The Case Concerning Microplastics

The miniscule plastic beads in the Bath & Body Works hand sanitizers that many Gen Z girls were obsessed with in grade school will outlive them... and their children... and their grandchildren. These plastic beads are called "microplastics," a term used to describe any plastic debris that is less than five millimeters in length. The origins of microplastics include cigarette filters, clothing and textiles (materials shed microplastics when washed), and cosmetics ("Microplastics: The Long Legacy Left behind by Plastic Pollution"). Since these are small plastics, they are not biodegradable and, therefore, are "seemingly immortal" (Van Dooren 2014: 16). Although the study of microplastics is relatively new, the prevailing research shows that they have the potential to accumulate and ultimately become harmful to human health, even if they are not causing apparent damage presently. There is increasing evidence, though, that microplastics are already resulting in the death of animals and marine organisms. As the abundance of microplastics in the environment continues to compound, it is imperative that scientists continue to study their effects and spread awareness of their dangers.

Microplastics were first discovered in 2004 by Professor Richard Thompson ("International Marine Litter Research Unit"). It was assumed that these had been accumulating since the 1960s, which was also around the time when microbeads were being manufactured for use in cosmetics and personal care products. Yet, it was not until 2015 that "President Obama signed the Microbead-Free Waters Act" ("What Are Microplastics?" 2016). Moreover, in 1968, plastic bottles of water became incredibly popular with bottled water brands, since it made the "packaging of larger water volume possible" (Pandal 2023). The use of plastic bottles would only increase from there, as "the policies of deregulation and privatization [were] instigated in the US and UK around 1980" (Eriksen 2016: 21). The ban on microbeads was a positive step towards limiting the amount of microplastics emitted into the environment, but yet there are still many other sources at large.

As more research is being done on the impacts of various pollutants, bioaccumulation has become a popular term. According to Merriam-Webster, bioaccumulation is defined as "the accumulation over time of a substance and especially a contaminant." The prefix of the word specifies that this accumulation occurs in a biological organism. Then, if that organism becomes prey, the predator will ingest the substance as well — this is called biomagnification. The combination of bioaccumulation and biomagnification creates a runaway process, or a positive feedback loop. *Overheating* author Thomas H. Eriksen emphasizes that the increasing frequency of these runaway processes was sparked by industrialization and the inauguration of the Anthropocene: "It is difficult to deny that contemporary modernity has gone into overdrive, replete with runaway processes, and full speed ahead in many interconnected domains" (Eriksen 2016: 42). As with the creation of plastics, many runaway processes do not have one single origin; instead, they live on through "interconnected domains," making them nearly impossible to terminate.

There is substantially more evidence for bioaccumulation than biomagnification within current scientific literature. For example, one study published in the National Library of Medicine found that microplastic bioaccumulation "occurs within each trophic level," but biomagnification was not supported (Miller et al. 2020). However, the researchers claim that the biomagnification study was likely hindered by "unrealistic" conditions. In another study, researchers predicted that there would be "moderate to high microplastic bioaccumulation... in lower trophic level marine organisms" (Alava 2020). This presents a health risk to not only secondary consumers, such as birds, but also to coastal communities that depend on seafood.

Sugg 3

Thom Van Dooren, author of *Flight Ways*, demonstrates the inevitability of this issue by explaining that "albatrosses invariably collect plastic items that they mistake for food or that are entangled with favorite food items" (Van Dooren 2014: 22). Studies have proven that plastics contain endocrine-disrupting chemicals that can harm the reproductive systems of birds (Parker 2023). The natural habits and behaviors of these birds are intertwined with plastic pollution, and the only way to prevent this from occurring is to eliminate the use of plastic altogether.

As members of the food chain, humans are also at risk of accumulating microplastics through environmental exposures — specifically food, water, and air. Some foods pose a greater risk of containing microplastics than others. One example of this is shellfish: humans eat the entire animal, including its stomach which would contain any microplastics that the organism consumed during its lifetime (Parker 2023). However, a team of scientists at the U.K.'s University of Plymouth determined that an individual would inhale more miniscule plastic fibers floating in the air than they would consume by eating shellfish (Parker 2023). Although there have been no definitive negative impacts on human health from consuming microplastics, laboratory tests have found that they "cause damage to human cells, including both allergic reactions and cell death" (Parker 2023). This is concerning, but the issue is occuring on such a small scale within the human body that the effects are not yet prominent.

When researching the validity of the concern about microplastics, internet searches yield contradicting results from less reliable media sources. For example, to one extreme, Daily Mail.com titled an article "DON'T PANIC! Microplastics in our bodies might not be so harmful to us after all, despite Italian researchers discovering miniscule beads in breast milk," and to the other extreme, the World Wildlife Foundation wrote an article called "Plastic ingestion by humans could equate to eating a credit card a week." Sources such as this cause a social panic

and spread misinformation, especially when there is not yet definitive evidence of the impacts of microplastics. Social panic is easily triggered by news about environmental issues because it directly impacts the ability to reproduce and persist as a species. Eriksen identifies this by explaining that humans "are confronted with their own vulnerability... they develop a heightened awareness of risk. Whether they adapt and adjust, protest or delink is an empirical question" (Eriksen 2016: 28). Despite the lack of proof that microplastics cause harm to humans, the concept of the body being invaded by small synthetic, foreign objects is justifiably concerning.

By 2050, the amount of manufactured plastics is predicted to triple (Parker 2023); therefore, the amount of microplastics being consumed by all living things will only increase. In *Overheating*, Eriksen comments that "there now appears to be no imminent end to oil, gas and coal supply, despite accelerating extraction. Unless, that is, the end result is a planet mostly uninhabitable for humans" (Eriksen 2016: 45). This prediction perfectly describes a future in which there is no limitation on plastic production: if microplastics continue to accumulate over more generations, there will likely be apparent health impacts eventually, which will result in a decline of the human population. "[I]t has been said that people belonging to the middle class today experience 17 times as much as their great-grandparents, but without an improved apparatus for digesting and understanding their experiences" (Eriksen 2016: 16). In this sentence, Eriksen references experiencing general changes. As microplastics persist in the environment, will humans be able to cope with the unforeseeable changes without an equivalent method of "digesting and understanding" what they are experiencing?

Beyond harming the health of all living things, microplastics may also affect the climate: "[S]kies heavily polluted with plastic will probably make both more high-altitude ice clouds, which tend to warm the Earth's surface, and more low-altitude water clouds, which tend to cool the Earth" (Jones 2023). The impacts of these possible modifications are currently unknown, as the amount of microplastics currently in the atmosphere is too small to be significant. However, if plastic production continues as predicted, microplastics have the potential to change the Earth's climate in one way or another.

The effects of the potential bioaccumulation of microplastics range from harming human health to interfering with the Earth's climate. Currently, there is no infallible way to predict these impacts. Although it is unlikely that all microplastics could be removed from the environment, it is important that plastic production is decreased in order to prevent the issue from becoming worse. As Eriksen wrote, "human desires, hopes and dreams often clash with demands for sustainability" (Eriksen 2016: 33). Plastic may be an important material in today's society, but it is already beginning to have irreversible negative effects on necessary ecosystems and species.

Works Cited

- Alava, Juan José. 2020. "Modeling the Bioaccumulation and Biomagnification Potential of Microplastics in a Cetacean Foodweb of the Northeastern Pacific: A Prospective Tool to Assess the Risk Exposure to Plastic Particles." Frontiers. 31 August. www.frontiersin.org/articles/10.3389/fmars.2020.566101/full\.
- Eriksen, Thomas Hylland. 2016. Overheating: An Anthropology of Accelerated Change. Pluto Press.
- "International Marine Litter Research Unit." University of Plymouth. www.plymouth.ac.uk/research/marine-litter.
- Jones, Nicola. 2023. "Microplastics Are Filling the Skies. Will They Affect the Climate?" Yale E360. 1 February. e360.yale.edu/features/plastic-waste-atmosphere-climate-weather.
- "Microplastics: The Long Legacy Left behind by Plastic Pollution." UNEP. www.unep.org/news-and-stories/story/microplastics-long-legacy-left-behind-plastic-poll tion.
- Miller, Michaela E., et al. 2020. "Bioaccumulation and biomagnification of microplastics in marine organisms: A review and meta-analysis of current data." National Library of Medicine. 16 October. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7567360/.
- Parker, Laura. 2023."Microplastics Are in Our Bodies. How Much Do They Harm Us?" National Geographic: Environment. 8 May. www.nationalgeographic.com/environment/ article/microplastics-are-in-our-bodies-how-much-do-they-harm-us.
- Pandal, Natraj. 2023. "Birth of the Bottled Water Industry." BCC Research: BBC Research Blog.7 February. blog.bccresearch.com/birth-of-the-bottled-water-industry.

Van Dooren, Thom. 2014. Flight Ways: Life and Loss at the Edge of Extinction. Columbia

University Press.

"What Are Microplastics?" 2016. NOAA's National Ocean Service. 13 April.

https://oceanservice.noaa.gov/facts/microplastics.html.

Agarwal, Sarika, et al. 2023. "The Impact of Tourism on Local Communities: A Literature Review of Socio-Economic Factors." ResearchGate.

https://www.researchgate.net/publication/373644263_The_Impact_of_Tourism_on_Loc

Communities A Literature Review of Socio- Economic Factors.