Algae blooms act as bodyguards for bacteria in Great Lakes

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UB researchers found that green algae blooms (orange strands in the smaller picture) act as a barrier between UV radiation and bacteria, such as salmonella (green dots), which allows organisms to grow unheeded on Great Lakes beaches.

(Phys.org) —Beachgoers and anglers may despise algae, but bacteria such as E. coli and salmonella revel in it.

That's according to University at Buffalo researchers who have found that green algae in the Great Lakes not only protect bacteria from

destruction by the sun's ultraviolet rays, but feed the organisms as well.

The research, a cover article published in the journal Royal Society of Chemistry's *Environmental Science: Processes and Impacts*, offers new insight into how algae affect the health of the Great Lakes, the world's largest surface freshwater system.

"Because algae are a nuisance, we don't think that they are harmful. But some may be harboring bacteria," says Berat Haznedaroglu, PhD, a researcher at RENEW, a new interdisciplinary initiative at UB that focuses on energy, environment and water research.

E. coli – most strains of which are non-pathogenic – and algae are typically present in freshwater, and officials regularly test the water for bacteria levels. Although salmonella often finds its way into the waterways in fecal matter through runoff from sewers and farms, these bacteria are usually killed by UV rays.

However, an algae bloom – a boom in algae population – can act as a barrier between radiation and the organisms, allowing bacteria populations to grow unheeded. Extreme amounts of bacteria can force officials to close a beach for public safety.

Haznedaroglu, an assistant professor in UB's Department of Civil, Structural and Environmental Engineering in the School of Engineering and Applied Sciences, and graduate students collected algae samples from beaches at Beaver Island State Park and tested them with lab-grown E. coli and salmonella. The samples were continuously illuminated at the same conditions with a controlled amount of UV radiation similar to daylight.

In samples of water from the Niagara River containing 1,000 units of E. coli and salmonella per milliliter, without the protection of algae, the

bacteria survived for nearly six hours and 14 days, respectively. However, when algae were introduced, the E. coli lasted for 16 hours, while the salmonella experienced hardly any drop off.

Once samples were increased to 100,000 units, E. coli thrived for 11 days with an algae presence, compared to two days without. The larger salmonella sample shielded by algae experienced some decline, but subsisted at a greater rate than the exposed group.

Researchers found that the bacteria don't infect the algae as they would a host, but instead, hide beneath them to avoid sunlight. And since there are few food sources for the bacteria to feed on outside of a host, the bacteria also crowd around the algae to feed on organic molecules they release.

But removing algae from lakes does more harm than good. They produce needed oxygen for other aquatic life in the water and are a vital part of the food chain.

To prevent algae blooms, which are caused by an excess of nutrients, Haznedaroglu suggests people use fewer household cleaning products, soaps and detergents. These products often contain phosphate, a major nutrient for algae.

In addition to research on water quality, Haznedaroglu's lab also focuses on several positive uses for algae, including its potential as a biofuel, a protein supplement in juices and smoothies, and for nitrogen and phosphorous removal during waste water treatment.

More information: pubs.rsc.org/en/Content/Articl … m00659j#!divAbstract

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