what a WASTE!

WHERE DOES GARBAGE GO?

by CLAIRE EAMER

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With thanks to Alan Daley for the research help, smart ideas, meals at all hours, and generally for just being there–C.E.

For Ed Donlund–B.E.

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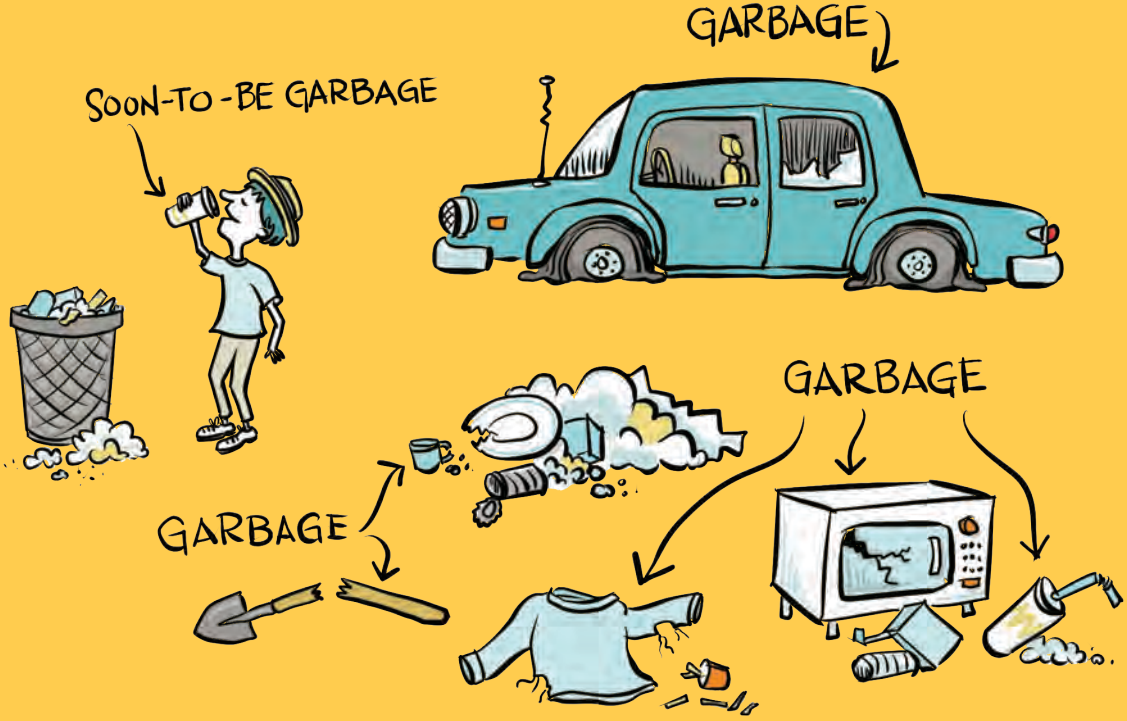
what is GARB



Simple question, right?

Garbage is just stuff you don't want and don't need. It's no good anymore, so you throw it away.

You might toss it in the garbage can or the recycling box or the compost bin or the dumpster in the alley. You might flush it down the drain or drop it on the ground. But those are just the first steps in throwing something away.

So, here's another simple question. Where, exactly, is "away"? Where does your garbage go after you toss it?

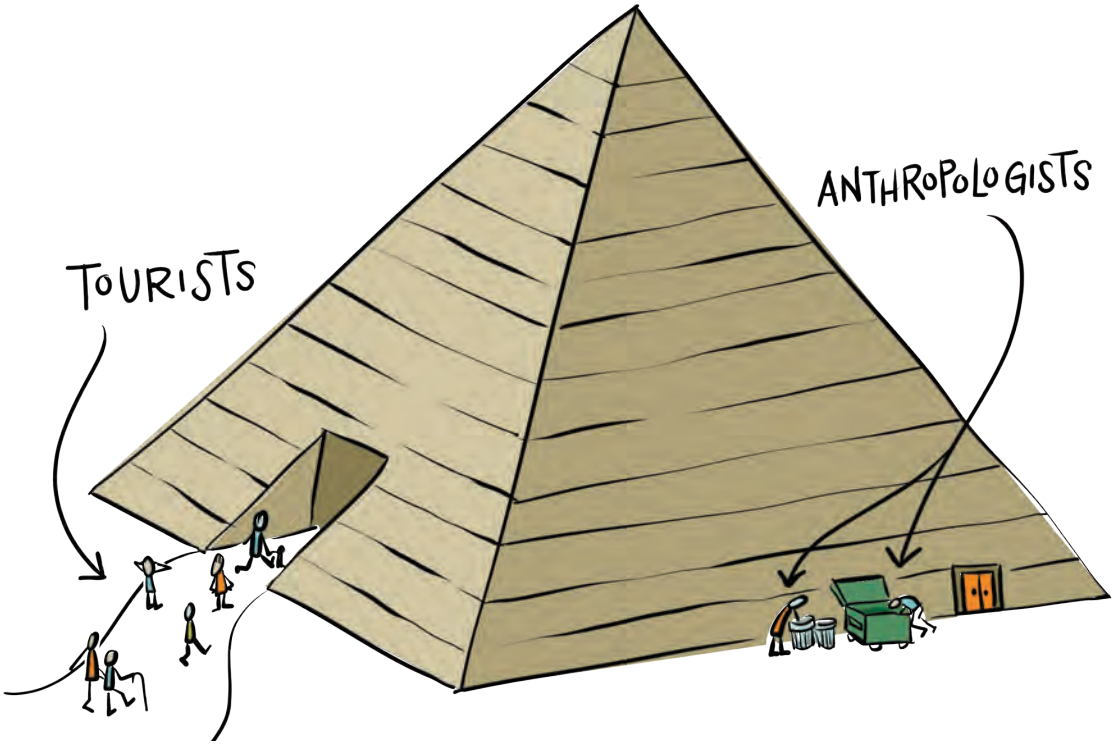
Actually, those two questions aren't simple at all. In fact, tracking down the answers will take us on a journey through time and around the world—from a South African cave still littered with the broken shells of a seafood feast that happened 162,000 years ago to the very edge of space, where dead satellites and other bits of garbage are orbiting Earth. We'll discover a mountain made from discarded olive-oil containers, an ocean of plastic, and tons of poop at the top of the world.

There's NEWS in the GARBAGE

Believe it or not, garbage is fascinating stuff. Archaeologists *love* garbage. Pyramids, cathedrals, and ancient temples tell us how people of the past wanted to be remembered. But their garbage tells us how they really lived. To an expert, a pile of garbage is a newspaper waiting to be read.

Just look at what gets tossed away in your kitchen. That garbage says a lot about how and where your family shops, what you eat, and how you prepare food. You'll probably find plenty of empty packages—cans and jars, boxes, cellophane wrappers, plastic tubs from yogurt and ice cream, Styrofoam meat trays, and plastic bags. That's because most of us—in most parts of the world—shop at stores where food is packaged and ready to be stuffed into a grocery bag.

If your family lived a century ago, your kitchen garbage would have been quite different. The only packaging materials would have been cans, jars, bottles, and paper. No Styrofoam, cellophane, or plastic—those materials hadn't been invented yet or hadn't made it out of the science lab.

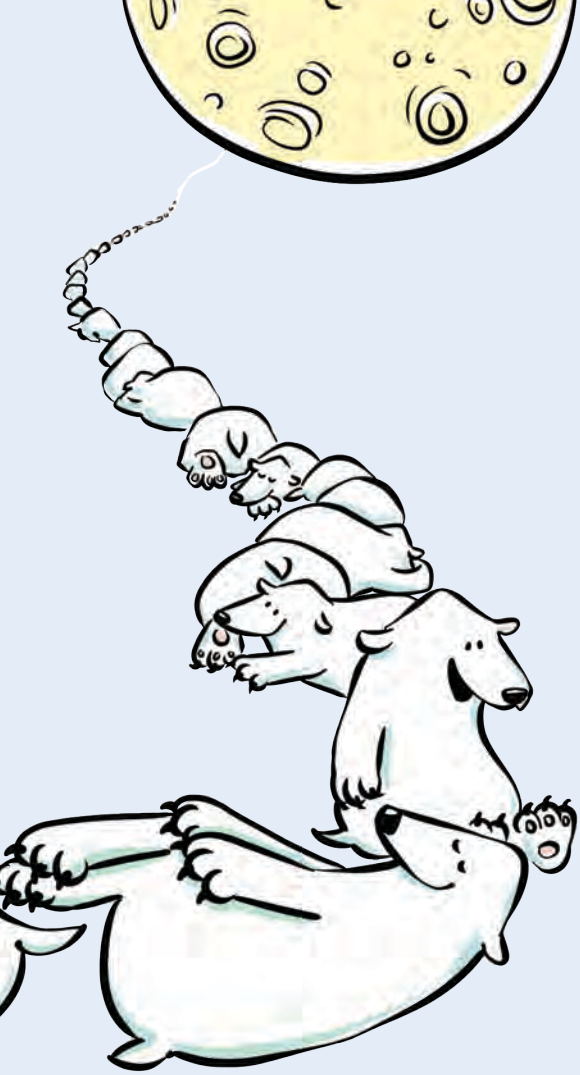


And a century before that, in the early 1800s? Kitchen garbage was mainly bones and vegetable trimmings, with a few bits of broken glass or pottery. Cans wouldn't show up in the trash until canned condensed milk hit store shelves in the 1850s.

Those piles of kitchen garbage reveal how the people of the time lived, what they ate, how they prepared their food, and what kinds of materials were available to them. And each pile probably ended up in a different "away." That information, too, is part of the story garbage tells.

Garbage doesn't just tell a story. Today, it *is* a story. The news is full of reports about garbage: contaminated water spilling into streams, shiploads of old electronics abandoned in distant ports, discarded fishing nets entangling whales, cities running out of space to dump their waste.

Why spend so much time talking about trash? Well, the truth is that we produce a lot of it. In 2015, the United Nations Environment Programme estimated the total amount of solid waste produced around the world in a single year at 7 to 10 billion metric tons. That includes everything from trashed cars to stale bagels—all of it thrown away. It's a huge number, almost too big to imagine.



Try thinking of it in terms of polar bears. The biggest polar bear ever recorded—a shambling giant shot in Alaska in 1960—weighed about 1,000 kilograms (2,205 pounds), or 1 metric ton. So that annual pile of garbage is the equivalent of 7 to 10 billion giant polar bears. The line of bears, standing nose to tail, would reach to the moon and back at least 27 times.

No wonder garbage is in the news!

Trash Talk

Garbage · Trash
Rubbish · Waste
Litter · Refuse

All of these words mean stuff you throw away. But people use different words in different parts of the world. Which one do you use?

Dustbin
Garbage can
Trashcan
Dumpster
Rubbish bin

All of these terms mean a container for waste. What's it called in your neighborhood?

BAD NEWS, GOOD NEWS

People have always produced garbage. It's just part of living. You can't eat a clam supper—as those African diners did 162,000 years ago—without leaving a pile of clamshells. It would be like eating a plateful of chicken wings and leaving no bones. Today, however, humans are producing different kinds of garbage, and more of it than we have space for. We're running out of "away."

How did we get into this mess? Why is there so much garbage? Are some kinds worse than others? What is all of this trash doing to us and to the world? We'll explore all of those questions, and others too. An especially important one is whether there's still time to make a change.

The answer to that last question, fortunately, is a definite *yes*! In the pages that follow, we'll meet smart people with smart ideas—grown-ups and kids—and the governments and corporations that are supporting their efforts or coming up with their own. We'll encounter a Canadian man who started the blue box recycling movement and a Dutch teenager whose invention could help remove plastic from the world's oceans. We'll see how some companies are working together to cut down on the waste they produce, and how some governments are turning waste into energy—and money.

It's all part of the story of garbage—a story that's even older than we are.

CHAPTER 1

THE BEGINNING OF GARBAGE

Humans are really good at making garbage. We've been doing it for a long time—pretty much as long as there have been humans.

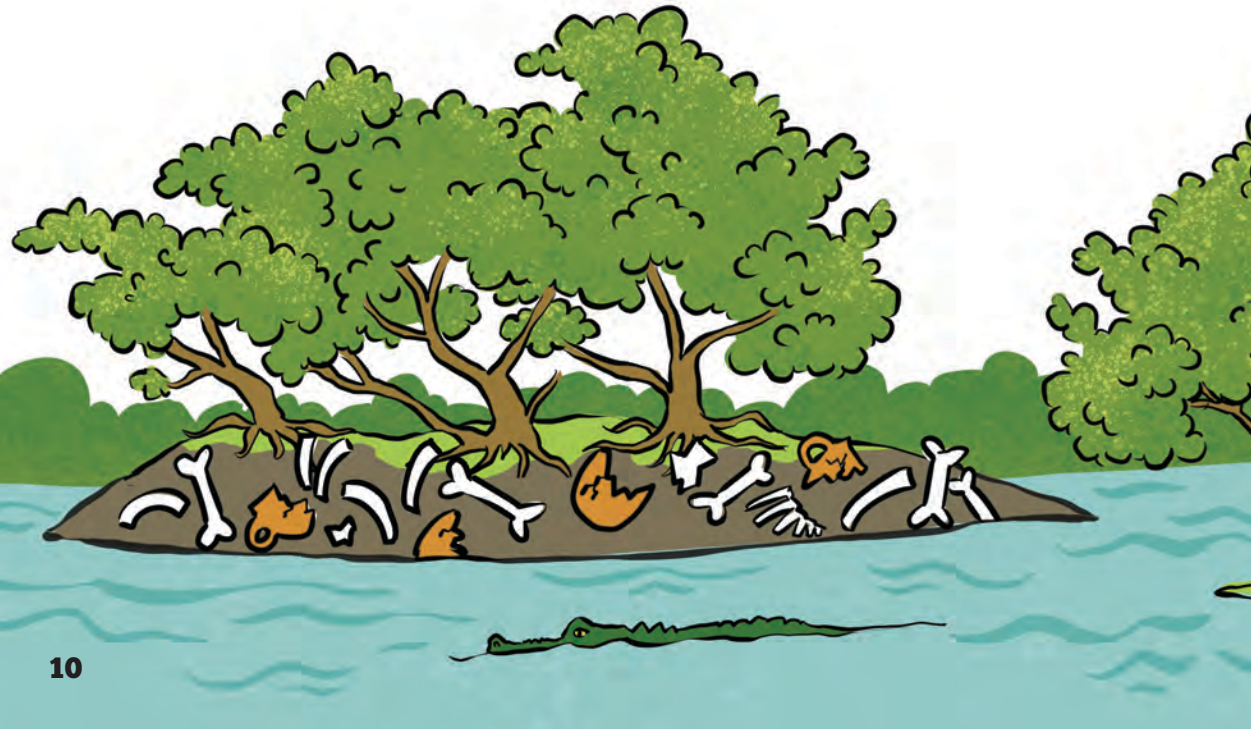
Our ancient relatives left garbage behind even before our own kind of human, *Homo sapiens*, arrived on the scene. About a million years ago, some of those relatives—probably members of a species called *Homo erectus*—sat around a fire in a huge cave in southern Africa. All that's left in the cave today is a layer of ash, but that ash includes the burnt remains of twigs and leaves that were probably used as fuel for the fire. It also contains bits of animal bones that had been heated to temperatures you would expect from a small twig fire. It's hard to be sure after all this time, but it looks as if our ancient relatives might have been cooking dinner—the earliest evidence so far of cooking with fire.

Somewhat later—well, actually about half a million years later—some folks (more *Homo erectus*, since our species still hadn't shown up on the evolutionary tree) were sitting beside a quiet river in what is now Indonesia. We know this because they left a scattering of shells behind. Those shells tell us what those long-ago people were doing: collecting and eating freshwater mussels.

a WHOLE LOT of GARBAGE

Sure, that's garbage, but it's not garbage like we produce it, right? It's not mounds and piles and mountains of garbage. And it's biodegradable: it's all materials, such as wood, bone, and shell, that will eventually break down and disappear into the soil (although those half-million-year-old mussel shells haven't disappeared yet!).

Well, even biodegradable garbage mounts up. Remember those clamshells from 162,000 years ago? They've been traced back to a handful of people (*Homo sapiens*, this time) who sheltered in a large cave on the seashore near the southern tip of Africa. It was a great place to gather shellfish, enough for a small feast. The people pried the shells open, ate the contents, and left the shells behind, scattered on the cave floor. The pickings were so good near that cave that they kept coming back—and so did their children and their children's children. So many yummy shellfish meals were eventually eaten in that cave—over tens of thousands of years—that parts of the cave floor are now piled more than knee-deep with broken shells.



In other parts of the world, people tossed their garbage into piles instead of scattering it. The Florida Everglades, mostly a vast and soggy wetland, is dotted with green bumps—small islands that rise above the marsh and provide the perfect place for land-loving bushes and trees to take root. In fact, they are commonly called tree islands. For a long time, people thought the tree islands were odd geological formations. Recently, however, scientists have dug a little deeper. Literally.

Archaeologists excavated a few islands and discovered that they are actually rubbish heaps. About 5,000 years ago, the people who lived in the Everglades piled up bones, shells, scraps of food, charcoal from their fires, broken pots and tools, and anything else they didn't need. The decomposing food waste and other organic material fed plants, which grew in and over the mounds of rubbish.

Gradually, soil accumulated, and bigger plants flourished. Now the roots of trees keep the old garbage from washing away. Birds nest on the islands, and panthers and alligators take shelter there. Long-abandoned garbage has become an important part of the Everglades landscape.

Trash Talk

Mudlark

In 19th-century London, mudlarks were children who waded barefoot through the mud of the River Thames, searching for rags, bits of metal, or anything else they could sell to buy food. In those days, the Thames was thick with garbage, raw sewage, and even rotting corpses, so it was a nasty and dangerous job.

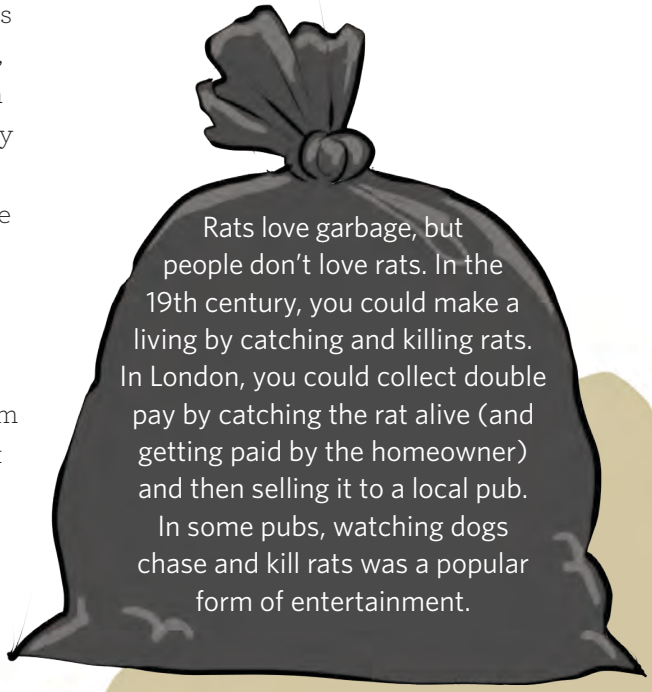
A SIGN OF CHANGE

It's not only garbage itself that tells a tale. The way we get rid of garbage says plenty about us too. If archaeologists want to know whether an ancient site was a temporary camp or a place where people lived all year, they look for the garbage.

In a temporary camp, used for maybe a few weeks during fishing season or berry-picking time, people might leave garbage almost anywhere. Mostly, that garbage would be the same kinds of things found in the Everglades tree islands—food scraps, broken tools, maybe the sticks used for hanging fish to dry or a sheet of bark used as a berry bowl. By the time the people came back the next year, most of the garbage would be gone, scavenged by animals or dried up and blown away.

If you live in a place year-round, getting rid of garbage is a bigger problem. You can't just walk away from it, and the garbage isn't going to walk away either. When you throw something out, it has to go somewhere. And that's what archaeologists look for—the somewhere, the "away" place, that tells them that people were living in a settlement long enough to have a garbage problem.

For those of us accustomed to carefully labeled trashcans that tell us what to throw out where, the places our ancestors chose to dump their garbage might be surprising. Early peoples often believed in the "out of sight is out of mind" approach. Rubbish might be dropped on the floor and covered with layers of dirt and fresh reeds or other greenery. Sometimes it was tossed into an unused room or shoved into an empty house. Often, household garbage was simply thrown into the street.



Rats love garbage, but people don't love rats. In the 19th century, you could make a living by catching and killing rats. In London, you could collect double pay by catching the rat alive (and getting paid by the homeowner) and then selling it to a local pub. In some pubs, watching dogs chase and kill rats was a popular form of entertainment.

Of course, throwing rubbish into the street doesn't make it go away. It does, however, change the street. If you keep tossing garbage out the window or the front door, perhaps covering it with dirt or just letting the rain and traffic pack it down, the street level will get higher. And higher. Add in the rubble from ruined buildings, broken bits of furniture, the sweepings from stables, and all the other junk generated by cities, old and new, and serious changes are likely to happen. Archaeologists calculate that in the ancient city of Troy, in what is now Turkey, the ground level rose at a rate of more than a meter a century over the 4,000 years of the city's history. That's a total of 40 meters (131 feet), or roughly the height of a 12-story building. The culprit? Garbage.