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Harbor Sludge Might Hold Means to Clean The Anacostia River

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How tough do you have to be to survive in [Baltimore](#)? Try breathing toxic waste instead of air.

That's what [University of Maryland](#) scientists have

discovered a tiny microbe doing at the stinky, oily bottom of Charm City's stupendously polluted harbor. Down there, in muck as oozy as black jello, this creature can actually survive on PCBs -- one of the most harmful pollutants in U.S. waters -- and, in the process, break them down into something less dangerous.

Now, researchers are hoping to harness this nasty bit of nature's magic and use it to help other PCB-laden waterways, such as the [Anacostia River](#). Their goal is to create a new kind of biological cleaning crew, bred from the original Baltimore stock.

"Up until now, nobody knew what to do with PCBs. They just lived with them," said Kevin Sowers, one of the scientists who led this research. "If we can do this, it will be the first time that we've been able to actually treat PCBs with a natural process."

This story begins at the Inner Harbor. It might look like a nice place to tourists, who generally stay above the waterline. But on the bottom, it's a different, much uglier story.

For decades, the harbor has been a catch basin for toxic dumping, gasoline leaks and runoff from dirty city streets. All that settled on the bottom to become a kind of super-sludge, which is to pollution what Washington is to lawyers. You could try, but you probably couldn't cram in any more.

"This is Baltimore Harbor," Sowers said one recent day in his laboratory, as researcher Birthe Kjellerup was opening a Mason jar full of black, viscous mud collected from the bottom. She was wearing gloves, since the stuff, and its rotten-egg smell, tends to linger on anything it touches.

"It'll be kind of a black coloration on your fingers, and it takes awhile to get it off," Sowers said. "It's like really black, oily ink."

Among the nastiness that suffuses this gunk are PCBs, whose full name is polychlorinated biphenyls. They are industrial chemicals, which were made from the 1920s until their manufacture was banned in 1977.

Over the years, PCBs were spilled into rivers, where they were eaten by bottom-feeding fish and then inadvertently eaten by creatures, including people, that eat fish. In humans, the chemicals have been linked to cancer and reproductive problems.

Health authorities warn against eating catfish from the Anacostia and Potomac rivers in Washington or eating the "mustard," or tomalley, in the innards of blue crabs from the mid-[Chesapeake Bay](#), because of concerns

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about PCB contamination. Several other local waterways, including the Patuxent, Monocacy and Severn rivers, also have fish-consumption warnings because of these pollutants.

Scientists would like to get rid of the PCBs built up in these waters, but these chemicals were engineered so they would not break down. That used to be a good thing; now it's a problem.

"They don't fall apart in the environment," said Joel Baker, a professor at the University of Maryland Center for Environmental Science. "They don't fall apart in humans."

In the Anacostia, which is heavily contaminated with PCBs from industrial work at the [Washington Navy Yard](#) and other sites, people are trying to bury the problem. Sections of river bottom have been covered with materials designed to keep the pollutants in place.

"Unless you dredge it up," which is very expensive, "there's no other way," said Monir Chowdhury of the District's Department of the Environment.

Sowers, the University of Maryland researcher, has spent years looking for another way. He needed to look in an extremely polluted place, in the hopes of finding a creature that was well-adapted to living in poison.

Sowers didn't have to look far. His lab sits on a pier extending into the dark, trashy waters of the Baltimore Harbor. Which is like a coral expert having an office on the [Great Barrier Reef](#).

"I just go out the back door," Sowers said.

Using samples of that black harbor mud, Sowers and his team eventually found a very small -- as in eight-millionths of an inch wide -- lemon-shaped microbe that can break down certain PCBs. What it does is something like breathing, for a single-celled creature without any lungs.

"Instead of using oxygen, they're using PCBs," Sowers said. At the end of this process, the microbe has stripped one of the chlorine atoms out of the PCB molecule, making the chemical more vulnerable to other creatures that might break it down completely.

So, eventually, they might clean up Baltimore's problem on their own, but the time scale for that is probably decades, at the least, Sowers said. The amount of PCBs in the harbor has decreased sharply in the past 30 years, he said, but some of that is probably because of contaminated mud being washed out or removed through dredging.

In that time, Sowers said, the same microbe has been found all over the world, including in the Anacostia. His theory is that these microbes had evolved to rely on some PCB-like chemical that was in the environment naturally and then took to PCBs when humans started dumping them in.

Now, Sowers said, he would like to supercharge the reproduction of this creature and others like it, so they might be injected en masse into a place such as the Anacostia. He is experimenting with ways to do that, looking at adding other chemicals the microbes rely on to grow. Still, he said, it could be years before that goal is reached.

Thinking ahead, Sowers said, he cannot foresee any danger that these cleanup microbes might become a problem when PCBs are gone.

"Once they're done eating the PCBs, essentially they're going to stop living," he said.

In the meantime, Sowers said, he has been fielding requests from researchers in other cities, whose local

muck does not measure up to the Baltimore brand. He bottles it up and ships it off.

"It's good stuff," Sowers said.

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