a tourism economy."²⁰ As an ethnographer of science, a participant observer on the 'fundamentals' graduate course offered to aspiring ecologists by the Organization of Tropical Studies (OTS), I was certainly already aware of the inequitable social entanglements and surprising multi-species relations that so often underpin ecological spectacles.²¹ Nonetheless, I was compelled to take snapshots of my own (Figure 3).

"When we go to the tropics," writes Nancy Stepan, "perhaps as eco-tourists to see the jungle, we imagine ourselves stepping back in time, into a purer or less spoilt place than our own."²² With Stepan's words in mind, I was surprised to learn of an environmental management regime in Palo Verde that was not based on recreating an imagined original purity, but instead bent on preserving a specific historical moment. "Our main objective has been to restore Palo Verde to the conditions of 1978," said Dr. Eugenio Gonzalez, who was

¹⁷ Isabelle Stengers, *Cosmopolitics II* (Minneapolis: University of Minnesota Press, 2011), 387.

¹⁸ Martin Heidegger, the philosopher of the twentieth century who more than any other strove to separate man from the living being, articulated a famous triple thesis about human exceptionalism: "the stone is worldless; the animal is poor in world; man is world-forming." Elsewhere I have tussled with Heidegger, to write about animals as constantly moving among worlds, always exploring lines of flight that might lead somewhere else, and forming emergent worlds. (See: Martin Heidegger, *The Fundamental Concepts of Metaphysics* (Bloomington: Indiana University Press, 2010), 201; Eben Kirksey, "Interspecies Love: Being and Becoming with a Common Ant, *Ectatomma Ruidum* (Roger)," in *Humans and Other Animals: Rethinking the Species Interface*, ed. Anette Lanjouw and Raymond Corbey. (Cambridge: Cambridge University Press, in press).

¹⁹ Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950* (Chicago: Chicago University Press, 2011).

²⁰ Luis A. Vivanco, "Spectacular Quetzals, Ecotourism, and Environmental Futures in Monte Verde, Costa Rica," *Ethnology* 40, no. 2 (2001): 90.

²¹ In addition to Vivanco, I was reading: Paige West, *Conservation Is Our Government Now: The Politics of Ecology in Papua New Guinea* (Durham: Duke University Press, 2006).

²² Nancy Leys Stepan, *Picturing Tropical Nature* (Ithaca, New York: Cornell University Press, 2001), 11.

then Director of the OTS Palo Verde Biological Research Station, and one of the most powerful spokespersons representing the nature of this picturesque landscape. There were no comprehensive studies of the ecological dynamics in the wetland in 1978 but certainly everyone remembers abundant bird life. "In the dry season there was a tremendous amount of birds, especially ducks," said David Stewart, a cattle rancher whose grandfather immigrated to Costa Rica from the United States. "The sky would just be black with them, it was incredible."²³



Figure 3 Palo Verde National Park pictured at sunset
(Photograph: Eben Kirksey)

Before Palo Verde was turned into a national park, hundreds of thousands of wintering migratory birds routinely visited the wetlands. Spectacular flocks of up to a hundred thousand Blue-Winged Teals, a hundred thousand Pintail, twenty thousand Black-Bellied Whistling Ducks, as well as an abundance of Muscovy Ducks, White Faced Whistling Ducks, Northern Shovellers, and Roseate Spoonbills regularly alighted in the marsh.²⁴ "The grass-sedge marsh was open with a scattering of Palo Verde trees," writes Douglas Gill, a Professor of Zoology at the University of Maryland. "Magenta carpets of blooming Water Hyacinths, covered the marsh as far as the eye could see. Black-Shouldered Kites hovered over spots as if suspended

²³ Quoted in Amy Angert, et al., "Cattle, Cattails, and Saltwater: A Tale of Many Stories or Pers. Comm. Vs. Pers. Obs," in *Organization for Tropical Studies, 71-94 Coursebook* (San Jose, Costa Rica, 2003).

²⁴ Julio Sanchez, Juan Rodriguez, and Carlos Salas, *Distribución, Ciclos Reproductivos Y Aspectos Ecológicos De Aves Acuáticas* (San Jose, Costa Rica: EUNED, 1985); William S. Burnidge, "Cattle and the Management of Freshwater Neotropical Wetlands in Palo Verde National Park, Guanacaste, Costa Rica" (Master of Science of Natural Resources, The University of Michigan, 2000).

by a wire ... Clouds of Black-Bellied Whistling Ducks and Blue-Winged Teals would rise with each pass of a Wintering Peregrine Falcon."²⁵

These spectacular flocks of birds had long frequented Palo Verde alongside a massive ranching scheme. For most of the twentieth century this wetland and the surrounding forests had been heavily grazed during the dry season by huge herds of cattle—ranging from ten to fifteen thousand head—as well as hundreds of pigs and horses.²⁶ When Costa Rican Government officials began evicting livestock from Palo Verde in 1980, with the intention of protecting waterfowl, they were disrupting deeply rooted agricultural, ecological, and financial systems.

Bovine lifeforms have been entangled with capitalism for hundreds of years. The word 'cattle' originated in the mid-thirteenth century from the Anglo-French word *catel* 'property.' It is etymological kin to 'chattel' and 'capital.'²⁷ If Marx understood human capitalists "not as agents in their own right, but as those who personify the power of capital,"²⁸ then cattle might also be seen as animal familiars of this ghostly spirit.²⁹ Never just sticking to one environment, always seeking to roam elsewhere, cattle are nomadic companions of capital. Constantly moving among elements and promiscuously intermingling with different cultural systems, this species embodies the parasitic character of capital, enabling it to invade and occupy diverse ecosystems. Even as cattle destroyed endangered worlds, they also helped shape emerging worlds.³⁰

As one of the first organisms imported to the New World, bovines were part of what Alfred Crosby calls the "Columbian Exchange"—the phrase he coined to refer to the large-scale transfer of biological and cultural elements between Europe and the Americas. Crosby regards cattle as agents of genocide and ecological imperialism: "The animals, preyed upon by few or no American predators, troubled by few or no American diseases, and left to feed freely upon the rich grasses and roots and wild fruits, reproduced rapidly. Their numbers burgeoned so rapidly, in fact, that doubtlessly they had much to do with the extinction of certain plants, animals, and even the Indians themselves, whose gardens they encroached upon."³¹ Even as cattle enabled capital to invade lands via previous unknown exploits, this nomadic species was constantly escaping along unexpected lines of flight.³²

²⁵ Douglas E. Gill, "A Naturalist's Guide to the OTS Palo Verde Field Station," in *Organization of Tropical Studies Coursebook* 63 (San Jose: Costa Rica, 1988).

²⁶ Michael McCoy and Juan Rodriguez, "Cattail (*Typha Domingensis*) Eradication Methods in the Restoration of a Tropical, Seasonal, Freshwater Marsh," in *Global Wetlands: Old World and New*, ed. W. J. Mitsch (Amsterdam: Elsevier Science Publisher, 1994), 471; Florencia Trama, pers. com.

²⁷ Online Etymology Dictionary, "Cattle," accessed 11 October 2012, <http://www.etymonline.com/index.php?term=cattle>

²⁸ Mitchell, *Rule of Experts*, 30.

²⁹ Also see: Cheah, "Spectral Nationality"; Shukin, "Animal Capital."

³⁰ Anthropologists once studied 'vanishing worlds.' But in the last two decades scholarly discussions have turned toward culture defined not as 'tradition,' but as the world-making networks, geographies, innovations, meanings, and assemblages that are carrying us into the future. See: Department of Anthropology at UC Santa Cruz, "Emerging Worlds," accessed 11 October 2012, <http://anthro.ucsc.edu/about/emerging-worlds/index.html>

³¹ Alfred W. Crosby, *The Columbian Exchange; Biological and Cultural Consequences of 1492* (Westport: Greenwood Publishing Company, 1972), 75.

³² See also: Paul Kockelman, "Enemies, Parasites, and Noise: How to Take up Residence in a System without Becoming a Term in It," *Journal of Linguistic Anthropology* 20, no. 2 (2010): 406-21.

Nomads are “incontrovertibly destructive or tolerant,” in the words of Isabelle Stengers.³³ Capitalism, which Stengers regards as “the only truly tolerant and relativist undertaking,” is ever generating new nomads—agents capable of adapting to varied political, cultural, or ecological contexts.³⁴ Wealthy Spanish landowners captured the productive nature of cattle and capital by grounding these flighty agents, channeling their ability to destroy and tolerate different environments. Large ranches, haciendas, were established from Alta California (present-day California and Nevada) to Argentina.³⁵ Following the invention of barbed wire in 1874 on the Great Plains, a technology “of violence and pain across species,” Latin American cattlemen were able to fence in wandering animals, to more fully capture their world-making force.³⁶

With the rise of U.S. hegemony in the Americas in the early twentieth century, cattle became vehicles of Yankee capitalism. In the Guanacaste Province of Costa Rica, on the northern Pacific Slope of the country, global shifts of power in the modern world system of production had dramatic impacts on local land use.³⁷ Wilson Stewart, a cowboy from the United States, purchased the land that later became Palo Verde National Park from Costa Rican President Don Bernardo in 1923. Further developments in refrigeration and transportation technologies, in the coming decades, enabled ranching families like the Stewarts to transform the forested landscapes of Costa Rica into value-added biomass that was consumed by humans in distant cities.³⁸

The spread of cattle in Stewart’s land was facilitated by Jaragua (*Hyparrhenia rufa*), a grass introduced to Costa Rica from Africa in 1943 that helped destroy the tropical forest and turn it into savanna. The spiky seeds of Jaragua were spread by Stewart’s cowboys throughout his ranch. Jaragua was a ‘companion species’ of cattle, to purloin a phrase from Donna Haraway. Companion species are messmates who break bread together (the Latin root of companion is *cum panis*, with bread). They are locked in relations of use where care and killing go hand-in-hand.³⁹ Jaragua grass was not propagated because it is particularly nutritious for cattle.⁴⁰ Instead, cowboys spread the seeds of this plant because it was a companion in killing that facilitated large-scale ecological transformation. Jaragua is extremely flammable and can quickly resprout after hot fires.⁴¹ Setting annual fires during the dry season, interloping

³³ Stengers, *Cosmopolitics II*, 390.

³⁴ Isabelle Stengers, *Cosmopolitics I* (Minneapolis: University of Minnesota Press, 2010): 74.

³⁵ Silvio Duncan and John Markoff, “Civilization and Barbarism: Cattle Frontiers in Latin America,” in *States of Violence*, ed. Fernando Coronil and Julie Skurski (Ann Arbor: University of Michigan Press, 2006): 34.

³⁶ Reviel Netz, *The Cutting Edge: An Environmental History of Modernity* (Middletown: Wesleyan University Press, 2004): viii.

³⁷ J. Calvo-Alvarado, B. McLennan, A. Sanchez-Azofeifa, and T. Garvin, “Deforestation and Forest Restoration in Guanacaste, Costa Rica: Putting Conservation Policies in Context,” *Forest Ecology and Management* 258 (2009): 931-40.

³⁸ Duncan and Markoff. “Civilization and Barbarism,” 35.

³⁹ Donna Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003): 36; See also: Haraway, *When Species Meet*, 74, 164.

⁴⁰ R. Daubenmire, “Ecology of *Hyparrhenia rufa* (Nees) in Derived Savanna in Northwestern Costa Rica,” *Journal of Applied Ecology* 9, no. 1 (1972): 11-23; Karin Gerhardt, “Tree Seedling Development in Tropical Dry Abandoned Pasture and Secondary Forest in Costa Rica,” *Journal of Vegetation Science* 4 (1993): 95-102.

⁴¹ Carol A. Kearns and David W. Inouye, “Pollinators, Flowering Plants, and Conservation Biology,” *American Institute of Biological Sciences* 47, no. 5 (1997): 297-307.

humans helped Jaragua regenerate in their fields and facilitated its spread, like a rhizome, into the surrounding forest.



Figure 4 Seeds of Jaragua grass
(Photograph: U.S. Department of Agriculture)

In a botanical sense rhizomes are the underground stems of plants that spread laterally in the soil, propagating vegetatively, sending down roots, and sending up new shoots. Strictly speaking Jaragua grass does not have rhizomes. This plant does not have underground stems. If Gilles Deleuze and Félix Guattari regard ants and rats as figural rhizomes, then perhaps Jaragua also has the properties of an ‘animal rhizome.’⁴² The seeds of Jaragua writhe about on the ground after falling from the plant, crawling around in all directions. This movement is accomplished by a small spike on each seed, about twenty-two millimeters long, that is “highly hygroscopic”, meaning that it readily absorbs moisture from the air to swell up and contract in length. “A constant twisting or untwisting,” writes one naturalist, “causes the disseminules to creep slowly over the surface.”⁴³ Like cattle, this parasitic grass was constantly on the move, exploring the frontiers of new environments, seeking out new places to sprout. Capital possessed the body of Jaragua—using its talents of movement, provision, and habitat creation for cattle—to spread productive potential into hitherto impenetrable jungles. The animal rhizomes of this grass, crept along the forest floor, becoming capital personified.

In the mid-twentieth century the wetlands and woodlands of Palo Verde were firmly possessed by cattle and associated companion species. Three key players—cattle, Jaragua grass, and cowboys from the United States—enfolded each other into a world that initially seemed

⁴² Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia* (London: Athlone Press, 1987): 6, 9.

⁴³ Daunbenmire, “Ecology of *Hyparrhenia rufa*,” 15.

like it would endure for centuries to come. But as the modern world system reconfigured itself at the end of the twentieth century, and local political circumstances rapidly changed, this world became endangered.⁴⁴ Wild fluctuations in the price of beef on international markets in the 1970s began to undercut the profitability of the Stewart ranch and other cattle operations in the region.⁴⁵ At the same time a powerful social movement of Costa Rican squatters began gaining ground in their fight for land. Making a high-stakes decision, the Costa Rican Government expropriated the Stewart ranch in 1975.⁴⁶ Some of the land was divided into irrigated rice parcels and given to the squatters. The rest, some 45,492 acres, was turned into Palo Verde National Park. Social justice concerns and conservation priorities seemed to be resolved, once and for all, with the expropriation of this land. But, rather than a final peace, the new stewards of the land found themselves wrangling with unexpected disruptions by multiple species of parasites.

Interruptions

After the newly acquired land for Palo Verde National Park was placed under the management of conservation biologists, all cattle were initially evicted.⁴⁷ Jaragua, the tenacious companion of cattle and capital, stayed behind in the dry uplands. Carefully patrolling the boundaries of the newly established preserve, guards worked to protect the regenerating forest and the wetland ecosystem from incursions by local farmers and hunters. After a few good years of abundant birdlife, something went wrong. Shortly after the last cattle were removed from the refuge in 1981, most of the birds took off on alternate lines of flight.⁴⁸ Other parasitic agents also began interrupting human plans. The open grass-sedge marsh, and carpets of water hyacinths, came to be replaced by dense stands of cattails (*Typha dominguensis*). By 1986 cattails had virtually become a mono-culture in the wetlands—crowding out duck habitat, blocking views of the picturesque vista, creating a wall of vegetation that made biological research increasingly difficult. Sightings of migratory birds declined dramatically. Visions of multiple social worlds, and the lifeways of charismatic species, were disrupted by this plant, an unforeseen surprise. Lacking a spokesperson, cattails became killable.⁴⁹

Officials at Palo Verde National Park initially imagined cattle as the enemies of conservation. But, they soon invited these nomads back onto parklands once again. By reintroducing livestock officials hoped to limit the growth of Jaragua grass and cattails. If cattle and capitalism were articulated to U.S. hegemony here for much of the twentieth century, new political and economic assemblages emerged. In 1986 the national wildlife service signed a five-year contract giving a Costa Rican cattle rancher license to graze up to one thousand head of cattle in the marsh. But these cattle also proved to be difficult to manage. Unaccustomed to wetland conditions, wary of crocodiles and unknown others lurking in the water, these animals

⁴⁴ Immanuel Maurice Wallerstein, *The Decline of American Power: The U.S. In a Chaotic World* (New York: New Press, 2003).

⁴⁵ Calvo-Alvarado, "Deforestation," 934.

⁴⁶ Gill, "A Naturalist's Guide," 9.

⁴⁷ Gill, "A Naturalist's Guide"; McCoy and Rodriguez, "Cattail (*Typha domingensis*) Eradication Methods."

⁴⁸ Gill, "A Naturalist's Guide," 9.

⁴⁹ See also: Haraway, *When Species Meet*, 80.

preferred to graze in dry grasslands where the conservationists were trying to regrow a forest. These cattle proved ineffective in killing the cattails.⁵⁰



Figure 5 The rhizome of the cattail

The actual living rhizomes of cattails are more complex, fleshy, and surprising than the figural rhizomes of Deleuze and Guattari. Chemical weapons of sorts are produced by cattails. Cocktails of compounds that resemble commonly available herbicides and military-grade chemicals like Agent Orange, are produced by cattails to inhibit the growth of other plant species. The characteristic brown cigar-shaped clusters at the top of each cattail spike also produce thousands of airborne seeds, enabling quick dispersion over large spatial scales. Sally Horn, of the University of Tennessee, recently found cattail pollen near the Palo Verde wetlands with a radiocarbon date of older than two thousand years before present. In light of these findings, critical observers have begun to question the normative guidelines underlying the management regime that calls for the elimination of cattails from the national park. If the original marsh vegetation—before the cattle ranch—consisted of cattails, should this be preserved? Horn told me that evidence of cattails in Palo Verde a few thousand years ago, is a snapshot in geological time. It is not a picture of the original condition of the marsh. Over geological time-scales marshes come and go. The composition of plants in a marsh can change dramatically in much shorter time-scales—decades, years, and, in the wake of catastrophe, days.

⁵⁰ Huge aqueducts built in the early 1980s, to bring water to rice parcels in nearby villages, dramatically altered the hydrology of the region. After the failed attempt to control cattails with cattle, the managers of Palo Verde began to speculate that these hydrological changes were driving the cattail growth. Michael McCoy and Juan Rodriguez, "Cattail (*Typha domingensis*) Eradication Methods in the Restoration of a Tropical, Seasonal, Freshwater Marsh," in *Global Wetlands: Old World and New*, ed. W. J. Mitsch (Amsterdam: Elsevier Science Publisher, 1994), 469-82; See also: Julio Cesar Calo, "Influencia De Las Actividades De La Cuenca Del Rio Tempisque En La Calidad Del Agua." Paper presented at "Taller El Agua en el Rio Tempisque: Calidad Flujos y Conservacion" (Palo Verde Biological Station. 7-10 November 2000).

⁵¹ Image available on-line (this image is in the public domain because its copyright has expired) http://commons.wikimedia.org/wiki/File:Illustration_Typha_latifolia0.jpg

The Director of Palo Verde Biological Station, a biologist from the United States named Michael McCoy, next tried sending in machete crews to kill cattails. Rhizomes of this tenacious plant proved very difficult to combat. When chopped up, and left for dead, the rhizomes resprouted from the resulting fragments (Figure 6). Burning the cattails also failed. The flames destroyed nearly all of the Palo Verde trees, the only nesting sites for six pairs of endangered Everglade Kites. Ashes from these fires fertilised the growth of new cattails in the next wet season.⁵² Appropriating technologies of industrial agriculture, in 1989 McCoy began using retrofit tractors with huge chopping blades as part of the ongoing effort to kill cattails and actively recreate the conditions of an earlier moment in history. This method of tilling, known as *fanguero* in Costa Rican slang, had long been used by regional farmers to cut up weeds in rice paddies, places where conventional disking or mowing techniques do not work. *Fanguero* proved to be highly successful at eliminating the unwanted plants in the national park. When run through dense stands of vegetation, at the right water levels, they crushed the cattail stems and drowned the plants in water.



Figures 6 & 7 A *fanguero* tractor retrofit with chopping blades (Photograph: © Suzanne J. Kelson)
Galo next to his trademark jeep (Photograph: © Daniela Marini).

Edgardo Aragon, a mechanic who is commonly known by his nickname, ‘Galo’, became the principle operator of the *fanguero* machines, the cattail-crushing tractors. Galo’s trademark vehicle, an aging jeep with a bright orange paint job, is a common sight on the dirt roads that crisscross rice parcels beyond the park boundaries. Sitting on the curb outside his machine shop, occasionally interrupting our conversation to banter as neighbours passed by, Galo told me about his boyhood memories of visiting Palo Verde with his parents, family friends of the Stewarts—the Yankee cattle ranchers. “*This lake wasn’t always filled with a mountain of weeds, no. This lake was paradise. After all of the cows were taken out the lake was lost,*” Galo said. Collaborating with conservation biologists in their war against cattails, Galo became recognised as an honorary park guard. He worked to recreate the paradise from his youth.

⁵² Michael B. McCoy, “Seasonal, Freshwater Marshes in the Tropics. A Case in Which Cattle Grazing Is Not Detrimental,” in *Principles of Conservation Biology*, ed. G. K. Meffe and C. R. Carroll (Sunderland: Sinauer Associates, 1994), 352-53.

Galo's use of agricultural techniques in this natural refuge initially produced a spectacular rebound in the populations of two species: the Blue-Winged Teals and the Black-Bellied Whistling-Ducks. In early 1991, the year tractors first plied the wetlands of Palo Verde, some twenty thousand Black-Bellied Whistling Ducks and twelve thousand Blue-Winged Teals were counted in an area that had been almost devoid of bird life the previous year.⁵³ But, Galo quickly found that the costs of operating his tractors in deep wetlands with cattails were much higher than he initially expected.⁵⁴ Gunning his motor to its maximum capacity, burning up gallons of gas and stressing his machines, was necessary to get through dense cattail stands. Park managers began to look abroad for funds to support these costly technocultural interventions.⁵⁵ Palo Verde had become entangled in a transnational scheme to foster the life of migratory ducks. A multinational regime of biopower was influencing local articulations of sovereign power. Representatives of the Costa Rican Government were exercising their power to identify 'bare life', singling out certain species of creatures as killable, in conversation with foreign agents who were exporting their own brand of sovereignty abroad.⁵⁶

Gaming Global Futures

Ducks have powerful spokespeople. As migratory bird populations showed signs of rebounding in Palo Verde National Park, financial support for crushing cattails began to flow from Ducks Unlimited, a U.S. hunting organisation that claims to be the "world's leader in wetlands and waterfowl conservation." By protecting duck habitat in Costa Rica, a place where hunting is illegal, Ducks Unlimited was generating more game for North American hunters. With more than six-hundred thousand members, this organisation is working "toward the vision of wetlands sufficient to fill the skies with waterfowl today, tomorrow and forever."⁵⁷ The Washington DC office of Ducks Unlimited has a team of professional lobbyists who advocate for the right to bear arms and the rights of ducks to safe and secure habitat. This organisation has helped create or restore twelve million acres of wetlands.⁵⁸ With an extensive grassroots network, a well-oiled fundraising machine, and a distinctive brand, Ducks Unlimited has brought the political into contact with what David Wesley has termed "socio-duckonomics."⁵⁹

Socio-duckonomics refers to the commodified material culture of duck hunters, the habits of the hunted, and the value of the places where the two meet. "There must be something special about four dead teals that occupy a minuscule portion of the bottom of an

⁵³ McCoy and Rodriguez, "Cattail (*Typha domingensis*) Eradication Methods."

⁵⁴ By 2006 Galo was charging some \$70 USD per hectare to crush cattails in Palo Verde, but this was hardly enough to cover his expenses. I obtained this figure by cross-checking the reports from Galo (Edgardo Aragon) with Florencia Trama and Ulises Chavarria. Over 500 hectares of cattails have been crushed with tractors in Palo Verde since 1989, with a total approximate cost of \$39,000.

⁵⁵ Gonzales secured funds for creating and monitoring duck habitat from Costa Rica's Environment Ministry, Idea Wild, the U.S. Fish and Wildlife Service, and the Costa Rica-USA Foundation, among other sources (Trama 2005).

⁵⁶ Also see: Michel Foucault, "Right of Death and Power over Life," in *The Foucault Reader*, ed. Paul Rabinow (1984), 258-72; Giorgio Agamben, *Homo Sacer* (Stanford, Stanford University Press, 1998); Youatt, "Counting Species."

⁵⁷ Duke Unlimited, "The DU Mission," accessed 11 October 2012, <http://www.ducks.org/about-du>

⁵⁸ Duke Unlimited, "Wetlands and Grassland Habitat", accessed 11 October 2012, <http://www.ducks.org/conservation/habitat>

⁵⁹ David E. Wesley, "Socio-Duckonomics," in *Valuing Wildlife: Economic and Social Perspectives*, ed. J. D. Decker and Gary R. Goff (Boulder: Westview Press, 1987), 136-42.

\$8,000 mudboat," writes Wesley.⁶⁰ Duck hunters, who place so much value in a few dead birds, harbour few illusions about the productive networks that help bring their flighty quarry into being.⁶¹ They are also not shy about investing money in the latest technologies that facilitate the killing of these creatures. In 2006 waterfowl enthusiasts in the United States spent over \$1.3 billion on guns, ammunition, travel, and recreational services.⁶² The goal of pursuing, deceiving, and killing waterfowl along with the force of these funds has driven the development of a mind-boggling array of novel technologies: portable hay bale blinds, bullets made of Environ-Metal instead of lead, decoys with patent-pending Breeze-Ryder™ base, as well as mudboats, flat bottom vessels used to manoeuvre in hard-to-reach places in marshes and grassy lakes.

Socio-duckonomics has fueled a host of biopolitical regimes that optimise and control populations of waterfowl. In the early twentieth century one of the major initiatives of duck hunters was to protect the original 'duck factory'—over three-hundred thousand square miles of wetlands in the Prairie Pothole Region of the United States and Canada.⁶³ Socio-duckonomics also penetrated the U.S. Federal Government—becoming institutionalised in the Fish and Wildlife Service. "Through the 1980s wetlands management was centered on waterfowl," said Mark Madison, the Fish and Wildlife Service Historian, in a telephone interview. "Early programs were just about counting ducks even when management practices were hurting certain ecological communities, like those of fish."

Tracing the flight of birds, and the flow of capital, I landed in my own backyard. Shortly after returning from my initial field research in Costa Rica, I found myself sitting on a stuffed elephant-leg stool, at nine-thirty on a Monday morning, in the office of Gary Lease, the Dean of the Humanities at UC Santa Cruz, where I was finishing my PhD. An avid hunter, a committed environmentalist, and a card-carrying member of Ducks Unlimited, he proved to be a generous and intelligent interlocutor about transnational schemes centered on fostering the life of waterfowl. Lease "knows a great deal about those he kills, how they live and die, and what threatens their kind and their resources," writes Donna Haraway, one of his colleagues in the History of Consciousness program. "His approach is resolutely tuned to ecological discourses and he seems tone deaf to the demands individual animals might make as ventriloquized in rights idioms."⁶⁴

Running late from another meeting, Lease says "*I'm always glad to spread the gospel of Ducks Unlimited. That's what it is, of course, and like any gospel it needs a critical hearing. "Ducks Unlimited is obsessed with habitat", Gary says. "Other hunting organisations, Delta Waterfowl for example, are controlling the population growth of predators—foxes, coyotes, raccoons, skunks—through trapping. Heavy trapping results in dramatic increases in the numbers of successful nests. Ducks Unlimited is only concerned with habitat modification. Some groups have recently accused Ducks Unlimited of being anti-hunter."*

⁶⁰ Wesley, "Socio-Duckonomics," 137.

⁶¹ In contrast, ecotourists who regard certain bird species as spectacular, often fail to consider the social and ecological relations that produce the charismatic creatures of interest (see Vivanco 2001).

⁶² U.S. Department of the Interior, "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" (Washington, D.C.: U.S. Fish and Wildlife Service, 2006).

⁶³ Minnesota Department of Natural Resources, "Retooling Minnesota's Duck Factory," accessed 11 October 2012, http://www.dnr.state.mn.us/volunteer/sep0ct09/duck_factory.html

⁶⁴ Haraway, *When Species Meet*, 296.

After chatting for more than an hour, Lease insists that we meet the next morning at eight-thirty. When I return to his office, he is wearing a shirt with a Ducks Unlimited logo and has brought me a pile of books, magazines, and newsletters. One of the books he has lent me, *Our Sport*, was graced with an anonymous poem on its back cover: "The hunters of ducks are a crazy breed, A hole in the mud is all they need, A place to hide from a flying duck, In eighty acres of smelly muck ... Would I spend my money and waste my time, And listen to lies in the winter time? Would I do all these things no sane man should? BROTHER, YOU'RE GODDAM RIGHT I WOULD!"⁶⁵

Following a battle with cancer, Gary Lease passed away before he could tell me more about the ineffable thrill of duck hunting. Mingling with Gary's friends, who gathered to celebrate his life in 2008 at the annual California Waterfowl Banquet, I was given a privileged view of how the values of environmental consciousness and commerce are at play in hunting cultures of the contemporary U.S. Sixty guns were raffled at the banquet, many in the name of Gary. A general contractor, whose construction company offered up a Wesson automatic twenty gauge shotgun to the highest bidder, told me: "*Being a gun donor promotes business.*" Gesturing around the room to gambling with 'Ducky Dice', to merchandise donated to the raffle and an auction, he said: "*All this money is going to conservation.*"

As a voyeur at the Ducky Dice table, where contestants payed \$20.00 for one roll of the dice, I struggled to understand the pleasure of this game from a safe non-participatory distance. The most enthusiastic player I saw was a skinny man with red ears, pale blue eyes, a muted buttoned-down shirt, and white hair. Throwing the dice with a distinctive backhand twist, his eyes sparkled and his mouth pursed in a boyish glee. Winning combinations of the dice were somewhat loose. The crew running the table were free to cut deals. One young man told a contestant: "*If you throw snake-eyes on this next throw, I'll give you four raffle tickets.*" Ducky Dice participants were testing their luck twice. Raffle tickets earned participants the chance of winning one of the sixty shot guns or sundry other door prizes.

Duck hunting is a "game measured in the number of hours enjoyed," rather than just being about studying birds, exercising skill, or releasing a "bloodletting" lust, in the words of John Cartier.⁶⁶ This game is remaking global futures. It involves the contingencies of strange connections—alliances between unlikely partners, between humans and non-humans, between enemies locked in intractable conflict.⁶⁷ Players of Ducky Dice in California, and those who enjoy the game of duck hunting, are obliquely shaping the wetlands of Palo Verde and countless other protected parklands around the globe. Socio-duckonomics involves the uneasy articulation of Anglo-American hunters, the spirit of capital, conservation biologists, and migratory waterfowl. These surprising entanglements have inspired hope for some, and dread for others.

Life in *La Frontera* (The Borderlands)

Following the flight of ducks led me to Bagatzí, a farming village just outside the border of Palo Verde National Park. Bagatzí was founded right after a powerful social movement, the *precaristas* (the rabble proletariat), waged a successful campaign to shut down the massive

⁶⁵ Charles Sawyer, *Our Sport: Market Hunting* (Los Banos: Loose Change Publications, 2005).

⁶⁶ John Cartier, *Getting the Most out of Modern Waterfowling* (New York, St. Martin's Press, 1974): 4.

⁶⁷ Anna Lowenhaupt Tsing and Elizabeth Pollman, "Global Futures: The Game," in *Histories of the Future*, ed. Daniel Rosenberg and Susan Friend Harding (Durham: Duke University Press, 2005), 109.

Stewart family cattle ranching operation. *"I don't know how many hectares the Stewart family had,"* says Manuel Gonzales, an elder *precarista* who spent his youth agitating on the frontlines against Yankee capitalism. *"I can tell you in haciendas, they had seven haciendas. It is incalculable how much land they had."* After the Costa Rican Government expropriated the Stewart ranch in 1975, and set aside some nineteen thousand hectares of wetlands and seasonally dry forest that became Palo Verde National Park, the remaining land was divided up and given to *precaristas*.⁶⁸ Government institutions coordinated the selection process—soliciting recommendations from the Board of the Rural Bank and the local Political Committee. *"When they did the selection it was a surprise,"* recounted one of the lucky *precaristas*. *"A big envelope arrived at the house that said 'Congratulations, you were one of the people selected for the grand irrigation project.' None of our families were asking for land, it was a surprise."*

Each lucky family was given a small cement house and an irrigated rice parcel when the government built this village in the early 1980s. The government also leveled ground to make a soccer field, a central village green of sorts. They built an elementary school that doubles as a church on Sundays. One enterprising Bagatzí resident opened up a *bodega*—a small store selling canned foods, soap, candy bars, and soda—in the living room of his house. When I took up temporary residence in Bagatzí in 2011, I was surprised to learn that the *bodega* possessed the only telephone in town. I was also surprised to find that many houses of the original rice farmers had been abandoned, with weeds growing on the roofs. Accommodations at the nearby Palo Verde Biological Station, where I had been learning to speak with and for the fringe-toed foam frog, were simple to be sure. Researchers were living in rooms with bunk beds, which were \$65.00 a night, adjoining a basic laboratory and a small library with computer terminals. The biological station only had a few telephones and a painfully slow internet connection. Still as I moved among worlds, hitching rides with Bagatzí residents who worked at the research station, the architectures of apartheid separating these two communities were brought into sharp relief.

In Bagatzí I rented a room for \$4.00 a day in Tifa Tours, an artisanal paper-making cooperative run by a small group of women from farming families. Scientists from Palo Verde Biological Station, and program officers from the United Nations Development Program, had been providing aid to these women in hopes of transforming the biomass of cattails (*Typha dominguensis*) into value-added aesthetic objects. The donors were trying to create economic incentives for killing cattails. Ana Janzen, one of the founders of Tifa Tours, gave me a tour of the facilities in early 2009, after showing me a room full of cobwebs and bunk beds that was to be my temporary home. She told me about the heady moments when they rushed to fulfill their first big order for *Typha* paper—a request from the University of Costa Rica for eight hundred sheets of paper for printing the diplomas of a graduating class. *"Everyone worked hard to meet the deadline,"* Ana told me, *"spending long hours here at the factory. But when we were almost done one of the machines got really hot. And then it stopped working properly. We finished the job, but the last sheets of paper didn't turn out so well."*

Cattail fiber is not particularly well-suited for making paper. *"We made rice paper that turned out beautifully and banana paper is also nice. We really tried hard to work with Typha, because this is what our donors wanted, even though we found it didn't produce very nice paper."* But, the schemes of the donors, wily agents of socio-duckonomics, ultimately failed.

⁶⁸ Gill, "A Naturalist's Guide," 9.

Cattails proved resistant to capture by capitalism and remained as persistent parasites—interrupting human dreams. This rhizomorphic plant broke the motorised machines of this modest paper-making project just as the operation was starting to get off the ground.⁶⁹ Visions of turning Bagatzí into a picturesque ecotourist destination, by establishing bunk beds for visitors who might want to tour marshes full of *Typha dominguensis*, also failed. I lived alone in Tifa Tours surrounded by hulking machines that had been abandoned by the ghostly specter of capital. “Our equipment is worth a lot of money,” Ana Janzen told me, “but none of us have the technical skills to fix it. The machines are very heavy, and it would cost a lot to bring them somewhere for repairs.”



Figure 8 A machine in Tifa Tours that broke down while printing diplomas for University of Costa Rica graduates. The cooperative became inactive after the machines stopped functioning. Spectral promises made to the women of Bagatzí—fictions and fabulations about modernity—evaporated as the fickle spirit of capital danced away (Photograph: Eben Kirksey)

The story of Tifa Tours speaks to the opportunities and challenges that emerge when one dwells in borderlands where multiple species meet amidst relations of radical asymmetry.⁷⁰ Gloria Anzaldúa’s bilingual book, *Borderlands (La Frontera)* describes the U.S. Mexican border as *una herida abierta* where the Third World grates against the first and bleeds.⁷¹ Making paper with cattails was helping make habitat for ducks—one of the things bleeding across the frontier zone separating Bagatzí rice farmers from the conservationists managing Palo Verde National Park. One duck species visiting the protected wetland by the tens of thousands, in spectacular clouds, has a different name in Spanish. The Black-Bellied Whistling Duck is called *Piche* in

⁶⁹ Deleuze and Guattari, *Thousand Plateaus*, 456.

⁷⁰ For the original sources on the ‘contact zone’ concept, and later articulations of the idea in multi-species worlds, see: Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992); James Clifford, *Routes: Travel and Translation in the Late Twentieth Century* (Cambridge: Harvard University Press, 1997); Juanita Sundberg, “Conservation Encounters: Transculturation in the ‘Contact Zones’ of Empire,” *Cultural Geography* 13, no. 2 (2006): 239-65; Haraway, Donna. *When Species Meet* (Minneapolis: University of Minnesota Press, 2008).

⁷¹ Anzaldúa, *Borderlands*, 1.

Costa Rican slang. A playful interaction with a Costa Rican biologist helped me understand subtle linguistic associations with this word. One day, as I was finishing lunch in the dining hall of Palo Verde Biological Station alongside other researchers and dozens of undergraduate students, she called out: “*Como se llama las hembras de los Piches?*” [What do you call the female Piches?] As I stood there looking dumbfounded, she continued: “*Como se llama las hembras de los gatos* [cats]?” “*Gatas*” “*Como se llama las hembras de los perros* [dogs]?” “*Perras.*” “*Entonces, como se llama las hembras de los Piches?*” “*Pichas!* [Costa Rican slang for “Penises!”] The room exploded into laughter as I trundled into the wetlands in a pair of rubber boots while hefting a borrowed pair of binoculars to watch ducks.



Figure 9 Black Bellied Whistling Ducks, or *Piches*, resting on a floating island of water hyacinth in Palo Verde National Park (Photograph: CIENTEC, available under a CC BY-NC-SA 2.0 license).

Many Costa Ricans revile *Piches* because they are destructive pests in rice fields. One study of Black-Bellied Whistling Duck gut contents in Palo Verde found that 92% of their food was rice.⁷² This nocturnal species spends its days resting in protected parklands, and stages raids on neighbouring fields at night. I joined Gerardo Mesa, one of Bagatzí’s original rice farmers, on a late night expedition to his rice parcels to learn about the challenges of living with these parasites. Like all rice farmers who live in the shadow of Palo Verde National Park, he has to watch his fields every night for fifteen days after planting a new rice crop. The new

⁷² Jorge E. Botero, “Ecology of Blue-Winged Teal Wintering in the Neotropics” (PhD. University of Wisconsin, 1992); Jorge E. Botero and Donald H. Rusch, “Food of Blue-Winged Teal in Two Neotropical Wetlands,” *Journal of Wildlife Management* 58, no. 3 (1994): 561-65.

sprouts are the favourite food of *piches*. When I arrived at his house late one night Gerardo was bustling in his back room—he had just taken a quick shower and was collecting his things. He wore a floppy round hat, a long sleeved shirt, and thick brown pants. Grey stubble was sprouting from his sun-baked brown skin.



Figure 10 Duck hunting, the world making game of powerful foreigners, is illegal in Costa Rica. Some farmers of Bagatzí have become poachers, intruding onto the government nature preserve in Palo Verde managed by conservation biologists. This mannequin with a wooden ‘gun’ was installed by park guards on one of the dirt roads crisscrossing the national park. Guards made mimetic copies of themselves, aiming to startle intruders with uncanny specters (Photograph: Eben Kirksey)

While Gerardo’s primary goal on this nighttime trip was to chase off ducks he also told me about complex institutional ecologies and oblique powers that were slowly moving farmers off their land. Gerardo talked about the challenges of living with a diversity of parasites. Bouncing along the dirt roads that lead to the rice parcels of Bagatzí in a black Isuzu pick-up, a community owned vehicle that was clinging to life, he told me about the habits of the waterfowl that were visiting his fields. “*Piches are hard to scare,*” Gerardo said. “*Swarms of them just move through the freshly planted fields, gobbling up the rice seeds.*” Anyone who plants crops during the onset of the dry season, in January and February, must stay awake all night to contend with clouds of ducks. “*If you fall asleep for fifteen minutes your crop is lost,*” Gerardo said. We stopped in a parcel belonging to his brother that had just been planted with rice days earlier. Makeshift lanterns, glass Welch’s grape juice bottles filled with kerosene and a wick, were spaced along the terrace walls surrounding the paddy. His brother had been out here earlier in the evening to light them. “*It’s beautiful out here,*” Gerardo said, pointing up at the waning moon emerging on the horizon. “*The ducks see the lights that we’ve put out here and think that there is a village.*”



Figure 11 Gerardo Mesa surveying his brother's rice field (Photograph: Eben Kirksey)

As we chatted about environmental injustice—about the money that was being spent by North American duck hunters to create habitat for crop pests—Gerardo pointed me toward other lines of flight. He gestured to global political and economic forces that were exposing human bodies and wetland ecosystems to a host of dangerous chemicals. If Latin American farmers had once been “stuck in the middle, between demands from parasites like intestinal flatworms for a portion of their dinner and demands from macroparasites, the landowners”, the situation was now more complex.⁷³ Gerardo, like most Bagatzí residents, was a landowner. But he was being squeezed by new species of macroparasites—national insurance schemes as well as multi-national corporations like BASF Chemical, Dow, and Monsanto. With multiple species of microparasites feasting in his fields—bacteria, fungi, worms, mites, flies, and other insects—he was buying a costly diversity of fungicides, herbicides, and insecticides.⁷⁴ The residents of Bagatzí were falling into debt. Farmers like Gerardo had become hopelessly entangled, seemingly with no way out.

⁷³ Brown, “Mircoparasites and Macroparasites,” 161.

⁷⁴ Federico Rizo, “Monitoreo De Los Arrozales Del Proyecto Tamarindo: Estudio De Los Agroquimicos Y Macroinvertebrados Bentonicos En Relacion Al Parque Nacional Palo Verde,” Paper presented at “Restauracion y Conservacion de Ecosistemas en la Cuenca baja del Rio Tempisque: Hacia una Perspectiva de Manejo Integrado” (Bagaces, Guanacaste, 6-7 November 2003).

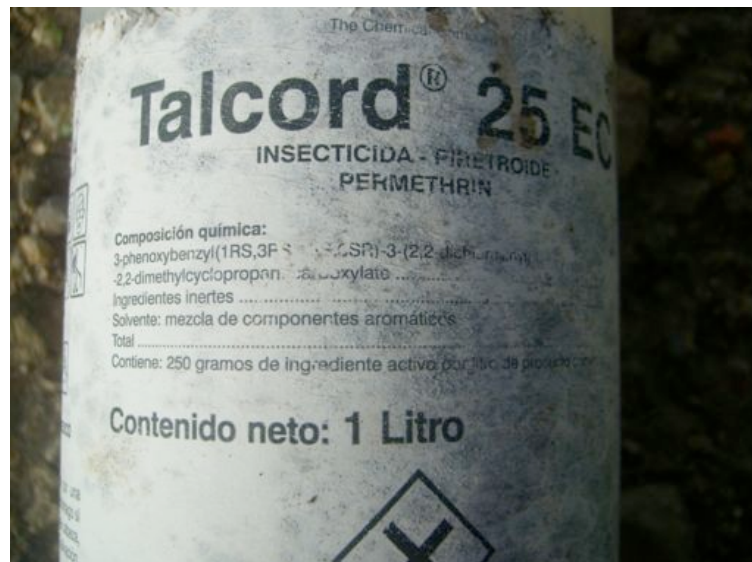


Figure 12 (Photograph: Eben Kirksey)

Bagatzí rice farmers use Talcord, produced by the German company BASF Chemical, to kill little *gusanos*—worms that eat rice seeds as they are germinating (Figure 15). I happened to find this empty bottle of Talcord discarded on the side of the road. “DAÑINO!” [HARMFUL!], the label warned. “*Antidoto: No Tiene*” [Antidote: Not Available]. The label also noted that Talcord is toxic for fish, bees, and crustaceans. Talcord is also used to protect the rice crop at a later stage in the cycle—when *chinchas*, insects in the Order Homoptera, arrive in droves, sucking at the stems or leaves of the rice plants. Mites, flies, bacteria, and fungi are among the other *plagas* (plagues/pests) that attack the rice crop. A diversity of *plaguicidas* (fungicides, herbicides, and insecticides) are used to combat these organisms. One study in the neighbouring village of Tamarindo found that there were nine herbicides, five fungicides, and nine insecticides in use.⁷⁵ Many rice paddies drain into the national park and as a result agrochemicals are entering protected lands. Still, the impacts of these fertilisers and poisons are difficult to track and understand. One study of aquatic macro-invertebrates—insect larvae, snails, and isopods, among other creatures—found more abundance and diversity of organisms in the runoff from the rice fields than in the open waters in nearby protected wetlands. The relative lifelessness of the wetlands was attributed to low oxygen levels. A conference paper, based on a literature review, suggested that agrochemicals might be altering the endocrine system of fish in PaloVerde.⁷⁶ In my own literature review I was unable to find any studies of the impacts of these chemicals on the humans who live in Bagatzí. A government doctor, who visits Bagatzí every fifteen days, told me about cases of serious exposure to agrochemicals—resulting in central nervous system effects and states of unconsciousness.

Pointing out a field of sugar cane next to where we were standing, Gerardo told me about how this plant was slowly pushing rice farmers off their land. “*Cane fields are refuges for rice pests, like rats. During the day whistling ducks hide in the sugar plants and attack the rice sprouts at night,*” he said. Sugar cane companies, the Taboga Refinery and the Old Sugar

⁷⁵ Rizo, “Monitoreo de los Arrozales,” 4.

⁷⁶ F. Villalobos-Brenes, L. Castillo, and J. A. Morales, “Efectos Toxicos Y Alteracion Endocrina En La Ictiofauna Del Area Bagatzi-Poza Verde,” Paper presented at “Restauracion y Conservacion de Ecosistemas en la Cuenca Baja del Rio Tempisque: Hacia una Perspectiva de Manejo Integrado” (Bagaces, Guanacaste, 6-7 November 2003).

Factory, were approaching rice farmers and presenting quick fixes to their financial woes. Offering six-year contracts to land owners, the cane companies were taking on their debts and making payments to the banks where loans were owed. The companies were taking care of everything. Sending in crews of cane workers, usually migrant laborers from Nicaragua, the companies were doing all the planting, the chemical applications, and the harvesting. With no work left to do, with their fields tied up in the financial schemes of outsiders, the rice farmers of Bagatzí were also becoming nomadic—departing for opportunities further afield.

Fernando Ortiz regarded sugar as an agent of transculturation in Cuba, as a force of cultural loss, acquisition, and innovation. The character of sugar is “white, sweet, and odorless,” in the words of Ortiz, “Nutritive, arousing, joyful, pleasing to the flesh, sensual.”⁷⁷ Some Bagatzí residents were learning to live with sugar, planting this agent of transculturation on their own terms. Other residents, like Gerardo Mesa, were resisting sugar cane, a plant that was spreading through the hinterlands of Costa Rica with literal and figural rhizomes. In their resistance, many residents of Bagatzí were caring for other organisms whose bodies had been possessed, and then abandoned, by the spirit of transnational capitalism. Purchasing cattle, the ur-companions of capital that were once evicted from Palo Verde National Park, strangely enabled some Bagatzí farmers to wander through the protected reserve.

Gerardo Mesa told me how concrete hopes and livable futures have been tied to the continued presence of cattle and capitalism in Palo Verde National Park. While cattle were not effective in the killing of cattails, they proved integral in managing Jaragua, the flammable grass with animal rhizomes, which had grown out of control in tall impenetrable stands. Jaragua prevented the forest from regenerating in the early years of the national park by shading out tree seedlings. Short on funds and failing to find workable mechanical methods for controlling invasive grasses, authorities let small herds of cattle run wild once again in parklands. By early 2009, by the time of our late night foray into rice fields, this reforestation program had become a success story: “In all of the park, there are now only small patches of Jaragua,” Ulises Chavarria, a plant taxonomist who is director of the national park, later told me in an interview. Cattle had become surrogate species for the regenerating dry tropical forest in Palo Verde, an ecosystem that earlier generations of bovines had destroyed.

In the 1980s light grazing by cattle in Palo Verde National Park reduced the risk of fire and allowed tree seedlings to emerge from the shade of the tall grasses. As cattle munched away at unwanted rhizomes, they entered into related stories of interspecies surrogacy. Dan Janzen, a young ecologist from the United States, began to understand the cattle as surrogates that might replace huge mammals—like ground sloths, gomphotheres (mastodon-like creatures), and relatives of horses—that went extinct in the late Pleistocene (about twelve thousand years Before Present). Many tropical tree species with large fruits were orphaned by these extinctions—they had depended on the Pleistocene fauna to distribute their fruits. Cattle and horses, Janzen demonstrated, are capable seed dispersers for these specific types of tropical trees. With the introduction of these animals by European settlers, the distribution of plants in forests of the tropical Americas came to more closely resemble the Pleistocene era than the forest that existed just prior to the Columbian Exchange.⁷⁸

⁷⁷ Fernando Ortiz, *Cuban Counterpoint, Tobacco and Sugar* (Durham: Duke University Press, 1940/1995): 139.

⁷⁸ Daniel H. Janzen and Paul S. Martin, “Neotropical Anachronisms: The Fruits the Gomphotheres Ate,” *Science* 215, no. 4528 (1982): 19.



Figure 13 & 14 Elizabeth Castro, a resident of Bagatzí, milking a cow that had been grazing in Palo Verde National Park (Photograph: © Daniela Marini); The Mexican calabash (*Crescentia alba*) has a cannonball sized fruit with a hard shell. Horses, which freely graze in Palo Verde National Park alongside cattle, break open these fruits and help disperse the seeds (Photograph: Eben Kirksey).

Hopes are sometimes grounded in the arrival of events or figures on future horizons. At other historical moments, or in different cultural locations, hopes are pinned on the anticipated departure of dreaded or despised figures.⁷⁹ If Ulises Chavarria grounded concrete hopes for the future of the tropical forest in the absence of Jaragua grass, Gerardo Mesa was pinning his own cautious dreams on the departure of ducks. During our night-time expedition Gerardo Mesa and I found evidence—the presence of a relative absence—which fed his modest imaginings about a more livable future. We heard a few isolated pairs of ducks on the wing, but none were actively foraging in his parcel. Talking late into the night, we discussed how oblique powers were shifting, how ducks were being pushed out of the parklands, moving away from rice fields. Funds from U.S. hunters, who had been sustaining the ‘duck factory’ in Palo Verde, were drying up amidst a global financial crisis. Ulises Chavarria was using some of his own limited government funds to crush cattails in the immediate vicinity of Palo Verde Biological Station—creating a vista for birdwatchers and a space for field ecologists to conduct research in the open marsh. But large-scale habitat modification catering to migratory ducks was no longer in his plans.

Perched on the edge of Gerardo Mesa’s parcel, I found my mind wandering beyond our discussion of human dreams and schemes. Fringe-toed foam frogs interrupted my thoughts that night—they were calling to each other in the rice fields and in the drainage ditches of sugar

⁷⁹ For more on hopes pinned on a despised figure, see: S. Eben Kirksey, *Freedom in Entangled Worlds: West Papua and the Architecture of Global Power* (Durham: Duke University Press, 2012): 25-28.

cane fields, aqueous micro-environments awash in chemical toxins. Following my first contacts with this tenacious amphibian, after working with biology graduate students who failed to make it speak to semiotic theories, I began searching for its noisy din in unexpected places. On the margins of parking lots, and in agricultural drainage ditches, this tenacious animal was multiplying beyond human dreams and schemes. Standing with Gerardo Mesa late at night, in a landscape that had been blasted by multiple waves of capitalism, I came to see the fringe-toed foam frog as a living figure of biocultural hope.⁸⁰

Fringe-toed foam frogs are listed as being of ‘Least Concern’ on the IUCN Red List of Endangered Species. They are flourishing amidst waves of extinction—at a moment in geological time when over one-half of all amphibians known to science are on the brink of extinction.⁸¹ Constantly switching from one element to another, this frog is always hopping among environmental worlds—running wild in *la frontera*, the borderlands, where capital is warring with itself in a schizophrenic dance. Living as a parasite in worlds designed with the well-being of other species in mind, foam frogs are generating a noisy cacophony—refusing to speak to anthropocentric concerns, invading and occupying agricultural ecosystems flooded with toxins designed to kill unloved others. The wily nature of the fringe-toed foam frog offers a potent reminder of the limits of human knowledge and forms of representation. In the words of Jean Rostand: “Theories pass. The frog remains.”

Living With Para-sites and Para-selves

Bruno Latour’s ideas about speaking for nature initially led me to imagine scenarios for bringing democracy to the swampy hinterlands of Costa Rica—scenarios where rice farmers and Jaragua grass, cattails and foam frogs might command spokespeople on equal footing with those who speak for ducks. Graduate students from the United States, who routinely visit Palo Verde Biological Station on field ecology courses, have earnestly attempted to speak for cattails, and the multitude of creatures living in their shadows. They tried to build what Latour would call *speech prosthetics*, to add new voices to the chorus.⁸² Assembling diverse technological devices into networks, these students worked to make neglected species participate in “the articulation of the common world.”⁸³ One group of graduate students found that open water where the cattails had been crushed was comparatively lifeless. Large animals, such as turtles and aquatic rodents, were being killed outright by the chopping blades of the tractors.⁸⁴ There were more beetles, flies, true bugs, water fleas, rotifers, isopods, other crustaceans, mites, snails, caddisflies, and nematode worms in the cattail stands when compared with the open water.⁸⁵

⁸⁰ See also: Anna Tsing, “Blasted Landscapes (and the Gentle Art of Mushroom Picking),” in *The Multispecies Salon: Gleanings from a Para-Site*, ed. S. Eben Kirksey (Durham: Duke University Press, under review); S. Eben Kirksey, Maria Brodine, and Nick Shapiro, “Hope in Blast Landscapes,” in *The Multispecies Salon: Gleanings from a Para-Site*, ed. S. Eben Kirksey (Durham: Duke University Press, under review).

⁸¹ Amphibian Ark, “Frightening Statistics”, accessed 11 October 2012, <http://www.amphibianark.org/the-crisis/frightening-statistics/>

⁸² Latour, *Politics of Nature*, 64, 69.

⁸³ Latour, *Politics of Nature*, 249.

⁸⁴ Robert Timm, personal communication

⁸⁵ Erica Garcia, Chad Smith, Karrie Ann Fadroski, Heather Macrellis, and Thomas Radzio, “Comparing Aquatic Invertebrate Diversity in *Typha dominguensis* Versus Open Water Sites at the Palo Verde Marsh,” in *Organization for Tropical Studies, Course Book 59-63* (San Jose, Costa Rica, 2003).



Figure 15 A turtle hiding in its shell near a *fanguero* tractor rolling through the wetlands of Palo Verde National Park (Photograph: Eben Kirksey)

The speech prosthetics of these graduate students were fragile. They only sampled six sites in open water, and five sites in cattail stands. Senior scientists in residence at Palo Verde Biological Station never conducted a follow up study with larger sample sizes to track the populations of these organisms through time. Instead of trying to create a democratic assembly, a unified Parliament of Things where all creatures of the wetlands might one day be represented, the park officials were being moved by oblique powers. Amidst competing visions of conservation and agricultural production, shifts in these oblique powers were determining who lived and died. “The perspective of the Parliament of Things belongs to a utopia,” in the words of Isabelle Stengers. “It is nothing more than an empty dream if it does not function as a diagnostic vector for what makes it a mere utopia, as a learning ground for resisting what today opportunistically frames our world.”⁸⁶

Latour’s actor network theory orbits around the work of human entrepreneurs who enlist other agents in common worlds. Envisioning the construction of an ever-expanding parliament, Latour proposes making agents jointly articulate “a single collective, defined as an ever-growing list of associations between human and nonhuman actors.”⁸⁷ Latour’s broad category of the “nonhuman” betrays the anthropocentrism at the heart of his parliamentary proposals. “Non-human is like non-white,” contends Susan Leigh Star, “it implies a lack of

⁸⁶ Stengers, *Cosmopolitics II*, 347.

⁸⁷ Latour, *Politics of Nature*, 89.

something.”⁸⁸ Creatures, like the fringe-toed foam frog, that refuse to participate in anthropocentric collectives are living figures of post-human hopes. Living and dying in zones of abandonment, these organisms are in an epistemological space beyond the reach of scientific measurement and direct biopolitical regulation.⁸⁹ Even as aspiring scientists earnestly worked to democratically speak for nature, struggling to build stable speech prosthetics for a multitude of unloved critters, I found constant evidence of constitutive outsiders. I discovered species that were ever elusive, unloved others who were unrepresented in realms of human discourse.⁹⁰

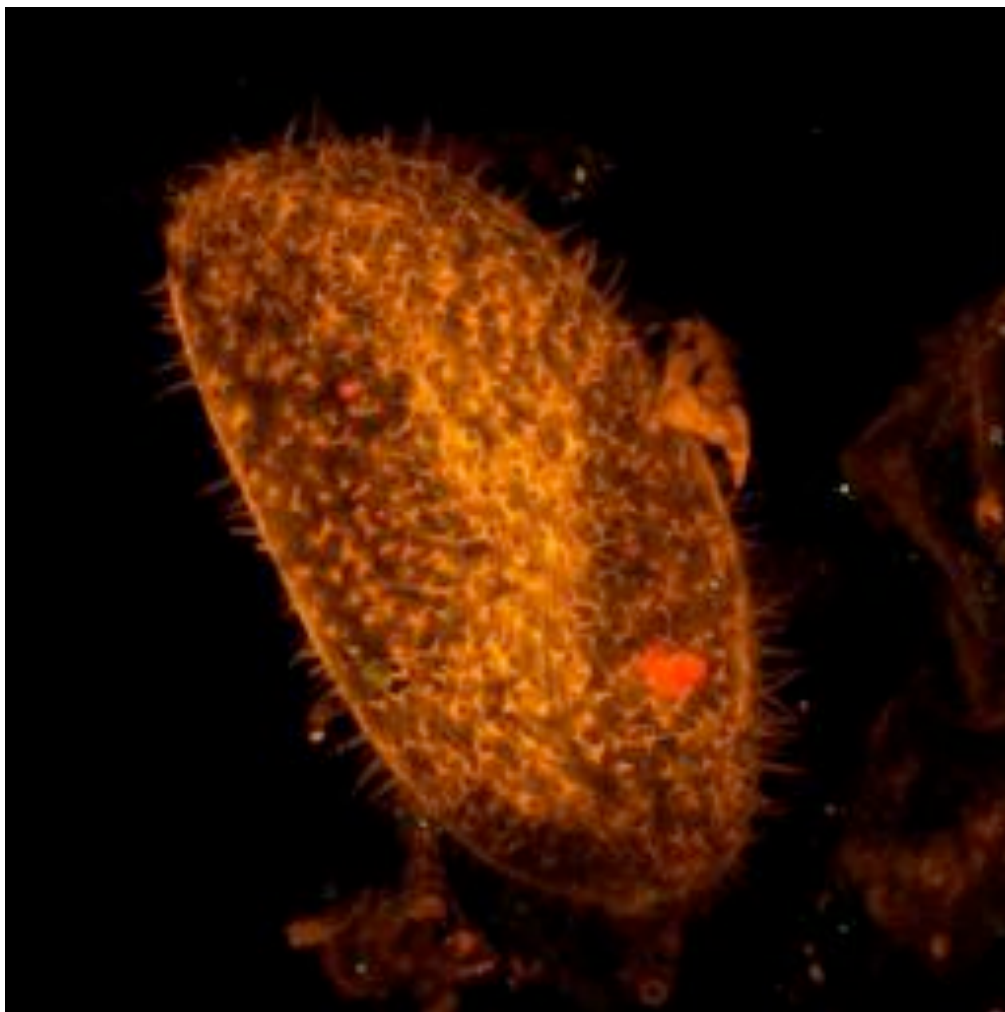


Figure 16 Unloved others of Palo Verde (Photographs: © Frédéric Landmann).

⁸⁸ Quoted in: Kirksey and Helmreich, “The Emergence of Multispecies Ethnography,” 555.

⁸⁹ For more on the implications of living in a zone of abandonment, see: Nancy Scheper-Hughes, *Death without Weeping: The Violence of Everyday Life in Brazil* (Berkeley: University of California Press, 1992), 268-339; Donna Haraway, *Modest_Witness@Second_Millennium.Femaleman_Meets_Oncomouse: Feminism and Technoscience* (New York: Routledge, 1997), 202-12; Guilherme João Biehl, *Vita: Life in a Zone of Social Abandonment* (Berkeley: University of California Press, 2005).

⁹⁰ See: Deborah Bird Rose and Thom van Dooren, “Unloved Others: Death of the Disregarded in the Time of Extinctions,” *Australian Humanities Review* 50 (2011).



Figures 17 & and 18 More unloved others of Palo Verde (Photographs: © Frédéric Landmann).

Following the graduate students into a zone of abandonment, I gained access to microscopes and became a voyeur in the worlds of aquatic microbes from Palo Verde. I encountered spirulina algae, single-celled paramecia, as well as multiple species of decapods. Tiny twinkling dots, like small stars, moved around in the water just beyond the microscopes' resolution. For me these twinkling dots became figures of the cosmos, the unknown beyond fragile structures of human knowledge, full of lurking strangers who may be friend or foe.⁹¹ In this complex field of ecological relations, a cautionary injunction from Joe Dumit came to mind: "Never think you know all the species involved in a decision. Corollary: Never think you speak for all of yourself."⁹²

Paul Kockelman (following William James) understands the self as an ensemble—the sum total of beings and things we call our own.⁹³ Actions oriented to the care of others enlist them in the ensemble.⁹⁴ Applying these ideas to the borderlands of Palo Verde, one might talk about rice plants, or the community-owned black Isuzu pick-up, as an extended part of Gerardo Mesa's self. Duck hunters—who care for a multitude of beings, places, and things throughout the Americas—have an extensive ensemble made up of what Brian Rotman might regard as "para-selves." Rotman suggests that we are "beside our selves with glee and dissolution, intermittently present to ourselves, each of us a para-self."⁹⁵ Para-selves, like

⁹¹ For more on the unknown, see: Isabelle Stengers, "The Cosmopolitical Proposal," in *Making Things Public: Atmospheres of Democracy*, ed. Bruno Latour and Peter Weibel (Cambridge: MIT Press, 2005), 995; Haraway, *When Species Meet*, 35; For an account linking narratives about space exploration with aqueous environments, see: Stefan Helmreich, *Alien Ocean: Anthropological Voyages in Microbial Seas* (Berkeley: University of California Press, 2009), xi.

⁹² Joseph Dumit, "Foreword," in *Tactical Biopolitics: Art, Activism, and Technoscience*, ed. Beatriz da Costa and Kavita Philip (Cambridge: The MIT Press, 2008), xii.

⁹³ Paul Kockelman, "A Mayan Ontology of Poultry: Selfhood, Affect, Animals, and Ethnography," *Language in Society* 40 (2011): 1-28.

⁹⁴ In human realms the self-as-ensemble includes one's clothes and house, one's ancestors and friends, one's nail clippings and excretions, one's body, soul, thoughts, and ways of being in the world. See: William James, "The Self," in *Psychology: The Briefer Course* (Notre Dame Press, 1892/1985), 43-83.

⁹⁵ Rotman, *Becoming Beside Ourselves*, 104.

parasites, have a subsidiary relation to our own selves—they can be irregular, disordered, or improper.⁹⁶ Parasites and para-selves are jokers, wild cards, who take on different values depending on their positions with respect to other beings who live with them in common systems.⁹⁷

While Michel Serres sees the parasite as a source of life, at moments he suggests that we should bring a hostile and definitive end to the problem of living with parasites. Playing with the French word *hôte*, which means both ‘host’ and ‘guest’ in English, Serres suggests: “It might be dangerous not to decide who is the host and who is the guest, who gives and who receives, who is the parasite and who is the *table d’hôte*, who has the gift and who has the loss, and where hostility begins within hospitality.”⁹⁸ At certain moments influential historical actors in Palo Verde attempted to eradicate certain species of parasites that were interrupting the lives of valued animals or feasting on the lifeblood of agricultural plants. Despite repeated attempts to exterminate cattails, this tenacious plant resisted with literal and figural rhizomes. Even after blasting *gusanos*, *chinchas*, and other *plagas* with the latest agricultural toxins, a diversity of mites, flies, bacteria, and fungi kept coming back to the rice fields of Bagatzí. Failed attempts at final solutions ended in tragedy—farmers lost their land, hunters lost habitat for their flighty quarry, and toxic chemicals spread through human bodies and ecological communities.⁹⁹

Rather than definitively resolve relations between ‘hosts’ and ‘guests’, rather than focus relentlessly on possible final solutions, perhaps it is best to always play the joker, or the wild card. Humans and parasites, who flexibly became para-selves of one another in Palo Verde, maintained an abiding presence in the landscape by being beside themselves in a multiplicity of symbioses. Cattle, the tenacious companion species of capitalism, abided in parklands with help from a multitude of their human para-selves—park administrators, farmers, and consumers who paid to drink their milk and eat their flesh. The stories of these entangled agents involve elements of comedy—a celebration of integration, continuity, and shared values—in contrast to the tragic destruction and loss accompanying failed attempts at final solutions.¹⁰⁰

There is a growing fatigue with the idiom of warfare and eradication as applied to parasites that live in the human body.¹⁰¹ The old and tired dysphemisms that get applied to unwanted organisms in ecosystems—invasives, non-natives, exotics, weedy species—inspire a

⁹⁶ See the definition of the prefix “para-” in: Marcus, *Para-Sites*, 6; See also: *Oxford English Dictionary*.

⁹⁷ Kockelman has written a brilliant account of enemies, parasites, and noise—critically reviewing Serres’ work and bringing it into conversation with Peirce’s notion of thirdness. He notes that Serres spends very little time on interpretation (or code), and instead focuses his efforts on circulation (or channel). Formulating his own technical definition, Kockelman asserts that the parasite inhabits the implications of this statement: “An object (action or sign) considered as a means to an end (or infrastructure considered as a path to a destination) is a second (or intermediary), but insofar as it implies (embodies or indexes) other ends it might be diverted to serve, or indeed implies any way it may fail to serve an end (whether original or diverted), it is a third (or mediator).” Kockelman, “Enemies, Parasites, and Noise,” 412-3.

⁹⁸ Serres, *The Parasite*, 15-16.

⁹⁹ For an unconventional account of the final solution in Nazi Germany, and an account of tragic and comedic narratives, see: Hayden White, “Historical Emplotment and the Problem of Truth,” in *Probing the Limits of Representation: Nazism and the ‘Final Solution’*, ed. Saul Friedlander (London: Harvard University Press, 1992), 37.

¹⁰⁰ For more on comedy, tragedy, and figuration, see: Hayden White, *Figural Realism: Studies in the Mimesis Effect* (Baltimore: Johns Hopkins University Press, 1999), 9.

¹⁰¹ Caitlin Berrigan, “The Life Cycle of a Common Weed: Reciprocity, Anxiety, and the Aesthetics of Noncatharsis,” *Women’s Studies Quarterly* 40, no. 2 (2012): 98.

similar fatigue. Instead of imagining final solutions to the problem of living with adaptable and prolific creatures, I suggest that we instead think with care about our para-selves and parasites. “Thinking with care” is a vital requisite of being in interdependent worlds, to borrow the words of Maria Puig de la Bellacasa. Care can generate ontological resonances, fostering relations among lively beings.¹⁰² The actual worlds I have described from Palo Verde might serve as a learning ground for carefully rethinking our relations with ontologically flexible species—like cattails, foam frogs, and ducks. My preliminary diagnosis of problems plaguing these worlds is a vector pointing towards the imagining of novel utopic worlds.

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¹⁰² Maria Puig de la Bellacasa, “‘Nothing Comes without Its World’: Thinking with Care,” *The Sociological Review* 60, no. 2 (2012): 198.

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