

Anna Lowenhaupt Tsing, Heather Anne Swanson, Elaine Gan, and Nils Bubandt (editors)
Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene
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Reviewed by Wenda K. Bauchspies, 2019

Wenda K. Bauchspies is an interdisciplinary social scientist specializing in science, technology, and gender in West Africa from a cultural perspective. She has been a professor at Pennsylvania State University and Georgia Institute of Technology, as well as a senior scientist of gender for the International Crops Research Institute of the Semi-Arid Tropics and a program director at the National Science Foundation. Currently, she is the co-director for International Research and Engagement for the Center for Gender in a Global Context at Michigan State University.

Quote: "The futures may be terrible and terrifying or exceptional and amazing. Either way they are monsters of multiplicity and interconnectivity in a complex and multidirectional universe."

Ghosts, monsters, and the Anthropocene are the vehicles for a transdisciplinary dialogue in the edited volume *Arts of Living on a Damaged Planet* among natural scientists, humanities scholars, artists, and social scientists, a dialogue that theorizes about the enmeshment, entanglements, and uneven effects of human transformation of the natureculture. The Aarhus University Research on the Anthropocene (AURA) Project (2013-2018) is the node that brought the four editors and nineteen contributors into an exploration of the strange, wonderful, and terrible worlds of modern life.

The title alone may intrigue a philosopher to pick it up because it implies a treatise focused on the how of human existence beyond a Garden of Eden. A quick skim of the table of contents reveals chapter titles hinting at interdisciplinary knowing, ethics of connections, and natureculture explorations. However, it is the book's embodiment of ending in the middle and the reader's agency to begin to read it, regardless of which side of the book is facing up, that may invite a feminist philosopher who values embracing diversity, shifting power, and exploring unknown epistemologies to read this unconventionally printed book that theoretically embodies where it is headed (to the middle) in order to nurture and catalyze meaningful natureculture knowledge-production.

Arts of Living on a Damaged Planet is a book with two beginnings, each of which ends in the middle, framed by Jesse Lopez's illustrations of tree trunks, octopus arms, and hairy tentacles. The reader has a choice to begin with "Ghosts on a Damaged Planet" or "Monsters and the Arts of Living." In either direction, the text is reinforced and enlivened with images and illustrations from spelunking around Chernobyl and a white fairy lantern (a flower from the California grasslands) to chestnut stumps and the tree of life.

I started reading from the "Ghosts" half of the book and discovered the spookiness of the present infused by the past with the hauntings of extinctions. The spookiness is grounded in how we forget that there was a time before our existence and where the landscape's ghosts remind us of what once was. The "Monster" half of the book focuses on the monstrosity of our futures infused by the present. The futures may be terrible and terrifying or exceptional and amazing. Either way they are monsters of multiplicity and interconnectivity in a complex and multidirectional universe. Whichever half the reader begins with, "Monster" pieces intertwine with "Ghost" pieces and vice versa because, as the editors explain, "monsters and ghosts cannot be segregated" (G3). All of the pieces challenge the reader to slow down in order to see the multiple pasts, presents, and futures through a multispecies perspective to ignite our curiosity of the entanglements and complexity of our world.

The "Monster" side of the book begins with a strong cast of storytellers, including Ursula K. LeGuin, Donna Haraway, and Ingrid M. Parker. It ends with a coda from Dorion Sagan (writer and theorist of culture, evolution, and ecology) that offers comfort and encourages humans to be active knowers in the future because the history embedded in the rocks reminds us that after a mass extinction there is a blooming of new forms of life within the biosphere. Using three sections--"Inhabiting Multispecies Bodies," "Beyond Individuals," and "At the Edge of Extinction"--the ten contributors to "Monsters and the Arts of Living" created a narrative with threads about Lynn Margulis (an interdisciplinary biologist who pioneered current theories of endosymbiosis), symbiosis, and interrelations that enable the essays to create meaning with and through one another.

The opening question of "Monsters and the Arts of Living" inverts the fear of the self and other being/becoming indistinguishable from the creation of monsters that are us and beyond us in order to create a pathway for existence in a moment of escalating extinctions. The monstrosity of being an organism, a relation or world so entangled that there is no beginning or end, has been the enemy of rationalization, the Enlightenment, and Reformation. This half of the volume proposes an epistemology that places relations, dependencies, entanglements, and symbioses at the center of scientific thought in order to know the collaborations and consolidation of boundaries that make science via our histories, bodies, and beings. It builds upon a wealth of disciplinary and interdisciplinary work (from ecology and microbial biology to feminist science studies) to naturalize the question "what if all organisms . . . are tangled up with each other?" Within the biological and ecological sciences, this question of interconnections and dependency may not be quite as startling as it might be within other scientific disciplines such as physics, earth science, psychology, or chemistry. If that is the case, the unwritten volume 2 of *Arts of Living on a Damaged Planet* could take this storyline of entanglement into other scientific disciplines beyond symbiogenesis and sympoiesis and begin to trace the presence of symbioses within other sciences. This might be a terrifying tale of many more monsters that are unseen and absent within traditional scientific storylines.

The first section of "Monsters" is "Inhabiting Multispecies Bodies" and tells the new story of biology where cross-species interactions are valued and vital to the development and evolution of individual species. These interactions are illustrated through the Crochet

Coral Reef and the Madagascar Ako project. The section is an exhibition of science, art, and activism intended to illustrate how the lives of individuals and entire species maintain the health of the earth's compost pile in "sympoietic tangling." Microbial worlds and multispecies relationships (specifically the squid-vibrio symbiosis) are explored in chapter 3 to tell a tale about how microbes surround and support our environment.

The importance of cross-species interactions is the first section of the "Monster" discussion and leads easily into the second section, "Beyond Individuals." Scott Gilbert (scholar of developmental genetics and embryology) expands upon the Holobiont ("an organism plus its persistent communities of symbionts" [M73]) hinted at in the earlier section. It is not a surprise that Gilbert states: "we are all holobionts by birth" (M86). Holobionts echo the permeability of boundaries also found in some of the "Ghost" essays. Chapter 5's focus on humans and wolves brings monsters squarely into the story through tracing the boundary of the holobionts via literature and raises questions about the assumed primacy of humans and their microbes; humans and wolves; and other relations of mutual dependence. The next contributor moves the discussion from wolves to salmon, sea lice, and wrasse in a Norwegian fiord to explore the domestication of a holobiont and the resulting damage and hope. Deborah Gordon (a professor of biology) stretches the focus of an organism and its symbionts to embrace the collective behavior of ants within their world in order to think about collective behavior ecologically and about entire communities as a holobiont.

The third section of "Monsters," "At the Edge of Extinction," focuses on animals and plants at risk of extinction: horseshoe crabs, red knot birds, and plants native to California's grasslands. One author tells the story of animals soon to be lost and another author of absent plants to highlight the interconnections and entanglement of species. Both writers suggest that in order to have an effect beyond slowing the emerging mass extinction, we need knowledge of these multispecies relations and their ecologies. In the final section of "Monsters," ghosts of flowers and soon-to-be ghosts of red knot birds and horseshoe crabs are apparent and haunting; the monsters of the essays all originate with human practices that introduce invasive species, decrease habitats, and increase land and natural-resources fatigue. One probable outcome from these monsters' presences is a future devoid of flowers, birds, and crabs, and an uncertainty about what this space is without them. In light of the first two sections of "Monsters," an unwritten essay that haunts "At the Edge of Extinction" would be one that theorizes about the impact on the scientific community of the monster that may be on the verge of extinction should the ideas in this book be taken up seriously by the entire scientific community. The authors in this collection advocate for a science that studies the collective interconnections and entanglements without fully imagining how the landscape of science would change once the tenet of individuals and solitary species as unconnected and isolated from the entangled world becomes extinct.

The ten essays on the ghosts haunting the landscape asks the reader to pay attention to environmental ruination in order to transform the unseen (those things present but not yet seen) and absences (those things not yet there) into a process of creation for living. The authors offer strategies for how to pay attention through dialogues of knowledge-

practices across disciplines, to read landscapes, and to reclaim the past in order to see the present. The essays work together to counter the message of forgetfulness and the denial of human impact on other species, our shared environment, and multispecies connections. The "Ghost" essays may depress and sadden the reader with their chronicles of changing landscapes that endanger already fragile species, plants, and ecosystems. However, they may also challenge us to see the garden within the grave and the grave within the garden in order to begin to understand and respond to the landscape(s) from a new perspective.

The first section of "Ghosts," "In the Midst of Damage," explores the contradictions of modernity through strangeness. Kate Brown (a historian) tells the story of a technician of radioactive decay at Chernobyl who spends his free time exploring the depths and hidden spaces of the reactor to understand the power of nuclear power and photographing the unseen cesium, plutonium, and uranium hanging in the air waiting to have their portraits taken. The essay speaks to the strangeness of a disaster biographer who knows it is dangerous but persists in order to capture the deterioration as well as the promise of what comes next. The next essay, by Deborah Bird Rose (an ecological philosopher), builds on the strangeness of promise through an aboriginal aesthetic of "shimmer" in multispecies processes. In Australia, flying foxes are considered pests by some human communities and are killed, whereas for eucalypts, corymbias, and other similar trees, flying foxes are their pollinators carrying pollen great distances and from tree to tree. This shimmering between the flying foxes and flowering trees benefits both parties and ensures their survival. Rose challenges the reader to see the shimmering in the midst of destruction in order to become a part of shimmering life.

"Footprints of the Dead" is the second section of "Ghosts," with four essays exploring ghostly footprints, ghosts within, minuscule ghosts, and boundary ghosts. Chapter 4 takes a long-term ecological and biogeographical look at megafauna, their history, their intersection with humans, and the implications of their extinction. The next chapter uses a historical approach to explore the ladders and trees of scientific conceptions of the evolution of life. Both chapters speak to absences and the danger of being limited by our metaphors. Karen Barad (a theoretical particle physicist) uses the uncanniness of terrestrial and atmospheric mushrooms inhabiting each other's matter to see the minuscule ghosts of matter imploding and exploding their entanglements. The final chapter in this section explores epistemological undecidability by examining a mud volcano in Indonesia, where locals and experts relate a narrative that mixes and merges the boundary for determining natural and human-based causes.

The final section of "Ghosts," "What Remains," continues the theme of articulating the unseen in order to live with and alongside ecosystems full of invisible connections and entanglements by offering practices and methods that highlight and make visible these entanglements. Andrew Mathews (a forester and anthropologist) merges practices from both disciplines to tell the story of a chestnut forest, its caretakers, their absence, and entrance of disease. Anne Pringle (a botanist) uses pens and sheets of plastic to document the life of lichen in a cemetery in New England since 2005. Both Mathews and Pringle focus on observation over time to see and document altered landscapes that tell a tale of nature and humans as integrated and connected. Mary Louise Pratt ends "Ghosts in the

Landscape" with a Coda that elegantly speaks to the importance of how the Anthropocene will live and is being lived. Pratt pulls on a thread weaving itself in and out of the *Arts of Living* and exposes the spookiness of writing as a tool of shimmering that nurtures living.

The editors of *Arts of Living on a Damaged Planet* set out to illustrate through storytelling the ambivalent entanglements of ghosts and monsters in the Anthropocene as a practical means toward broadening our knowledge-creation of the challenges of a world in the making. If the scientific community takes to heart their offering (and the offerings of those who came before them), the scientific paradigm-shift (that started with feminist science studies, the civil rights movement, and environmentalism) from objectivity to subjectivity might just take hold as a dominant epistemology. If so, will it be adopted in time for humans to move beyond the fear of ghosts and monsters to celebrate and engage with the entanglement of multispecies ecosystems? And if adopted, what/who will be the ghosts and monsters to take us into the unknown, unseen, and lost landscapes of our futures in the making? It is a story that we hope to be around long enough to write and to read.

The essays from *Arts of Living on a Damaged Planet* could be used individually in undergraduate classes focused on the Anthropocene, environmental studies, biology, science studies, or philosophy of science. This is a potentially provocative volume to use in interdisciplinary graduate courses with students from natural sciences and the humanities.