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The Future of the Extinction Plot: Last Animals and Humans in Octavia Butler's *Xenogenesis* Trilogy

We can date the emergence of a scientific concept of extinction to Darwin's era, and in *On the Origin of Species* (1859) Darwin argued that species extinction formed an integral step in making way for the emergence of new species. Darwin viewed extinction as a normal and recurrent event in the process of natural selection, and wrote skeptically about the idea of large-scale extinction events. More recent research on the history of extinctions, however, has identified five previous mass extinctions in the fossil record. Hauntingly, there is now evidence of a sixth mass extinction event happening today, with extinction rates rising to somewhere between 100 to 1000 times what are estimated to be background or normal rates of extinction.[1] This sixth mass extinction is due to a number of anthropogenic causes, from overhunting to habitat reduction to the spread of invasive species into previously isolated ecosystems. Understanding extinction today means to grasp how the increasing rate of the loss of individual species is bound up with a complicated intermixing of conquest and concern running through human-animal relations.

The intricate connection between the future of life and the end of specific species which Darwin recognized also has had profound effects on cultural representations of extinction. One could already discern in Darwin's time the literary subgenre of "last man" stories that situated a scientific concept of extinction within narrative and plot structures of the novel, thereby inverting common *Bildungsroman* tropes of development and maturity so popular in the late eighteenth and early nineteenth centuries. More recently, extinction events are seen as common devices in a wide range of science fiction and speculative fiction, not all of which are dystopian or apocalyptic, as biodiversity depletion is becoming the new normal and therefore the new realism.

Yet even from the early historical versions of the extinction plot, one sees two very different lines of literary inquiry, which can be distinguished as "last man" and "last animal" plots. Mary Shelley wrote in both these modes to differing ends. *Frankenstein* (1818) is a last animal plot, in that the monster created by Frankenstein is the only animal of its species; it cannot or will not mate with humans, and seeks a female of its kind with which it can reproduce. Shelley's *The Last Man* (1826) depicts the elimination of humans by a plague, which spells the ruin of civilization but leaves the lives of animals untouched. In last animal plots, the single animal is mourned; the reader is

asked to pause in a melancholy mode over the dormant species, yet modernity continues unabated. In last man plots, the planet is already in vast turmoil, modernity has collapsed, and the future is deemed unimaginable because it is uninhabitable by humans.

In most novels that deal with the finitude of planetary life, these two narrative plots remain quite separate. Even if in many last man novels animals have also vanished, it is fairly common for these stories to focus solely on the crisis faced by humans, with violence to animals as collateral damage in the background. More recent novels, however, by Octavia Butler (the *Xenogenesis* trilogy, finished in 1989), Margaret Atwood (*Oryx and Crake* [2004] and *Year of the Flood* [2009]), and Paolo Bacigalupi (*The Wind-Up Girl* [2009]) have made overtures to intertwine both plots, examining the entangled fates of humans and animals in a world undergoing ecological shock. These novels in particular are interested in how new genetic science changes what we mean by last man and last animal plots. In these narratives, genetic modification, cloning, and the storing of genomes in gene banks play central roles in reconfiguring what we mean by both species and species extinction. This essay discusses Octavia Butler's *Xenogenesis* trilogy —a collection of three novels — *Dawn* (1987), *Adulthood Rites* (1988), and *Imago* (1989) (and also called *Lilith's Brood*) — in the context of how the rise of genomic technologies has called for fundamental revisions in science and art concerning extinction.[2] Previous scholarship on this trilogy has focused on how genetic determinism in the novels speaks to debates on fixed or flexible models of race and gender. My interest here is in discussing how Butler positions genetic determinism within a series of biological and existential questions that force her characters and readers to confront biopolitical decisions that appear specifically at the threshold of extinction events. Butler's trilogy aligns science fiction and the future of science in a narrative concerning how to think and act self-reflexively about extinction in an era in which all life has become by definition precarious.

Butler's novel begins in a time a few centuries after nuclear warfare has decimated the planet, eradicated most terrestrial animals, and nearly eliminated humans. A small group of remaining humans have been captured and put into suspended animation by a visiting alien species called the Oankali. The Oankali have three distinct bodies, male, female, and a third non-gendered form called ooloi. Oankali need five bodies to mate, the male and female Oankali, an ooloi, and a male and female of another species. From the outset of the novel, we find that the Oankali, have stored human DNA on their spaceship that is also itself alive, and have begun manipulating it, learning to control human diseases and mitigate antisocial behavior and mood swings. Among the captive

humans, the Oankali awaken Lilith Iyapo as the person to take charge of awakening the rest of the humans, to introduce them to the aliens, and to plan their return to earth. The few remaining humans on earth are offered the choice to interbreed with the alien species and eventually leave earth, or remain on earth but to be sterilized, completing the extinction event. The Oankali announce themselves as "gene traders" (41), but they also are interested in making a genetic bank of the overall biodiversity of the earth. Despite the mass extinction event of the nuclear war, "Earth was still a huge biological bank itself, balancing its own ecology with little Oankali help." By comparison, on the shuttle, "there was only a potential profusion stored in people's memories and in seed, cell, and gene-print banks" (481).

Butler's story of alien-human interbreeding opens on to themes prescient today that involve shifting notions of human-animal relations, the connection of rising extinction rates to ecological distress, and the rapidly developing gene sciences. While Butler had experimented with some of these concerns in her earlier books in her *Patternist* series (particularly in *Clay's Ark* published in 1984), in the *Xenogenesis* novels0 Butler constructs a situation in which gene storage, genetic manipulation, and the exchange of genetic material through inter-species sexual reproduction are intertwined throughout the arc of the narrative. The Oankali themselves declare their manipulations of genetic material to be a biological necessity: "We do what you would call genetic engineering. We know you had begun to do it yourselves a little, but it's foreign to you. We do it naturally. We must do it. It renews us, enables us to survive as an evolving species instead of specializing ourselves into extinction or stagnation" (40). Here gene gathering and manipulation are described as being instrumentally necessary to the continuation-by-variation of the Oankali. The Oankali declare extinction to be as execrable as "stagnation," which implies that staying put in one species form or on one planet is a mistake. The aliens seek either to persuade or impose this attitude upon the few remaining humans.

Thus the last human narrative in the Xenogenesis trilogy intersects with a new, first animal narrative, a human-Oankali hybrid, which is indicative of the non-apocalyptic optimism of the Oankali.[3] This first animal narrative, with the role of Adam/Eve played by Lilith, also stands as an allegory for the notion that science fiction is the special genre that can use posthuman figures to imagine an alternative to human conflicts. Neither ultimately dystopian nor utopian, Butler's trilogy takes a cautious and intimate look at

how gene banks and genetic manipulation play crucial roles in a world of escalating extinction rates. Early in the novel, one Oankali explains that even though they now have banked genetic material and can clone humans, they would rather find a willing partner who challenges them to grow biologically and culturally. "We … do need you…. A partner must be biologically interesting, attractive to us, and you are fascinating. You are horror and beauty in a rare combination. In a very real way, you've captured us, and we can't escape" (153).

Here I want to examine some of the recent scientific developments in reductionist gene science that focus on the manipulation and storing of genes as a way to stem animal extinction. Comparing this scientific research on extinction to the last human and last animal narratives of science fiction in Butler's novels allows us to understand better the rapidly changing stakes of what extinction means today. Not all visions of the precarious life of animals are the same, so careful attention is needed to unpack the specific metaphors, techno-sciences, and conservation aims that circulate around last animals. Additionally, a closer look at gene banking and extinction in contemporary science and in Butler's trilogy opens up further analysis of how issues of biodiversity connect to biopolitics and animal materialities central to current debates in animal studies. Butler's novels ask the reader to consider the effects of the malleability of biology through an animal-human-alien spectrum. Her writings speak to how animal studies can bring out new understandings of what happens at biological thresholds, ranging from the posthuman turn to human extinction. As Kari Weil states, "If animal studies has come of age, it is perhaps because nonhuman animals have become a limit case for theories of difference, otherness, and power" (5). However, the documentation, narratives, and scientific attention that are directed to last animals are often quite different from research on more commonly discussed themes in animal studies, such as animal rights, consciousness, using animals for food, or companion species. "Last" lives have a different power than lives that seem to be lived in abundance, even as the lives of animals in broad terms remains quite precarious today.

The end of an animal species raises complex questions about how to define species, how speciation works, how to record species loss, and how human power and attitudes toward species difference are factors in escalating rates of animal extinction today. Taken all together, these matters indicate that extinction must play a significant role in the field of animal studies, although the topic of extinction has been relatively under-discussed in this context. Donna Haraway, Sarah Franklin, and Richard Twine, among other scholars of animal studies, have called for more attention to how "stem cells, and the emergent industries of cell line banking and tissue engineering, integrate life and

death in new ways that are both culturally and economically significant — and ask for critical attention" (Franklin 5). In the context of the increasing evidence of biodiversity loss across the planet, Haraway argues for a sense of a common danger facing humans and animals "to guide us in getting on together in defiance of the double death of extinctions and exterminations in the polluted oceans of indifference that threaten to drown the ongoingness of terran generations" (*Species Matters* 17). What makes Butler's work particularly compelling is the way she brings together issues of biology and ecology on microscopic and macroscopic scales without assuming that a healthy holism towards the planet will resolve biological conflicts into a benign condition of biodiversity. As I will discuss, the Oankali are motivated to archive the earth's biodiversity but not save the earth itself. The aliens are deeply curious about the earth's animal life but have no deep connection to animals in particular beyond the fact that their spaceship itself is a giant living entity. The Oankali do not see a contradiction in their desire to trade genes with humans and to store the earth's biological material in seed and gene banks while they let life on earth go extinct.

"We have prints of all of you": The Speculative Fiction of Gene Banking and Trading. At several moments in Butler's trilogy, the Oankali remind humans that "We have prints of all of you" (291), meaning that they have collected and stored the genetic material of humans as well as of the plants and animals on earth. The ideas that biological diversity resides at the level of the gene and that genes can be collected as "prints" into what are now called "gene banks" are converging areas of biotechnological application today in conservation biology. Modifying DNA, cloning whole organisms from an embryo, and storing genomic material cryogenically (in a seed bank, cell bank, or even as a computer program), are each distinct forms of assisted reproduction technologies (ART) that are redefining the terms of species and speciation. Genomic manipulation and cloning have received considerable attention in scientific and public literature. While gene banking is less well-known, it plays a significant role in Butler's novel and in scientific work on extinction today.

Even before the first cloned animal, Dolly, was achieved in 1997, several laboratories had already begun to collect the embryonic material of animals on the brink of extinction. These gene bank collections are often called "frozen zoos." A frozen zoo is a collection of sperm, egg, and skin cells taken from endangered species and preserved in tanks of liquid nitrogen at -196 degrees Celsius. The first facility of this type was

developed by the San Diego Zoological Society (led by Kurt Benirschke[4]) in 1975. This research center, which copyrighted the name "Frozen Zoo," now has samples from more than 8,400 individuals, representing more than 800 species and subspecies. If a species that had its DNA preserved were to go extinct, in principle scientists could use the DNA stored in these frozen zoos to resuscitate the animal, as long as another living animal, whose reproductive process closely followed the extinct animal, could bring the embryo to term. Frozen zoos now have further research and funding momentum in the wake of increased attention to the notion of a sixth mass extinction, including a major facility recently established in England called "The Frozen Ark." The metaphor of the ark or zoo gives these projects a millenarian halo, what Donna Haraway describes as a "sacred-secular" narrative of "both physical and epistemological rescue" (*When Species* 252) that helps garner attention but belies the difficulty these research centers face in achieving reproductive success for animals rapidly dwindling in numbers.

Already by the late 1980s, when Butler published the first books in the trilogy, several live births had been accomplished using previously frozen embryos. For example, Dr. Betsy Dresser, first at the Cincinnati Zoo, and then moving to the Audubon Center for Research of Endangered Species (ACRES) in 1995, has achieved several instances of applying a range of ART to endangered animals, including the use of cloning and cryogenically preserved genetic material. At ACRES, Dresser also has established a frozen zoo that holds the DNA of over 5,000 animals. While research centers such as ACRES are building gene banks and developing technologies to revive and reproduce frozen embryos, many proponents of wildlife conservation question the large sums of money being channeled to these laboratories rather than to preserving existing animals in their ecosystems. Dresser, in response, calls for a multi-layered approach to conservation, stating that "Any tool for saving endangered species is important. Cloning is just another reproductive tool, like in-vitro fertilization" (qtd. in Trivedi).

Dresser conveys a stoic optimism in applying cloning science along with other forms of assisted reproduction technology to conservation biology, and it is easy to understand why. So much of popular culture reception of this science spins out into hypotheticals of greedy corporate genome manipulation for personal betterment or benevolent yet naïve scientists unleashing unforeseen dangerous consequences. James Rollins crafted a pulp thriller, *Altar of Eden* (2010), inspired by the Audubon center, which imagined an underworld of profiteering with enhanced animals. In Rollins's novel, the director of the frozen zoo at ACRES, a fictional character named Dr. Lorna Polk, works on developing ART techniques for endangered animals but finds herself enmeshed in a

James Bond-like scenario in which she must thwart a paramilitary operation on a tropical island attempting to apply similar genetic science to create super-animals and super-humans. Such narratives of reductionist science used for outrageous biopolitical purposes and ego-driven bodily enhancement are formulaic conceits common in Hollywood productions. Butler manages to craft her narrative skillfully around ART and gene banking without resorting to these big-screen scenarios, even as she makes explicit connections between gene banking and control over social and biological systems. What needs to be scrutinized more is how the work of frozen zoos is entangled with governmental and non-governmental agencies, landscape developers, the wider spectrum of biological science, indigenous people's local animal knowledge, animal welfare activists, and poachers.

Some anecdotal insight into how frozen zoos operate can be of help here. I recently had the chance to view a small frozen zoo facility created at the Toronto Zoo. Essentially, all that is needed to begin a frozen zoo is a tank of liquid nitrogen and some gamete cells. These storage tanks slowly leak, so they must be refilled weekly, while security measures and updated databases need to be maintained. At the Toronto Zoo, where a few dozen gamete cells of endangered animals are stored, the tanks occupy a small room next to a lab in which a few scientists work on developing better and more consistent techniques for freezing and reviving cells. Much of the science dealing with freezing, storing, and reviving cryogenically preserved cells of endangered animals comes from the research done in the field of human infertility treatment. The scientists at the Toronto Zoo work on adapting this research and technology to the needs of specific animals and cell lines. They are not interested in making animals from scratch, and several spoke skeptically of science done at frozen zoos elsewhere that sought exclusivity or stressed achieving scientific firsts without focusing more on the primary aim of these labs: to find a way to increase animal numbers in their native habitats. The practical pay-off of these labs is more likely found in the capacity to send chilled elephant sperm for insemination rather than the cumbersome whole elephant, or figuring out that there may be laws against transporting some animals across borders to meet their mates, but not against sending the frozen gametes. These frozen zoo projects are just beginning to grapple with what kind of legal, biological, and politicized animal is revealed at the frozen, bankable cellular level. The daily functioning of these labs is not really evocative of new Noah's arks but rather appears as plodding science, caught

between unpredictability and determination, navigating through the entanglements of conservation, zoo culture, and animal reproduction research.

The few environmental humanities scholars who have discussed frozen zoos, including Haraway, Carol Freeman, Stephanie Turner, and Matthew Chrulew, have understood the freezing and cloning of DNA for the most part as a biopolitical practice where the care of the animal is subordinated to the power of technoscientific institutions and the process of scientific development and control over life.[5] Chrulew argues that frozen zoos "exemplify in extremis the zoo-logic by which embodied living creatures, in connectivity with generations and kin, and emplaced within habitat, are subordinated to reified notions of the species and its genome…. What [the frozen zoo] reveals is the hierarchy of differential valuation that structures the biopolitics of endangered species preservation, prioritising species over individuals, code over life, genes over bodies." There is ample reason to be critical about the biopolitics of regenerating species from frozen DNA, as current research produces much more failure than success, and each procedure involves experimentation that can be invasive to animal bodies. In addition to the painful procedures animals must endure, as well as the many cases of miscarriage in such research, frozen zoo projects also problematically depend on a limited gene pool, tend to preserve favored and usually charismatic animals rather than all endangered species, and mix conservation research with for-profit potential and biological patents. One key question that needs to be continually asked is whether invasiveness is preferable to extinction, or is there another way? Furthermore, ART practices increase the reliance of animal life on new technological developments, which are prone to failure or obsolescence, and must justify themselves to institutional funding sources. Finally, such science effectively diminishes the importance of localism, bypassing local knowledge and indigenous practices of care for ecosystems and cohabiting with animals.

The frozen zoo is based on limited, reductionist science and recognizes that a frozen cell is a poor substitute for the wild animal. Thus the frozen zoo is but one contribution to a species survival plan that is constantly under review for improvement and constantly prone to failure. In conjunction with a biopolitical critique of such reductionist science, it is worth considering what this science could contribute to conservation work that may at times rely on reductionism but is effective only in the context of larger efforts to support biodiversity at multiple scales and time frames. Frozen zoos involve thinking about and acting according to time scales longer than a human generation, which is essential in conceptualizing long-term ecological changes. These projects look hundreds of years into the future, meaning that the zoo is a technology of prediction as much as a

conservation of the past. Frozen zoos predict both a catastrophic futurity and a technologically advanced and biodiversity-caring future civilization that can put such an archive to use, a possible world both utopian and crumbling.[6] Finally, catastrophic planning can result in more attention to ecological fragility in the present, while reductionism to the gene can lead to expansiveness later.

In Butler's trilogy, ecological catastrophe and the use of gene banks are two aspects of the same situation. As the Oankali explain to the surviving humans, the nuclear war had decimated the overwhelming majority of life on the planet and "had made their world utterly hostile to life" (290). Almost all of the plant and animal life the humans see on the planet has been reconstructed from the "prints" of plant and animal genomes the Oankali had made. Without this re-engineering, "Nothing would have survived except bacteria, a few small land plants and animals, and some sea creatures. Most of the life that you see around you we reseeded from prints, from collected specimens from our own creations, and from altered remnants of things that had undergone benign changes before we found them" (290). If intelligent humans have begun to preserve genetic material in seed and gene banks as a way to try to evade permanent ecological loss, one could argue that similar intelligent life elsewhere in the cosmos will have confronted a comparable problem and conceived of a version of genomic banking as well. If our gene banks convey care for biodiversity, would not other species' banks express the same thing, even if humans were part of such collections? It would appear that the Oankali demonstrate a distinctly biocentric ethos in their attention to archiving life on earth and going to the trouble to "reseed" it once again for human habitation. In the rest of this essay, however, I will argue that Butler's narrative offers a more ambivalent view of how the aliens use gene banks, reductionist gene science, and proclaim that "We revere life" (153). As I will show, the Oankali do not revere the earth, nor do they believe that the specific lives of animal species are ultimately all that important.

Species-Being between Essentialism and Extinction. Reductionist gene science and gene banking play the paradoxical role of offering both salvation and extinction in Butler's trilogy. The Oankali are constantly collecting genetic data to learn about earth but also to store its information before the earth is destroyed, since it effectively will be torn apart after the Oankali leave. An Oankali tells a human, in seeming consolation, "we all took prints of you — read all that your bodies could tell us about themselves

and created a kind of blueprint. I could make a physical copy of you even if you hadn't survived" (289). Since much of the biodiversity on earth did not survive the nuclear war, life on earth is already a reprint, with biodiversity achieved by simulacra. The Oankali store the earth's genomic material, but then mix and match it with other genomic material when they reseed the planet. In post-extinction event times, the line between biodiversity bank and zoo is no longer distinct. Furthermore, if the Oankali can reseed earth, they can reseed other planets just as easily; thus there is no reason to be specifically attached to one planet. They can recreate extinct animals but just as well create new animals by way of genetic manipulation. The reader of Butler's trilogy then is prompted to ask the same questions regarding gene banking used for conservation biology today as well — will it be used to maintain biodiversity on earth or is it preparation to seed another planet?

The gene bank made from Earth's biodiversity that the Oankali establish is inseparable from the motivation to absorb human genes into their bodies, thereby effacing the human species even while preserving its genes. Thus, in Butler's story, for human genes to survive, the human form and specific human body must give way. The material of the human genome is being divorced from the figure of the human body by the Oankali. The surviving human characters are faced with this cognitive and embodied dissonance. Those who choose to keep the human body intact, but at the cost of fatefully eliminating the human genome since they are sterilized, are called resisters. Placing the onus for this decision on humans, the Oankali initially believed that the nuclear war demonstrated that humans had decided to commit what the novel calls "humanicide" (8). As one of the Oankali, Jdahya, tells Lilith, "We thought … that there had been a consensus among you, that you had agreed to die" (16). Yet when the remaining humans are faced with self-knowledge of their own imminent extinction event, they are willing to use war against the aliens to keep the human form intact.

The Oankali undermine species specificity both by favoring genotypes over phenotypic forms and welcoming biotechnological manipulation regardless of any ensuing extinctions. To make sense of the current stakes of extinction, I would argue, requires a concept of animal species specificity that is more than just a collection of genes. A rabbit is not the same as a paramecium, which is not the same as a human; species specificity matters at the level of the overall biological form (phenotype) as much as at the minimal genomic level. However, it still needs to be acknowledged that being tied too rigidly to a notion of species identity is a version of biological essentialism that is undone by evolution itself. Butler's trilogy prompts readers to accept both essentialism and change in the animal in order to make sense of the contingent identity of a species. By showing

both extinction and speciation in action, her work also recognizes how processes of natural and artificial selection have made and are still making species. Animal studies and extinction studies require fine-tuned attention to both species specification and metamorphosis, which intertwine the integrity and consistency of a genome with aspects of genetic mutation, manipulation, and hybridization. It is common for conservation biologists today to declare the species "the basic unit of conservation" (Marchetti and Moyle 37) but at the same time to question what species and speciation really entails. The increasing introduction of ART into speciation indicates that sexual mating is not the only way for reproduction (or speciation) to happen. In Butler's narrative, the human desire for being specifically human, and reproducing sexually without interference, is cast as either a form of resistance or nostalgia, depending on each character's degree of consent. The Oankali either will convince or force the human species to give way to speciation.

The Oankali are fond of sampling and storing biodiversity, but are they what deep ecologists would call biocentric (which is usually counterpoised to anthropocentric)? How does the *Xenogenesis* plot intersect with a concern for life in general — and against speciesism — which would connect Butler's trilogy to an ecological critique of the contemporary human dominance of other species? As Nikanj, one of Lilith's Oankali partners, puts it, "We revere life" (153). For example, Akin, Lilith's human-Oankali child, takes every opportunity he can to "taste" the biological life around him, not to consume it but to store its genetic material and also appreciate its presence. By contrast, "Humans had evolved from hierarchical life, dominating, often killing other life" (564). The Oankali define themselves as life made from other life, and seem to adhere to a kind of universal biological egalitarianism: "Oankali had evolved from acquisitive life, collecting and combining with other life. To kill was not simply wasteful to the Oankali. It was as unacceptable as slicing off their own healthy limbs. They fought only to save their lives and the lives of others" (564). In another example of this reverence for life, the Oankali do not eat animals and require that humans who mate with them do the same.

However, there remain some tensions between the biocentrism of the Oankali, with their gene storing and trading, and care for the specific biodiversity that the earth holds. To care for biodiversity certainly involves limiting extinctions when feasible or if caused by human negligence or self-interest. Yet the Oankali are not worried at all about the extinction of the specific form of the human species or of any other animal. If

humans rebel or refuse, Nikanj mentions rather casually that, since the Oankali already have the human genomes banked, "We would be sorry to lose you, but at least we would save something" (291). The generic biocentrism of the Oankali, the need to "save something," is evident furthermore in their claim that "Life was treasure. The only treasure" (564). This phrasing suggests that life in general is the only true value, not any specific life form. The Oankali are not concerned by the loss of earth in the slightest, which they will leave a shell of itself by harvesting it of organic and inorganic material for their space ship.

Another way of phrasing this difference between biocentrism and biodiversity is that the Oankali care much about life (and gene pools), but are not very attentive to specific animals themselves. The Oankali relish life at the level of genetic surplus and storage, but are not very mindful of the nuances of the lives of animals. The Oankali do not seem to have close relations with companion species aside from their own ship, which is alive. One might say that Oankali revere genes and what can be done with them more than any specific animal. While on the spaceship, Akin is drawn to a composite animal the Oankali had assembled called a "tilio," which is described as being similar to an otter. "Assemble was the right word, Akin thought. The tilio had been fashioned from the combined genes of several animals. Humans put animals in cages or tied them to keep them from straying. Oankali simply bred animals who did not want to stray and who enjoyed doing what they were intended to do. They were also pleased to be rewarded with new sensations or pleasurable familiar sensations" (446-47). Akin responds with both affection and suspicion towards this constructed animal that seems to enjoy its captivity. He recognizes in this animal the tendency of the Oankali to treat life as something one takes "blueprints" of and controls, mastering its biology and behavior, even as one reveres it. But Akin also questions this view of life that connects reverence to domestication, saying to himself, "You controlled both animals and people by controlling their reproduction — controlling it absolutely. But perhaps Akin could learn something that would be of use to the resisters. And he liked animals" (447). Akin shows a care for the animal that is not the same as the Oankali attitude towards care for its genes and reproductive potential, which they seem to equate with "life."

In the context then of this discussion of the nuances of the extinction plot, gene banking, and reductionist gene science in "assembling" animals, we can further complicate recent debates in literary critical responses to Butler's apparent genetic essentialism. The topic of whether or not Butler endorses a genetic essentialism in her novels has opened a series of vexing discussions among scholars of her work. Jessie Stickgold-Sarah points out that "The gene figures in *Xenogenesis* in several ways, all of them

distressing: as a tool of surveillance, as fate, as the threatened core of human identity, as a source of fundamental human flaws. Even when Lilith or other human beings challenge these interpretations, they are unable to advance any opposing metaphors" (425). Hoda Zaki argues that Butler's acceptance of a biological hardwiring of human behavior is a politically conservative position, because it forecloses any notion that humans could act otherwise to effect positive social change. Sherryl Vint points out that it is really the Oankali who are the genetic essentialists, and that the humans in the story are not entirely convinced that their behavior is wholly structured by the "conflict" in their genes that codes for hierarchy as well as intelligence (*Bodies* 66).[7] Yet, as Vint also notes, the Oankali are largely portrayed as positive, while many of the humans seem brutish and refuse to learn from, much less mate with, the aliens. Genetic essentialism, then, seems biopolitically opportunist for the Oankali and biopolitically fateful for humans.

In response to Zaki's argument, several critics have claimed rather that Butler's genetic essentialism is used strategically to critique other forms of essentialism, especially racism. The Oankali do not mention race at all, and it has no biological bearing for them. While the remaining humans retain some racial stereotypes and separate tribal and linguistic behaviors, they do not focus on race but are concerned with the human as a species. Nancy Jesser proposes that "Butler's essentialism should be read within a context of a gene theory that undermines racial categories and constructs, but that does not abandon genetic input in other human aspects, most importantly sex/gender" (39). Thus for Jesser, biological essentialism is needed to dismiss the pseudoscience of racial difference, but ends up reinstating in Butler's trilogy a model of heterosexual kinship. Among the core themes consistent across each of the books of the trilogy is the importance of parenting, kinship, and heterosexual pairing among humans. Whether or not humans can reproduce, they are continually pairing off heterosexually in the narrative, and looking askance at those who don't pair. To produce a human-Oankali hybrid or "construct" as the novel calls them, five total parents are required, including a heterosexual human couple. The novel ends up apparently confirming what queer theorist Lee Edelman has convincingly established as the relentless drive for "reproductive futurity" that is a hallmark of heteronormative sociality. In Edelman's scathing assessment, the entire social apparatus of espousing faith in the future, being useful and productive in the present, and nurturing the next generation is designed to effect a continuation of heteronormative values and marginalize queer,

nonreproductive, and anti-social lives. Science fiction's investment in futurity crosses paths directly with this powerful critique.

However, two things in Butler's trilogy force a rethinking of this view that reproductive futurity must be tied to restrictive gender and social norms: the immanent event of extinction and the inclusion of alien genes into the condition for any human reproduction in the future. Butler does not offer much of an alternative to Edelman and Jesser's criticisms, but her trilogy brings in to play other factors that change what sexual reproduction entails. In these novels, every form of reproduction is a contested, tense, insecure, and instable activity. The Oankali need three differently gendered bodies to mate — a human male and female and an ooloi — and the Oankali acknowledge that they are not sure how the "union" between the species will turn out. The humans who resist having hybrid children unwillingly condemn themselves to being non-reproductive. These humans are by no means accepting of anything like a queer existence, but their position does effectively tie being human to being non-reproductive and non-futural (although later they are given the option to make a new colony on Mars that would allow for human reproduction). The complexly layered reproductive decisions facing humans and aliens do not add up to a streamlined faith in the future. Rather desire and sex are caught up in intense biological and psychological concerns that circle around situations of life teetering on extinction.

Mating with Oankali includes a heterosexual component, but it is more than this, requiring a human-alien intimacy that breaks from values ascribed to the heteronormative, such as stigmatizing otherness and privileging standard models of the self. As Donna Haraway writes, *Xenogenesis* "is about the monstrous fear and hope that the child will not, after all, be like the parent.... Butler's fiction is about resistance to the imperative to recreate the sacred image of the same" (*Simians* 226). Just as important, reproductive futurity for humans turns into a critique of their own speciesism, the attitude that human species is implicitly special and can control the lives of all other animals with impunity. For humans to reproduce, to have a genetic future, they must open themselves to genetic otherness and forego notions of species purity and human dominion over all life. Lilith argues that the Oankali are just as much at risk as humans in this exchange: "They change us and we change them…. But some of what makes us Human will survive, just as some of what makes them Oankali will survive" (282). Reproductivity as hybridizing with the alien other in this sense also becomes anti-anthroponormative. A heteronormative speciesism that favors the human over all other species no longer holds when reproductive futurity means no longer remaining human.

One of Butler's driving conceits in the trilogy is that any crossing of the human divide with other species, let alone with aliens, would require a complicated reconfiguration of what sex means from the body to the genome. In interviews collected in *Conversations with Octavia Butler*, Butler has noted that she particularly wanted to imagine the Oankali as creatures who don't look like us yet desire us. They are more like ameboa than like mammals. Butler then says, "I wanted to have the interesting task of figuring out exactly how a different form of sex might work biologically" (105). Her solution is to turn to reductionist gene science and construct a kind of genetic consistency across species. This sense of a shared gene pool with aliens, supplemented by the Oankali desire to bank all genes they encounter, then leads back into problems of power and the ethical responsibility of manipulating the genes of humans and other animals, with or without their consent.

Whatever genes make up the Oankali, those genes themselves seek to combine with other genes in perpetual symbiosis. Oankali do not see genes as "selfish" (in Richard Dawkins's sense) in that they only want to perpetuate themselves. The Oankali would gladly trade genes to become other, rather than reproduce themselves and their current genes over and over again into "stagnation." Yet in another sense, the Oankali do participate in the discourse of "selfish genes" in that they see the gene as the sole locus of action. Akin states to a human he tries to convince to go to Mars, "Human purpose isn't what you say it is or what I say it is. It's what your biology says it is — what your genes say it is" (501). Genes seem to do all the speaking for the Oankali. Evelyn Fox Keller has written extensively on the view, so dominant throughout the twentieth century, that the gene is the origin and primary site of activity that defines the organism. Keller provides an intricate history of how the gene became such a singular focus for biologists, but also indicates how much of recent biotechnology is moving away from such a narrow focus on genes alone, and towards broader developmental biology and ecology. Keller adds that the shift away from the gene as lone actor is due not only to better science but also to a better understanding of how science is connected to institutions, discourses, and social practices. For, as Keller remarks, "What is specifically eclipsed in the discourse of gene action is the cytoplasmic body, marked simultaneously by gender, by international conflict, and by disciplinary politics" (*Refiguring Life* xv). To bring this back to Butler's trilogy, the Oankali see the gene as the site of action, but they too act on the gene, and change it according to their interests, which need not coincide with the interests of the original animal the genes come

from. Similar concerns are raised by contemporary frozen zoos, a technology that cannot help but increase the focus on isolated genes as the object of preservation.

That the Oankali's reverent valuation of life is open to further critique is also indicative of the ethical ambiguity of their delight in genetic manipulation seemingly as a techno-aesthetic pastime. Lilith tells the other human captives, "we're in the hands of people who manipulate DNA as naturally as we manipulate pencils and paintbrushes" (167). Readers have noted that Lilith seems to compare the Oankali to artists at the level of the gene, but pencils and paintbrushes are also tools for any form of instrumental work. Pencils can be erased and paint is easy to cover over with more paint, suggesting a transience to Oankali gene science. This artistic sense of gene manipulation does not ultimately entail a care for the autonomy of animals. In other words, Oankali have a feeling for the gene (to borrow terms from Evelyn Fox Keller's *A Feeling for the Organism*), a somewhat lesser feeling for the organism, and not much feeling for the animal or ecosystem. No Oankali suggests preserving the earth, much less freezing it.

Animal Autonomy and Alien Phenomenology. Ultimately, the reverence for life declared by the Oankali means storing, manipulating, and mixing genes rather than caring for the more or less stable and repetitive lives of specific animals in their habitats. Akin comes to fight for the restoration of human autonomy not just because he is part human, but also because he is wary of how the Oankali treat genes and animals generally. Akin is skeptical about some of the biopolitical practices of the Oankali even while he recognizes the fatal "conflict" (as the book calls it) in the human genome that codes for both hierarchy and intelligence and is blamed for leading humans to humanicide. Forcing humans to trade genes with the Oankali will apparently resolve the genetic contradiction that led humans to kill themselves and other animals. But Akin recognizes that the Oankali would also be responsible for the ultimate extinction of humans: "Because of us, they won't exist anymore" (377). After realizing the role the Oankali are playing in human extinction, Akin exclaims, "There should be Humans who don't change or die — Humans to go on if the … unions fail" (378). Akin's protests suggest that genetic manipulation might not be enough to ensure alien-human compatibility.

Akin's insistence that the specific form of the human not go extinct but be allowed to try to live on Mars is consistent with how other humans critique the Oankali for treating them as mere animals. That is, the Oankali treat humans the way humans tend to treat animals, as mere means for human ends. Lilith remarks on this comparison early on in the first novel after hearing of how the Oankali have been learning about human bodies

by manipulating their DNA while they sleep: "We used to treat animals that way … We did things to them — inoculations, surgery, isolation — all for their own good. We wanted them healthy and protected — sometimes so we could eat them later" (33). Sherryl Vint calls narratives about alien treatment of humans as animals "reversal stories" (*Animal* 158). She describes this narrative conceit as a device to show a "perceptual world and cultural norms [that] are different from one's own" (158). Humans who treat animals reductively as mere matter or means to satisfy human desires are themselves the object of reductive treatment by the Oankali. The aliens are effectively establishing their own frozen zoo of human DNA, reversing the collector/collection relationship of today's frozen zoos. "They collect the eggs, store them, collect sperm, store it" (295), as one Oankali matter-of-factly notes. Often the motive to store sperm and egg cells from animals encountered on earth takes precedence over any longer-term relationship with the animal. Akin balks at this frozen zoo-like treatment, and the primacy of reductionist science, while bonding with other animals. In effect, Akin seeks to reverse the reversal story and learn from this situation by preventing unnecessary human extinction and caring about biodiversity for its own sake.

Reversal stories connect to becoming-animal stories, but we should be careful here in assessing how much these two genres overlap in the context of the discussion of extinction and reductionist gene science. While Butler's trilogy beckons the reader with the fantasy of becoming-alien, a version of becoming-animal in the lexicon of Deleuze and Guattari, the narrative poses hard questions about extinction and the loss of biodiversity that are not addressed in philosophies of becoming. Becoming-animal is not an end in itself but a stepping stone to a more powerful ontology of continuous individuation. Deleuze claims that individuation entails a rudimentary vitalist power called "a life" that is inextinguishable in the universe because it is the immanent condition of the universe with itself. This power is complete, not reliant on anything else, and never can be vanquished. Deleuze calls "a life" "an impersonal and yet singular life" (28). "This indefinite life does not itself have moments … but only between-times, between moments" (29). Such indefinite life resides between the life of a specific body and its death, dwelling in neither. A life requires no body, indeed it is purely virtual and trans-individual. A life is a power that works within a plane of immanence to create events and singularities out of nothing more than the conditions of immanence of the plane. According to Deleuze, these planes are infinite, and just as the

virtual is infinite, so is this power of a life. Such immanent power is implicit in all being, yet is particularly manifest in intense moments of individuation that appear either when an organism evolves or when it dies. This death is, however, only a temporary pause in the continual becoming of a life that will carry on in another form. Ultimately, then, by Deleuze's philosophical account, extinction is only local, as life itself cannot go dormant and "might do without any individuality" (30).

In Butler's trilogy, becoming-alien means absorption into a continuous becoming that may ultimately lead to a loss of animal form even as some form of life goes on. One of the ooloi "constructs" (a construct is a human-ooloi hybrid) named Ahajas tells a human that

> "If I died on a lifeless world, a world that could sustain some form of life if it were tenacious enough, organelles within each cell of my body would survive and evolve. In perhaps a thousand million years, that world would be as full of life as this one….
> "Nothing is more tenacious than the life we are made of. A world of life from apparent death, from dissolution. That's what we believe in." (662-63)

Life without death approaches "a life," which Deleuze believed would be "complete bliss" (27). Yet as Ahajas nears a state of crisis over his need to find a mate in the final novel of the trilogy, its body starts to lose its form and threatens to turn into a less complex form of a life that would be deemed a permanent loss of its previous identity. Ahajas begins to panic and viscerally resists such an outcome, seeing this possibility as a devolution even if not a death. In fact, the Oankali cannot really promise a world free from dissolution, even if death is not a concern since its body would effectively sprout life anew in some way. Without a mate, ooloi risk losing their biological specificity to the extent of becoming a kind of organic soup. The ooloi and Oankali, just like humans, strive to resist a certain loss of form or physical complexity that would set their bodies into a gelatinous state. Becoming-alien, even as it undermines the human/other distinction, is not necessarily compatible with care for the nuances of biodiversity and the uniqueness of animal lives. There is a tension throughout the whole of the trilogy between the motive of banking "blueprints" of animals as they are and the motive to continuously become other and reconfigure life that takes no heed of past biological forms and sees biodiversity only as a useful tool for continual hybridization. Indeed, why make genetic blueprints or bank specific animal genes at all if "a life" is really what is revered?

Butler's last human and last animal plots show how notions of genetic determinism, hybridity, becoming, and biodiversity come under intense pressure in times of extinction. Current attempts at amassing a frozen zoo and experimenting with ways to circumvent extinction through techno-science are projects that expand the scope of responsibility for animals, but the discourse of animal care used in these cases is not justification alone and needs closer consideration. Furthermore, notions of animal becoming and hybridity also should be examined closely as complex entanglements, whether real or imagined, that always involve species in questions of power over life. Cary Wolfe points to how the rapid expansion of a biopolitical framework "increasingly takes as its political object planetary life itself" (52), as it spreads into the lives of animals from the minute genomic level to the scale of global ecology. Thresholds of speciation and animal finitude are powerful sites for understanding how biopolitics works. Butler's trilogy examines these conflicted conditions in particular at the tense intersection where multiple extinction narratives converge in scenes of last human and last animal conditions.

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Notes

1. Scientists began to use the phrase "The Sixth Mass Extinction" a few decades ago to describe the recent escalation in plant and animal extinction, comparing the current depletion of species to five previous massive extinction events that have been verified using fossil records (Leakey and Lewin). Paleontological evidence for previous mass extinctions is discussed by David M. Raup in *Extinction: Bad Genes or Bad Luck?* (1991).

2. All citations from the trilogy are from Octavia E. Butler *Lilith's Brood* (2000).

3. Ursula Heise argues that studies of extinction narratives need to question the tendency for such stories to always depict biodiversity in an inexorable decline, with a melancholic frame locked in. In contrast, Heise calls for a wider range of narrative comprehensions of extinction. In the case of Butler's trilogy, the Oankali's relentless

optimism and receptivity to human complexity suggest an alternative emotional and scientific approach to extinction narratives.

4. Benirschke leaves open speculation on why a frozen zoo might be needed: "You must collect things for reasons we don't understand" (326). See also Ryder and Benirschke. For more recent research on biodiversity cryopreservation, see Jewgenow et al.

5. See Haraway, Freeman, Turner, and Chrulew. For further context, see also Tudge, Heatherington.

6. Dresser has remarked that if humans ever find themselves terraforming other planets out of discovery or necessity, they would most likely use frozen DNA to re-establish animal populations (qtd. in Freeman 219).

7. As Vint notes further, "The Oankali may be genetic essentialists, but Butler's readers are encouraged not to be" (67).

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