

Potential identification of *Aphanocapsa* from water sample

A short study



Figure 1. Location where water sample was taken.

Introduction:

Protists and algae in our waters is vital to the global ecosystem yet are often underappreciated both in importance and diversity. In this short study, a water sample was taken with the goal of trying to establish a monoculture to be able to identify a species of algae from that location. Unfortunately, it was not possible to get a genome sequence for phylogenomic species identification but via morphological identification a potential identify could be found in the genera *Aphanocapsa*.

Sample location:

The water sample was taken at 2022-11-06 at 59°16'26.1"N 17°57'17.7"E which is next to a walking path close to the outflow of the lake "Långsjön" in Älvsjö in Stockholm. The lake is in the middle of a suburban area and has had problems with summer algae blooms and dumping of trash into the lake by locals. The sample was taken at around 10:00 in the morning and was kept by an outdoor facing window in a Falcon tube before it could be placed in the growth media

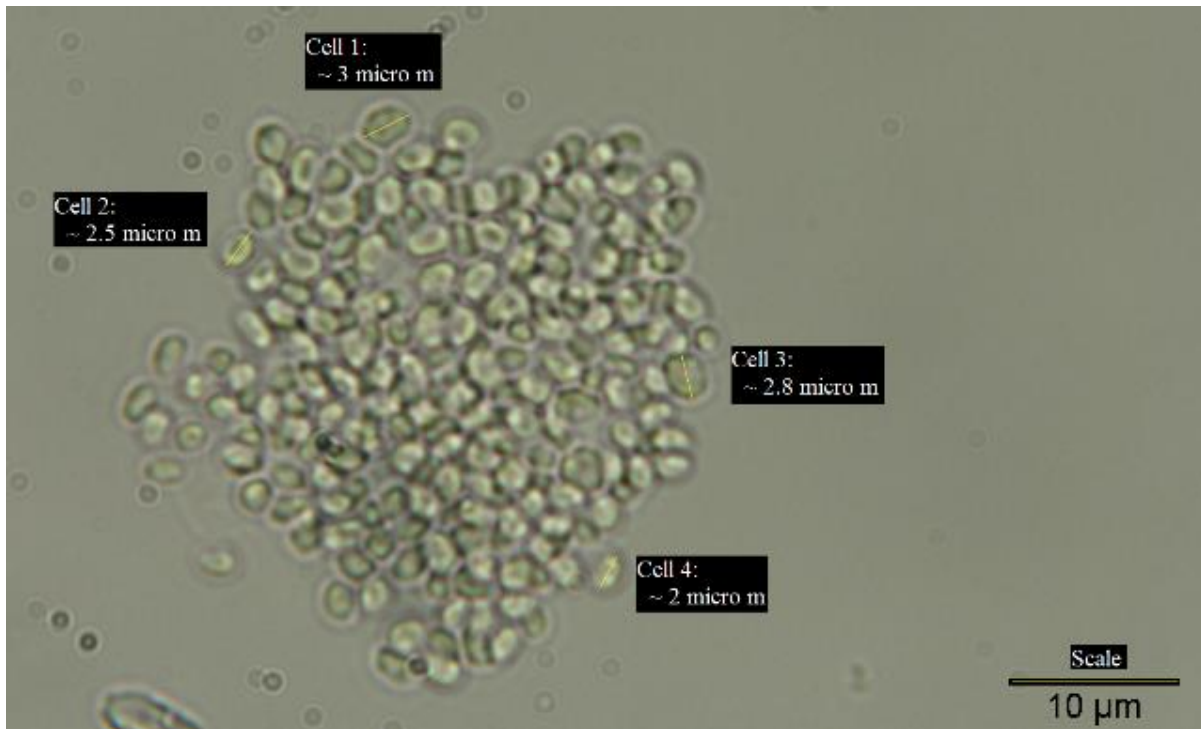


Figure 2. Image from water sample of small colony at 100 times magnification with Scale and Cell (Cell 1, Cell 2, Cell 3 and Cell 4) measurements in μm .

Materials and methods:

After the water sample was taken to the lab, it was stood upright for 15 minutes to be able to settle. A well plate was then prepared with 900 μL of MWC in 21 wells and 900 μL of Z8 in 21 wells, leaving at least 6 wells empty. After the water sample had settled, 1 mL was taken from the top layer, the middle layer and the bottom layer of the sample and placed in empty wells in the plate. A 1:10 dilution series was then created for each 6 initial samples, 3 in using Z8 wells and 3 in the MWC wells, by taking by taking 100 μL of initial sample and putting it in a well filled with 900 μL media and then mixing and continuing until reaching a concentration of approximately 1.0×10^{-7} of initial water sample at the end of each dilution series. This was done with the hope of being able to establish at least one monoculture. The plate was then sealed with parafilm and incubated under a 18 $^{\circ}\text{C}$ day, 15 $^{\circ}\text{C}$ night, 16 hour light cycle for approximately 25 days. PCR samples were prepared from the

chosen monoculture, however the results from this study did not give clean sequences and therefore phylogenetic identification could not be done.

Species identification:

Aphanocapsa is a genus within the Phylum *Cyanobacteria*, typically forming microscopic colonies which are flat and can be roughly spherical or have an irregular shape. They have mucilage but it is generally not very visible and the individual cells in the colonies typically do not have their own mucilage envelope. The cells are spherical and around 0.4 – 6 μm in diameter but this can also change depending on species. In freshwater species they are typically green but can vary in shade from pale blue-green to a darker olive green and they can be commonly found as a plankton, but the habitat may vary and some species are been found in soil instead of water.

Since no PCR results could be use to compare the monocultures genome against

references, the species identification is purely based on morphology. One of the more distinctive features was the small cell size ranging from 2 – 3 μm in diameter (*Figure 2*) fitting into the *Aphanocapsa* cell size range of around 0.4 – 6 μm . Another major clue was the colony

structure which was quite flat and widespread over the bottom of the well yet still forming non-spherical, denser clusters in several areas which differs from the colony structure of for example *Microcystis* (*Figure 2* and *Figure 3*).

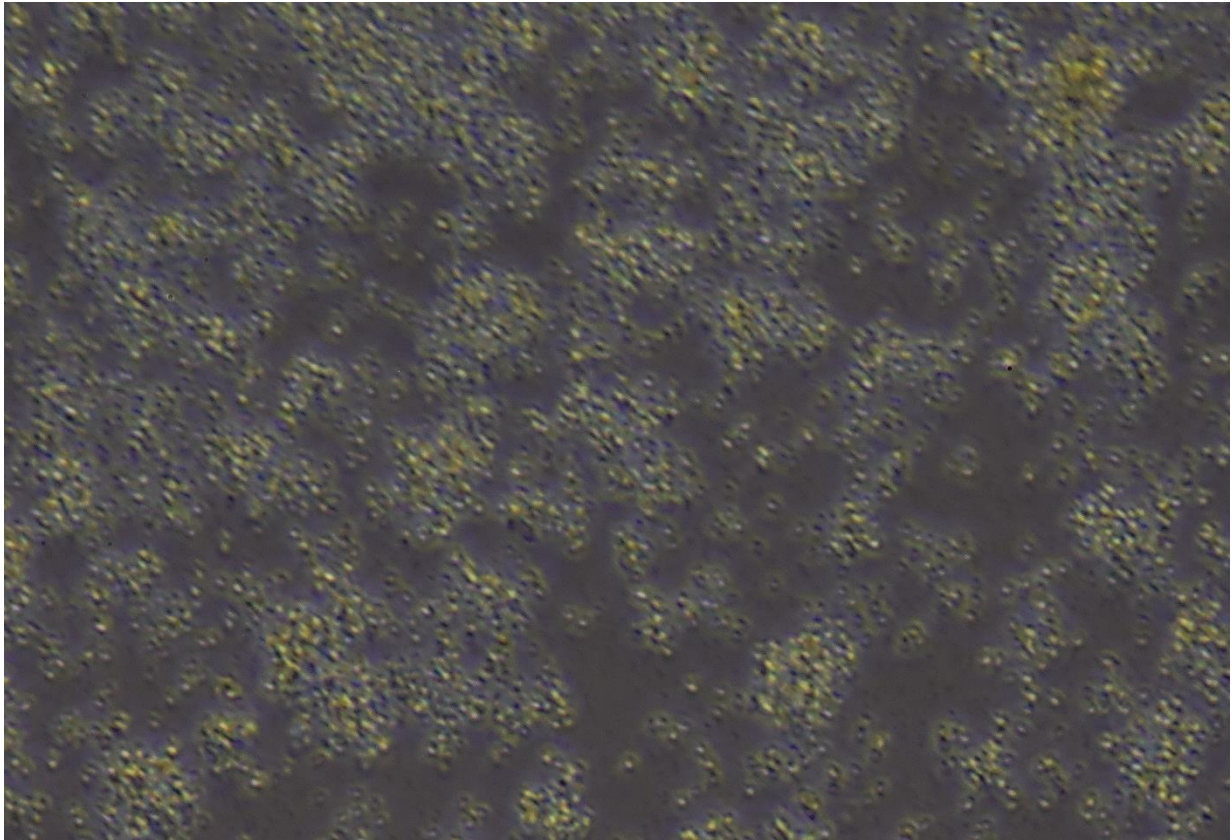


Figure 3. Overview of colony formation from water sample in monoculture at 40 times magnification.

Sources:

Bellinger EG, Sigeo DC. 2015. Freshwater Algae: Identification, Enumeration and Use As Bioindicators. John Wiley & Sons, Incorporated, Hoboken, UNITED KINGDOM.

Aphanocapsa. Montclair state University: <https://www.montclair.edu/water-science/freshwater-cyanobacteria-of-new-jersey/visual-guide-to-cyanobacteria-in-new-jersey/coccoid/colonial/aphanocapsa/>. Accessed 15 December 2022.