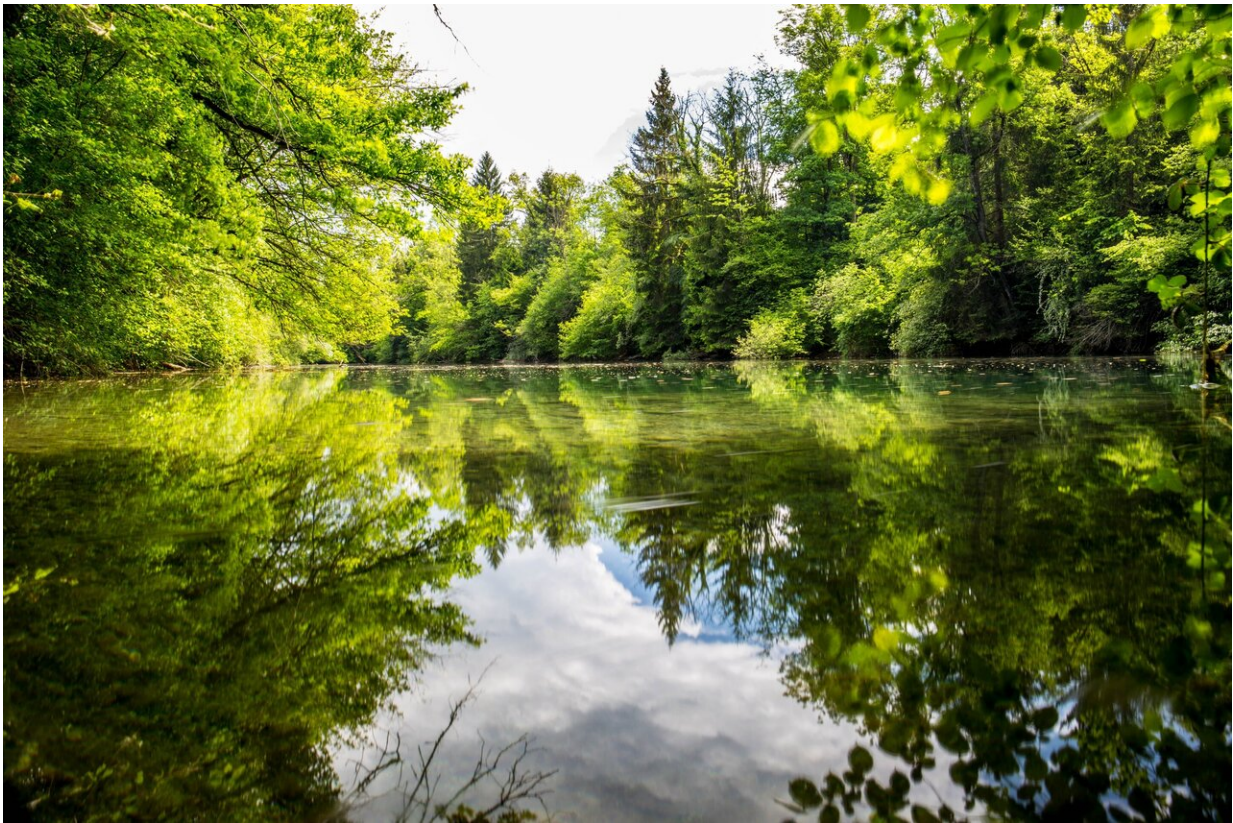


# Study finds airborne release of toxin from algal scum

April 2 2021

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Credit: Unsplash/CC0 Public Domain

A dangerous toxin has been witnessed—for the first time—releasing into the air from pond scum, research published in the peer-reviewed journal *Lake and Reservoir Management* today shows.

Not only is [pond scum](#)—otherwise known as algal [bloom](#)—an unsightly formation which can occur on still water across the world, it can also prove dangerous to wildlife and humans.

For the first time, scientists have now detected the presence of the algal toxin anatoxin-a (ATX) which is also known as 'Very Fast Death Factor', in the air near a Massachusetts pond with large [algal blooms](#).

ATX can cause a range of symptoms at acute doses, including loss of coordination, muscular twitching and respiratory paralysis, and has been linked to the deaths of livestock, waterfowl and dogs from drinking contaminated water.

ATX is produced by [single celled organisms](#) known as cyanobacteria, which can form harmful algal blooms—when huge amounts of cyanobacteria grow in lake surface waters. Blooms are exacerbated by fertilizer run-off entering lakes or ponds from nearby fields or improperly treated wastewater, and can stimulate growth and high water temperatures. Cyanobacteria, which also are known as [blue-green algae](#), are actually a type of bacteria that can photosynthesize.

Cyanobacterial blooms can also lead to low oxygen conditions, further degrading water quality. This is because when the algae in these large blooms die, they sink to the lake bottom and decompose, which can use up all the oxygen in the water, killing fish and other animals. The blooms also can release toxins into the water that can prove fatal for these animals.

"ATX is one of the more dangerous cyanotoxins produced by [harmful algal blooms](#), which are becoming more predominant in lakes and ponds worldwide due to global warming and climate change," says lead author Dr. James Sutherland, at the Nantucket Land Council.

ATX had never been detected in the atmosphere before, but Sutherland and his colleagues suspected that it might become airborne under certain environmental conditions.

To test this possibility, they collected samples of airborne particles from around the edge of Capaum Pond on Nantucket Island in Massachusetts, US, from July to October 2019, when it was regularly covered with algal blooms, by sucking air through a glass fiber filter. They then used an analytical technique called liquid chromatography-tandem mass spectrometry to search for ATX in these samples, as well as in samples of water from the pond.

Not only were they able to detect ATX in the pond water, at concentrations of up to 21ng/mg, but on one occasion they also detected it in the air around the pond, at an average concentration of 0.87ng/filter, which corresponds to a potential airborne exposure of 0.16ng/m<sup>3</sup>. This detection occurred on a foggy day in September, after a windy night, when the ATX was likely blown from the surface of the water by the strong wind and then protected by the fog, allowing it to be detected.

The researchers are unsure exactly how ATX is released into the air from the pond, whether within small water droplets, attached to aerosol particles or even inside cyanobacteria blown into the air. It is also unclear what effects exposure to these trace concentrations of ATX might have on humans and wildlife, but the fact that there is exposure is clearly a cause for concern and requires further research.

Whilst this new toxin was witnessed in one specific [pond](#), researchers warn caution for people across the world to approach still [water](#) with algal blooms. Therefore, further research is needed to test algal blooms in ponds internationally.

"People often recreate around these lakes and ponds with algal blooms

without any awareness of the potential problems," said Sutherland. "Direct contact or inhalation of these cyanotoxins can present health risks for individuals, and we have reported a potential human health exposure not previously examined."

**More information:** The detection of airborne anatoxin-a (ATX) on glass fiber filters during a harmful algal bloom, *Lake and Reservoir Management* (2021). [DOI: 10.1080/10402381.2021.1881191](https://doi.org/10.1080/10402381.2021.1881191)

Provided by Taylor & Francis

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