

Freshwater Phytoplankton ID SHEET

TARGET ALGAE



Dolichospermum spp.



Credit: GreenWater Laboratories/CyanoLab



***Raphidiopsis* spp.**
Straight morphotype



***Microcystis* spp.**

Aphanizomenon spp.



Credit: GreenWater Laboratories/CyanoLab

Dolichospermum spp.



Credit: GreenWater Laboratories/CyanoLab



***Raphidiopsis* spp.**
Curved morphotype



***Microcystis* spp.**

Notes about *Aphanizomenon*:

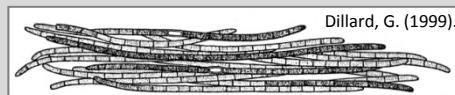
Toxin: Saxitoxin

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.



Notes about *Dolichospermum*

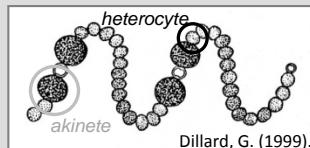
Toxin: Anatoxin-a

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.



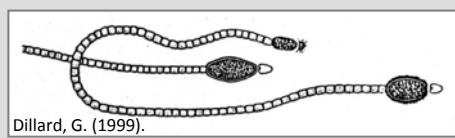
Notes about *Raphidiopsis*:

Toxin: Cylindrospermopsin 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. Heterocysts and akinetes are terminal.



Notes about *Microcystis*:

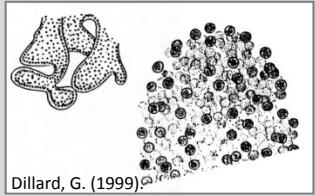
Toxin: Microcystin

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 aerotopes.



Planktothrix spp.



Credit: GreenWater Laboratories/Cyanolab

Planktothrix spp.



Credit: Ohio University

Notes about Planktothrix:

Toxin: *Microcystins*

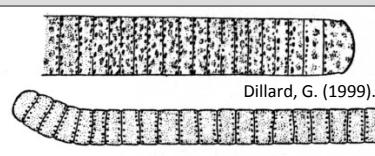
N-fixation: No

Marine version: *Trichodesmium*

Cyanophyta – Cyanophyceae – Oscillatoriales

More than 70 known species

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



Dillard, G. (1999).

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*, *Cylindrospermopsis* and *Gloeotrichia*. *Trichodesmium* and *Richelia* are nitrogen fixing marine genera.