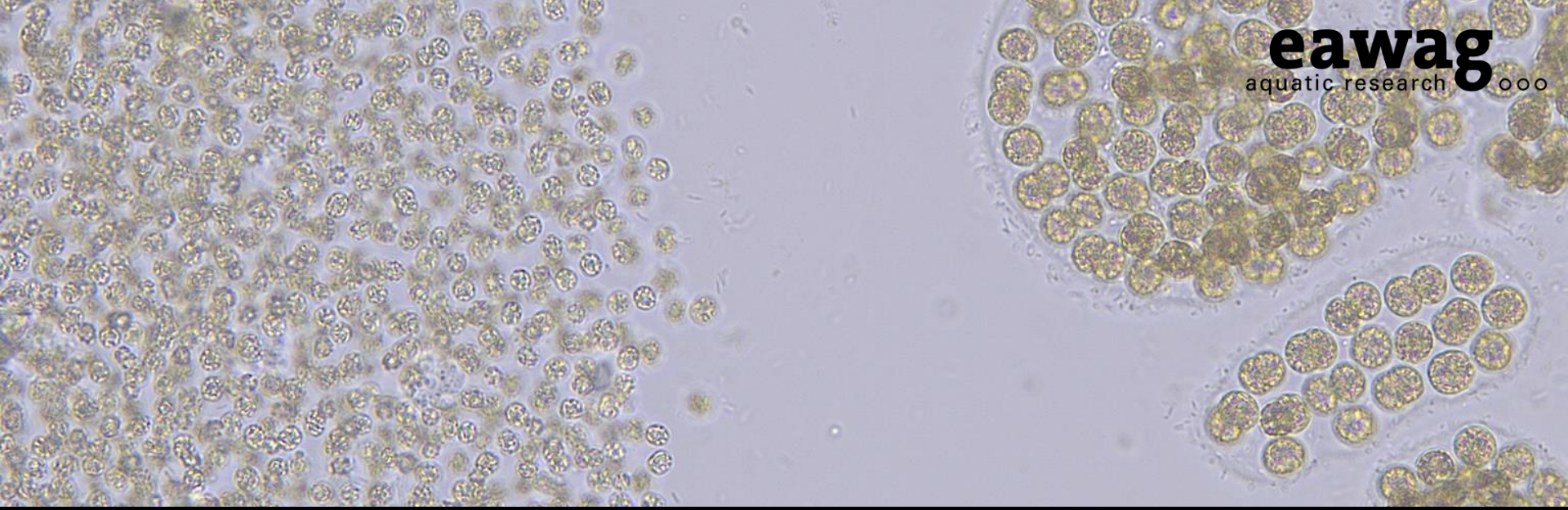


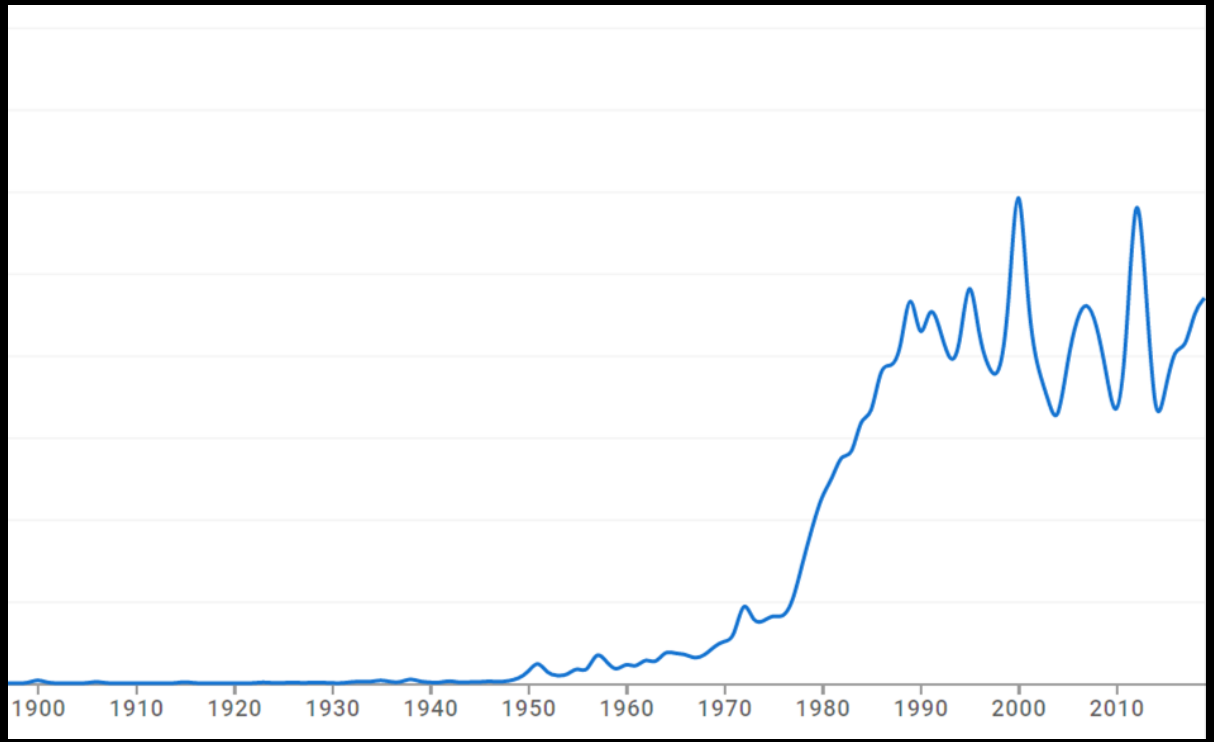
Blaualgen, Cyanophytes, Cyanobacteria
mehr als nur Bakterien

Stefanie Merkli

Mitgliederversammlung SGHL 2023

Olten, 9. November 2023

Cyanobacteria in google books since 1900



source: google Books Ngram Viewer (Cyanobateria + cyanobacteria + CYANOBACTERIA + cyanophyta + Cyanophyta + Blaualgen + Blaualge)
1900 - 2019

Abo Giftige Cyanobakterien in Schweizer Seen

Wann werden Blaualgen für Menschen gefährlich?

Wegen Cyanobakterien endete ein Spaziergang am Greifensee für zwei junge Hunde tödlich. Was müssen Tierfreunde und Badende beachten? Die wichtigsten Fragen und Antworten.

Barbara Reye
Publiziert: 16.05.2022, 21:25

12

Blaualgen-Alarm am Neuenburgersee: Kinder sollen nicht mehr im See baden

Nach dem Tod eines Hundes warnen die Behörden vor dem Baden im Neuenburgersee.

21.06.2022, 09.44 Uhr

Hören Merken Drucken Teilen

Blaualgen verderben stellenweise den Badespass im Luganersee

Perfektes Badewetter – und der Strand ist gesperrt: So geht es derzeit mehreren Gemeinden am Luganersee. Sie mussten ihre Badestellen wegen Blaualgen sperren. Sie werfen nun dem Kanton Untätigkeit vor.

Redaktion: Jörg André
23.08.2023, 16:30 Uhr

Giftige Blaualgen im Greifensee

Zwei Hunde sterben nach Bad im kühlen Wasser

Im Tierspital Zürich starben zwei Hunde, nachdem sie im Greifensee gewesen waren. Sie sollen sich an Blaualgen vergiftet haben.

Publiziert: 15.05.2022, 12:37

8

Abo Mehrere Sichtungen

Giftige Blaualgen profitieren von warmen Temperaturen

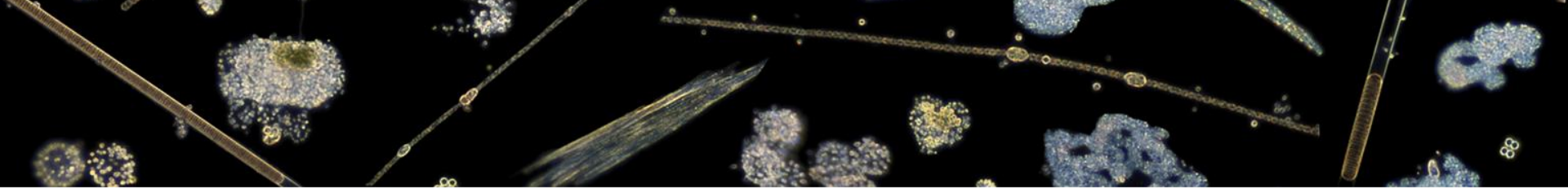
An der Wasseroberfläche des Zürichsees können zurzeit an diversen Stellen rote Schlieren festgestellt werden. Schuld daran ist unter anderem der warme Herbst.

Raphael Meier
Publiziert: 03.01.2023, 19:00

2

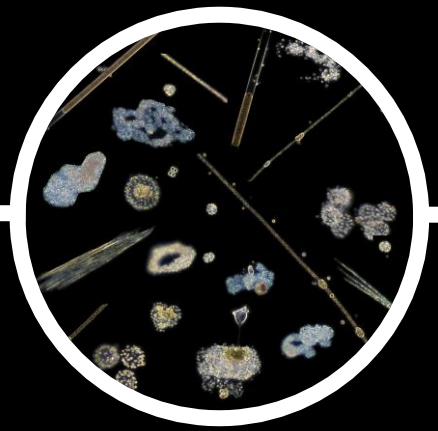
Ce lac suisse est infesté et c'est dangereux

Des images impressionnantes ont été prises mercredi au lac de Lugano, dans le secteur situé près de Riva San vitale.



Content

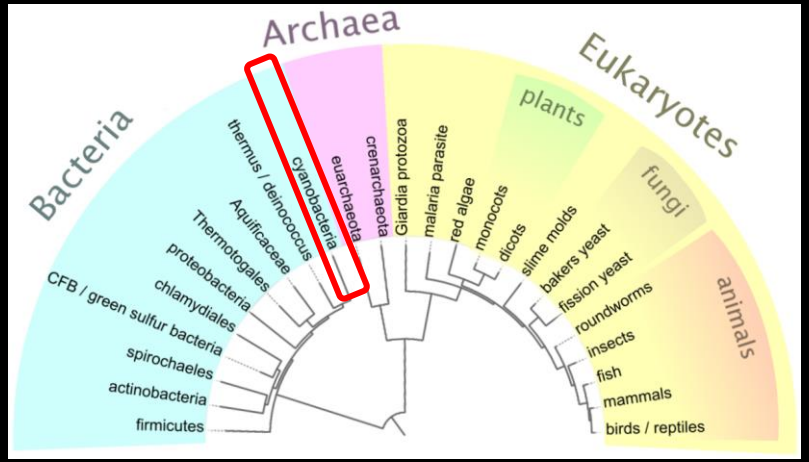
- Cyanobacteria basics
- What makes freshwater cyanobacteria special?
- Cyanobacteria blooms
- Cyanobacteria research in Greifensee



Cyanobacteria basics

General

- Prokaryotes
  - Allocation from eukaryotes (plants) to bacteria in the 1960s/70s [1,3]



source: Wikipedia

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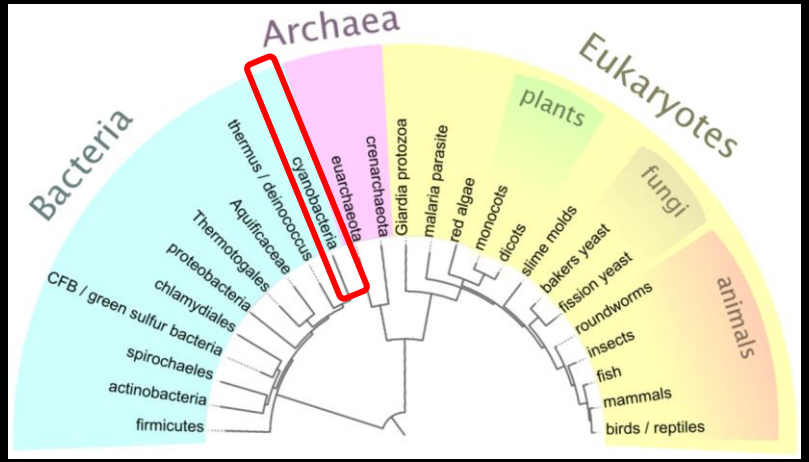

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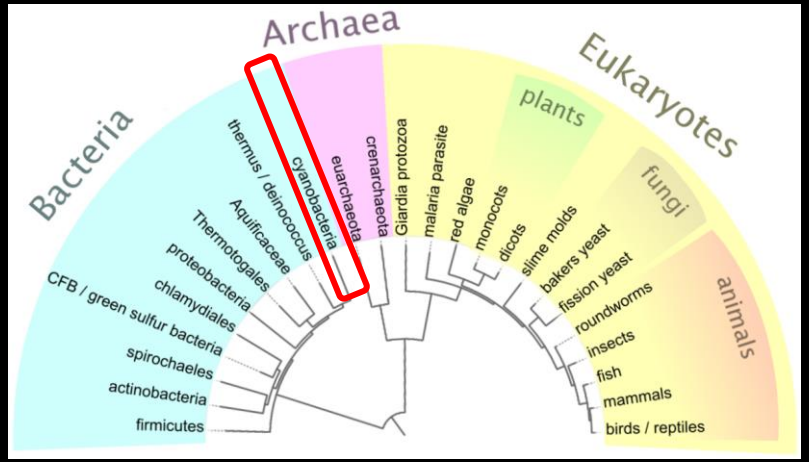

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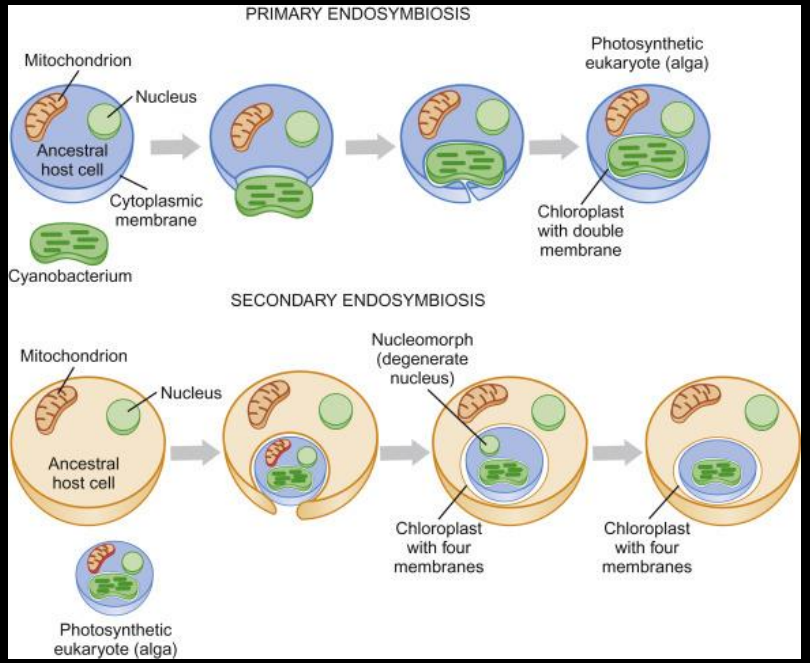
- Through an early symbiosis, they gave rise to the plastids of algae and higher plants [3]



source: Clark, David P., and Nanette J. Pazdernik. Molecular biology. Elsevier, 2012.

Occurrence

- 150 genera with ~ 2000 - 8000 species [1, 2]

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- Thrive in almost any environment [3]
  - Marine and freshwater

(Australia, September 2019)

source: NASA

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source: SUPSI

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source: unsplash Denys Nevozhai

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source: Czerwik-Marcinkowska, Joanna. Acta Agrobotanica 66.1 (2013).

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source: Gaylarde, Christine C. Heritage 3.4 (2020): 1469-1482.

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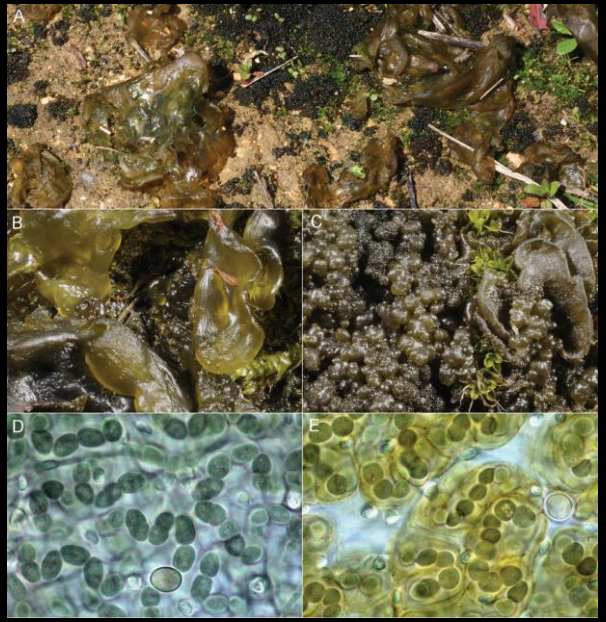
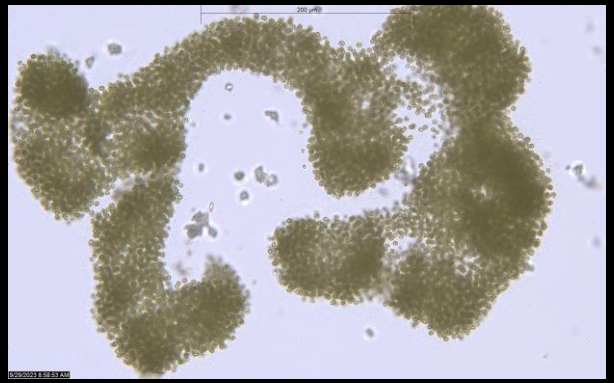


source: Rikkinen, Jouko. MycoKeys (2013).

Freshwater taxonomy

- 3 forms/orders:
  - Coccal: **Chroococcales**



source: Marta Reyes, Silvana Käser, Stefanie Merkli

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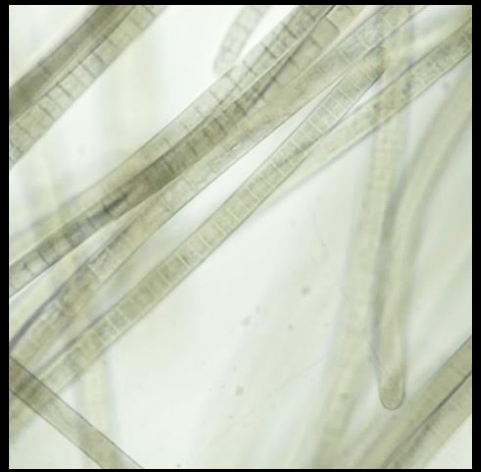
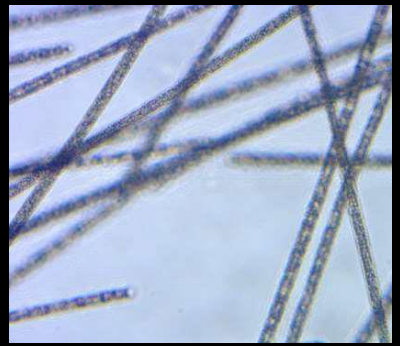
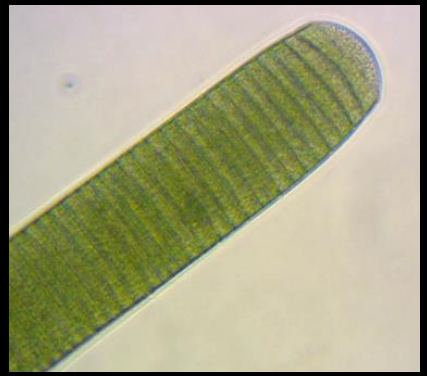


* more details in next section





source: Marta Reyes, Silvana Käser Stefanie Merkli

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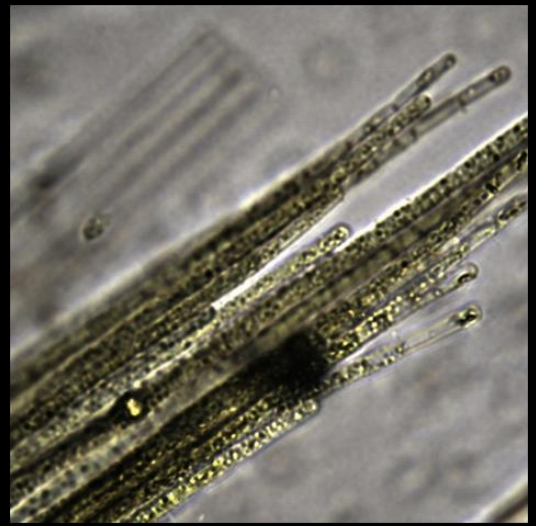

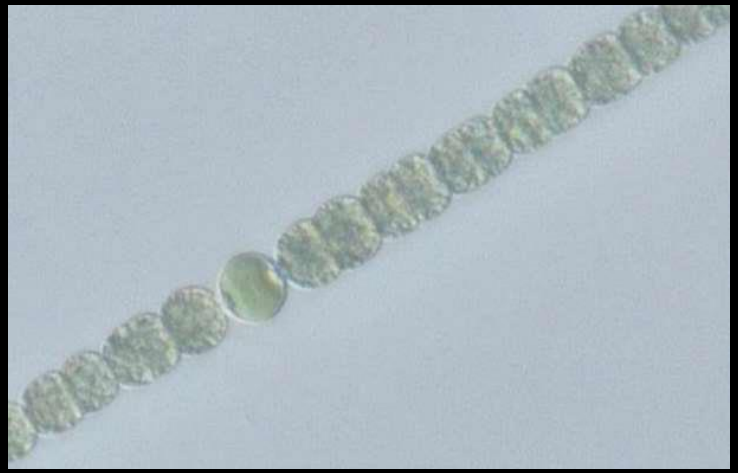

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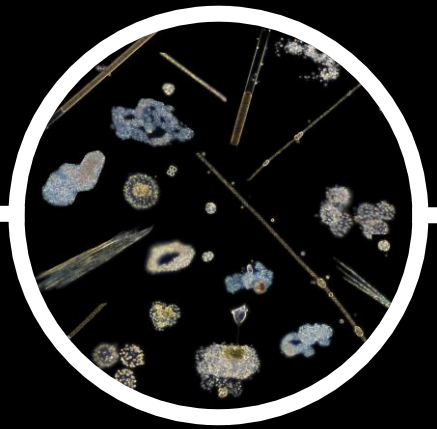

What makes freshwater cyanobacteria special?

Morphological specialties

- Heterocysts: N_2-fixation [1,3]
  - Preferred N-sources: NH_4^+ > NO_3^- / NO_2^- > N_2
  - Inhibited through O_2
  - Temporal and spatial separation
  - Temperature dependence (nitrogenase) [6]

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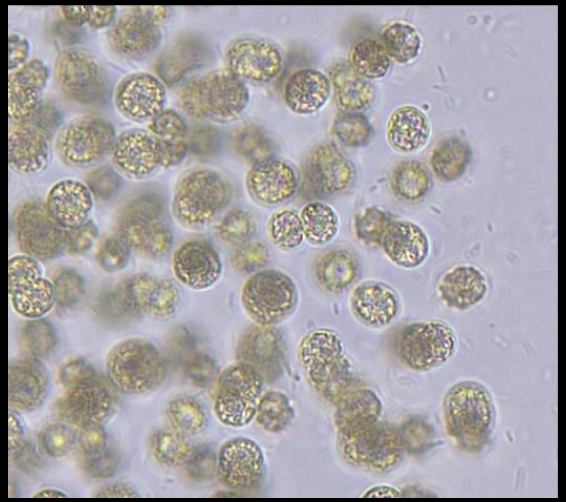
  - Pros and Cons
  - Stokes' law → vertical migration of large colonies



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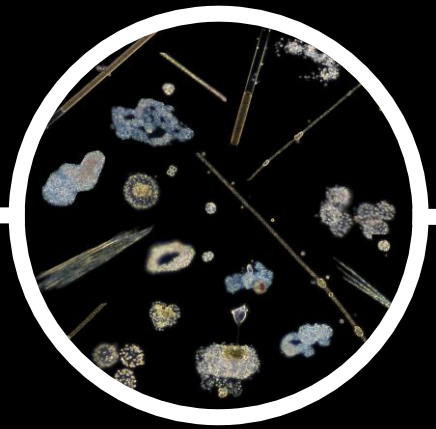
- Toxictiy
  - Hepatotoxins (inhibition of protein phosphatase in the liver)
  - Neurotoxins (interference with the functioning of neuromuscular system)
  - Cytotoxins (inhibition of protein synthesis in multiple organs)
  - Dermatotoxins (skin)
  - irritant toxins (irritation & allergic responses)



Cyanobacteria blooms

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- Isles & Pomati (2021). Frontiers in Ecology and the Environment

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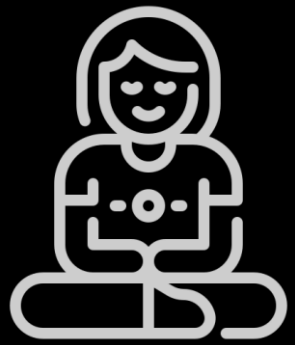
- Oxygen depletion from microbial degradation of aging blooms can lead to hypoxia and anoxia, resulting in death of fish and benthic invertebrates.

How do I recognize cyanobacteria blooms?

- Water very turbid



Patience
images will follow

How do I recognize cyanobacteria blooms?

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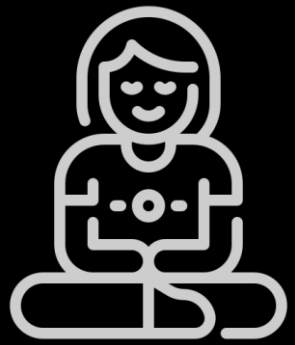

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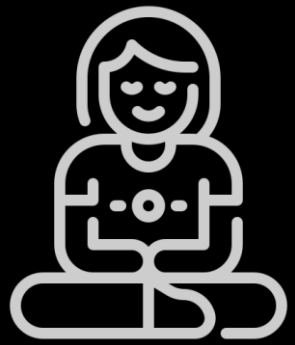

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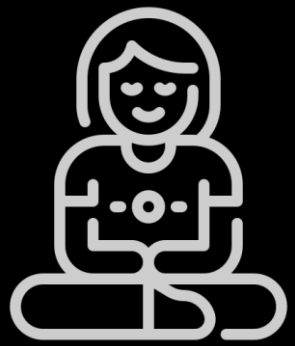
- Not visible to the eye whether the cyanobacteria are harmless or releasing toxic substances



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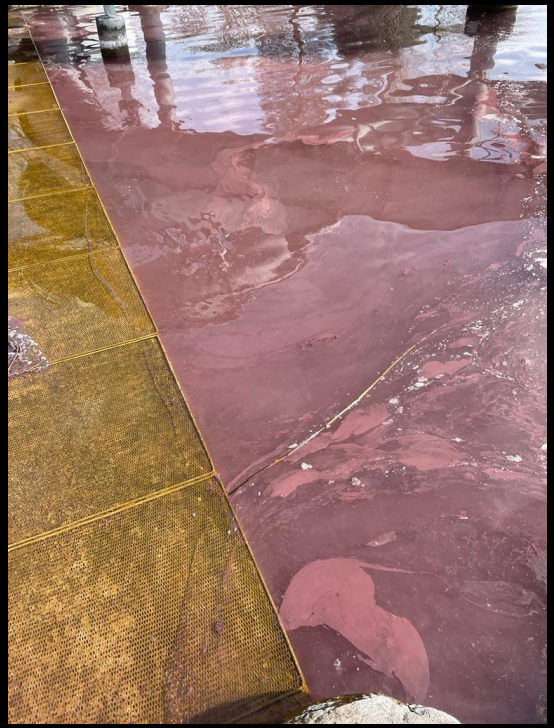
How do I recognize cyanobacteria blooms?

March

Planktothrix rubescens



source: Joan, privat (Zürichsee)

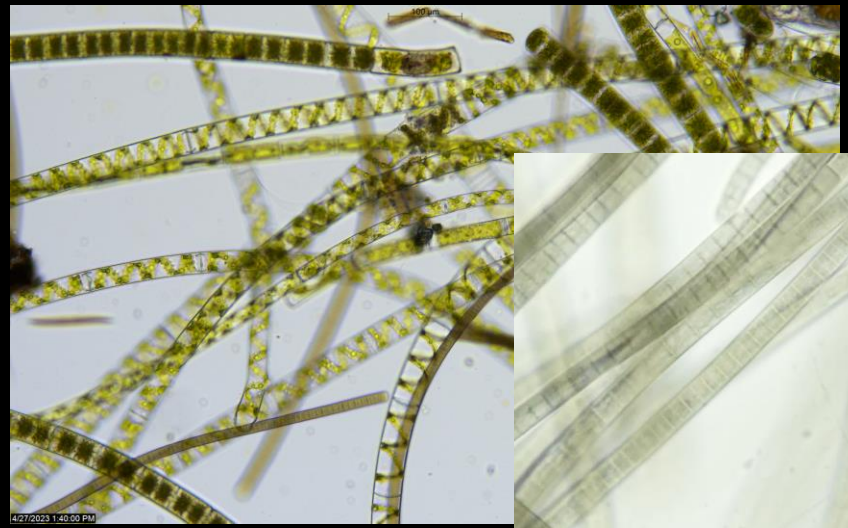
source: Eawag, Silvana Käser

How do I recognize cyanobacteria blooms?

May

Tychonema sp.

Greifensee



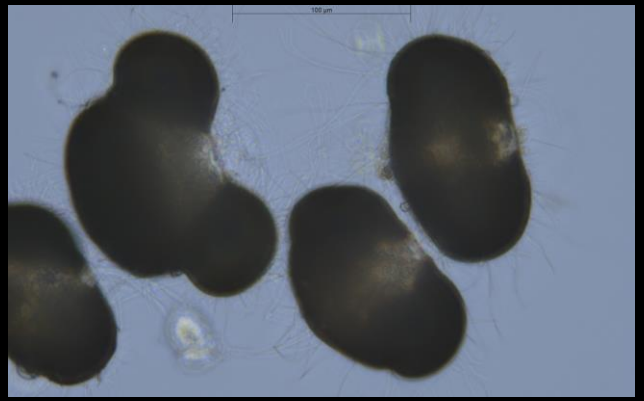
source: Eawag, Marta Reyes

How do I recognize cyanobacteria blooms?

May 🕐

Pollen

Greifensee

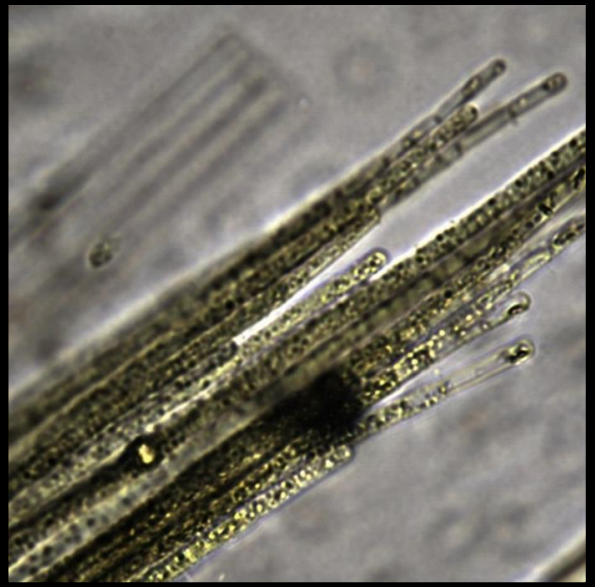


How do I recognize cyanobacteria blooms?

August

Aphanizomenon flos-aquae

source: AWEL Kanton Zürich (Lützelsee)



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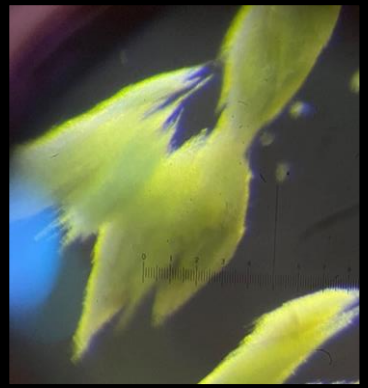
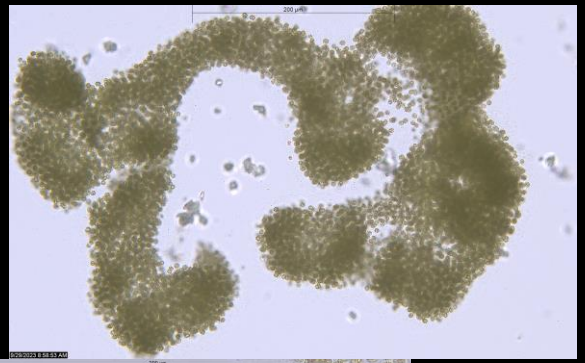
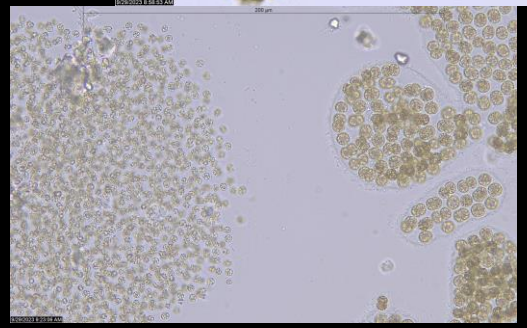


How do I recognize cyanobacteria blooms?

September

Microcystis sp.





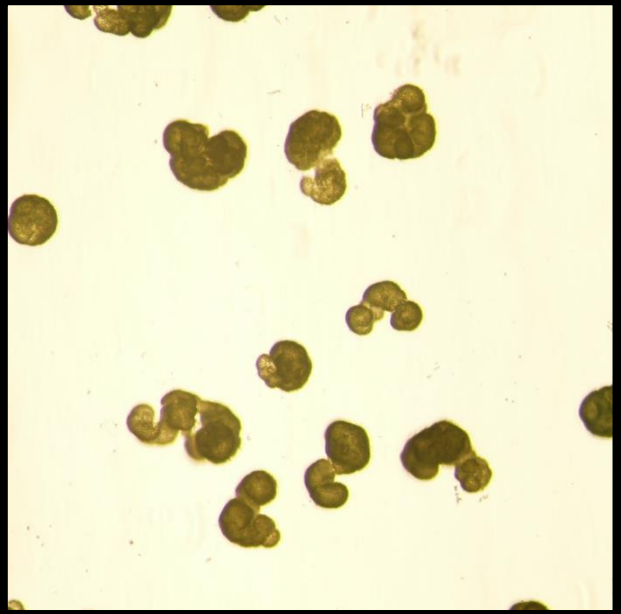
source: Francesco Pomati (Bettenauer Weiher Uzwil)

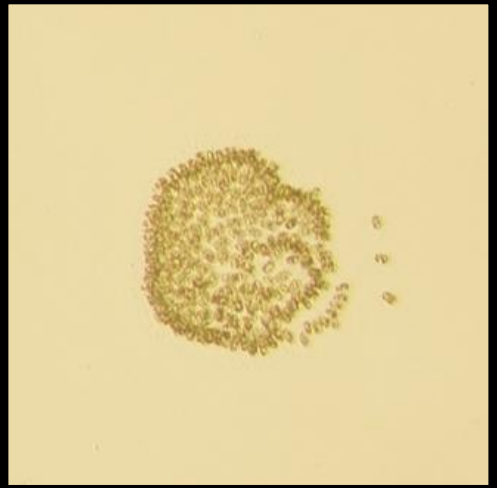
How do I recognize cyanobacteria blooms?

September

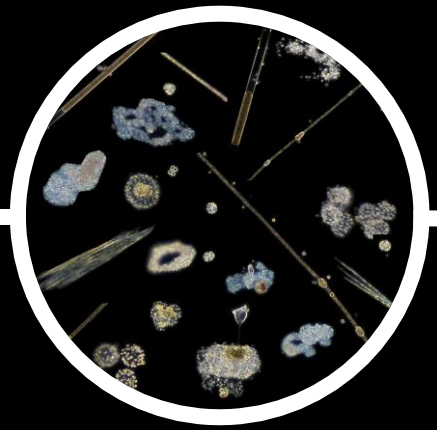
Woronichinia naegeliana

source: Eawag, Francesco Pomati (Greifensee)





source: Eawag, Marta Reyes



Cyanobacteria research in Greifensee

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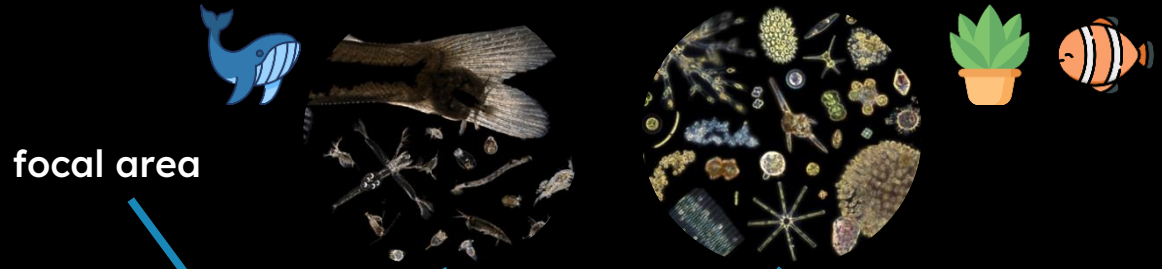
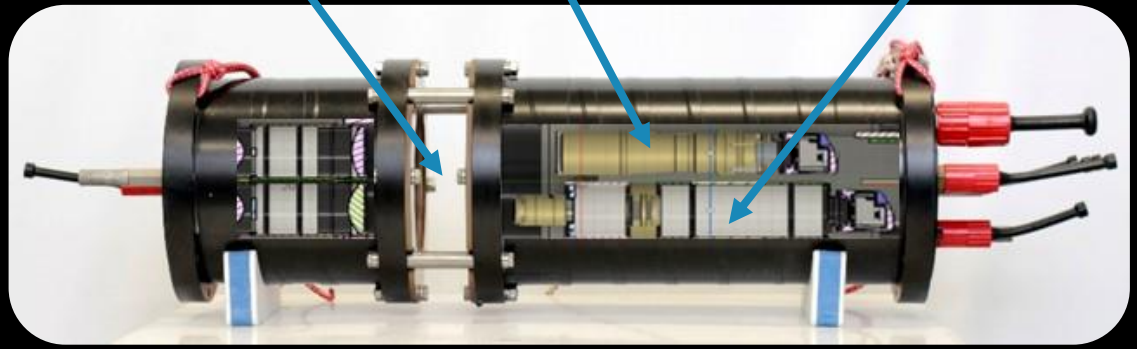
Cyanobacteria in Greifensee

Cyanobacteria in Greifensee

aquascope.ch



focal area



light source

objectives, camera & computer

Jules Jaffe Lab for Underwater Imaging
(Scripps Institution of Oceanography, La Jolla, California)

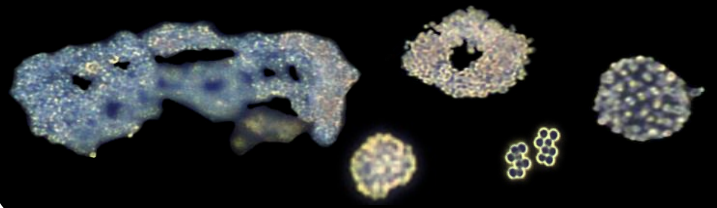
Underwater dual-magnification imaging for automated lake plankton monitoring

Water Research 203 (2021) 117524

Ewa Merz [a,*,1], Thea Kozakiewicz [a,*], Marta Reyes [a,*], Christian Ebi [a,*], Peter Isles [a,*], Marco Baity-Jesi [a,*], Paul Roberts [b,c], Jules S. Jaffe [b], Stuart R. Dennis [a], Thomas Hardeman [a], Nelson Stevens [a], Tom Lorimer [a,b], Francesco Pomati [a,*,1]

* objects are not scaled

Cyanobacteria in Greifensee



Chroococcales:

- *Microcystis sp.* - *Chroococcales*
- *Snowella sp.*
- *Coelosphaerium sp.*

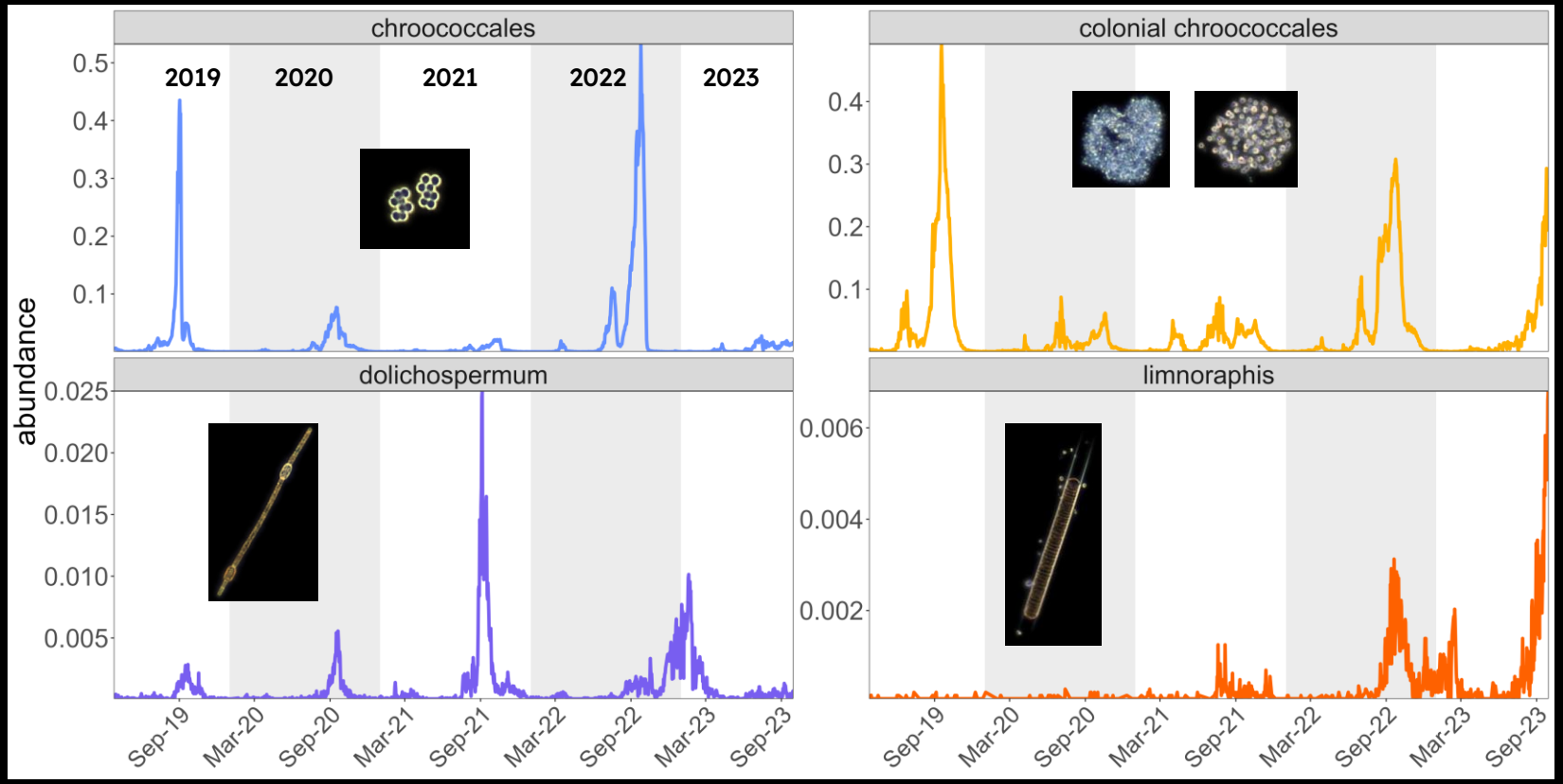
Nostocales:

- *Apahnizomenon flos-aquae*
- *Dolichospermum / Anabaena sp*

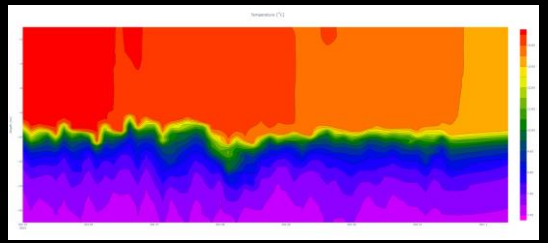
Oscillatoriales:

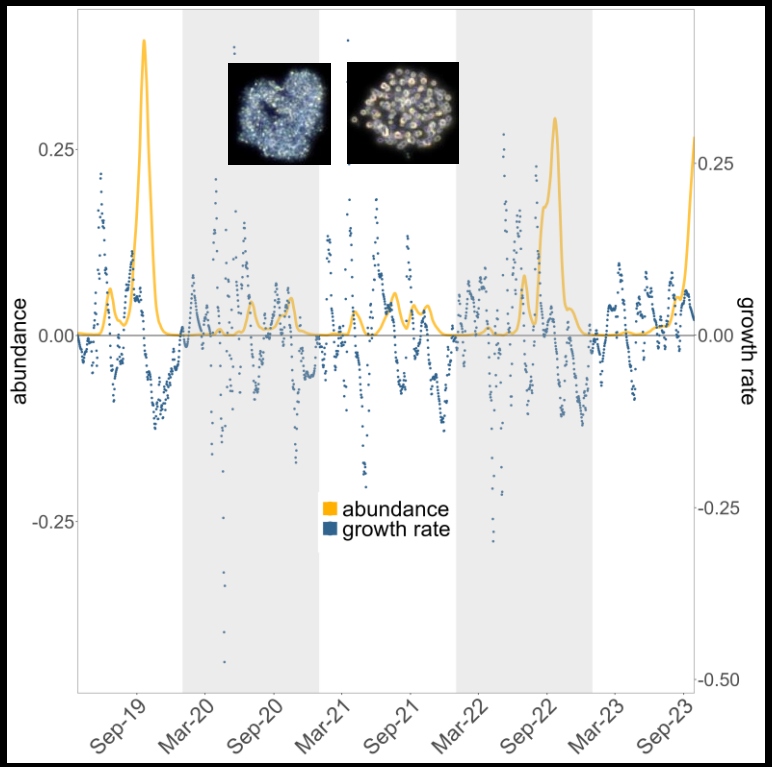
- *Planktothrix sp.*
- *Limnoraphis sp*
- *Thychonema sp.*

Cyanobacteria in Greifensee



Cyanobacteria in Greifensee





Acknowledgement

Marta Reyes

Silvana Käser

Francesco Pomati

Swiss National Science Foundation

eawag aquatic research

all icons from Flaticon

Cyanobacteria sources

Eawag FAQ Cyanobacteria	AWEL Kanton Zürich Blaualgen	cyanobloom	CyanoWorld	CyanoMetDB
				

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