

Cyanobacteria Blue-Green Algae

Harmful Algal Blooms (HABs)
in Ohio Waters in 2010

Presentation Part I of II



Photo: Grand Lake St. Marys
St. Marys, Ohio 2010

Introduction:

In the summer of 2010, several of Ohio's inland lakes experienced cyanobacteria blue-green algae blooms, commonly referred to as Harmful Algal Blooms (HABs).

During the 2010 HAB outbreak, the Ohio Department of Health (ODH) received reports of illness from persons who had contact with HAB-contaminated waters and/or reports of pet illness and death after dogs swam and/or drank water from these lakes.

This presentation will take you through the initial public health discovery and involvement.



Cyanobacteria

"Blue-Green Algae"

Cyanobacteria, often called blue-green algae, are not algae but singled-celled bacteria that photosynthesize like a plant.

Blue-green algae are naturally found in Ohio lakes, ponds, and slow-moving streams. That can also be found in brackish and marine waters.



Burr Oak State Park
Glouster, Ohio 2004

"Algal Blooms"

Individual microscopic bacteria can sometime form visible colonies or bundles of filaments in clusters of cells that can form mat-like layers.



Scioto Trail State Park
Chillicothe, Ohio 2010

Harmful Algal Blooms (HABs)

Examples of Cyanobacteria (Blue-Green Algae)

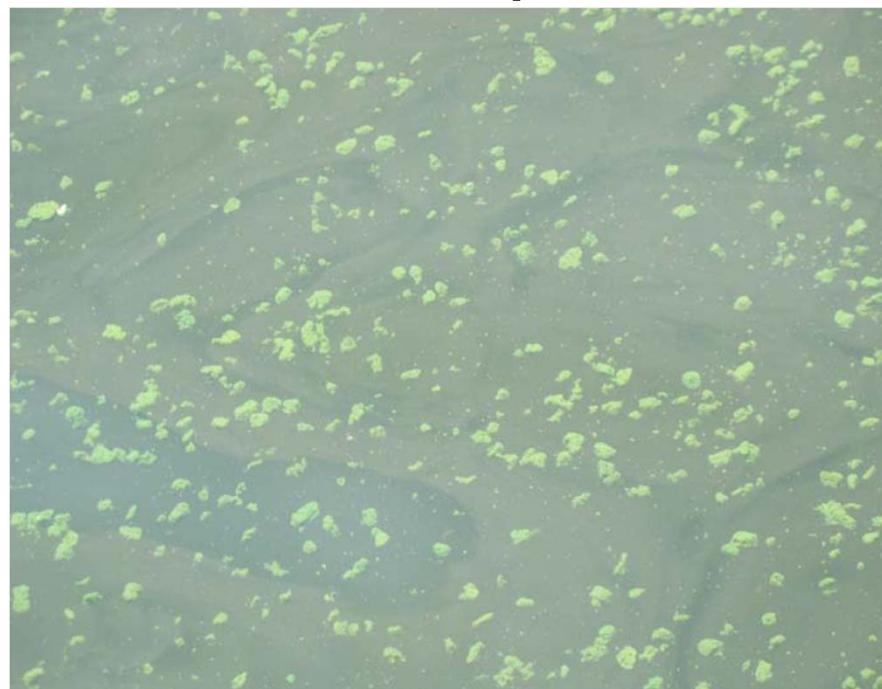
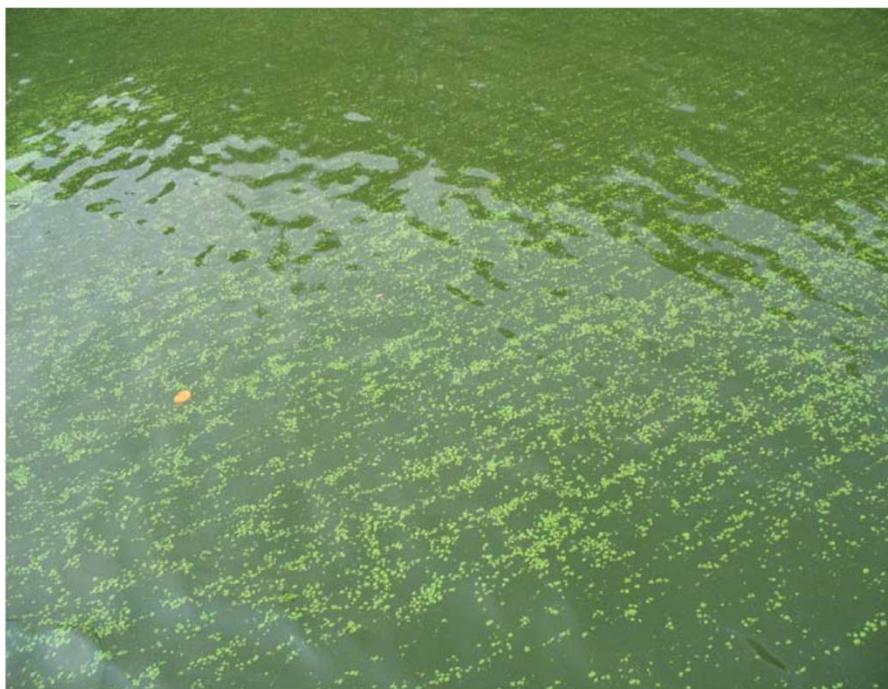


Examples of Common - Harmless Algae and Aquatic Plants



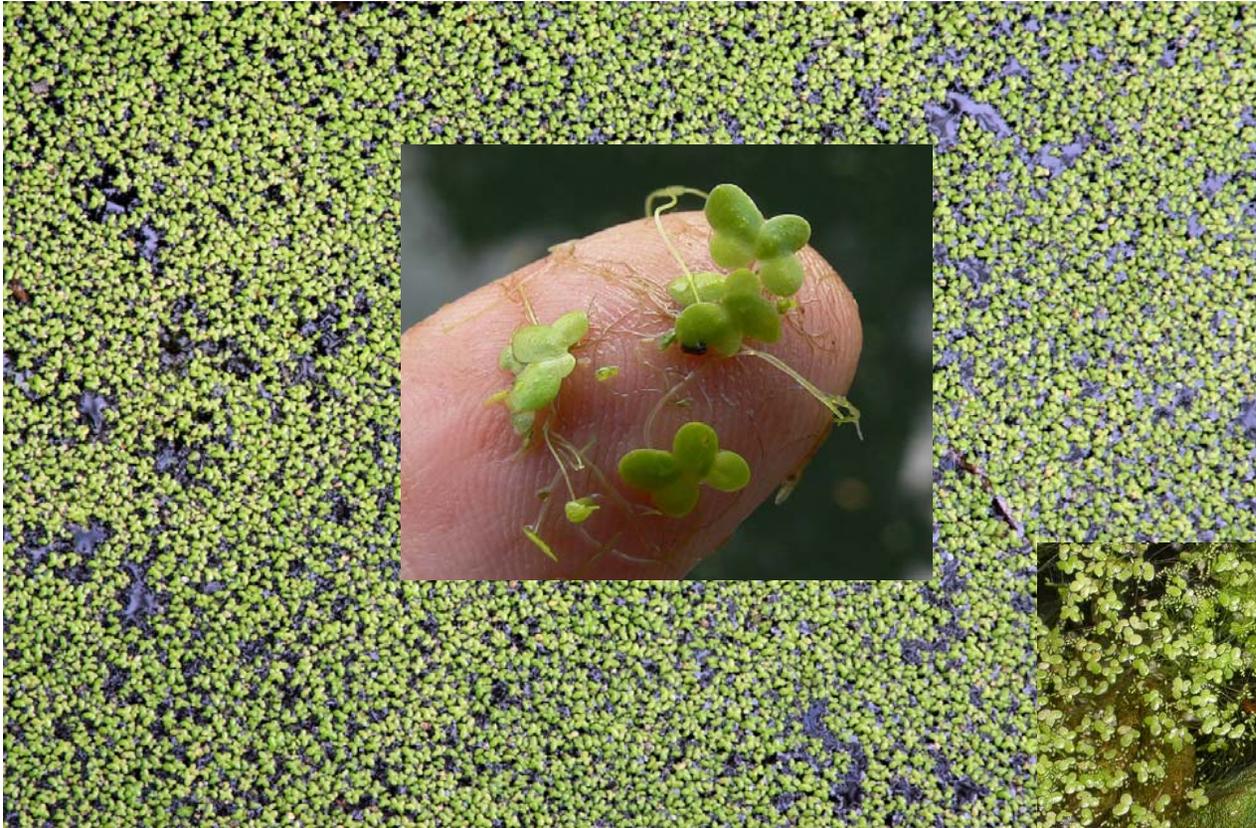
Examples of Blue-Green Algae *Microcystis* Bloom

Close-up



Ohio River *Microcystis* bloom, 8/22/08
Photo by: Jim Crawford, Ohio EPA Emergency Response

Examples of Duckweed Harmless Aquatic Plants



Cyanobacteria “Blue-Green Algae” Harmful Algal Blooms (HABs)

Although not all species of cyanobacteria produce toxins, massive growth of some species of blue-green algae can result in Harmful Algal Blooms (HABs)

Cyanobacteria can produce neurotoxins (which affect the nervous system) and hepatotoxins (which affect the liver) and dermal toxins (which affect the skin).

Scientists do not fully understand what causes the same species of algae to trigger toxin production during one bloom and not produce toxin during the next.

Cyanotoxins

Freshwater Cyanotoxins	Type of Toxin	Causative organism	Vector
Anatoxin-a	Neurotoxin	<i>Anabaena</i> spp. <i>Aphanizomenon</i> spp. <i>Planktothrix</i> spp.	Contaminated fresh water
Anatoxin-a(s)	Neurotoxin	<i>Anabaena flos-aquae</i>	Contaminated fresh water
Cylindrospermopsin	Hepatotoxin	<i>Cylindrospermopsis raciborskii</i> , <i>Aphanizomenon ovalisporum</i>	Contaminated fresh water and possibly fish
Lyngbyatoxin	Dermal toxin	<i>Lyngbya</i> spp.	Contaminated fresh or marine waters
Microcystins	Hepatotoxin	<i>M. aeruginosa</i> <i>Anabaena</i> spp. <i>Planktothrix</i> spp.	Contaminated fresh water
Saxitoxins	Neurotoxin	<i>Anabaena circinalis</i> <i>Lyngbya wollei</i>	Contaminated fresh water



Safe Levels:

WHO established a safe level of microcystin in drinking water at 1.0 ppb and 20.0 ppb for recreational waters.

Note: There are currently no drinking water or recreational safe level standards for the other cyanotoxins listed in the above chart (Nov 2010)

Cyanotoxins

Route, Symptoms/Onset

Exposure and Clinical Presentation:

Route of Exposure	Symptoms/Signs	Time to symptom onset*	Differential Diagnosis
Swallowing water contaminated with cyanobacteria or toxins	Hepatotoxins (microcystins, cylindrospermopsin) Elevated AST/ALT, GGT Gastroenteritis Acute hepatitis Kidney damage Malaise Headache Anorexia	Minutes to hours	Other hepatotoxin poisoning, other microbial infections/toxins Viral hepatitis Viral Gastroenteritis Hepatotoxic drug ingestion (acetaminophen)
Swallowing water contaminated with cyanobacteria or toxins	Neurotoxins (anatoxin-a, anatoxin-a[s], saxitoxin) Paresthesia Tremor Fasciculations Hypersalivation Diarrhea Ataxia Motor weakness Respiratory and muscular paralysis	Minutes to hours	Pesticide poisoning, other toxin poisoning
Skin contact with water contaminated with cyanobacteria or toxins or contact with animals contaminated with cyanobacteria	Dermal toxins (Lyngbyatoxins, lipopolysaccharide endotoxins) Rash, hives Skin blistering Allergic reactions	Minutes to hours	Other dermal allergens. non-allergic urticaria, photosensitivity reactions
Inhaling aerosolized droplets contaminated with cyanobacteria or toxins	Upper respiratory irritation Rhinitis Possible allergic reaction	Unknown, but likely an acute reaction	Other airborne allergens, upper respiratory infection, flu

* Symptom onset times are primarily extrapolations from laboratory animal data and events.

To see section **II** of the Harmful Algal Blooms (HABs) in Ohio Waters in 2010 presentation visit:

<http://www.odh.ohio.gov/~media/ODH/ASSETS/Files/eh/HABs/HAB2010prespart2.ashx>

For More Information:



Ohio Department of Health
Health Assessment Section
35 E. Chestnut St.
Columbus, Ohio 43215
(614) 466-1390
Greg.stein@odh.ohio.gov