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GEOG-1045H

**Reflection Assignment:  
Microplastics, Ice Algae, and Sea Algae**

### What?

Microplastics have a maximum size of 5mm, and fall under two categories of identification: primary and secondary (Díaz-Mendoza et al., 2020; Häder et al., 2021). Primary microplastics have been manufactured at such a small size, while secondary microplastics are larger plastics that have fragmented for various reasons (Díaz-Mendoza et al., 2020; Häder et al., 2021). Plasticizers, a substance used to increase the quality, lifespan, and flexibility of plastic, have found their way into the human body through the digestion of plants (Larue et al., 2021). With this in mind, it is a concern that microplastics are spreading throughout the Arctic food web undetected in a similar manner (Larue et al., 2021).

Ice algae (*Fragillariopsis cylindrus*) and sea algae (phytoplankton) are the base microbial species in the Arctic food web (Daase et al., 2021). During the warmer months, ice algae are responsible for half of the base of the Arctic food web (Ehrlich et al., 2020). Anything that can negatively impact ice algae can be passed on through the food web affecting creatures that dwell on the ocean floor (Ehrlich et al., 2020), to give some perspective on the butterfly effect this microbial species has in the Arctic. The presence of microplastics in the Arctic waters negatively impacts ice algae by hindering their ability to grow (Hoffman et al., 2020), meaning ice algae are in further danger, as climate change warming Arctic waters is already affecting the stability of microbial life (Hoffman et al., 2020).

Microplastics tend to stick to clusters of sea algae (Long et al., 2015). During sea algae blooms in the warmer months, a higher density of microplastics are entrapped in sea algae clusters because there is more to stick to. Furthermore, clusters of sea algae that fall to the ocean floor bring microplastics with them (Long et al., 2015), spreading them across the food web. It has been recently discovered that microplastics are toxic to sea algae (Larue et al., 2021).

Chemicals in microplastics are damaging the sea algae photosynthesis processes (Larue et al., 2021) therefore damaging the only method of energy production.

### So What?

Plastics have been a part of daily human production and activities for decades. At first, the idea of plastics was thought to have been a step of progression for humanity, as they made life much easier. Over the years, with the overproduction and overuse of plastics, humans have accumulated more plastics to last us many lifetimes; more than we could ever use. Our frenzies in the production and use of plastics have overlooked the possible negative long-term effects on the environment. Microplastics are one of these negative long-term effects of the use of plastics. We once thought the Arctic was untouchable, and would forever stay frozen and sterile, unaffected by man. The existence of microplastics in the Arctic proves that theory wrong.

This is generally significant because plastic is toxic and harmful. If microplastics are infiltrating the base of the food web in the Arctic today, the future of that food web is in grave danger. When the Arctic food web begins to die out, humanity will too be in danger. We depend on species in the Arctic as food sources, worldwide. When that food source is diminished, there will be a domino effect of food shortages and competition for other resources. There is no instance in humanity where the dwindling of resources creates more harmony and peace among nations. The Arctic Indigenous populations will be losing out on Arctic resources as well, destroying the little bits of their heritage they have managed to preserve through colonialism.

On a more personal level, I love the Arctic. It brings deep sorrow knowing we have damaged the Arctic environment out of our own selfishness. I lived in Nunavut for a period of my life, and during that time I was blessed with the opportunity to truly experience the circumpolar North. I found a love for the Arctic ecosystems and an appreciation for the species

that thrive up there. Knowing that my species is responsible for damaging the beauty of the North is devastating. Furthermore, there are Indigenous living in the Arctic who depend on the natural resources out there to survive. I went out on the land and had the opportunity to experience hunting, trapping, and fishing. Life is already difficult as it is for the Arctic Indigenous, and it will only get more challenging thanks to the anthropogenic changes in the Arctic food web.

I learned about microplastics, ice algae, and sea algae, during the third module of this course. When I was reading up on Arctic biospheres, I came across peer-reviewed articles about phytoplankton being affected by microplastics. From there, I did readings in my spare time to learn more about the presence of microplastics in the Arctic. I learned that microplastics are present everywhere. We have created so much plastic waste that what was once the untouched frozen tundra is now filled with human garbage. The deep floor of the Arctic Ocean is riddled with plastic, and I am beside myself in learning this. I learned that when we thought we were not harming the Arctic, species were picking up microplastics through ocean currents and the general food web.

Learning about microplastics made me feel sick to my stomach. As I have mentioned in a discussion post, prior to this class I never bothered to educate myself on what microplastics were and the effect they have on the environment. I feel ashamed that I have not previously taken the time to educate myself about microplastics, especially since this is a term I have heard floating around for years. I want to learn more about what other microbial species are affected by microplastics. I want to learn more about what I can do to reduce the number of microplastics in the ocean.

Now What?

After learning about the presence of microplastics, I have made changes in my life to reduce my personal use of plastics as much as possible. I now actively choose to avoid the use of plastics in all possible ways, including significantly reducing the number of plastics I have in my home. I have chosen glass containers over plastic Tupperware, and I have purchased reusable rags to replace microfiber cloths and other disposable cleaning cloths. I now purchase sponges made out of recycled materials to use in the kitchen and purchase personal hygiene products from Lush that don't come in plastic containers. Looking back on my egregious use of plastics is shameful, as I previously didn't care enough to change my lifestyle.

Prior to this course, I did not have the same care for the environment as I do now, at the end of this course. I always had the impression that the earth was here before the existence of *Homo sapiens* and the earth will thrive again once we have gone extinct. Influenced by other personal reasons as well, I was not as alarmed or invested as I should have been about anthropogenic changes to the environment. After learning about Arctic waters and how the marine environment is not untouched by man, my perspective has drastically changed. I have gone from thinking the state of the world is a problem for another generation, to understanding that it is my responsibility to do what I can to help make the world a better place.

With my new knowledge about the presence of microplastics in Arctic microbial organisms, I would like to educate my peers and others in my life in hopes of raising awareness of the danger the Arctic is facing. I hope to set an example for those around me with my own lifestyle changes, encouraging them to follow suit. In regards to my online presence on social media, I will take the time to share more information and layman-friendly articles about microplastics and the negative impacts they have on the environment. I will be on the lookout for

future studies about the effects of microplastics on Arctic ecosystems, as I am now invested in learning more about this topic.

A broader issue that needs to be addressed is the lack of funding for scientific research in the Arctic environments. The presence of microplastics is an indicator that more time and attention needs to be dedicated to Arctic marine environments, and funding is needed in order to conduct more research. Most of the peer-reviewed research I read for this assignment stated there has not been enough research on microplastics to refer to, and how that needs to be addressed. Where there is more allocated funding, there is more research. In addition to Arctic marine environments, I think more funding in general needs to be allocated to the circumpolar North. Although I have not directly touched upon this throughout my reflection, it is important to educate the Arctic Indigenous populations in the circumpolar North about scientific findings. As the people who primarily live in Arctic ecosystems. I think it is important to share with them what we have learned about the state of their home, and to further discuss what can be done together to reduce anthropogenic changes.

Personally, this reflection assignment has helped me reevaluate my overall lifestyle and value of the environments around me. From here, I believe I will only find more ways to reduce my carbon footprint and to do the best I can to preserve the environment during my lifetime. It has further encouraged me to continue following my dream to work in the sciences, especially from an anthropological perspective. As a student in anthropology, I think it is important to understand human behaviour and our past actions so that we can learn how to do better for the future.

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