

Master Key to the Filamentous Red Algae

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 Red algae with

1. **uniseriate** growth, that is, where most of the basic shape of the plant is produced from the growth of cells in a single line
2. overall thread-like or **filamentous** construction. This excludes leafy, blade-like and ribbon-like algae or those consisting of solid cylinders or hollow tubes constructed of relatively equal-sided (parenchymatous) cells. Algae with filaments formed into a meshwork or net have also been excluded from this key (they are found in a separate key – the “Red Mesh Algae”)

Unfortunately, in some filamentous algae the basic thread-like construction is obscured by

- additional cells (cortical cells) growing around the central thread. These can be a loose sheath of additional threads (rhizoids), **or** compact, irregularly arranged cells **or** uniformly arranged cells and these may produce compressed or slightly flattened branches
- in others, dense, overlapping rings or whorls of short side branches obscure the underlying filamentous construction

In such algae the uniseriate, filamentous growth pattern can then only be seen under the microscope

- near plant tips, or by making tissue squashes in order to move apart the corticating cells, or
- by cutting a cross section to expose the central filament, or
- by viewing short, relatively un-corticated side tufts

- 1a. filaments of cells **naked**, growing in a single line (monosiphonous); branches of about the same length. Compact wrappings (cortication) of regularly arranged cells around axes **absent**, although in some, loose rhizoids or scattered cells occur.

Figs 1, 2. go to

“Filamentous red algae of southern Australia Part I: algae with naked filaments”

(Tribes: Monosporaeae, Callithamnieae, Spermothamnieae, Griffithsiaeae, Warreniaeae, Bornetiaeae, Sphondylothamnieae in the Family: Ceramiaceae)



Fig. 1 *Griffithsia teges*: threads of naked, cylindrical, elongate cells

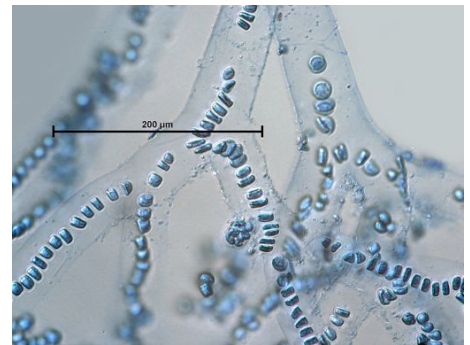


Fig. 2 *Stylonema alsidii*: threads of un-connected, disc-shaped cells

- 1b. filaments ringed with short branches (whorl-branchlets) **or** tightly wrapped (corticated) with additional cells
..... 2.

- 2a. axes ringed with whorl-branchlets
..... 3.

- 2b. axes wrapped with tightly adhering additional cells (corticated cells)
..... 4.

- 3a. filament cells ringed with 2-4 short, **overlapping** branches (whorl-branchlets) with dense but loose rhizoids resulting in felt-like branches, cylindrical or flattened in outline.
Figs 3-6. go to

“Filamentous red algae of southern Australia Part II: algae with whorl-branchlets overlapping, rhizoidal covering dense”

(Tribes: Warreniaeae, Wrangeliaeae, Lasiotaliaeae, Crouaniaeae, Dasyphileae in the Family: Ceramiaceae)

- 3b. filaments with **well-separated** opposite pairs or rings of 3-4 whorl-branchlets.
Figs 7-9 (next page) go to

“Filamentous red algae of southern Australia Part III: algae with well-defined whorl-branchlets”

(Tribes: Sphondylothamnieae, Antithamnieae, Heterothamnieae, Pterothamnieae, Family: Ceramiaceae, *Inkyuleea*, Family: Balliaceae)



Fig. 3. *Euptilocladia mucosa*: flat-branched, felt-like branches

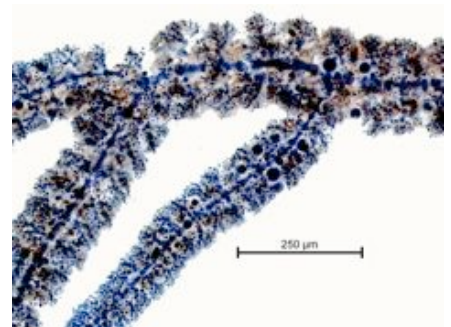


Fig. 4. *Crouania shepleyana*: overlapping whorl-branchlets

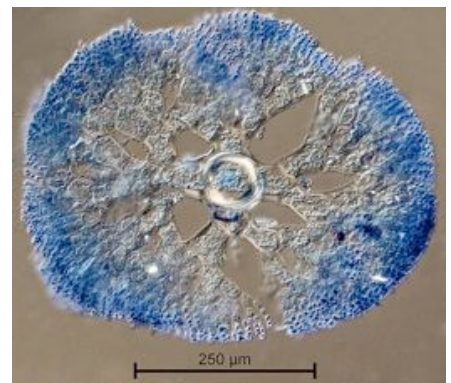
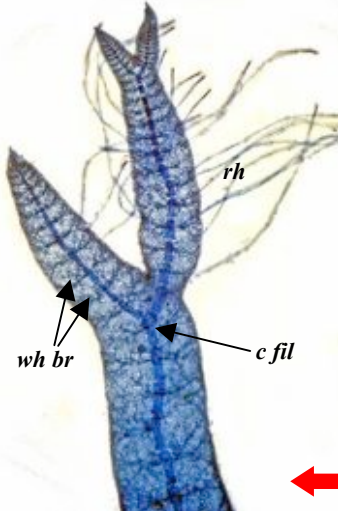


Fig. 5. *Euptilocladia mucosa*: whorl-branchlets overlapping, cross section needed to find the 4 radiating branchlets present

Fig. 6. *Gattya pinella*: blade tip: central filament (*c fil*), whorl branchlets (*wh br*) beneath surface cells, rhizoids (*rh*)

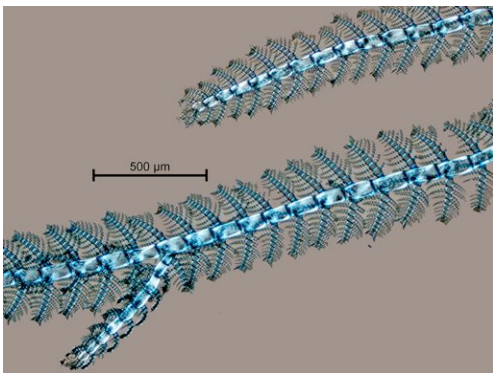


Fig. 7. *Acrothamnion preissii*: opposite pairs of whorl-branchlets



Fig. 8. *Wollastoniella mucronata*: rings of well-separated, short whorl-branchlets



Fig. 9. *Scageliopsis patens*: extended, well-separated whorl-branchlets

4a. cells of exposed filaments ringed with small cells around **upper parts** (nodes); main branches (axes) may be partly or wholly covered by additional corticating cells; bright gland cells may be present. Figs 10-14.

..... go to
“Filamentous red algae of southern Australia Part IV: nodally-corticated algae”
 (Tribes: Ceramieae, Spyrideae, in the Family: Ceramiaceae)

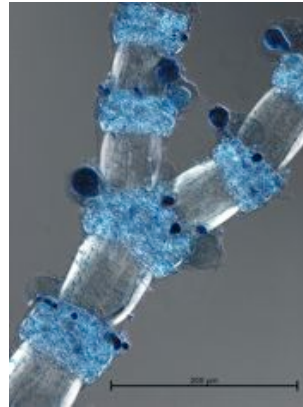


Fig. 10. *Ceramium isogonum*: well-separated nodal bands;

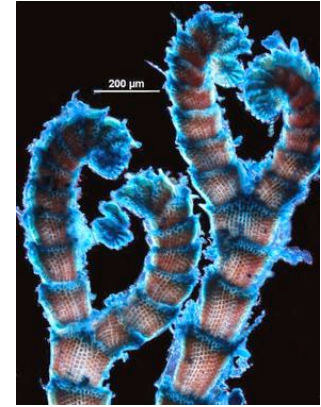


Fig. 11. *Centroceros clavulatum*: nodal cell rings; longitudinal columns of cortical cells

4b. main branches (axes) with the central filament usually ringed by regular bands of (pericentral) cells equal in length to axial cells, sometimes obscured by further corticating cells; bright gland cells **absent** or produced inwardly from the pericentral cells 5.

5a. apical cells prominent; pericentral cells in rings of 4, usually 2 of the opposite ones each with a pair of **flanking cells** half their length; plants often quickly disintegrating after collection. Figs 15, 16
 go to

“Filamentous red algae of southern Australia Part VI: Family: Sarcomeniaceae”

5b. apical cells prominent or obscure, pericentral cells 3-20, or obscure, pairs of flanking cells **absent**; plants not disintegrating rapidly 6.

6a. side branches similar to main branches 7. (next page)

6b. side branches **short**, sometimes filamentous, naked, branched or in single lines (monosiphonous), or flat-branched and comb-like 8. (next page)



Fig. 13. *Spyridia dasyoides*: opposite, stiff, prominently banded side filaments

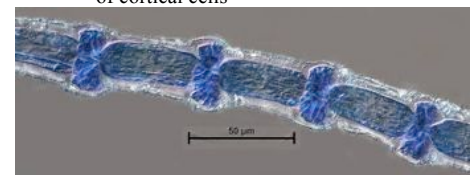


Fig. 12. *Spyridia filamentosa* single filament: corticating cells at nodes 2 cells deep

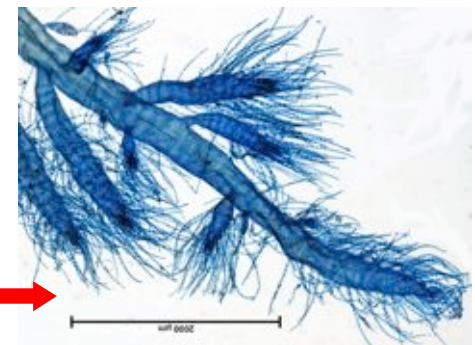


Fig. 14. *Spyridia squalida*: axis with a banded appearance and side branches with tufts of filaments

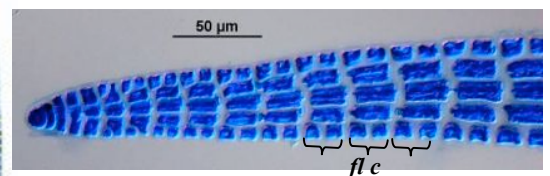
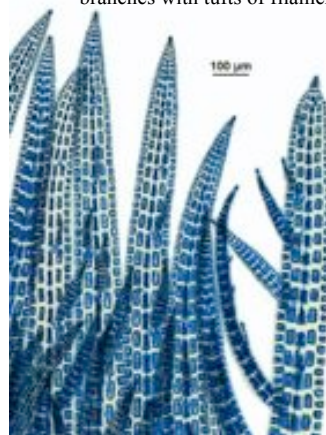


Fig. 15. *Platysiphonia delicata*: flanking cells (*fl c*) paired on 2 opposite pericentral cells

Fig. 16. *Platysiphonia delicata*: prominent apical cells

- 7a. pericentral cells 4-20. Extremely fine, **colourless**, hair-like branches (trichoblasts) occur close to growing points but may be rapidly shed. Figs 17-20

..... go to
“Filamentous red algae of southern Australia Part VII: Tribe: Polysiphonieae of the Family: Rhodomelaceae”

- 7b. pericentral cells 3. Trichoblasts **absent**. Plants are **tiny**, rarely observed, tufted, and represent the sporangial stage of *Asparagopsis* spp with tetrasporangia divided in a cross pattern (cruciate). Figs 21-23.
 *Falkenbergia* stage of *Asparagopsis*



Fig. 17. *Polysiphonia amphibolis*: filament with thin, branched, colourless trichoblasts

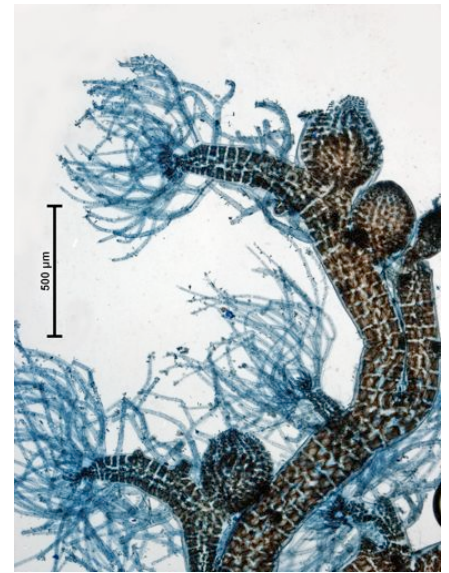


Fig. 18. *Polysiphonia atricapilla*: filaments with thin, branched, colourless trichoblasts at tips; goblet-shaped mature female structures (cystocarps)

- 8a. corticating (pericentral) cells **in bands**; tip cells with **straight** cross-walls; side branches mainly naked, branched or in single lines (monosiphonous), sometimes so numerous and hair-like they give the plant a woolly appearance. Tetrasporangia in cigar-shaped structures (stichidia); mature female structures (cystocarps) flask-shaped. Figs 24-26. (next page)

“Filamentous red algae of southern Australia. Part V: filaments corticated, side-branches naked”

Family: Dasyaceae

- 8b. irregularly-arranged, equal-sided corticating cells forming close to tips; tip cells with **sloping** (oblique) cross-walls; short side branches flat-branched, alternating along main branches (axes). Tetrasporangia scattered in side branches, cystocarps loosely wrapped in filaments of side branches. Figs 27-32, (next page).

“Filamentous red algae of southern Australia. Part VIII: axes with irregular cortication”

Tribes: Ptiloteae and Rhodocallideae, of the Family: Ceramiaceae

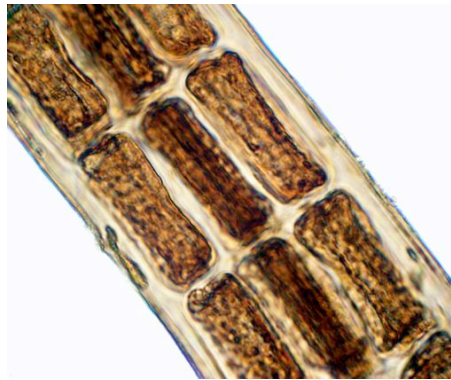


Fig. 19. *Polysiphonia teges*: bands of 4 pericentral cells obscure the underlying central filament of cells equal in length

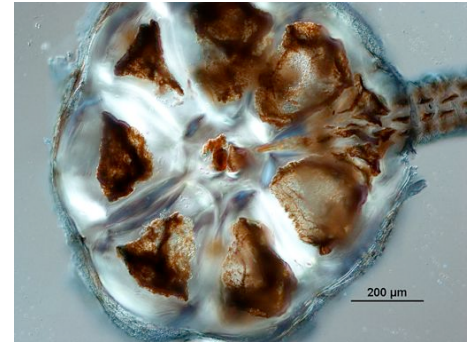
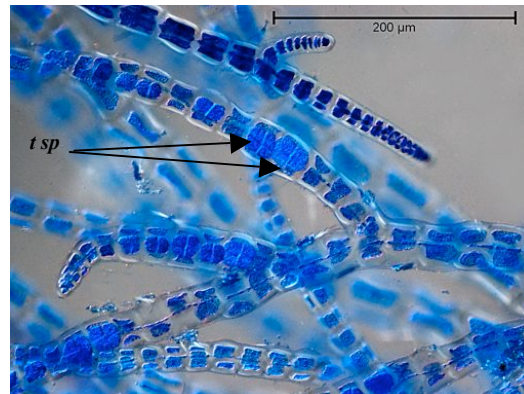


Fig. 20. *Polysiphonia decipiens*: cross section: central filament surrounded by 7 pericentral cells and a side branch



Fig. 21. *Falkenbergia* stage of *Asparagopsis*: minute tufts of filaments



Figs 22, 23. *Falkenbergia*: filaments with bands of 3 pericentral cells around narrow central cells; cruciate tetrasporangia (*t sp*)

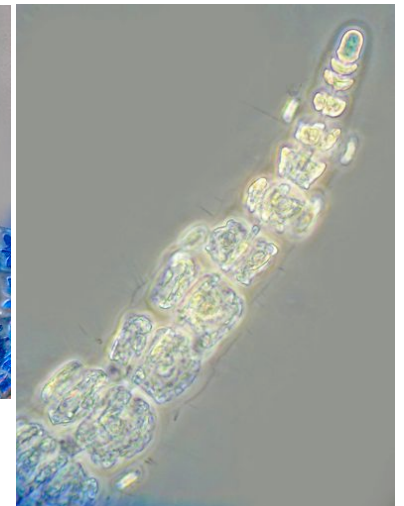




Fig. 24. *Dasya extensa*: dense hair-like side branches and stalked, mature female structures (cystocarps)

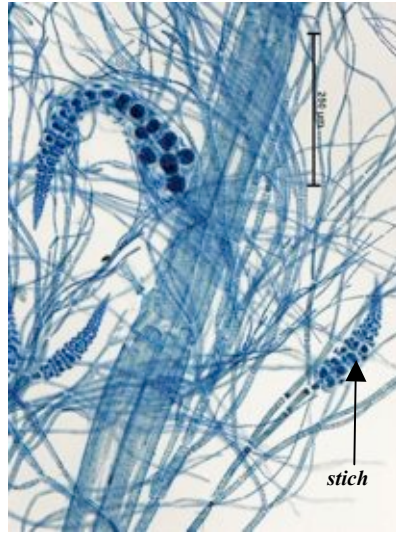


Fig. 25. *Dasya crescens*: narrow axes with bands of 4 pericentral cells; **coloured** side filaments naked, (no trichoblasts); lance-shaped stichidia (*stich*) present

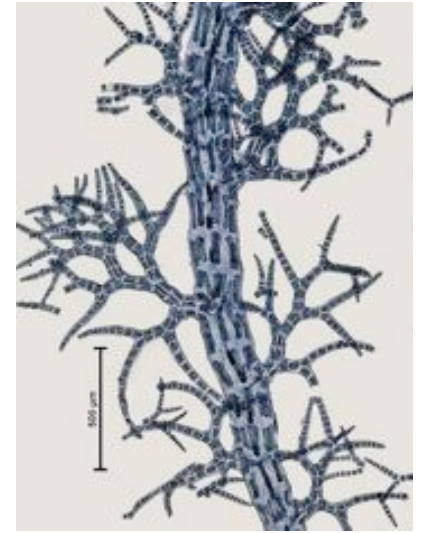


Fig. 26: *Heterosiphonia australis*: axis with bands of 7 pericentral cells (4-5 seen in side view); filamentous side branches branched, cells in a single line (monosiphonous) except at base



Fig. 27. *Euptilota articulata*: detail of feathery (pinnate) branching

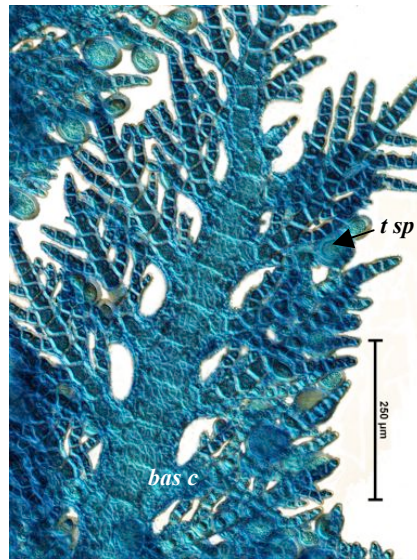


Fig. 28. *Euptilota articulata*: tetrasporangiate plant: alternating, comb-like side filaments; sloping (oblique) cross walls seen near tips; tetrasporangia (*t sp*) scattered in filaments

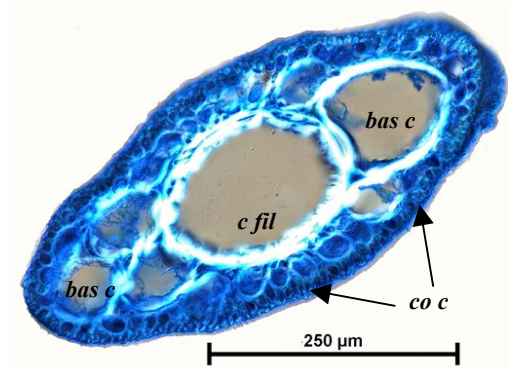


Fig. 29. *Euptilota articulata*, cross section: central filament (*c fil*); basal cells of side filaments (*bas c*); corticating cells (*co c*)



Fig. 30. *Rhodocallis elegans*: plants are flat-branched. The basic filamentous construction is visible only in undamaged branch tips and may be difficult to locate

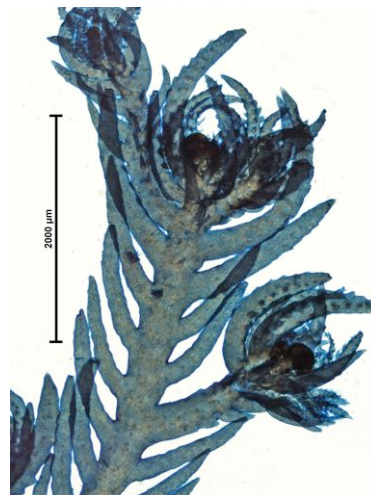


Fig. 31. *Rhodocallis elegans*: naked mature female structures (cystocarps) at branch tips

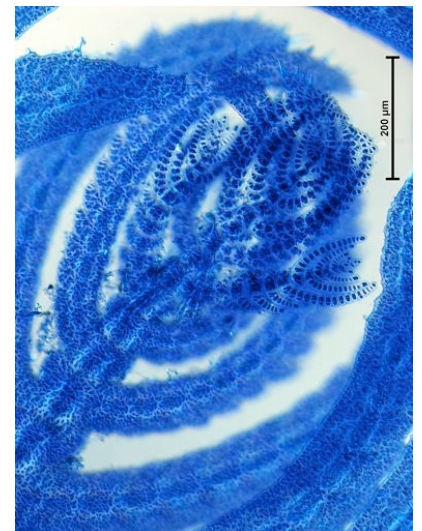


Fig. 32. *Rhodocallis elegans*, branch tip: filaments visible, side branches alternating