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FOR IMMEDIATE RELEASE

HAB Remediation Takes a Sustained, Biological Effort

By Suzan Chin-Taylor

Harmful algae blooms (HABs) are easy to spot in fresh water. The distinctive blue-green algae quickly take over the surface of the water, instantly creating a toxic hazard that can upend the local ecosystem. The cyanobacteria that promote these blooms are lethal to fish, animals, and even people. Municipalities and lake associations are quick to prohibit swimming in HAB-affected waters, but ultimately there's little that can be done to remediate the bloom.

A deadly serious problem

HABs occur when cyanobacteria – microscopic organisms present in all types of water – quickly multiply. Cyanobacteria use sunlight to make their own food. In warm, slow-moving, phosphorus- and nitrogen-rich environments (such as areas affected by fertilizer runoff), the bacteria multiply so fast that they can create visible "blooms" on or below the surface of the water. The bacteria can cause issues with taste and odor in drinking water, but the problem runs deeper.

HABs pose a threat to fish, animals, pets, people, and ecosystems when left unchecked. The dense blooms can block the sunlight and steal the oxygen that other organisms need to live. They also can make cyanotoxins, which are among the most powerful natural poisons in the world. Cyanotoxins can make people, animals, and other organisms sick, and there are no remedies.

Worse, you can't tell whether a harmful algae bloom has cyanotoxins just by looking at it. If the HAB occurs in a potable water supply and

isn't filtered appropriately, it will contaminate drinking water. Contaminated water can cause a variety of physical complications in animals, including:

- Vomiting
- Diarrhea
- Loss of appetite
- Loss of energy
- Tremors and seizures
- Stumbling and falling
- Foaming at the mouth
- Convulsions
- Excessive drooling

Human illness from HABs has occurred in more than 50 countries and at least 35 American states. Humans are most likely to contract illness when swimming in or drinking contaminated water, which also leads to a loss of recreational and aquaculture revenue.

Mechanical and chemical processes are insufficient

Unfortunately, mechanical, and chemical processes don't work for sustained HAB remediation. Mechanical processes, which physically remove the algae bloom, are labor-intensive. For example, one form of mechanical control disperses clay over the water's surface. As the clay particles aggregate with each other and the cyanobacteria cells, sedimentation occurs. This approach works in countries such as Korea that depend on a multimillion-dollar fish farming industry.

In the U.S., mechanical processes are difficult to execute at the needed scale because they are so costly and labor-intensive. Not to mention the permits and environmental clearances that must be obtained. Additionally, mechanical processes don't address the problem at its root. As long as there are warm, slow-moving, and nutrient-rich water sources, HABs will continue to occur.

Chemical processes are ecologically detrimental and expensive. Water management authorities commonly use copper sulfate, which is toxic to most aquatic organisms. The copper binds to fish gill membranes, making it impossible for them to function properly. Copper sulfate also causes cyanobacteria cells to leak, which releases toxins into the water.

Ultimately, neither of these solutions is sustainable and effective on a long-term basis.

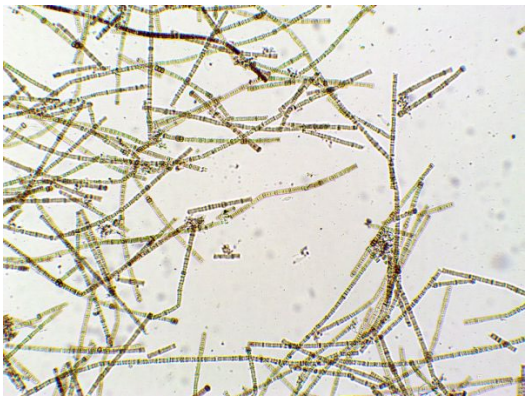
Soil-derived bacteria is an effective and safe solution

Soil-derived bacteria – Bacillus bacteria – are proven to be one solution. Bacillus bacteria consume nutrients that the cyanobacteria require. Not only does use of Bacillus help control harmful algae blooms and reduce

their reoccurrence, the bacteria also "eat" the settled solids to remediate harmful leftovers that could create a resurgence or recurring HAB.

One study found *Bacillus amyloliquefaciens* FZB42 was effective in removing 98.78% of harmful cyanobacteria. This bacteria strain creates bacilysin, a natural antibiotic that can kill cyanobacteria. A low incubation temperature (20 C) decreases these effects, as well as activated charcoal or soil at normal temperatures (30 C). Scientists are hopeful *Bacillus amyloliquefaciens* FZB42 can be developed as a biocontrol agent to mitigate HAB effects.

Naturally occurring soil-derived bacteria are also a safe and effective solution. That's why bioaugmentation is nature's remedy, made ready to scale. A consortium of microbial agents address the root of the HAB problem. The consortia of bacillus soil bacteria outcompete the cyanobacteria in an organic and sustainable way, remediating the harmful bacteria from the water body. The bacilli work with the existing microbiome to restore the waterbody to its natural and healthy state.



An available technology that automates the generation, activation, and dispensing of these types of microbes is the EBS-Di from EnBiorganic Technologies. Due diligence has shown that this provider's costs are held far lower than industry standards of microbial augmentation, and lower still than mechanical or chemical options. Low Cost and No Cost Performance Trials may be available for qualifying entities.

To protect ecosystems, organic microbial solutions are key

HAB instances are on the rise, and they pose a severe threat to local ecosystems. Instead of costly, temporary solutions that involve manually skimming blooms, or harsh chemical treatments that destroy the local microbiome, municipalities should consider a more effective approach. Advanced microbial solutions are a proven, sustainable, and cost-efficient approach to HAB remediation.

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Images to accompany this news release may be accessed and downloaded at:
https://drive.google.com/drive/folders/1zlmw--8CKibCrMewNYqGPGQ1vLkin_M6?usp=share_link

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EnBiorganic Technologies, founded in 2019, bridges science and technology to contribute to a living planet. We believe in synergy—various parts working together to produce an enhanced result. We are driven to build innovative solutions based on a foundation of solid science. Our team is focused on solving big issues that will have a significant impact in our backyard and beyond. Our current breakthroughs in wastewater solutions, HAB mediation and animal agriculture create value for our clients, while protecting the planet's most valuable resources. Learn more at: https://enbiorganic.com.