

CORPOREALITY, GENETIC TECHNOLOGY, AND CLIMATE CHANGE IN THE YEAR OF THE FLOOD

Young-hyun Lee
Sungkyunkwan University
lemieux82@skku.edu

Abstract

In her novel *The Year of the Flood*, Margaret Atwood vividly illustrates the unmistakable impact of climate change on people's lives these days. Genetic manipulation has become one of the technologies that people have grown dependent on to solve environmental problems in this age of climate change, where severe droughts, rising sea levels, melting glaciers, and the like are being reported more frequently than ever. But genetic engineering has profound consequences for human corporealities, as both COVID-19 and *The Year of the Flood* show. In the novel, Atwood presents a world where humanity finds it hardly possible to survive without genetic fiddling. We find ourselves in a similar situation in real life, especially during the current COVID-19 pandemic where genetic alteration technology is essential: studies have shown that vaccination using genetic engineering is the best way to halt the spread of the virus, but no one can give a definite answer to its long-term effects on bodies. Atwood illustrates through the Paradise Project episode in the novel that such a genetic experiment can make the ecological future more uncertain and unstable in the age of climate crisis. Though a few monopolistic multinational GMO companies touted genetic engineering technologies as a benevolent solution, it has become evident that they are only doing so for their own profit, as exemplified by the Vitamin pill episode in the novel. In the real world and in *The Year of the Flood*, climate change and multinational capitalism exert a bad influence on biodiversity. With human and nonhuman animal bodies being mistreated more than ever as materials for the gene industry, Atwood shows how badly women are exploited in an age of genetic engineering. As we depend too much on genetic technologies, we tend to overlook the small but influential agencies within human and nonhuman assemblages, which result in dismissing the entanglement between human and nonhuman beings. It is becoming more and more difficult to imagine how we can function without genetic alteration, especially during the COVID-19 pandemic.

Keywords

gene technologies; genetic alteration; human corporealities; climate change; trans-corporeality; Margaret Atwood; *The Year of the Flood*; pandemic; capitalism

About the author

Dr. Young-hyun Lee teaches at Sungkyunkwan University in Seoul. Her publications of translated books include *Do You Know The "Comfort Women" of the Imperial Japanese Military?* (2017), *Truth: Problems for Peace* (2017), and 나의 첫여름 (*My First Summer in the Sierra*), which she co-translated with Dr. Won-Chung Kim in 2008. Lee recently received two one-year research awards from the National Research Foundation, to be held at Kangwon University for the academic years 2018-19 and 2019-20. She is the author of the scholarly articles "Food Ethics and GMOs in Margaret Atwood's *Oryx and Crake* and Paolo Bacigalupi's *The Windup Girl*," (*Mushroom Clouds: Ecocritical Approaches to Militarization and the Environment in East Asia*, 2021), which Simon Estok, Iping Liang and Shinji Iwamasa co-edited, and was published in Routledge; "Trans-corporeality, Climate Change, and *My Year of Meats*," *Neohelicon* 47 (A&HCI, 2020); "인류세환경론과 타자성 재고: 여성과 유색인종, 자연의 동인으로서의 물질인식 (Reconsidered Anthropocene Environmentalism and Otherness: Recognition of Materiality of Women, People of Color, and Nature as Agent)," *Literature and Environment* 19.4 (2020); "Food Transformation Technology in Paolo Bacigalupi's *The Windup Girl* and What it Means for Us," *Kritika Kultura* 33/34 (A&HCI, 2019); "The Different Representation of Suffering in the Two Versions of *The Vegetarian*," *CLCWeb* 21.5 (A&HCI, 2019); and "A Study of *The Man with the Compound Eyes on Climate Change, Plastics, and Body*" (forthcoming 2021). Her research interests lie primarily in the area of environmental humanities, cli-fi (climate fiction), and translation.

The impact of climate change on peoples' lives is hard to ignore these days, a fact that registers strongly in Margaret Atwood's *The Year of the Flood*. Contemporary news is increasingly showing the inevitability of a future that will include the kinds of genetic manipulations that are so central to Atwood's novel. The COVID-19 pandemic has shown the world the utility of genetic science, but genetic engineering has profound consequences for human corporealities, as both COVID-19 and *The Year of the Flood* prove. Writing from a world that is already genetically altered, Atwood shows the inevitability of a future of genetic fiddling, even as she seeks to criticize it, and the result is that the critique itself rings hollow and naive in *The Year of the Flood*: Pandora's box is open, and there is no going back to a GMO-free world, which leaves humans and nonhuman nature with uncertainties.¹

Atwood depicts a society rife with problems, some of which are intended to be solved by the Paradise Project², a project that instead suggests an uncertain and unstable ecological future. Even the Crakers³ themselves—herbivorous humanoids that only breed seasonally—are products of genetic modification, created by the genius scientist Crake in Atwood's previous novel *Oryx and Crake*, who wanted a world with “no more prostitution, no sexual abuse of children, no haggling over the price, no pimps, no sex slaves. No more rape” (Atwood, *Oryx* 165). This does not mean that the Crakers will make Utopia. Even though the Lion Isaiahists⁴ might argue that their intention—to “force the advent of the Peaceable Kingdom” and “to fulfil the lion/lamb friendship prophecy without the first eating the second”—is just religious and benevolent, Toby⁵ thinks “[if] it's her fate to be mangled and devoured, she'd prefer a more conventional beast of prey” (Atwood, *The Year* 113). There are so many examples of the use of genetic manipulation in the name of solving pending issues, regardless of their aftermath. While our world is struggling to recover from the COVID-19 pandemic in an age of climate crisis, a recent headline reveals that another genetic alteration project is underway to head off other effects of climate change as in the following article: “The Release of 1 Billion Exterminator Mosquitoes has Begun.”⁶ The article warned that “the plan could backfire” and that the trajectory of the results was unclear (Noor). Genetic manipulations produce frighteningly unpredictable results.

Gene research profits a few monopolistic multinational companies that produce GMOs, as *The Year of the Flood* shows. HelthWyzer⁷ is a fictional representation of one such company that Atwood offers in the novel, a company that “had been sticking a slow-acting but incurable gene-spliced disease germ inside their supplements so they could make a lot of money on the treatments” (Atwood, *The Year* 350). At OrganInc Farms, Jimmy's father works as one of the foremost architects of the pigoon (the official name is “*sus multiorganifer*”) project. Its goal is to “grow an assortment of foolproof human-tissue organs in a transgenic knockout pig host. . . . A rapid-maturity gene was spliced in so the pigoon kidneys and livers and hearts

would be ready sooner, and now they were perfecting a pigoon that could grow five or six kidneys at a time” (Atwood, *Oryx* 22). The Pigoon project is therefore an example of the pursuit of maximum profit with minimum input in capitalism, at the expense not just of animals, but of their kin and of humanity. In reality, xenotransplantation (the transplantation of organic matter from a given species into a different one) is “just a question of when,” not “if,” as Karen Weintraub has suggested in her fascinating article in *The Guardian* about the use of animal organs for transplant in humans . The issues caused by genetic tampering in industrial capitalism have many social and environmental implications.

The Vitamin pill episode in *The Year of The Flood* exemplifies how commercializing genetics occurs in industrial capitalism, especially when environmental issues deteriorate due to climate change. We learn, for instance, that HelthWyzer had been secretly putting disease germs inside their supplements so they could profit off of the treatments. We see here that even the cycles of instability might stop at once, as the episode leads to a global pandemic that leads to the extinction of the human race, with genius scientists only preoccupied with maximizing their profit by selling the products of their research.

Biodiversity, already compromised by climate change, is further derogated by multinational capitalism, as seen in the Happicuppa episode in the novel. Happicuppa, a HelthWyzer coffee franchise, epitomizes contemporary monocropping, an agricultural practice that leads to biodiversity loss. The gene-spliced Happicuppa coffee was intended “so that all of its beans would ripen simultaneously, and coffee could be grown on huge plantations and harvested with machines. This threw the small growers out of business and reduced not just them, but their labourers to starvation-level poverty” (Atwood, *Oryx* 179). Although scholars disagree about the scope of the term “The Anthropocene,” some environmental scholars such as Donna Haraway prefer a different terminology: “Plantationocene.” Her fondness for the term comes from the history of the plantation as “fundamental to the history of industrial capitalism;” the “transportation of people and plants;” “forced labour systems;” and “simplification of lifeways into monocropping, run by forced labour,” especially “slave labour” (Franklin 54). It is “forced migrations of organisms, including people” that is characteristic of the Plantationocene (Franklin 54). This forced migration is continuing, for instance, with the increase of palm oil tree plantations destined for agrofuel production, increased production of coffee, tea, and rubber, and various other increasingly monocropped items. The fictional Happicuppa coffee franchise destroys diversity and livelihoods: the Happicuppa coffee bush is grown on huge plantations and harvested using machines, and, like Amazon.com, forces small operations into bankruptcy.

People abuse human and nonhuman animal bodies more than ever today, as these bodies have become the material of lucrative businesses and objects of genetic value. As German scholar Dunja M. Mohr stresses in her paper “Eco-Dystopia and Biotechnology: Margaret Atwood, *Oryx and Crake* (2003), *The Year of The Flood* (2009) and *MaddAddam* (2013),” “Renaissance science, medicine in particular, sounded the bell for the separation of body and soul; mind and body were no longer a harmonious divine unity; the era of dismemberment had begun” (284). As far as animal bodies are concerned, we rarely see whole and intact bodies of animals in *The Year of the Flood*. What we see are various forms of bodies: hybrids, parts cut off animal bodies, SecretBurger patties which are ground and mixed with unidentified bodies, and a menu:

The skinned carcasses were sold on to a chain of gourmet restaurants called Rarity. The public dining rooms served steak and lamb and venison and buffalo, certified disease-free so it could be cooked rare—that was what “Rarity” pretended to mean. But in the private banquet rooms—key-club entry, bouncer-enforced—you could eat endangered species. The profits were immense; one bottle of tiger-bone wine alone was worth a neckful of diamonds. (Atwood, *The Year* 37)

Though it is illegal to trade endangered species, the business is unstoppable because it is “very lucrative. . . There were pockets within pockets, with a CorpSeCorps⁸ hand in each one of them” (Atwood, *The Year* 37). As in the episode of the bank robbery in *The Year of the Flood*, in which “an identity filcher hacked the accounts, gaining access with [a] cut-off thumb” (310), society becomes unsafe.

While American scholar Brooks Bouson indicates that “we’re using up the Earth. It’s almost gone,” Atwood shows in *The Year of The Flood* that we are using up women, especially women’s bodies, in the gene research era. When women’s reproduction is replaced by laboratory reproduction, things can become abusive, as *The Year of the Flood* clearly reveals. To Blanco⁹—Toby’s boss, the manager of SecretBurgers—women are mindless and replaceable bodies and sexual slaves. Blanco says, “You’re meat!” when he sees Toby during his thwarted attack on the Gardeners (255). Bouson points out “the sexual cannibalism of Blanco, the predatory manager of SecretBurgers, who views the women who work for him—like Toby—as his female prey” (Bouson 13). The novel makes clear that “today [the center of power] wouldn’t be a single person, it would be the technological connections” (Atwood, *The Year* 271). In such a technocratic society, Toby’s parents are forced into bankruptcy by the CorpSeCorps. Toby, being left alone with nobody to support her, falls into a situation where she has no choice but to sell her hair, at first, and then her eggs. Before long, she cannot sell even her eggs, because “the second time the extraction needle had been infected” (Atwood, *The Year* 38). She becomes infertile, which is the main reason for her breakup with her boyfriend Stan. In a long tradition of

female objectification that facilitates and even encourages the transformation of the female subject into mere flesh, Atwood shows that treating women as rotting corpses and meat is dehumanizing. Some women working for Scales and Tails,¹⁰ as in the case of “temporaries,” are “disposable” (Atwood, *The Year* 479).

The meaning of the word “genetic” suggests the risk that human and nonhuman nature face above all else, in that once the gene is manipulated, the altered characteristics of a living being are transferred to the next generation. With environmental degradation continuing apace in *The Year of the Flood*, genetic manipulation “has unleashed invasive hybrids such as ‘pigoons,’¹¹ ‘bobkittens,’ ‘wolvogs,’ and ‘rakunks’ into the landscape, as well as introduced the threat of new and untreatable superviruses” (Canavan 142). The words “invasive” and “untreatable” here suggest the severity of the problem as it becomes more and more uncontrollable through genetic tampering.

The concept of agency in an age of climate change suggests that uncontrollable things exponentially rise as the number of genetic alterations increases. Stacy Alaimo explains that human beings tend to limit the concept of agency “within the province of rational—and thus exclusively human—deliberation” (Alaimo, *Bodily* 143). However, we can no longer ignore “the multiple non-human ‘actants’ with whom we share and co-constitute our common world” (*Posthuman Glossary* 293). Alaimo claims in a theory of ‘trans-corporeality’ that

reconsiderations of materiality . . . must grapple . . . with the question of material agency, since the evacuation of agency from nature underwrites the transformation of the world into a passive repository of resources for human use, which of course has had devastating ecological effects. (Alaimo, *Bodily* 143)

As Karen Barad, feminist American quantum physicist indicates, we need to understand “intra-action” as “the mutual constitution of entangled agencies” (Barad 33, original emphasis) in which “individual entities do not exist outside of their relationship” (*Posthuman Glossary* 293). It seems more evident than ever that “the interacting material agencies provoked by the staggering scale and fearsome pace of human activities” (Alaimo, *Exposed* 178) will lead us to unexpected results, especially in an era of climate crisis.

Overreliance on genetic technologies overlooks the small but influential agencies within the human and nonhuman assemblages, as *The Year of the Flood* shows. Microorganisms in human bodies are an example of such agency. As the US National Institute of Health states, “the human body contains trillions of microorganisms—outnumbering human cells by 10 to 1.”¹² In *The Year of the Flood*, Adam One¹³ appreciates “the gripping mural of the Fox Snake ingesting a Frog—an

apt reminder to us of the intertwined nature of the Dance of Life” (Atwood, *The Year* 277), in a world where small things tend to be ignored. According to British Science journalist Ed Yong, “our bodies are continuously built and reshaped by the bacteria inside us” (63), and while our “cells carry between 20,000 and 25,000 genes, . . . it is estimated that the microbes inside you wield around 500 times more. This genetic wealth, combined with their rapid evolution, makes them virtuosos of biochemistry,” in that they can adapt to any possible task: digesting what we eat; producing “vitamins and minerals” absent in our bodies; breaking down “toxins and hazardous chemicals;” and protecting us from disease (Yong 11-12). Such a trans-corporeal becoming, Jane Bennett suggests, may be able to “expose a wider distribution of agency” within human-non-human assemblages (122). This is important in relation to *The Year of the Flood* because people tend to overlook the power of agency, as genetic engineering technologies become more prevalent.

Overdependence on gene technologies leads to dismissing the entanglement between human and nonhuman beings. Bacteria, earthworms, snails, or mushrooms, however humble they look, are vital parts of the food chain because they return nutrients into the soil for other organisms to use. They also sometimes act as medicine, which was indispensable during the First World War, as Pilar¹⁴ explains in *The Year of the Flood*:

[Maggot] therapy was very ancient. It had been discarded as out of date along with leeches and bleeding, but during the First World War the doctors had noticed that soldiers’ wounds healed much faster if maggots were present. Not only did the helpful creatures eat the decaying flesh, they killed necrotic bacteria, and were thus a great help in preventing gangrene (Atwood, *The Year* 129).

The doctors who have joined the God’s Gardeners use various nonhuman beings for treatment instead of antibiotics or drugs made in the Compounds, as Pilar and Katuru did: “Pilar and Katuru sponged Zeb’s cuts with vinegar, then rubbed on honey. Zeb was no longer bleeding, though he was pale. Toby got him a drink of Sumac” (Atwood, *The Year* 129).¹⁵ Just like bees, leeches and maggots, vinegar and Sumac work as medicine in the hands of the Gardeners. With her vitality increasing, Toby saves Amanda and takes care of Ren by defeating violent, fearful beings as “Painballers,” which shows how human and nonhuman actors are entangled with each other.

Clients of AnooYoo Spa¹⁶ hope for non-decaying life and youthfulness, which presents a striking contrast with Pilar’s wish to be compost. Composting means mixing dead and decayed plants to help plants live and grow, a process Serpil Opperman calls “compost poiesis”:

Although poiesis originally signifies making (as in making material objects like tables, shoes, and artifacts, as well as storymaking, or art-making), compost poiesis amplifies the word's originary sense by reconciling making with unmaking to give a sense of the twofold condition of composting entities who undergo continuous decomposition and recomposition. Through metamorphosing with one another, they mesh with the earth's evolutionary systems to become part of a dervish whirl of environmentality. (136-137)

Pilar leaves a will that she be composted in Heritage Park, and she “herself thoughtfully selected the shrub she wished planted on top of her—a fine specimen of Elderberry—so that in time [God’s Gardeners] may expect some foraging dividends” (Atwood, *The Year* 219). Becoming compost, through which the cycle of life and death is accomplished, is a way to participate in the cycle of matter and make sustainable life possible for both human and nonhuman beings.

Atwood suggests that the Edencliff carefully tended by God’s Gardeners in the novel can be more effective than genetic manipulation as a way to overcome climate change. The Edencliff which God’s Gardeners created is an example of “refugia.”¹⁷ In a novel that ends with the extinction of humanity, God’s Gardeners create the Edencliff, which used to be “a sizzling wasteland, hemmed in by festering city slums and dens of wickedness; but now it has blossomed as the rose. By covering such barren rooftops with greenery” (Atwood, *The Year* 13), they feed themselves and save and take care of human and nonhuman life. Haraway, quoting Anna Tsing in *Staying with the Trouble: Making Kin in the Chthulucene*, suggests that “the inflection point between the Holocene and the Anthropocene might be the wiping out of most of the refugia from which diverse species assemblages (with or without people) can be reconstituted after major events (like desertification, or clear cutting, or, or, ...)” (159). Thus, creating the Edencliff is more essential than ever, and it deserves to be called “refugia” in that it provides every possible means to “sustain reworlding in rich cultural and biological diversity” in the age of climate change (Haraway 160). The Edencliff can be a starting point for a sustainable future for both human and nonhuman beings, but one thing is certain: there is no going back to a world without genetic manipulation. The genie is out of the bottle and is not going back in.

Atwood shows that such a genetic experiment as the Paradise Project in the age of climate crisis makes the ecological future more uncertain and unstable than ever. Though the causes of genetic engineering have always sounded benevolent, the real motive of the monopolistic multinational GMO companies behind them is to turn it into a lucrative business for their own profit. The Vitamin pill episode exemplifies how GMO businesses might develop in industrial capitalism, especially when environmental issues deteriorate due to climate change. Biodiversity is also under threat from climate change and multinational capitalism, both in the real world and in *The Year of the Flood*. Humanity mistreats human and nonhuman animal bodies more than ever, as

they have become materials for the gene industry. Atwood also shows that we are exploiting women in an age of genetic engineering. The concept of agency suggests that uncontrollable things exponentially increase, as the number of GMOs increases. The tendency toward overreliance on genetic technologies overlooks the small but influential agencies within human and nonhuman assemblages. Overdependence on genetic manipulation leads to dismissing the entanglement between human and nonhuman beings. Clients of AnooYoo Spa hope for nondecaying life and youthfulness, which presents a striking contrast with Pilar's wish to be compost in the novel. Toby's body illustrates how much women's bodies can be degraded, while the technocracy devotes all its energy to genetic manipulation for its own benefit. Atwood suggests in *The Year of the Flood* that the Edencliff carefully tended by God's Gardeners can be more effective than gene technologies in overcoming climate change. While it may be time to rethink our involvements with gene technologies, however, we also need to realize that at this point, it is difficult to imagine our survival without such science—a lesson that the mRNA COVID vaccines have powerfully imparted.

Notes

1. I am deeply indebted to Simon Estok's editorial suggestions and wording in this paragraph—particularly on the matter about the current state of genetic research being a kind of Pandora's Box.
2. The Paradise Project is intended to create a race that would replace humanity using genetic transformation technologies. Crake, a genius scientist, is "in charge of a really important initiative called the Paradise Project. They'd built a special dome for it, with its own air supply and quadruple security. He'd assembled a team of the best brains available, and they were working night and day" (Atwood, *The Year* 364).
3. The Crakers are the result of the above mentioned "Paradise Project" led by Crake.
4. The Lion Isaiahists are one of numerous fringe cults in *The Year of the Flood*. The following quotation indicates what this cult stands for: "The Lion Isaiahists and the Wolf Isaiahists both preached on street corners, battling when they met: they were at odds over whether it was the lion or the wolf that would lie down with the lamb once the Peaceable Kingdom had arrived" (Atwood, *The Year* 47).
5. *The Year of the Flood* follows two main female characters, Toby and Ren.
6. For more information, see <<https://gizmodo.com/the-release-of-1-billion-killer-gmo-mosquitoes-has-begu-1846800665>>.
7. Atwood shows several suspicious cases which are related with HelthWyzer. Toby's mother who had always been so careful about her health came down with a strange illness. In addition to exercises and vegetarian diet, she "took a dose of HelthWyzer Hi-Potency VitalVite supplements daily" (Atwood, *The Year* 31).
8. In *The Year of the Flood*, CorpSeCorps (the abbreviation for the Corporation Security Corps) intervenes and controls peoples' lives as a private security firm.
9. Blanco as the psychopathic manager of the burger chain (SecretBurgers) sexually assaults and murders the female employees working for him.
10. Ren, one of the two narrators and protagonists in *The Year of the Flood*, becomes a sex worker and trapeze dancer in the sex club Scales and Tails, part of SeksMart.
11. Genetic manipulation is used to transplant human stem cells and DNA into pigs, to grow new human pieces in *The Year of the Flood*. Pigoons (like pig balloon), luminous green rabbits, bobkittens, wolvogs, and rakunks are part of the creatures produced in these experiments.
12. For more information, see <<https://www.nih.gov/news-events/news-releases/nih-human-microbiome-project-defines-normal-bacterial-makeup-body>>.
13. He is the leader of the God's Gardeners. The God's Gardeners live an ecological life as a small community of survivors of "the Waterless Flood," which is a biological catastrophe.
14. Pilar is one of the God's Gardeners in *The Year of the Flood*. Her specialty is tending bees and mushrooms.
15. Sumac was used as a treatment for several different ailments in medieval medicine, primarily in Middle Eastern and South Asian countries (where it was more readily available than in Europe). An 11th-century shipwreck off the coast of Rhodes, excavated

by archaeologists in the 1970s, contained commercial quantities of sumac drupes. These could have been intended for use as medicine, as a culinary spice, or as a dye. A clinical study showed that dietary sumac decreases the blood pressure in patients with hypertension and can be used as adjunctive treatment (Wikipedia).

16. Here are some of the catchphrases for advertisement for the Anooyoo Spa, which shows what the place is for:

UGLY DUCKLINGS TO LOVELY SWANS AT THE ANOYOO SPA-IN-THE-PARK
! Goose Your Self-Esteem! ANOYOO ! DO IT FOR YOO ! On the brochures it said, Epidermal enhancement! Lower cost! Avoid gene errors! Fully reversible! AnooYoo didn't sell gene therapy—nothing so radical or permanent. Instead it sold more superficial treatments. Herbal elixirs, system cleansers, dermal mood lifts; vegetable nanocell injections, mildew-formula micromesh resurfacing, heavy-duty face creams, rehydrating balms. Iguana-based hue changes, microbial spot removal, flat-wart leech peels (Atwood, *The Year* 310).

17. Refugia is a plural form of refugium, which means “a geographical region that has remained unaltered by a climatic change affecting surrounding regions and that therefore forms a haven for relict fauna and flora” (Collins English Dictionary).

Works Cited

- Alaimo, Stacy. *Bodily Natures: Science, Environment, and the Material Self*. Indiana UP, 2010.
- . *Exposed: Environmental Politics and Pleasures in Posthuman Times*. U of Minnesota P, 2016.
- Atwood, Margaret. *The Year of the Flood*. Anchor, 2009.
- . *Oryx and Crake*. ARC, Amsterdam UP, 2018.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke UP, 2007.
- Bennett, Jane. *Vibrant Matter: A Political Ecology of Things*. Duke UP, 2010.
- Braidotti, Rosi, and Maria Hlavajova, editors. *Posthuman Glossary*. Bloomsbury, 2018.
- Brooks Bouson, Jane. "'We're Using Up the Earth. It's Almost Gone' A Return to the Post-Apocalyptic Future in Margaret Atwood's *The Year of the Flood*." *The Journal of Commonwealth Literature*, vol. 46, no. 1, 2011, pp. 9-26.
- Bryant, Levi R. *Onto-cartography*. Edinburgh UP, 2014.
- Canavan, Gerry. "Hope, But Not for Us: Ecological Science Fiction and the End of the World in Margaret Atwood's *Oryx and Crake* and *The Year of the Flood*." *Lit: Literature Interpretation Theory*, vol. 23, no. 2, 2012, pp. 138-159.
- Franklin, Sarah. "Staying with the Manifesto: an interview with Donna Haraway." *Theory, Culture & Society*, vol. 34, no. 4, 2017, pp. 49-63.
- Haraway, Donna. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities*, vol. 6, no. 1, 2015, pp. 159-165.
- Mead, Rebecca. "Margaret Atwood, The Prophet of Dystopia." *The New Yorker*. <https://www.newyorker.com/magazine/2017/04/17/margaret-atwood-the-prophet-of-dystopia>.
- Mohr, Dunja M. "Eco-Dystopia and Biotechnology: Margaret Atwood, *Oryx and Crake* (2003), *The Year of the Flood* (2009), and *MaddAddam* (2013)." *Dystopia, Science Fiction, Post-Apocalypse: Classics, New Tendencies and Model Interpretations*, 2015, pp. 283-302.
- "NIH Human Microbiome Project Defines Normal Bacterial Makeup of the Body." *National Institutes of Health*, 13 June 2012, <https://www.nih.gov/news-events/news-releases/nih-human-microbiome-project-defines-normal-bacterial-makeup-body>.
- Noor, Dharna. "The Release of 1 Billion Exterminator Mosquitoes Has Begun." *Gizmodo*, 31 Apr. 2021. <https://gizmodo.com/the-release-of-1-billion-killer-gmo-mosquitoes-has-begu-1846800665>.
- Oppermann, Serpil. "Compost." *Veer Ecology: A Companion for Environmental Thinking*, edited by Jeffrey Jerome and Lowell Duckert. U of Minnesota P, 2017.
- Vint, Sherryl. "Entangled Posthumanism." Review of *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*, by Karen Barad. *Science Fiction Studies Website*, https://www.depauw.edu/sfs/review_essays/vint105.html.
- Weintraub, Karen. "Using Animal Organs in Humans: 'It's Just a Question of When.'" *The Guardian*, 3 Apr. 2019, <https://www.theguardian.com/science/2019/apr/03/animal-global-organ-shortage-gene-editing-technology-transplant>.

Yong, Ed. *I Contain Multitudes: The Microbes within Us and a Grand View of Life*. Random House, 2016.