# Identifying Fungi Growing in Polyurethane Safety Goggles

## Research Question-

What type of Fungi are inside the goggles? Do they have the ability to break down plastics?

## Results:

We were able to determine that one of our fungal specimens belongs to the family Chaetomiaceae.

## Experimental Design:

- Cut pieces of goggles
- Extract DNA from fungi
- Amplify the ITS gene
- Sequence samples
- Identify the species of fungi.

## Conclusion:

Other studies report that Chaetomiaceae are able to degrade both PVCs and PCLs. We recommend that students in the future examine whether these fungi can degrade other types of plastics.

# Background 1

- Fungi was found growing in a pair of plastic laboratory goggles.
- Fungi may have the ability to break down microscopic plastics.
- These types of fungi might help clean up plastic pollution in the future.

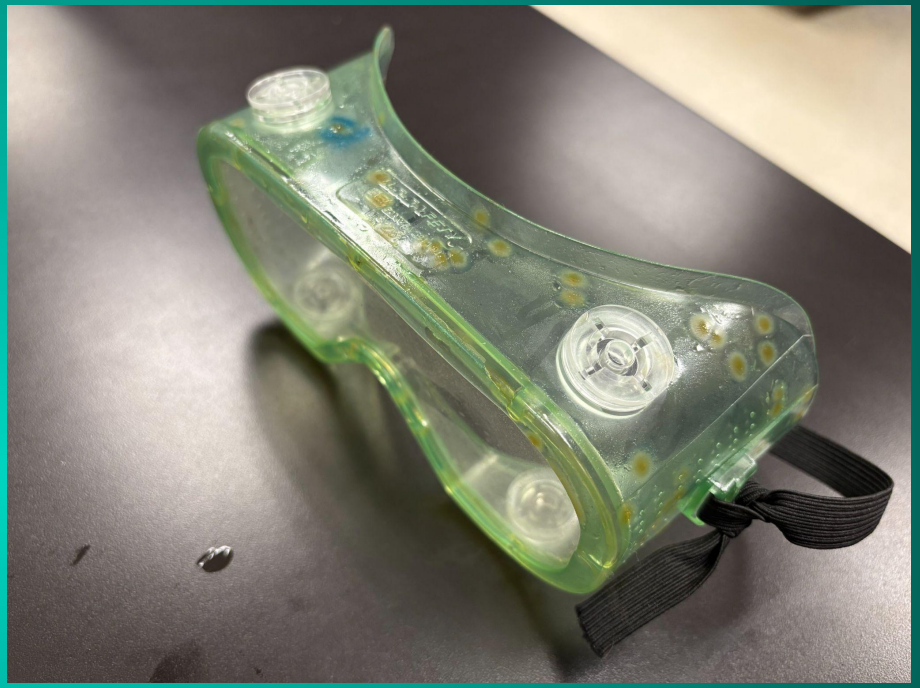


**Figure 1**: Lab goggles, source of fungi.

# Background 2

**Figure 2**: Stock image of plastic waste.

- Certain fungi enzymes are capable of breaking down synthetics plastics
- Microplastics are major problem in all ecosystems.
- Humans inhale/ ingest tens of thousands microplastics annually and are found in our blood, lungs, and placentas.
- Developing some sort of fungi eco-friendly cleanup strategy can help better human lifes and ecosystems.

# Purpose of research

The purpose of our research is to see if the fungi found in goggles can be cultured on different media types and determine what type of fungi it might be.

**Figure 3**: Students staining fungi samples for microscope imaging.

# Research Question

Can fungi from goggle PVC be cultured on different types of media?

Independent Variable:  Media Types and Growth Temperatures

Dependent Variable: Fungal Growth on media.

**Figure 4**: Students placing plastic containing fungi onto various growth medias.

# Experimental Design

## Phase 1: different agar media for bacteria/fungi

- Collected fungus samples from the petri dishes
- The dishes were evenly divided - 6 dishes for each
- agar plate (MEA, Sabouraud, LB, and PDA)
- Samples were collected every week for 5 weeks

**Figure 5**: Students performing electrophoresis of fungi PCR products.

# Experimental Design

## Phase 2: extract DNA from each fungal sample

- Extracted DNA from fungi
- Purified the DNA

## Phase 3: Amplified ITS gene using PCR

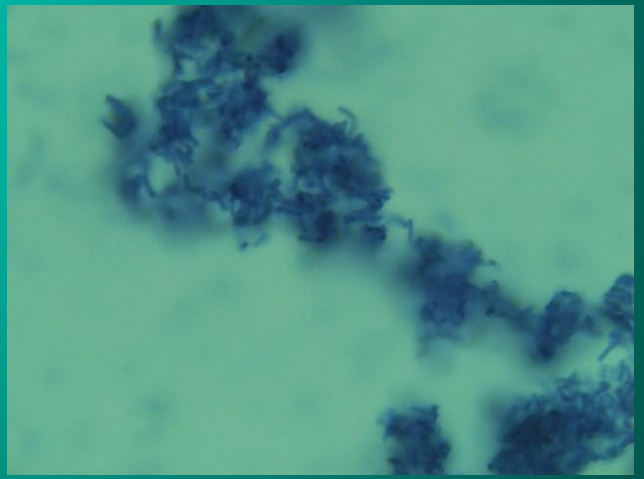
- Put each sample into a thermal cycler twice to amplify
- the ITS gene

**Figure 6**: Students preparing microscope slides of fungal specimens.

# Results of Fungi Cultures

- We were able to culture fungi from the pieces of goggle material on **MEA,Sabouraud, LB, PDA and** agars.

**Figures 7 & 8**: Preparing specimens (top) and microscope image of specimens (bottom)



# Results of Gene Amplification

- We were able to amplify DNA in 3 of our fungal specimens.

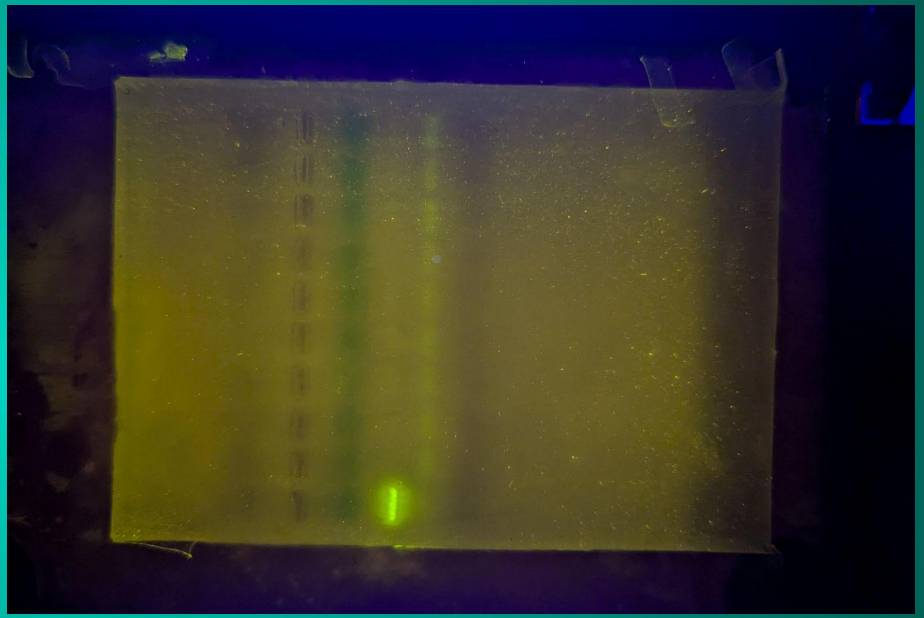


**Figure 9: Electrophoresis gel showing PCR results.**

# Results of DNA Barcoding

- One specimen returned results that were high enough quality for identification.

- We identified our gene sequences using BOLD.

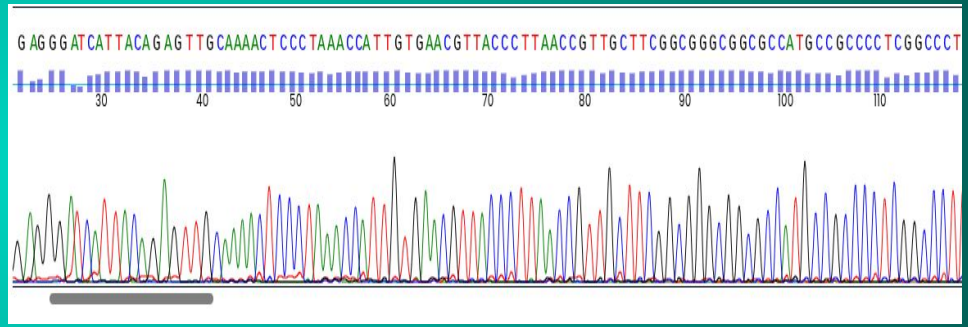



**Figure 10: Electropherogram of Fungi Sample 10**

# Results of DNA Barcoding

- Our fungi specimen was identified as belonging to the family *Chaetomiaceae*.

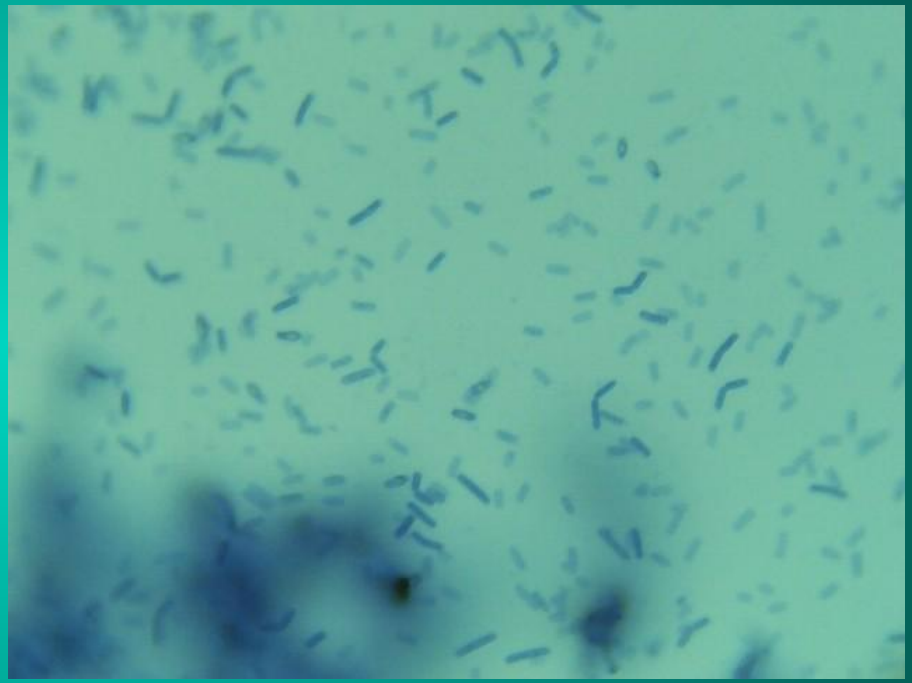


**Figure 11: Microscope image of sample 10.**

# Conclusion

- After determining the the family for our one high quality sample, we researched whether there is existing documentation of Chaetomiaceae being able to digest plastics.
- Vivi et al.  Found that fungi of the family Chaetomiaceae were able to degrade both PVCs and PCLs.
- Our results differ from last year's study.  All of last year's specimens that returned sequencing results belonged to the family *Didymellaceae*.

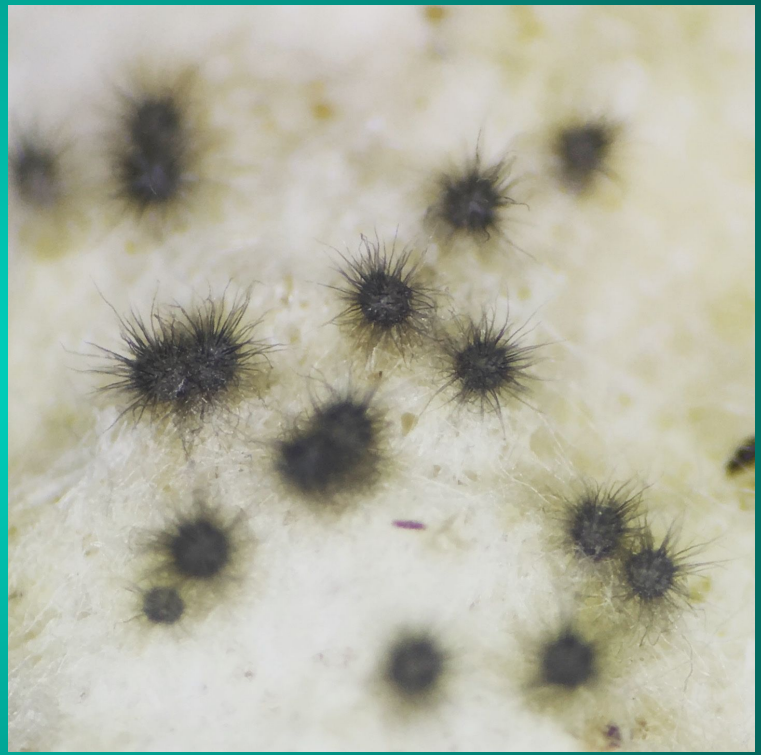


**Figure 12:  iNaturalist image of fungus from family *Chaetomiaceae.***

# Conclusion

- We suggest that students continue to study the fungi found in the lab goggles. Being that the fungi found from the previous two years were different, more information is needed to determine if both fungi are present in the goggles.
- We also recommend that future studies use different varieties of plastics. We have observed fungi growing on old compact discs which are made of polycarbonate. It would be interesting to determine if some types of fungi can break down many types of plastics.

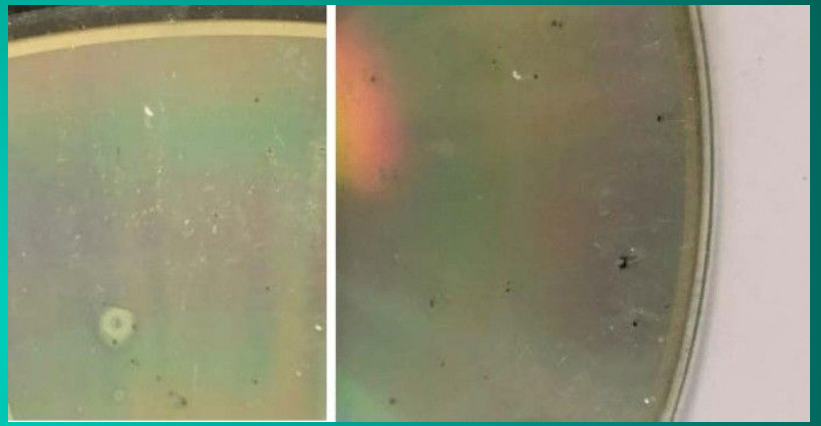


**Figure 12: Image of fungi growing on compact disc (Palermo, 2021)**

# Works Cited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