

A lonely plastic bag blows across a parking lot. It tumbles down a hill and into a creek, where the water carries it downstream to a river. Down the river it goes until it's swept out to sea. Day after day it floats in the expanse until, there in the distance—another plastic bag! And another, and another...and millions of others.

What is this strange place?

The Garbage Vortex

A white plastic bag is shown floating in the ocean, partially submerged. The bag is crumpled and has some air trapped inside, making it look like a small, inflated object. The water is a deep blue color, and the background is slightly blurred, suggesting a wide expanse of water.

ALARMING DISCOVERY

In the late 1990s, a sea captain and ocean researcher named Charles Moore entered a yacht race in Hawaii. As he was sailing back home to California, he came upon an odd sight: “There were shampoo caps and soap bottles and plastic bags and fishing floats as far as I could see. Here I was in the middle of the ocean, and there was nowhere I could go to avoid the plastic.”

Around the same time, oceanographer Curtis Ebbesmeyer was researching ocean currents by tracking debris that had washed up on beaches around the world. When he heard of Moore's discovery, he named it the Eastern Garbage Patch (EGP). Moore put together a team to survey the area in August 1998. Onboard the research ship *Alquita*, they pulled all sorts of strange objects out of the ocean:

an inflated volleyball dotted with barnacles, a picture tube for a 19" TV, a truck tire on a steel rim, and even a drum of hazardous chemicals. But most of what they saw was plastic...and something else. Moore described it as a “rich broth of minute sea creatures mixed with hundreds of colored plastic fragments—a plastic-plankton soup.” But there was six times more plastic than there was plankton.

TROPIC OF PLASTIC

Just how large is the Eastern Garbage Patch? No one knows for sure—it's growing all the time, and the translucent plastic floats just below the water's surface. “It's one of the great features of the planet Earth, but you can't see it,” said Ebbesmeyer. Estimates, however, say that it's larger than the state of Texas. And that's just on the surface. Much of the debris—up to 30%—sinks to the ocean floor and lands on top of

animal and plant life.

Just how fast is the EGP growing? In a survey conducted in 2007, Moore found that in less than a decade the “patch” had become a “superhighway of junk” running between San Francisco and Japan. He believes that the amount of plastic could now be 10 times higher than it was in 1998; some of the samples have as much as 48 parts plastic to 1 part plankton.

IN THE DOLDRUMS

How did all that garbage accumulate there? The answer is ocean currents. The EGP is located in an area known as the North Pacific Subtropical Gyre, about 1,000 miles from any landmass. The Gyre is formed by air and water currents that travel between the coasts of Washington, Mexico, and Japan. The clockwise currents form a vortex in the center, just as if a



giant soup spoon were constantly stirring it or, as Moore says, “the same way bubbles gather at the center of a hot tub.”

The Gyre is part of the Doldrums—an area named by ancient sailors for its weak winds. For centuries sailors avoided it for fear of stalling there, and fishermen knew there was nothing there to catch but plankton or jellyfish. The Gyre has always accumulated marine debris such as driftwood, as well as “flotsam and jetsam”—stuff that washes offshore from beaches or falls overboard from ships and is caught by the currents and pulled into the middle, where it swirls continuously. But the difference in the last century is that the never-ending influx of trash has made much larger. A plastic bag that flows into the ocean from a California river will ride the currents for up to a year before finally making it to the EGP. And because ocean currents travel only about 10 miles per day, depending on where a object enters the ocean, it could float for much longer—even decades.

REVENGE OF THE NURDLES

Most garbage breaks down over time, but plastic is different. No one really knows how long it takes for plastic to biodegrade because, so far, none of it has. Instead of biodegrading, plastic photodegrades—the sun’s UV rays cause it to become brittle, which breaks it down into small pieces... and then into minute particles that resemble tiny confetti.

Sailors call these plastic bits “mermaid tears,” but the technical term is nurdles. They’re light enough to float in the air (think of tiny packing peanuts and how impossible it is to keep them from spilling everywhere). Everything made out of plastic is made out of nurdles, and every year 5.5 quadrillion of them are manufactured around the world. Just how many end up in the oceans is anyone’s guess, but it’s a huge amount.

Moore has another name for nurdles: “poison pills.” They absorb oily toxic chemicals called persistent organic pollutants, or POPs, which include DDT

and PCBs. Though many of these chemicals were banned in the 1970s, they still linger in the environment and attach themselves to plastic debris. Japanese environmental researchers found that nurdles can absorb one million times their weight in POPs from surrounding water.

Even more troubling: The poison pills resemble plankton in how they seem to “swim” near the surface. Jellyfish and “filter feeder” fish that strain their food out of the water—and who have been eating plankton for eons—are now eating the nurdles instead. And then fish eat the nurdle-eaters. And then those fish are caught by fishing boats...which means there’s a good chance you’re getting more plastic in your diet than you realize. And not just plastic, but all of those toxic chemicals it absorbed.

THE SCOOP

But there is hope. In 2015 a 20-year-old Dutch engineering student named Boyan Slat unveiled his invention: a giant, floating buffer that uses existing ocean currents to collect the plastic bits. His organization, Ocean Cleanup, is currently obtaining the funding for a 62-mile long buffer that will be placed between Hawaii and California. Slat believes he can clean up half of the Pacific Garbage Patch within a decade. His critics have pointed out that it may be too little, too late—and Slat acknowledges that it’s an uphill battle. “But considering the size of the problem,” he says, “it is important to at least try.”