INTRODUCTION

BODIES TUMBLED INTO BODIES

Heather Swanson
Anna Tsing
Nils Bubandt
Elaine Gan

What If All Organisms, Including Humans, Are Tangled Up with Each Other?

Jellyfish are monsters. Soft glass parasols as colorful as flowers, they blossom from watery depths with delicate grace. Yet woe to those tangled in their stinging tentacles. Along beaches in Australia, Florida, and the Philippines, jellies are becoming a greater threat than sharks, sending scores of swimmers to hospitals, some with fatal stings. Off the coast of Japan, 450-pound Nomura's jellies have capsized boats that have snared loads of them in their nets. In the Black Sea, comb jellyfish eat ten times their weight in a single day, destroying fish and fisheries. As jellyfish consume the small fish fry, emptying seas of other species, the waters fill up with jellies in fantastical numbers. The richness of earlier marine assemblages is overwhelmed. The ocean turns monstrous. Filling the seas with sloshing goo, jellyfish are nightmare creatures of a future in which only monsters can survive.

How did such monstrosity arise? Those Black Sea combs—so inspiring and so terrible—arrived in the ballast water of ships as recently as the 1980s. They took over too-warm seas emptied out by overfishing and polluted by the choking runoff of industrial farming. Under other conditions, jellies are capable of playing well with other species. If jellyfish are monsters, it is because of their entanglements—with us. Jellies become bullies through modern human shipping, overfishing,

pollution, and global warming. In all our heedless entanglements with more-than-human life, we humans too are monsters.

Coral reefs are monsters. Their polyps rise from reefs of their own making—but not just their own. Like the mythical chimeras of ancient Greece, beasts made up of the head of a lion, the body of a goat, and the tail of a snake, coral reefs are made of mismatched parts—animal, plant, and more—that hang together in fragile coordinations. In contrast to jellies, warming waters do not turn corals into bullies; rather, they drive off symbiotic dinoflagellates, weakening the corals. The necessity of working together makes coral life possible; indeed, symbiosis is essential to life on earth. But symbiosis is also vulnerable. Corals, like jellies, are tied to others in rapidly shifting worlds, but for them, disrupted relations lead not to riotous reproduction but to decline and death. In all our vulnerable entanglements with more-than-human life, we humans too are monsters.

Monsters are useful figures with which to think the Anthropocene, this time of massive human transformations of multispecies life and their uneven effects. Monsters are the wonders of symbiosis *and* the threats of ecological disruption. Modern human activities have unleashed new and terrifying threats: from invasive predators such as jellyfish to virulent new pathogens to out-of-control chemical processes. Modern human activities have also exposed the crucial and ancient forms of monstrosity that modernity tried to extinguish: the multispecies entanglements that make life across the earth, as in the coral reef, flourish. The monsters in this book, then, have a double meaning: on one hand, they help us pay attention to ancient chimeric entanglements; on the other, they point us toward the monstrosities of modern Man. Monsters ask us to consider the wonders and terrors of symbiotic entanglement in the Anthropocene.

In the indeterminate conditions of environmental damage, nature is suddenly unfamiliar again. How shall we find our way? Perhaps sensibilities from folklore and science fiction—such as monsters and ghosts—will help. While ghosts (which appear in the other section of this book) help us read life's enmeshment in landscapes, monsters point us toward life's symbiotic entanglement across bodies. The double-sided format of *Arts of Living on a Damaged Planet* presents ghosts and monsters as two points of departure for characters, agencies, and stories that challenge the double conceit of modern Man. Against the fable of Progress, ghosts guide us through haunted lives

and landscapes. Against the conceit of the Individual, monsters highlight symbiosis, the enfolding of bodies within bodies in evolution and in every ecological niche. In dialectical fashion, ghosts and monsters unsettle *anthropos,* the Greek term for "human," from its presumed center stage in the Anthropocene by highlighting the webs of histories and bodies from which all life, including human life, emerges. Rather than imagining phantasms outside of natural history, the monsters and ghosts of this book are observable parts of the world. We learn them through multiple practices of knowing, from vernacular to official science, and draw inspiration from both the arts and sciences to work across genres of observation and storytelling.

The Art of Noticing Productive Crossings

It is unusual for natural scientists and humanists to have more than passing conversations about their work—yet learning about the conditions of livability in these dangerous times must surely be a common task. Consider, then, the excitement of the following exchange.

At the 2014 conference that forms the basis for this book, historian Kate Brown gave a talk about the sufferings of residents of the former plutonium-manufacturing district in Russia, where radioactive traces still course through soil and water. The residents' bodies were suffused with illness and unease. They complained of chronic fatigue, chronic pain, and digestive, circulatory, and immune disorders; they showed scars from multiple operations. Yet doctors could find no clear trace relating their multiple illnesses to radiation from the plutonium plant. The physicians checked for cancers traditionally associated with exposure to radioactivity; they did not find them. The patients' unspecific maladies did not fit standard diagnostic categories, and the doctors turned the residents away without treatment. The residents felt disregarded and betrayed.

Microbiologist Margaret McFall-Ngai listened to Brown's talk with interest: she recognized every symptom Brown listed from her own research, which focuses on how microbes affect the development of organisms, including humans. Rather than diffuse complaints, a product of bad living, as doctors had argued, McFall-Ngai thought all those ailments could easily arise from one cause: mutations in intestinal bacteria. Chronic doses of radiation that might not yet stimulate a human cell cancer could easily have caused bacterial mutations. It

seems likely that the plutonium-district residents were suffering from the ills of their microbial companions.

Suffering from the ills of another species: this is the condition of the Anthropocene, for humans and nonhumans alike. This suffering is a matter not just of empathy but also of material interdependence. We are mixed up with other species; we cannot live without them. Without intestinal bacteria, we cannot digest our food. Without endosymbiotic dinoflagellates, coral polyps lose their vitality. Yet such monstrosities have been anathema to the organization of modern industrial progress. Ironically, the denial of the monstrosity of entanglement has turned this life-making trait against us. Industrial campaigns exterminate impurities, undermining the coordinations that make life possible. Plantations grow monocultures, or single crops that deny the intimacies of companion species. Modern dairy and meat farms raise a handful of supercharged breeds. A new kind of monstrosity attacks us: our entanglements, blocked and concealed in these simplifications, return as virulent pathogens and spreading toxins. Industrial chemicals weave their way through our food webs; nuclear by-products sicken us not just through our human cells but also through our bacteria.

How shall we approach such blowback of the modern? Thinking together, a historian and a microbiologist found a new research problem, a problem both specific and of great import for our times. Their cross-disciplinary curiosity about the microbial worlds of the radiation-affected residents opens up questions about the multispecies mixes that make up our worlds. Brown and McFall-Ngai are both contributors to this book, and their dialogue is at once an example and a parable for the work that *Arts of Living on a Damaged Planet* seeks to do. We live on a human-damaged planet, contaminated by industrial pollution and losing more species every year—seemingly without possibilities for cleanup or replacement. Our continued survival demands that we learn something about how best to live and die within the entanglements we have. We need both senses of monstrosity: entanglement as life and as danger.

But Who, We Must Ask, Are "We"?

In the twentieth century, the natural and social sciences alike imagined the world as composed of individuals—with distinct bodies, genomes, and vested interests. Symbioses, when they were recognized,

were considered rare, anomalies in a world characterized by individual autonomy and relentless competition. It turns out, however, that such assumptions were wrong. Twenty-first-century research on organisms ranging from bacteria to insects to mammals has shown that symbiosis is a near-requirement for life—even for *Homo sapiens*. As developmental biologist Scott Gilbert explains in this side of the volume, our bodies contain more bacterial cells than human ones. Without bacteria, our immune systems do not develop properly. Even reproduction appears to be bacteria enabled. Life, put simply, is symbiosis "all the way down."

As Donna Haraway suggests, recognizing the importance of symbiotic makings *(sympoiesis)* is just the beginning of "staying with the trouble." Symbiotic relations must be constantly renewed and negotiated within life's entanglements. When conditions suddenly shift, once life-sustaining relations sometimes turn deadly. The case of low-dose chronic exposure to radioactivity shows us what can happen when symbiotic alliances are broken: essential gut microbes mutate into illness-causing enemies. Symbioses are vulnerable; the fate of one species can change whole ecosystems. As Ingrid Parker reminds us in her essay, the commercial hunting of sea otters off Pacific North America changed kelp forests to sea urchin barrens; without the otters, urchins took over. Because they were connected by common soil ecologies, whole suites of perennial grasses and wildflowers disappeared in California with the invasion of European annual grasses. This is one of the challenges of our times: entanglement with others makes life possible, but when one relationship goes awry, the repercussions ripple.

What Kinds of Monsters Are We Now?

Life has been monstrous almost from its beginnings. In ancient times, prokaryotes (bacteria and archaea) gave birth to monsters in which one organism engulfed others or joined immoderate liaisons, forming nucleated cells and multicellular organisms called eukaryotes. Ever since, we have muddled along in our mixes and messes. All eukaryotic life is monstrous.

Enlightenment Europe, however, tried to banish monsters. Monsters were identified with the irrational and the archaic. Category-crossing beings were abhorrent to Enlightenment ways of ordering

the world; sometimes they were classified as things of the devil, the antithesis of godly purity. Martin Luther, the Protestant reformer, identified the Catholic Church with monstrosity: in one vivid image, he offered a Papal Ass, a creature with the head of an ass and the breasts and belly of a woman. Luther helped forge what we think of as the modern world through his campaign against category-crossing monsters. But the forms of progress and rationalization that the Enlightenment and Reformation sparked have proved far scarier than the beasts they sought to banish. For later thinkers, rationalization meant individualization, the creation of distinct and alienated individuals, human and nonhuman. The landscape-making practices that followed from these new figures imagined the world as a space filled with autonomous entities and separable kinds, ones that could be easily aligned with capitalist fantasies of endless growth from alienated labor.

Ironically, the monstrosity of monocultures depends on the very multispecies relations that it denies. Anthropologist Marianne Lien provides a striking example of this logic of denial and dependence from Norwegian salmon farms. Commercial aquaculture aims to produce salmon exclusively, but this has proved impossible. When salmon are kept in close quarters, populations of sea lice—a naturally occurring but normally spatially scattered fish parasite—explode. Because the lice threaten fish health, farms first turned to chemical baths and medicated feeds, but the lice soon became resistant to the drugs. The situation forced the farms to turn to a multispecies intervention: putting wrasse, a lice-loving "cleaner fish," into the salmon pens to eat the parasites off the fishes' bodies. But wild wrasse populations were too small for the vast needs of the industry, so they had to begin farming wrasse. The wrasse had their own suite of relations: when young, wrasse require a diet of tiny crustaceans, served live. These copepods, however, proved hard to collect, so now they, too, must be cultivated.

The "simplifications" of industrial farming multiply beyond the original target species. Their multispecies modifications create ever more monsters—exploding numbers of parasites, drug-resistant bacteria, and more virulent diseases—by disrupting and torqueing the monsters that sustain life. The ecological simplifications of the modern world—products of the abhorrence of monsters—have turned monstrosity back against us, conjuring new threats to livability.

We Begin with Noticing

The seductive simplifications of industrial production threaten to render us blind to monstrosity in all its forms by covering over both lively and destructive connections. They bury once-vibrant rivers under urban concrete and obscure increasing inequalities beneath discourses of freedom and personal responsibility. Somehow, in the midst of ruins, we must maintain enough curiosity to notice the strange and wonderful as well as the terrible and terrifying. Natural history and ethnographic attentiveness—themselves products of modern projects—offer starting points for such curiosity, along with vernacular and indigenous knowledge practices. Such curiosity also means working against singular notions of modernity. How can we repurpose the tools of modernity against the terrors of Progress to make visible the other worlds it has ignored and damaged? Living in a time of planetary catastrophe thus begins with a practice at once humble and difficult: noticing the worlds around us.

Our monsters and ghosts help us notice landscapes of entanglement, bodies with other bodies, time with other times. They aid us in our call for a particular approach to noticing—one that draws inspiration from scientific observation alongside ethnography and critical theory. Ant expert Deborah Gordon embodies the forms of curiosity we hope to cultivate. Rather than be lulled by liberal economic theories, with their focus on individual determination of group outcomes, Gordon begins with questions about "collective behavior"—already in the realm of the monstrous. As a biologist committed to long-term fieldwork, Gordon has spent more than two decades observing ant interactions with the eye of a natural historian. Based on these observations, she has designed new kinds of experiments that show the flexible interdeterminacies of ant interactions with each other. Where other observers saw only rigid and mechanical "castes," Gordon was able to notice how ants are not individuals but shifting senses and signals that respond to situations of encounter as well as their environment. Mycologist Anne Pringle similarly enters the monstrous world of lichens, entanglements of algae and fungi. To study lichens, Pringle must begin by giving up modernist units of individuals and populations.

The modes of noticing we propose are purposefully promiscuous. The rigid segregation of the humanities and natural sciences was an

ideology for modern Man's conquest, but it is a poor tool for collaborative survival. Co-species survival requires arts of imagination as much as scientific specifications. But symbiotic scholarship takes time to evolve: many scholars in this book have spent decades in dialogue with others beyond their fields. Perhaps counterintuitively, slowing down to listen to the world—empirically and imaginatively at the same time—seems our only hope in a moment of crisis and urgency.

Our modes of noticing, however, are themselves monstrous in their connection to Man's conquest. Much of what we know about ecological connection comes from tracking the movement of radiation and other pollutants. Contamination often acts as a "tracer"—a way to see relations. We notice connections in part through their ruination; we see the importance of dinoflagellates to coral reefs only as the corals bleach and die. It is urgent that we start paying attention to more of our companions before we kill them off entirely.

We Listen for Modes of Storytelling

Some kinds of stories help us notice; others get in our way. Modern heroes—the guardians of progress across disciplines—are part of the problem. Thus, for example, McFall-Ngai has suggested that biologist Lynn Margulis, who first imagined symbiosis as the origin of cells, has not been accorded the preeminence she deserves because she is a woman and thus not eligible for hero status. Male scientists tend only to cite men, she explained, while women scientists tend to cite male and female scientists equally. Unless we learn to listen broadly, we may miss the biggest story of life on earth: symbiogenesis, the comaking of living things. Practices of storytelling matter.

Several forms of noticing and telling gather in *Arts of Living on a Damaged Planet*. We begin with creative writing, the necessary stimulus to imagining pasts, presents, and the yet-to-come. Ursula K. Le Guin starts off this half of the volume. She brings us into the craft of writing itself, always already part of other stories: "It's just part of a story, actually quite a lot of stories // if I'll only listen." There she teaches us quite properly to fear: "Whiteness crossed the continent / a poison fog where it went / villages were vacant / hearths and ways forsaken." And yet she shows us wonder, as the ocean "holds the whales as lightly / as the body holds the soul," even as it mixes the "slow swirl of pelagic polymers" and radioactive waste. Creative writing invites us to

imagine the world differently, to listen beyond newspaper headlines to hear those quiet stories about the Anthropocene whispered in small encounters. Imaginative writing draws us into what Donna Haraway, in her chapter, calls "art-science activisms," "sympoietic practices for living on a damaged planet."

To these imaginative frames we add the sciences of bodies tumbled into bodies, from developmental biology to ecology and from observation of ants to reflection on extinct elephants and rhinoceroses. They show us lichens, women in childbirth, strange sea creatures, missing wildflowers, and much more. Then, too, we need the environmental humanities and social sciences, which tell us of human and nonhuman histories, cultures and texts; they bring us into assemblages of power and meaning. We follow wolves, tentacular monsters, flying foxes, and stumps of chestnut trees. There are hybrid scholars, too, working across these lines, such as Donna Haraway, both biologist and cultural theorist; Karen Barad, a quantum field physicist and feminist philosopher; and Andrew Mathews, forester and anthropologist. They show us how to move beyond the exclusions that blocked our attention to cross-species entanglement. We follow kinds of stories that take us beyond the modern individual. Watching and writing: these, too, are arts of living.

Not all stories are equally useful in engaging us with collaborative survival, arts of living on a damaged planet. In her essay "The Carrier Bag Theory of Fiction," Ursula Le Guin quotes a Virginia Woolf glossary in which Woolf defines "heroism" as "botulism." This delightfully unexpected definition can again reframe the problem of livability in the Anthropocene. Woolf's "heroism" might stand in for the enactment of Man's conquest of Nature. This form of heroism has been a dream of modernity—and a cause of contemporary fears for life on earth. Heroic conquests, from big dams to mass relocations, have been dangerous acts, erasing many lives. Botulism is a form of food poisoning most commonly associated with canning; the anaerobic world inside the can may encourage the growth of toxin-producing *Clostridium botulinum* bacteria. These bacteria are common in soil and water, but they only produce toxins under special conditions, such as life inside a can. The aluminum can, a mid-twentieth-century invention, is a fitting icon of modern civilization and industrial distribution. The botulism in the can is similarly an icon of the monstrosities of the Anthropocene. Like radioactive contamination and proliferating sea lice, botulism is

produced from within the heart of modernity. Heroism—the story line of modern progress—is thus readable, indeed, as botulism. Livability in the Anthropocene is threatened by just those heroic story lines and practices that are thought to have made Man great.

Are there alternatives to heroism/botulism? Le Guin's essay suggests "carrier bags" as another way to tell a story. Collecting offers stories with more complex arcs of temporality, she argues; instead of a hero single-handedly making the future, there are entanglements and losses of many kinds.

Monsters are bodies tumbled into bodies; the art of telling monstrosity requires stories tumbled into stories. This is what literary critic Carla Freccero shows us through her attention to the jointly material and semiotic worlds of wolf–human relations. As she slips between literary tropes of the "lone wolf" and practices of wolf killing, forests tumble into fables tumble into politics. Material worlds and the stories we tell about them are bound up with each other. Meanwhile, biologist Andreas Hejnol shows us a dizzying range of body forms, from tapeworms to tunicates, in which each organism inherits the evolutionary solutions of its predecessors; old body plans are always mixed into contemporary ways of life. If we do not let progress "ladders" possess us, we are forced to recognize the monstrous in transformation. Classification systems are monster stories—and ghost stories—too. Nor can the question of monsters stop at the boundaries of life. An anthropogenic mud volcano, the subject of anthropologist Nils Bubandt's essay, is monstrous in just the ways we have been describing: both part of our natural connectedness and a threat to life. Spirits and stones emerge from the mud as our new sympoietic companions: they become part of us, and they urge us, as Haraway puts it, to stay with the trouble.

In this spirit, *Arts of Living on a Damaged Planet* is itself entangled. The volume seeks to draw out, rather than to simplify or banish, monsters and ghosts. It juxtaposes many genres to show how varied storytelling styles might inform each other both in learning about our challenged planet and in forging strategies for living with others in the yet-to-come.

While this introduction uses monsters to mix up bodies, challenging the rhetorical reign of the autonomous individual, the introduction to the other half of *Arts of Living on a Damaged Planet* uses ghosts. Ghosts show the layered temporalities of living and dying

that shape our landscapes, tripping up the forward march of progress. Ghosts, like monsters, are creatures of ambivalent entanglement. The landscape assemblages of multispecies living are possible because of ghosts; modern Man's singular timelines occlude our vision. Turn this book over and follow ghosts.

As an anthropologist with a lifelong interest in the worlds salmon and humans create together, **HEATHER SWANSON** explores the globe-spanning connections and comparisons of multispecies interactions. She is an assistant professor at Aarhus University and a postdoctoral researcher with the Aarhus University Research on the Anthropocene (AURA) project. She was a 2015–2016 fellow with the "Arctic Domestication in the Era of the Anthropocene" project, funded and hosted by the Centre for Advanced Study in Oslo, Norway.

ANNA TSING conceived of the conference from which this volume grew to spin common threads of curiosity across natural science, humanities, arts, and social science. She is a professor of anthropology at the University of California, Santa Cruz, and a Niels Bohr Professor with Aarhus University Research on the Anthropocene (AURA). Her most recent book, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins,* received the Gregory Bateson Prize and the Victor Turner Prize in Ethnographic Writing.

An anthropologist, **NILS BUBANDT** is professor at Aarhus University. He is a co-convener of Aarhus University Research on the Anthropocene (AURA), with Anna Tsing, and editor in chief of the journal *Ethnos,* with Mark Graham. In his book *The Empty Seashell: Witchcraft and Doubt on an Indonesian Island,* he explores the relationship between monstrosity and uncertainty. He also takes plane rides to conferences about the Anthropocene with a certain amount of ambivalence.

ELAINE GAN makes clocks and time machines as speculative devices for sensing and mapping worlds otherwise. Working at the intersection of digital arts, environmental anthropology, and science and

technology studies, she traces coordinations with things as small as mycorrhizae and as large as rivers. A recent curatorial collaboration, *DUMP! Multispecies Making and Unmaking* at Kunsthal Aarhus (2015), gathered artists, scientists, and organisms to explore multispecies socialities that persist in the garbage dumps and rubble of modernity and to contest the celebration of technoscientific fixes and human exceptionalism that permeates contemporary discourse.