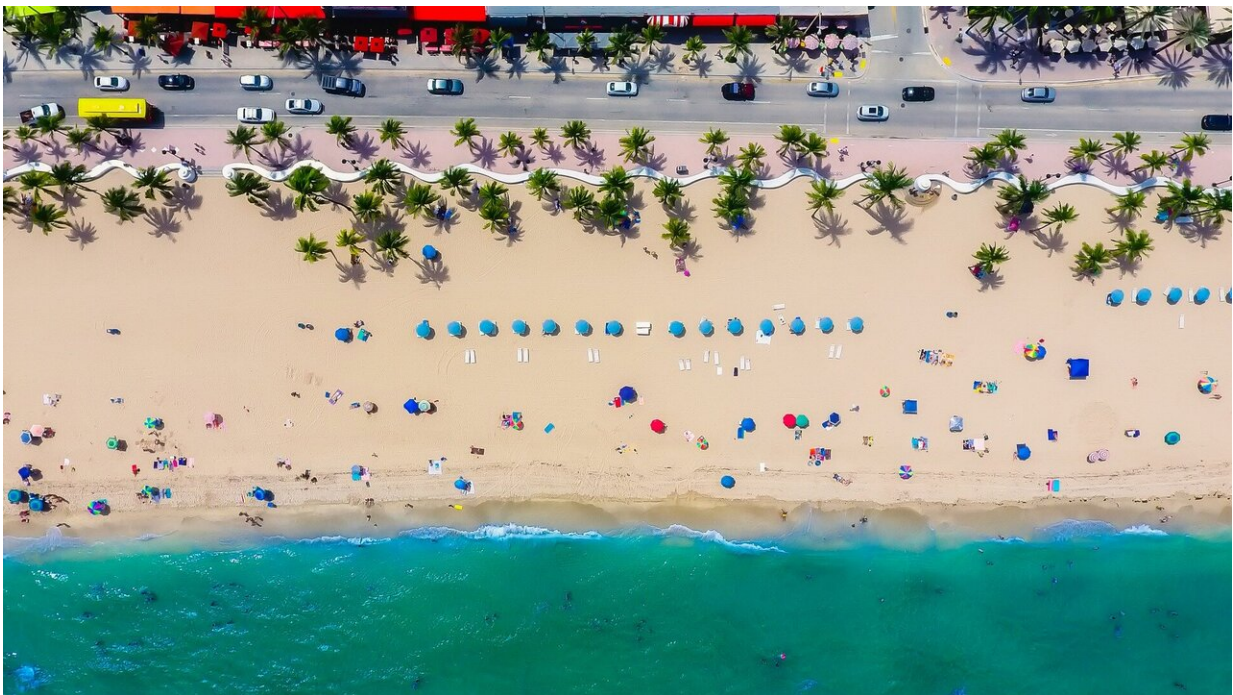


Climate change will raise Florida's risks of brain-eating amoeba and flesh-eating bacteria

August 5 2019, by Alex Harris



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When it's blisteringly hot outside, splashing in the ocean, a lake or even a swimming pool is a popular way to beat the heat. But as global temperatures rise, scientists say, so do your chances of catching a nasty—or even deadly—bug.

The scary one making headlines this summer is *Vibrio vulnificus*, also dubbed in [media reports](#) as "flesh-eating bacteria." Historically, it has been found in warm salt and brackish water, such as the Gulf of Mexico. So far this summer, one death has been linked to the disease and another man spent nearly two weeks in the hospital—both in Gulf coast locations.

But *Vibrio* isn't the only danger found in warming waters. Freshwater lakes and canals can have *Naegleria fowleri*, also known as the "brain eating amoeba." And pools, particularly public ones, may contain the gut-upsetting parasite called *Cryptosporidium*.

The bacteria, amoeba and parasite all have one thing in common—they're thermophilic, which means they like it hot.

Climate change is creating a more inviting environment for them all—including in waters beyond Florida. Warm spots such as Florida are getting hotter for longer periods of time, and areas that were traditionally too cool for any of these pathogens to thrive also are warming up. Higher concentrations of *Vibrio*, for instance, have already started making appearances further north in the Atlantic Ocean, most recently off North Carolina.

"Are we gonna see more cases? Absolutely," said Andria Rusk, a research associate professor of public health at Florida International University. "You're going to see *Vibrio* cases in the winter time and you're going to see *Vibrio* cases in traditionally cooler places in Florida. You have increased the likelihood of exposure."

Of course, the flesh-eating bacteria is already a problem in Florida, especially in the unusually warm Gulf. The Florida Health Department reported 92 cases of the bacterial infection in 2017 and 2018, of which 20 people died. As of July 12 this year, there have been 10 recorded

cases.

The Centers for Disease Control and Prevention estimate there are about 205 *Vibrio vulnificus* cases each year in the United States. But thanks to climate change, many experts project that number will grow.

A recent study published in the *Annals of Internal Medicine* showed *Vibrio vulnificus* is moving in higher amounts into new territories as global waters warm. The bacteria sickened five people in New Jersey and Delaware in 2017 and 2018, areas where it was previously rare to encounter.

"We have already seen *Vibrio* moving up the coast and we will continue to see it doing that," said Rusk, a member of FIU's Global Consortium.

But does it really eat your flesh?

"Short answer, yes. Long answer, define eating," Rusk said. "Flesh-eating is a little sensational in the same way 'man-eating shark' is."

A vibrio infection is like frostbite, she said. The body sacrifices parts of itself to focus resources on essential organs, and when those resources are pulled back from the infection site the tissue withers and dies.

The cure involves a course of "hardcore" antibiotics, cleaning the wound and maybe even skin grafts, Rusk said. The bacterial infection has about a 25 percent mortality rate, usually when complications such as sepsis set in.

In freshwater, the main concern is *Naegleria fowleri*, also known as the "brain-eating amoeba." It's harmless if swallowed; stomach acid dissolves it. But if the amoeba enters the nose, it can creep up the nasal passage and start living up to its name.

"It's an apt name," said Dennis Kyle, a cellular biology professor at the University of Georgia. "They literally do that."

He calls it "98 percent deadly but 99 percent preventable." A North Carolina man died after contracting the disease at a waterpark this month.

Amoeba infections are most common in the lower third of the country, including Texas, Georgia and Florida. It's why some summer camps require nose clips for watersports during the hottest summer months—as a precaution against the amoeba.

Any freshwater, even tapwater, can contain the amoeba, as long as its warm. There are diagnosed cases where people were infected from the water in a slip-n-slide or a neti pot, the plastic device used to flush out sinuses.

But in the last decade, this rare infection has spread north, to Maryland, Indiana, Kansas and even Minnesota, which the Centers for Disease Control's Dr. Jennifer Cope said was "600 miles further north than any previously confirmed case."

"I don't think there's any doubt that with [climate change](#) and increasing temperatures we're going to have more cases and more exposure," Kyle said.

The small number of cases (fewer than eight a year on average) makes it hard to determine if there are actually more cases now, both researchers cautioned. That's because there's also been an increased effort to train physicians to spot the amoeba. Many cases aren't diagnosed until an autopsy, and a CDC study found there are likely about 16 missed cases a year that go down on death certificates as generic neurological infections

"We don't think we're missing hundreds or thousands of cases but there's certainly cases that are being missed," Cope said.

Part of that effort is led by the Smelski family of central Florida, who lost their son Jordan after he caught the amoeba from a Costa Rican hot spring in 2014. He was 11.

Steve Smelski has been on a mission ever since to train clinicians to recognize the rare disease and for hospitals for carry the antibiotic cocktails that stops it in its tracks. He said a recent case, when a South Florida kid was quickly diagnosed and given the drug, makes his point for him. That boy only required two weeks of physical therapy before he was back to normal. An Arkansas girl with the same amoeba got the drug eight hours later. She needed 50 weeks of physical therapy.

"That's how devastating it can be. Eight hours can be 48 weeks of physical therapy," he said. "When its eating the brain, every hour counts."

Although the deadliest bugs occur in fresh and salt water, chlorine-soaked swimming pools can still harbor potentially harmful illnesses.

Pools can be home to the chlorine-tolerant *Cryptosporidium*, a parasite that is transmitted by water and comes from fecal pollution. Rusk said its most commonly spread by babies, who aren't known for their ability to contain their bowels.

"Crypto," as its known, likes warmer water and is more common in summer. The symptoms are flulike, and can resolve on their own for most people with healthy immune systems. It's dangerous for children, the elderly or anyone with a compromised immune system.

And like other waterborne pathogens, warmer weather means a longer

season with more chances of exposure throughout the year.

"The warmer it gets the more people go to swimming pools," Rusk said. "And again you have a greater risk of contraction."

How To Stay Safe

- To avoid a *Vibrio vulnificus* infection, experts recommend not exposing any open wounds (that includes bug bites) to salt or brackish water. Wear water shoes to avoid cuts and scrapes from rocks or shells. And if your wound gets bigger or develops blisters after exposure to ocean water, seek medical attention—immediately.

"One of the biggest problems with *Vibrio vulnificus* is they do not seek medical attention soon enough," Rusk said.

The people most at risk are those with weak immune systems, like children, the elderly or people undergoing cancer treatment. Rusk also pointed out that people with HIV are at risk, and Florida has one of the biggest populations of HIV positive people in the country.

- To avoid a *Naegleria fowleri* infection, take care not to get warm freshwater up your nose. Hold your nose when you cannonball, Rusk advises.

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Citation: Climate change will raise Florida's risks of brain-eating amoeba and flesh-eating bacteria (2019, August 5) retrieved 24 April 2024 from <https://medicalxpress.com/news/2019-08-climate-florida-brain-eating-amoeba-flesh-eating.html>

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