FRESHWATER PLANTS

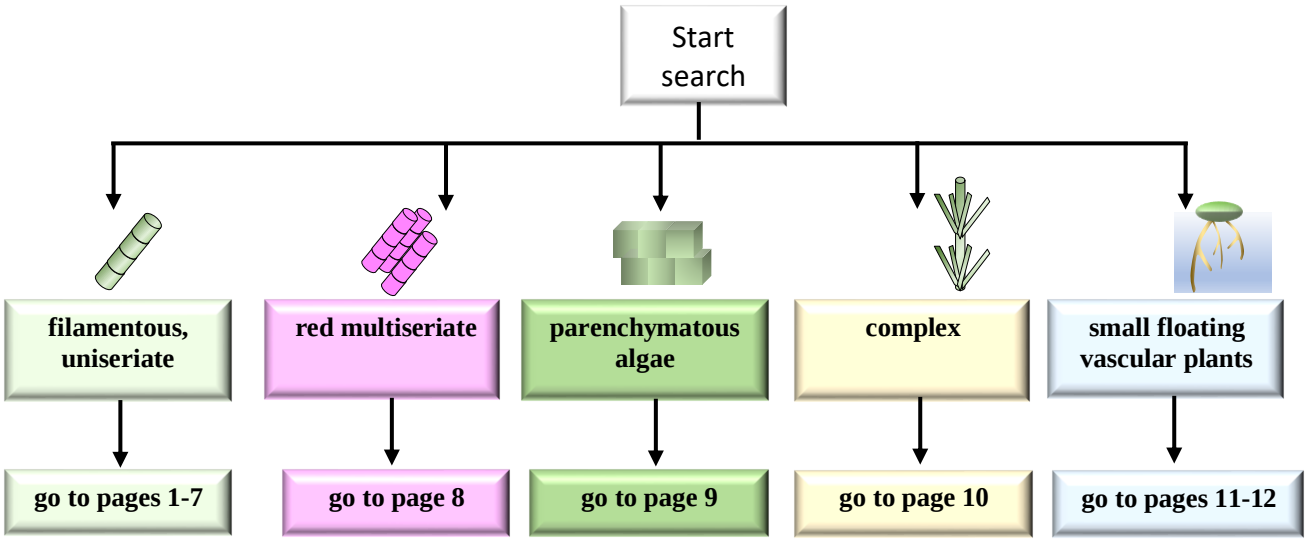
Snapshots of common algae (non-flowering plants) and floating vascular plants from collections investigated at the State Herbarium of South Australia

R N Baldock (2023)

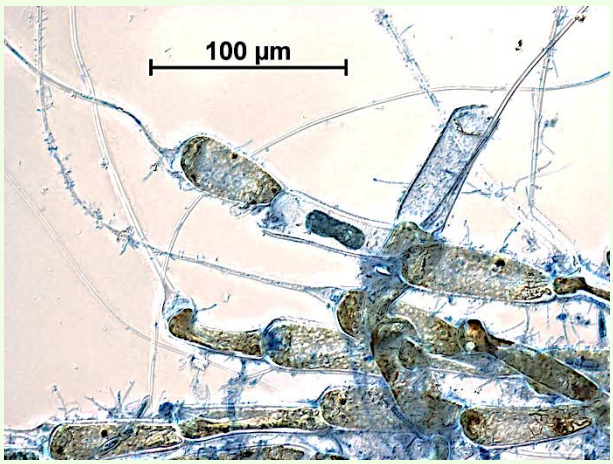
Diagnostic features follow

- **Entwisle, T. J. *et al* (1997)** *Freshwater Algae in Australia: a guide to conspicuous genera (second edition).* Sainty & associates
- **Prescott, G *et al* (1978) *How to know the freshwater algae.***

Number and shape of plastids and their pyrenoids are important diagnostic algal features (pyrenoids are starch storing organelles, staining blue-black with dilute iodine solution). Microscopic investigation is therefore necessary. Specimens in microscope the images below may be stained blue.



FILAMENTOUS, UNISERIATE ALGAE (single cell thick)



Bulbochaete

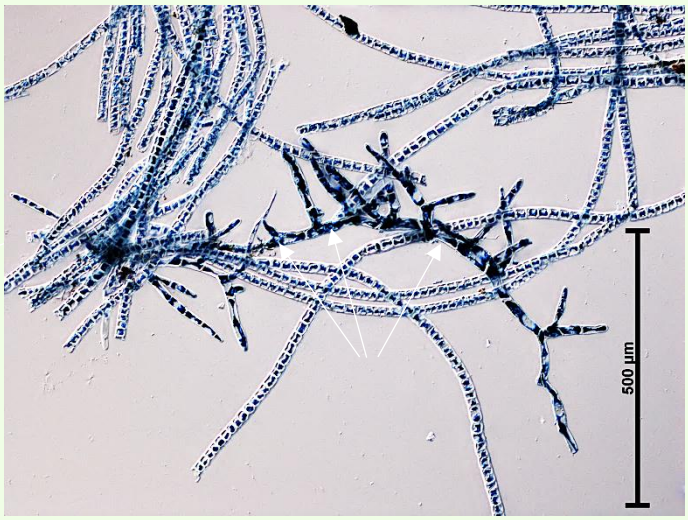
Division: Chlorophyta, Family: Oedogoniaceae

- **bulbous reproductive cells**
- **long, colourless hairs with bulbous bases occur at ends of single-cell laterals arranged asymmetrically along axes**

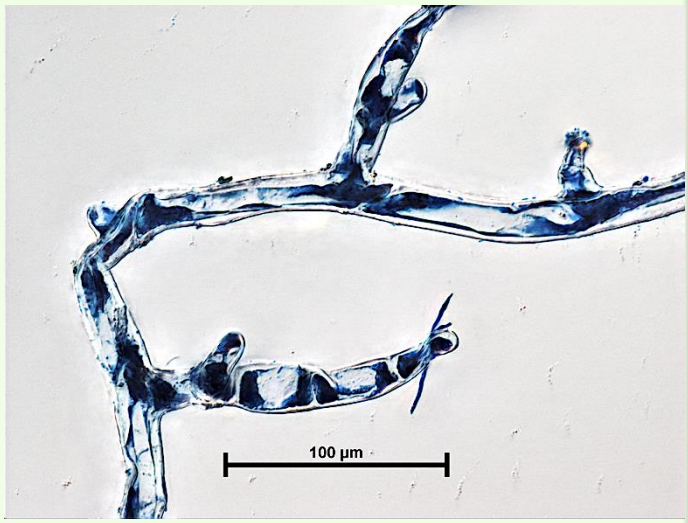
***Sirogonium* on the vascular waterweed *Potomageton*, R. Murray, SA**

Gongrosira

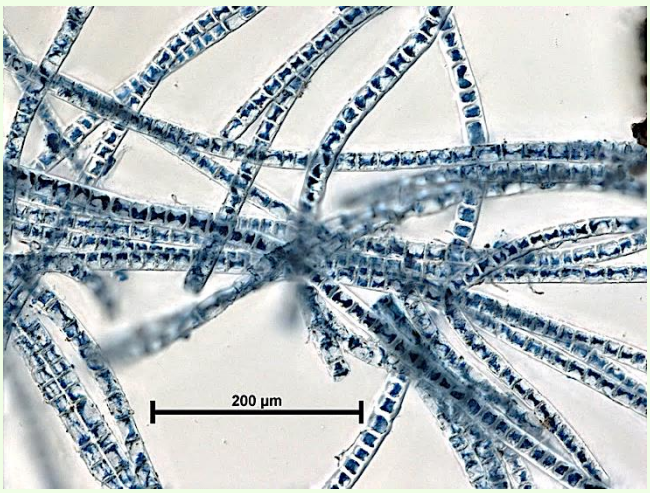
Division: Chlorophyta, Family: Chaetophoraceae



***Gongrosira* (arrowed) amongst *Klebsormidia* NSW Lindley collection**



- ***Distinct prostrate runner and short erect branches***

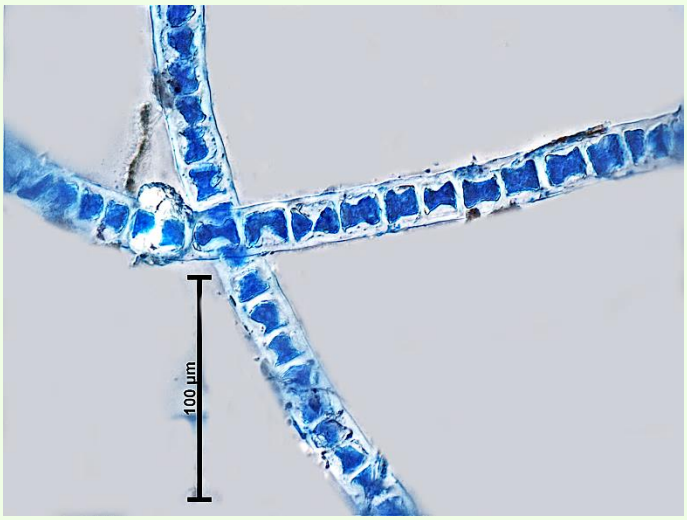


- **Single plastid encircling only half of the cell perimeter**
- **Single pyrenoid per plastid**

NSW on soil in dry sclerophyll scrub, relatively dense, amongst moss and sparse *?Gongrosira*

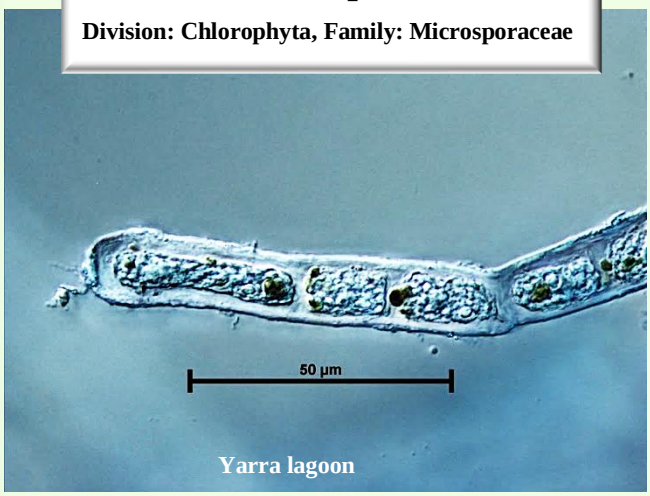
Klebsormidium

Division: Chlorophyta, Family: Klebsormidiaceae

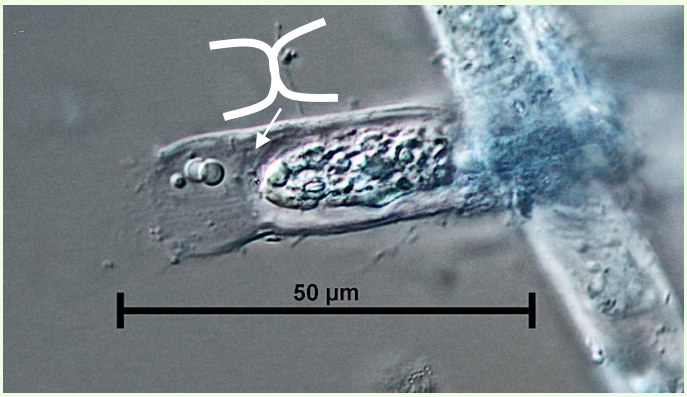


Microspora

Division: Chlorophyta, Family: Microsporaceae



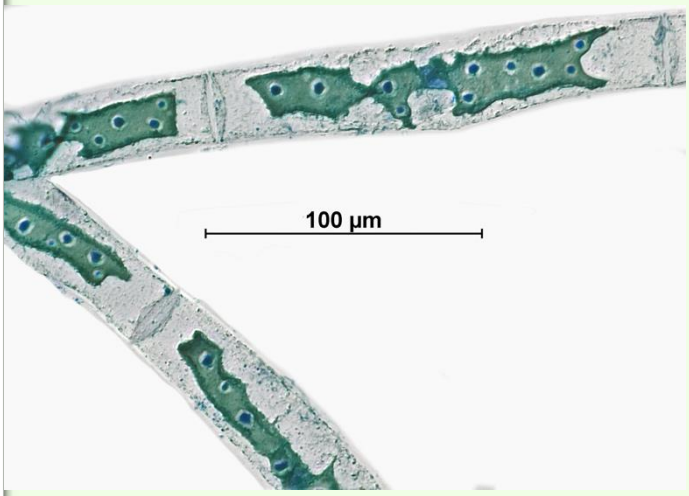
Yarra lagoon



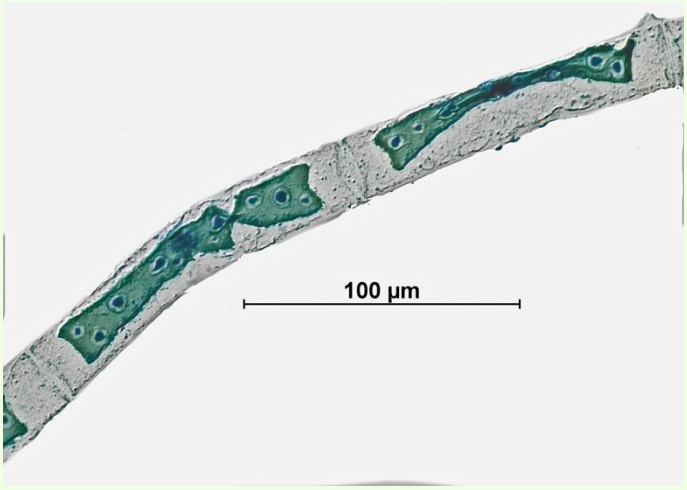
- **H-piece end walls (clear at broken ends of filaments**
- **Chloroplasts disc-shaped strung together in a net-like mass**

Mougeotia sestersignifera

Division: Chlorophyta, Family: Zygnemataceae



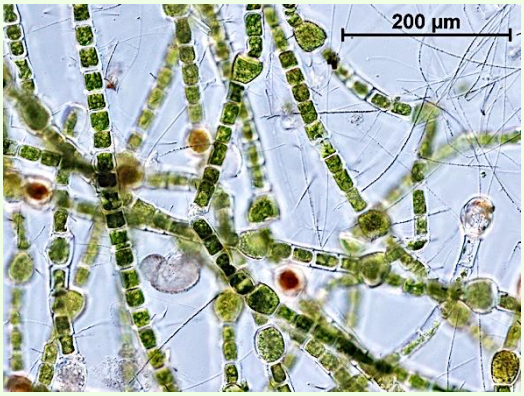
Endemic to SA; Type in an Ibis rookery, Bool Lagoon, SE of SA

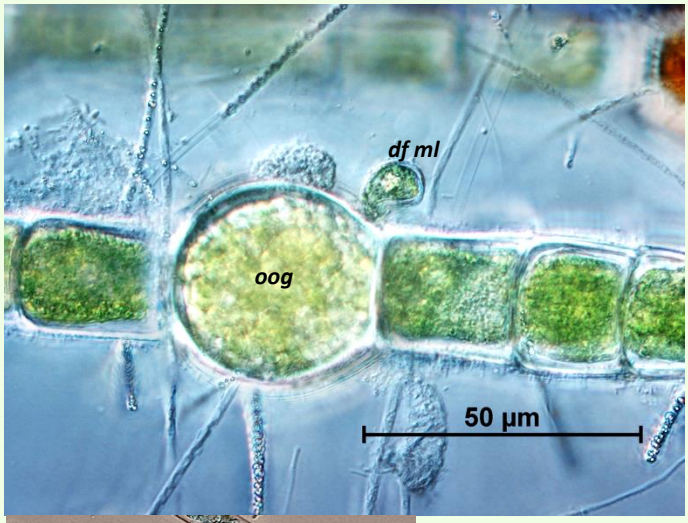


- **Plastid a single tape shape, sometimes twisted 1-2 times**
- **Numerous prominent pyrenoids**

Oedogonium

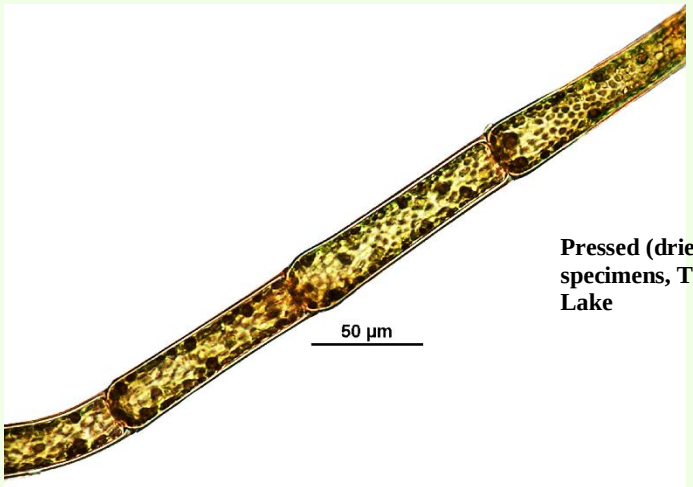
Division: Chlorophyta, Family: Oedogoniaceae



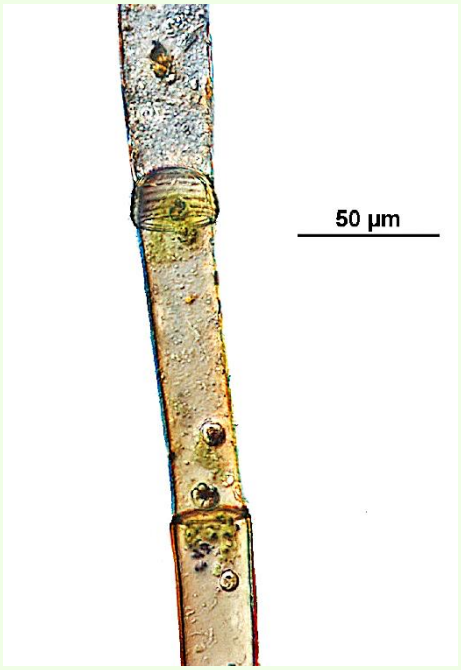


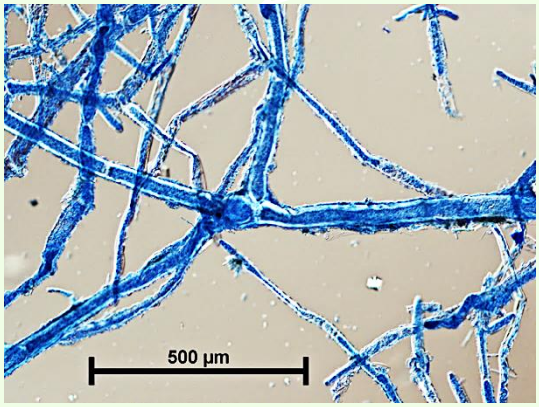
with colourless sulfur bacterial filaments , Rymill Park pond, Adelaide city, SA

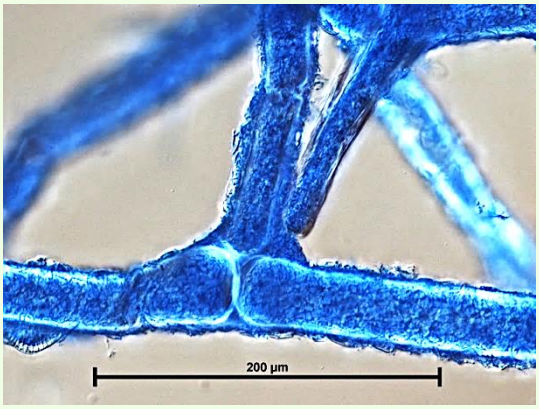
- **Single, net-like plastid, several pyrenoids**
- **Remains of end cell-walls (arrowed) form rings**
- **Dwarf males (*df ml*) & female oogonia (oog), on same filaments**
- **Zygospores (*zyg*), may be coloured**

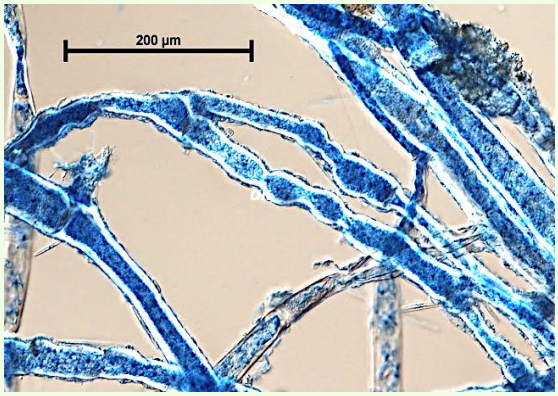


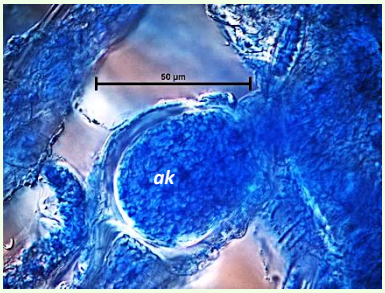
Pressed (dried) specimens, Torrens Lake











Disher Creek, River Murray SA; Glasshouse pond, Adelaide Botanic Gardens, SA

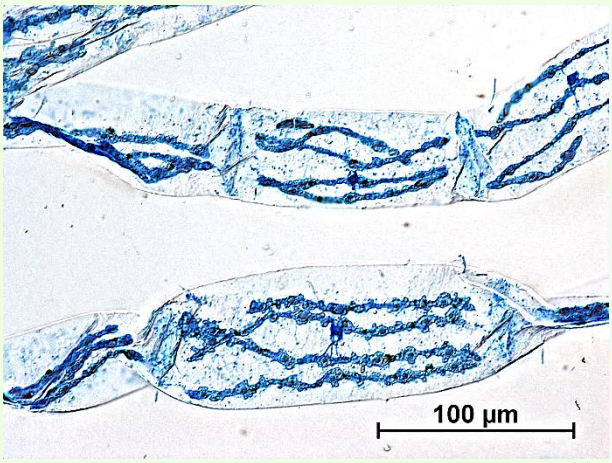
- **Mature lateral branches arise perpendicular to swollen junction of axial cells (arrowed)**
- **Bead-like vegetative propagules (akinetes, *ak*) form in between cells (are intercalary)**

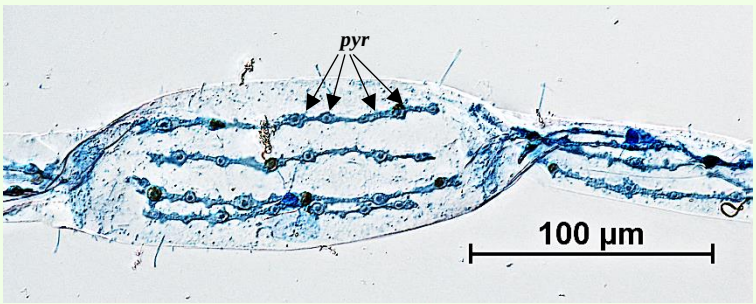
Pithophora

Division: Chlorophyta, Family: Cladophoraceae

Sirogonium

Division: Chlorophyta, Family: Zygnemataceae



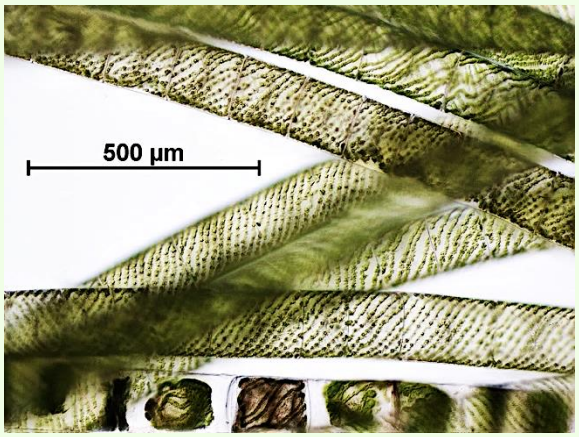


Sirogonium* on *Potomageton tricarinatus
River Murray, SA

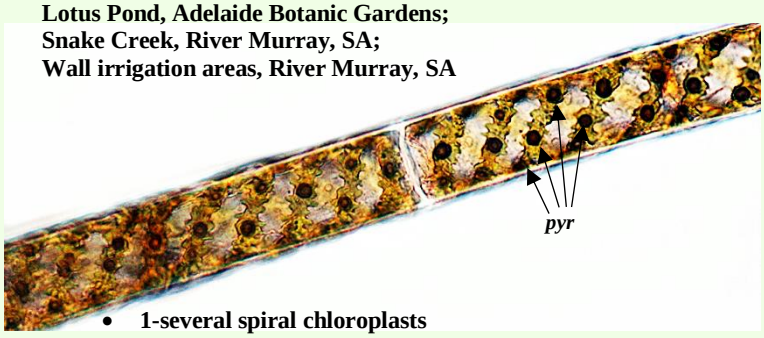
- **several linear chloroplasts lie parallel within cells**
- **pyrenoids (*pyr*) numerous and prominent**

Spirogyra

Division: Chlorophyta, Family: Zygnemataceae



Devlins Pound edge, SA;
Lotus Pond, Adelaide Botanic Gardens;
Snake Creek, River Murray, SA;
Wall irrigation areas, River Murray, SA



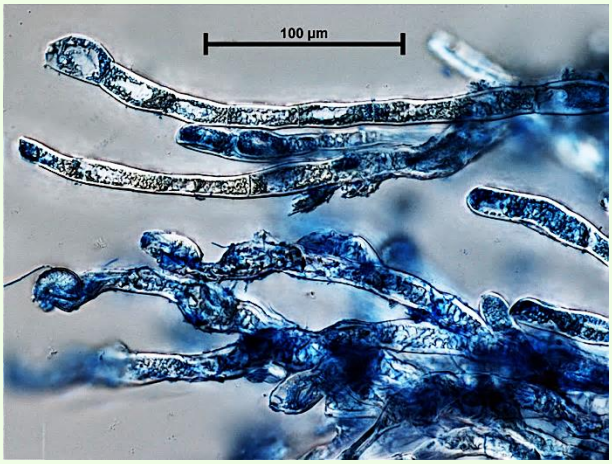
- **1-several spiral chloroplasts**
- **the pyrenoids (*pyr*) within plastids stain black with iodine due to presence of starch**

Stigeoclonium flagelliferum

Division: Chlorophya, Family: Chaetophoraceae

First Creek, Hackney SA, in rapidly flowing water

- **1-several plastids per cell**
- **Upright, branched filaments tapering to a sharp point, ending in a hair (although this may shed)**

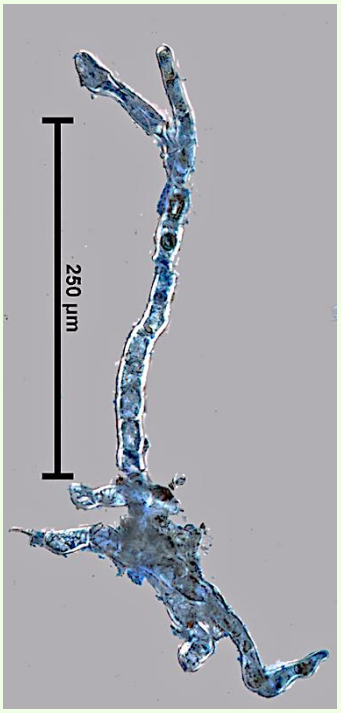


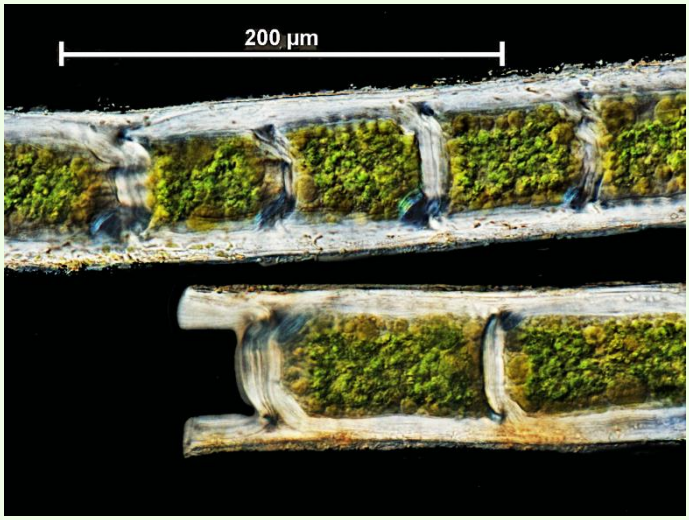
Trentepohlia

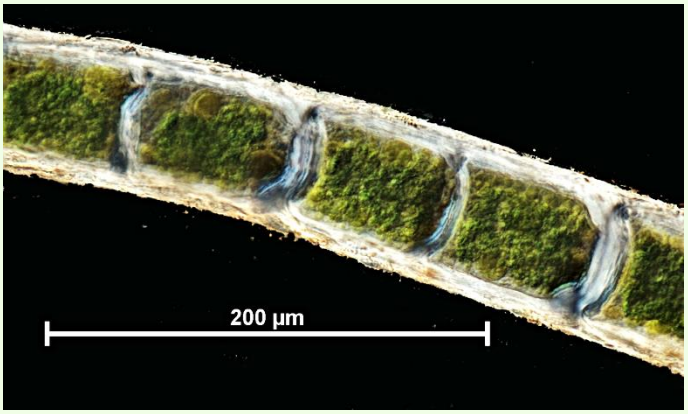
Division: Chlorophyta, Family: Trentepohliaceae

Mt Crawford forest
Whole plant
Stalked sporangia

- **whole plant resembles a lichen**
- **grows on tree bark**
- **sporangia are stalked**







Tribonema

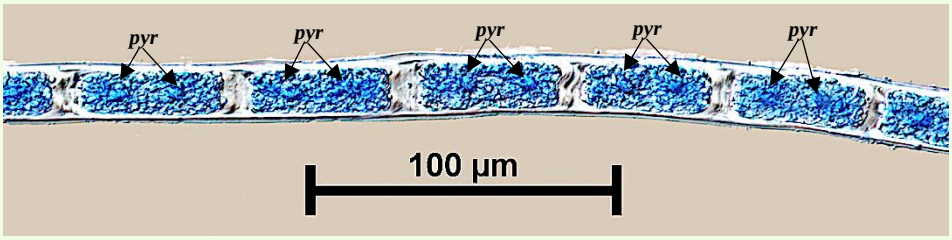
Division: Chlorophyta,
Family: Tribonemataceae

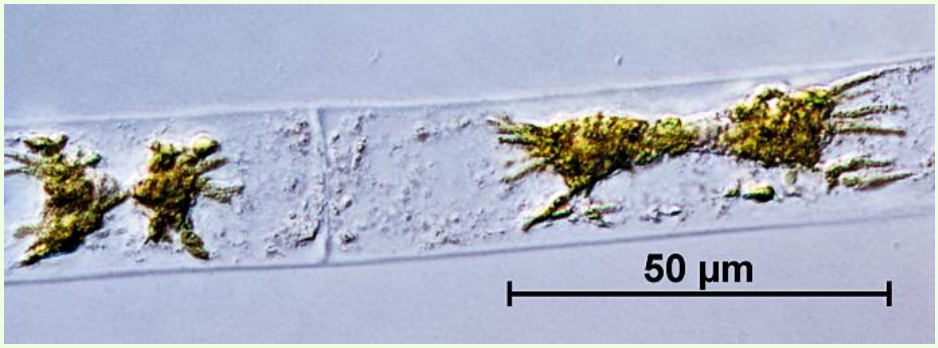
Specimen from Eyre Peninsula

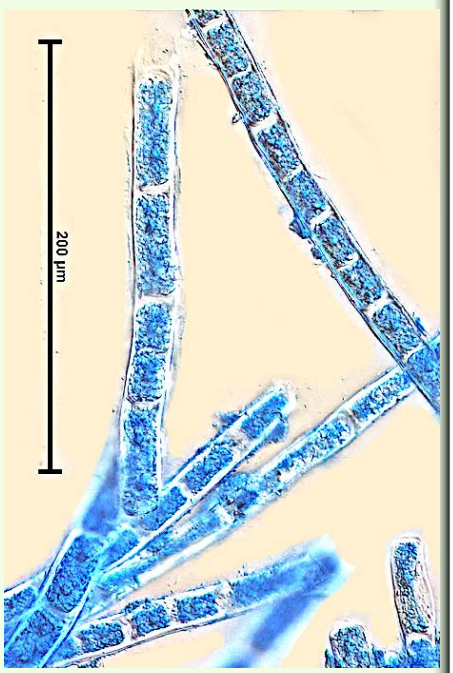
- Cell walls thick, laminated
- End walls form H-pieces, best seen in broken ends of filaments
- Plastids 1-several, pyrenoids absent

Zygnema

Division: Chlorophyta, Family: Zygnemataceae



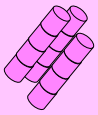


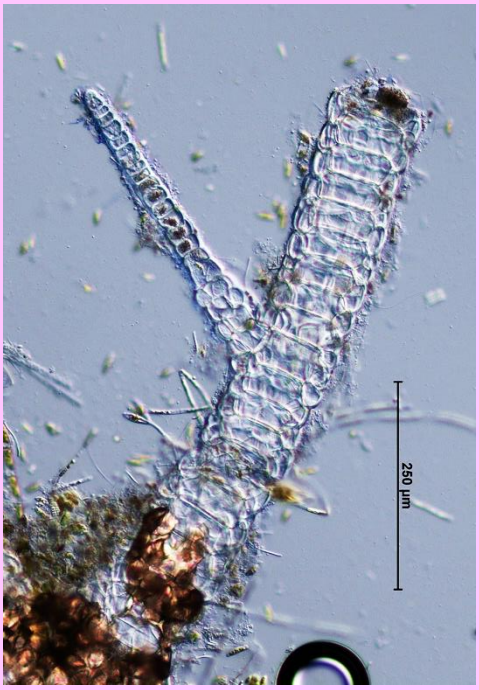


Big Bend Waterhole, River Murray, SA; on *Potomageton tricarinatus*, River murray, SA

- filaments unbranched
- chloroplasts with a pair of pyrenoids (*pyr*) best seen in plasmolysed cells where the chloroplasts have shrunk, becoming bi-polar in shape

RED, MULTISERIATE ALGAE



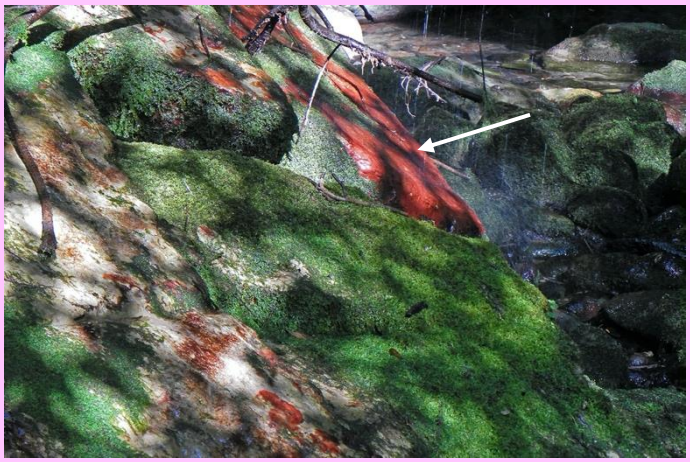


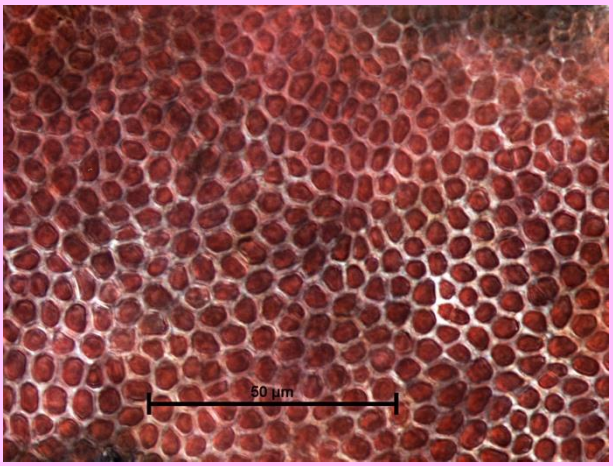
Compsopogon caeruleus

Division: Rhodophyta, Family: Compsopogonaceae

St Peters Billabong, (a previous meander of the River Torrens) Metropolitan Adelaide SA

- Plants may be dark-purple and thread-like when young, or sausage-shaped and bleached brown on maturity
- Young filaments uniseriate
- Older filaments have a central row of large, colourless cells, clothed in irregular, smaller coloured cells



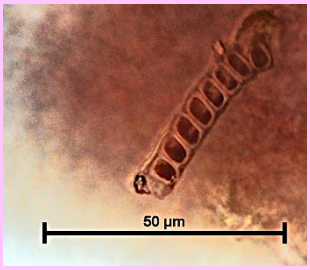


Hildenbrandia ?rivularis

Division: Rhodophyta, Family: Hildenbrandiaceae

Carnarvon Gorge Queensland

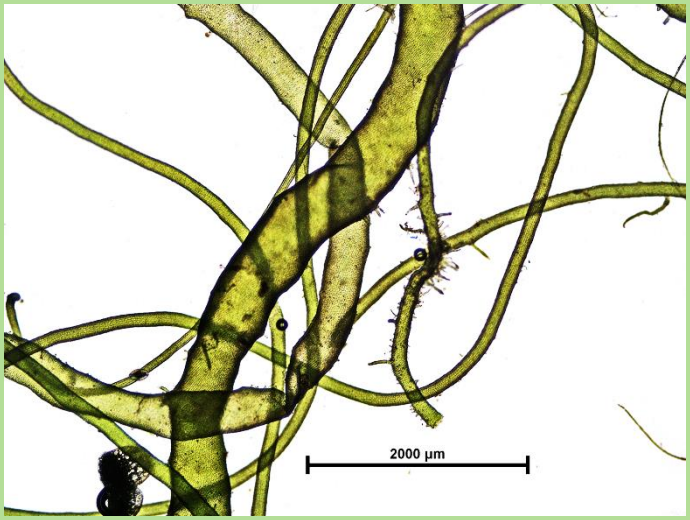
- Plant form bright red crusts on rocks (arrowed)
- Crusts consist of short, erect, tightly packed filaments (one shown at right)

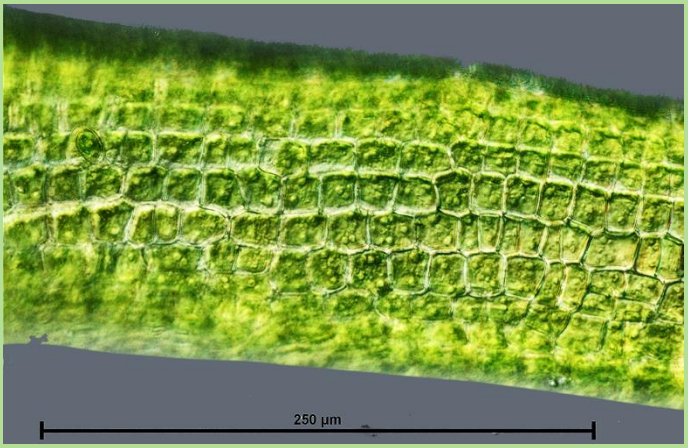


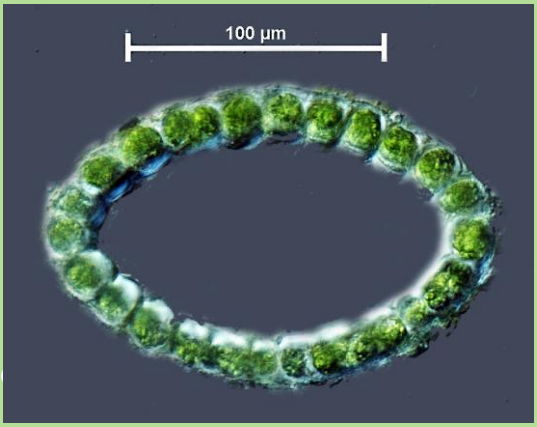
PARENCHYMATOUS ALGAE

§*Ulva flexuosa* subsp *paradoxa*

Division: Chlorophyta, Family: Ulvaceae







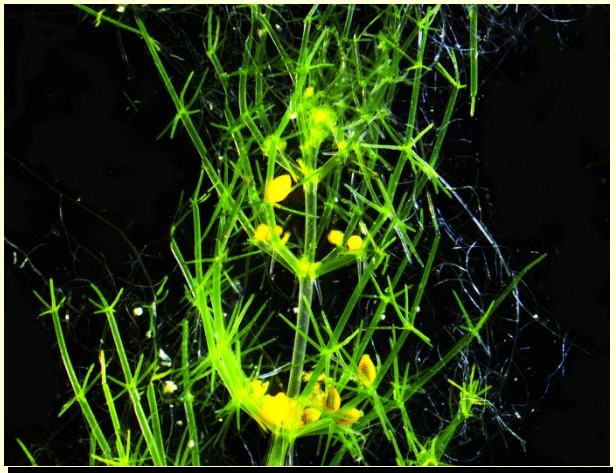
Pond Rymill Park Adelaide City, SA

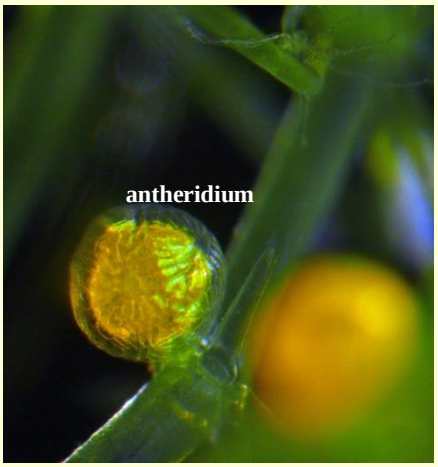
- **Mass of twisted threads**
- **Parenchymatous cells in surface view**
- **Single chloroplast fills cells, up to 5 pyrenoids per plastid**

- **Threads hollow**
- **Parenchymatous cells in surface view**

§as *Enteromorpha paradoxa* in the Marine Benthic Flora

COMPLEX ALGAE (RINGS OF SHORT BRANCHES ABOUT A CENTRAL AXIS)



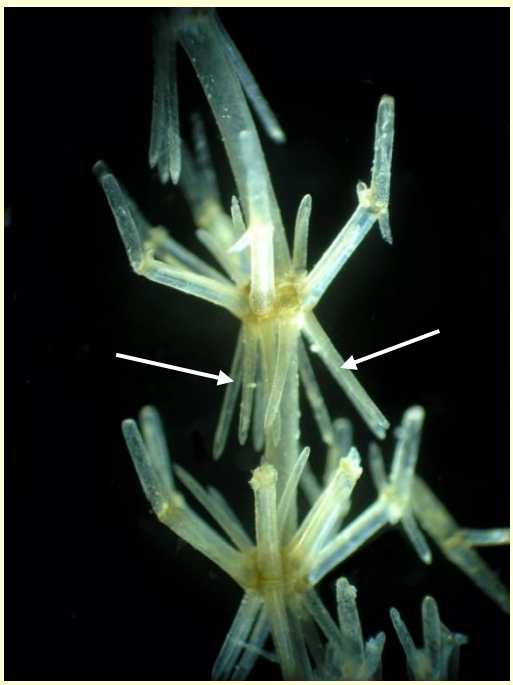


Chara

Division: Charophyta,
Family: Characeae

SARDI aquaculture tanks, West Beach, SA

- **Rings (whorls) of short side branches**
- **Male (antheridia) and female (oogonia) reproductive structures found together within the whorls**
- **Oogonia with a "crown" of 5 button-shaped structures**
- **Mature axis of a pressed specimen of *C vulgaris* coated with corticating cells, and spines (arrowed)**



Lamprothamnium papulosum

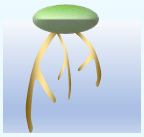
Division: Charophyta,
Family: Characeae

Little Dip, SE of SA

- **"spiky" habit**
- **Axis naked (not coated with corticating cells)**

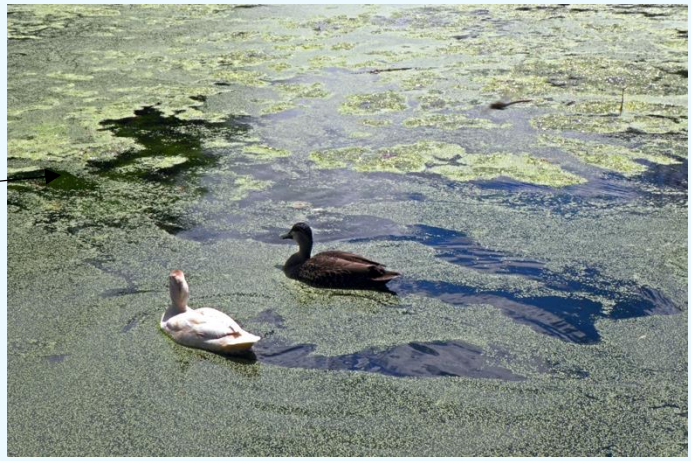
- **Reflexed spines (arrowed)**
- **Whorls of short, simple side branches *opposite* each side branch**

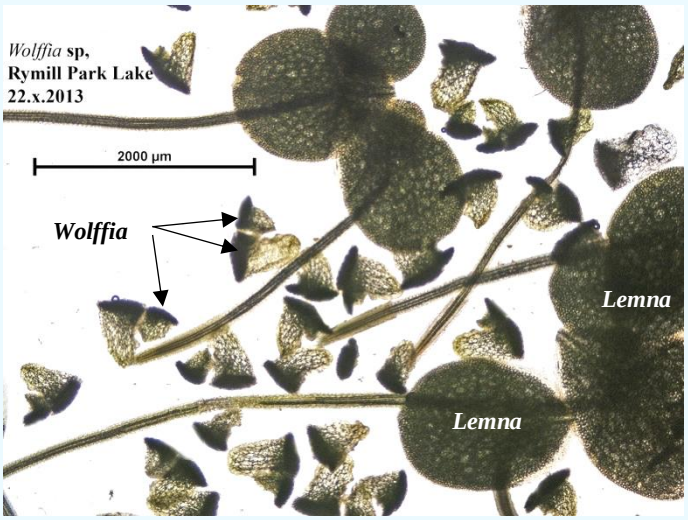
SMALL FLOATING VASCULAR PLANTS

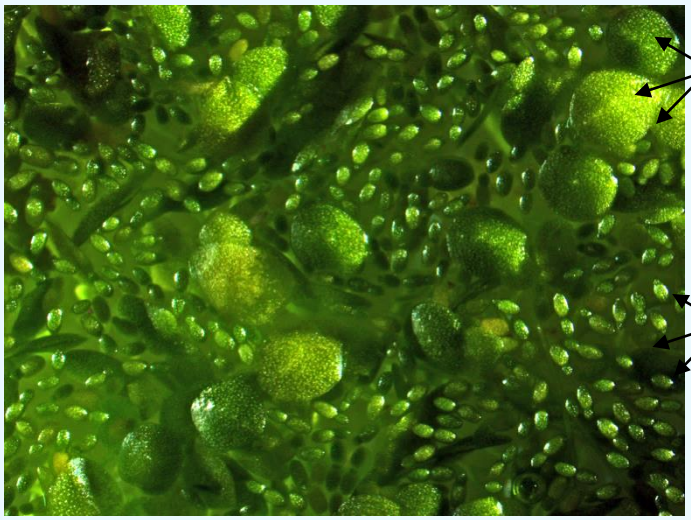


Wolffia and *Lemna*
Family: Araceae

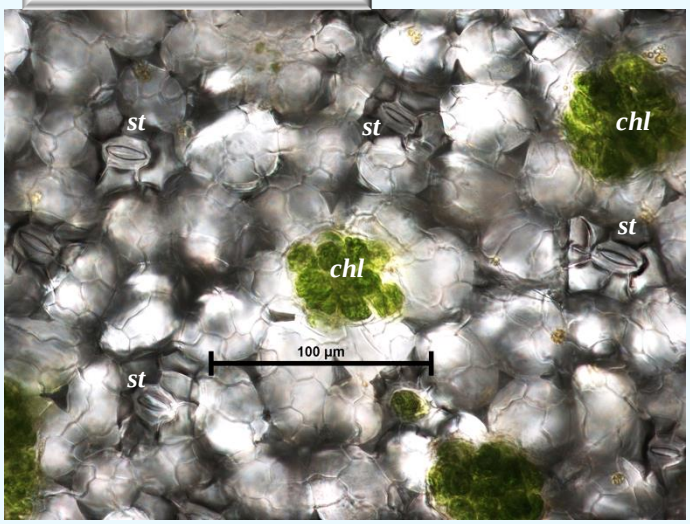
Rymill Pond and Torrens Lake, City of Adelaide, SA



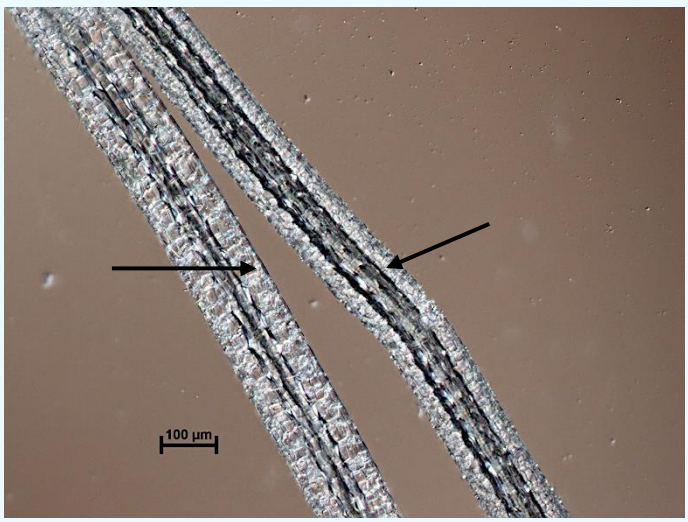




Lemna disperma

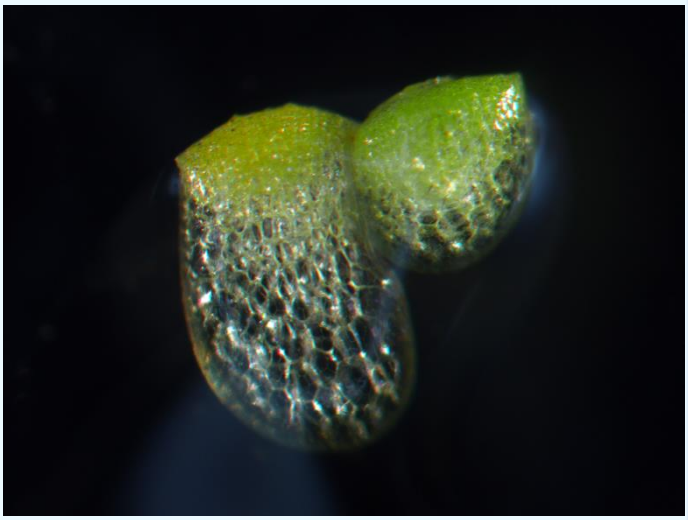


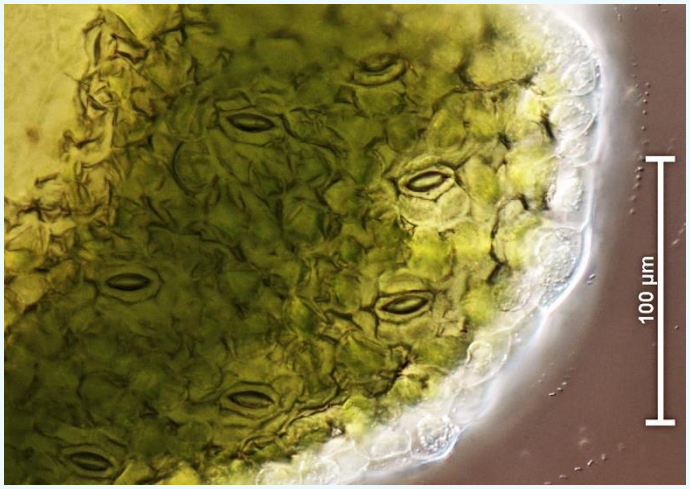
- **single floating leaves, stomates (*st*) uppermost**
- **Green alga, *Chlorochytriun lemnae*, (*chl*) symbiotic within the tissues of the *Lemna* leaves**



- **Vascular tissue in cores of *Lemna* roots**

Wolffia australiana





- **flowers exposed in openings in the leaves (arrowed)**
- **side view of single-leaved plant displays air-filled cells (aerenchyma)**
- **stomates visible in surface view of leaf**

FURTHER READING

Entwisle, T. *et al* (1997). *Freshwater Algae in Australia: a guide to conspicuous genera (second edition).* Sainty & associates