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Sushi with a Side of Plastic

“Sarah, what’s taking so long? Are you almost ready?” my brother calls out.

“Wait!” I yell back. I grab my jacket, and head out to the car.

It was my 15th birthday and my family was taking me out to a sushi restaurant. Growing up in a rather traditional Japanese household, the importance of sashimi (raw fish) in our family was pretty clear; it was collectively our favorite food, the delicacy that we desperately looked forward to on holidays. As my brother and I grew up, the weeks before a birthday were not filled with excitement because we survived yet another stressful year, but because we were going out to eat sushi.

As we drive to Oga's, the only sushi restaurant that my mom deemed “suitable” for our “Japanese taste buds”, I imagine what I am going to order. Salmon? Shrimp? Or maybe, my favorite- the expensive and coveted bluefin tuna?

We pile into the restaurant, the mere presence of the restaurant, filled with the delicate smell of freshly caught fish, make our stomachs grumble like it has never grumbled before.

“Thanks, Mom. This is the *best* birthday present,” I lovingly state. She looks up, a smirk spreading across her face, knowing fully well that I was about to ask her if I could order the Sashimi platter, the most expensive dish on the menu. It was the most beautiful assortment of raw fish constituting of everything from sea urchin to salmon eggs to bluefin tuna.

My brother, notoriously known for chiming in with not-so fun facts at the most inappropriate times, comes into the conversation.

“Did you know that there aren’t going to be fish left to eat in 50 or so years?”

I look up, a death stare emerging across my face. My mom, always seemingly interested in my brother’s infinite supply of knowledge, immediately changes from a look of happiness to a look of worry.

“Are you serious? What? Why? How?” She desperately asks. My brother solemnly nods.

“Overfishing. We’re killing faster than they can reproduce,” he responds, matter-of-factly. I roll my eyes.

“But you know what’s worse? The fish that we *can* eat, for now at least, are contaminated.” I sigh. I knew all about the mercury poisoning and the dangers it caused for pregnant women.

“What do you mean...contaminated?” My mom is now fully delved into the powers of Akiba’s fun-facts.

“Plastic pollution. The ocean is increasingly becoming polluted by our plastic waste and it affects our fish, which ultimately affects us,” He adds. I roll my eyes again.

“Shut up!” I shout. I did *not* want to think about toxic fish on my birthday, during the birthday *dinner* that I had excitedly waited for for 364 days.

“Akiba's just trying to scare us, Mom,” I reassure my mom. “He’s stupid,” my 15 year old personality adds.

We continued our dinner that night, not one word regarding plastics brought up again. I forgot about that night, that conversation, until I was hit with reality in my Environmental Science class almost a full three years later.

Akiba was right (for once); plastics in the ocean *are* contaminating our ‘beloved’ fish.

By now, it's no secret that the over-usage of plastic around the globe is a problem. But do we know where this plastic is going? What's happening to the plastic wrapper after we throw it out? How about that bottle that we casually toss onto the sidewalk because "what's the harm of just one more piece of litter"?

Not so surprisingly, it certainly is harmful.

Much of the plastic waste that we deposit on a daily basis is collecting in our oceans; the habitat of extensive marine life, the source of income for many countries, not to mention, our water supply (Tanner Video). In 2010, 8 million tons of plastic waste found its way into the oceans (Parker Web). **8 millions tons.** And the scariest fact? It's expected that this *ridiculously* high collection of waste will "increase tenfold in the next decade" if no significant environmental and societal changes are made (Parker Web).

The United States, the 20th highest generator of plastic debris, like other major wealthy countries, has a high consumer culture (Parker Web). Everything from plastic bags to toothpaste to facial products are sources of the collection of trash the size of a continent circling in our oceans (Tanner Video).

The average American disposes over a hundred pounds of plastic per year; as we dispose this plastic, the majority of it is either dumped into large landfills or directly into the sea (Tanner Video). Once in the waters, due to ever-moving currents in the ocean, the plastic waste circulates all around the world (Tanner Video).

As it circulates, due to the heat of the sun, the strength of the wind, and the movement of the water, the plastics that are getting dumped into the ocean become microplastics, which are small particles of plastic that normally range between 1mm to 5mm (Tanner Video). Because

plastic cannot rot, the remains of plastic, the microplastics, can last up to 500 hundred years (Tanner Video). As the plastic pieces get smaller and smaller, eventually becoming microscopic, it gets easier to absorb extremely high amounts of industrial and agricultural toxins which pollute the oceans due to the constant release of fossil fuels, oil spills, and unregulated agricultural practices (Tanner Video). Not only do these plastics absorb such toxic chemicals, but the plastics *itself* contain enough to affect the health of those who ingest them.

When manufacturing, in order to get plastics to become so versatile, a large amount of additives and adjustments are needed. These adjustments are made by a wide array of chemicals that “catalyze, lubricate, stabilize, harden, soften, strengthen, rubberize, colorize, textures, flameproof, germ-proof, heatproof, and prevent oxidation” (Moore and Phillips 241). For example, each component of a plastic baby bottle-- “rubbery nipple, hard plastic collar, and clear bottle base”-- can contain dozens of toxic chemicals, all of which are often undisclosed due to an unspoken rule of secrecy within the marketing community (Moore and Phillips 242). Overall, from industries, agricultural practices, and plastics themselves, the pollutants that find themselves in the ocean range from those with recognizable names to those that are unpronounceable; they are often dubbed as “alphabet-soup toxins” (Moore and Phillips 242). These include PCBs, DDT, PBDEs (used as flame retardants), PAHs (used in fossil fuels), plastic additives such as BPA, and many *many* more (Friedland, Relyea, and Courard-Hauri 391-394).

These toxic microplastics are very often mistaken as food by small fish. This is no surprise, considering that in certain areas of the ocean, there are *60 times* as much plastic as there is plankton (Tanner Video). Due to the sheer number of plastic particles floating around in the

oceans, it is extremely easy for fish to ingest these particles (Thompson, Olsen, Mitchell, Davis, Rowland, John, McGonigle, and Russell 1). Microplastics, in relation to size and shape, can also *look* like food, making it difficult for small fish to detect what is food and what are microplastic pieces (Andrews Web). In a study with the primary aim to describe the types of microplastics ingested by fish collected from the English Channel, 184 out of 504 fish, or a shocking 36.5%, contained synthetic polymers, or in simple terms, human-made plastics (Lusher 1-6). Similarly, in another study with a concentration on the amount of plastic found in the stomach of planktivorous fish in the North Pacific Central Gyre, researchers found that approximately 35% of 670 fish tested had plastic pieces in their gut, averaging 2.1 pieces per fish (Boerger, Lattin, Moore, and Moore 1-4).

Slowly, as small fish continue to eat more and more of these microplastics, the aforementioned toxic chemicals separate from these small plastic pieces due to the juices in the fishes' stomachs, entering the bloodstream and tissue (Barclay Web). These contaminated small fish such as herring and other small organisms such as plankton are eaten by larger fish such as tuna and salmon. When large fish eat smaller fish, they not only consume the flesh, but also take in the toxins that have accumulated in the fish (Barclay Web).

When humans catch fish like tuna and salmon for the purpose of food for us to *eat*, these harmful toxins have largely accumulated in these *large fish's* bloodstream and tissue (Barclay Web). In short, the fish that we eat contain the dangerous remnants of plastic. The impacts of these toxins are extensive; from "birth defects, immune system problems, and childhood developmental issues" to BPA's interference of normal hormonal functions, the health consequences from eating contaminated fish have absolutely no limit (Andrews Web).

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My phone lights up.

“Sarah, stop watching Netflix and hurry up!” a text from my friend reads. I smile, my extreme procrastination and inability to be on time is a longtime inside joke within my friend group.

“Coming,” I quickly reply. I grab my jacket and head out to the car. We are driving to Osaka, a personal favorite sushi restaurant.

We climb out of the car, and enter the restaurant, the beautiful Japanese decoration taking me back to my grandparent’s house in Obihiro, Japan. Immediately, the fresh scent of raw fish hits me. However, something is different this time. Really, terribly, different. Instead of making me hungrier, it causes the opposite effect. I feel sick.

We sit down and look at the menu, my eyes automatically sliding to the ‘sashimi’ page. *Mackerel, White Tuna, Bass*. I start to feel nauseous. *Salmon, Bluefin*. I stop reading.

“What are you ordering?” my friend, Sara, asks. I gulp.

“Um... the Kappa Maki,” I respond, pointing to the cucumber roll. She looks confused. I *always* order raw fish when I am at a Japanese restaurant. Always. But with all of the new information about plastics contaminating the fish that I used to love fresh in my mind, the only words that I see on the menu are ‘Plastic Tuna Roll \$5.00, Plastic Salmon Maki \$6.50, Plastic Deluxe \$21.95’.

“Do you know that the fish that we eat are contaminated with toxic chemicals?” I casually try to bring up. My friend looks at me, puzzled.

“Stop trying to go all ‘AP Enviro’ on me,” she jokes. Usually, I laugh along with her, but this time, I simply can’t.

“No, I’m serious!” I desperately respond. As I continue on to explain the severity of the issue, I can tell that her concentration is elsewhere. I pause. There is no use in explaining the complexities of the marine food chain during a girl’s night out. I steer the conversation into a more serious one.

“You know it causes really serious health effects, right?” She perks up.

“Like, what?” She asks, trying to keep her cool. I smile-- I have *finally* grasped her attention.

That night, we talked all about plastics in the ocean and what we could do on a minuscule, individual level to reduce this problem, a topic that normally bored her.

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A week ago, I made the mistake of going to a sushi restaurant with my friend, but I came out with an important lesson. Talking about plastics in the ocean can be boring, especially when it doesn’t connect to someone personally. It can get overwhelming when it seems as though there is absolutely nothing that we can do. However, it *isn’t* boring-- it affects many, many people on a personal level, and it *isn’t* overwhelming-- there are many simple steps that one can take.

Let’s go back to the very root of the problem-- buying plastics and our “throw-away” nature (Andrews Web). Our culture has made us *need* plastic, but why? Why are we falling for these manipulative business tactics? While we cannot eliminate the usage of plastic entirely, there are many alternatives steps that we can take (Andrews Web). Remembering to bring a water bottle to school, placing a reusable bag next to your grocery list the next time you go food

shopping, opting for a paper bag whenever possible, waiting until you find a recycling bin when you do have plastic to dispose instead of dumping it into a trashcan-- these are just a few of the options available.

So the next time you think of the vast ocean filled with continent-sized plastic garbage patches contaminating the fish on your dinner plate, remember:

It's the little things in life that change the most.

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Ocean Awareness Student Contests

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Reflection:

Researching this topic horrified me. Growing up in a Japanese household, fish has always been a large part of my life-- it is deeply ingrained in my family culture, history, and lifestyle. All my life, I heard about the dangers of eating meat, especially through the famous documentaries surrounding unsafe agricultural practices, but rarely have I heard about the dangers of fish (aside from mercury poisoning). However, delving into this topic truly opened my eyes. I flashbaced to the many, many times that I went out to sushi restaurants, excited to eat my favorite food, sashimi. My mind reversed back to the many times that I ignored my brother desperately trying to explain the problems surrounding the fishing industry. I didn't want to believe it; I didn't *want* to believe that I was eating toxic chemicals every time I ate fish. So instead, I ignored it. However, while doing this project, my mindset started to change-- ignoring the problem *was* the problem. More often than not, people (myself included) ignore topics that seemingly have no impact on our life and problems that *feel* out of our control. When I confronted my friend about the contamination of fish, however, it was the first time that I truly believed that things *can* change; we, as individuals, *can* make even the smallest difference through little alterations in our daily lives. This was indubitably one of the most transformative projects that I have ever undertaken.