

Scenedesmus sp. in Uppsala pond

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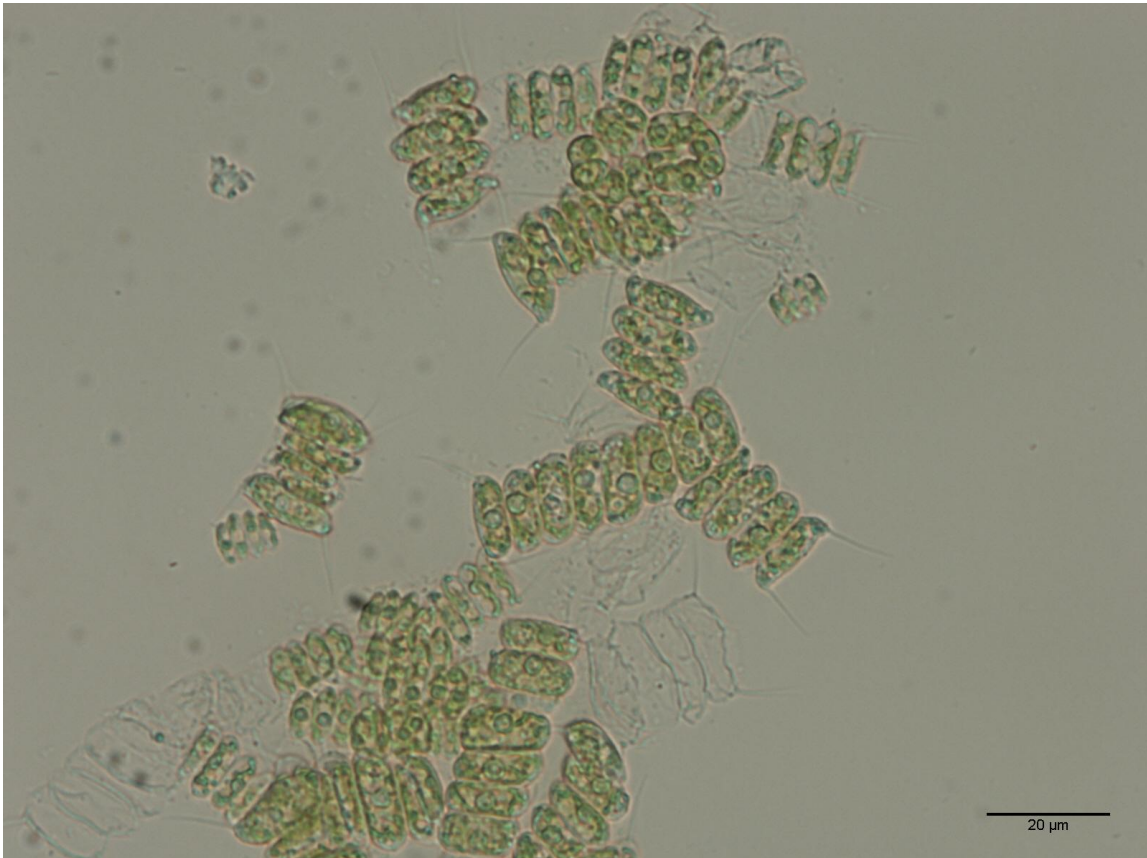


Fig. 1: Live and dead colonies of Scenedesmus sp. at 40x magnification. Spines are visible on the anterior and posterior ends of the colonies.

As part of a course in “Diversity and Evolution of Microbial Eukaryotes”, an algal species was isolated from a freshwater sample taken in central Uppsala. Identification of the species via sequencing was attempted, but failed. However morphological analysis, using a key, suggests it to be of the genus *Scenedesmus*.

Sampling

The water sample was collected from a small stream flowing from a pond in central Uppsala, the 11 of November 2022. By some rocks at the bank of the stream, the sediment was disturbed, and a water sample was taken.



Fig. 2: Sample location in central Uppsala. Water sample was taken from between rocks at the edge of a slow-moving stream.

The sample was then left to rest so that the contents of the water column would precipitate, and a clear top, middle, and bottom layer could be established. In order to isolate a single species, 10-fold serial dilutions were then performed on samples from all three zones, down to a dilution of 10^{-7} . This was done on a 48-well-plate, repeated in both MWC and Z8 medium. The algae in the prepared dilution plate were left to grow in a light room with a 18 °C day, 15 °C night, 16 hour light cycle. After 17 days, the wells were examined for single-species isolates.

Morphology and genus

At the 10^{-4} dilution sampled from the bottom layer, grown in Z8 medium, only one species could be observed. Using a morphological key for algae, the isolate was identified as *Scenedesmus* sp. DNA extraction and PCR was performed, using the primers PF1 and FAD4. However, the sequences from the PCR were of poor quality, and possibly contaminated by multiple organisms. As such, they were unusable for further molecular species identification.

In the microscope, the organisms were generally observed in colonies of 4, although sometimes also in (possibly dividing) colonies of 8. The individual cells were oblong, with a size of around $15 \times 5 \mu\text{m}$. “Spine” structures were observed at the anterior and posterior edges of the colonies, although these were thin and only visible at high magnification. The colonies tended to clump together into large aggregates visible to the naked eye. This made it hard to determine if the well was exclusively inhabited by *Scenedesmus*, or if it was contaminated by another organism, undetected in these large aggregates.

Scenedesmus is a very common freshwater alga. Because of its fatty acid productivity and biomass, it is viewed as a promising candidate for use in biofuels. As an added benefit, after oil extraction for fuel, the algal residues appear to also be useful as animal food¹. On a separate but interesting note, *Scenedesmus* is also the only known chlorophyllic organism to have caused infection in immunocompetent people. Two independent cases have been studied, where species of the subgenera *Desmodesmus* caused infection after open injuries in freshwater². However, infection appears to be exceedingly rare, with seemingly less than a handful suspected cases reported. It might not be overly controversial to claim that the potential benefits of *Scenedesmus* seem to far outweigh any potential danger they pose.

1. Abomohra A, El-Sheekh M, Hanelt D. 2014. "Pilot cultivation of the chlorophyte microalga *Scenedesmus obliquus* as a promising feedstock for biofuel". *Biomass and Bioenergy* 64: 237–44. <https://doi.org/10.1016/j.biombioe.2014.03.049>.
2. Westblade L, Ranganath S, Dunne W, Burnham C.A, Fader R, Ford B. 2015. "Infection with a Chlorophyllic Eukaryote after a Traumatic Freshwater Injury". *New England Journal of Medicine* 372: 982–84. <https://doi.org/10.1056/NEJMc1401816>.