# Quick Fix

## THE KINGDOM FUNGI, FOOD CHAINS & PLASTIC POLLUTION

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Looking for a way to link the study of fungi to your students' awareness of our increasingly imperiled global environment?

My biology students at Penn State Lehigh Valley begin studying the fungi kingdom of life by discussing the pivotal roles that fungi play in recycling nutrients. Students are amazed to learn that fungus absorbs nutrients from the environment outside its body. Almost any carbon-containing substrate – even jet fuel and house paint – can be consumed by fungi or bacteria.

The moment my students recover from their amazement at the elegance of our food chain, I ask them to consider whether the damage that humans have done to our environment poses any greater challenge to the fungi kingdom than the one currently swirling around in the "Eastern Garbage Patch."

Also known as the Northern Pacific subtropical gyre, the Patch is a 10-million-square-mile stretch of ocean about 800 miles north of Hawaii. This body of water, and the air above it, normally swirl in a slow, deep, clockwise vortex caused by a mountain of high-pressure air that lingers above it. However, we view photos of a sewer for plastic waste in this desolate place, resulting in a never-ending trash tsunami. In 2007, it was measured to be twice the size of Texas.

In class, we identify plastic bags, nets, ropes, bottles, motor-oil jugs, diapers, toys, razors, toothbrushes, cigarette lighters and more, swirling endlessly in what was once pristine seascape. We speculate about whether fungi might offer one possibility for reducing the size of the Patch.

But plastic polymers, unlike those of living things (proteins, carbohydrates, lipids, DNA, and RNA) which break down, aren't biodegradable. Students come to recognize that fungi are powerless to absorb them.

Next we talk about how this plastic pollution strangles the food chain – foraging birds, dolphins, fish, and sea turtles. Even more alarming, we speculate about what it means to the food chain that microscopic pieces of plastic are drifting like fish food throughout the water, mimicking plankton, the food supply of most aquatic life. As the lesson nears its climax, the students begin to realize that through nature's food chains and intricate food webs, that plastic ends up in us.

Finally, students read Susan Casey's article, "Our oceans are turning into plastic ... are we?" from the October 2007 issue of *Best Life* (available online at http://www.bestlifeonline.com/cms/publish/travel-leisure/Our_oceans_are_turning_plastic_are_weshtml). This article highlights, among other things, that the Eastern Garbage Patch contains six times more plastic than it does plankton.

This lesson draws to a close as we discuss how we manufacture about 60 billion new tons of plastic each year, much of which becomes disposable single-use products such as that water bottle sitting around the classroom or tucked into backpacks each day. Students who may previously have been awed by the enduring nature of non-biodegradable plastics gradually begin to wonder whether we really need so many plastic items in our everyday lives. A look back at the photos of the Patch is enough to get us talking about which items we could reduce, or do away with altogether.

Finally, when we view charts that show that only about 4% of plastics are recycled, students generally become very interested in finding better personal and societal solutions to this growing problem. As much as they've come to appreciate the yeomen's work that fungi perform, they realize that without our help, these professional decomposers may hit a dead end.

## References

Casey, S. (2007). Our oceans are turning into plastic... are we? *Best Life*, October.

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