Visual Identification of Cyanobacteria Blooms

(also referred to as blue-green algae blooms)

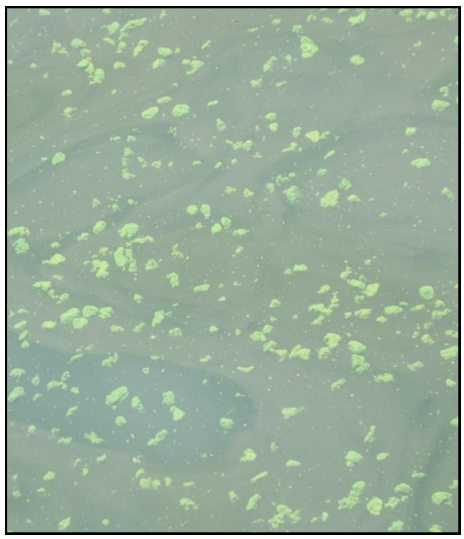
With some practice, cyanobacteria blooms can usually be visually distinguished from green algae blooms and duckweed without using a microscope. This document contains:

- General tips on the differences between cyanobacteria blooms and green algae blooms and the aquatic plant duckweed.
- A photo gallery of Ohio cyanobacteria blooms produced by different types of cyanobacteria and their associated toxin levels (if available).
- Photomicrographs of the most common toxin-producing cyanobacteria genera.
- Examples of green algae blooms and duckweed, for comparison purposes.

The photomicrographs are included since it is generally not possible to determine the type of cyanobacteria present in a bloom without use of a microscope, and different genera can produce different toxins.

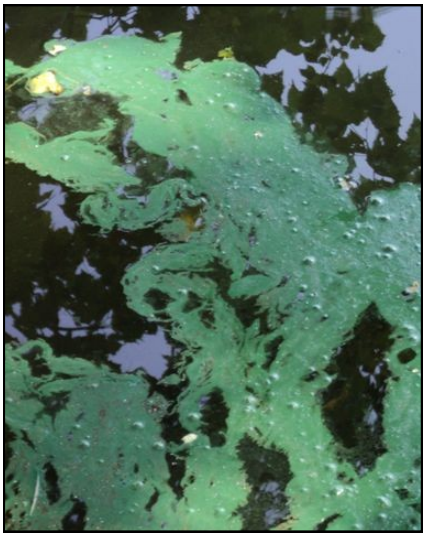
Please be aware that bloom severity is not always a good indication of toxin concentration. While most cyanobacteria blooms that appear minor will only have very low levels of toxins present, in other cases minor blooms may have higher concentrations of toxins. This may be because when cyanobacteria cells die they can release toxins present within their cells. A photo taken at the end of a bloom cycle, after it starts to dissipate, may look like a minor bloom, but toxin levels are still high. In addition, some cyanobacteria are more likely to produce toxins than others, so it is often difficult to assess toxin concentrations by visual evidence alone.

Cyanobacteria (also referred to as blue-green algae)



Microcystis bloom

Anabaena bloom



Planktothrix & *Anabaena* bloom

Cyanobacteria can be distributed throughout the water or they can float to form scums on or near the surface. The cells of many cyanobacteria group together to grow in colonies. Blooms can look like slicks of opaque, bright green paint, but closer inspection often reveals the grainy, sawdust-like, appearance of individual colonies. Blooms mixed throughout the water column can resemble pea soup. While most cyanobacteria in Ohio have their namesake blue or greenish coloration, they can also appear yellow, brown, purple, red or white. As cyanobacteria begin to clump together and decompose they can produce gases that often have a "swampy" or "freshly cut grass" odor.

Green Algae & Duckweed

Cladophora bloom

Spirogyra bloom

Duckweed

Not all algal blooms or surface scums are cyanobacteria. Some green algae like *Cladophora* and *Spirogyra* can also create large blooms, but they do not produce harmful algal toxins. Green algae come in many forms and may look like underwater moss, thick stringy mats or floating slimy scum. Duckweed are tiny aquatic plants with a grainy or couscous-like texture. They may resemble miniature lily pads and are generally beneficial to the environment.

Jackson Lake on 8/17/10. Microcystins detected at 0.15 ppb on 8/18/10. The maximum concentration detected at this site was 0.20 ppb on 8/23/10.

Wingfoot Lake on 10/11/10. *Microcystis* bloom. Microcystins detected from 0.6 - 1.9 ppb on 10/12/10. Please note, a week prior to this microcystins were detected above 250 ppb and a week after this photo was taken concentrations were up to 46.5 ppb. This demonstrates the dynamics of a bloom and how toxin concentrations can change rapidly.

Catawba Island at Miller's ferry dock on 8/10/10. Microcystins detected at 5.5 ppb on 8/10/10.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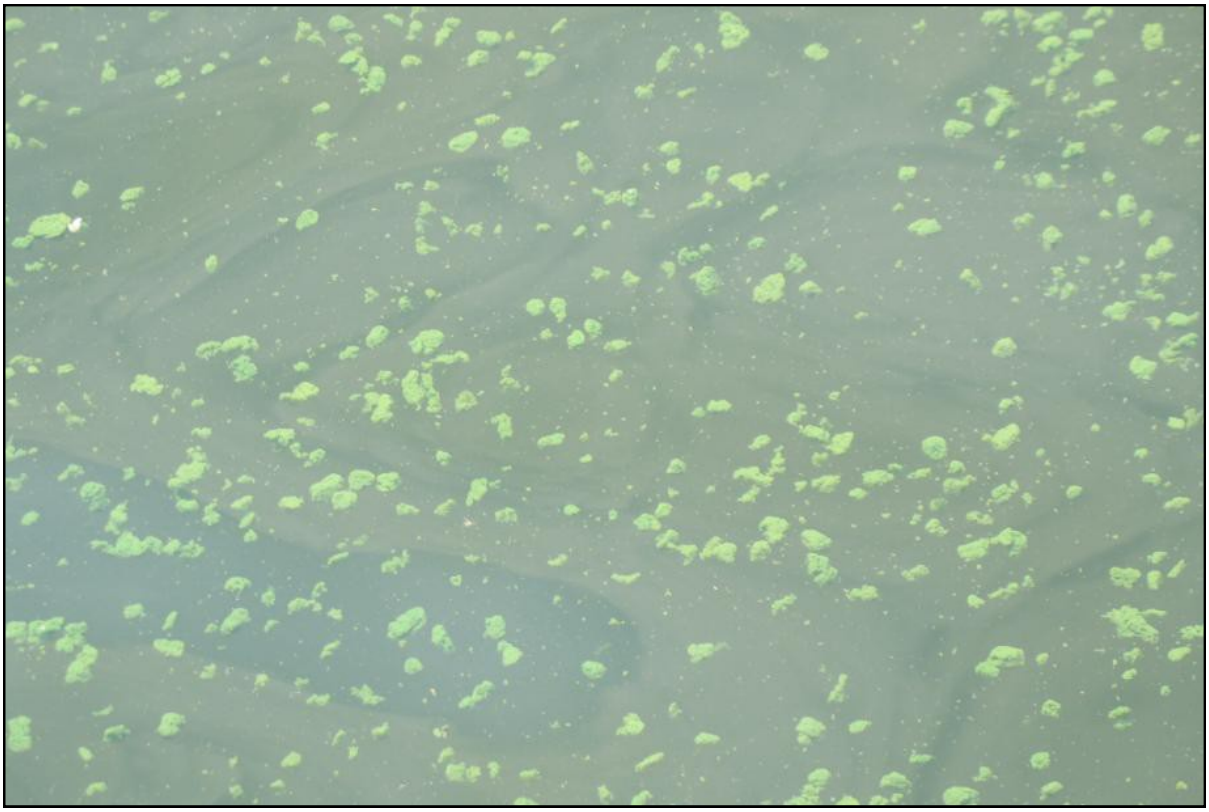
East Harbor State Park Beach on 8/10/10. Microcystins detected at 19 ppb on 8/10/10.

Ohio River *Microcystis* bloom on 8/22/08. This demonstrates that cyanobacteria blooms can occur on slow flowing rivers, in addition to lakes.



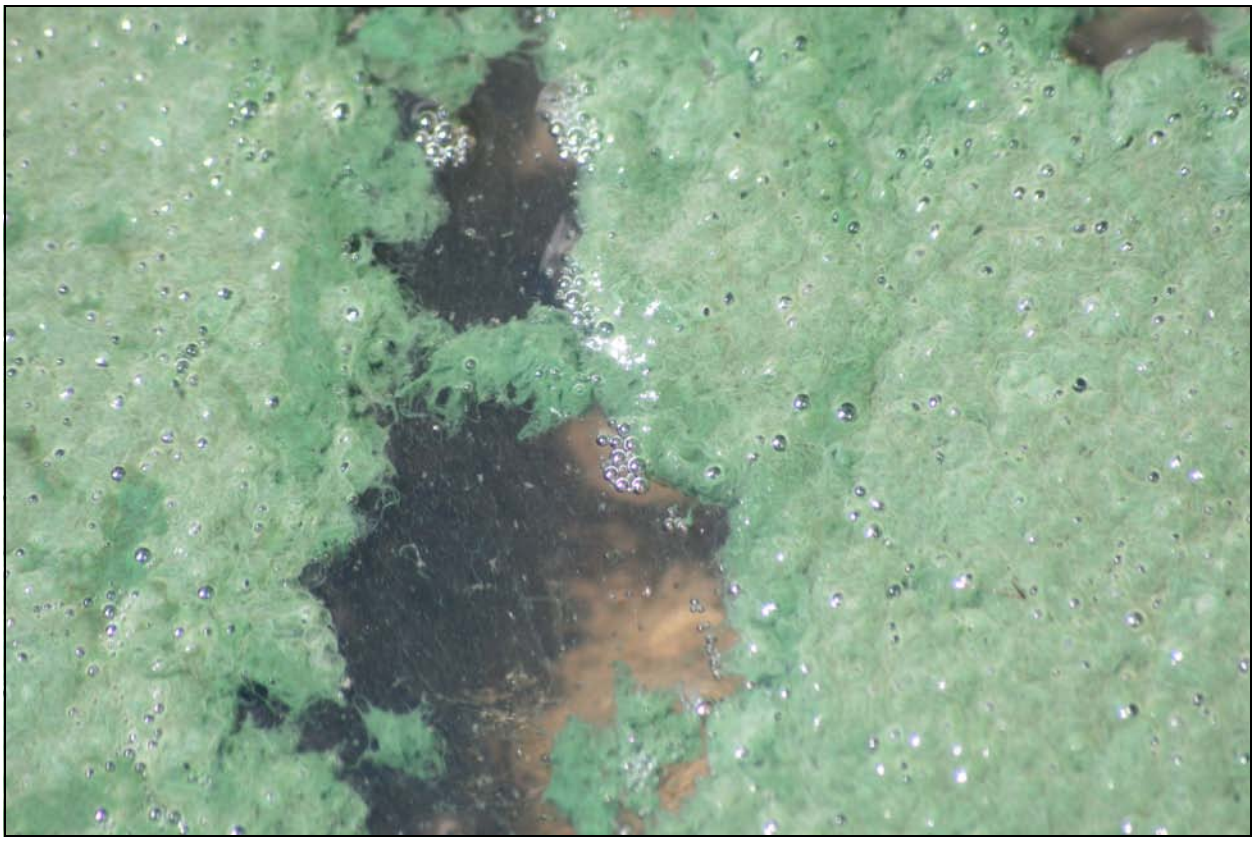
Woodsfield Reservoir on 9/29/10. *Anabaena* bloom. Microcystins detections on 9/29/10 of 0.68 ppb at center of lake and 360 ppb within bloom at lake inlet (photo taken near the inlet).

Lake Alma on 8/23/10. Microcystin detections of 0.2 - 0.3 ppb, Anatoxin-a detection of 0.2 ppb, and Cylindrospermopsin detections of 0.2 - 0.3 ppb on August 23. Low levels of toxins were present until 10/18/10, and Saxitoxin was also detected at 0.09 ppb at that time.

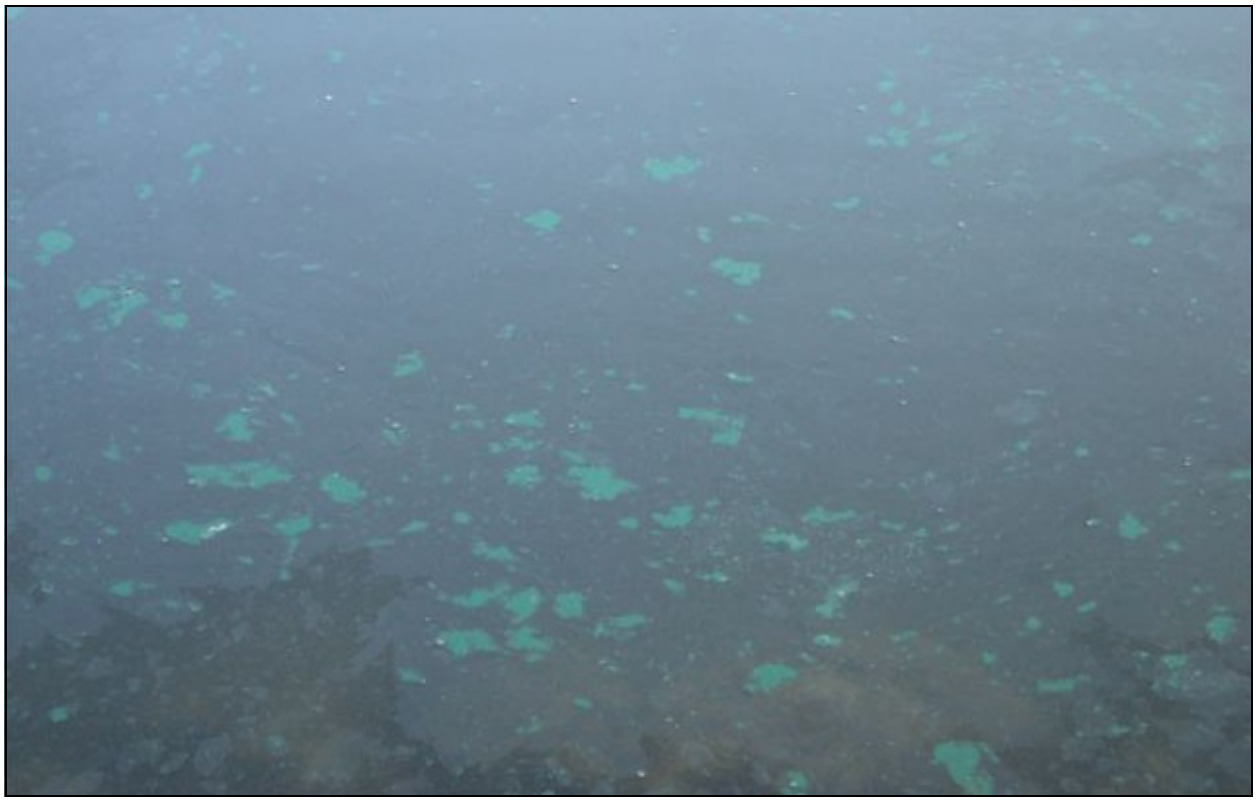
Lake Hope on 8/17/10. *Planktothrix* Bloom. Microcystins were not detected on 8/15/10 but were present at 0.20 ppb on 8/23/10.

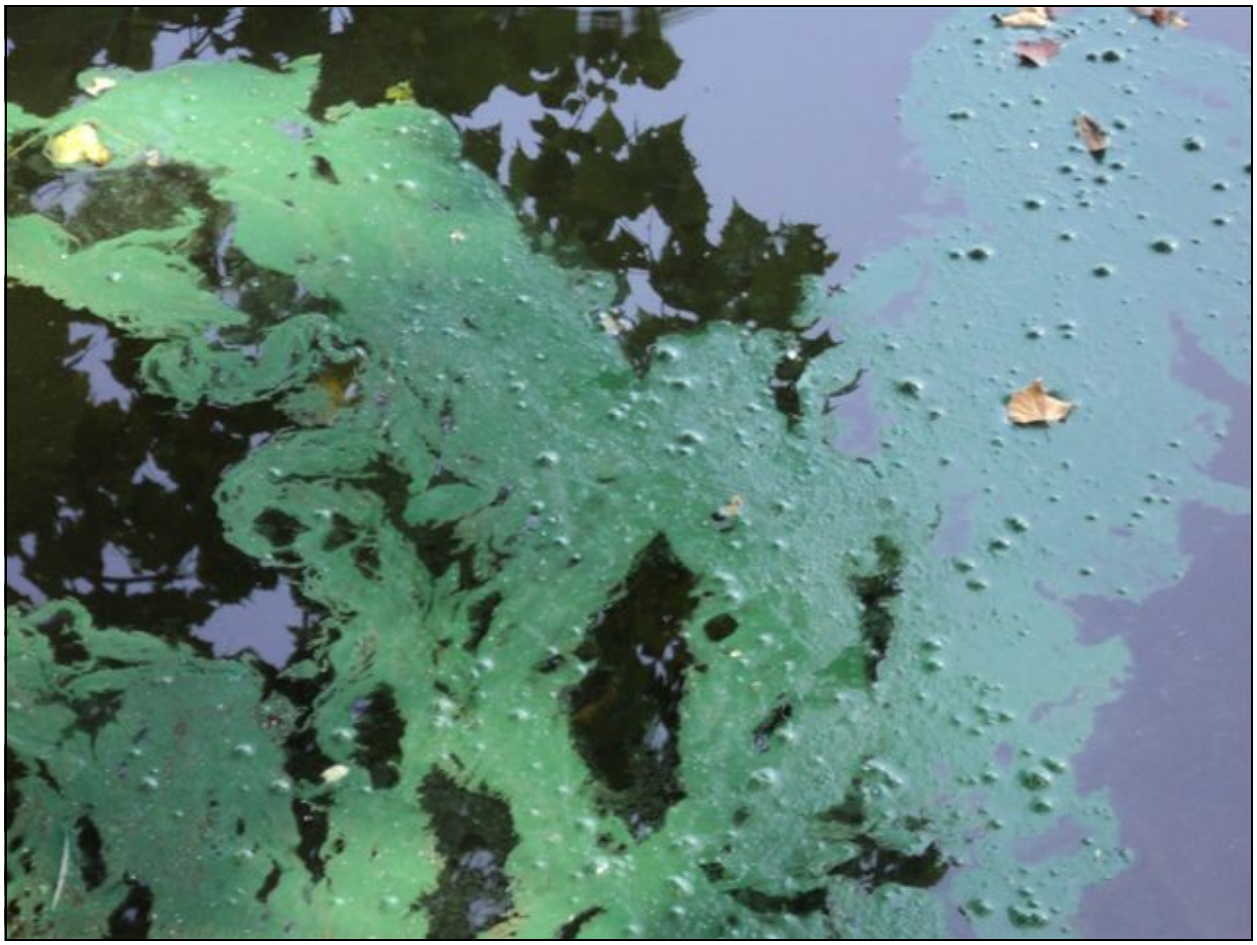
Deer Creek Lake on 8/20/10. Microcystins detections of 2.0-4.6 ppb on 8/15/10 and 0.7-0.9 ppb on 8/23/10.

Silver Lake/ Lake Mac-o-Chee, Camp Wilson on 7/20/10. Microcystins detected at 1000 ppb.



Cutler Lake, Blue Rock State Park, first week of August, 2010. Anatoxin-a detections of 0.05 - 10 ppb and Saxitoxin detected at 0.1 ppb. Most abundant species were *Planktothrix isothrix* & *Anabaena smithii*. (*Aphanizomenon* was also present).



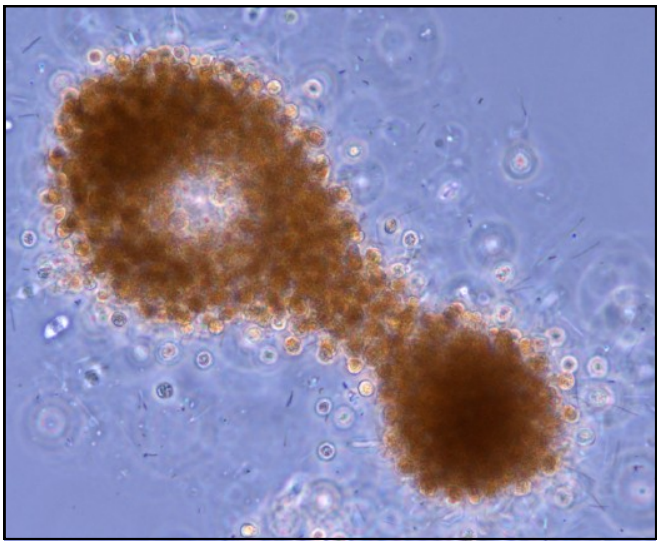


Burr Oak Lake on 7/21/10. Microcystins detected at 0.20 ppb on 7/26/10. Sample collected on 7/28/10 showed most abundant species were *Cylindrospermopsis raciborskii*. *Planktolyngbya f. limnetica*, and *Aphanizomenon* sp., however when the bloom first appeared *Anabaena* was the most prevalent species.

Maumee Bay *Lyngbya* bloom in 2007.

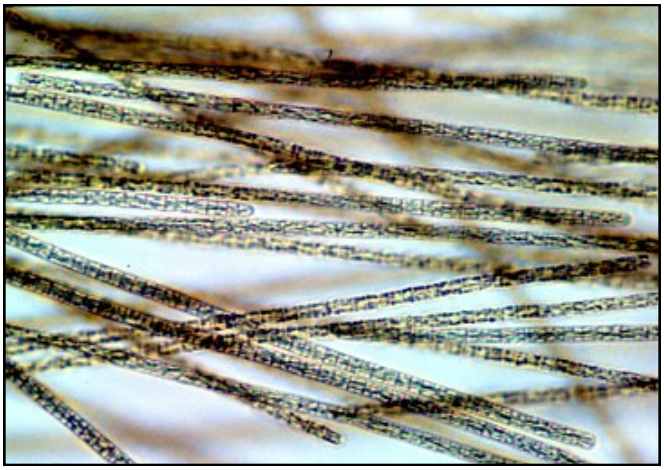
Cyanobacteria Photomicrographs

Anabaena



Microcystis

Aphanizomenon



Planktothrix

Cylindrospermopsis

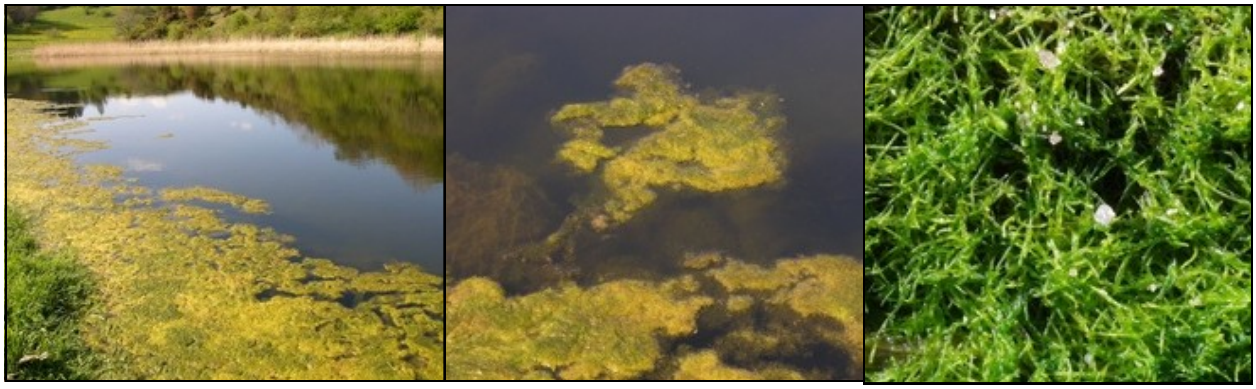
Please note, there are many different species within each genus and each species may have different morphological characteristics. Additional cyanobacteria photomicrographs and identification information is available at:

http://www-cyanosite.bio.purdue.edu/images/images.html

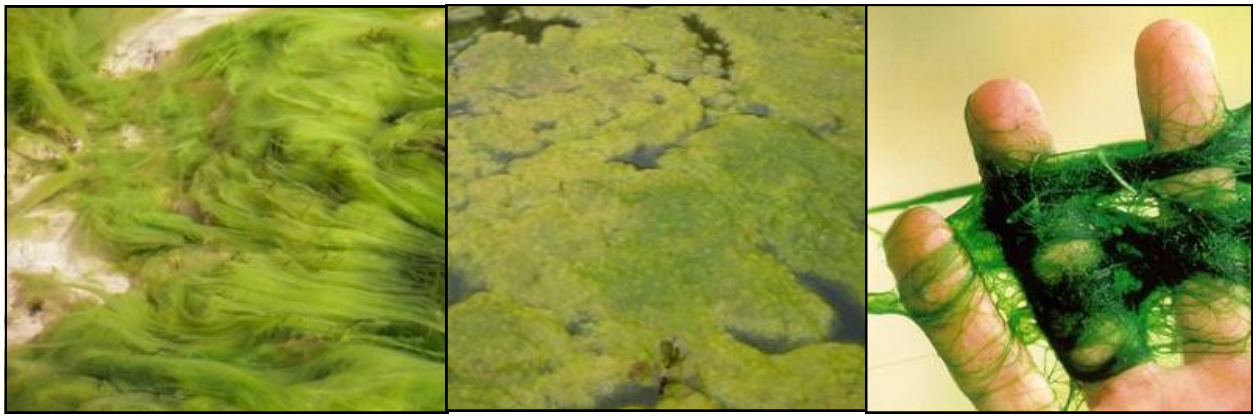
http://www.ohio.edu/plantbio/vislab/algaeimage/Cyanobacteria.htm

http://www.epa.ohio.gov/portals/35/inland_lakes/10000%20Algae%20Plates_1.pdf

Examples of Green Algae Blooms and Duckweed



Examples of *Cladophora* green algae blooms.



Examples of *Spirogyra* green algae blooms.

Examples of the aquatic plant duckweed.

Ohio green algae blooms.

Green algae bloom on Caesar Creek that resembled a *Planktothrix* cyanobacteria bloom. This demonstrates that in some instances a green algae bloom can resemble a cyanobacteria bloom and evaluation with a microscope is necessary.