THE OHIO STATE UNIVERSITY

Argonne National Laboratory Student Researcher for Sustainable Plastic Polymers

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Background

Agency:
- Argonne National Laboratory
- Runs through the Department of Energy
- My specific initiative was a project funded by BETO

Location:
- Lemont, IL

Mission Statement:
- "Argonne is a multidisciplinary science and engineering research center, where talented scientists and engineers work together to answer the biggest questions facing humanity, from how to obtain affordable energy to protecting ourselves and our environment."

Interesting facts:
- They aim to accelerate science through 5 core values (Impact, Safety, Respect, Integrity, and Teamwork)
- Argonne was birthed from a secret mission— the Manhattan Project (to create the world's first self-sustaining nuclear reaction)

How did I find this job?
- Their online application on their SULI website (Science Undergraduate Laboratory Internships)

Historical Significance

Figure 1. This drawing shows the 49 scientists who created the first controlled, self-sustaining nuclear chain reaction on December 2, 1942 at the lab.

Present Day

Figure 2. An arial view of the lab today.

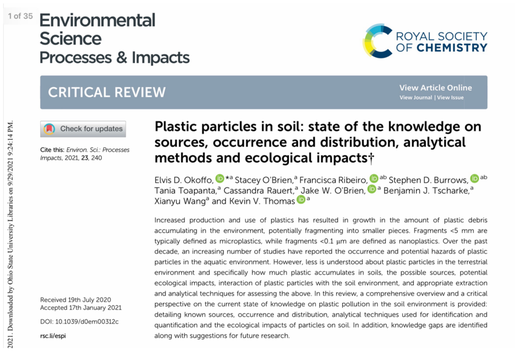
On the Job

Project Overview
- Title- Waste Plastics in Soil
- The accumulation of discarded plastics is a significant and growing problem because of slow degradation rates
- Focus- Toxicity of different plastic polymers, both synthetic and bio-based, in soil environments

Main/Frequent Duties
- Read current literature (1-3 articles a day)
- Extracted qualitative and quantitative data
- Organized data into an excel database
- Synthesized the information to make it easy to understand by anyone
- Contributed to Argonne's State of Knowledge Report on Plastic
- Submitted Abstracts and Articles to Scientific Conferences for review
- Wrote many reports to update The Department of Energy and BETO on research progress

Specific Accomplishments
- Worked on a bio-based plastic made of starch films from food waste
- Created my own database with all of my research over the summer for plastic's effects on soil biota (plants and organisms)
- Conducted a 15 minute presentation at the end of internship to my peers and other scientists

Searching Through Current Literature



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Environmental Science Processes & Impacts

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Plastic particles in soil: state of the knowledge on sources, occurrence and distribution, analytical methods and ecological impacts†

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Increased production and use of plastics has resulted in growth in the amount of plastic debris accumulating in the environment, potentially fragmenting into smaller pieces. Fragments <5 mm are typically defined as microplastics, while fragments <0.1 μm are defined as nanoplastics. Over the past decade, an increasing number of studies have reported the occurrence and potential hazards of plastic particles in the aquatic environment. However, less is understood about plastic particles in the terrestrial environment and specifically how much plastic accumulates in soils, the possible sources, potential ecological impacts, interaction of plastic particles with the soil environment, and appropriate extraction and analytical techniques for assessing the above. In this review, a comprehensive overview and a critical perspective on the current state of knowledge on plastic pollution in the soil environment is provided: detailing known sources, occurrence and distribution, analytical techniques used for identification and quantification and the ecological impacts of particles on soil. In addition, knowledge gaps are identified along with suggestions for future research.

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rsc.li/espi

2021. Downloaded by Ohio State University Libraries on 4/29/2021 9:24:14 PM.

Figure 3. When I was looking for data that was relevant to our project, I would start by reading the abstract to determine if it was applicable. This is the very first article that I read this summer and it actually ended up being the most helpful because it gave me a general foundation for plastic pollution.

Learning the Different Types of Plastic

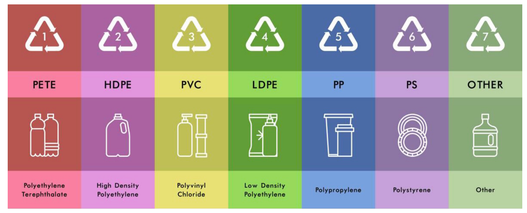

Figure 4. This image shows all of the different synthetic plastics that I researched over the summer. I had to first familiarize myself with their properties, examine their toxicity, and then compare everything to the bioplastics that we were focusing on.

Building Diagrams

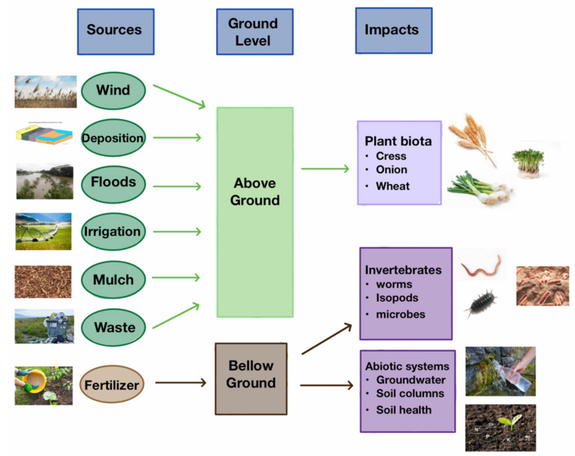

Figure 5. Turning our research into visual aids was an important part in communicating our findings. This is a diagram that I created towards the end of the summer based on over 40 articles that I read. It explains the most common sources of plastic in the soil and, based on soil depth, examples of what it effects in the environment.

Learning off the Lawn Presentation

Figure 6. This is the title slide for the 15-minute oral presentation that I did in front of all my peers (100+ college students) as well as various Argonne staff. It contained all of my research methods and results from the summer

Reflection

Future Career Aspirations
- Environmental Science Research (any area of Natural Resources)
- I would definitely seen another job/internship related to this one
- I hope to work for a Lab within the Department of Energy or another lab with similar values and work environment

Moving Forward
- Apply for a student research position at another location (hopefully in-person)
- Eventually go to Grad school after I find a specific area of environmental science that I want to focus on
- Continue doing any research opportunity similar to this experience

Recommendations
- Apply on the SULI website
- Read through the different locations and their specialization to see what fits your interests
- Ask for letter of recommendations early to give them and you enough time
- This internship is really what you make of it, so take advantage of anything you want to attend (i.e. coffee with a researcher, Friday trivia games, etc.)

All DOE National Lab Locations

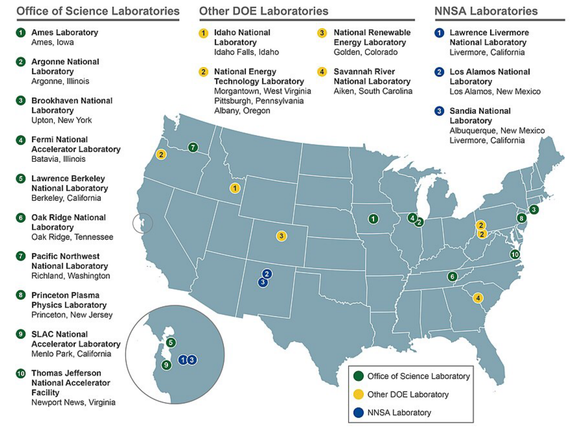

Figure 7. This image shows all of the labs which have their own research specialization

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2. Image 2: https://www.lerchbates.com/en-US/About-Us/Projects/Argonne-National-Laboratory
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