Seven things you should know about blue-green algae

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It happens every summer: blue-green algae bloom into vast blankets of colorful scum in lakes, disrupting ecosystems and potentially exposing people to toxins.

Blue-green algae, also known as cyanobacteria, act as single-celled microscopic plants fuelled by high temperatures and nutrients often found in chemical runoff.

Freshwater ecologist Rolf Vinebrooke, who studies cyanobacteria as a professor in the University of Alberta's Department of Biological Sciences, shares some facts and expert tips to keep in mind this summer before you head to the beach.

Blue-green algae can be toxic

Some species of blue-green algae produce toxins that are harmful to both humans and animals, causing symptoms like skin irritation, nausea and sore throat. And species found in Alberta lakes have some of the highest toxin production in Canada, says Vinebrooke.

"I always say they make a chemical cocktail."

Hepatotoxins are a part of the chemical mix that targets liver tissue in higher organisms, according to Vinebrooke. Liver damage brought on by hepatotoxins has been documented as harmful to humans and can be deadly for livestock, wildlife and pets that drink water from algae-infested lakes.

Cyanobacteria also produce neurotoxins that disrupt nervous system function by causing blockage in respiratory nerve impulses, paving the way for potential suffocation and disorientation, Vinebrooke notes.

"You often see it in waterfowl—if they've drunk a lot of blue-green algae and they're on a dock looking like they're staggering, it can be the neurotoxins produced by blue-green algae."

Avoiding it is best—especially for your pets

Vinebrooke says avoiding water that contains blue-green algal blooms is always best.

Public advisories posted by Alberta Health Services act as a warning based on water monitoring done in part by Vinebrooke's lab, which receives more than 500 samples every year from beaches across Alberta. Problems can arise because the plant can be hidden in water, so keeping an eye out for advisories is key, he notes.

"Sometimes the wave action causes it to all mix up and it's like mixing something into a glass of milk and then stirring it all up."

If you do come into contact with a bloom, Vinebrooke recommends thoroughly rinsing off immediately after coming out of the water.

Toxins in blue green algae can be particularly toxic for animals that drink lake water—and unlike humans, your pet may need professional treatment.

Algae blooms come with an environmental cost

Once blue-green algae have all the nutrients, warm temperatures and sunlight they need to start growing in earnest, their spread can go unchecked, Vinebrooke explains.

"Lots of blue-green algae just don't get grazed. They're either just too large or they're slimy so the other organisms can't eat them," Vinebrooke says.

And as summer comes to a close and temperatures drop, huge masses of

algae start to decompose, creating a new environmental stressor that can harm a lot of organisms.

"It causes a loss of oxygen from water because of the decomposition," Vinebrooke explains. "Sometimes fish kills are the result of blue-green algae just decomposing en masse to the point where there's no other oxygen left in the water for other organisms."

Humans are contributing to algae blooms

Vinebrooke says humans are indirectly contributing to optimal bloom conditions. Fertilizers and certain household products like detergent and soap contain phosphorus—a key nutrient source for blue-green algae that, when released into the environment by human runoff or rain storms, fuels algal blooms that can devastate ecosystems.

The phosphorus-algae connection was cemented with pioneering research by freshwater ecologist David Schindler, who demonstrated the link with work done in experimental lakes, Vinebrooke notes.

Cyanobacteria thrive at temperatures of almost 30 C in lake environments affected by climate change. Rising summer temperatures also contribute to lakes biochemically recycling pre-deposited phosphorus, Vinebrooke says, offsetting changes humans make to avoid chemical runoffs that fuel blooms.

"Not all blue-green algae are warm-loving species, but the ones that cause problems in general are."

There are ways to beat algae blooms

Algae blooms can be eliminated with several methods, according to

Vinebrooke, including putting algae-killing chemical compounds into water or bioremediation that alters lakes by increasing the amount of organisms able to eat the algae.

Water fountains in lakes or ponds also fight algae blooms and are often part of prevention strategies.

"It might look good, but it's also there for the purpose of aerating the water so that the phosphorus stays locked up in the sediments and the blue-green algae don't get too much of it."

Outside of industrial and scientific efforts, Vinebrooke says people who live near water should avoid getting chemicals like lawn fertilizers into the waterways, and protect coastline vegetation to help prevent chemicals that promote algae growth from entering water.

Researchers are studying it from space

Blue-green algae blooms are dynamic and need to be studied from a broader perspective with field experiments, large-scale surveys and paleolimnology—the science of reconstructing lake history using sediments, says Vinebrooke.

Satellite imaging is a method Vinebrooke's lab also uses for research, with funding from Alberta Innovates and in partnership with several provincial agencies including Alberta Health and the Alberta Biodiversity Monitoring Institute.

Imaging data captured from space helps Vinebrooke's lab get a clearer and more immediate picture of how blooms are developing and fading, and how lake movement is being affected in response to different factors.

"The satellites pass over Alberta almost every couple of days, or almost on a daily basis in some cases," he says.

Earth's original organism still has mysteries to uncover

You can find blue-green algae in water ecosystems worldwide, spanning deserts, the Arctic, oceans and soils. The mucky cyanobacteria are actually the original organism that enabled life to evolve on Earth, Vinebrooke explains.

"They essentially were the first organisms to start producing oxygen by way of photosynthesis."

That's one of the reasons blue-green algae are so adaptable and not easy to get rid of, says Vinebrooke, because they've been around for so long and have evolved in so many different environments.

"If you give blue-green algae a foothold, they generally tend to become very abundant and dominant compared with a lot of other types of algae or phytoplankton."

Scientists don't know what signals blue-green algae to create toxins, because it is sometimes benign. And new algae blooms can be spontaneous, arriving one day and gone the next—leaving scientists with plenty of questions still to answer, says Vinebrooke.

"It's still a knowledge gap for sure."

Provided by University of Alberta