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Characterization of microalgal and protist diversity in an anthropic campus pond through light microscopy

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Abstract: *Freshwater ponds host a wide range of microorganisms, the diversity of which remains largely undocumented for campus water bodies. The present work aimed to carry out a preliminary characterization of the microalgal and protist community present in this pond, through direct light microscopy. Water samples were collected over the course of one week, from random points around the pond perimeter, as locations varied between days. At each visit, water temperature as well as pH were recorded. A reduced volume, consisting of a single drop obtained through pipetting, was placed on a standard glass slide for each sample, which was then observed under a light microscope and photographed, in order to allow identification at the species level where possible. Overall, the samples revealed a diverse range of morphotypes, which spanned various forms, several of which displayed active movement. The resulting photographic record, as such, provides a reference collection of the species present in the pond, suitable for use in student identification exercises. Although preliminary, this protocol could aid in establishing a baseline for future, more detailed biodiversity monitoring of the pond, as well as similar water bodies.*

Keywords: *Protozoa, Chlorophyta, freshwater, ecosystem, biodiversity, biomonitoring*

• Introduction

Freshwater ponds, including small water bodies of anthropic origin, host microalgae, which act as primary producers, as well as protists, which take part in the microbiome loop (2). As algae are also widely used as bioindicators (1), the documentation of these communities can be relevant, even if just for educational purposes, though their diversity remains largely undocumented for small water bodies. The present work aimed to carry out a preliminary characterization of the microalgal and protist community of an ornamental campus pond through direct light microscopy, in order to provide a photographic reference collection for student identification exercises.

• Material and method

The studied pond is an artificial, ornamental water body located in the Japanese Park of the University of Life Sciences "King Michael I” from Timisoara. It is approximately 5–7 m in diameter and lined with a rubber pond liner, presents aquatic vegetation, fish, ducks as well as amphibians. Samples were collected over one week in October 2026, from five random points around the pond perimeter (open water and periphyton scrapings), and pooled into one composite sample per day, while water temperature and pH were recorded at each visit.

Single drops were observed live, and afterwards fixed with Lugol's iodine, under an Optika B-157 light microscope (40x and 60x objectives), then photographed with a phone through the eyepiece. Taxa were identified at genus or family level, using the keys of Bellinger and Sigee (1), Patterson (5) as well as Foissner and Berger (3). The study is ongoing and as such, the full paper will present more species encountered during future samplings.

• Results and discussions

Throughout the samples, more than 25 taxa of microalgae and protists were identified at genus or family level (Table 1; Fig. 1–16), green algae and diatoms being the most diverse groups. The presence of *Pediastrum* s.l., *Desmodesmus* and *Tetradesmus*, which are common in nutrient-rich standing waters (1), could possibly reflect the input of organic matter from fish and ducks, although no nutrient measurements were carried out. Bdelloid (Fig. 17) and monogonont rotifers, cladocerans as well as nematodes were recorded as well (4). Identification at species level was not possible, as it requires calibrated measurements, oil immersion and, for diatoms, cleaned frustules.

Table 1. Pond taxa presented in this poster.

Group	Taxa (figure)
Chlorophyta, Charophyta	*Coelastrum* (fig. 1), *Desmodesmus* (fig. 2), *Tetradesmus* (fig. 3), *Pediastrum* s.l. (fig. 4), *Golenkinia* (fig. 5), *Cosmarium* (fig. 6)
Euglenophyta	*Euglena* (fig. 7), *Lepocinclis* (fig.8)
Bacillariophyta	*Navicula* s.l. (fig. 9), Naviculales, cf. *Craticula* (fig. 10), *Ulnaria* (fig.11), Cymbellaceae (fig. 12), pennate diatom (fig.13)
Cyanobacteria	filamentous Cyanobacteria (fig. 14)
Ciliophora	*Euplotes* (fig. 15), *Frontonia* (fig. 16)
Rotifera (accompanying fauna)	Bdelloidea (fig. 17)

• Conclusions

The survey allowed the identification of over 25 microalgal and protist taxa (of which 17 are presented in figures here), which could aid in identification exercises for students, as well as provide a baseline for pond health monitorization. Repeated sampling in winter and spring, together with calibrated photography and oil immersion, is considered in order to reach species level identification, in future runs.

• References

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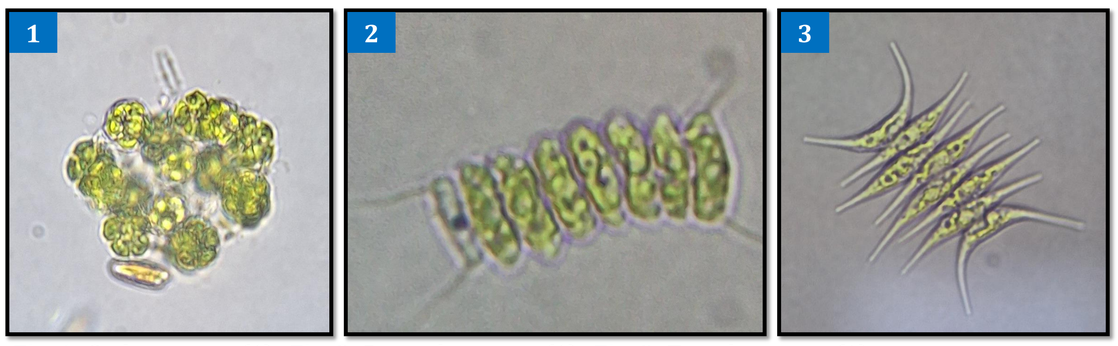


Fig. 1. *Coelastrum* sp. (1) **Fig. 2.** *Desmodesmus* sp. (1) **Fig. 3.** *Tetradesmus* sp. (1)

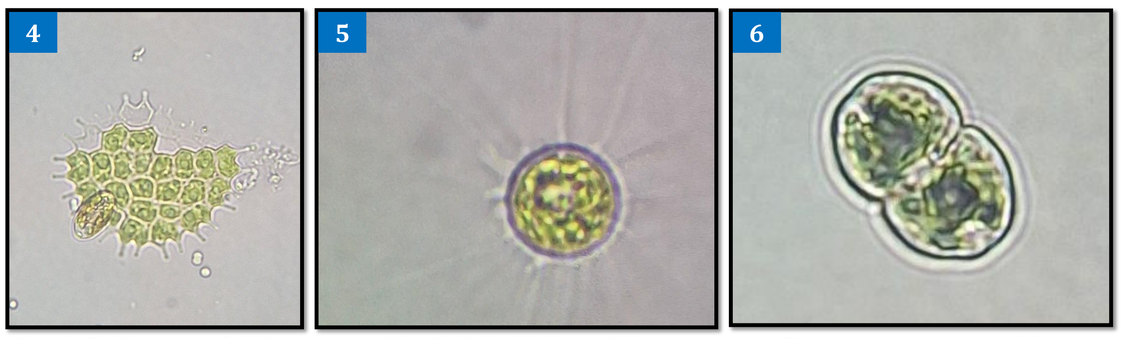


Fig. 4. *Pediastrum* s.l. (1) **Fig. 5.** *Golenkinia* sp. (1) **Fig. 6.** *Cosmarium* sp. (1)

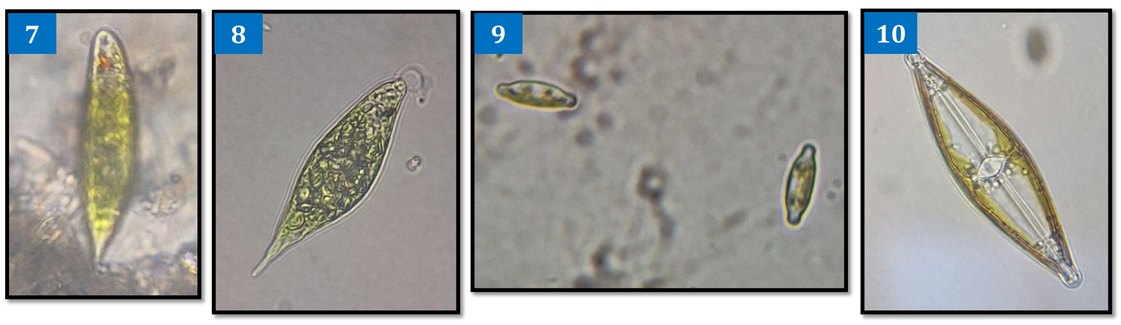


Fig. 7. *Euglena* sp. (1, 5) **Fig. 8.** *Lepocinclis* sp. (1) **Fig. 9.** *Navicula* s.l. (1) **Fig. 10.** Naviculales, cf. *Craticula* (1)



Fig. 11. *Ulnaria* sp. (1) **Fig. 12.** Cymbellaceae (1) **Fig. 13.** Pennate diatom (1)

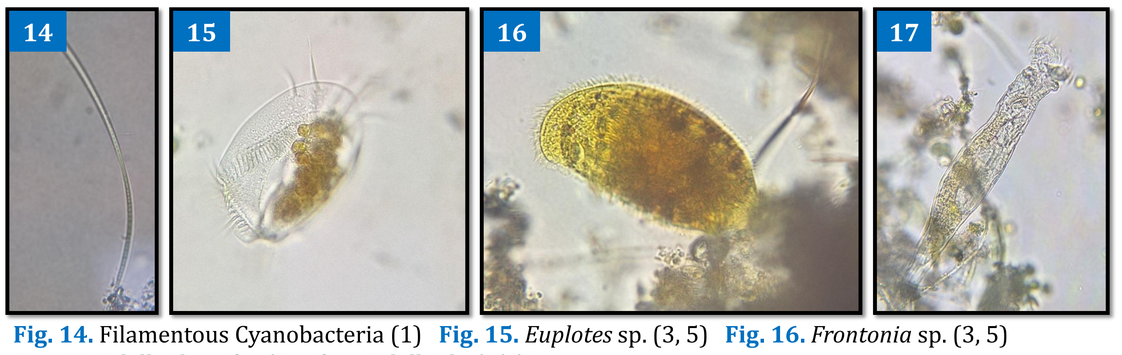


Fig. 14. Filamentous Cyanobacteria (1) **Fig. 15.** *Euplotes* sp. (3, 5) **Fig. 16.** *Frontonia* sp. (3, 5)
Fig. 17. Bdelloid rotifer (Rotifera, Bdelloidea) (4)

Note: *All taxa were identified through light microscopy and phone photography, without molecular (DNA) analyses or other advanced methods. Because of this, the identifications should be considered tentative, and several of them may be subject to revision by the publishing of the final paper.*