

Protist of the year 2025

Armor-plated ciliate *Coleps*



Photo: B. Sonntag

Profile

- Single-celled organisms of the genus *Coleps* belong to the Ciliophora (ciliates)
- Size 40 - 80 μm
- Barrel-shaped
- Calcareous armor with teeth, windows, and outlets for cilia. A cilium each is located in a window of the armor.
- Depending on the species, *Coleps* has one or more 'caudal cilia' at the rear end of the cell
- Oral apparatus with cell mouth at the front end
- Can live in symbiosis with green algae (optional)
- Common in lakes and ponds, also in rivers and in marine environments
- Free-swimming in the plankton and in the shore area of lakes.

Colorless - colorful



Photos: B. Sonntag

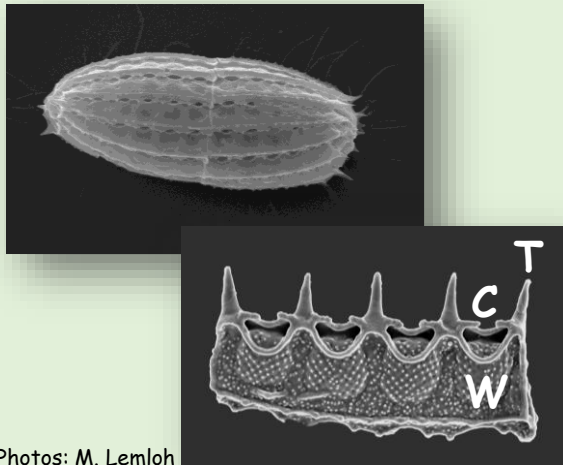
There are several species in the genus *Coleps*. These feed primarily on microorganisms such as bacteria and protists, as well as on carrion and on flakes of dead material floating in the water, which are usually colonized by microorganisms (detritus).

Coleps therefore often appears very colorful when food is being digested in 'food vacuoles'. The resulting orange-reddish color in *Coleps* appears when algal food is acidified during digestion.

Armor made of calcareous plates with spines, windows, and ciliary outlets

A peculiarity among ciliates!

Coleps produces impressive calcium carbonate plates (biomineralization). These plates together form a flexible armor. After each cell division, approx. 1-2 x per day, this armor is completed by new plates from the resulting daughter cells.



Photos: M. Lemloh

Each plate shows different structures such as teeth (T), windows (W), and ciliary outlets (C), the latter serving as an aperture allowing the cilia to pass the armour. *Coleps* is currently used in research to investigate the processes during biomineralization.

Other special features

- **Cryptic species:** as with other ciliates, the genus *Coleps* merges genetically different (= cryptic) species that cannot be discriminated microscopically.
- **Swarm formation:** if there are dying or dead microorganisms such as ciliates or copepods in the environment, entire swarms of *Coleps* come to feast on the carrion.



Photo: B. Sonntag

- **Mixotrophy:** *Coleps* can live in symbiosis with green algae and then appears grass-green. The algal symbionts provide the ciliate with nutrients, which they produce through photosynthesis. The combination of ingested food and the often temporary possession of endosymbionts is called mixotrophy.

Recommended literature

Lemloh et al. 2013, J Struct Biol 18, 155-161, doi: 10.1016/j.jsb.2012.12.001

Pröschold et al. 2021, Sci Rep 11, 5916, doi: 10.1038/s41598-021-84265-y

Cultures are available from

Culture Collection of Algae and Protozoa
Scottish Association for Marine Science, Oban, Scotland
<https://www.ccap.ac.uk/>

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