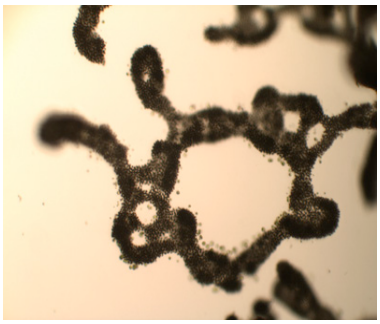
Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute

Microcystis in the Environment and Its Health Effects

Microcystis is found naturally at low concentrations in freshwater systems and sometimes in low salinity areas. It occasionally forms a harmful algal bloom (HAB). *Microcystis* produces a toxin that can affect human and animal health.

Introduction



*Microcystis,*a genus of **cyanobacteria**, is a microscopic organism that is found naturally at low concentrations in freshwater systems such as lakes and streams. It occasionally forms a harmful algal bloom (HAB). *Microcystis* is also sometimes found in low salinity waters when it is washed out of a freshwater system. It has frequently been reported in both fresh and low salinity waters in Florida. Although often called a bluegreen algae, *Microcystis* is actually not an alga, but a simpler form of life more closely related to bacteria. It occurs globally, from Australia to South America to Europe, and to the United States.

Under optimal conditions (such as high light and calm weather, usually in summer), *Microcystis* occasionally forms a bloom, or dense aggregation of cells, that floats on the surface of the water forming a thick layer or 'mat'. At higher concentrations, *Microcystis* blooms are so dense that they resemble bright green paint that has been spilled in the water. These blooms potentially affect water quality as well as the health of human and natural resources. Decomposition of large blooms can lower the concentration of dissolved oxygen in the water, resulting in hypoxia (low oxygen) or anoxia (no oxygen). Sometimes, this results in fish kills. The blooms can also be unsightly, often floating at the surface in a layer of decaying, odiferous, gelatinous scum.

Excessive nutrient inputs have often been cited as the cause of freshwater cyanobacteria blooms. Although nutrient enrichment, or eutrophication, contributes to bloom formation, the underlying factors leading to a cyanobacterial bloom are complex. They may include poor water flow (stagnant conditions) and alternations of the lake ecosystem such as land clearing, agricultural activities, and water management.

Of the more than 50 genera of freshwater cyanobacteria identified, approximately one third produce toxins. *Microcystis* is the most common of these toxic cyanobacteria and has been associated with human and livestock poisoning as well as fish kills. Consequently, considerable research has focused on this organism and its toxins. Not all *Microcystis* blooms are harmful or toxic. In fact, both toxic and nontoxic strains of *Microcystis* exist. Toxic strains can also regulate the gene for toxin expression, essentially 'turning on' or 'turning off' toxin production so that they may not be toxic under all conditions. Toxic strains of *Microcystis* produce a protein-based toxin called microcystin. Currently, more than 60 structural variants of microcystins have been identified. Some other cyanobacteria such as *Anabaena flos-aquae* also produce microcystins.

Health Effects

Microcystins are hepatotoxins (toxins that acts upon the liver) and known tumor promoters. If people drink water

contaminated by microcystins, symptoms of exposure include nausea, vomiting and, in very rare but severe cases, acute liver failure. Reported health effects from cyanobacteria in humans are highly uncommon in the United States.

Although the likelihood of people being affected by a *Microcystis* bloom is low, minor skin irritation can occur with contact, and gastrointestinal discomfort can also occur if water from a bloom is ingested. People recreationally exposed (e.g., personal watercraft operators) to microcystins have also reported minor skin irritation. Health problems may occur in animals if they are chronically exposed to fresh water with *Microcystis* present. Just as livestock and domestic animals can be poisoned by drinking contaminated water, fish and bird mortalities have been reported in water bodies with persistent *Microcystis* blooms.

To limit exposure to microcystin toxin:

- Avoid or limit exposure to water containing high concentrations of *Microcystis*. This includes swimming and any activity resulting in accidental immersion.
- Do not allow children or pets to play in water containing a bloom.
- Never drink untreated water containing a *Microcystis* bloom, and do not let pets or livestock drink the water.
- Do not use herbicides to kill *Microcystis* cells because this will release the toxins directly into the water.

If exposed, wash the area thoroughly with clean water. Also thoroughly wash the fur of a pet that has been swimming in waters containing *Microcystis*.

Contact Information

FWRI Fish Kill Hotline: (800) 636-0511 (toll-free)
The FWRI Fish Kill Hotline is available for citizens to report fish kills, diseased fish, or fish with other abnormalities. The hotline's recorded message asks callers to leave contact information and a detailed report. A biologist will respond, usually the following workday, if more information is needed. This service is part of a federally funded project to survey fish-related diseases and mortalities. Fish kills may also be reported online; visit **Report a Fish Kill** for additional information and details. (Please note, the FWRI Fish Kill Hotline should NOT be called to request dead fish cleanup; local authorities are responsible for dead fish cleanup — usually only public beaches.)

FWC Wildlife Alert Hotline: (888) 404-3922 (toll-free)

Marine and Freshwater Toxins Hotline: (888) 232-8635 (toll-free)
The Marine and Freshwater Toxins Hotline is available for reporting harmful effects associated with a marine or estuarine event. Callers are connected to the **Florida Poison Information Center** in Miami, which operates 24 hours a day, seven days a week. The center is staffed by health care professionals who record the caller's information and assist with health and safety concerns. The **Florida Department of Health** (DOH) encourages people who have experienced harmful effects associated with exposure to aquatic toxins or harmful algae to call the hotline.

Florida Department of Health Web Site
http://www.doh.state.fl.us/environment/community/aquatic/cyanobacteria.htm

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