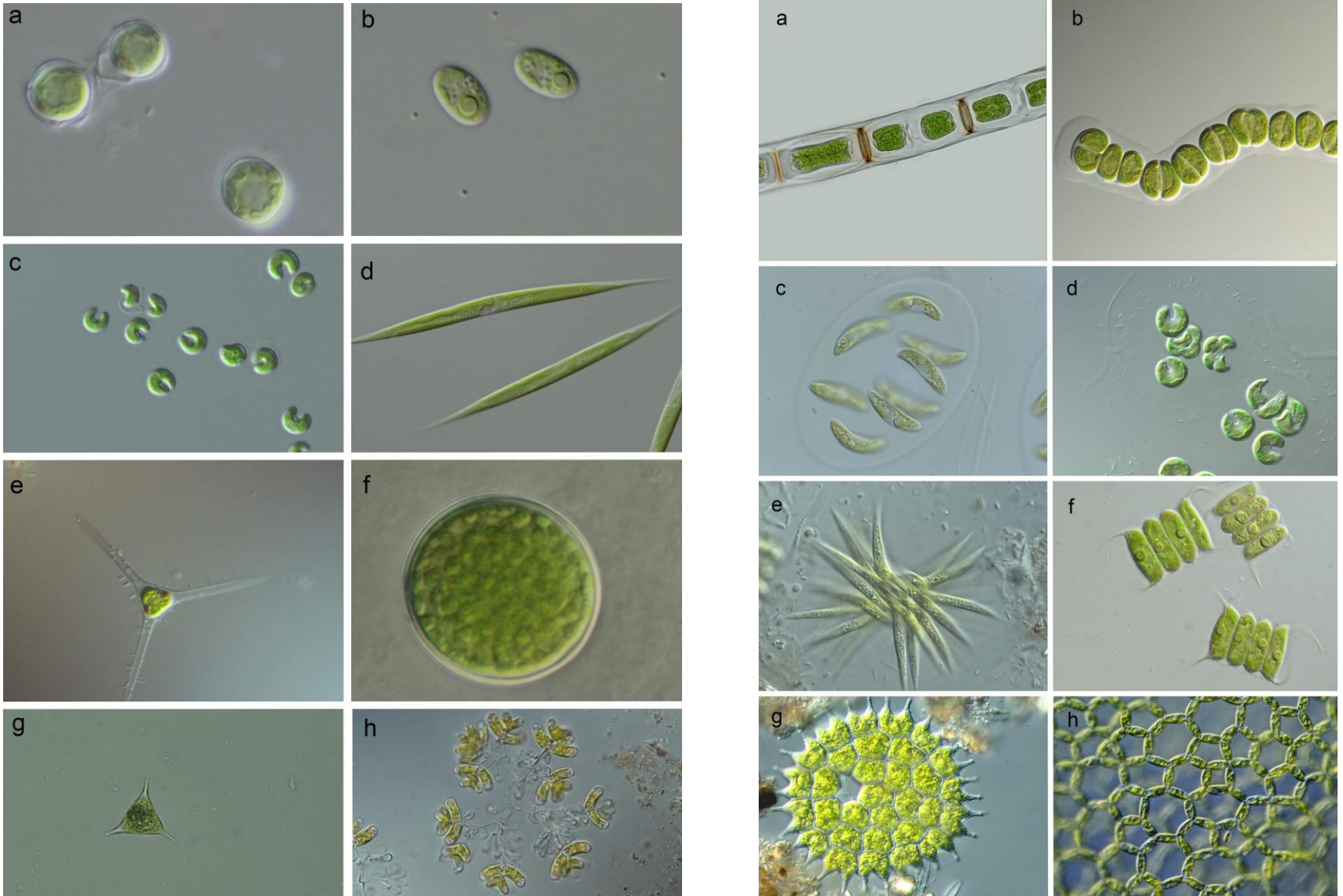


Chlorophyta, Sphaeropleales

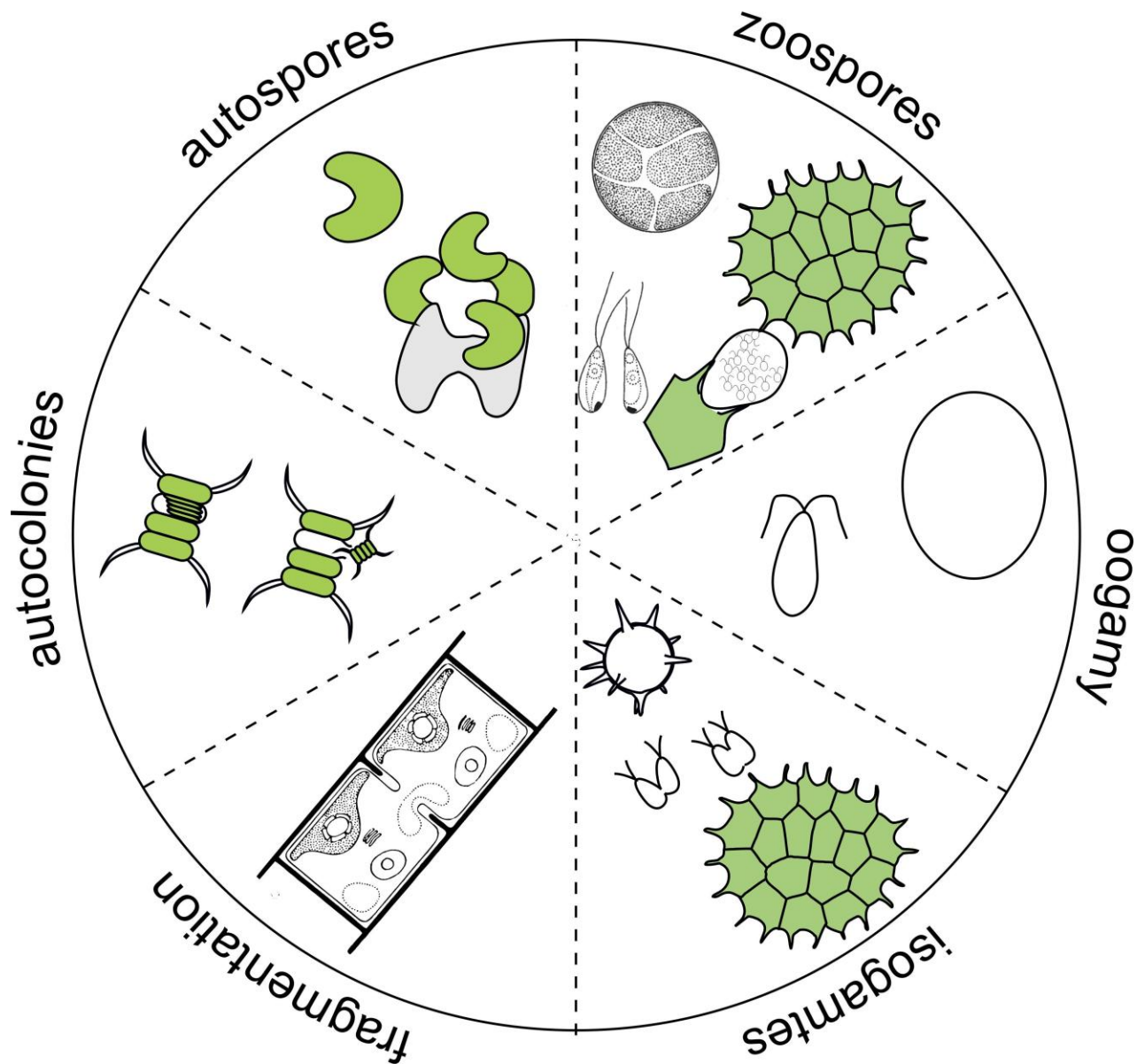


Chlorophyta, Sphaeropleales

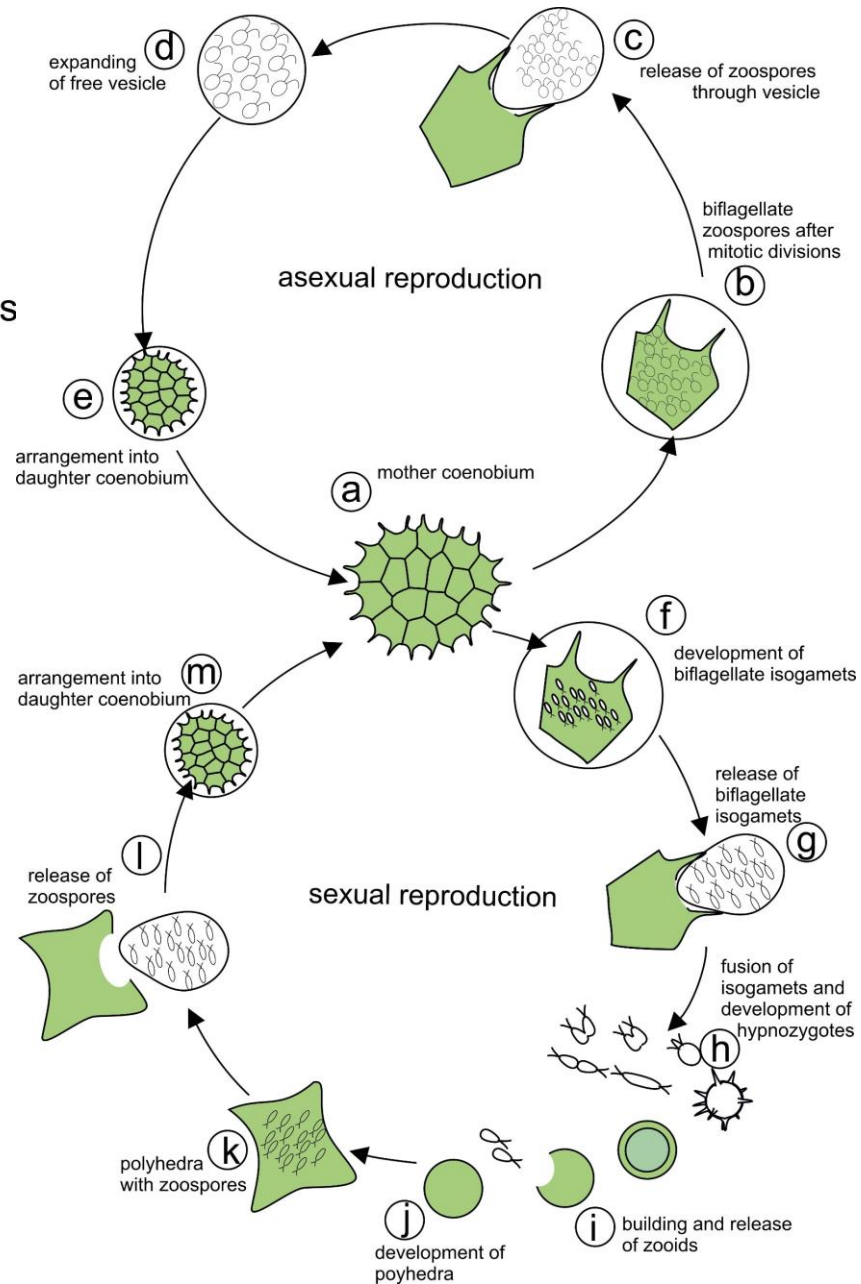
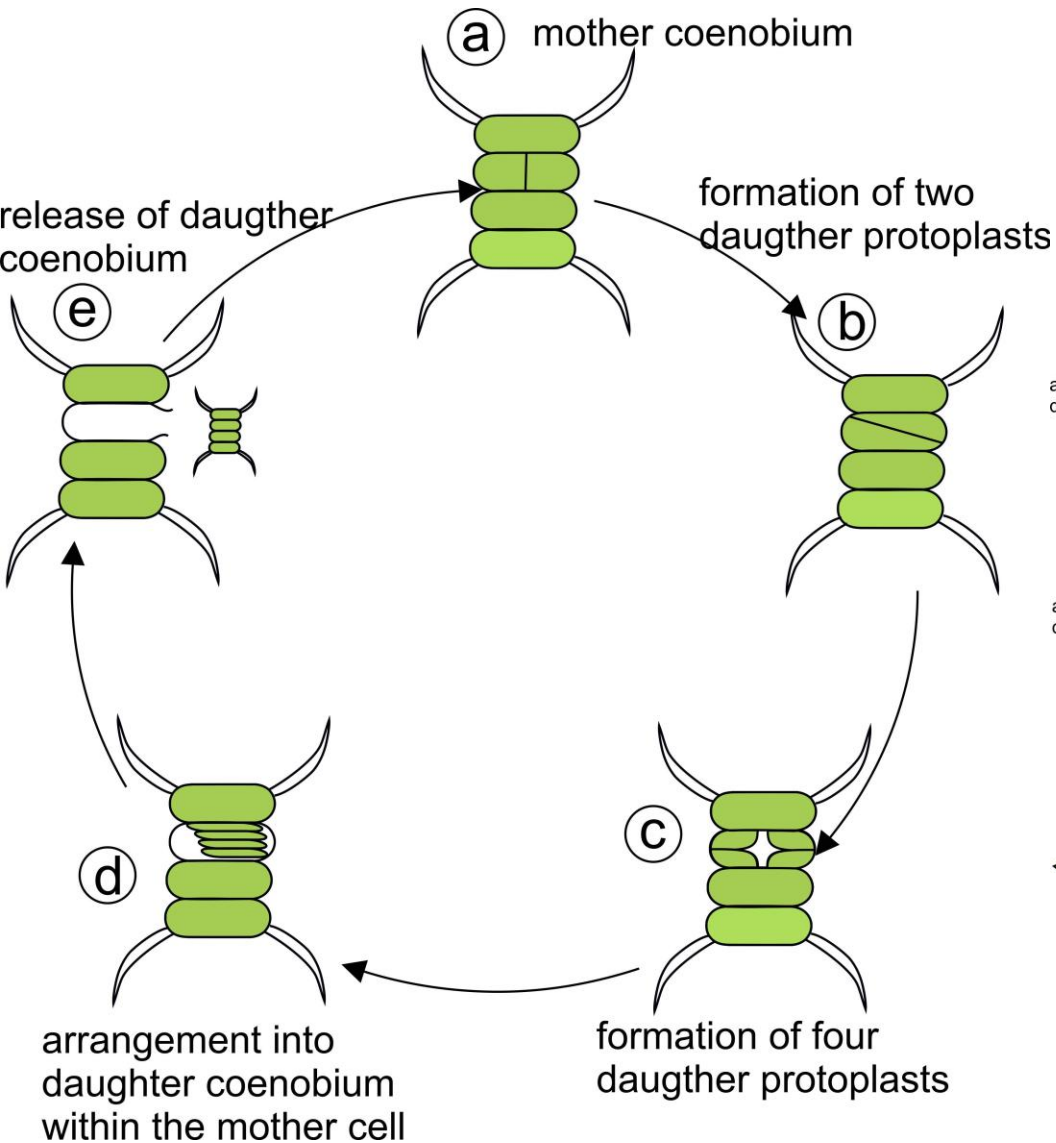
- Wide array of morphological diversity
- Solitary, colonial, filamentous forms



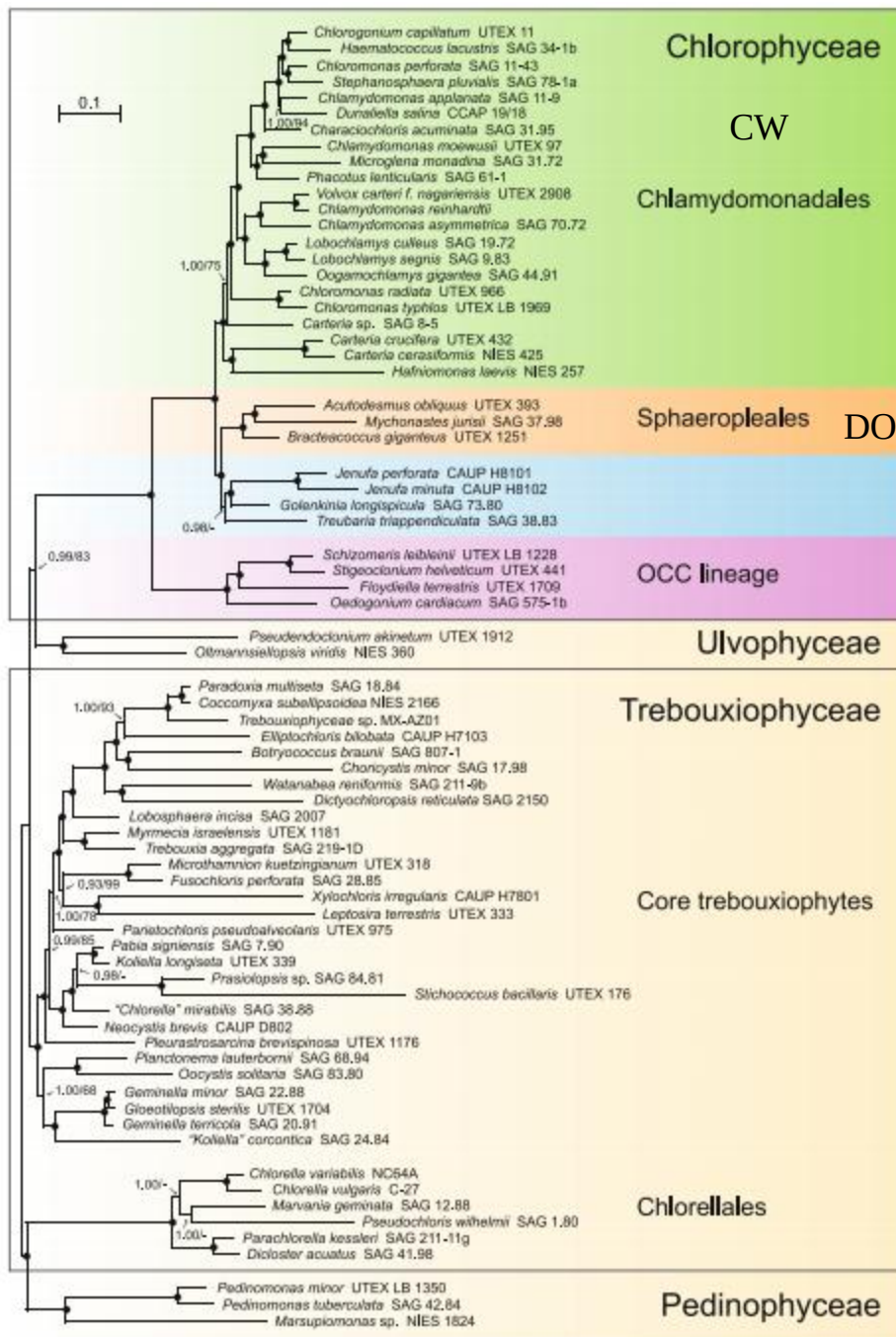
Reproduction



Reproduction - coenobia



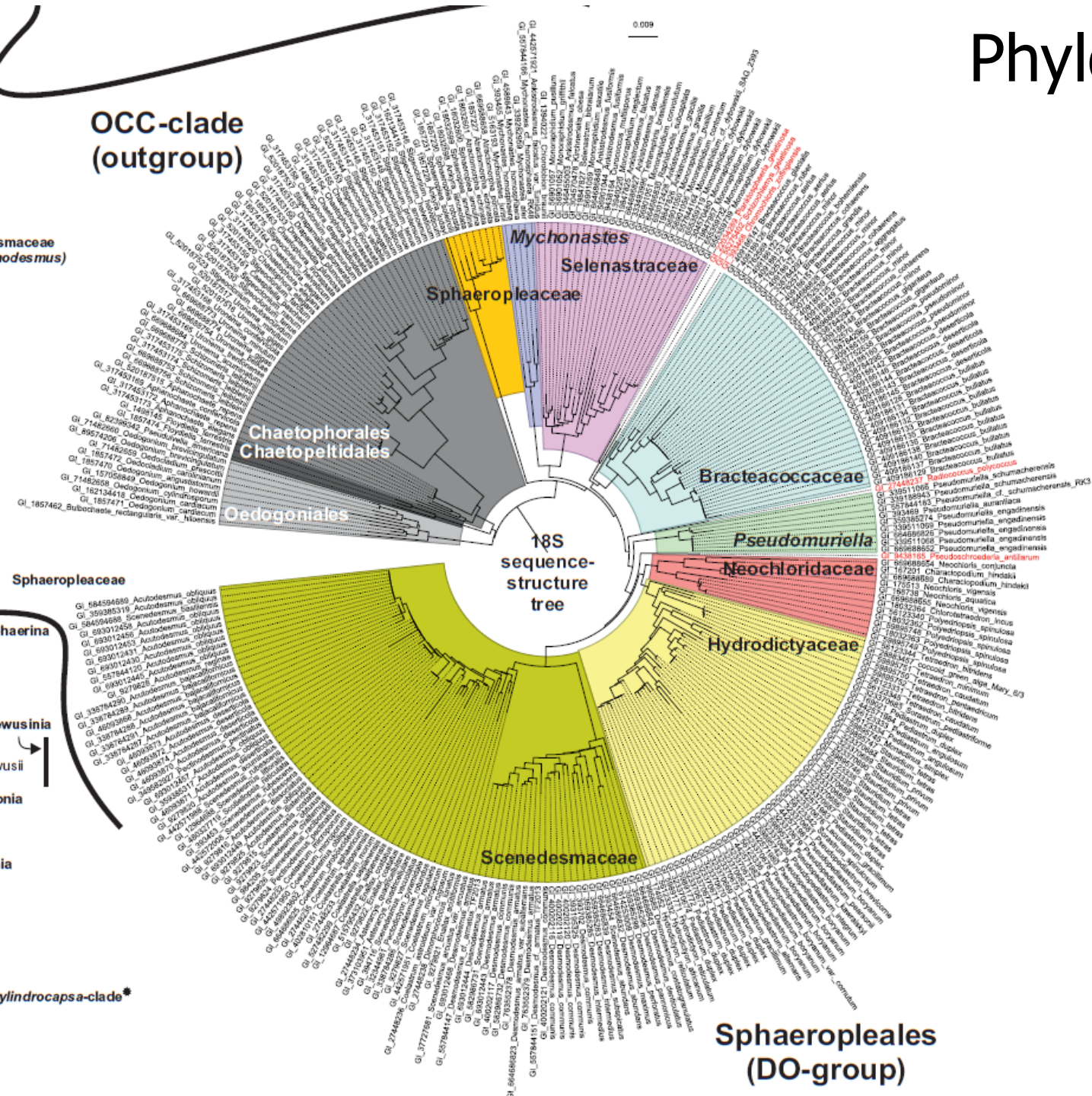
Phylogeny



Phylogeny of chlorophyte taxa inferred using nucleotide data sets assembled from 69 protein-coding and 29 RNA-coding genes

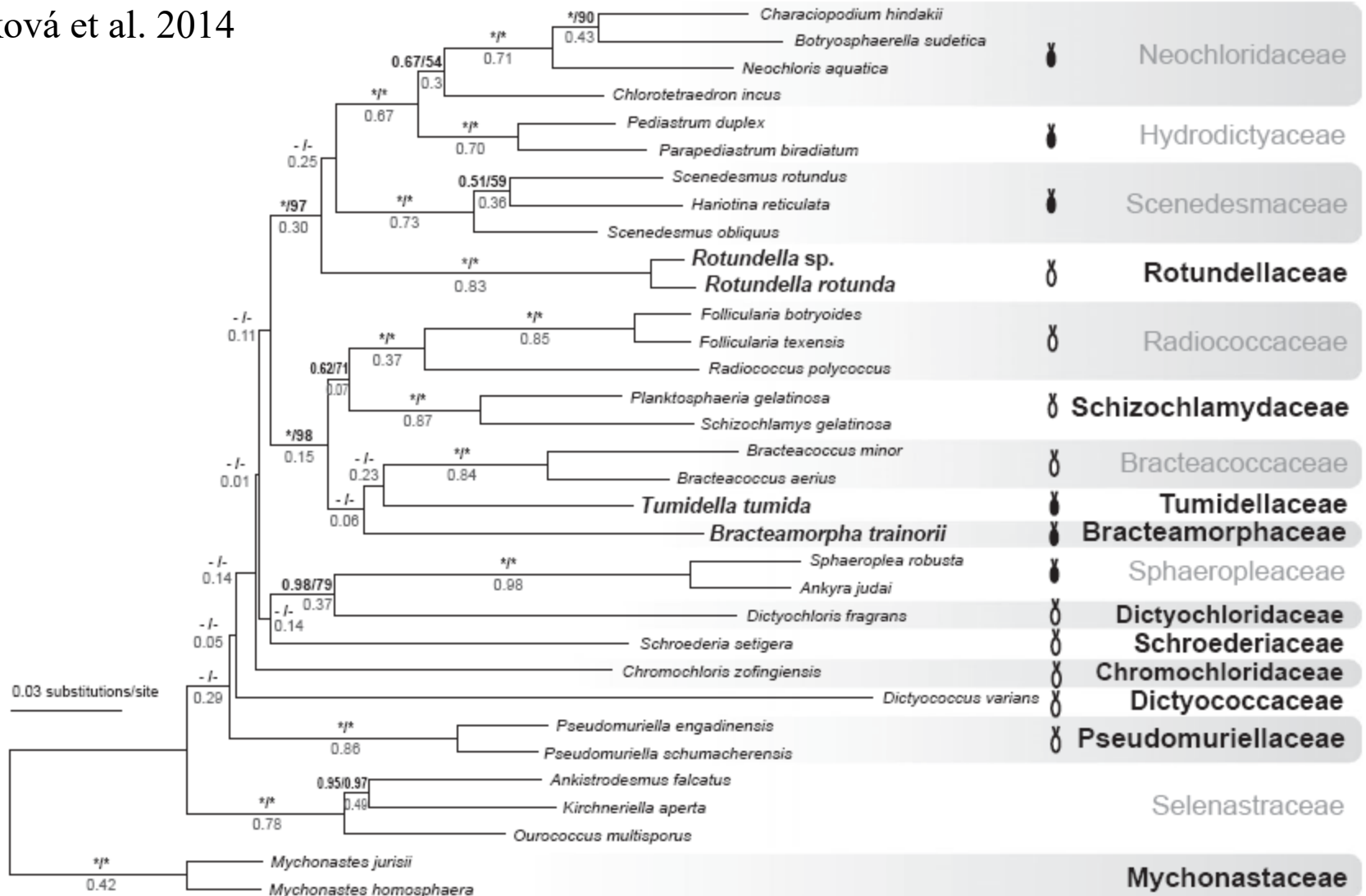
Lamieux et al. 2015

Phylogeny

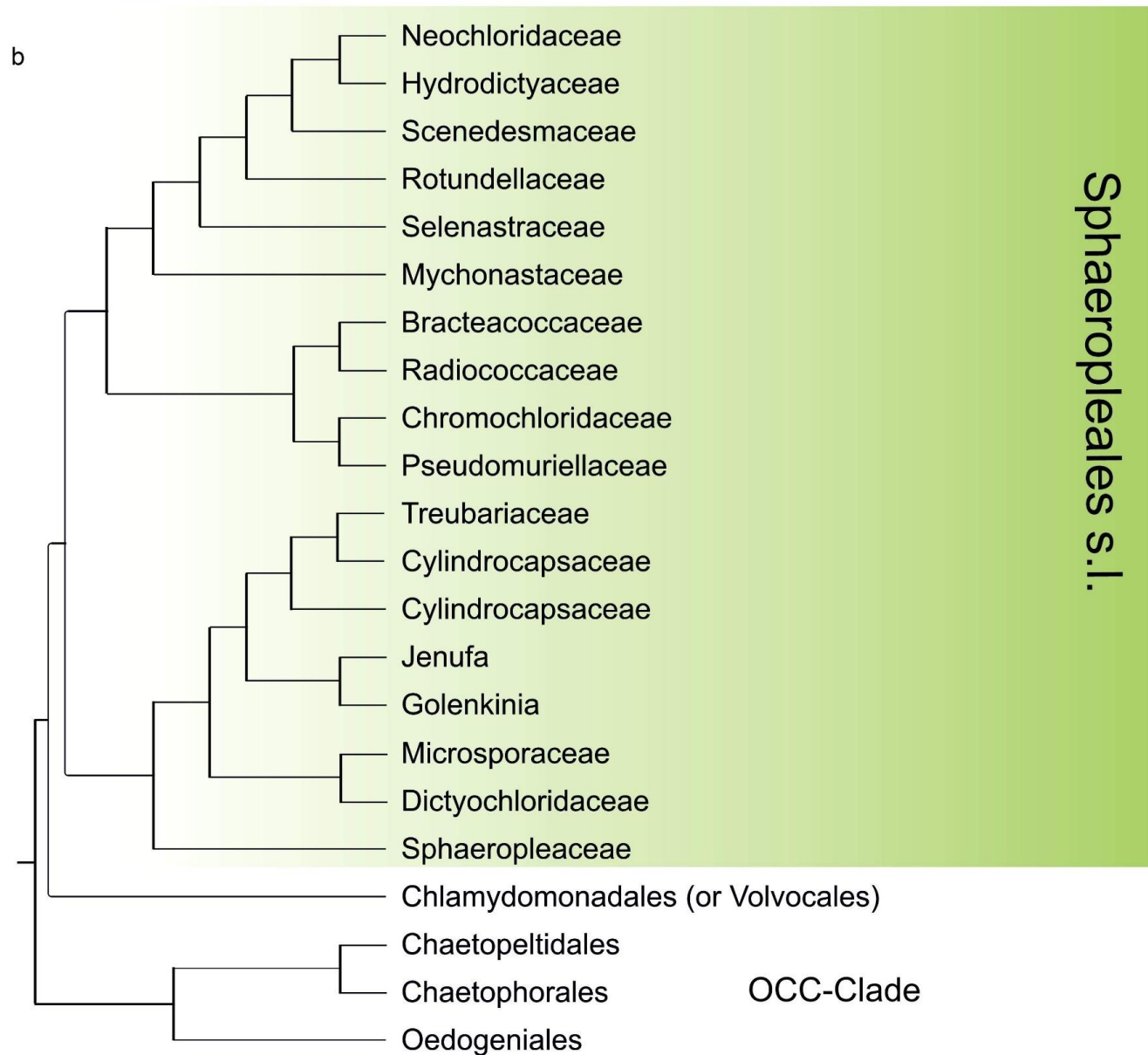


Phylogeny

Fučíková et al. 2014



Phylogeny



Neochloridaceae

Botryosphaerella sudetica

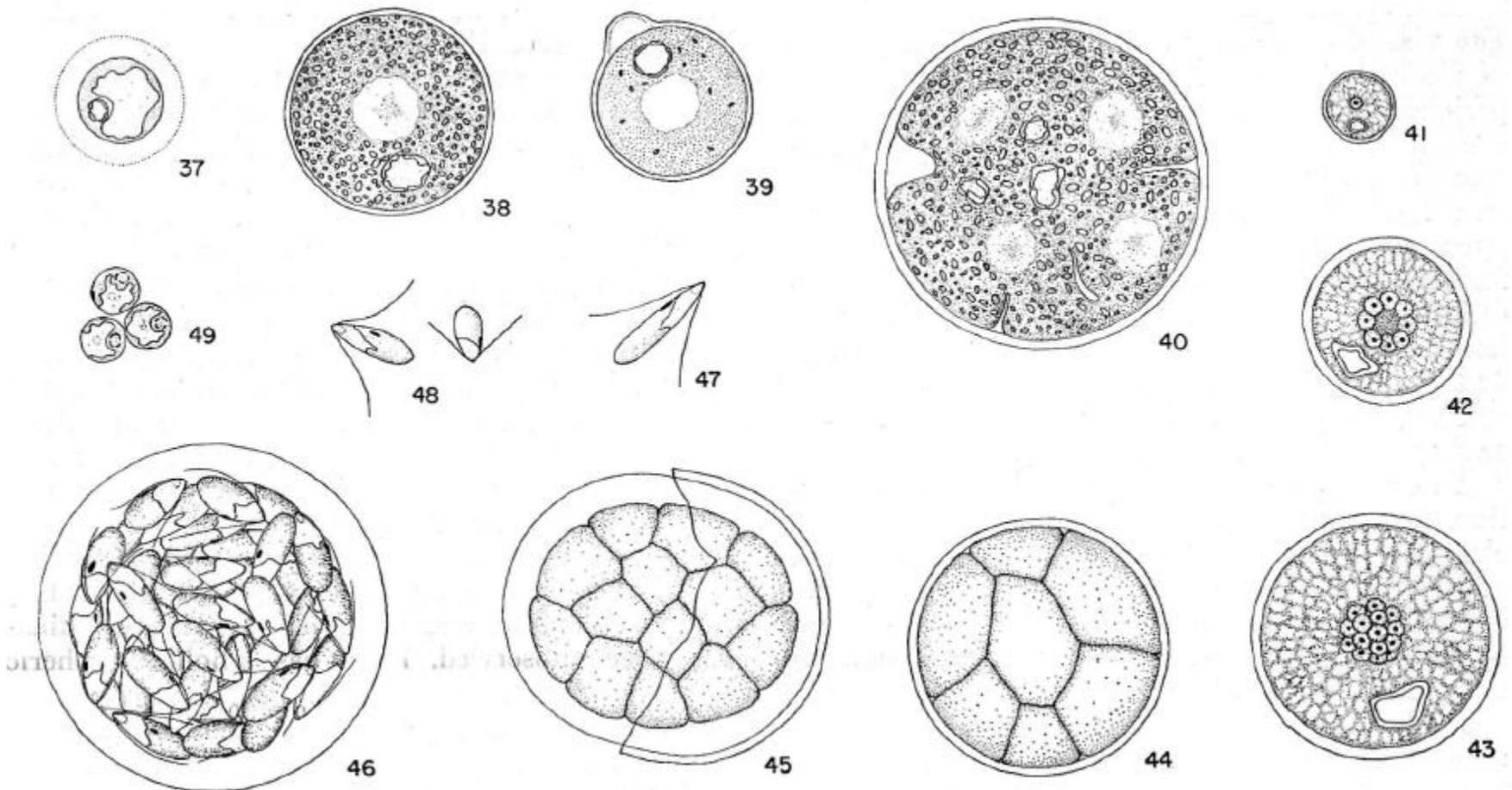
- irregular grape-like clusters; cells spherical or widely oval
- in peat-bogs with *Sphagnum* or in littoral of oligotrophic pools and small lakes



Neochloridaceae

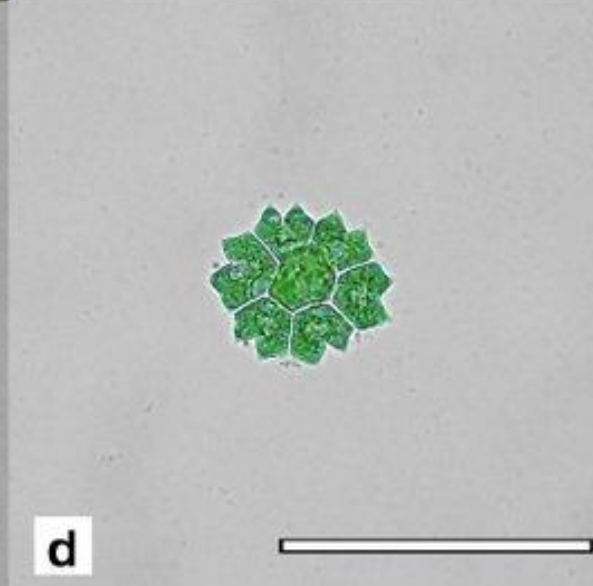
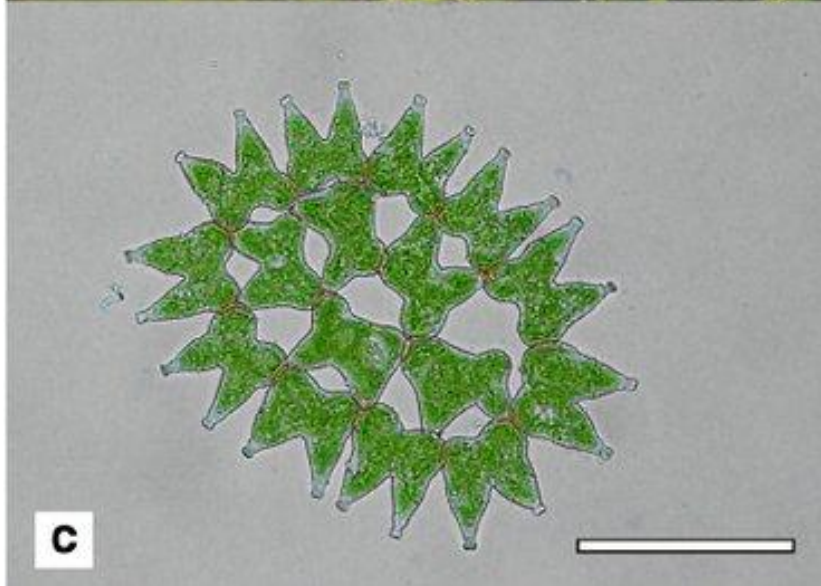
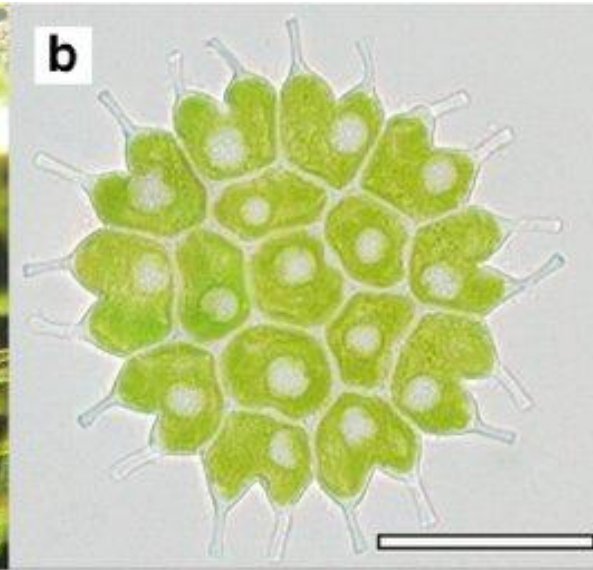
Neochloris

- cells spherical, multinucleate, with a hollow spherical, parietal chloroplast including one or more pyrenoids
- in the soil, in swamps, ponds...



Hydrodictyaceae

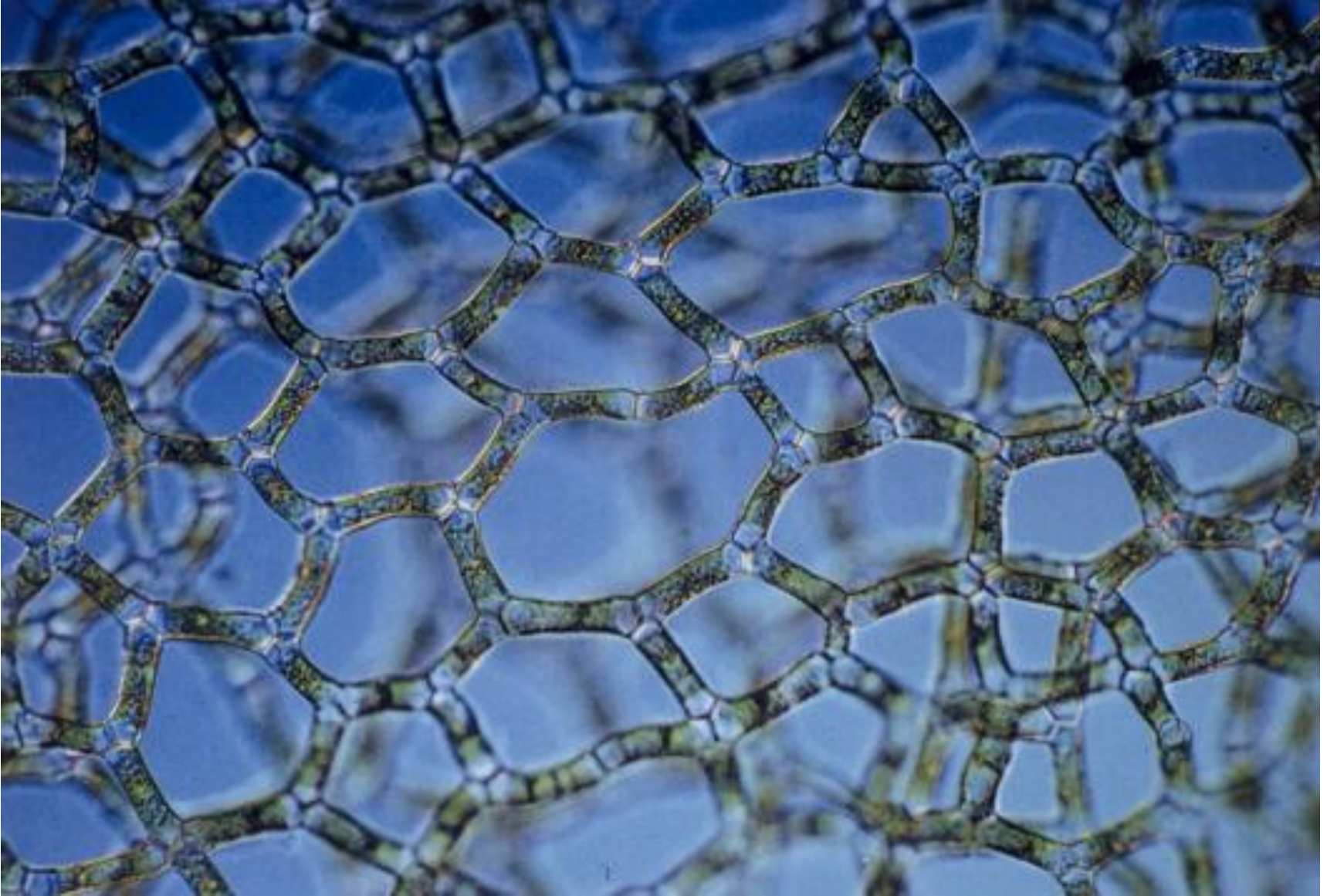
- Usually colonial algae, with the exception of *Tetradron*



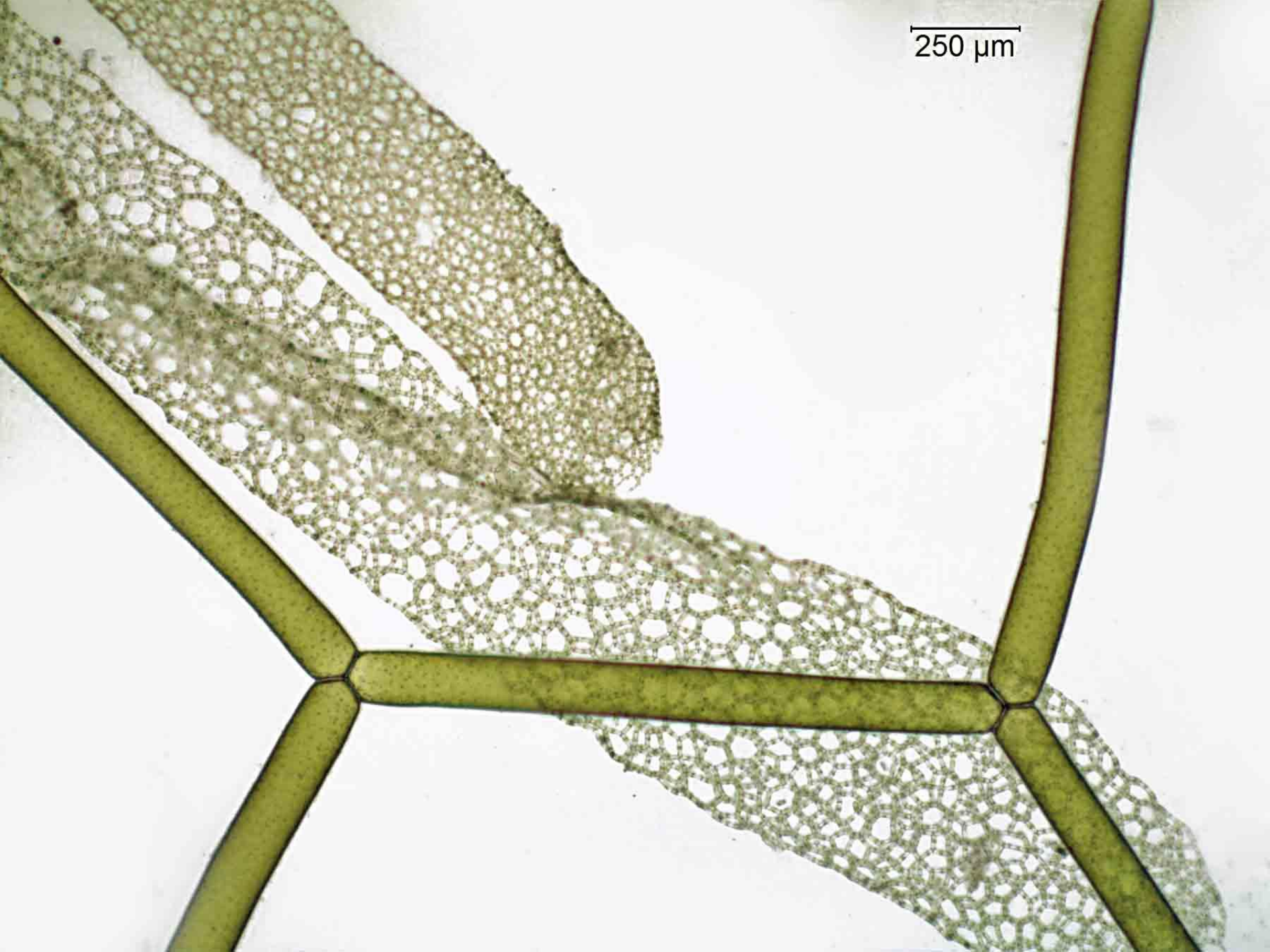
Hydrodictyaceae

Hydrodictyon reticulatum

- Net-shaped coenobium



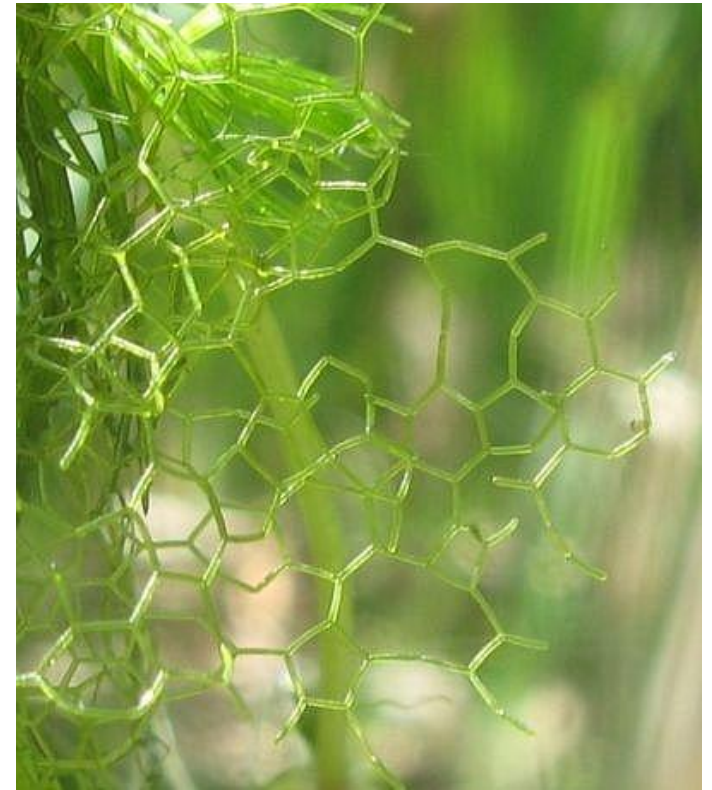
250 μm



Hydrodictyaceae



Floating mats of the water net in July 2009
floating on the surface of Keston Pond, near
Bromley, Kent, UK.



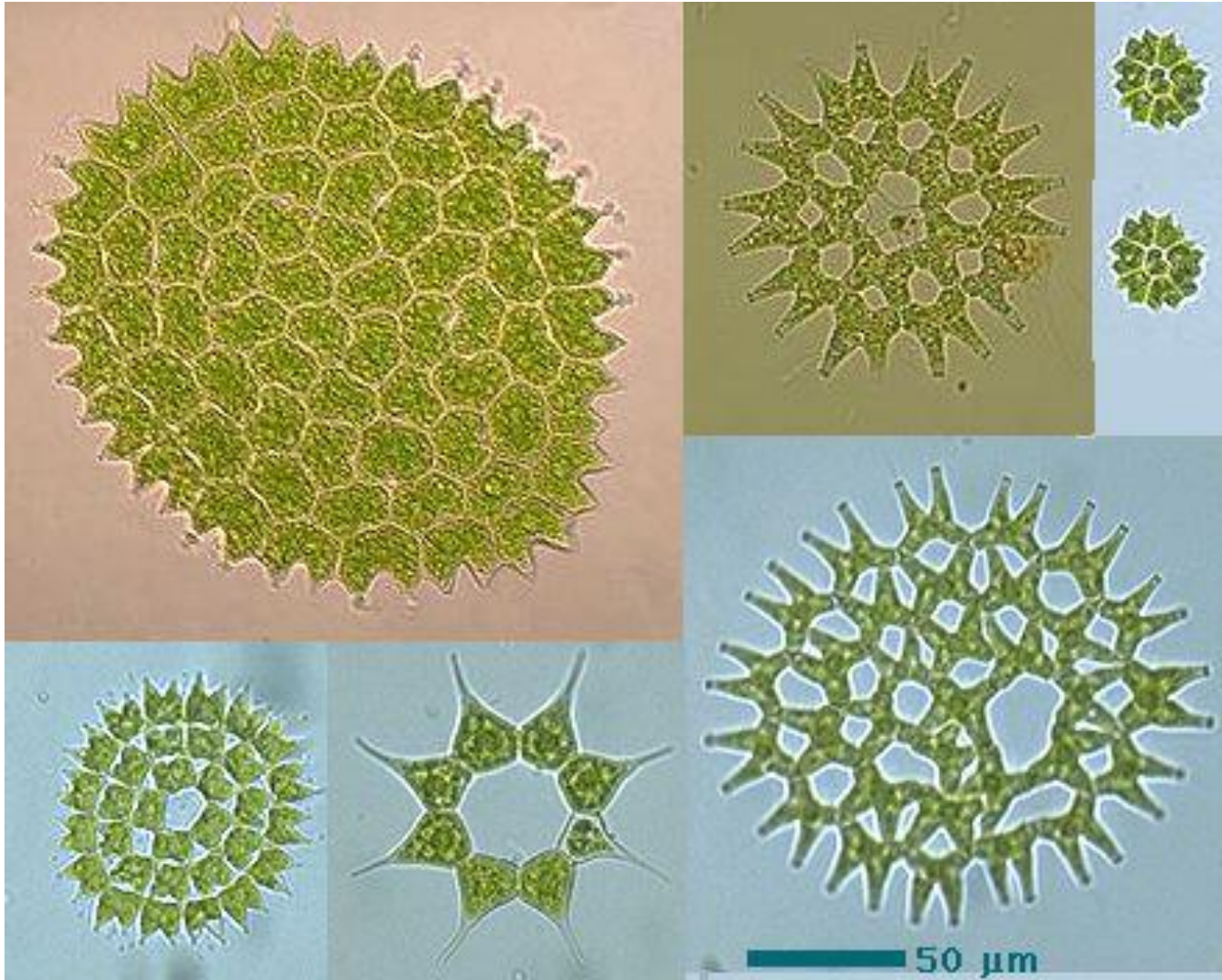
Hydrodictyaceae



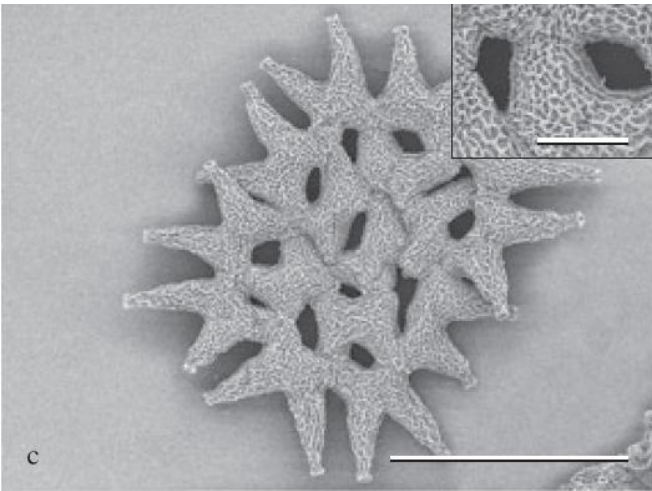
Rybník nedaleko Českých Budějovic sloužící jako ptačí rezervace, který byl doslova zamořen rozsáhlými porosty zelené řasy rodu *Hydrodictyon*.
Foto: Petr Znachor

Hydrodictyaceae

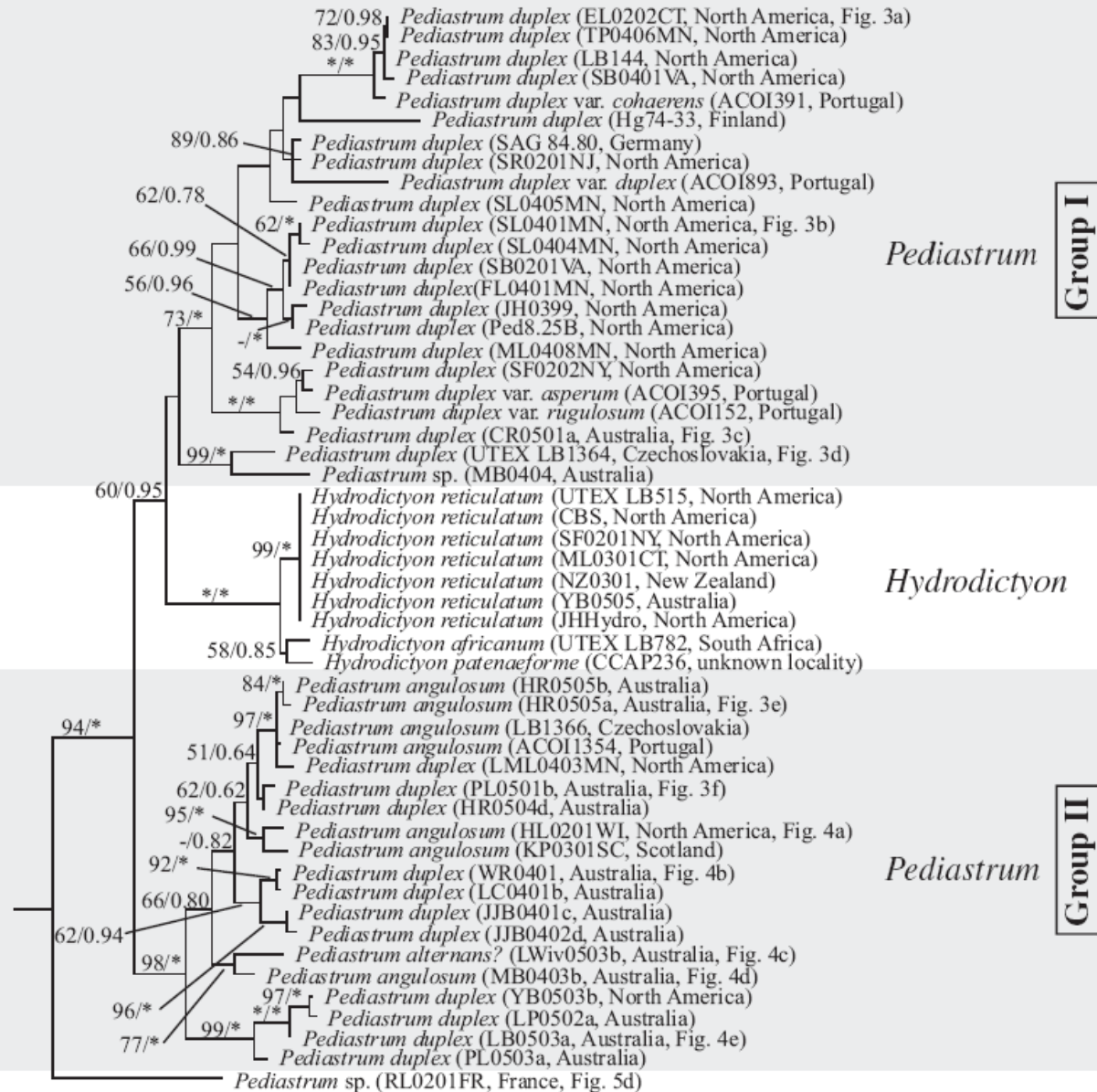
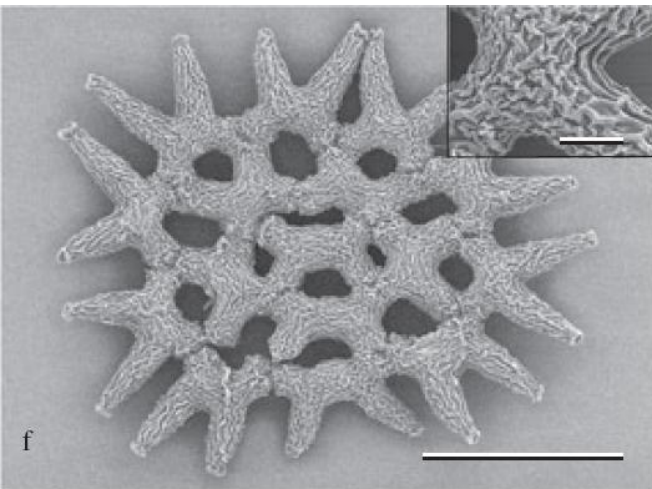
- *Pediastrum* – more than 400 species described, many of them being uncertain



Hydrodictyaceae

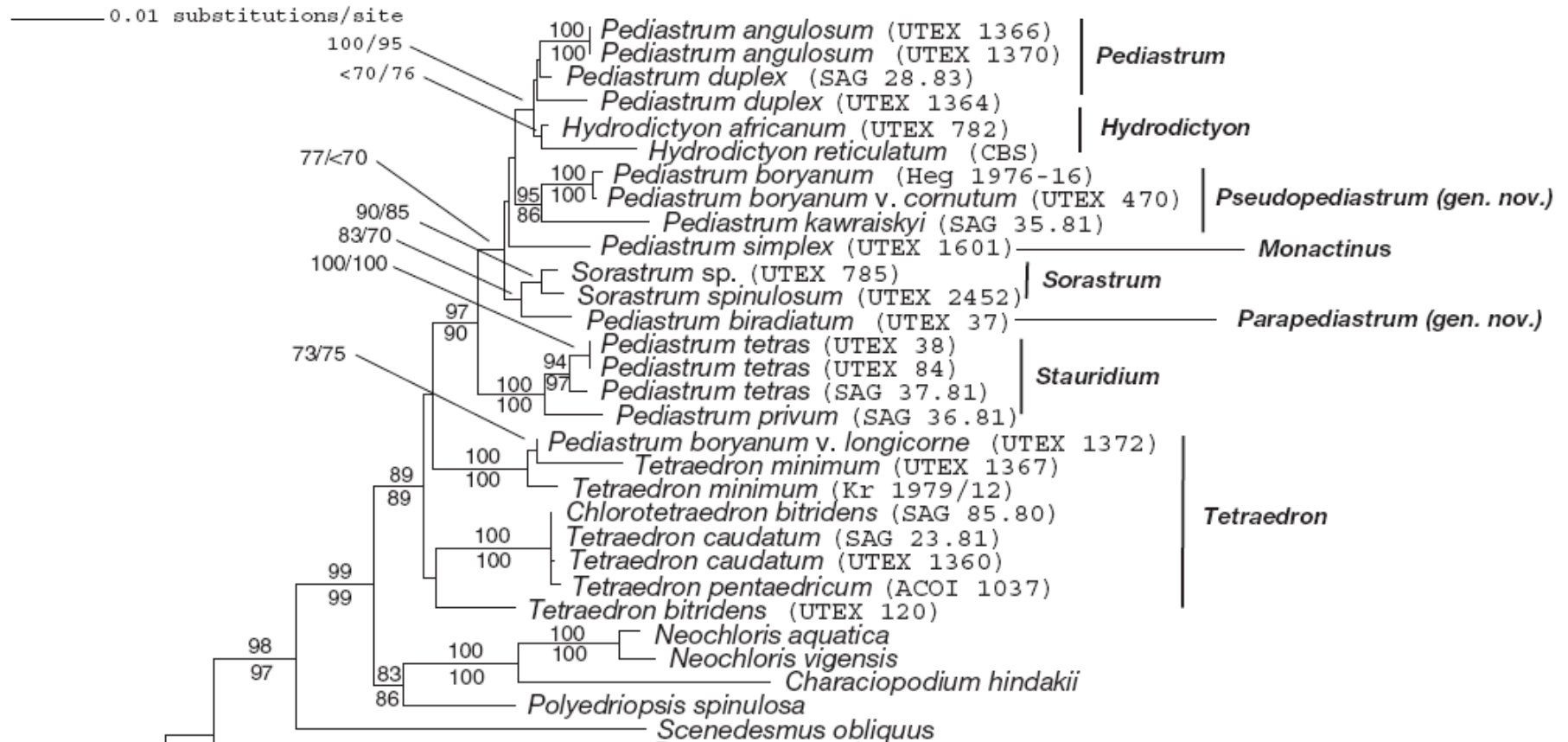


- *Hydrodictyon* nested within *Pediastrum*



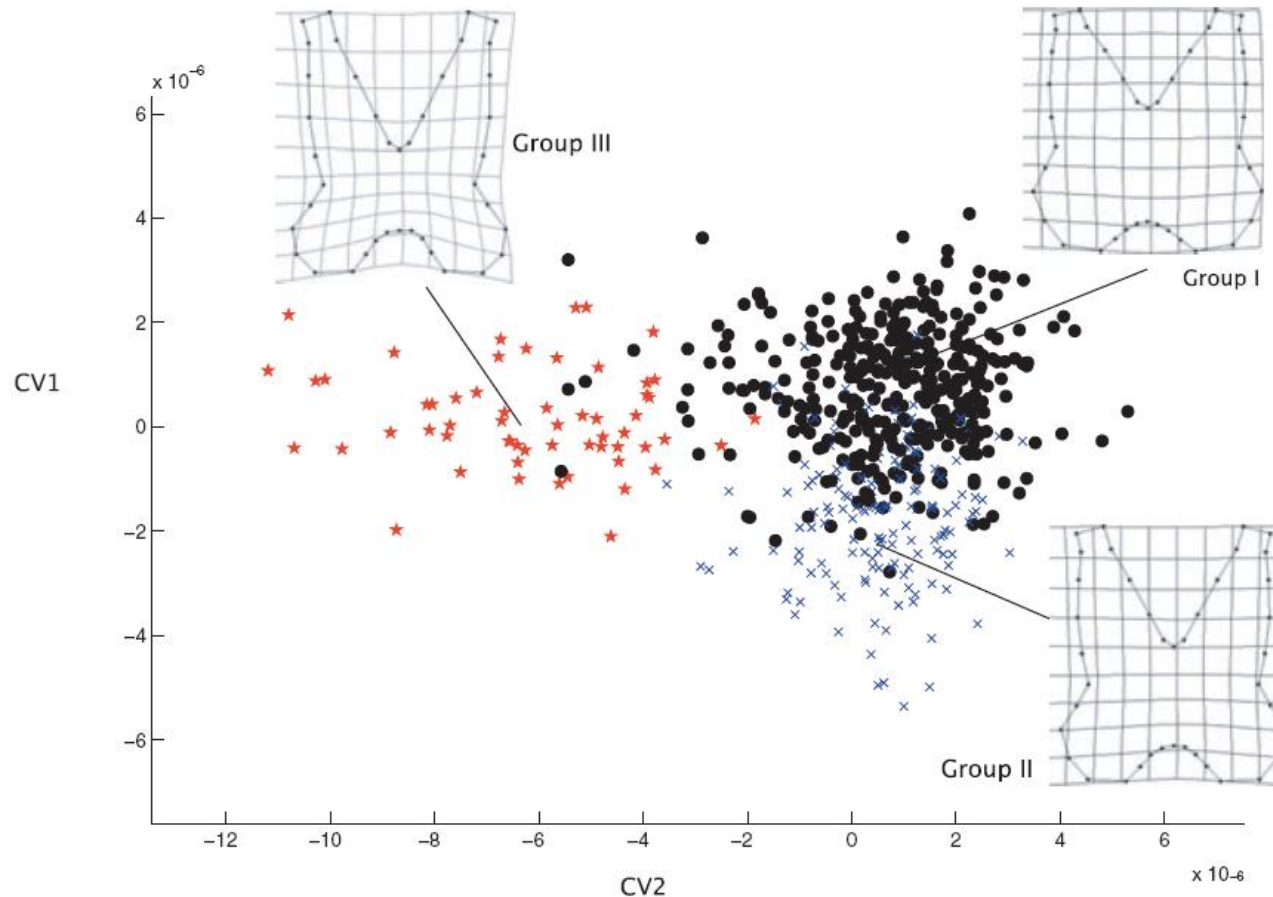
Hydrodictyaceae

- Pediastrum* – paraphyletic taxon, definition of new genera



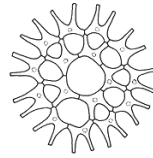
Hydrodictyaceae

- Some new genera established with the help of geometric morphometrics of cells (e.g., *Lacunastrum*)

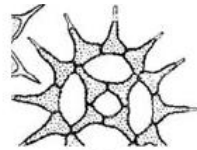


Hydrodictyaceae

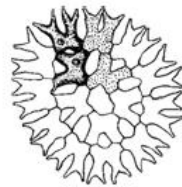
Lacunastrum



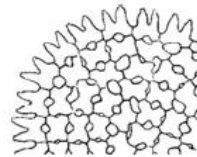
Monactinus



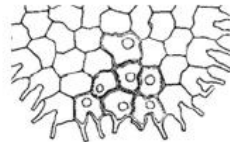
Parapediastrium



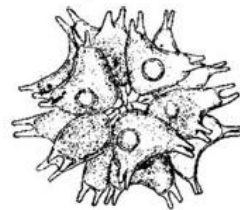
Pediastrium



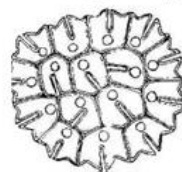
Pseudopediastrium



Sorastrum



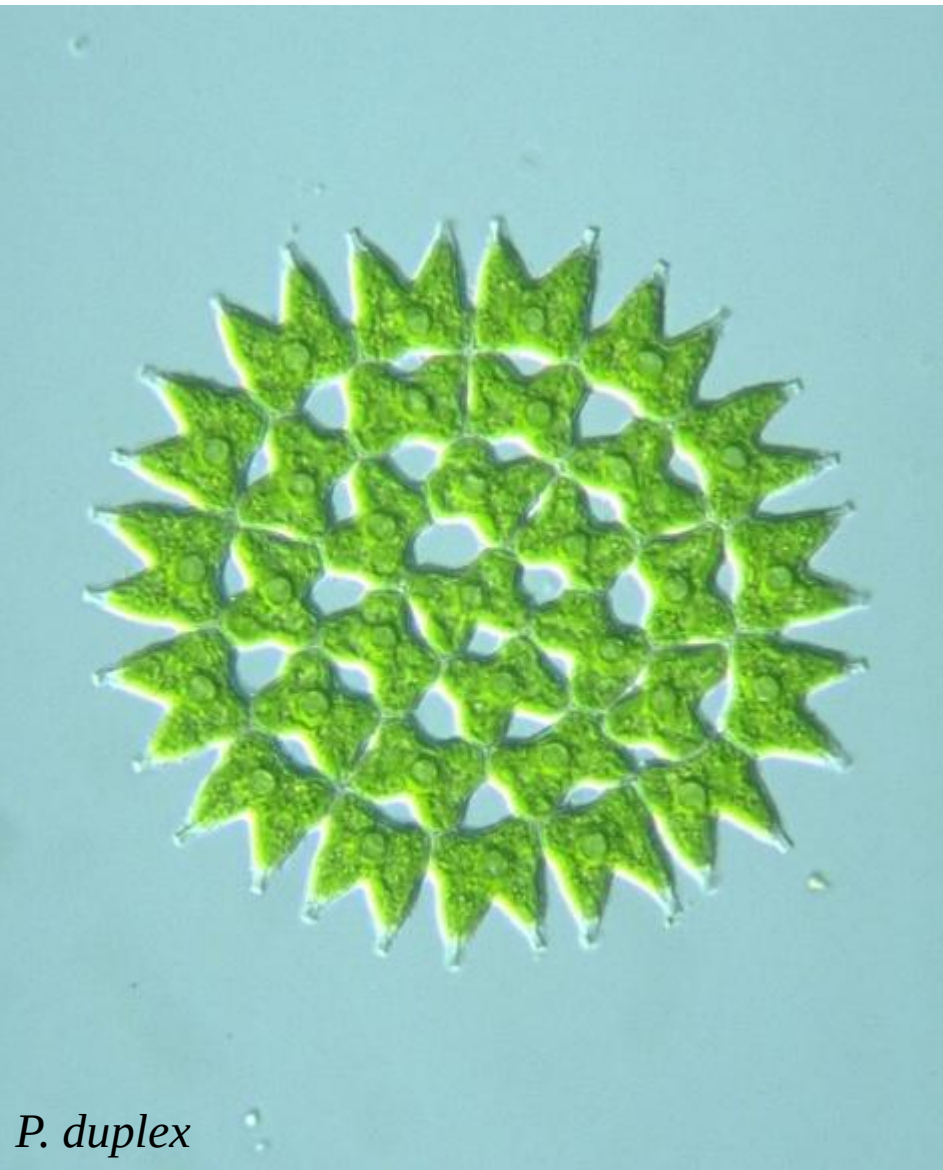
Stauridium



- **Lacunastrum**
 - *L. gracillimum*
- **Monactinus**
 - *M. simplex*
- **Parapediastrium**
 - *P. biradiatum*
- **Pediastrium**
 - *P. duplex*
 - *P. angulosum*
- **Pseudopediastrium**
 - *P. boryanum*
 - *P. kawraiskyi*
 - „*P. integrum*“
- **Sorastrum**
 - *S. spinulosum*
 - *S. americanum*
 - *S. biradiatum*
- **Stauridium**
 - *S. tetras*
 - *S. privum*

Hydrodictyaceae

Pediastrum - Two or more horn-like processes; intercellular space present



P. duplex

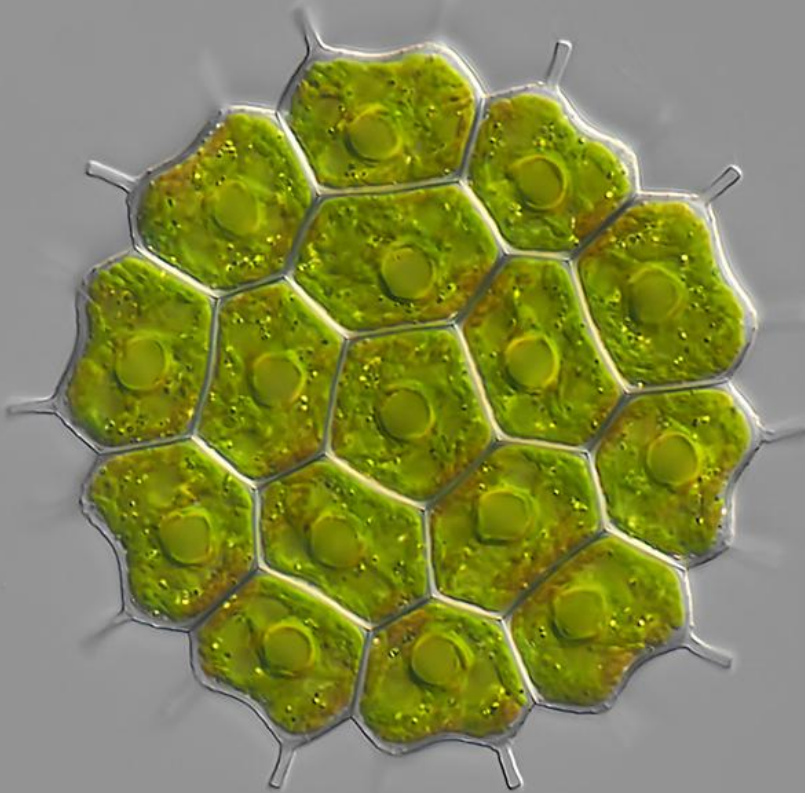


P. angulosum

Hydrodictyaceae

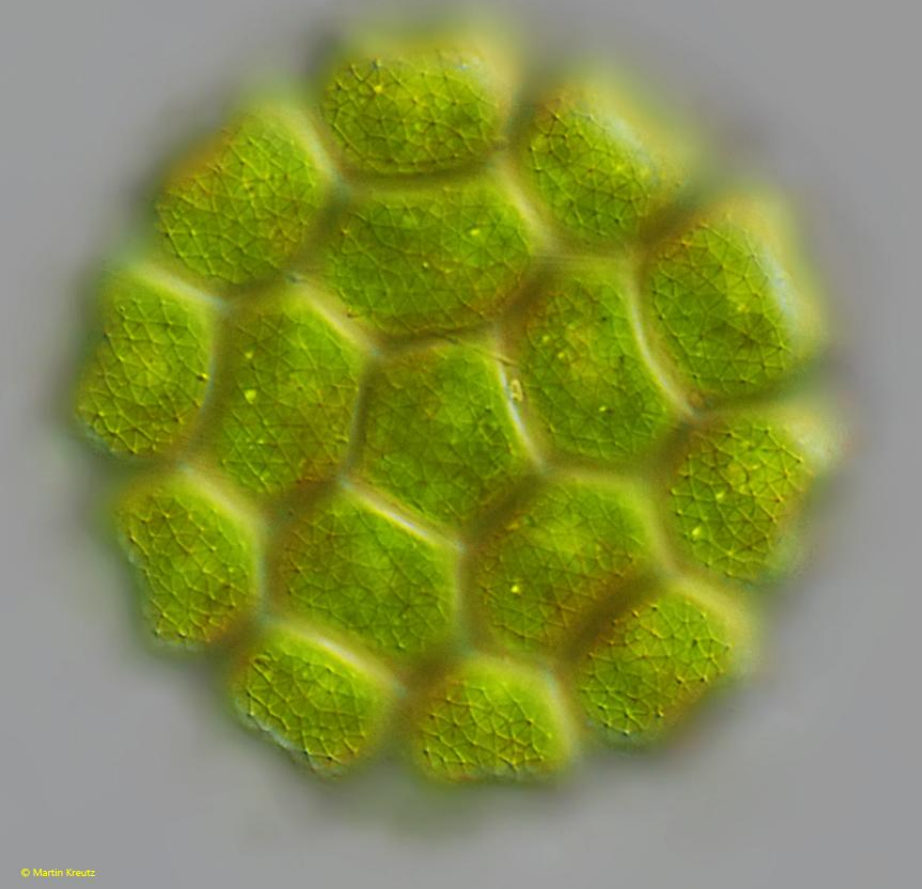
Pseudopediastrum - Two or more horn-like processes; intercellular space usually absent; cell wall granulated or reticulated

Pseudopediastrum boryanum
Obj. 100 X



© Martin Kreutz

Pseudopediastrum boryanum
Obj. 100 X

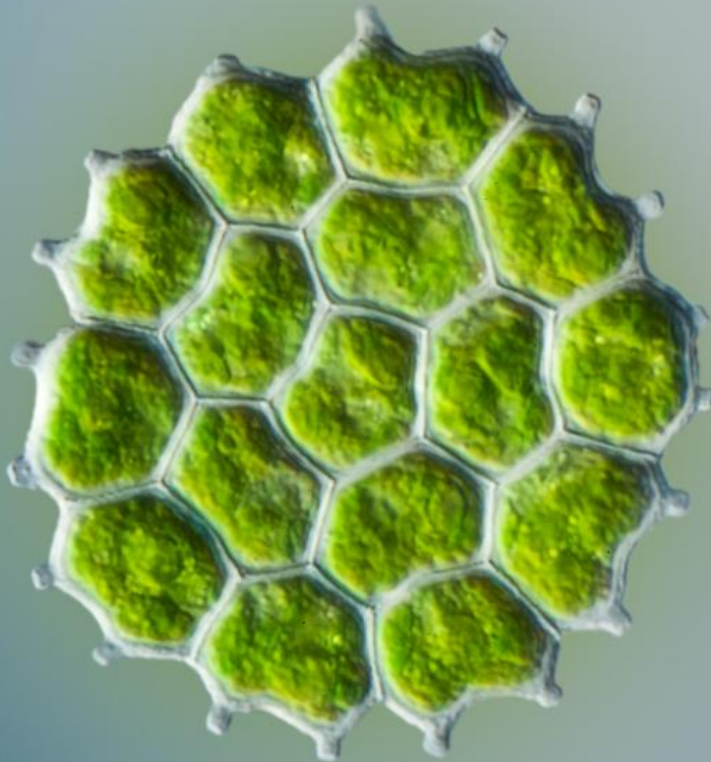


© Martin Kreutz

P. boryanum

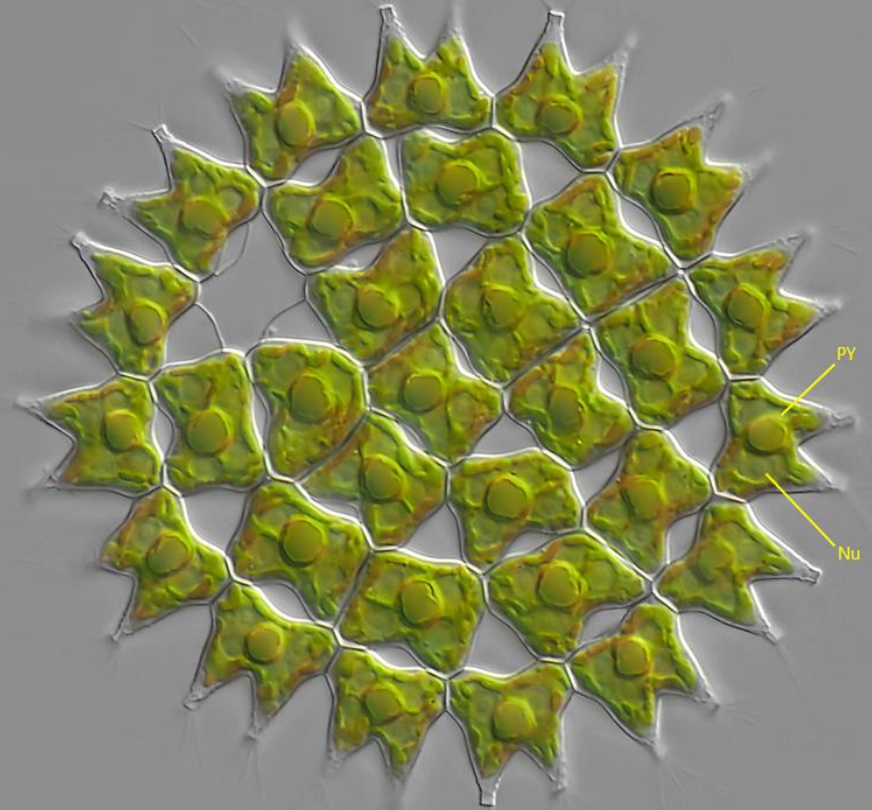
Hydrodictyaceae

Pseudopediastrum - Two or more horn-like processes; intercellular space usually absent; cell wall granulated or reticulated



P. integrum

Pseudopediastrum cornutum
Obj. 100 X

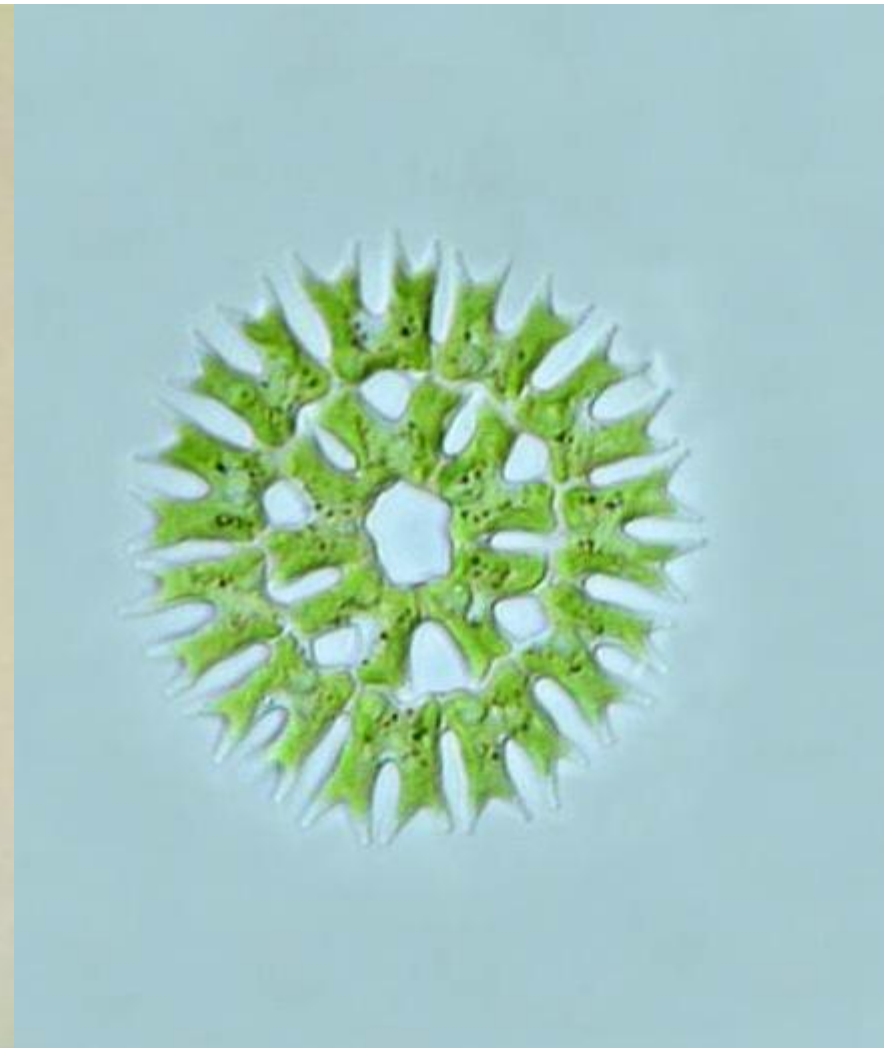
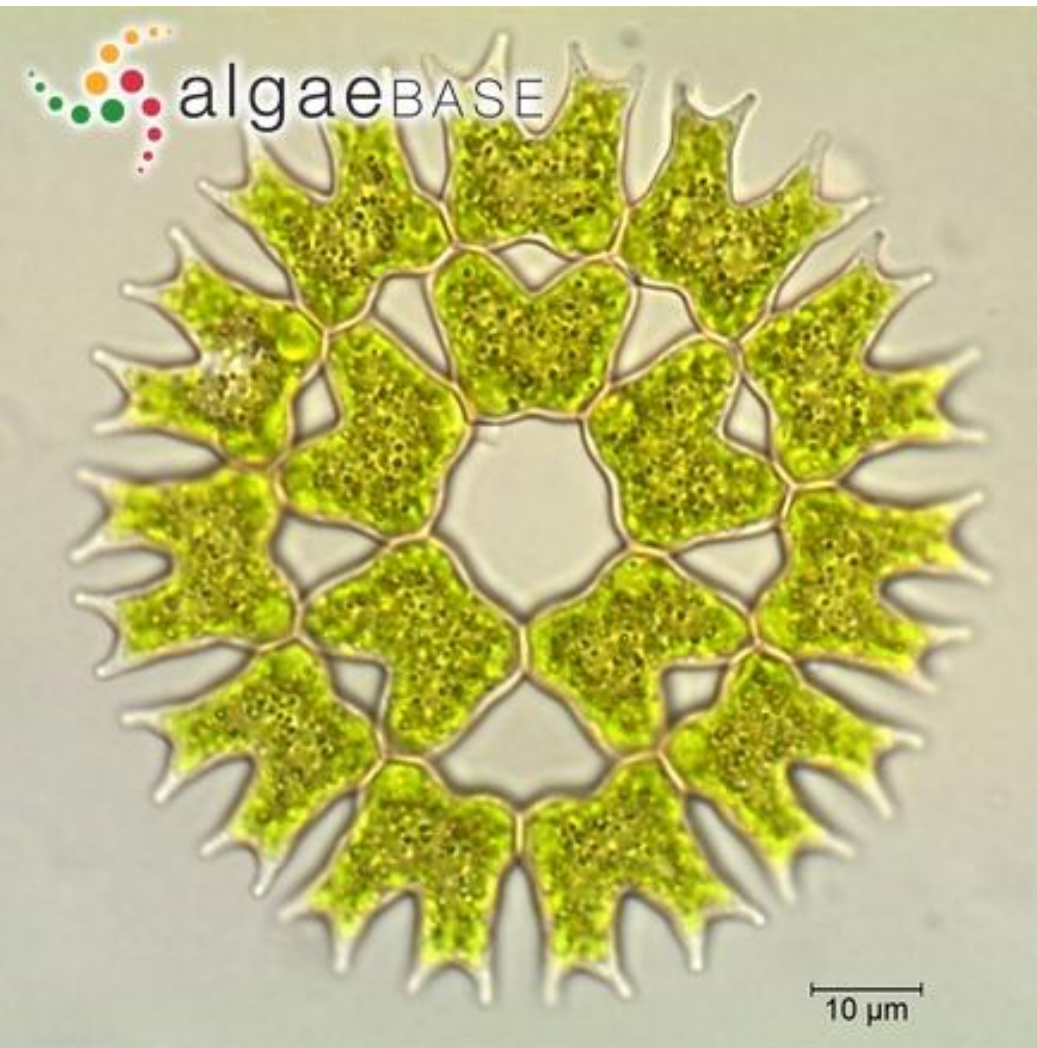


© Martin Kreutz

P. cornutum

Hydrodictyaceae

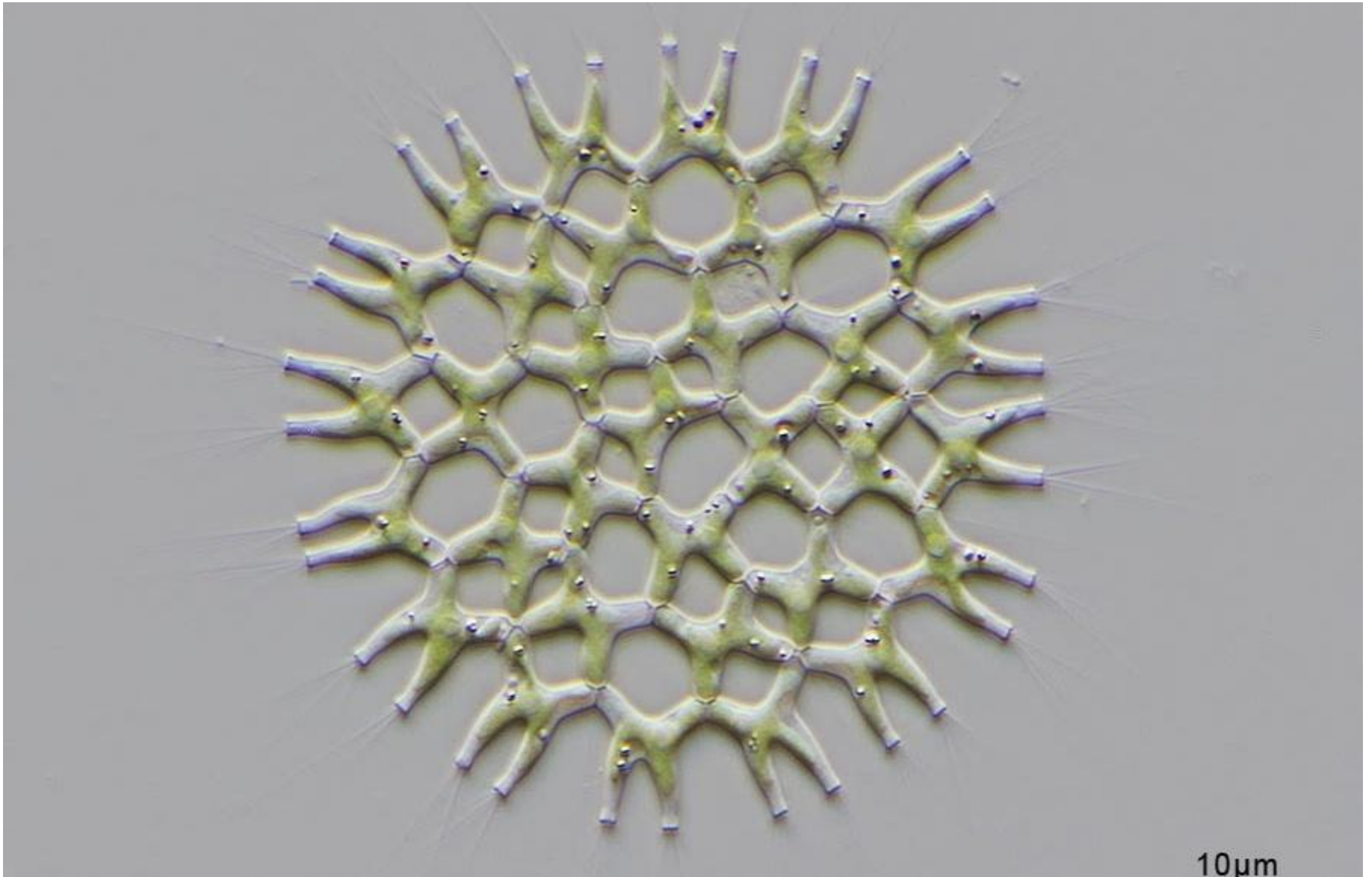
Parapediastrium - Marginal cells with two large, long, and narrow lobes each divaricated into two lesser lobes



P. biradiatum

Hydrodictyaceae

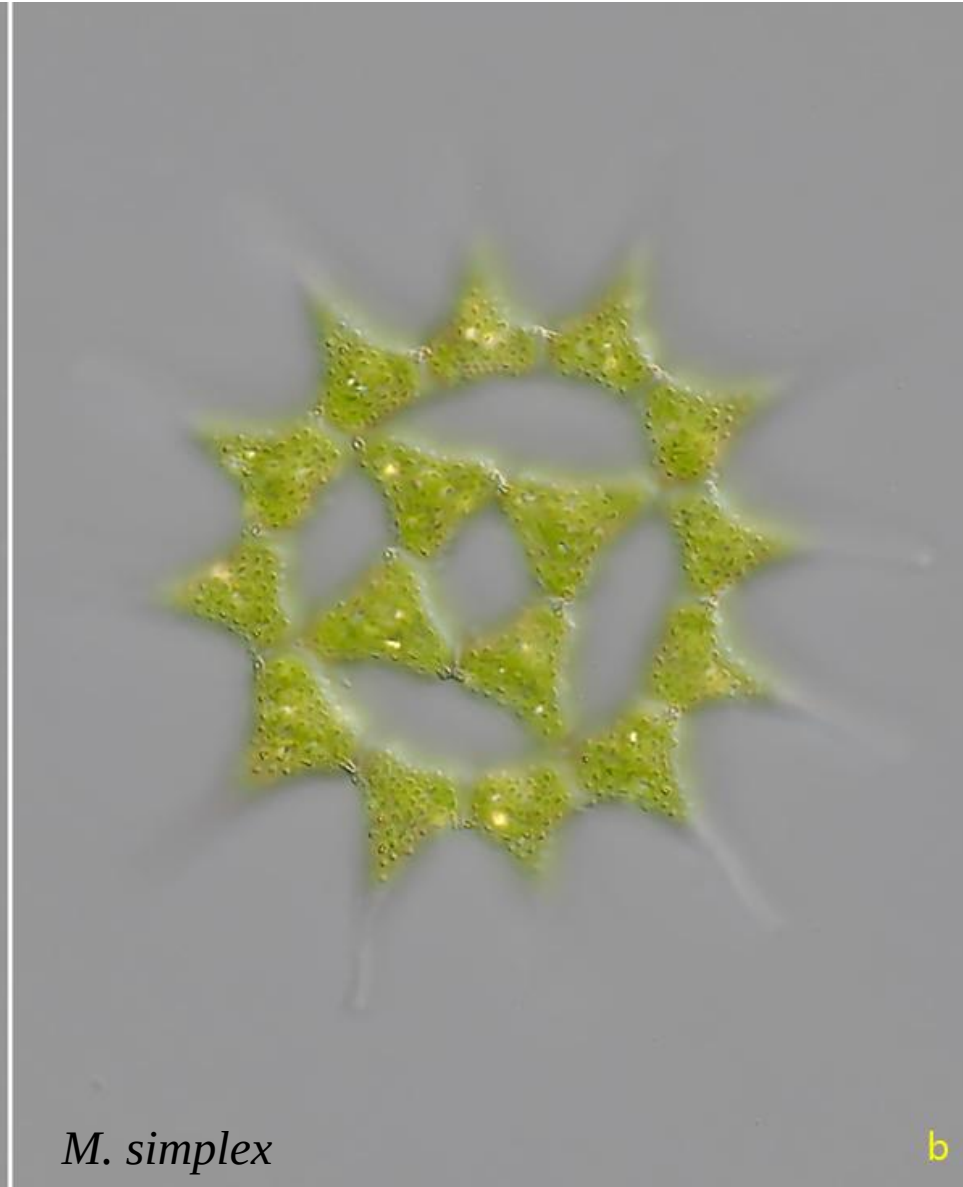
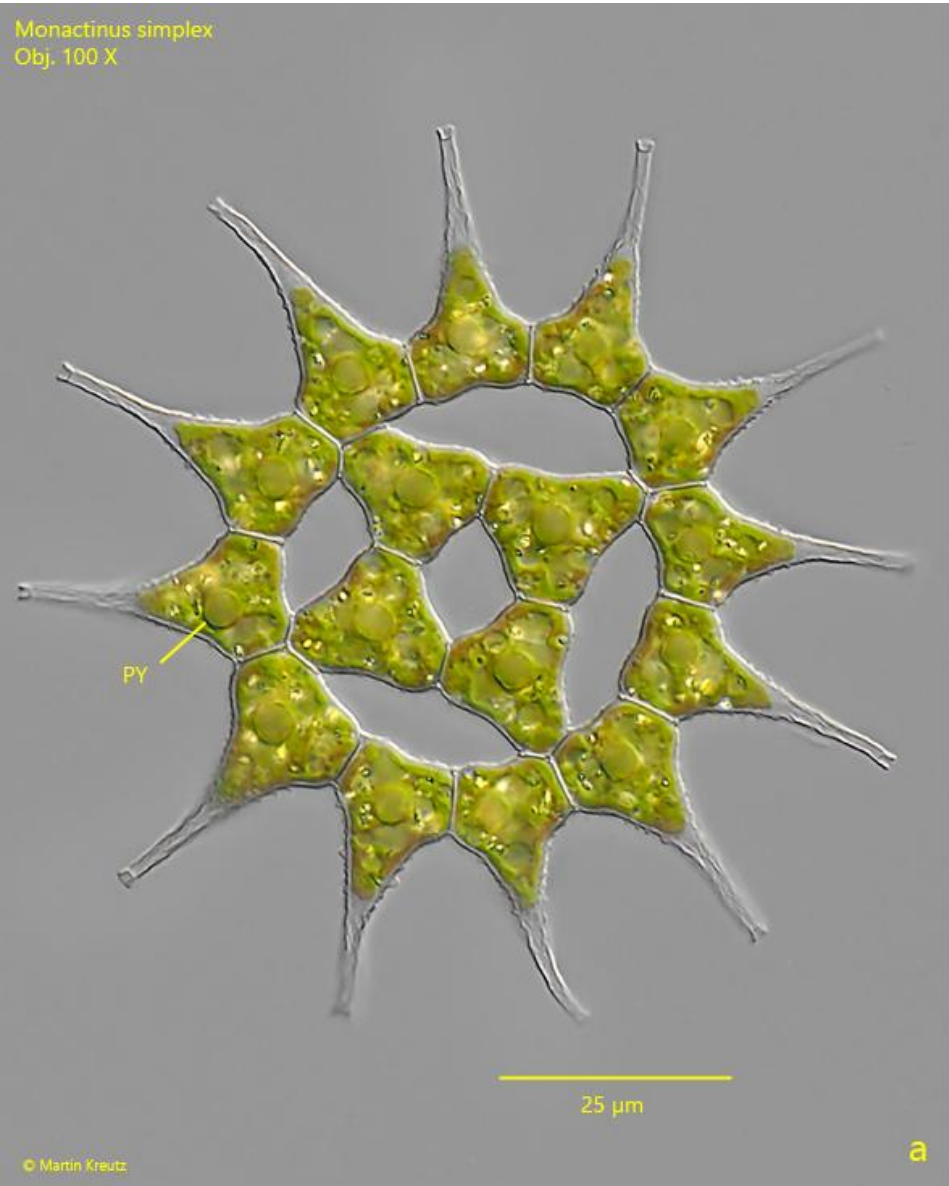
Lacunastrum - Coenobia with distinct holes with an area larger than cell surface area



L. gracillimum

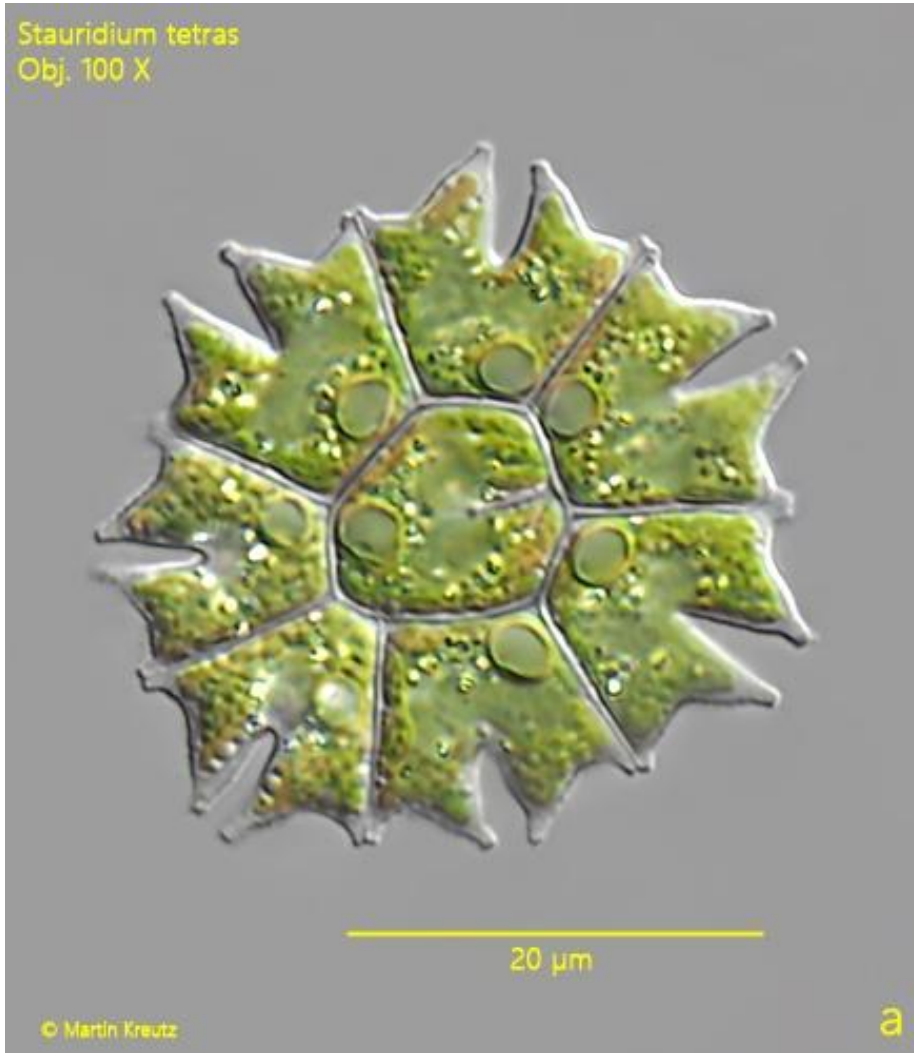
Hydrodictyaceae

Monactinus - On each marginal cell only one lobe with only one processus.



Hydrodictyaceae

Stauridium - Marginal cells without any lobes or with narrow incisions and four very short projections, without any intracellular holes



S. tetras

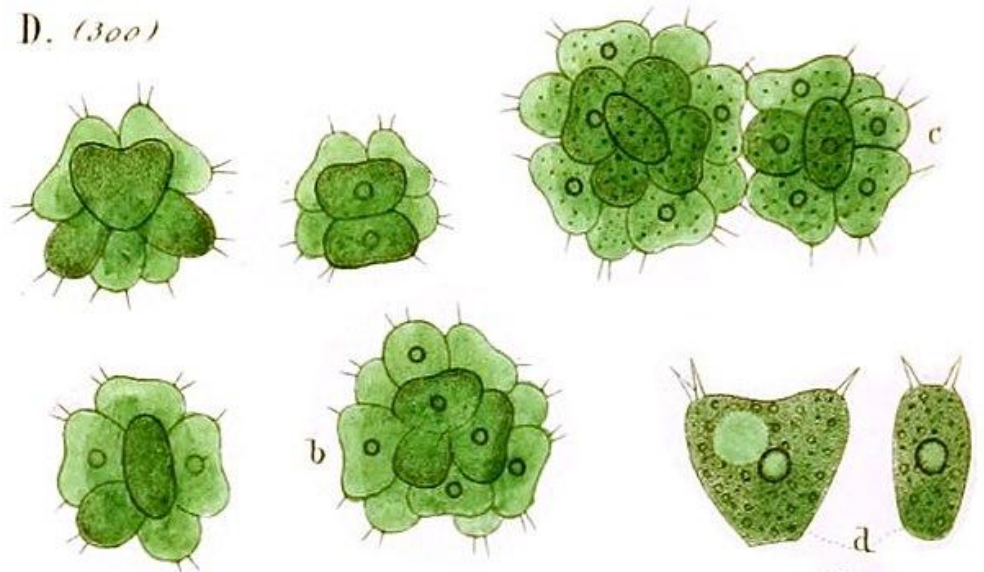
S. privum (no incisions)

Hydrodictyaceae

Sorastrum – Three-dimensional coenobia



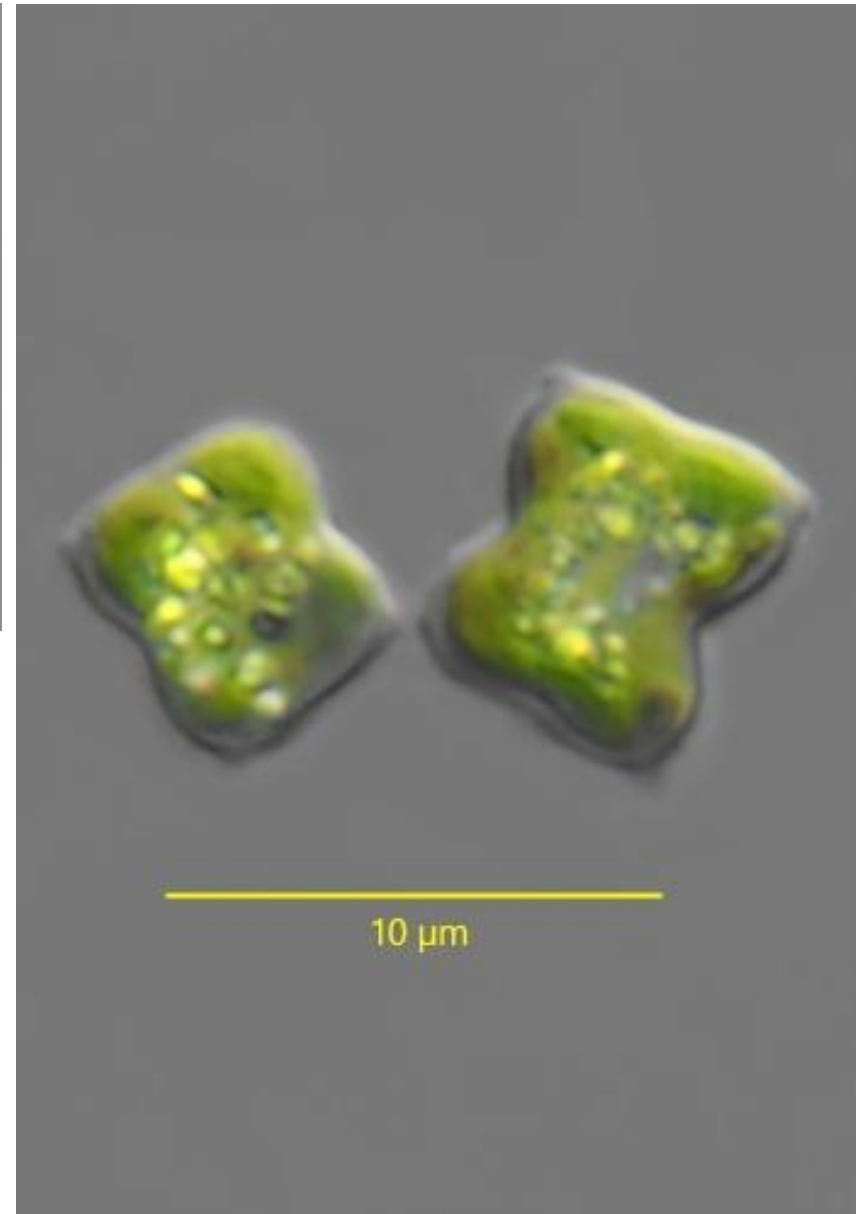
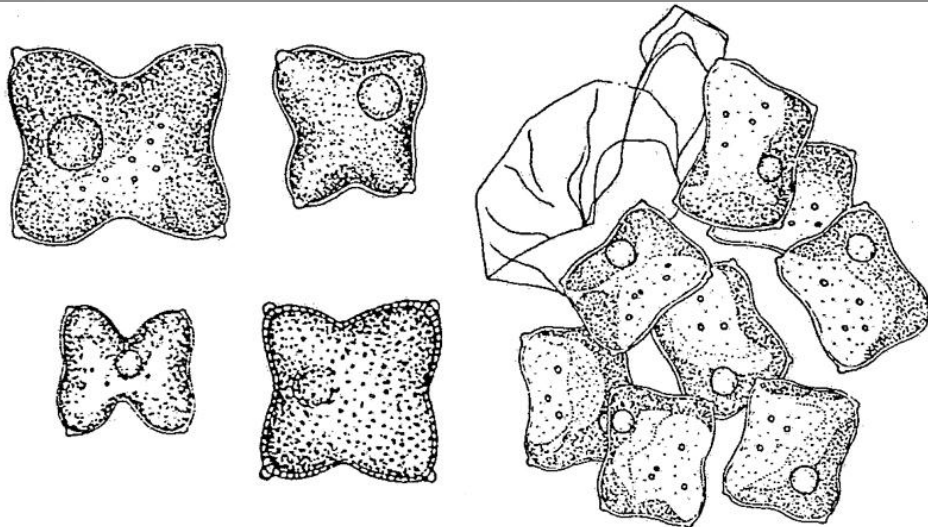
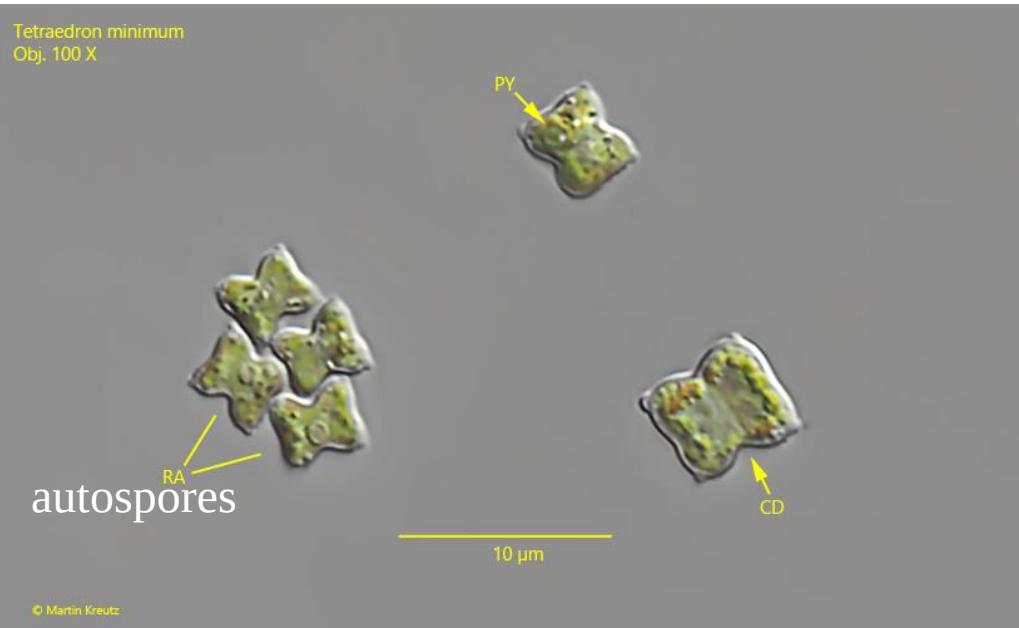
D. (300)



Sorastrum spinulosum (620)

Hydrodictyaceae

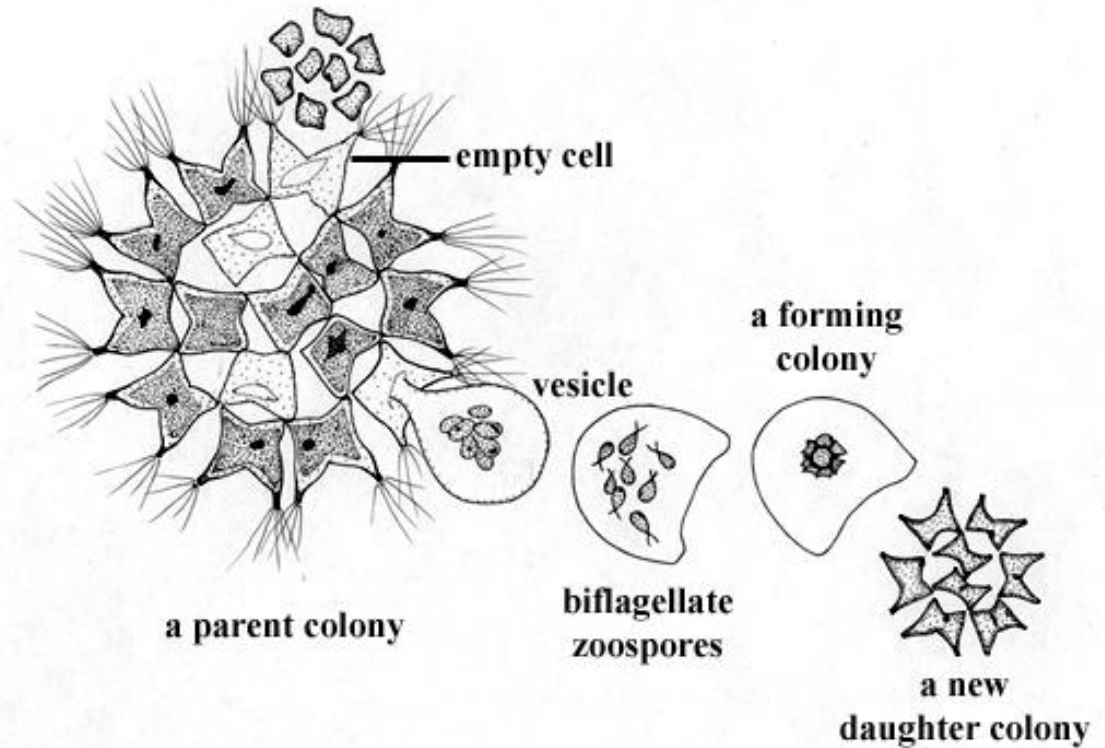
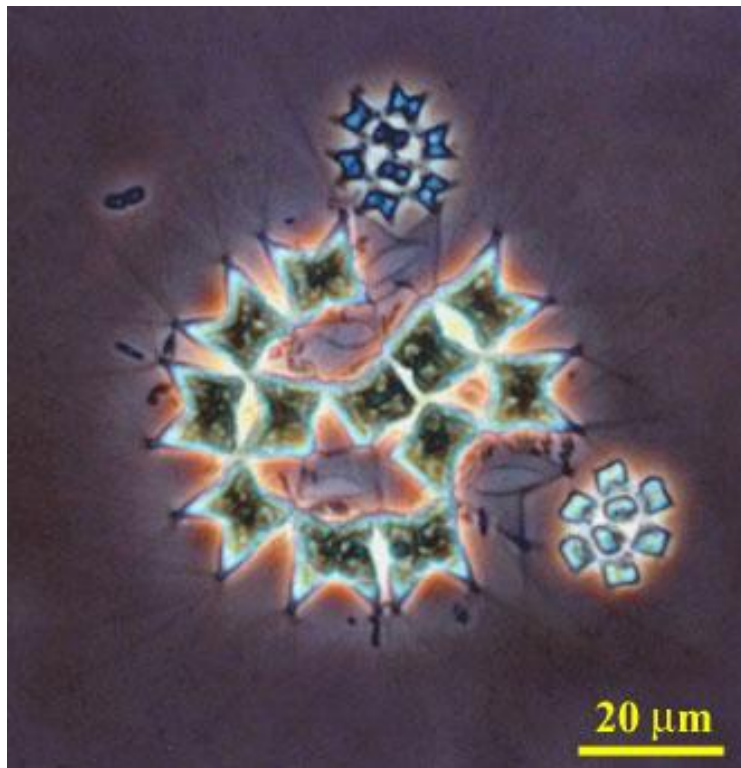
Tetraedron – Cells solitary, 3-4-5 angular, flattened, cell wall smooth or warty.



Hydrodictyaceae

Asexual reproduction

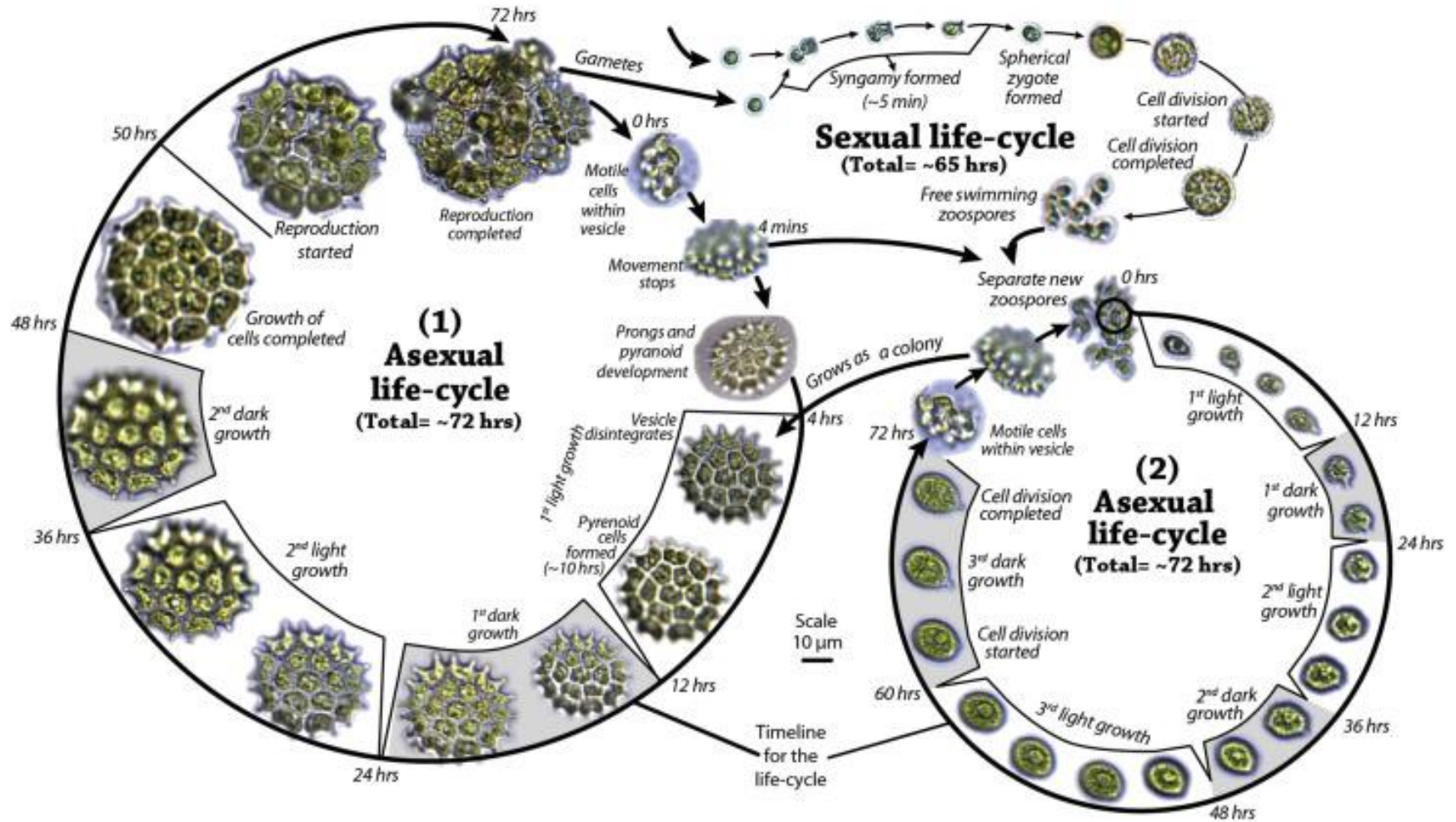
- A parent colony produces a number of biflagellate zoospores kept within a vesicle.
- A vesicle leaves the mother cell, cells organise into a new complete daughter colony.



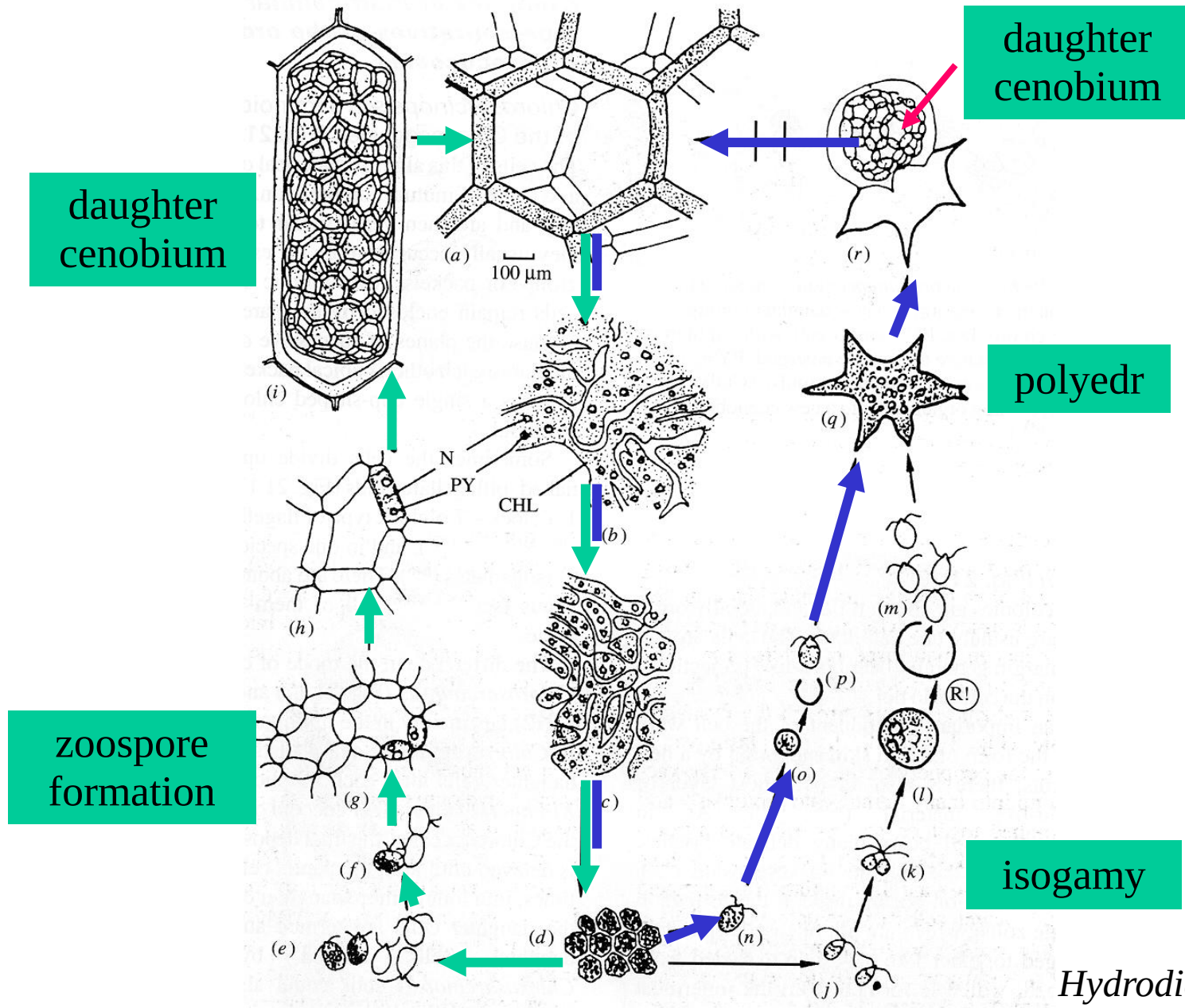
Hydrodictyaceae

Sexual reproduction

- By isogamy; after fusion forming a thick-walled hypnozygote



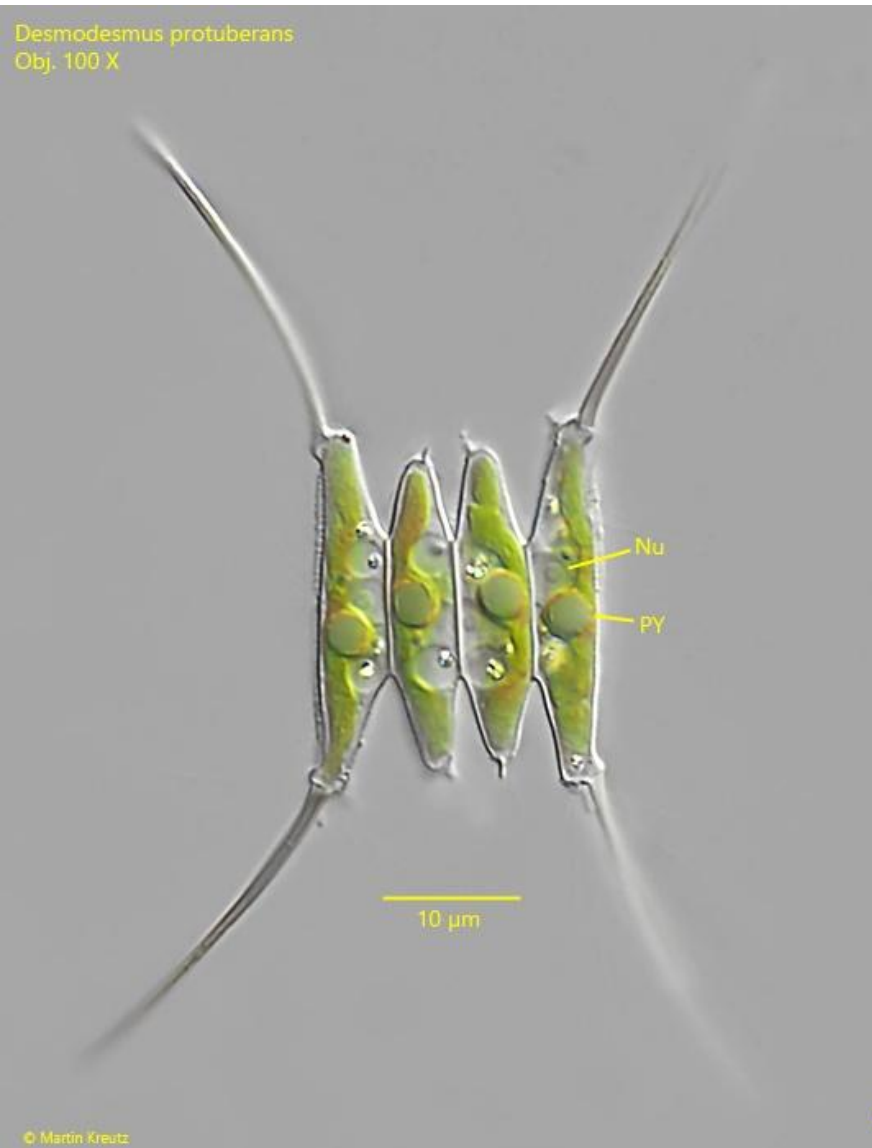
Hydrodictyaceae



Scenedesmaceae

- The largest family, including solitary or coenobial genera; cells usually spherical, linearly, alternating, or arranged in 2-3 rows.

Desmodesmus protuberans
Obj. 100 X



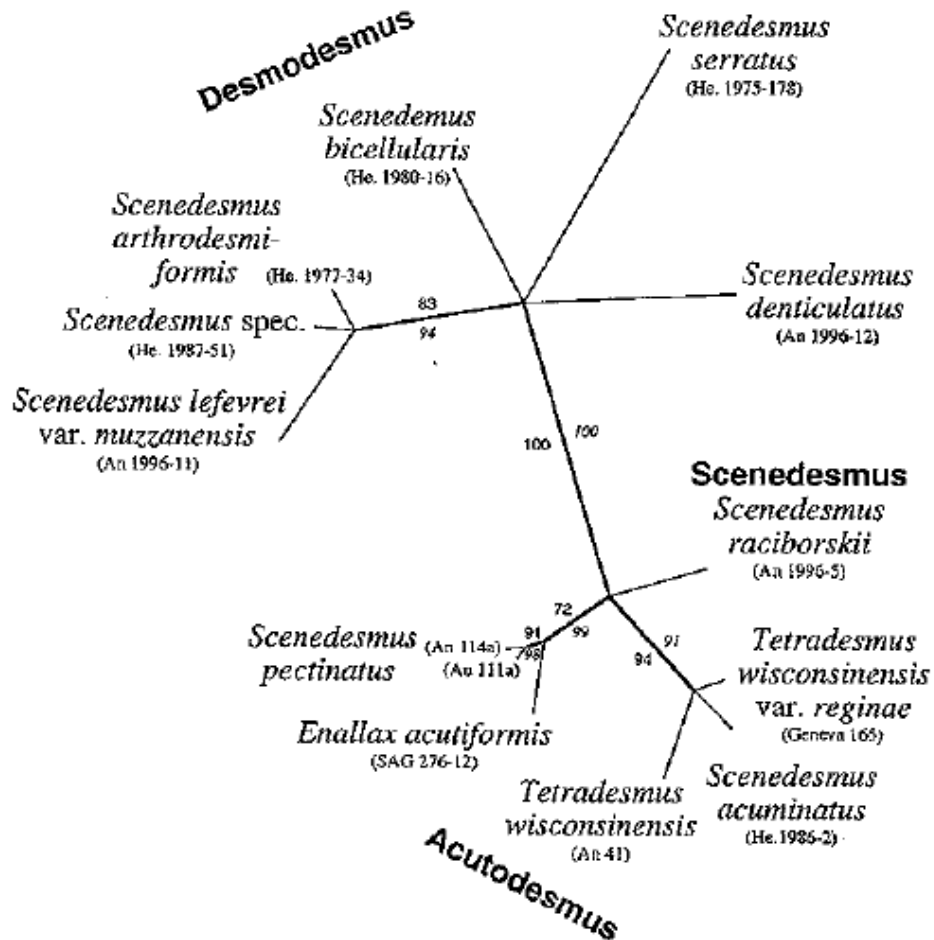
Scenedesmaceae

- ***Scenedesmus***: more than 450 taxa described so far. The genus was split to several narrowly defined genera.



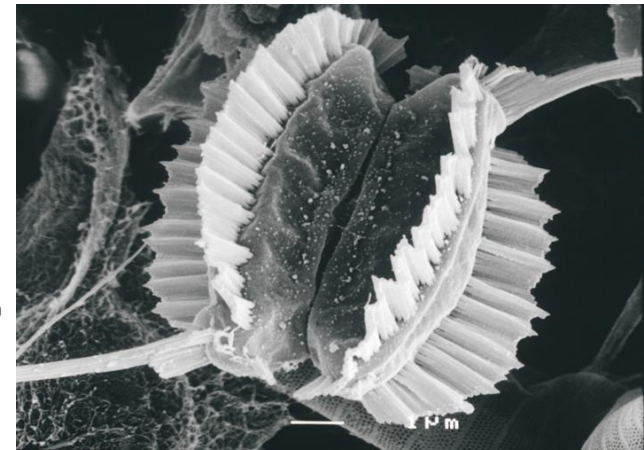
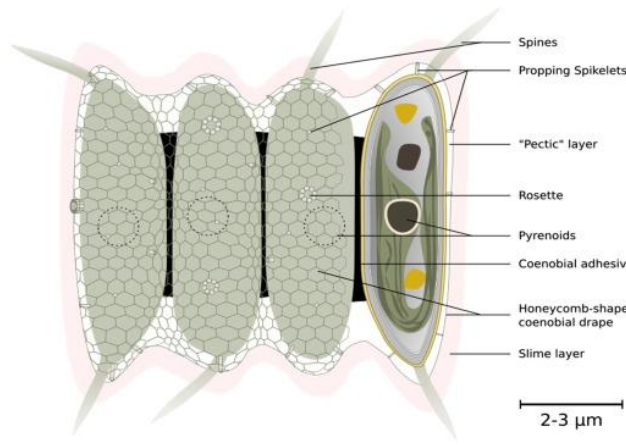
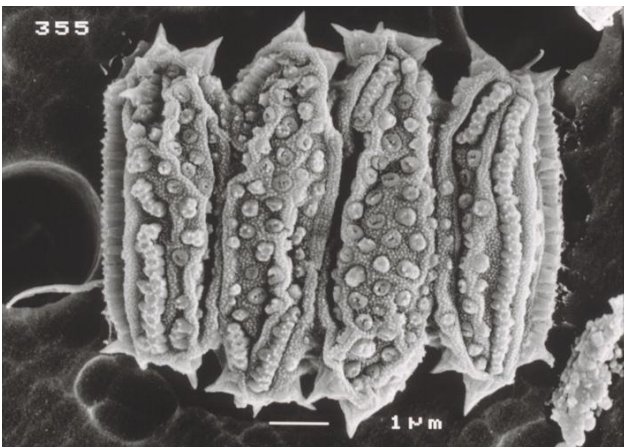
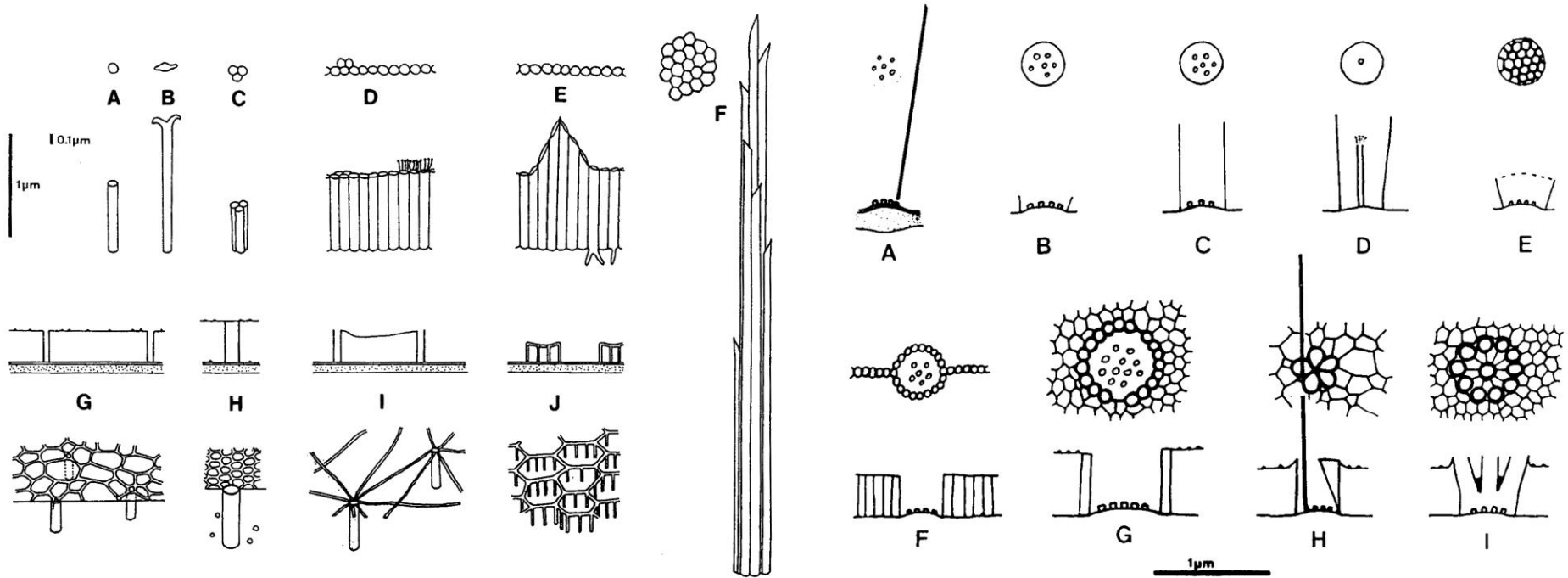
Scenedesmaceae

- **Scenedesmus** – cell wall smooth, without spines
- **Desmodesmus** – cell wall granulated, with spines and ribs



Scenedesmaceae

Desmodesmus – Cell wall ornamented, under EM exhibiting ultrastructures of the outer algal cell wall layer.



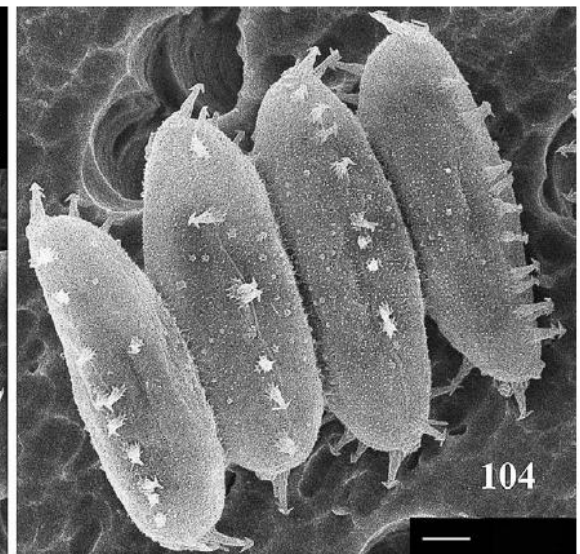
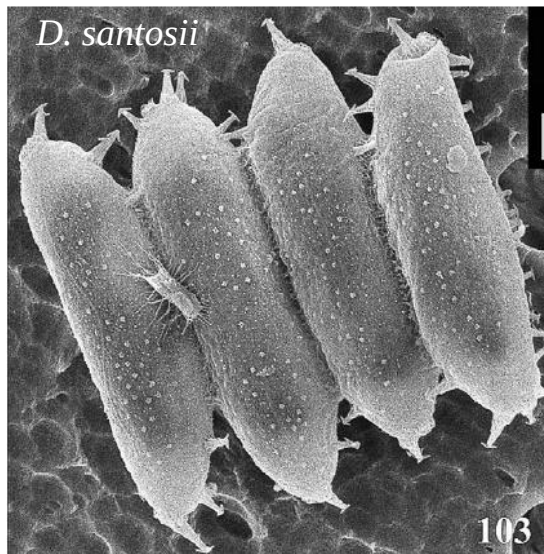
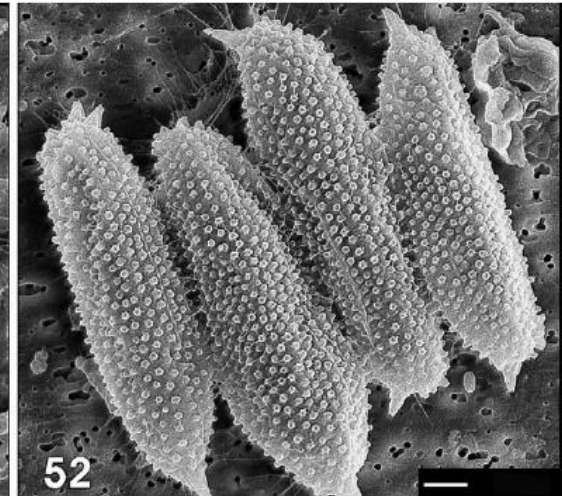
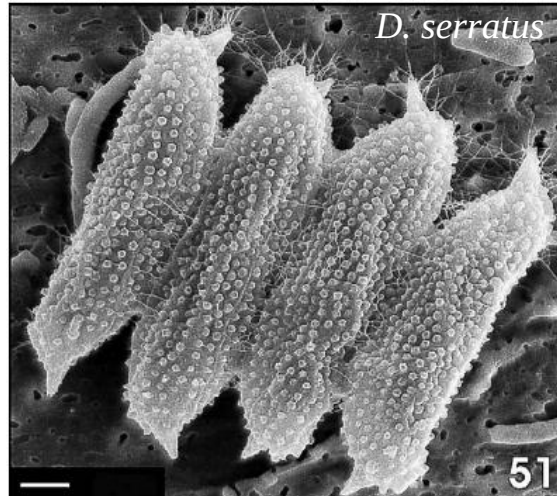
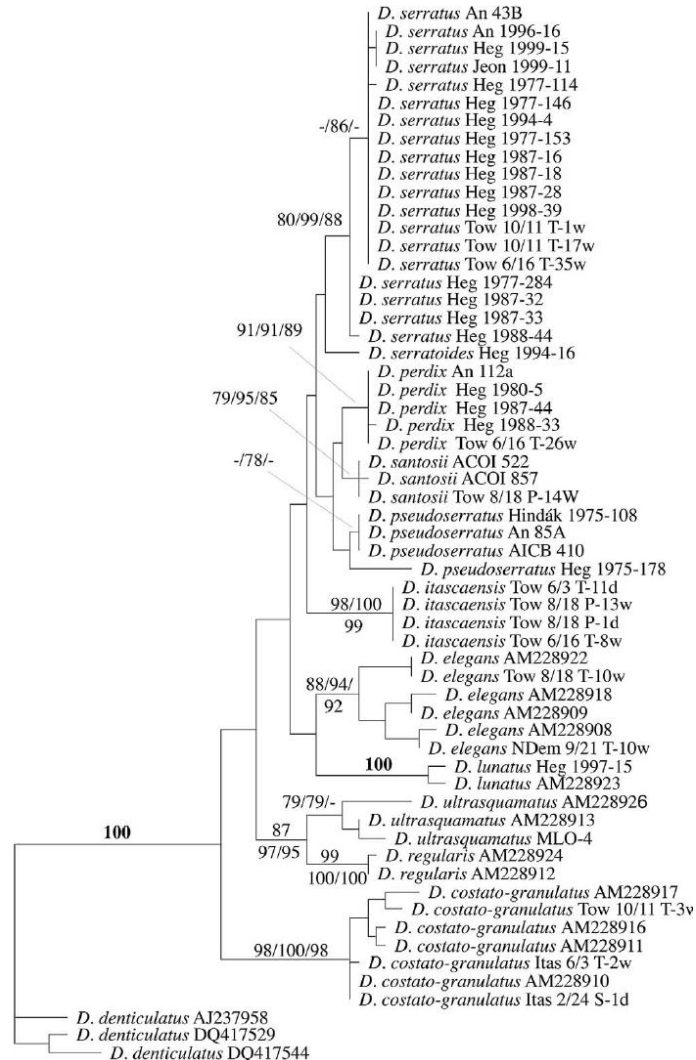
Scenedesmaceae

Desmodesmus – Cell wall ornamented, under EM exhibiting ultrastructures of the outer algenan cell wall layer.



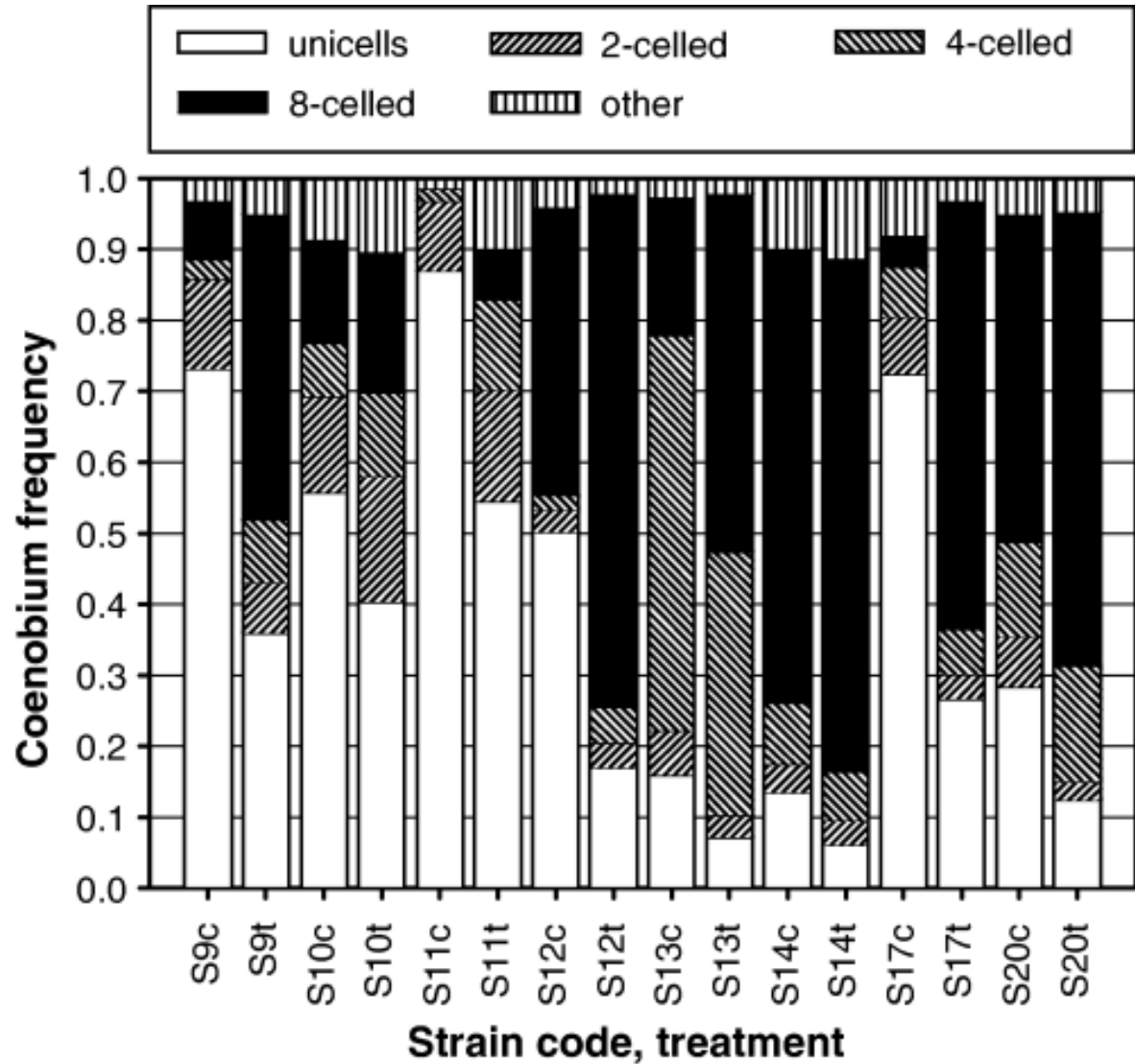
Scenedesmaceae

Desmodesmus – High cryptic diversity within morphologically-defined genera.



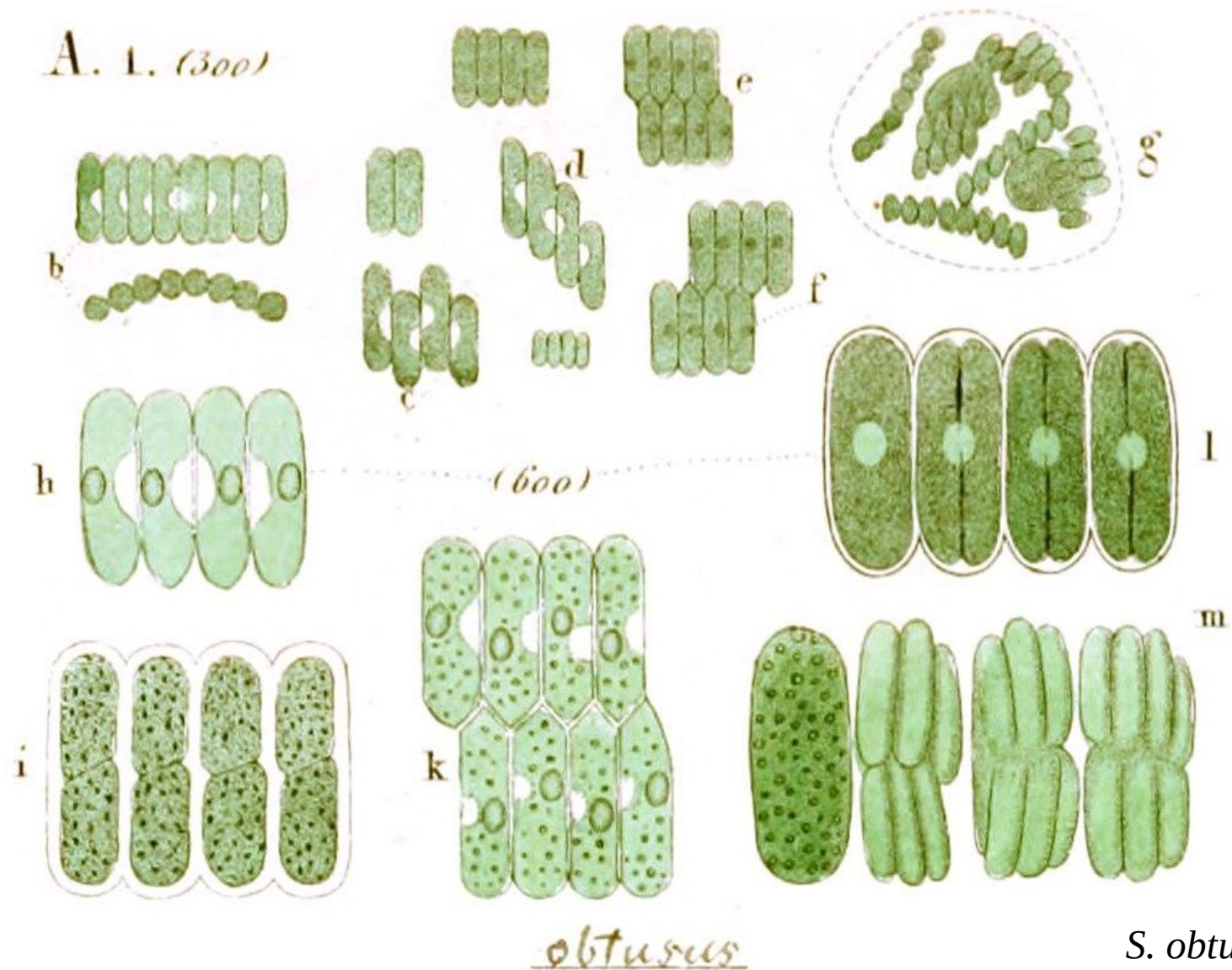
Scenedesmaceae

Desmodesmus – High phenotypic plasticity (grazing-induced)



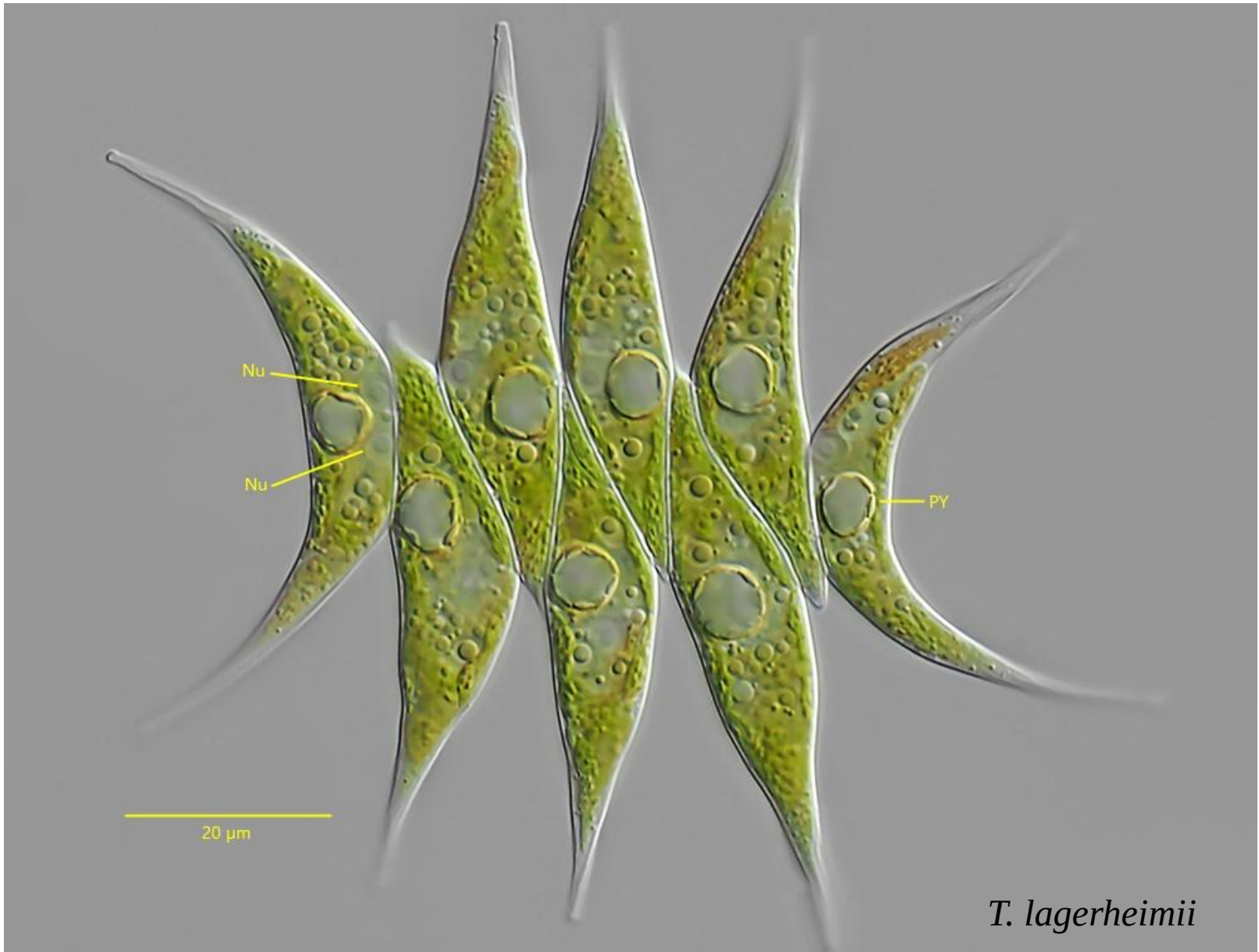
Scenedesmaceae

Scenedesmus – Cell wall smooth, cells without spines.



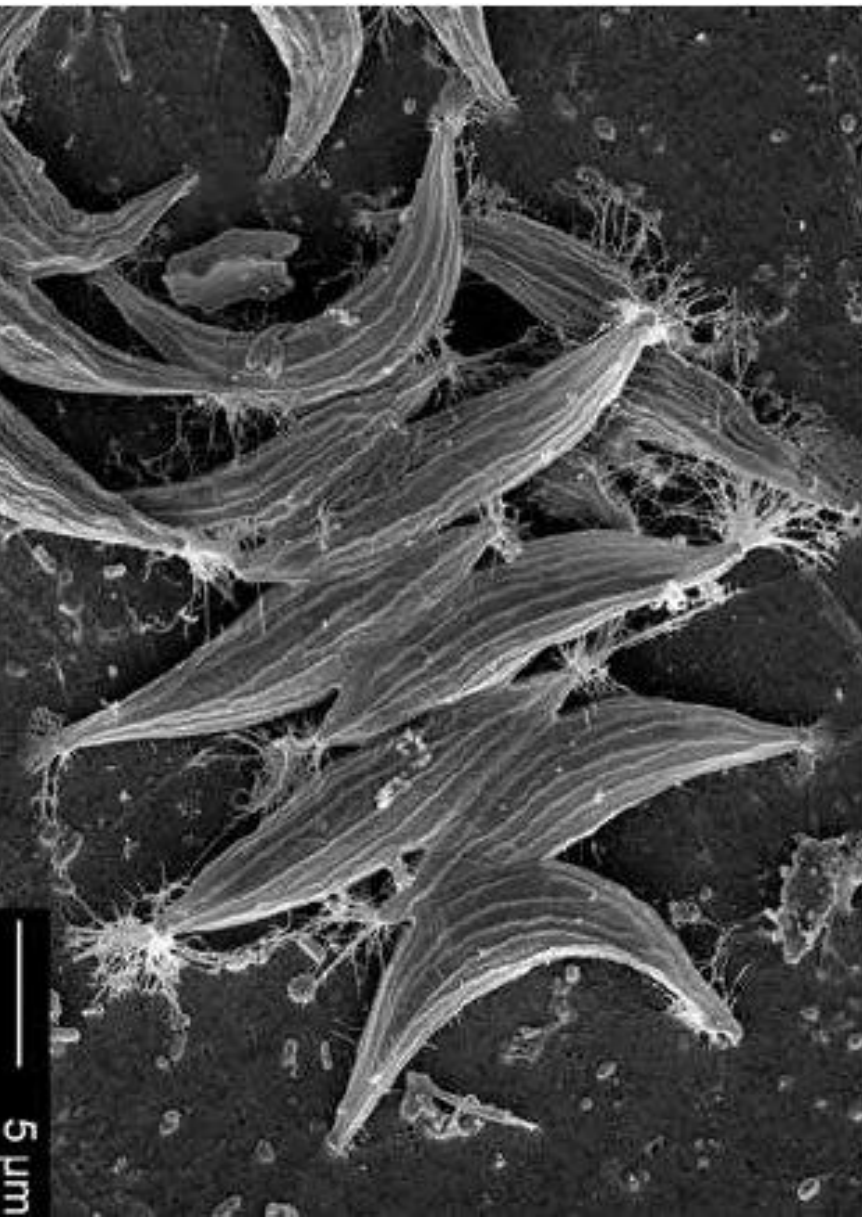
Scenedesmaceae

Tetradesmus – Cells spindle-like, with pointed ends



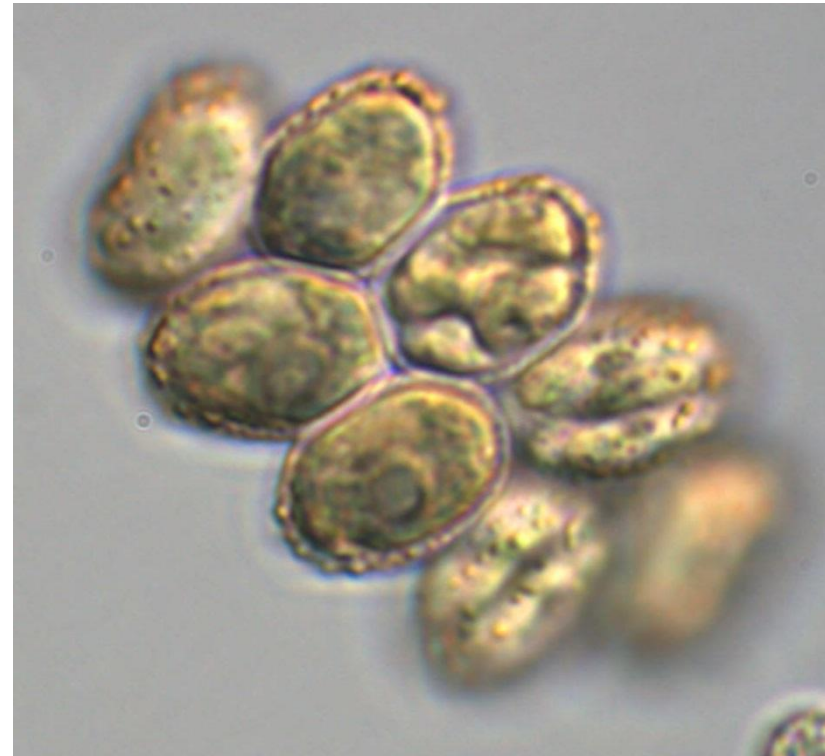
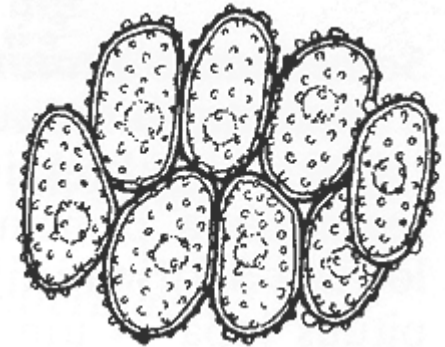
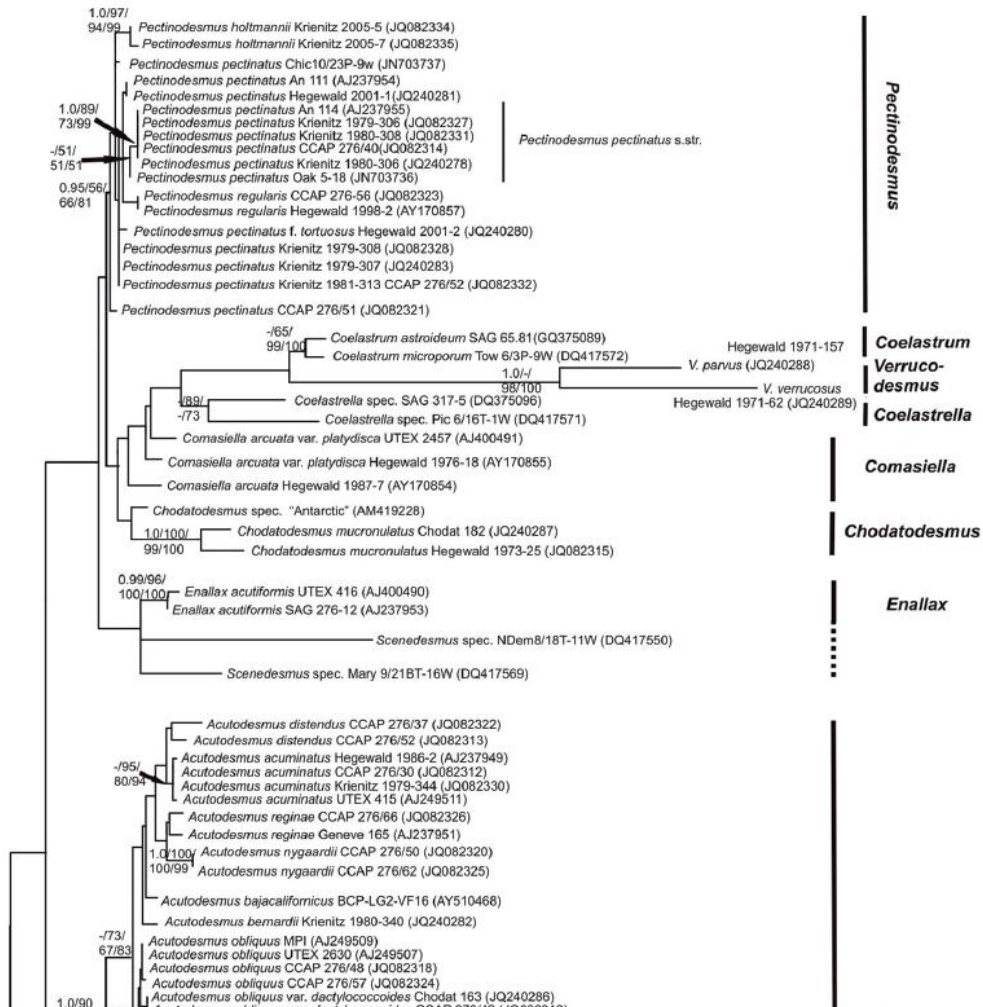
Scenedesmaceae

Pectinodesmus – Cells spindle-like, with pointed ends, cell wall with rows



Scenedesmaceae

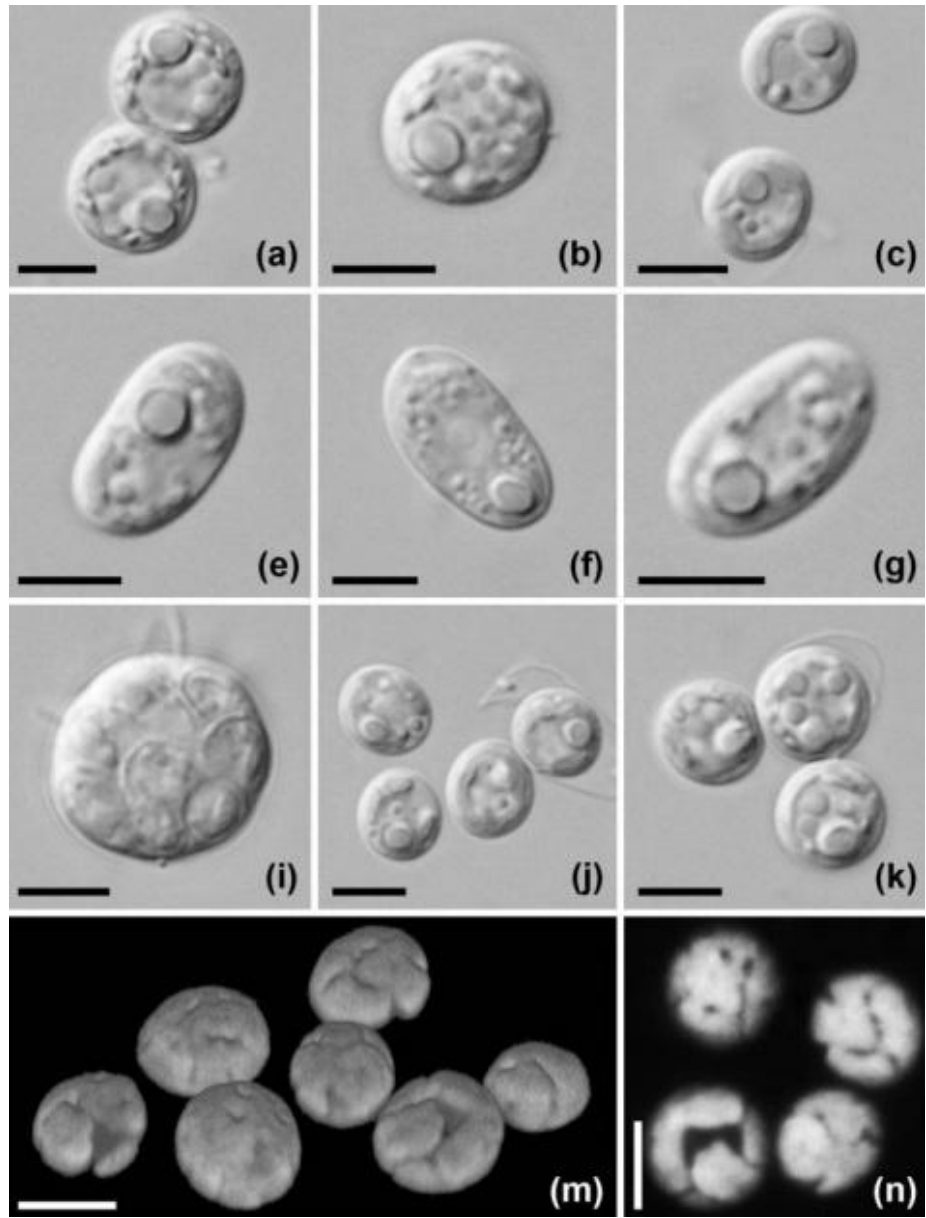
- **Verrucodesmus** – granulated cell wall



Scenedesmaceae

Unicellular genera: planktonic and aerophytic algae

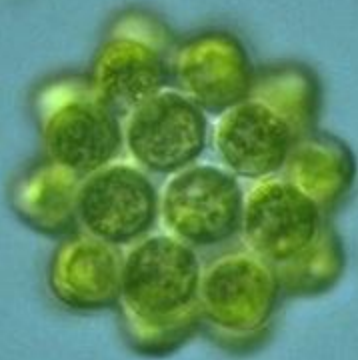
Hylodesmus



Scenedesmaceae

- ***Coelastrum*** – cells in spherical coenobia, densely aligned, often connected by strands

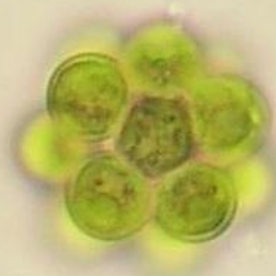
C. astroideum



C. proboscideum



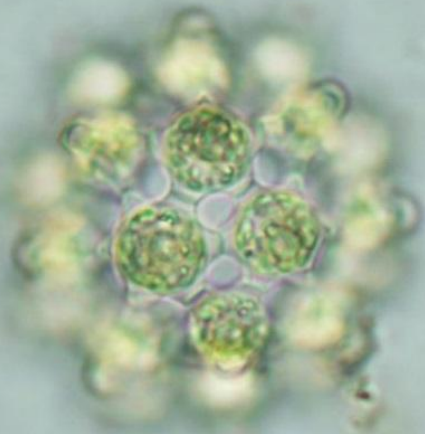
C. microporum



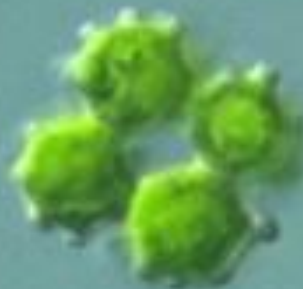
SINICE
& RASY.cz

20 µm

C. pulchrum



C. morus

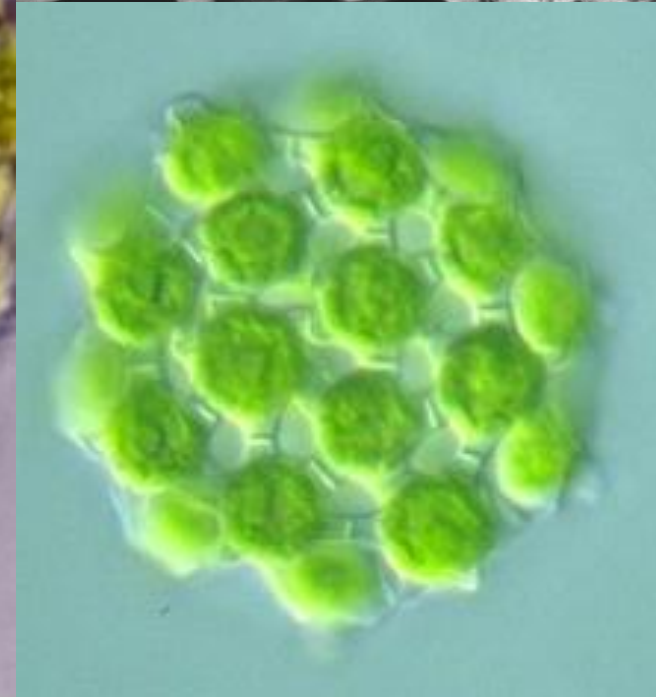
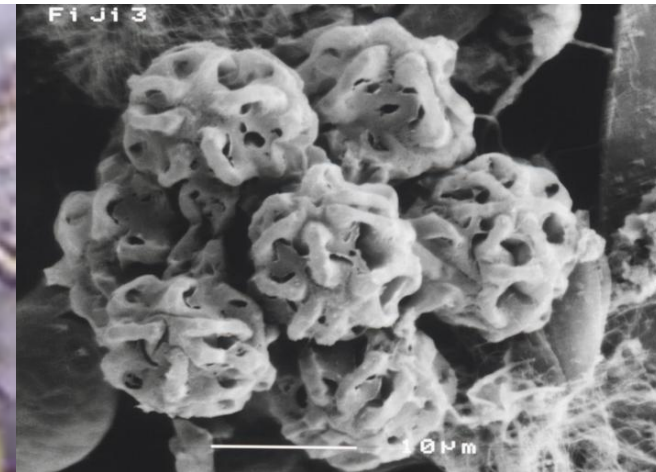


C. pseudomicroporum



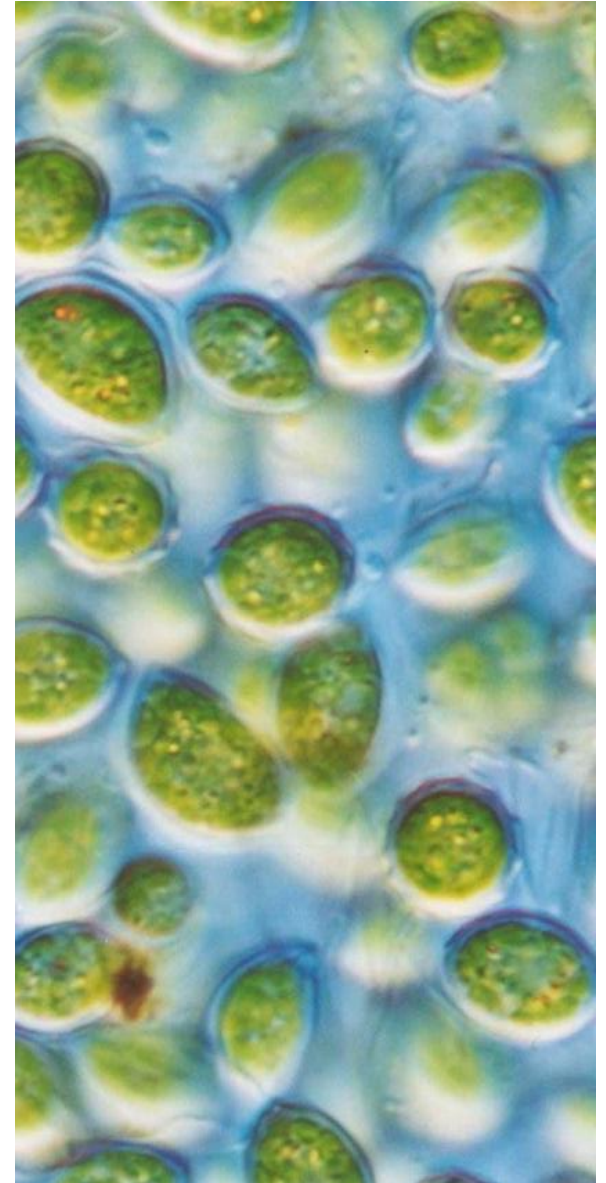
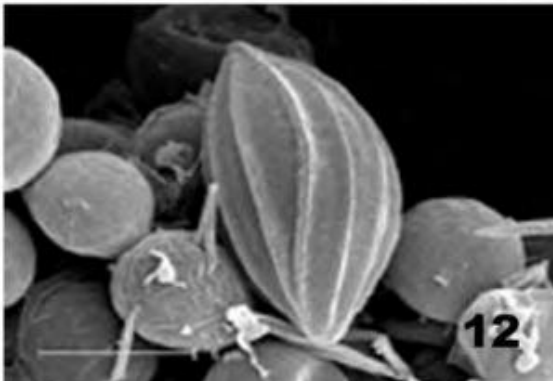
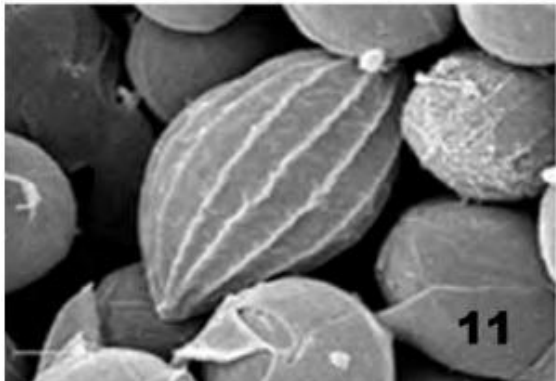
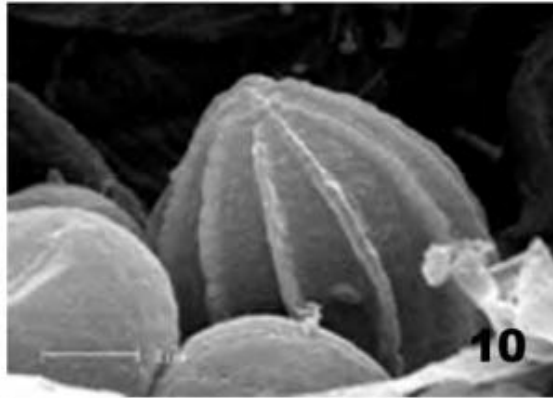
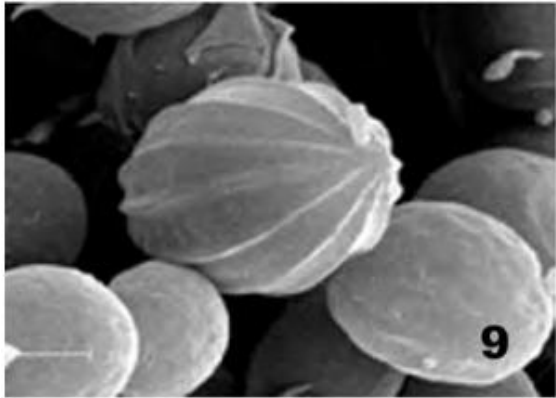
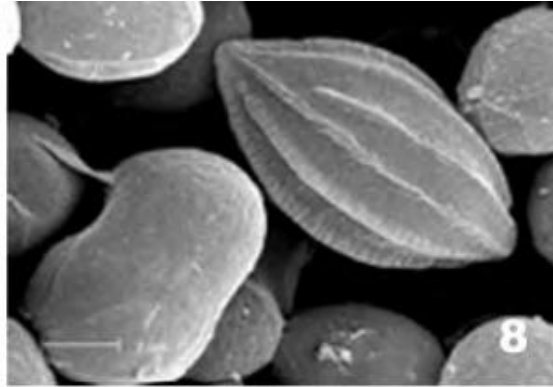
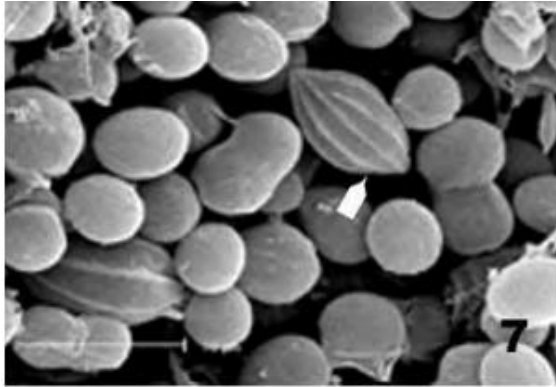
Scenedesmaceae

- *Hariotina* – cells connected by net-like connecting strands



Scenedesmaceae

- *Coelastrella* – cells with longitudinal strips or ribs visible under LM



Scenedesmaceae

Ennalax – Cells with longitudinal strips or ribs visible under LM, „coenobial Coelastrella“



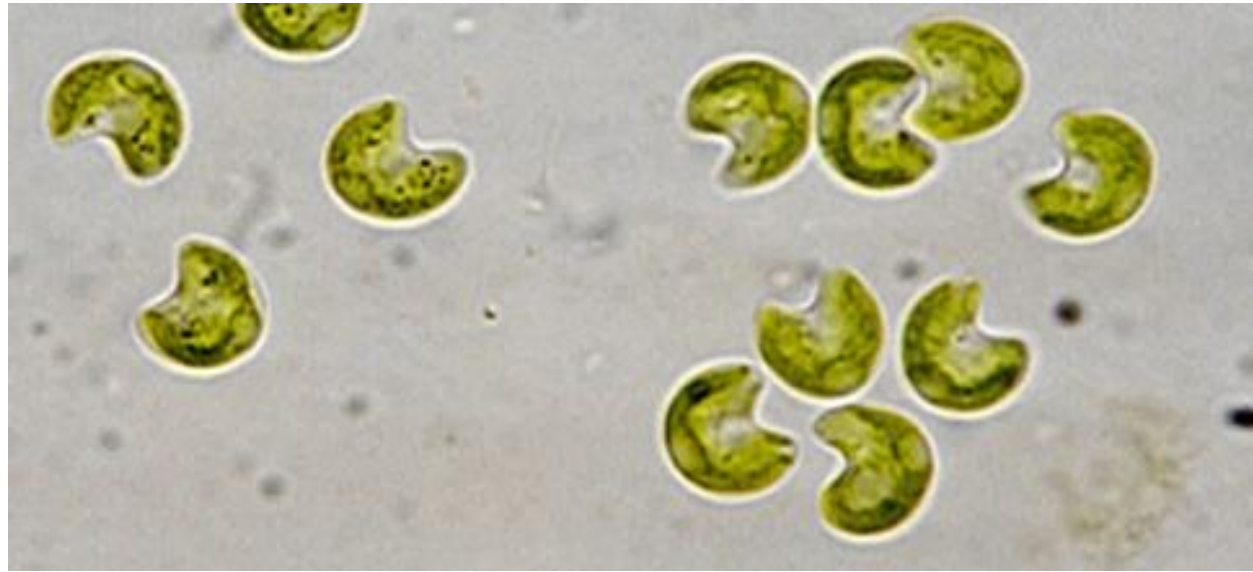
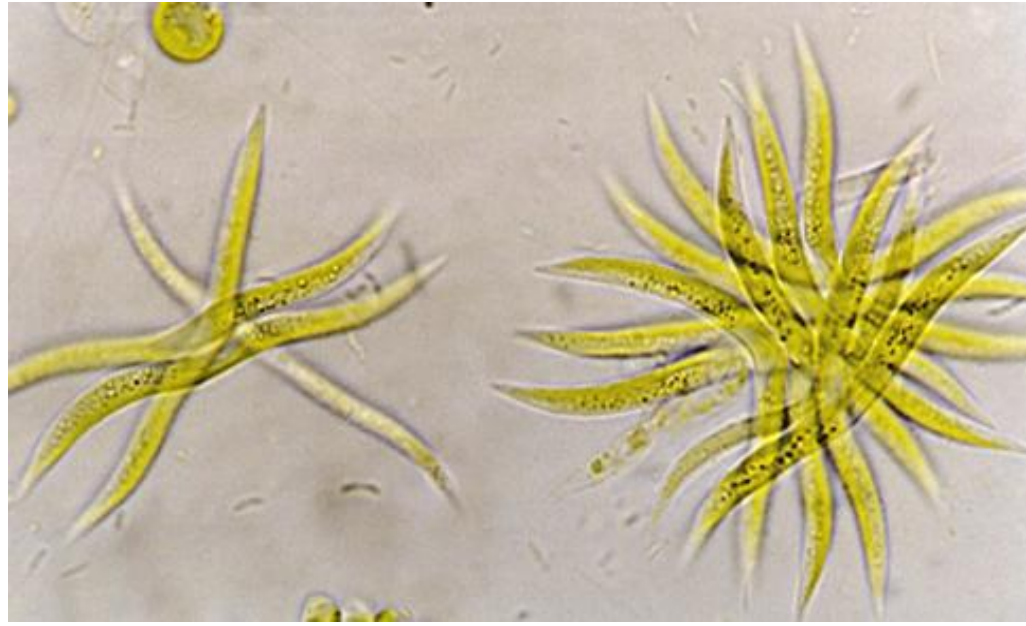
Scenedesmaceae

Dimorphococcus – Cells heart or kidney-like shaped, arranged in 4 pairs which are connected by remnants of the mother cell wall



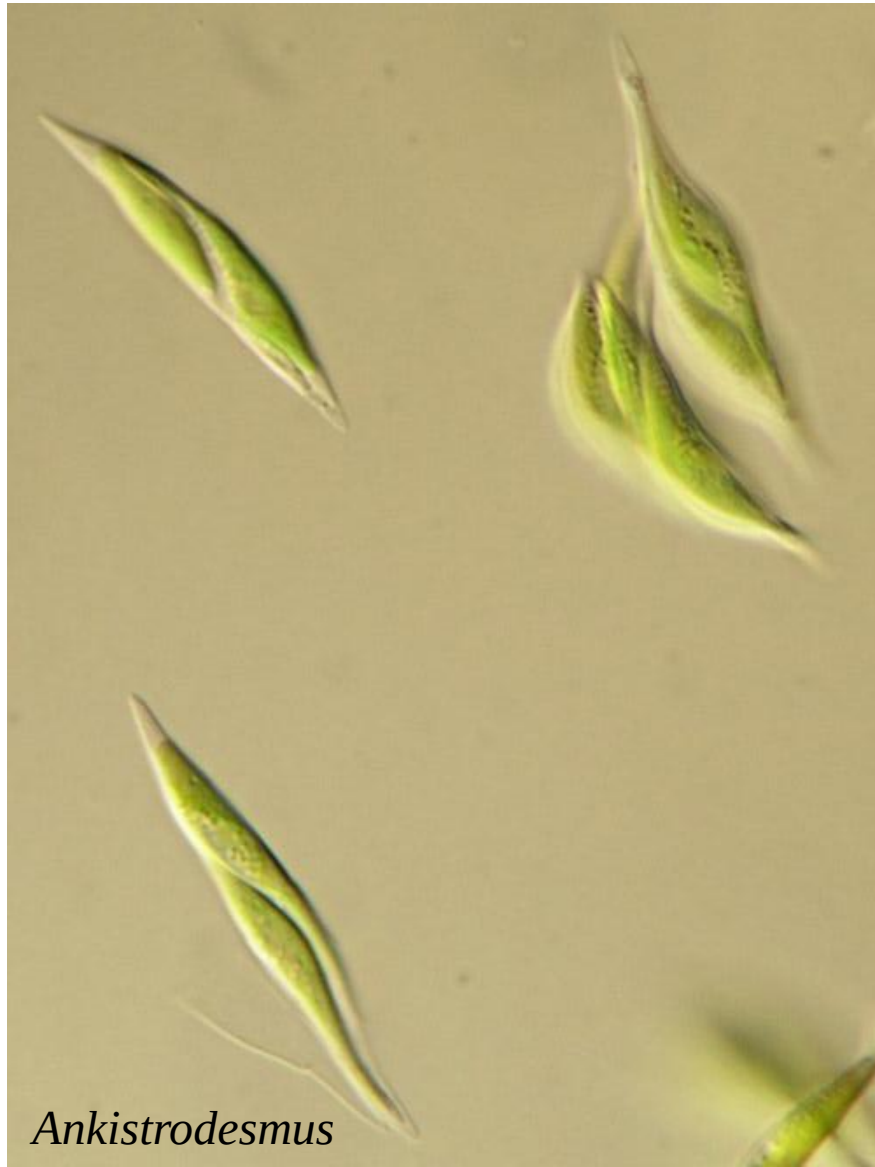
Selenastraceae

Cells solitary or in colonies, with diverse cell shape (elongated, crescent-like, ...).



Selenastraceae

Ankistrodesmus*, *Monoraphidium – Cells needle-shaped, lunate to sigmoid, usually colobial; species of both genera are intermixed



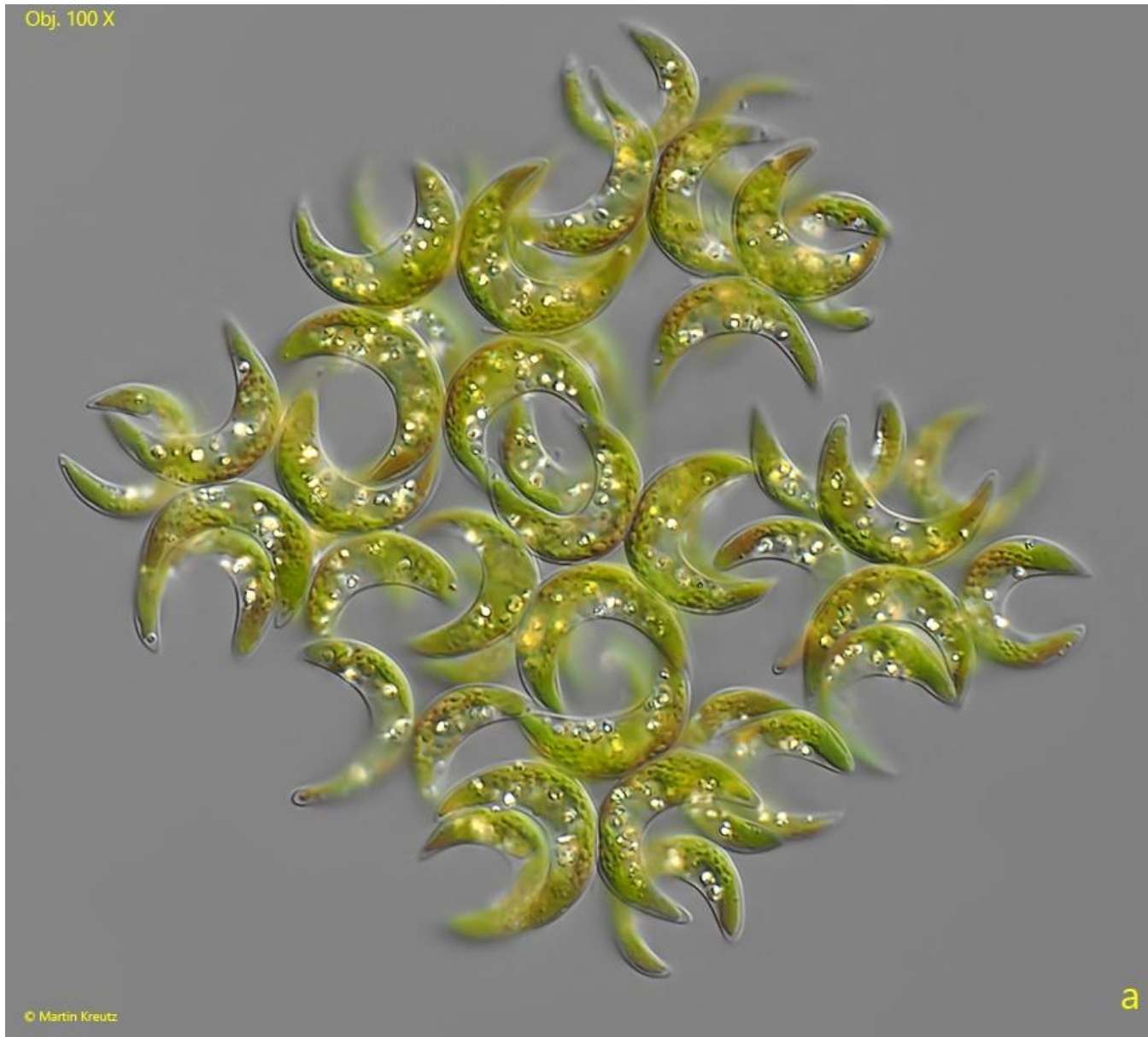
Ankistrodesmus



Monoraphidium

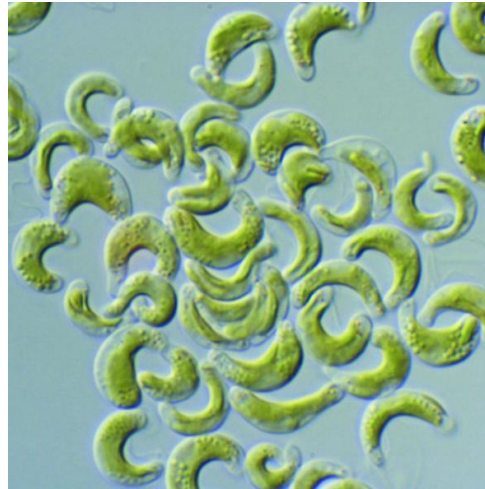
Selenastraceae

Selenastrum – Cells lunate, arranged in colonies and attached by dorsal sides



Selenastraceae

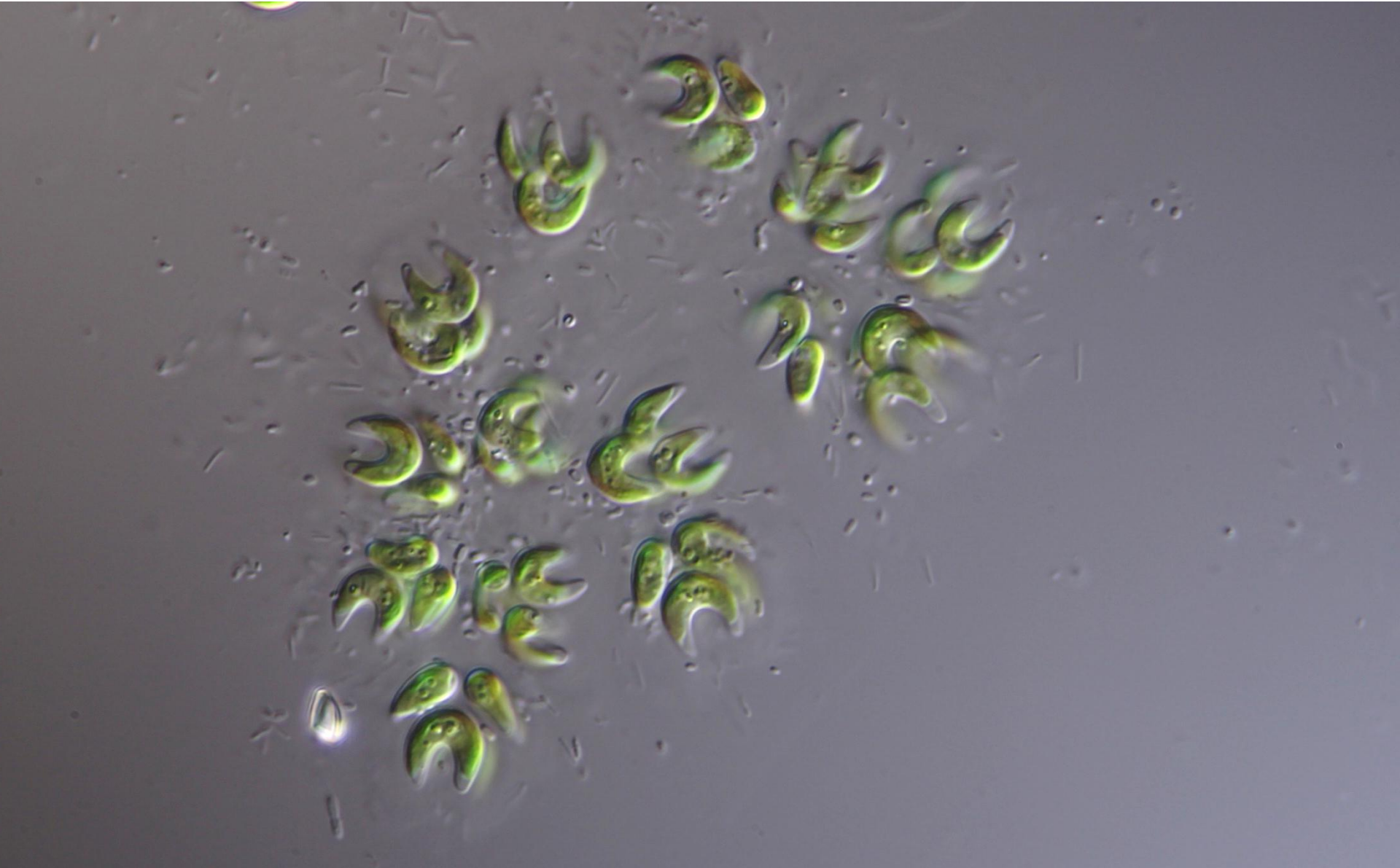
Selenastrum capricornutum – Monitoring the inhibitory and stimulatory effect of various substances (e.g. monitoring chronic toxicity of wastewater, effect of herbicides on primary producers)



Obr. 1 – Schéma dávkování roztoků do jamek mikrotitrační destičky

Selenastraceae

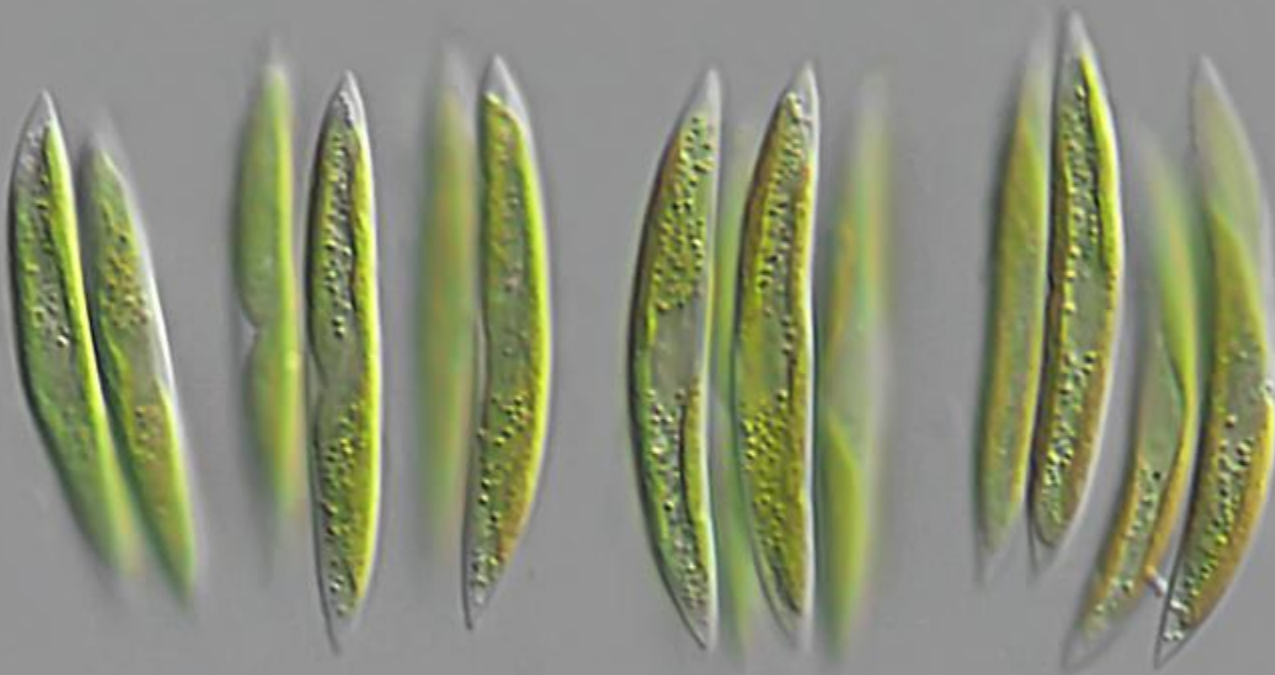
Kirchneriella – Cells lunate, croissant-like, not attached by dorsal sides



Selenastraceae

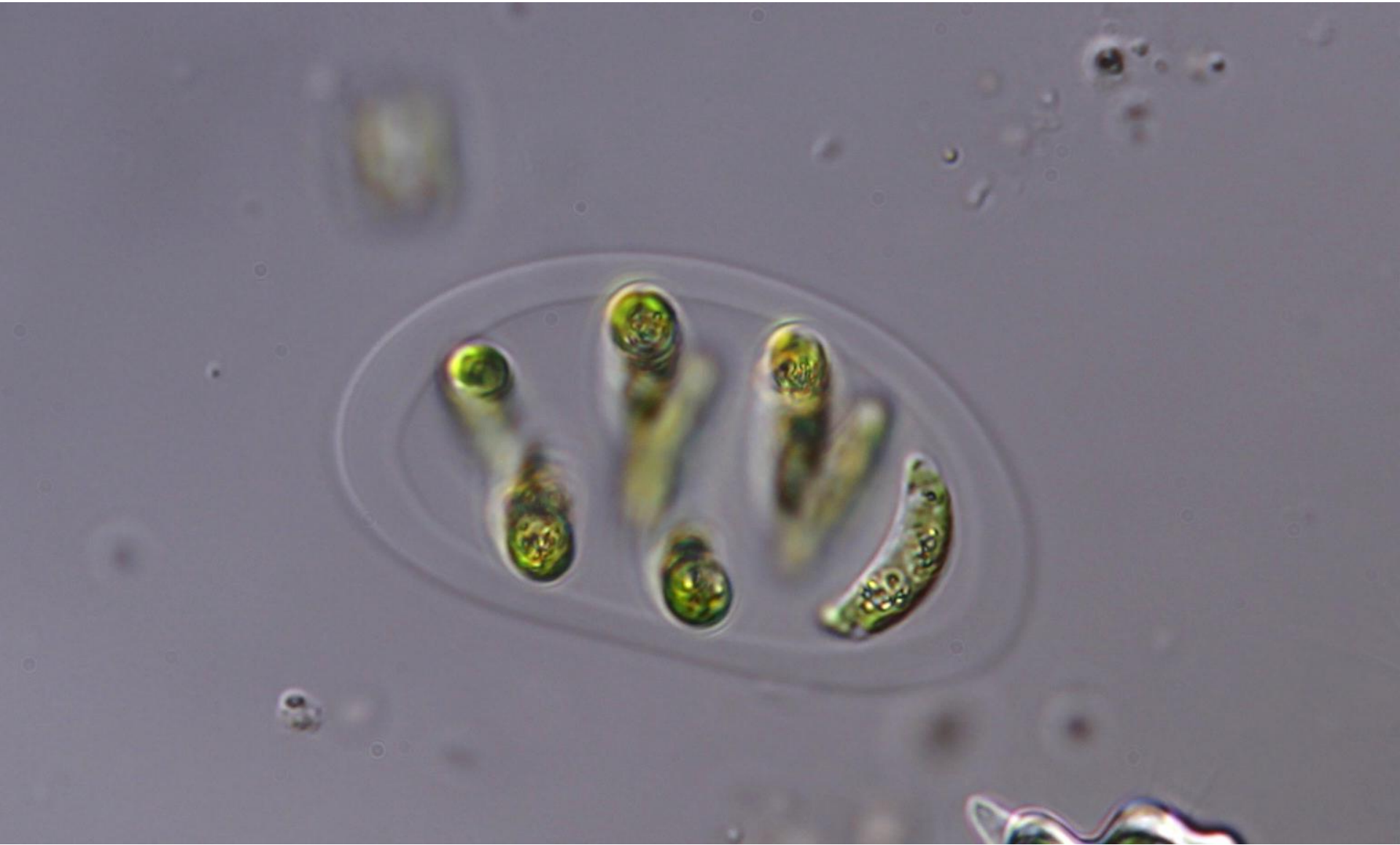
Quadrigula – Cells straight, distant from each other in colonies

Quadrigula closterioides
Obj. 100 X



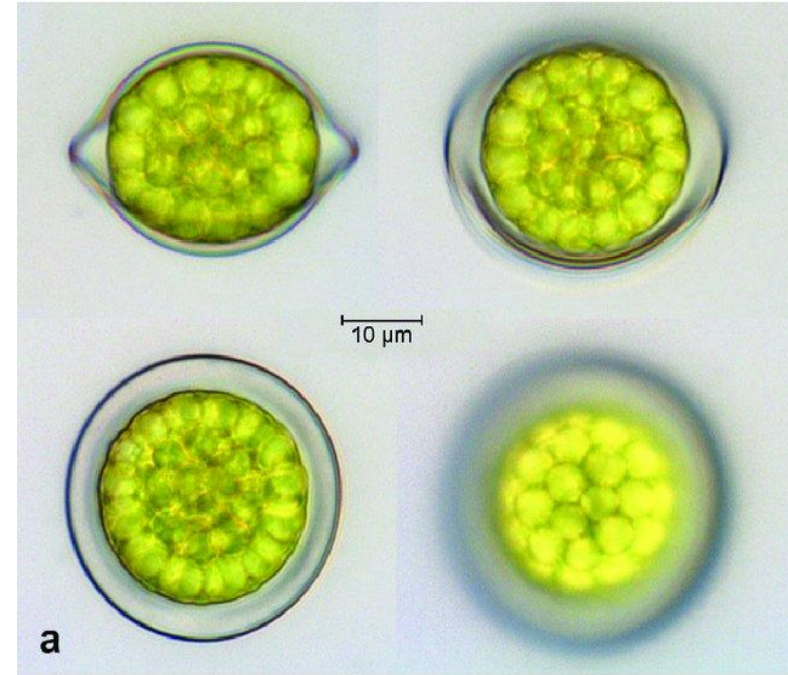
Nephrocytiaceae

Nephrocytium – Cells oval, cylindrical, crescent-shaped to lunate, embedded in a hyaline mucilage



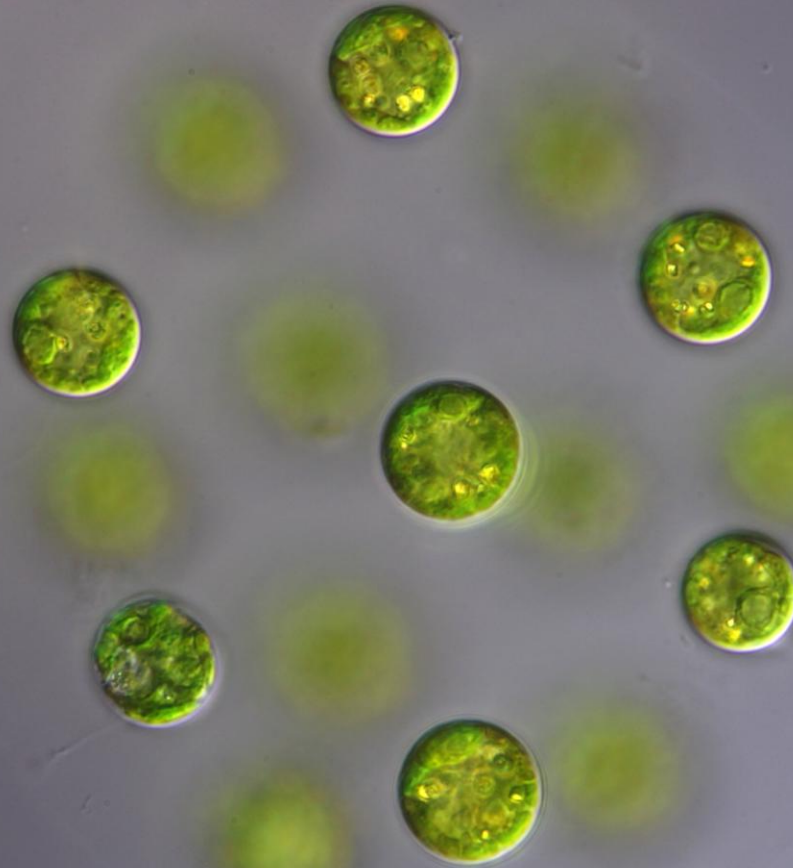
Treubariaceae

Variously shaped cells, with a placoderm cell membrane, consisting of two or more parts.



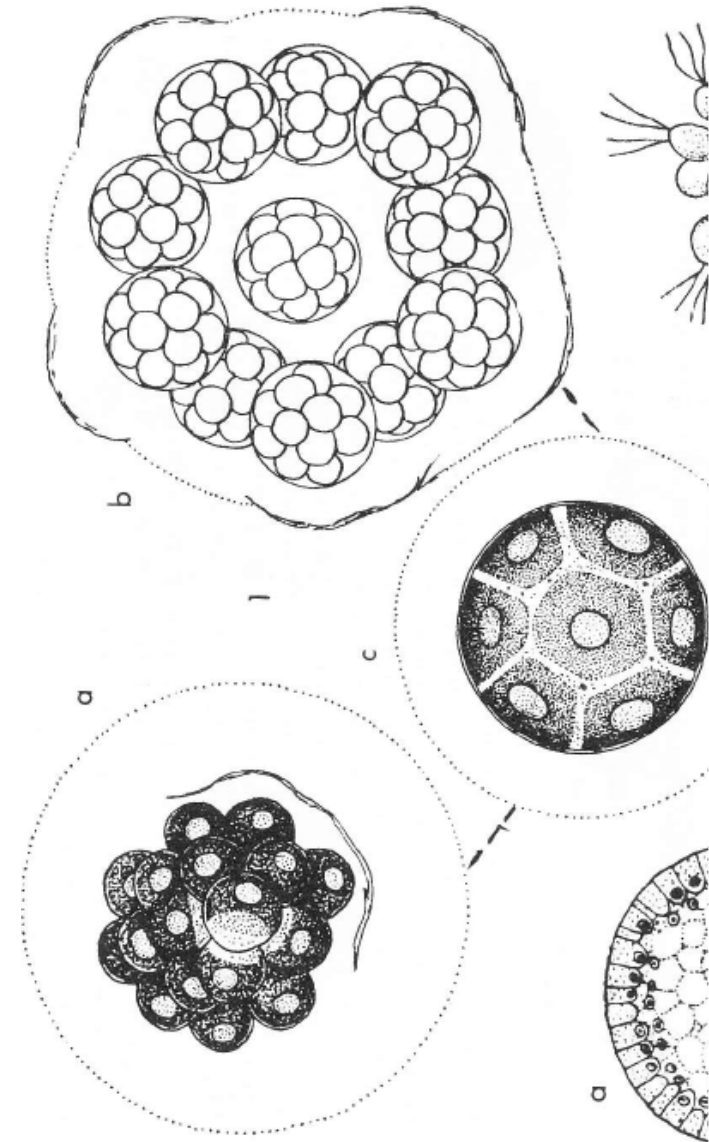
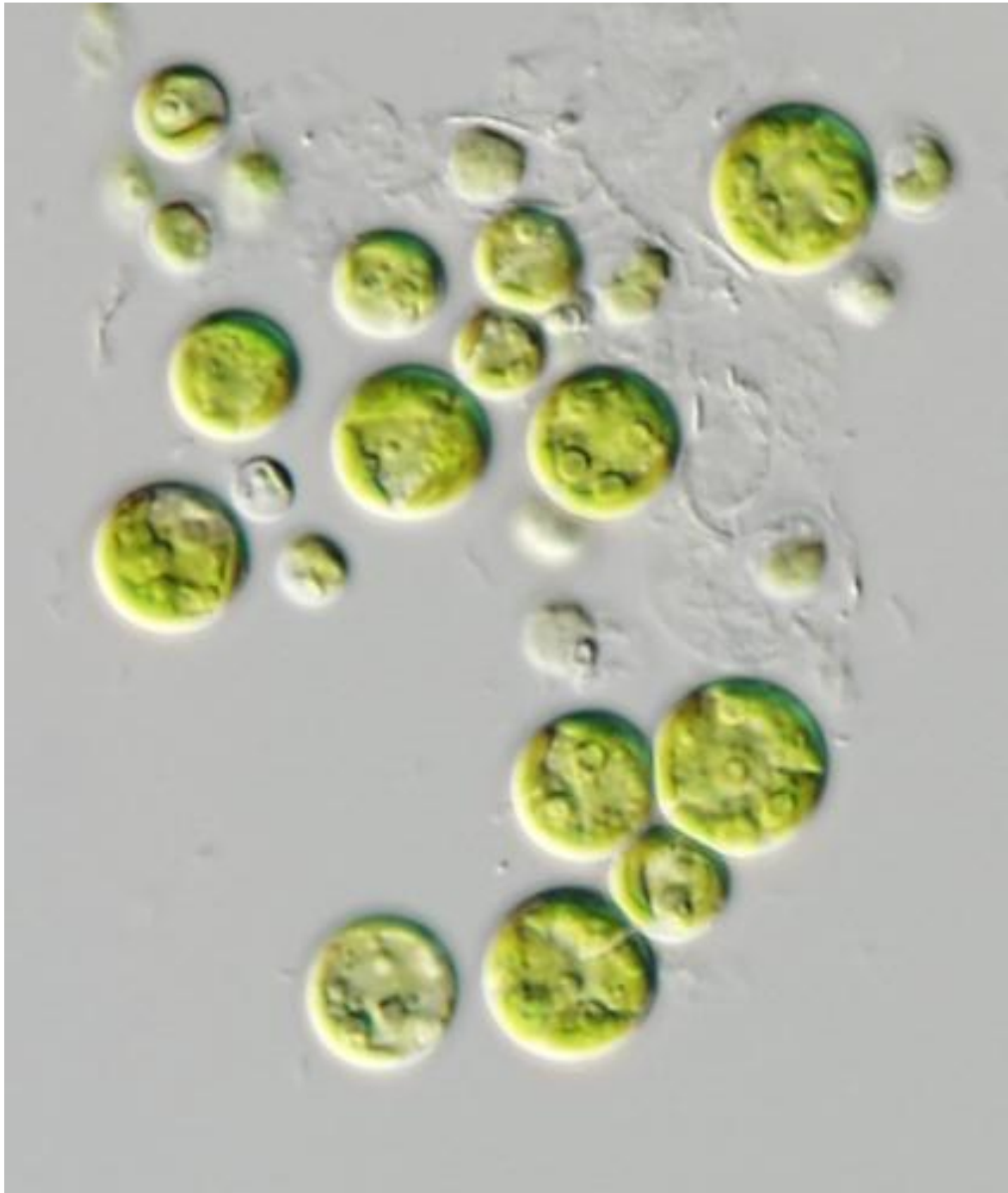
Radiococcaceae

Solitary or colonial coccoids, often covered with a prominent mucilaginous envelope



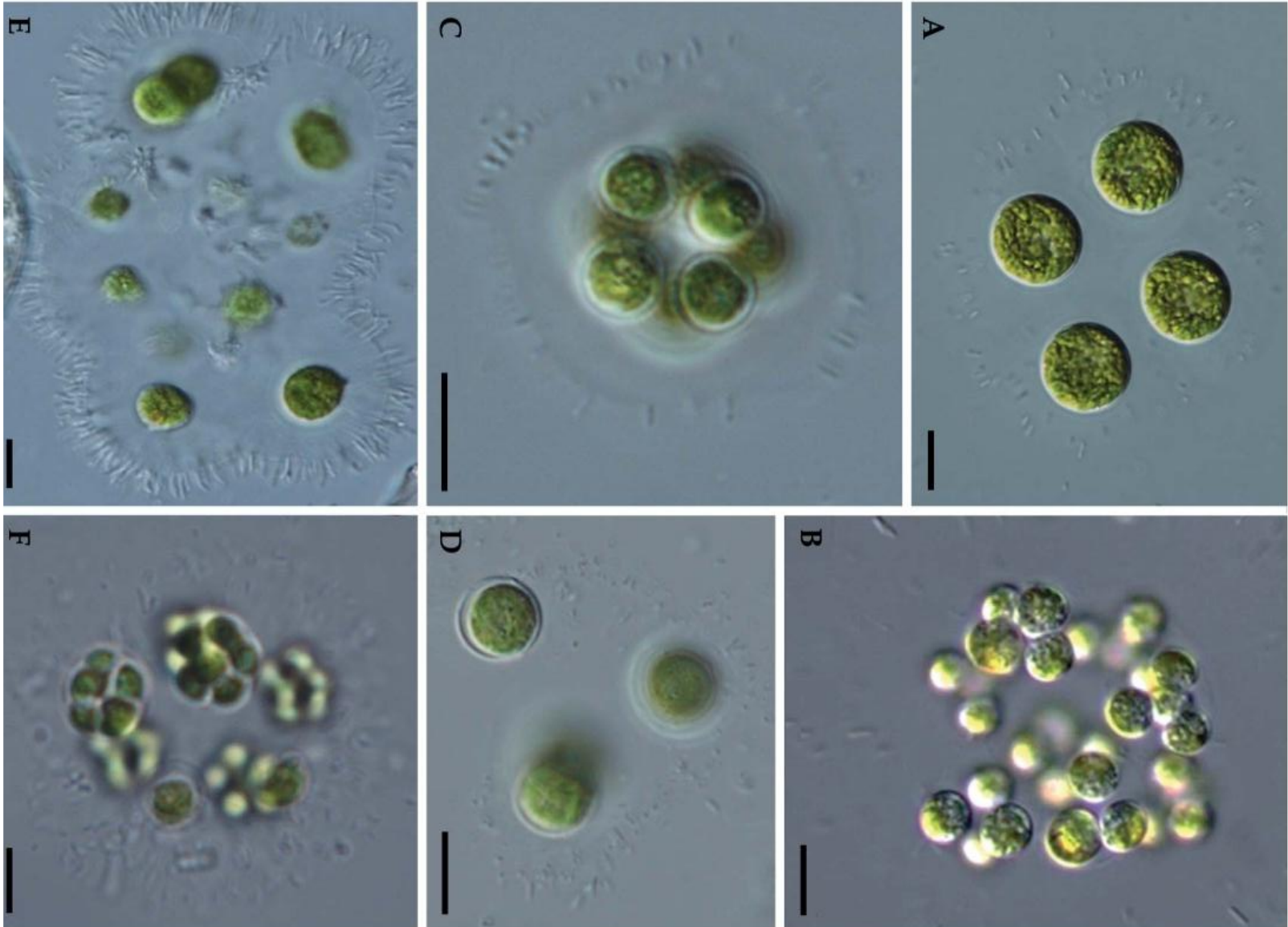
Radiococcaceae

Planktosphaeria – Cells with multiple plastids, each containing a pyrenoid.



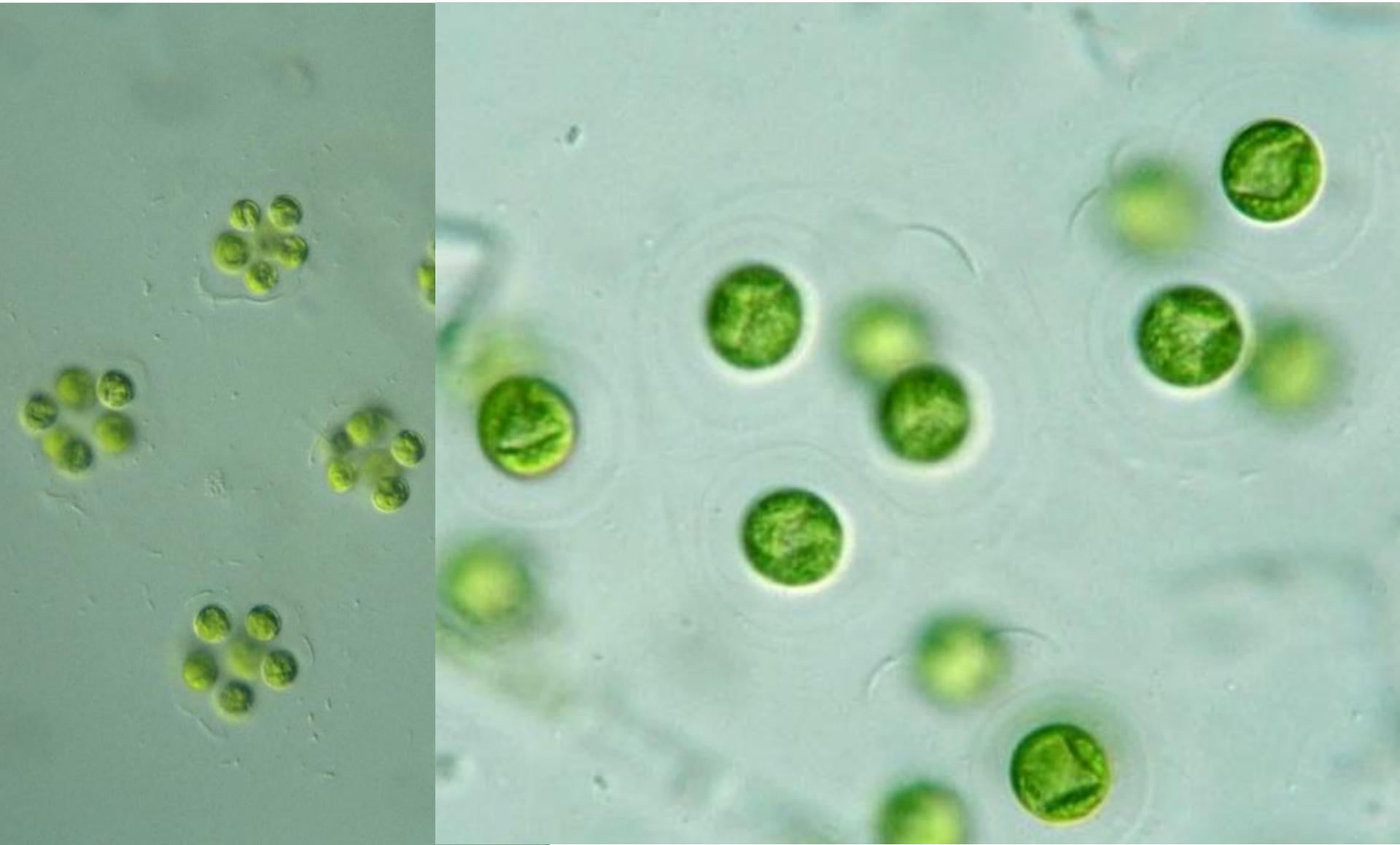
Radiococcaceae

Radiococcus – cells in a mucilaginous colony usually having a radial-fibrous structure; chloroplast single, parietal, with a pyrenoid.



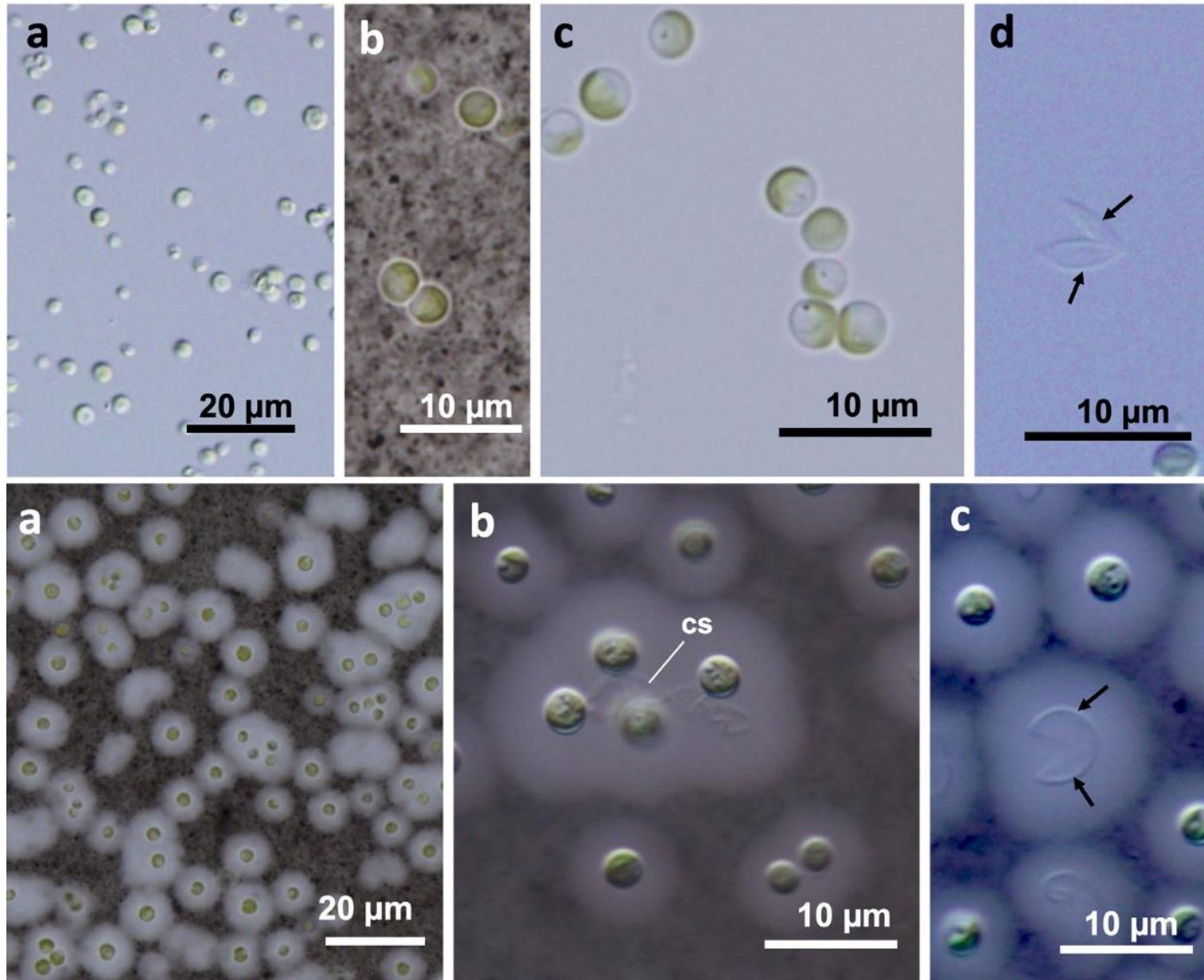
Radiococcaceae

Coenochloris – the fragments of sporangial cell walls remain in the mucilaginous envelope; chloroplast parietal, with a pyrenoid



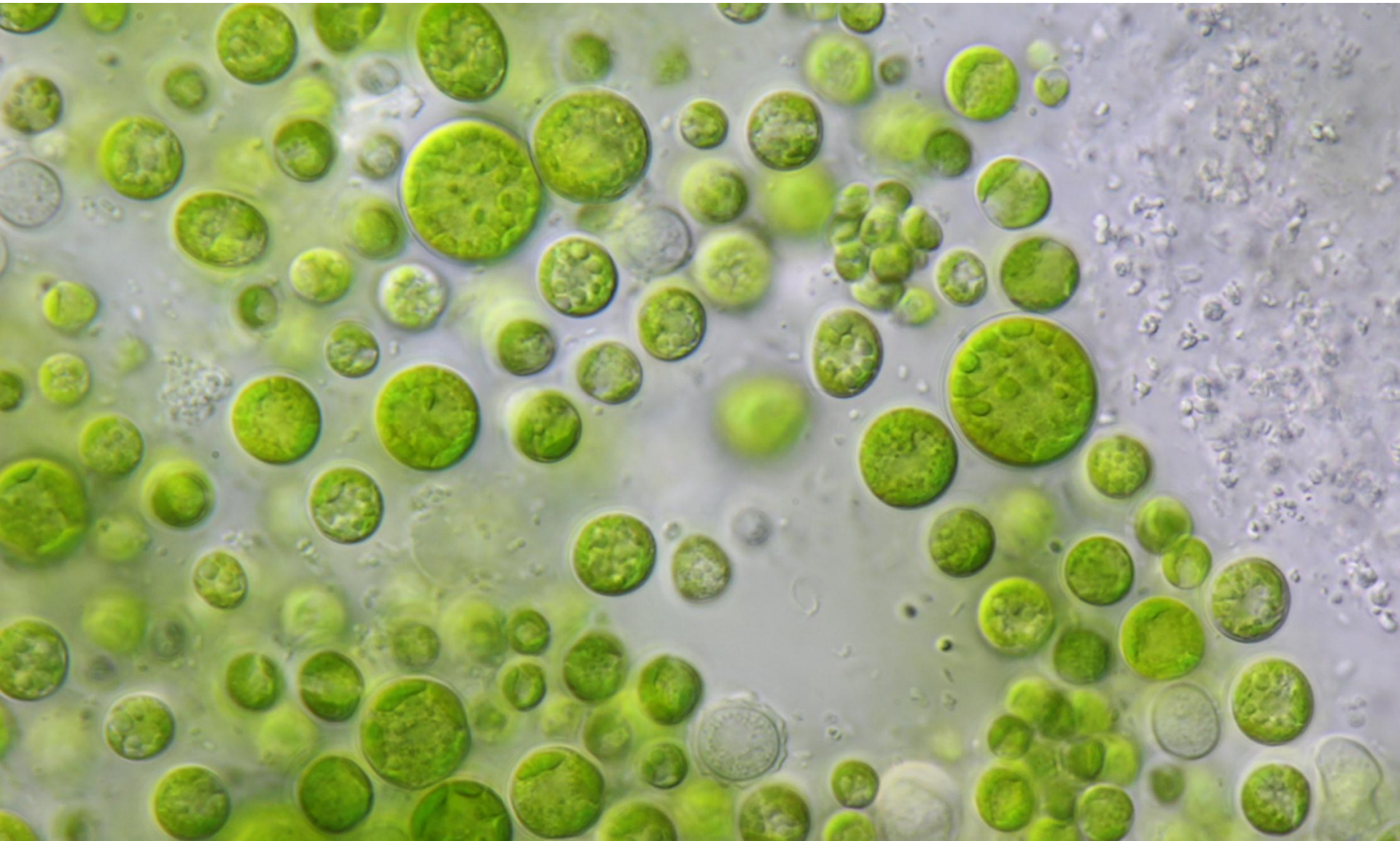
Mychonastaceae

Mychonastes – unicellular or colonial cells of small dimensions, in plankton.



Bracteacoccaceae

Bracteacoccus – multinucleate cells possessing multiple plastids without pyrenoids; usually terrestrial and aerophytic genus.



Bracteacoccaceae

Bracteacoccus – a total of 13 morphologically highly similar taxa – phylogenetic species concept.

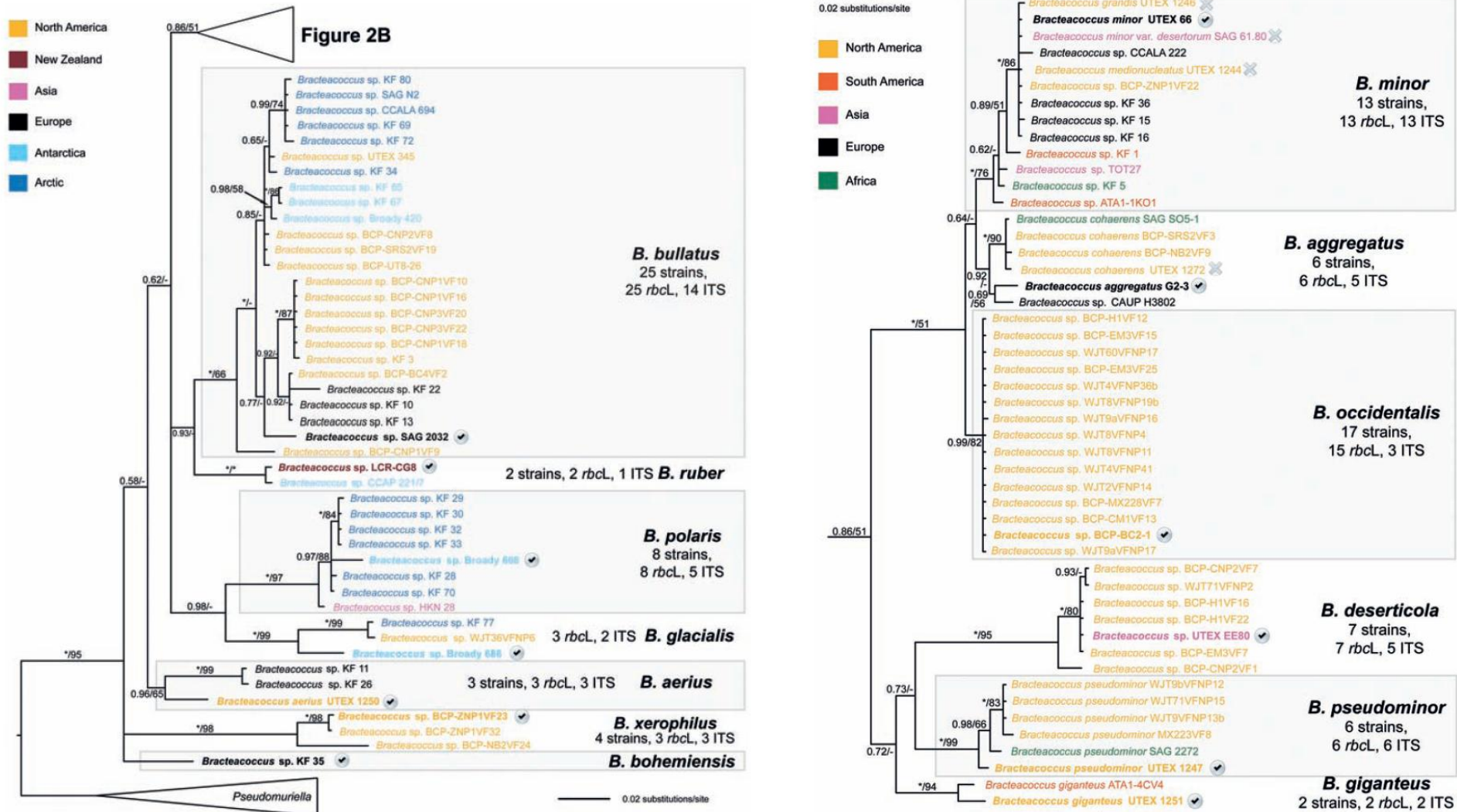
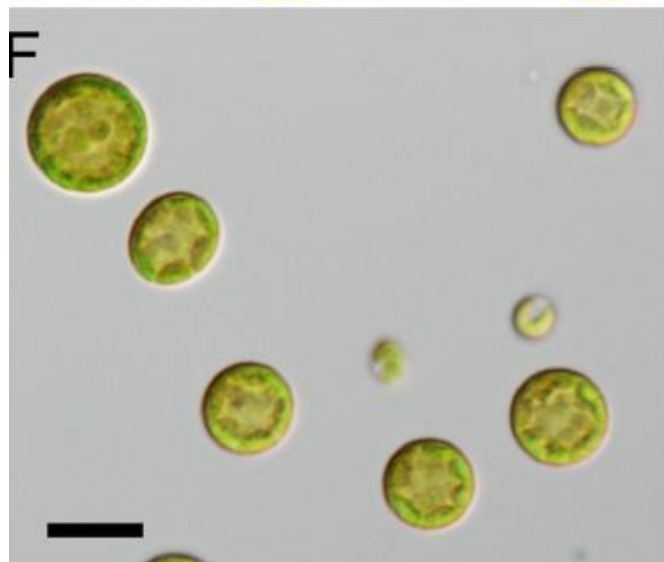
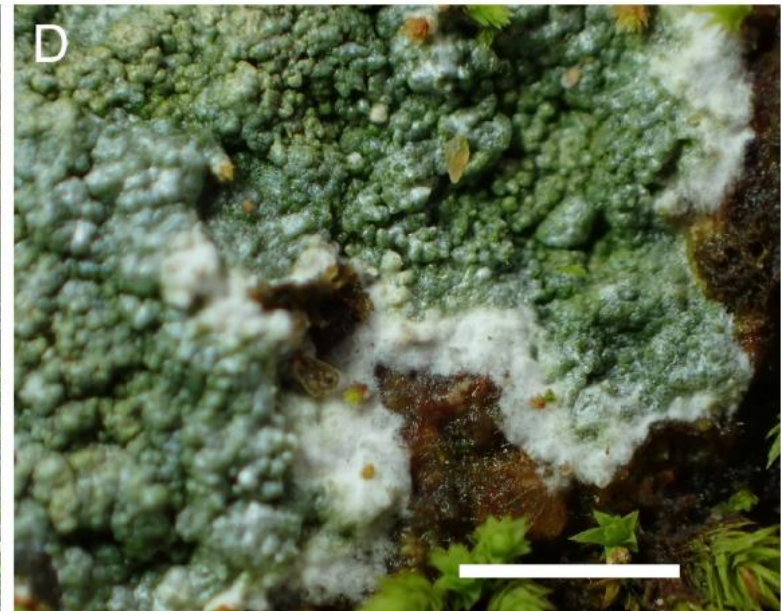
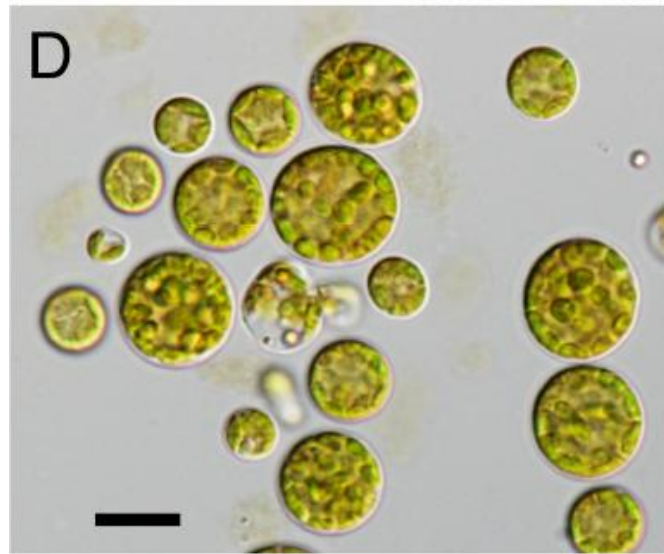


Fig. 2B.

Bracteacoccaceae

Bracteacoccus – the only lichen symbiont of the class Chlorophyceae: in a basidiolichen *Sulzbacheromyces sinensis*.

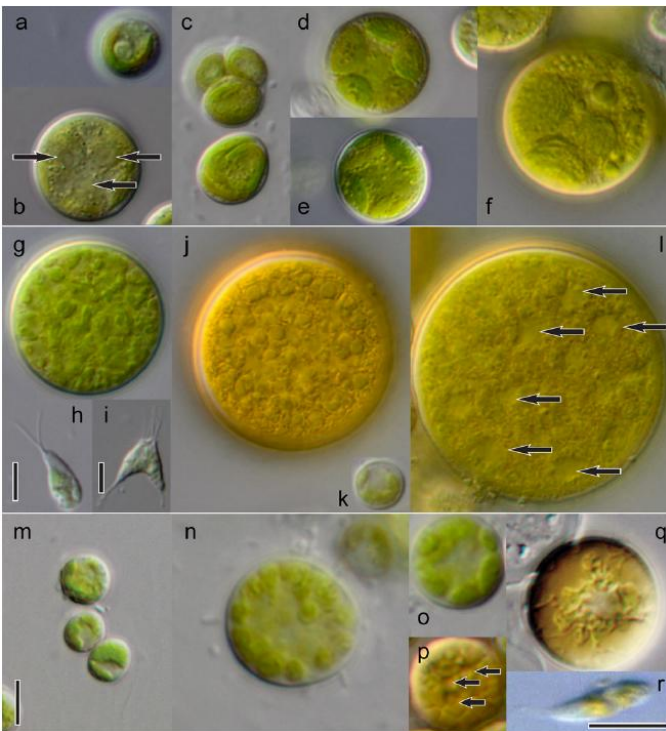


Families of terrestrial algae

Multinucleate cells, colored when mature. Many plastids without pyrenoids.

- ***Chromochloris*** – red colour, cells up to 13 mm
- ***Pseudomuriella*** – orange colour, cells up to 13 mm
- ***Rotundella*** – orange-brown colour, cells up to 20 mm
- ***Tumidella*** – golden-orange colour, cells up to 33 mm
- ***Bracteamorpha*** – orange colour, cells up to 24 mm

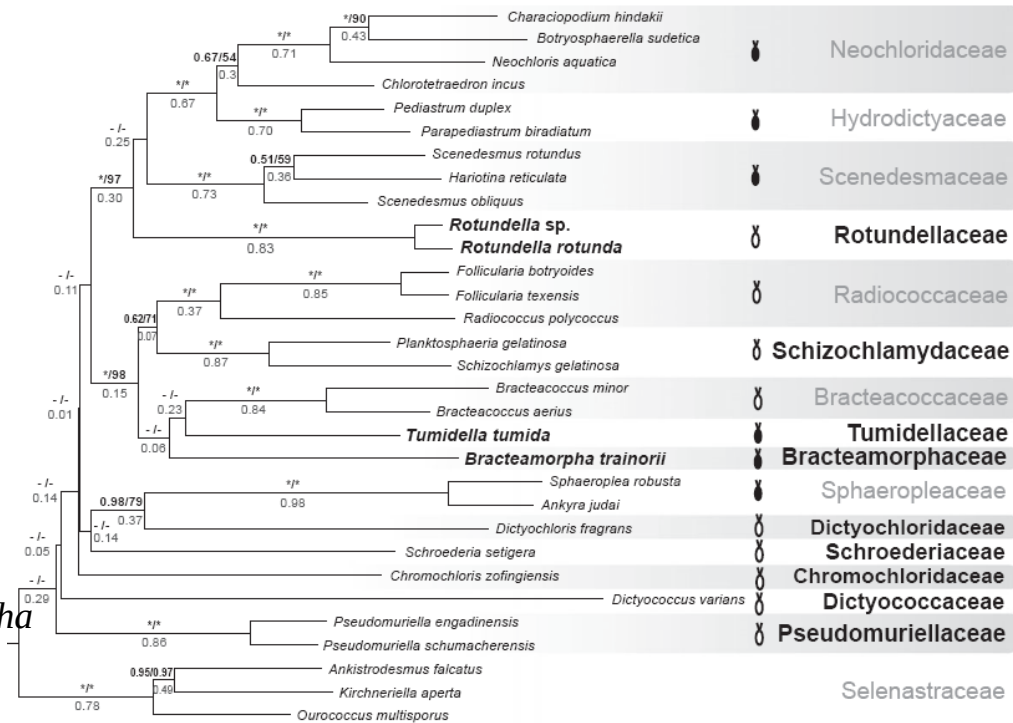
Cryptic genera



Rotundella

Tumidella

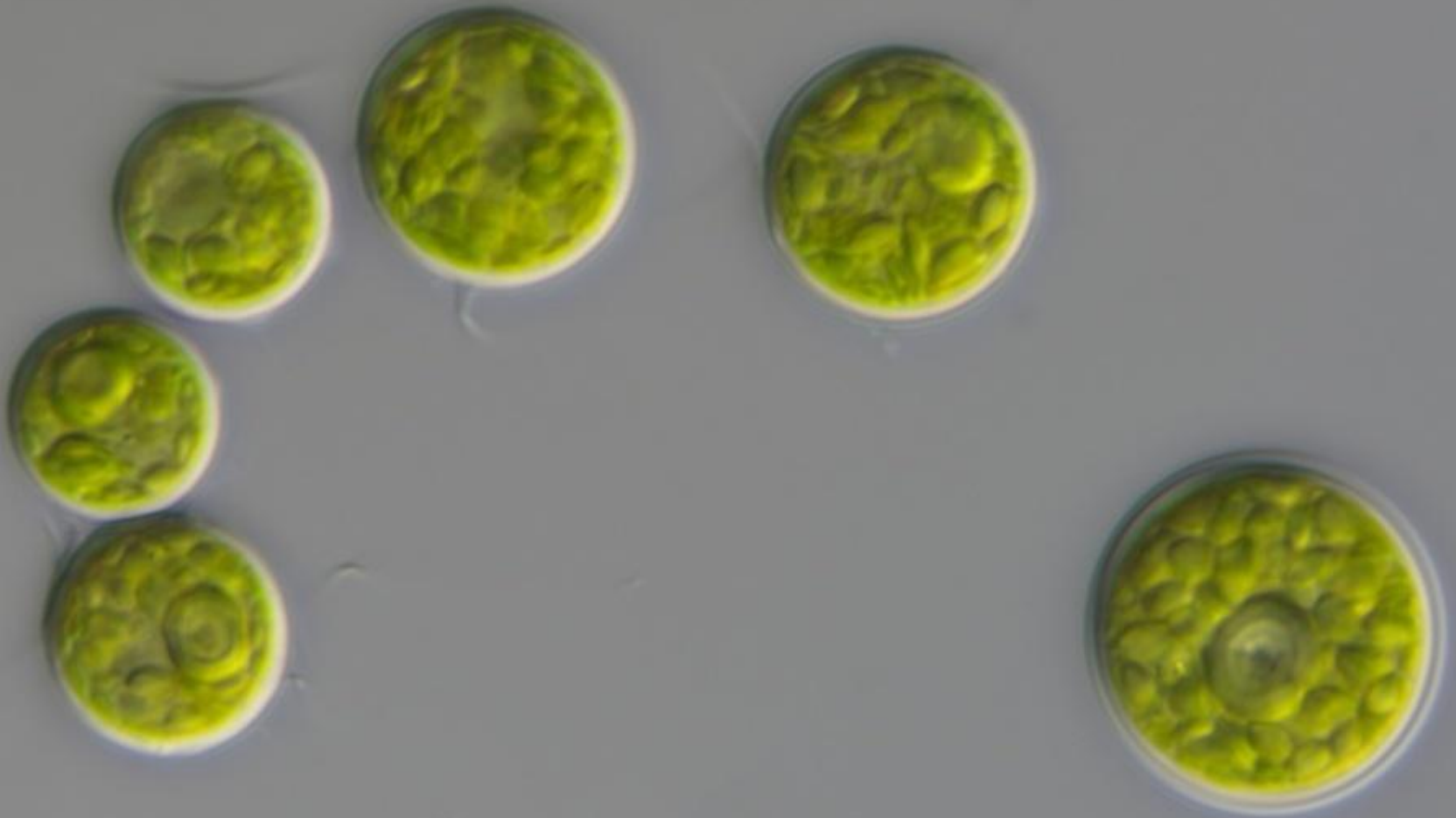
Bracteamorpha



Golenkiniaceae

Green coccoid cells, more or less spherical or polyhedral, with or without spines

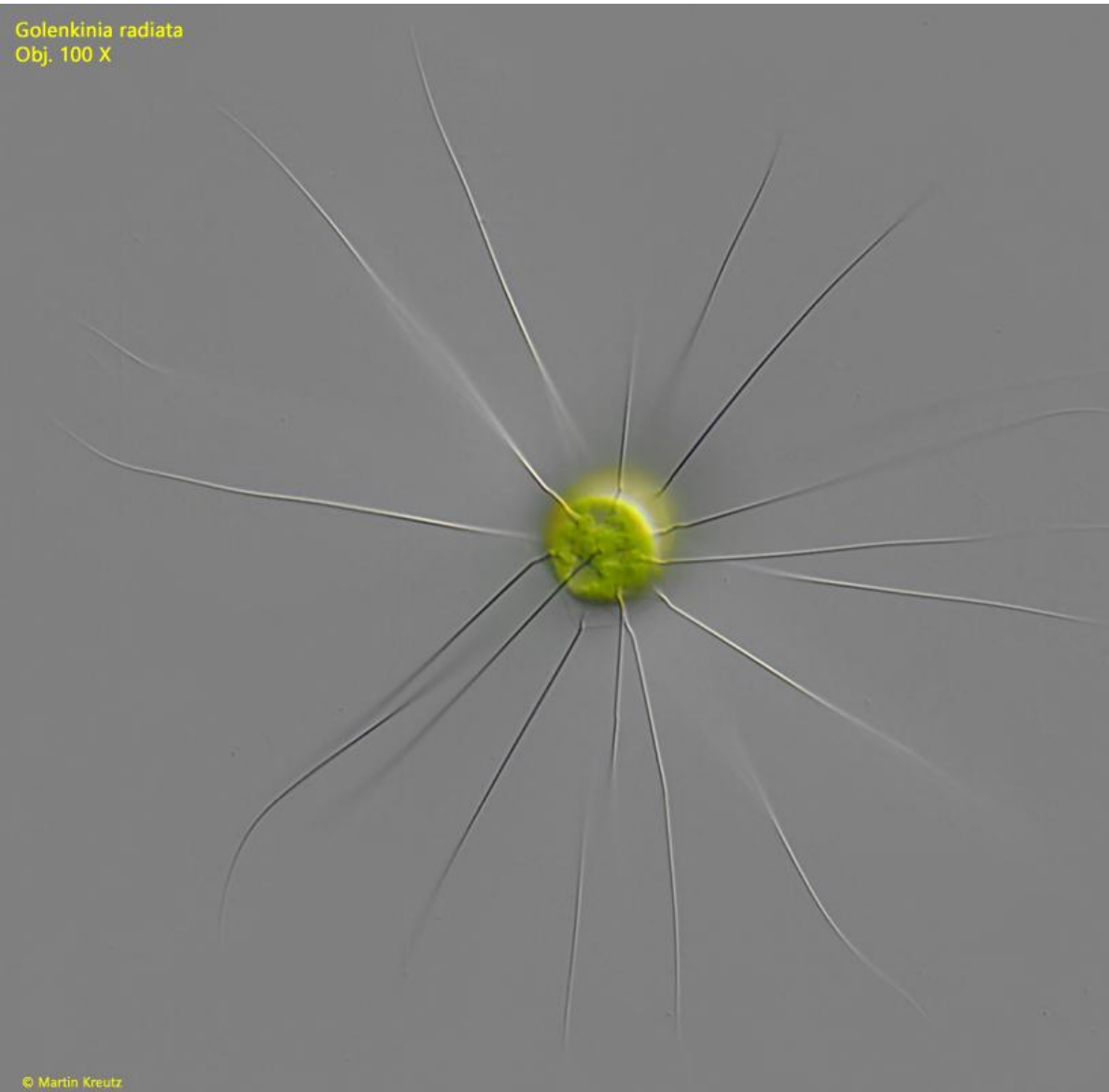
SAG 73.80



20 μ m

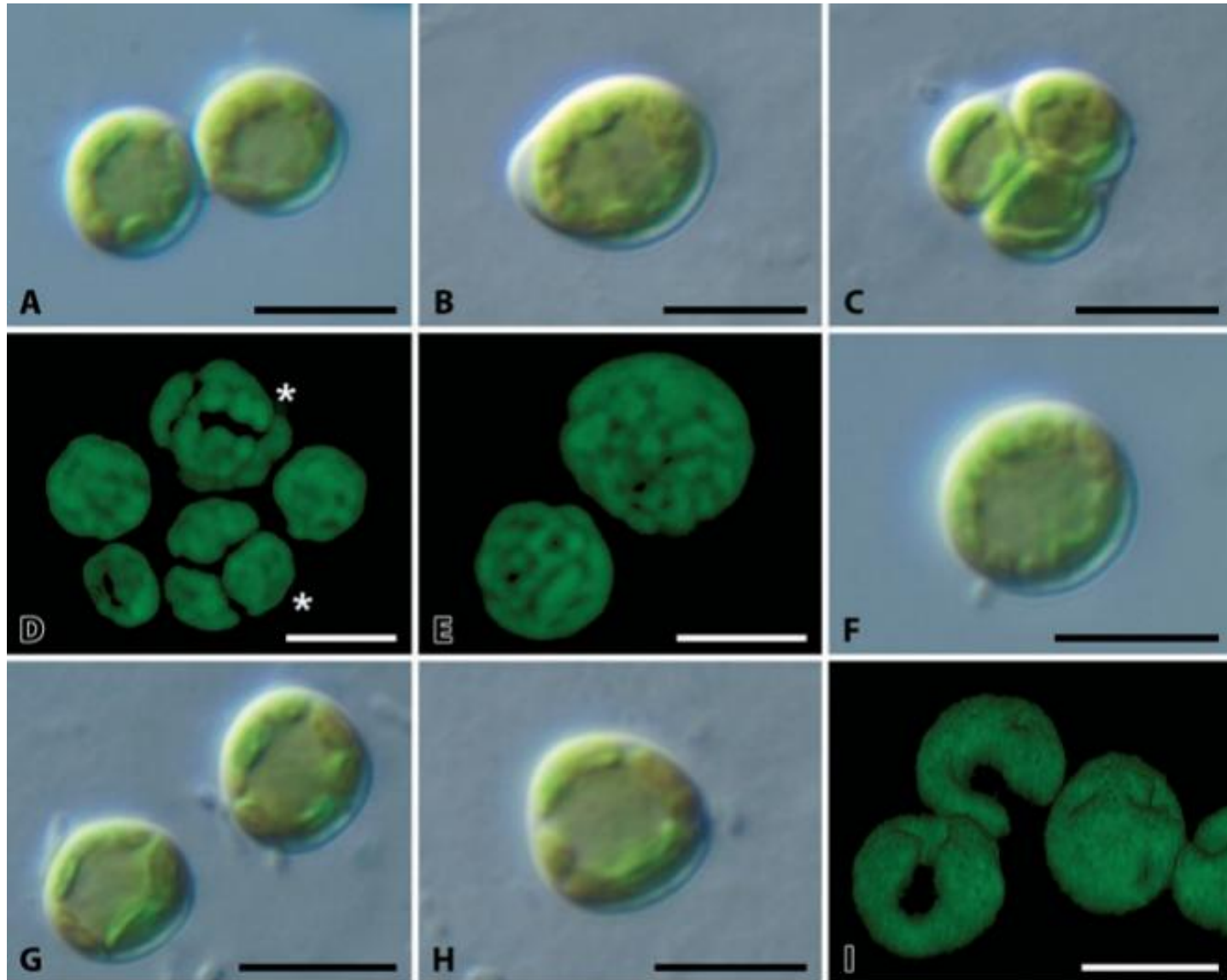
Golenkiniaceae

Golenkinia – Cells with spines, planktonic



Golenkiniaceae

Jenufa – Cells without spines, aerophytic and terrestrial; named after the opera *Jenůfa* by the Moravian composer Leoš Janáček



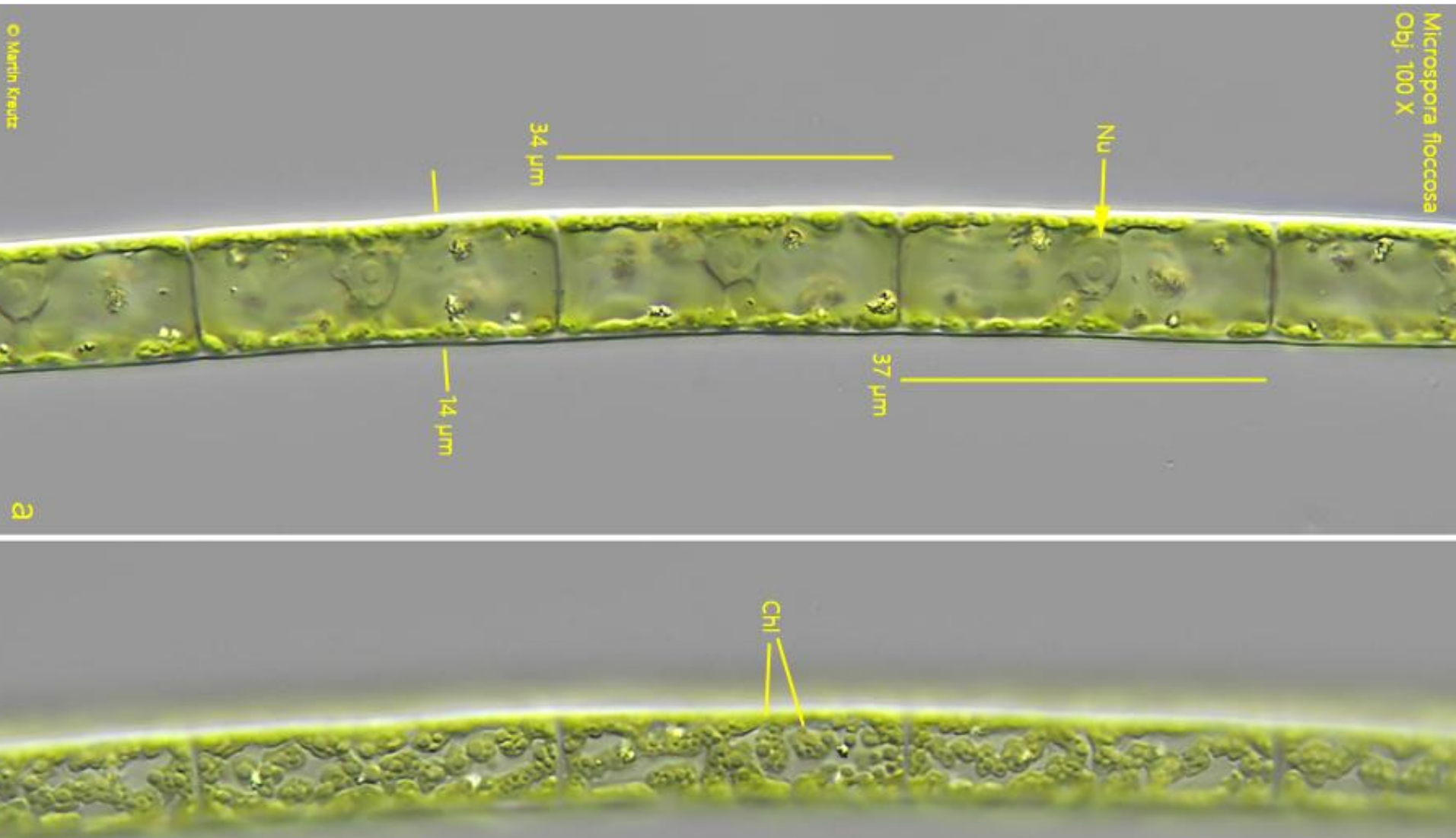
Microsporaceae

Microspora – Unbranched uniseriate filaments; cell wall in the filaments bipartite H-shaped with overlapping ends; chloroplast parietal, perforated



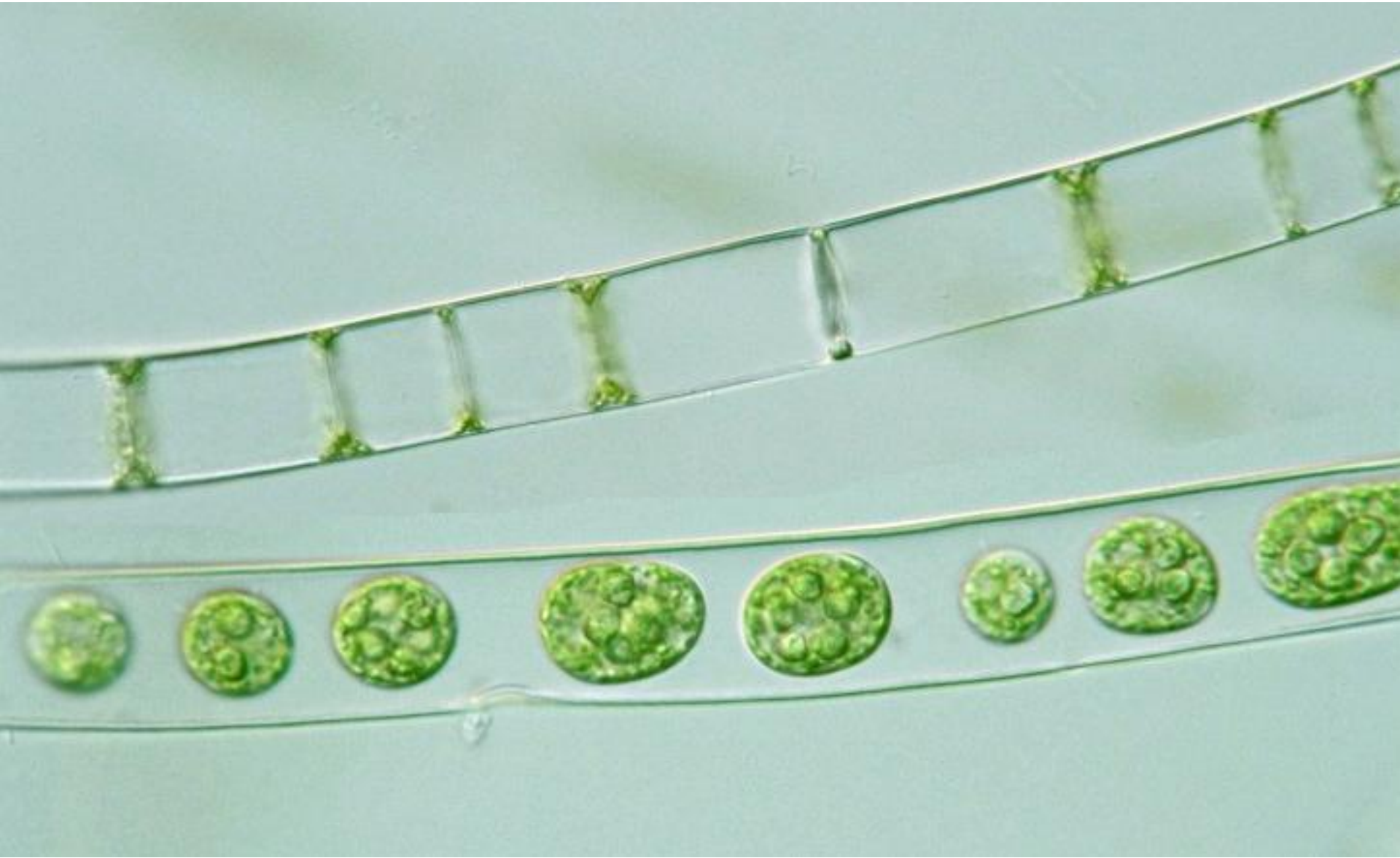
Microsporaceae

Microspora – Unbranched uniseriate filaments; cell wall in the filaments bipartite H-shaped with overlapping ends; chloroplast parietal, perforated



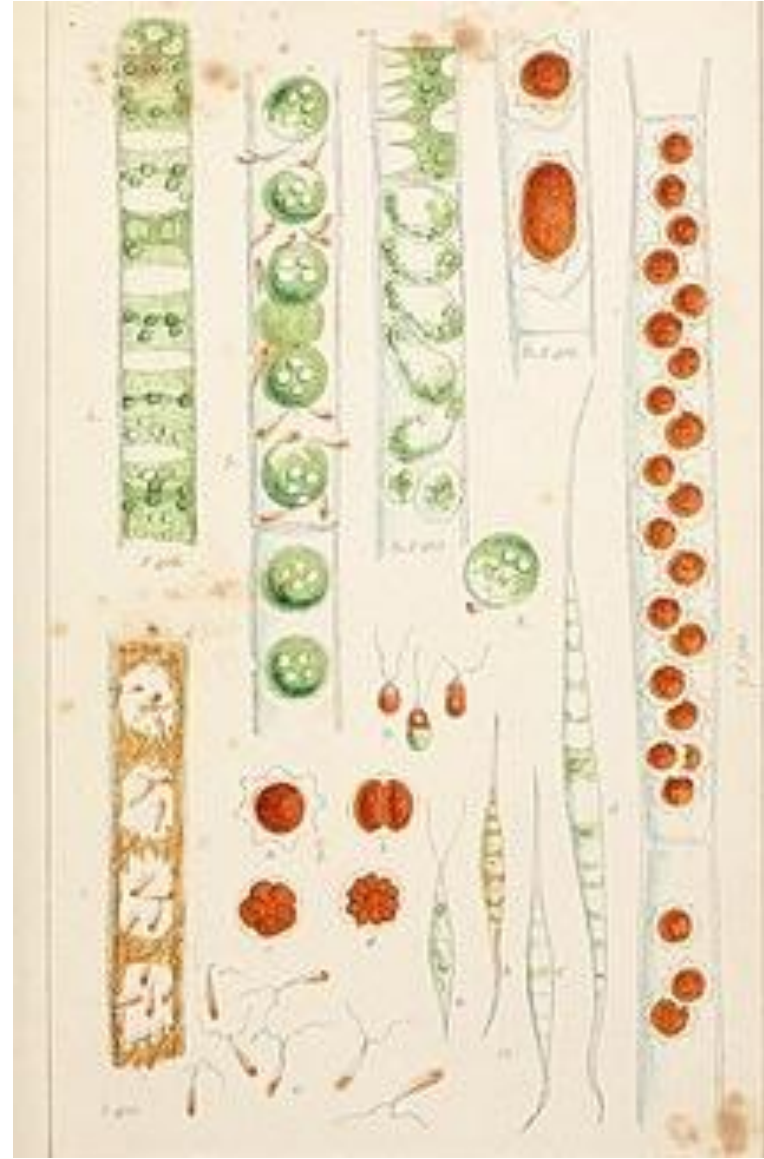
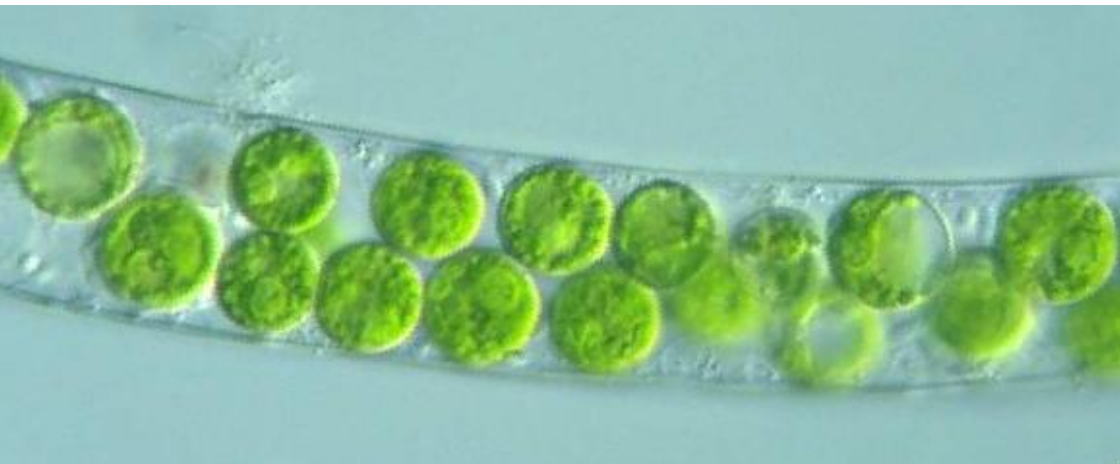
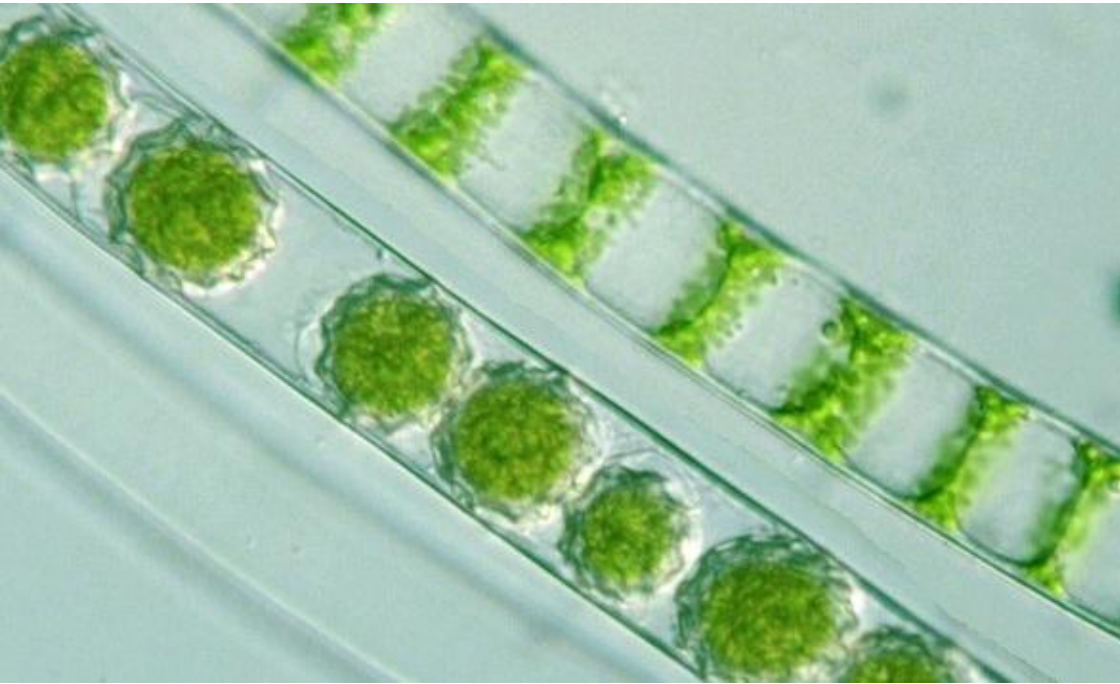
Sphaeropleaceae

Unicellular or filamentous coenocytic algae, fusiform vegetative cells



Sphaeropleaceae

Sphaeroplea - Multicellular, unbranched, uniseriate filaments; cells multinucleate; sexual reproduction oogamous; oogonia spherical, often lying in a single or in double series.



Sphaeropleaceae

Ankyra - Cells solitary, spindle- or cylindrical, heteropolar, at both ends ending in a pointed extension.

