

Freshwater Phytoplankton ID SHEET

TARGET ALGAE



Aphanizomenon spp.



Credit: GreenWater Laboratories/CyanoLab

Notes about Aphanizomenon:

Toxin: Saxitoxin **N-fixation:** Yes
Cyanophyta – Cyanophyceae – Nostocales
4 described species
Trichomes solitary or gathered in small or large fascicles (clusters) with trichomes arranged in parallel layers.



Anabaena spp. (now Dolichospermum)



Credit: GreenWater Laboratories/CyanoLab

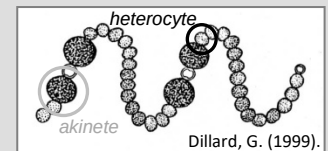
Anabaena spp. (now Dolichospermum)



Credit: GreenWater Laboratories/CyanoLab

Notes about Anabaena:

Toxin: Anatoxin-a **N-fixation:** Yes
Cyanophyta – Cyanophyceae – Nostocales
More than 80 known species
Trichomes are straight, curved or coiled, in some species with mucilaginous colorless envelopes, mat forming.



Cyndrospermopsis spp. Straight morphotype



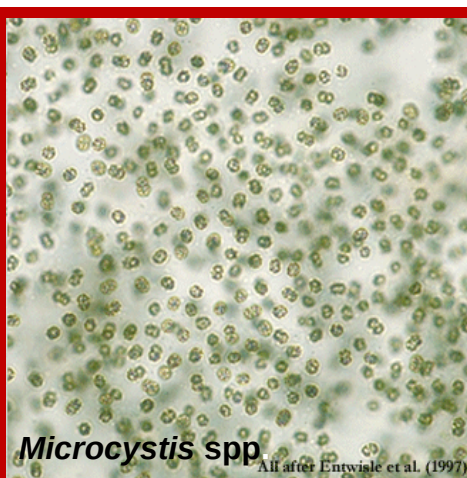
Cyndrospermopsis spp. Curved morphotype

Notes about Cyndrospermopsis:

Toxin: Cyndrospermopsin **N-fixation:** Yes
Cyanophyta – Cyanophyceae – Nostocales
Around 10 known species
Trichomes are straight, bent or spirally coiled. Cells are cylindrical or barrel-shaped pale blue-green or yellowish, with aerotypes. Heterocytes and akinetes are terminal.



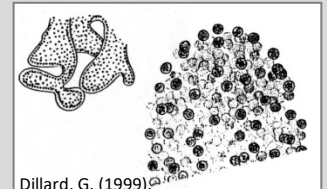
Microcystis spp.



Microcystis spp.

Notes about Microcystis:

Toxin: Microcystin **N-fixation:** No
Cyanophyta – Cyanophyceae – Chroococcales
Around 25 known species
Colonies are irregular, cloud-like with hollow spaces and sometimes with a well developed outer margin. Cells are spherical with may aerotypes.

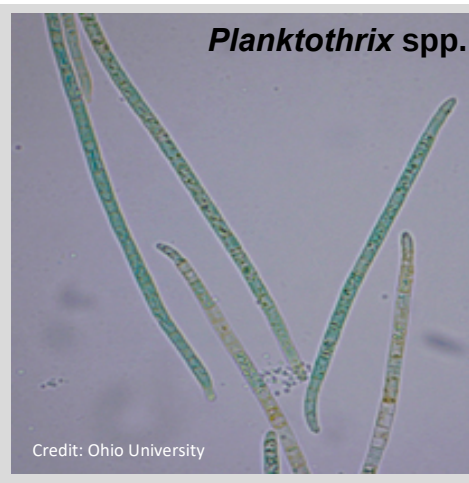


Planktothrix spp.



Credit: GreenWater Laboratories/CyanoLab

Planktothrix spp.



Credit: Ohio University

Notes about Planktothrix:

Toxin: None (?)

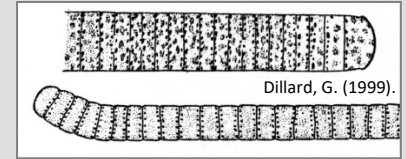
N-fixation: No

Marine version: Trichodesmium

Cyanophyta – Cyanophyceae – Oscillatoriales

More than 70 known species

Trichomes cylindrical, straight or slightly waved, motile with gliding oscillations.



Terminology:

Akinete(s) - thick-walled resting spore, full of reserve material, which enable the alga to survive periods when environmental conditions are not favorable to growth

Heterocyte(s) - special cell with thick several layered cell wall, active in nitrogen fixation

Trichome(s) - a filament (row) of cells, which are connected

Reference: Cronberg, G., and H. Annadotter. 2006. Manual on Aquatic Cyanobacteria. A photo guide and synopsis of their toxicology. ISSHA, Copenhagen, Denmark.

Nitrogen Fixation:

Nitrogen is an essential component in the synthesis of the aerotopes. A deficit of nitrogen may not only affect cell metabolism negatively, but also the buoyancy of the organism. Cyanobacteria can make use of nitrogen as: nitrate, nitrite or ammonium. Some species are also able to perform nitrogen fixation of atmospheric nitrogen (N_2). Order of preference is ammonium > nitrate > N_2 .

Nitrogen-fixation occurs inside a special transformed, vegetative cell, the heterocyte. Heterocytes are thick-walled. The nitrogen-fixing enzyme complex, nitrogenase, is functioning inside the heterocyte. Nitrogenase is inactivated by oxygen, and the heterocytes provide protection by enhanced respiration, and by the barrier of the heterocyte envelope.

During periods when environmental sources of combined inorganic nitrogen have been depleted, the nitrogen-fixing cyanobacteria become most competitive. The common distributed freshwater genera that can fix nitrogen are the heterocyte-bearing, filamentous members of the Nostocales: Anabaena, Anabaenopsis, Aphanizomenon, Cyndrospermopsis and Gloeotrichia. Trichodesmium and Richelia are nitrogen fixing marine genera.

Sampling Procedure:

Wearing gloves dip the 125 mL & 1 L sample bottles into the water and fill. Cap bottles and return to microscope for slide analysis.

Slide Preparation

First drop: Squeeze pipette and take sample from the lower portion of 125 mL sample bottle. Place drop onto the middle of the

Second drop: Squeeze pipette and take sample from the top portion of sample bottle. Place drop onto the middle of the gridded slide.

Gently lay cover slip at an angle to avoid air bubbles.

Slide Analysis:

First, focus on phytoplankton with the lowest objective, 4x. Then scan the entire slide using the 10x objective lens, noting what target phytoplankton are found.

Determine the Relative Abundance

Approximate how much of the slide each of the target species found covered. Use the following percentages when entering data:

0% = No

1 – 65% = Yes

65% – 100% = Elevated

UPS Shipping Instructions:

If instructed to do so, fill out and attach a 'Plankton Sample Label' to bottle. **Freeze** the 1 L bottle ASAP, and ship with blue ice pack.

Ship via **UPS NEXT DAY AIR** (red label) to:

Dr. Steve Morton
NOAA Phytoplankton Monitoring Network
219 Fort Johnson Road
Charleston, SC 29412

Payment by Recipient, UPS #XXXXXXXXX

► Contact PMN for the UPS Acct # or for more shipping labels

PMN Questions & Needs:

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Taxonomy Questions:

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