

Research clarifies hazards posed by harmful algal blooms

June 14 2022, by Steve Lundeberg



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Research by Oregon State University has shed new light on the hazards associated with harmful algal blooms such as one four years ago that fouled drinking water in Oregon's capital city of Salem.

The study led by Theo Dreher, emeritus professor of microbiology, involved sampling of cyanobacterial blooms from 10 Oregon lakes including Detroit Reservoir, which provides drinking water for Salem.

Genome sequencing and toxin analyses enabled Dreher and collaborators in the OSU colleges of Science and Agricultural Sciences to identify the precise types of toxins produced by specific organisms.

"This information is important for protecting [public health](#), both with regard to consumption of drinking water and exposure to toxins through recreation on lakes," Dreher said. "Two toxin-producing *Dolichospermum* cyanobacteria were present in Detroit Reservoir, one producing a type of cylindrospermopsin and another producing an uncommon form of microcystin. Occurrences of toxins had been known previously, but now we know the precise toxin types and the organisms making them."

Cyanobacteria, often referred to as [blue-green algae](#), are microscopic organisms ubiquitous in all types of water around the globe. They use sunlight to make their own food and in warm, nutrient-rich environments and can quickly multiply, resulting in blooms that spread across the water's surface.

These [harmful algal blooms](#), often abbreviated to HABs and which are of concern when visible in [lake](#) water, can form at any time of the year but most often between spring and fall.

In 2007 a [national survey](#) by the Environmental Protection Agency found microcystin, a recognized liver toxin and potential liver carcinogen, in one out of every three lakes that were sampled. Some strains of cyanobacteria can also produce neurotoxins, while most of the toxin-producing algae can cause gastrointestinal illness and acute skin rashes.

"Cyanobacterial HABs affect many of Oregon's lakes each year," Dreher said. "Some, but not all, of the blooms are toxic. Potential exposure to cyanotoxins is of public health concern, and blooms particularly pose a threat to dogs entering lakes."

Among the 10 bodies of water in the research by Dreher and OSU colleagues Ryan Mueller and Ed Davis II, toxigenic *Dolichospermum* cyanobacteria caused blooms in four of them: Detroit Reservoir and Odell Lake in the Cascades, Lake Billy Chinook (Metolius Arm) in central Oregon and Junipers Reservoir, a private reservoir west of Lakeview in southern Oregon.

Analysis verified the presence and type of [toxin](#). Microcystin was present in Odell Lake, Lake Billy Chinook and Junipers Reservoir.

"In [early summer](#) of 2018, low concentrations of microcystin and cylindrospermopsin cyanotoxins were found in finished tap water in Salem," Dreher said. "A do-not-drink advisory was issued for vulnerable members of the population, particularly infants and pregnant women. Our research establishes the cyanobacteria and toxins that were involved in that emergency."

Dreher notes that the Salem scare, along with the death of more than 30 steers from drinking cyanotoxin from Junipers Reservoir in June 2017, raised awareness of the hazards of cyanobacterial blooms in the state. The Oregon Legislature has since provided funding to the Department of Environmental Quality in an effort to improve the state's ability to detect blooms and respond to them, he said.

"The good news is that not every cyanobacterial bloom that occurs in our lakes is toxic, although it is always wise to follow the rule of avoiding contact when there's green growth in the water," Dreher said.

If a person or a pet comes in contact with water that may contain harmful bacteria, the Centers for Disease Control and Prevention advises immediate rinsing with fresh water. Dogs should not be allowed to lick the contaminated water off their fur, the CDC adds, and a veterinarian should be called right away.

Anyone swallowing water near a harmful algal [bloom](#) should immediately call a doctor or poison control center.

Amanda Foss of GreenWater Laboratories in Palatka, Florida, also took part in this research. The findings were published in *Harmful Algae*.

More information: Theo W. Dreher et al, 7-epi-cylindrospermopsin and microcystin producers among diverse *Anabaena/Dolichospermum/Aphanizomenon* CyanoHABs in Oregon, USA, *Harmful Algae* (2022). [DOI: 10.1016/j.hal.2022.102241](https://doi.org/10.1016/j.hal.2022.102241)

Provided by Oregon State University

Citation: Research clarifies hazards posed by harmful algal blooms (2022, June 14) retrieved 6 May 2024 from <https://phys.org/news/2022-06-hazards-posed-algal-blooms.html>

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