

# Cyanobacteria vs Algae

What are the differences?



# Strategies for Preventing and Managing Harmful Cyanobacterial Blooms (HCBs)

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## 3. Introduction to the Cyanobacteria

### 3.1 What Are Cyanobacteria?

Cyanobacteria are prokaryotic organisms that are taxonomically classified as members of the Kingdom Bacteria ([ITIS 2020](#) ▷). They are a normal component of the biological communities found in water or growing at the bottom of lakes, ponds, rivers, and streams. They are also found in wetlands and many terrestrial environments.

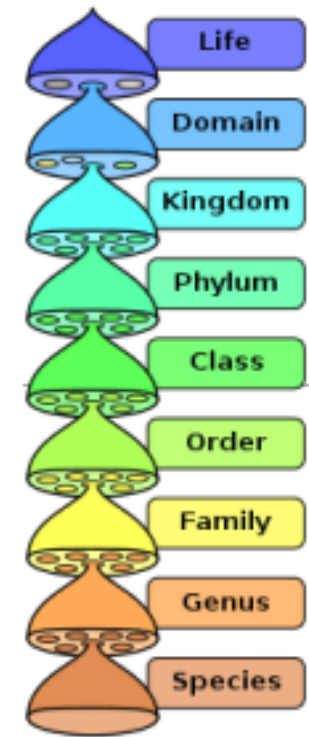
Cyanobacteria are often called algae, a nonscientific term that includes organisms from a variety of taxonomic groups ([Guiry 2019](#) ▷). Cyanobacterial blooms are also known as *blue-green algal blooms* or *harmful algal blooms* (HABs). **In this document, we use the term *harmful cyanobacterial bloom* (HCB) specifically to distinguish cyanobacteria from other potentially harmful algae populations in marine and freshwater habitats.**

▼ [Read more](#)

Reference: <https://hcb-1.itrcweb.org/introduction/>

**Still confused as to the differences between “cyanobacteria and algae” See next 3 slides ...**

# Taxonomic Differences:



The hierarchy of biological classification's eight major taxonomic ranks. A domain contains one or more kingdoms. Intermediate minor rankings are not shown.

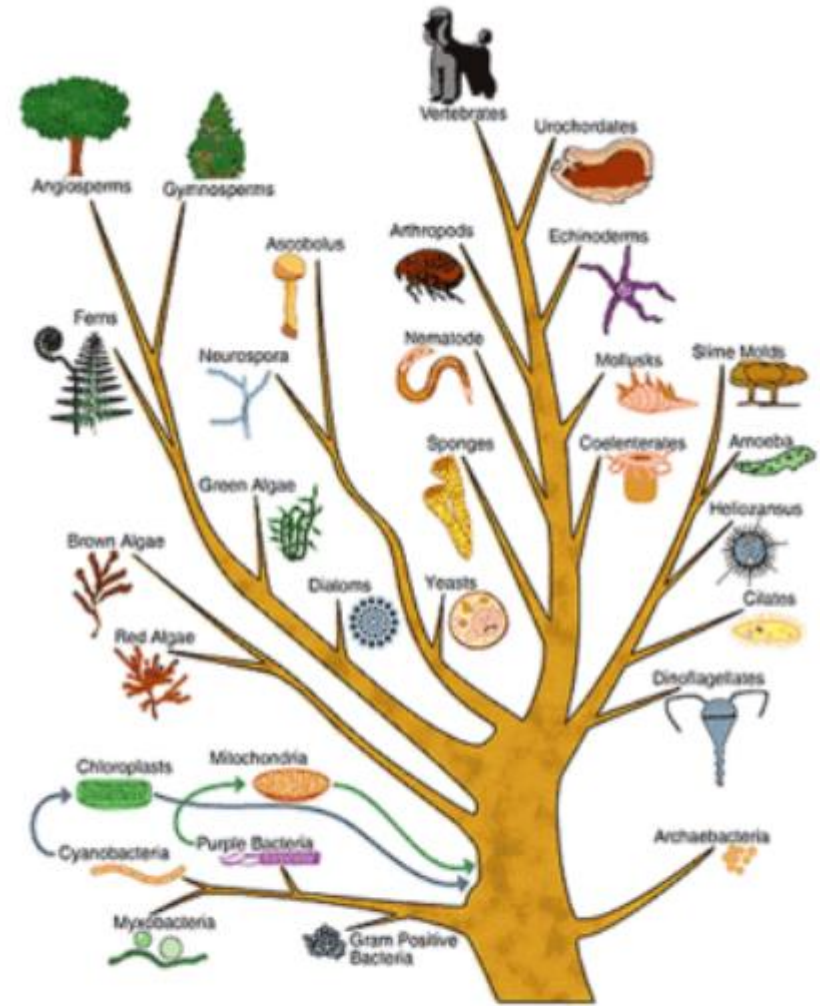


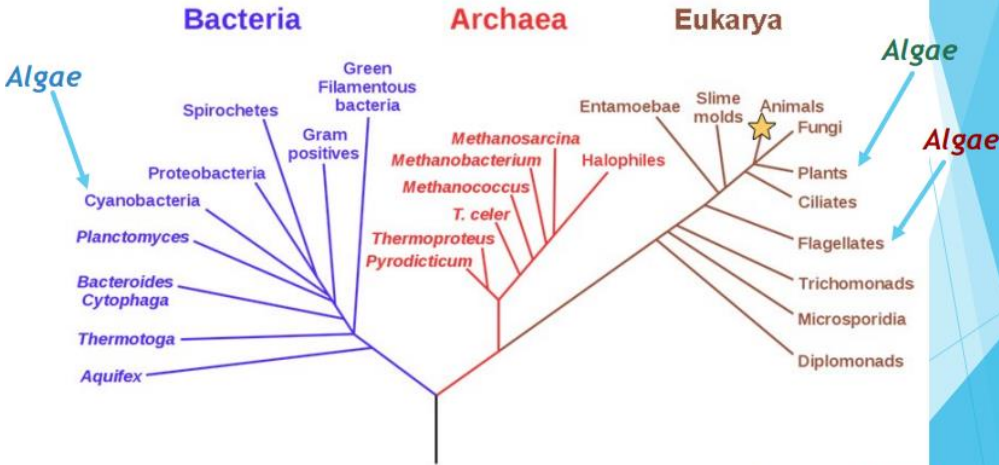
Figure 10.4: A phylogenetic tree.

Credit: [Phylogenetic Tree from creationwiki.org](https://creationwiki.org/Phylogenetic_Tree)

# Phylogeny

## Phylogenetic Tree of Life

★ = You are here



[https://en.wikipedia.org/wiki/Kingdom\\_\(biology\)](https://en.wikipedia.org/wiki/Kingdom_(biology))



Phylogenetic and symbiogenetic tree of living organisms, showing the origins of eukaryotes & prokaryotes



Cyanobacteria vs Algae		
More Information Online <a href="http://WWW.DIFFERENCEBETWEEN.COM">WWW.DIFFERENCEBETWEEN.COM</a>		
	Cyanobacteria	Algae
DEFINITION	Cyanobacteria are photosynthetic bacteria.	Algae are unicellular, eukaryotic, plant-like organisms present in the aquatic environments.
KINGDOM	Kingdom Monera	Kingdom Protista
CELLULAR ORGANIZATION	Cyanobacteria are prokaryotes.	Algae are eukaryotes.
PIGMENTS	Chlorophyll a, phycocyanin, and phycoerythrin.	Chlorophyll a, b, carotenoids and xanthophylls.
CHLOROPLASTS	Do not possess	Possess Chloroplasts
NUCLEUS AND MEMBRANE-BOUND ORGANELLES	Do not possess.	Possess a nucleus and membrane bound organelles.
NITROGEN FIXATION	Able to do nitrogen fixation	Unable to do nitrogen fixation
EXAMPLES	Anabaena, Nostoc, Microcystis, Spirulina, Oscillatoria, etc.	Chlamydomonas, Spirogyra, Ulva, Chlorella, etc.

## Microscopic Differences:

Cyanobacteria are  
*Prokaryotes* (no cell nucleus)

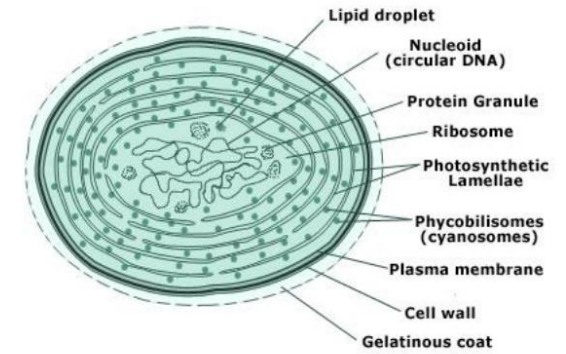


Figure 10.1a: Cell structure of blue-algae.  
[Click for a text description of Figure 10.1a.](#)

Credit: [TutorVista](#)

Algae are  
*Eukaryotes* (nucleus within cell)

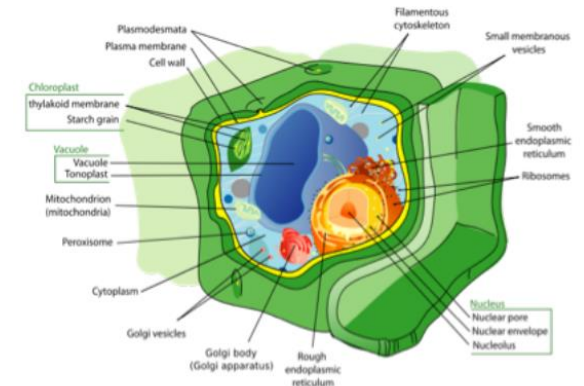


Figure 10.2a: Eukaryote schematic structure.  
[Click for a text description of Figure 10.2a.](#)

Credit: [Eukaryote: from wikipedia.com](#)

Author: Caroline Burgess Clifford, Senior Research Associate, Energy Institute, The Pennsylvania State University.



## Common plants and other algae mistaken for cyanobacteria blooms

Duckweed and watermeal are small, native, floating plants that appear similar to a cyanobacteria bloom from a distance (Figure E), but closer inspection of a cyanobacteria bloom will look like Figures A, B, & C. Each individual duckweed or watermeal plant is clearly visible to the naked eye (Figure F & G), whereas cyanobacteria are microscopic. Duckweed and watermeal may often be found in the same locations as cyanobacteria and thrive in similar nutrient-rich conditions. Other types of algae can also bloom in nutrient-rich waters. Cyanobacteria may appear as small chunks in the water, but they do not form long thread-like strands like other types of filamentous algae (see Figure H). When a cyanobacteria bloom is stirred with a stick, cyanobacteria cells appear to dissolve in water like Kool-aid®, while duckweed and watermeal will remain tiny solid bits floating on the surface and other types of algae will typically clump like hair (Figure H).



**Figure E.** Duckweed plants may appear as a film on the surface but are not algae

**Figure F.** It may be difficult to differentiate between an algae bloom and duckweed

**Figure G.** Individual duckweed plants against a ruler

**Figure H.** Filamentous green algae accumulating on a paddle



**Figure A.** Blue-green algae may make the water look like pea soup

**Figure B.** Thick green foam may wash ashore during a bloom

**Figure C.** Blue-green algae may make the water look cloudy with a green tint

**Figure D.** Film on surface of water can look like spilled paint

## Macroscopic (visual) differences, algae vs cyanobacteria:

### FLOATING PHENOMENA THAT AREN'T CYANOBACTERIA BLOOMS

#### DUCKWEED



**D**uckweed, a plant unrelated to cyanobacteria, looks similar when it proliferates and washes ashore, but you should be able to note that each speck is an individual flattened floating leaf, while cyanobacteria have no leaves. There are a number of different species of duckweed, all in the family *Lemnaceae*. Duckweed is most common in sheltered bays and inlets.

#### GREEN ALGAE



**L**ake Champlain also experiences blooms of non-toxic green algae such as *Cladophora*. This species grows attached to rocks and breaks off in clumps that may appear brown or green and stringy. *Cladophora* do not form paint-like oily slicks. Other examples of algae that are not cyanobacteria may look like long green hairs, green clumps, yellowish clouds, or gelatinous brown balls.

#### POLLEN



**A**ccumulations of pollen from pine and other trees may also appear like cyanobacteria. Pollen forms a film on the water, but unlike green algae and cyanobacteria, it is yellowish and will feel coarse to the touch rather than slimy. When pollen is abundant it will coat items on land as well as in the water. Pollen most often accumulates in spring and early summer.



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