

Pictured Key to some common filamentous red algae of southern Australia.

Part VII: Tribe: Polysiphonieae of the Family : Rhodomelaceae

Red Algae. With some 800 species, many of which are endemic (found nowhere else), southern Australia is a major centre of diversity for red algae. Classification is based on detailed reproductive features. Many species unrelated reproductively have similar vegetative form or shape, making identification very difficult if the technical systematic literature is used.

This key Fortunately, we can use this apparent problem to advantage - common shapes or morphologies will allow you to sort *some* algae directly into the level of genus or Family and so shortcut a systematic search through intricate and often unavailable reproductive features. The pictured key below uses this *artificial* way of starting the search for a name. It's designed to get you to a possible major group in a hurry. Then you can proceed to the appropriate fact sheets within this website.

Scale: the coin used as a scale is 24mm or almost 1" wide. Microscope images of algae are usually blue stained.

This key is restricted to only one group of *filamentous* algae of the Family: **Rhodomelaceae**.

Ribbon-like or leafy members of this Family are excluded and may be covered in separate pictured keys in the future. The Rhodomelaceae have:-

- a basic *filamentous construction*. Cells grow in a single line (algae are *uniserial*), although this may be visible only near plant tips
- delicate, branched hairs (*trichoblasts*) associated with tip cells, although these are often shed
- *pericentral cells* equal in length to each filament cell which give filaments a characteristic banded appearance. The banded appearance may later be obliterated by additional cells (cortical cells) running lengthwise or rhizoids running between or on top of existing cells. Cross sections are then needed to locate both the central filament and pericentral cells
- *flask-shaped* mature female structures (cystocarps) and special lance-shaped branches (*stichidia*) containing tetrasporangia. Tetrasporangia can occur in single or paired columns either straight or spirally arranged

The Tribe: Polysiphonieae, covered by the key below, has these additional features:-

- filaments free (not joined sideways in a ribbon-shaped structure), and radially branched
- pericentral cells 4-20, clear at least near the branch tips
- trichoblasts *colourless*, present early but often shed
- some species with long, continually growing branches (of indeterminate length) and short branches (of determinate length)

Check in the "algal look-alikes" panel at the end of this key to exclude other filamentous algae with cortication and bands of pericentral cells.

The key below follows that in the Flora of southern Australia Part IIID, and requires that plant tips and reproductive structures be viewed microscopically.

- 1a. most branches similar in length and width. Figs 1-3. *Polysiphonia* (26 spp)
- 1b. side or determinate branches short, sometimes densely covering the main or indeterminate branches. (see Figs 4, 5) 2.
- 2a. side branches coated (corticated) with additional cells to close to their tips 3.
- 2b. side branches not or only slightly corticated 4.
- 3a. cross sections of branches near tips have 4 pericentral cells, branches radially arranged, tips narrowing to a point. Figs 4-9. *Lophurella periclados*
- 3b. cross sections of branches near tips have 6 pericentral cells, branches spirally arranged, tips compressed and minutely forked. Figs 10-14. *Alleynea bicornis*

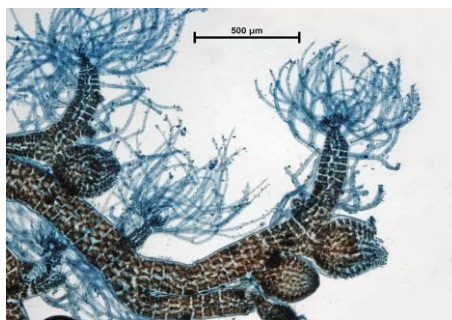


Fig. 1: *Polysiphonia atricapilla*: banded branches of similar size, colourless trichoblasts at tips, bulbous mature female structures (cystocarps)

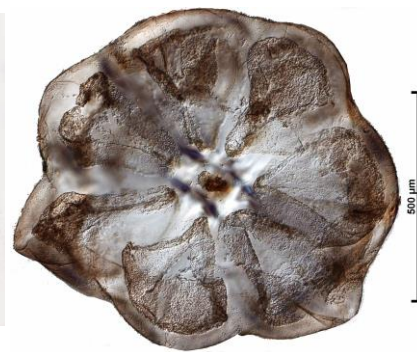


Fig. 2: *Polysiphonia decipiens* cross section: central filament, 7 pericentral cells



Fig. 3: *Polysiphonia decipiens*: branches of similar size, colourless trichoblasts at tips, bulbous mature female structures (cystocarps) and branches bearing tetrasporangia



Fig. 4: *Lophurella periclados*: poorly tufted specimen, long main-, short side-branches



Fig. 5: *Lophurella periclados*: tufted specimen



Fig. 6: *Lophurella periclados*: curved short side-branches corticated to tips



Fig. 7: *Lophurella periclados*: tetrasporangia in single, spiral columns

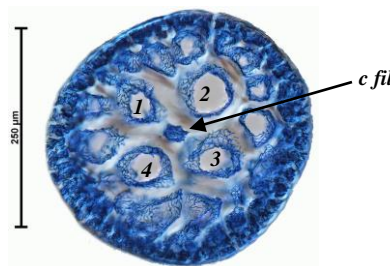


Fig. 8: *Lophurella periclados*, cross section near the branch tip: central filament (*c fil*) and 4 pericentral cells (1-4) clearly defined

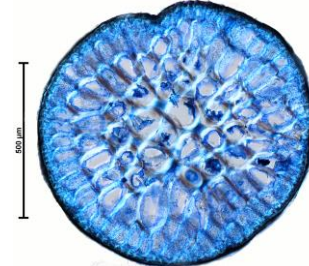


Fig. 9: *Lophurella periclados*, cross section of an older branch: central filament and pericentral cells obscured by corticating cells



Fig. 10: *Alleynea bicornis*: long main branches, short side-branches

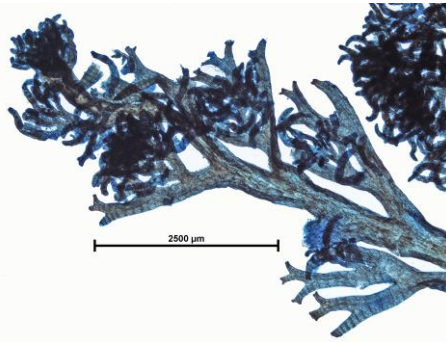


Fig. 11: *Alleynea bicornis*: heavily corticated branches, forked at tips

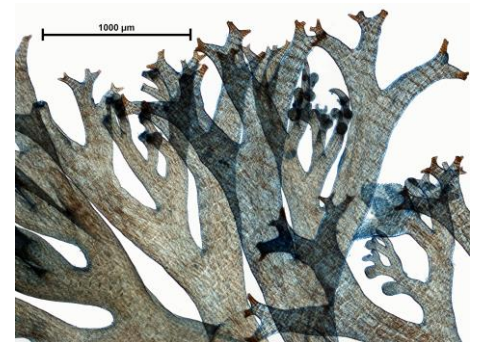


Fig. 12: *Alleynea bicornis*: forked tips, some banding of pericentral cells showing through surface cortical cells

- 4a. short side-branches radially branched 5.
- 4b. short side-branches branched in 2 opposite columns 9.
- 5a. four pericentral cells; branches can be naked *or* heavily corticated 6.
- 5b. seven or 6-12 pericentral cells, all branches naked 8.
- 6a. rare; main branches **naked**. Figs 15-19. *Tolypocladia penningtonensis*
- 6b. main branches (axes) **heavily corticated**; short side-branches often spiky, giving barb-wire appearance to long branches. Figs 20-27 (next page) *Echinothamnion* (2 spp)

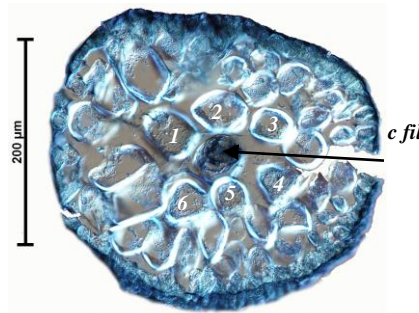


Fig. 13: *Alleynea bicornis*: cross section near a branch tip: central filament (*c fil*), 6 pericentral cells (1-6)

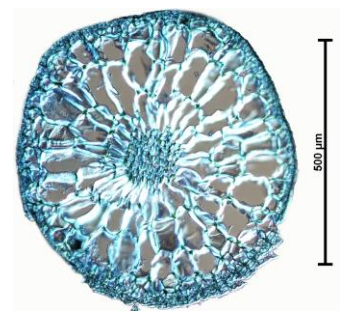


Fig. 14: *Alleynea bicornis*: cross section of an older branch: central filament and pericentral cells obscured by corticating cells



Fig. 15: *Tolypocladia penningtonensis*



Fig. 16: *Tolypocladia penningtonensis*: main branches densely covered with radially arranged, naked short side branches

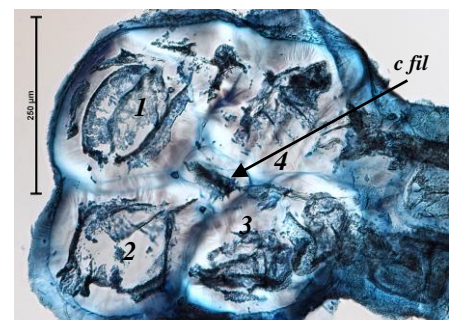


Fig. 17: *Tolypocladia penningtonensis*, cross section of axis, side branch attached: central filament (*c fil*); 4 prominent pericentral cells (1-4), cortication **absent**

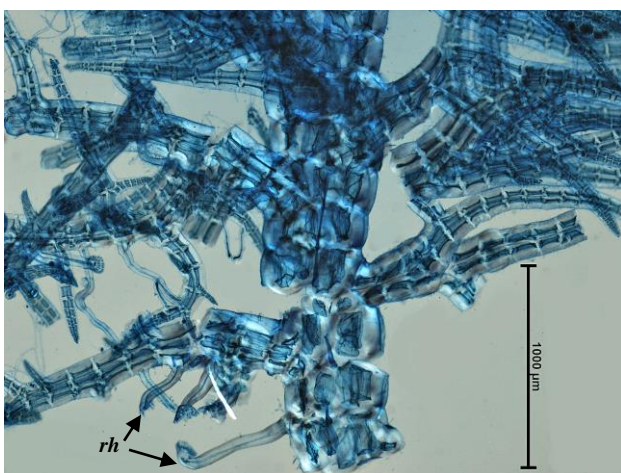


Fig. 18: *Tolypocladia penningtonensis*, near the base of a long-branch: cortication absent; bands of bulging pericentral cells prominent; rhizoids (*rh*) present

Fig. 19: *Tolypocladia penningtonensis*: branches uncorticated; branched trichoblasts close to tips are hair-like

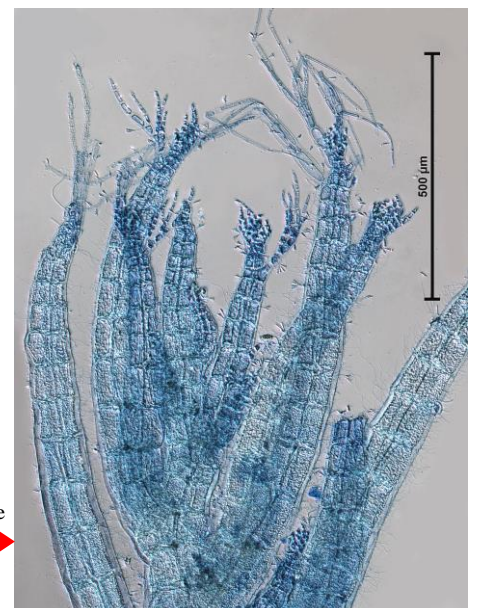




Fig. 20: *Echinothamnion hystrix*, robust form, with dense short side-branches wrapping around irregularly branched long-branches



Fig. 21: *Echinothamnion hystrix*, slender form from 32m deep



Fig. 22: *Echinothamnion hystrix*: spiky side-branches on unbranched long-branches

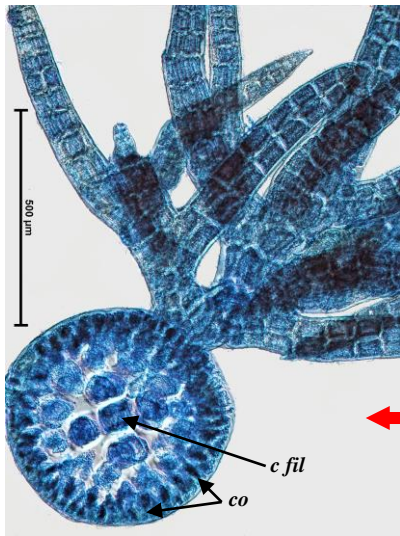


Fig. 23: *Echinothamnion hystrix*, cross section: emerging short side branch corticated at base; central filament (*c fil*); 4 pericentral cells and outer corticated layer (*co*)

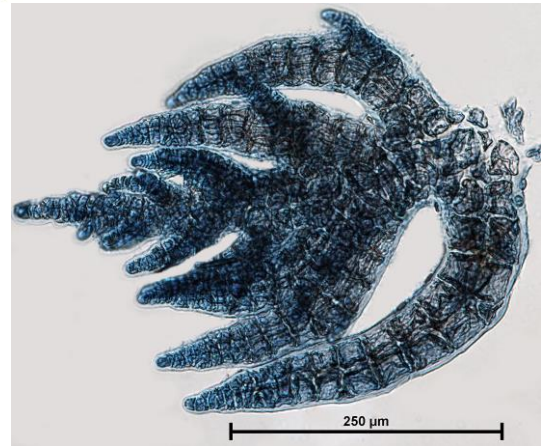


Fig. 24: *Echinothamnion hystrix*, branch tip

- 7a. plants slender in calm waters, robust in rough waters; long branches irregular in length and branching pattern, some unbranched or little-branched. Figs 20-24 (above)
 *Echinothamnion hystrix*
- 7b. long branches branched regularly several times, side branches long near the plant base, reducing in length towards the plant tip. Figs 25-27.
 *Echinothamnion hookeri*



Fig. 25: *Echinothamnion hookeri*: long branches branched regularly 1-2 times, generally longer towards the plant base



Fig. 26: *Echinothamnion hookeri*: a single long branch branched regularly into further long branches each coated with short side branches

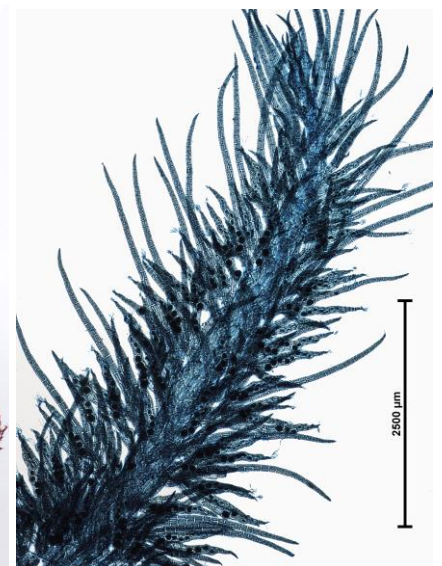


Fig. 27: *Echinothamnion hookeri*: tip of a branch, heavily corticated, densely coated with filamentous short side branches and tetrasporangial branches (stichidia)

- 8a. trichoblasts abundant, although shed near plant base; 7 pericentral cells in cross section of branches; tetrasporangia in the special sporangial branches (stichidia) are *single* in a spiral column. Figs 28-33. *Diplocladia patersonis*
- 8b. trichoblasts rare or obscure; 11-15 pericentral cells in cross sections of branches; tetrasporangia in spiralling *pairs* in stichidia. Figs 34-37. *Perrinia ericoides*

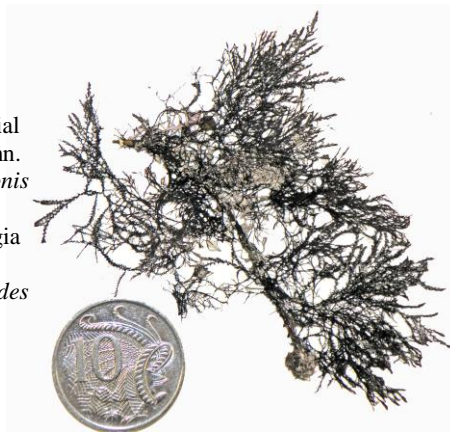


Fig. 28: *Diplocladia patersonis*

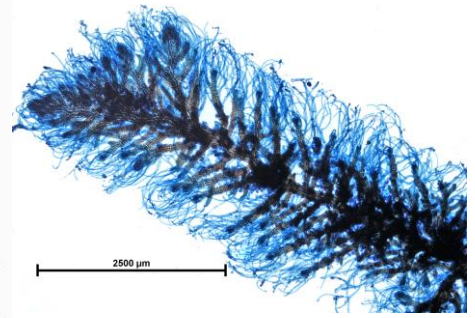


Fig. 29: *Diplocladia patersonis*: a long-branch tip wrapped in radial short branches ending in numerous hair-like trichoblasts



Fig. 30: *Diplocladia patersonis* growing in a rock pool. Coffin Bay S Australia. Photo: G Saunders

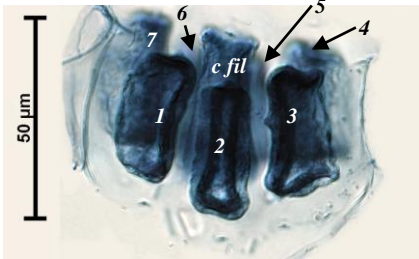


Fig. 31: *Diplocladia patersonis*: band of pericentral cells (1-7) about a central filament cell (*c fil*) filament cell extracted from a branch

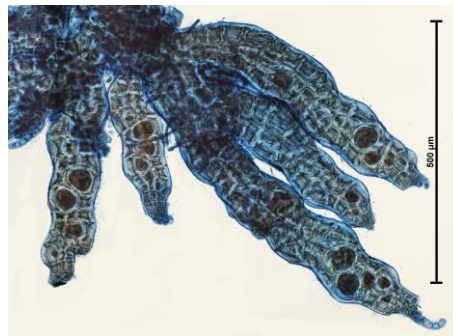


Fig. 32: *Diplocladia patersonis*: cluster of tetrasporangial branches (stichidia) ending in very short trichoblasts; sporangia in a single spiral column



Fig. 33: *Diplocladia patersonis*: detail of a branch tip with trichoblasts



Fig. 34: *Perrinia ericoides*

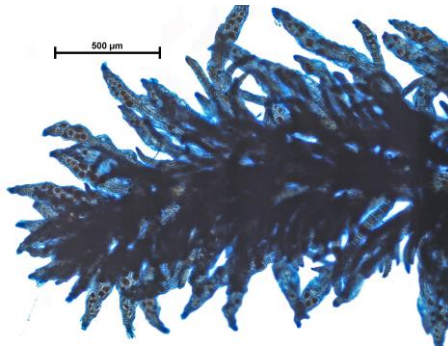


Fig. 35: *Perrinia ericoides*, branch tip: cluster of short branches and tetrasporangial branches (stichidia), hair-like trichoblasts absent

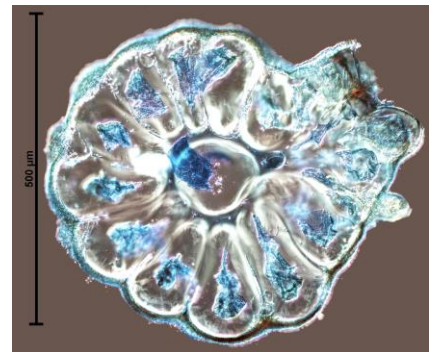


Fig. 36: *Perrinia ericoides*: cross section of a naked (uncorticated) branch with 11 pericentral cells ringing a central filament

- 9a. rare, only a few specimens collected (Tasmania & Victoria). Short side-branches occur in alternating clusters of 2-5, the lower member of clusters often cylindrical, the remaining compressed and toothed, each tooth initially ending in a trichoblasts which is later lost. Figs 38-40, next page
..... *Pitophycos tasmanica*
- 9b. short side branches compressed, branched several times, often ending in an unbranched (monosiphonous), hair-like filament (without pericentral cells), true trichoblasts absent; microscopic, egg-shaped animals often attached to branches
Figs 41-44, next page
..... *Chiracanthia arborea*

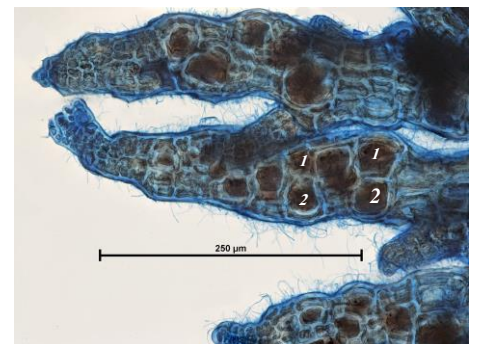


Fig. 37: *Perrinia ericoides*, detail of tetrasporangial branches (stichidia): stubby trichoblasts at tips and spiralling pairs of sporangia (two pairs, shown as 1, 2, in face view)

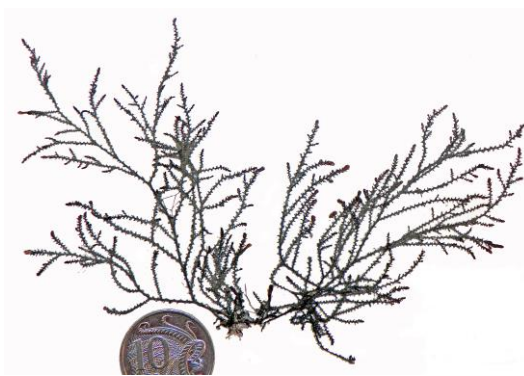


Fig. 38: *Pityophycos tasmanica*



Fig. 39: *Pityophycos tasmanica*: detail of bunched short side-branches



Fig. 40: *Pityophycos tasmanica*: detail of toothed short side-branches; heavily corticated main branch (axis)



Fig. 41: *Chiracanthia arborea*: examples of denuded, partly denuded and densely branched plants

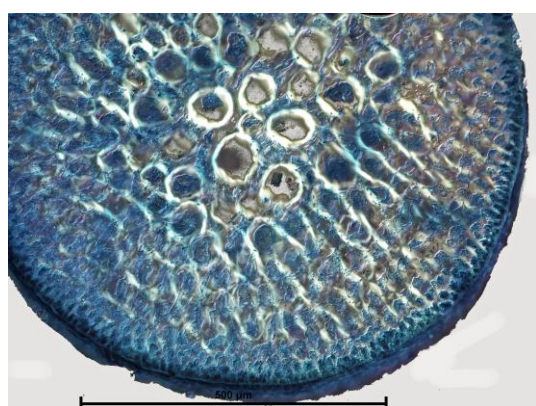


Fig. 42: *Chiracanthia arborea*, cross section: central filament and 4 pericentral cells prominent; cortication wide, grading from inner large to outer small cells

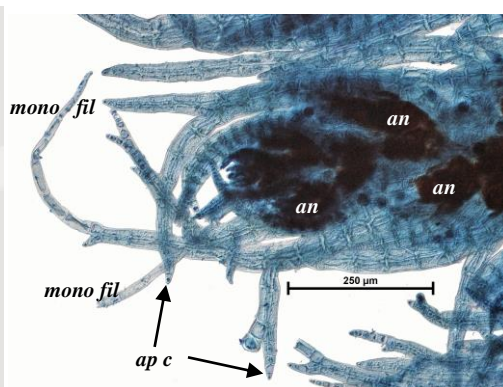


Fig. 43: *Chiracanthia arborea*, branch tips: forked short-branches ending in a small conical cell (apical cell, *ap c*) or extended into an unbranched (monosiphonous) filament (*mono fil*); dark animals (*an*) growing on branches

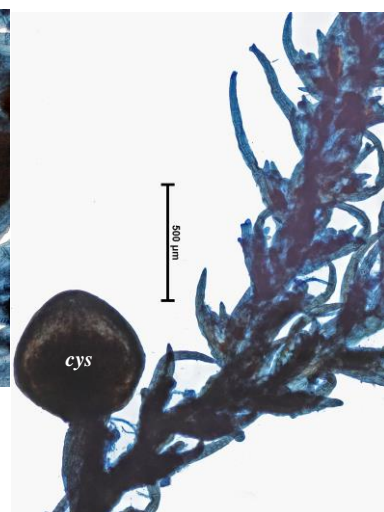


Fig. 44: *Chiracanthia arborea* clustered side-branches; dense, globular mature female structure (cystocarp, *cys*)

Look-alike algae: other filamentous Rhodomelaceae

Several other tribes in the family: Rhodomelaceae also resemble the Polysiphonieae, described above. Microscopic investigation is usually necessary to separate them. In contrast, these tribes all have coloured branched hairs (trichoblasts) although they may be rapidly shed, and some may be stubby, resembling short side-branches of the Polysiphonieae. Here are a few tribal differences:-

- I. Lophothalieae (11 genera): pericentral cells 4, 5 or 7, with naked axes (Figs A-C) or sheathed with additional (corticating) cells (Figs D-F)
- II. Herposiphonieae (7 genera): pericentral cells 4-16 without additional cortication; branches of determinate growth and those of indeterminate growth alternate in definite sequences along axes (Figs G-J)
- III. Lophosiphonieae (2 genera): pericentral cells 4-20 without additional cortication; small plants growing on other algae; branches of indeterminate growth curved, short-branches arising on upper side (Fig. K)

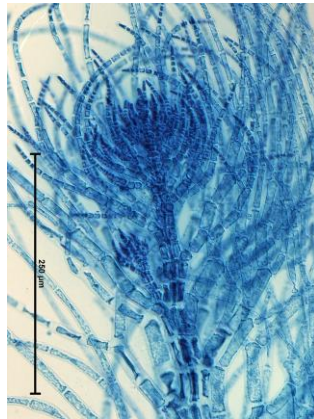


Fig. A: *Veleroa adunca*: coloured, branched filaments; main branches naked except for bands of pericentral cells

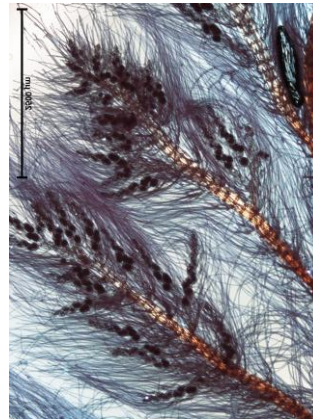


Fig. B: *Brongniartella australis*: short sporangial branches (stichidia), tetrasporangia in spiral columns

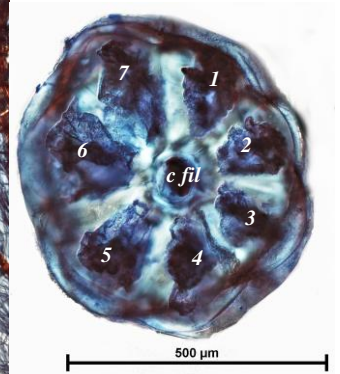


Fig. C: *Brongniartella australis*, cross section: central filament (*c fil*), 7 pericentral cells (1-7)

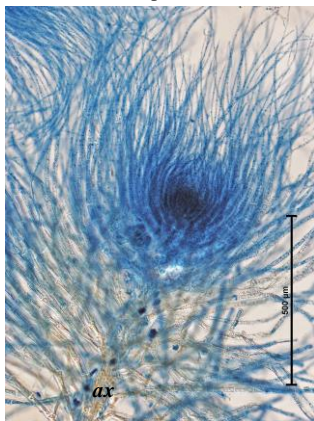


Fig. D, E: two magnifications of *Micropeuce feredayae*: dense coloured, filaments (trichoblasts) obscuring the axis (*ax*) sheathed in corticating cells obscuring the underlying bands of pericentral cells

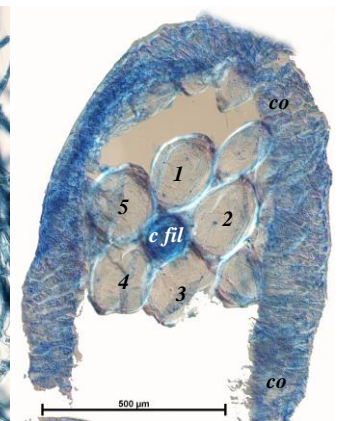
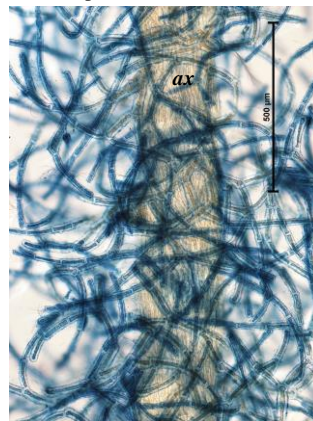


Fig. F: *Micropeuce feredayae*, cross section: central filament (*c fil*), 5 pericentral cells (1-5); sheathing corticating layer (*co*) (partly torn free)



Fig. G: *Herposiphonia versicolor* on a stem of seagrass

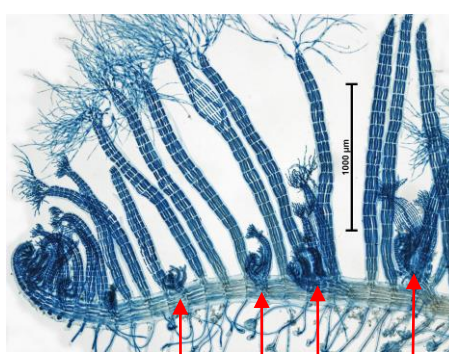


Fig. H: *Herposiphonia versicolor* horizontal branch with bands of pericentral cells; attachment cells (haptera) on under side, branches of potentially unlimited growth (red arrowed) alternating with every 3 branches of limited growth tipped with trichoblasts



Fig. I: *Herposiphonia versicolor*, cross section: central filament, 11 pericentral cells, additional cortication absent

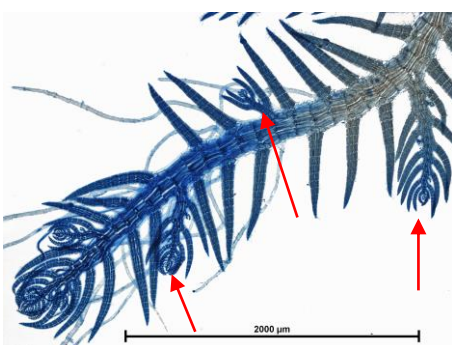


Fig. J: *Herposiphoniella plurisegmenta*: branches of potentially unlimited growth (red arrowed), alternating with every 5-7 branches of limited growth

Fig. K: *Lophosiphonia obscura*, curved branch of indeterminate growth, shorter branches (of determinate growth) on upper side

