PICTURED KEY TO SOME COMMON FILAMENTOUS RED ALGAE OF SOUTHERN AUSTRALIA, PART IX.
TRIBE: LOPHOTHALIEAE OF THE FAMILY: RHODOMELACEAE

This key is restricted to red algae that have

- thin, cylindrical, main branches (axes) showing microscopic ***bands*** of (pericentral) cells surrounding a central thread, at least near the tips of plants
- a ring of ***4-7*** pericentral cells surrounding a central thread seen in cross-sections of axes ***near plant tips***
- in most genera, ***additional*** (corticating) ***cells***, at least near the plant base, that coat and obscure the pericentral bands
- in all genera**,** relatively persistent, ***coloured branchlets*** of naked cells, arising initially from each of the pericentral bands, sometimes giving the plant a woolly appearance. (These represent coloured ***trichoblasts***, equivalent to the colourless ones found in the Tribe: Polysiphonieae.) They may be branched or unbranched, spreading, curled upwards, or form discrete tufts. In lower parts of plants these are shed which requires a thorough search under the microscope if they are to be found
- sporangia ***singly*** or in ***pairs*** in a spiral pattern along swollen branchlets or in special cigar-shaped structures (stichidia)

The key below attempts to separate genera on mainly vegetative features. Unfortunately vegetative features also resemble *Dasya* species in the Tribe: Dasyaceae. Sporangia occur in rings of 4-6 and only in special structures (stichidia) in the Dasyaceae, and walls of cells at forks in branchlets are not completely separate, but overlap basally.

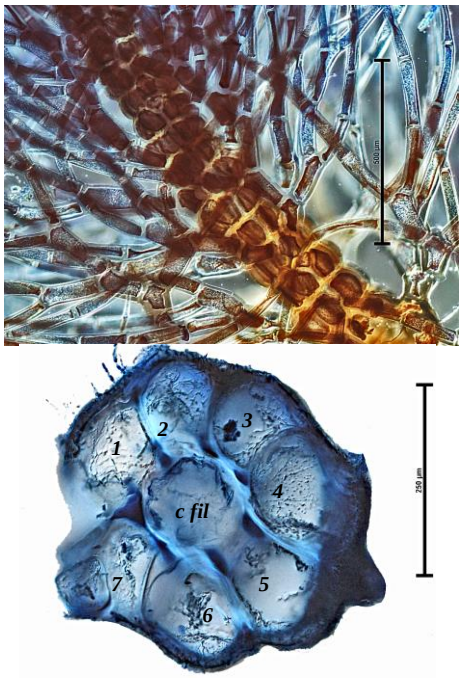
1a. microscopic bands of (pericentral) cells observable throughout main branches ….. 2.

1b. microscopic bands of cells seen only near branch tips, rapidly obscured by additional (corticating) cells ……..…. 3.

2a. plants 100-500 mm tall; side branchlets usually radially and irregularly branched; cross sections of main branches (axes) viewed microscopically show a central thread ringed by ***7*** (pericentral) cells. Figs 1-3.
…… *Brongniartella australis*

2b. plants delicate, 10-40 mm tall, intricately branched, growing on sea grasses or algae; side branchlets flat-branched (branched in one plane, but difficult to determine), curving upwards; axes in cross section with ***4*** pericentral cells. Figs 4-7.
…… *Veleroa adunca*

Fig. 1: *Brongniartella australis*, whole plants



Figs 2, 3: *Brongniartella australis*. Top, radially arranged branchlets on an axis with bands of pericentral cells. Bottom, cross section with central thread (***c fil***) ringed by pericentral cells (***1-7***)

Fig. 4: *Veleroa adunca*, whole plants on a sea grass stem

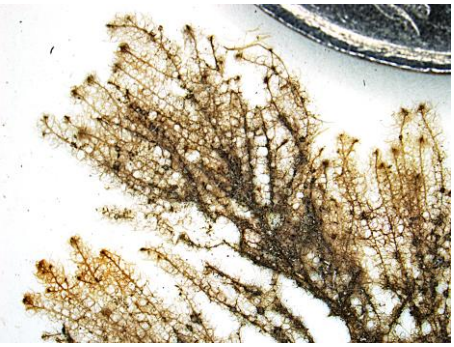


Fig. 5: *Veleroa adunca*, detail of intricate branching

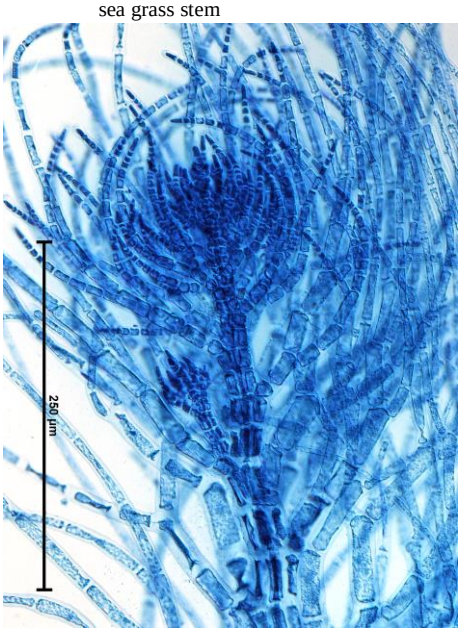


Fig. 6: *Veleroa adunca*, near plant tip, prominent pericentral bands, 3 of the 4 cells present in each band are visible in surface view; side branchlets are obscurely flat-branched

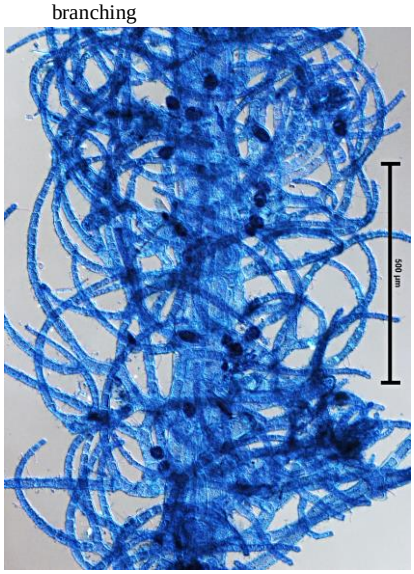


Fig. 7: *Veleroa adunca*, fine, upturned branchlets

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed.*. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

3a. plants rust-red in colour, grow on the brown algae *Cystophora* and *Carpophyllum*. Axes in cross section show ***5*** (rarely 4) ***pericentral cells.*** Spores occur in special branches (stichidia) in a ***single*** straight line, but with collapsed, empty chambers opposite each spore, producing a lop-sided effect. Figs 8-. ..... *Haplodasya* (2 named, 1 un-named spp.) 4

3b. plants grow largely on solid surfaces. There are ***4-7*** pericentral cells in cross sections. Spores occur singly or in pairs in ***spirals*** within special branches (stichidia) or normal vegetative branches ..... 6.

4a. plants minute, ≈ 2 mm tall, on *Cystophora monilifera*. Figs 8, 9. *Haplodasya* un-named sp.

4b. plants 50-100 mm tall …….. 5.

5a. plants 20-50 mm tall, of straggling axes with numerous, short side tufts, growing on a variety of *Cystophora* spp. (but ***not*** *C. siliquosa*) and *Carpohyllum*. Figs 10-12. ..... *Haplodasya urceolata*

5b. plants about 100 mm long, of slimy, worm-like main branches and sparse side branches, densely clothed in upper parts with hair-like threads, growing on *Cystophora siliquosa.* Figs 13-15. ..... *Haplodasya tomentosa*

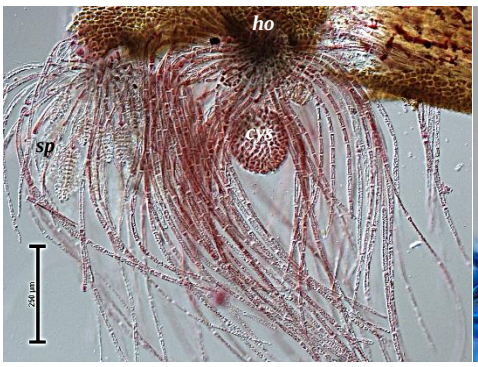


Fig. 8: *Haplodasya* un-named sp., base embedded in the host (***ho***), male clusters (***sp***), mature female structure (***cys***)

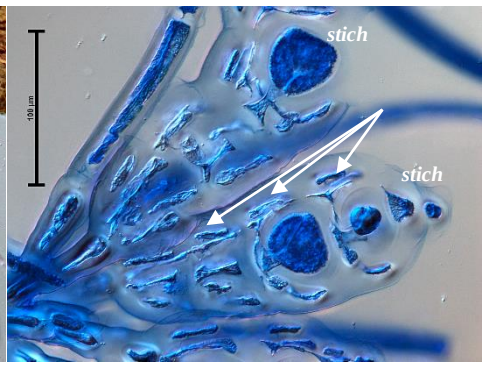
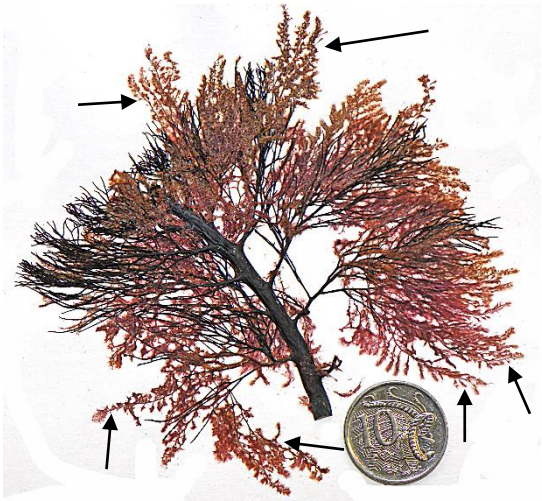
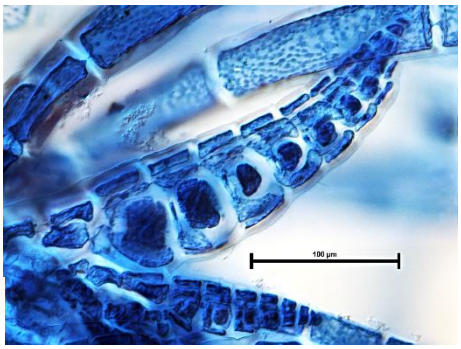


Fig. 9: *Haplodasya* un-named sp., special sporangial structures (stichidia, ***stich***) with paired chambers, one of the pair empty (arrowed)





Figs 10-12: *Haplodasya urceolata*. Above left, numerous plants (rusty red, arrowed) on *Cystophora moniliformis* (black); above right, preserved (bleached) specimen with long-necked, flask-shaped mature female structures (cystocarps); left, lop-sided spore structure (spores in a single line with collapsed, empty chambers opposite)

Figs 13-15: *Haplodasya tomentosa*.
Far left and middle. several plants (rusty red) on *Cystophora siliquosa* (black); above right, preserved (bleached) specimen with flask-shaped mature female structures (cystocarps) and a dense felty covering of hair-like threads

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed*.. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

6a. side branchlets in discrete ***bunches*** or tufts ("short shoots"), at least along mature axes ..... 7.

6b. side branchlets of hair-like threads forming a relatively continuous, woolly or cob-web like wrapping in younger parts of plants ..... 9.

7a. tufts consist of a central thread and short branches ..... 8.

7b. tufts consist of stiff, naked, spreading threads branched obscurely at their base. Figs 15-18. ..... *Doxodasya bolbochaete*

8a. tufts soft, branchlets clumped; mature female structures (cystocarps) flask shaped, with a prominent neck; axes with 5 pericentral cells in cross section. Figs 19-23. ..... *Micropeuce glomulifera*

8b. tufts stiff, spreading, clothed in additional cells basally, ending in sharp points; cystocarps without a neck; axes with 4 pericentral cells in cross section. Figs 24-28 (next page) ..... *Doxodasya lenormandiana*

Fig. 15: *Doxodasya bolbochaete*

Fig. 16: *Doxodasya bolbochaete*, stiff, tufted side branchlets (bearing male structures)

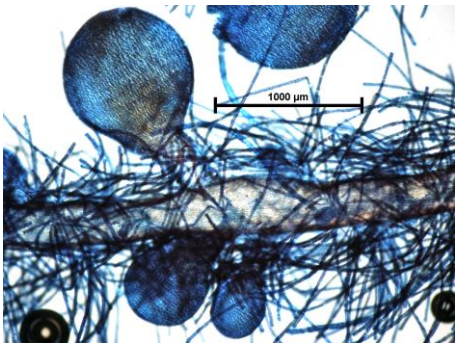


Fig. 17: *Doxodasya bolbochaete*, bulbous mature female structures (cystocarps)

Fig. 18: *Doxodasya bolbochaete*, cross section with central thread, 4 pericentral cells and branchlet tuft from the top surface

Fig. 19: *Micropeuce glomulifera*, partially denuded plant, tufts near tips only

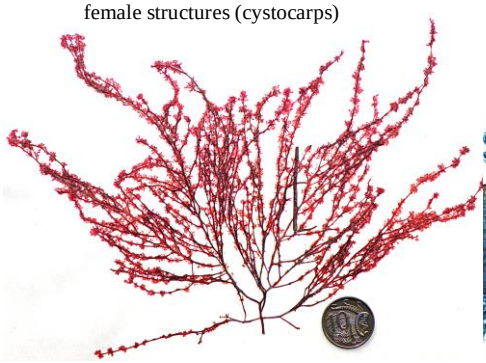


Fig. 20: *Micropeuce glomulifera*, with side tufts along most of the lengths of axes

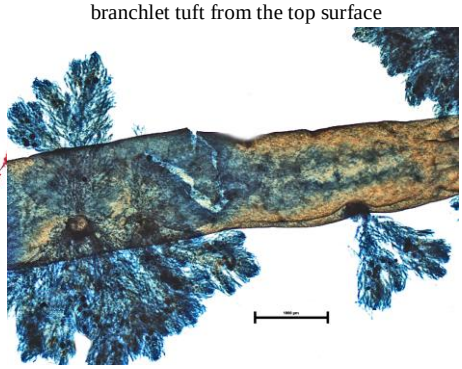


Fig. 21: *Micropeuce glomulifera*, detail of side tufts along an axis

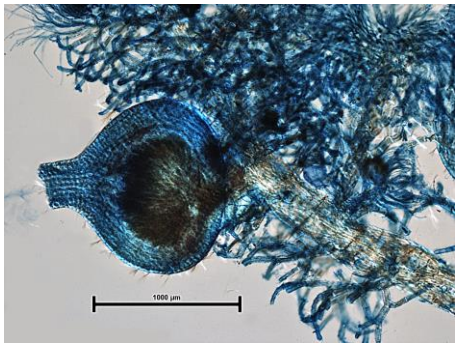


Fig. 22: *Micropeuce glomulifera*, flask-shaped mature female structure, with a long neck, in a side tuft

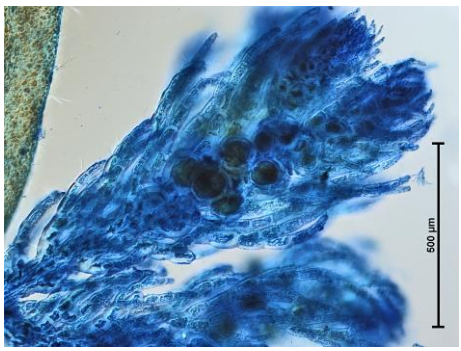


Fig. 23 *Micropeuce glomulifera*, sporangia in pairs in a spiral along a tufted branchlet

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed*.. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

Fig. 24: *Doxodasya lenormandiana*

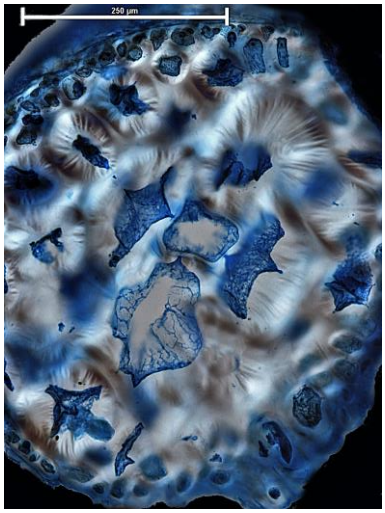


Fig. 25: *Doxodasya lenormandiana*, cross section, central thread ringed by 4 pericentral cells

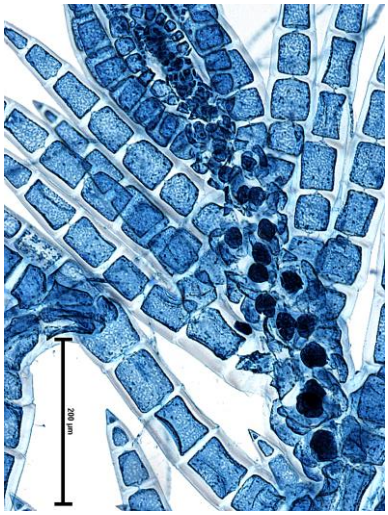


Fig. 26: *Doxodasya lenormandiana*, branchlet bearing sporangia in a spiral, threads ending in pointed cells

9a. plants tough, axes, with 4 pericentral cells in cross section, bear short, ***spiny*** corticated branches (coated in additional cells). Hair-like threads inconspicuous, especially in pressed specimens. Figs 29-34. ..... *Endosiphonia spinulosa*

9b. plants soft, thin or wiry, spines ***absent***. Hair-like threads often prominent ..... 10.

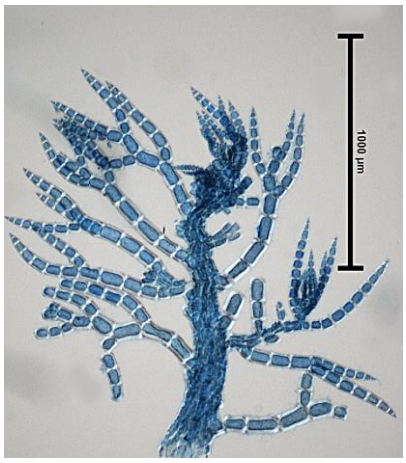


Fig. 27: *Doxodasya lenormandiana*, branchlet bearing anomalous, extremely fine threads (arrowed)

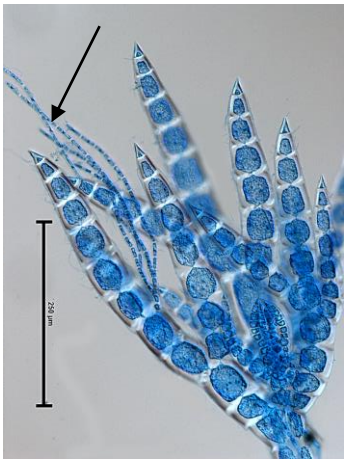


Fig. 28: *Doxodasya lenormandiana*, branchlet ending in pointed cells, coated with additional cells (corticated) below

Fig. 29: *Endosiphonia spinulosa*, dense branching obscuring the spiny axes

Figs 30, 31: *Endosiphonia spinulosa*, spines exposed

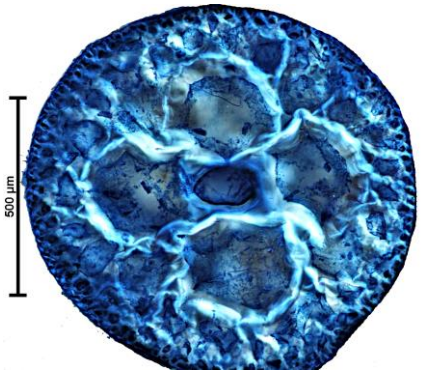


Fig. 32: *Endosiphonia spinulosa*, cross section, central thread, ringed by 4 pericentral cells

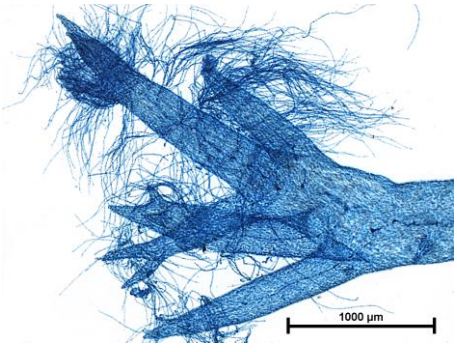


Fig. 33 *Endosiphonia spinulosa*, spines and hair-like threads

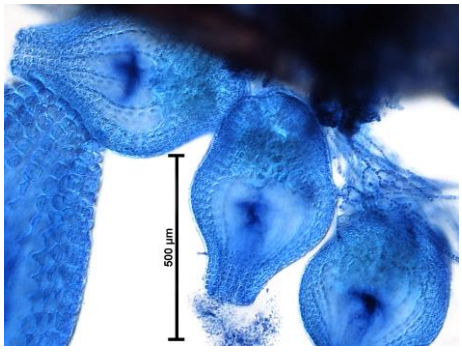


Fig. 34 *Endosiphonia spinulosa*, mature female structures (cystocarps)

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed.*. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

10a. plants soft, axes thin, only lower parts clothed in additional cells (corticated); 4 pericentral cells in cross sections of axes; spores in a spiral in specialised structures (stichidia), lacking hair-like threads. (Plants could be mistaken for a species of *Polysiphonia* except that the hair-like threads (trichoblasts) are coloured.) Figs 34-37. ..... *Lophocladia kuetzingii*

10b. plants tough; axes thin or thick and corticated except at tips; 5-7 pericentral cells in cross sections, although these may be seen only near plant tips; spores in pairs in spirals along short branches ..... 11.

11a. plant holdfasts branched; upper branches feathery; 7 pericentral cells in cross sections, visible only at plant tips, rapidly obscured by numerous threads, some bearing dark ***gland cells*** that are found also in external naked threads. Figs 38-43. ..... *Holotrichia comosa*

11b. holdfasts various; upper branches more irregular; 5-7 pericentral cells in cross sections, internal threads ***absent***, gland cells ***absent*** ..... 12.

Fig. 34: *Lophocladia kuetzingii*

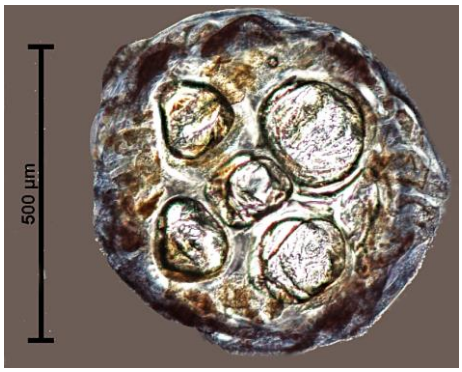


Fig. 35: *Lophocladia kuetzingii*, cross section, central filament, 4 pericentral cells

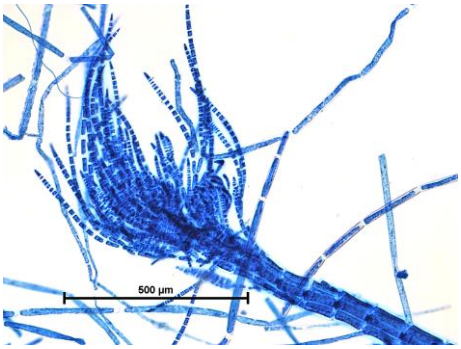


Fig. 36: *Lophocladia kuetzingii*, axis tip with unbranched, hair-like threads, axes with bands of pericentral cells

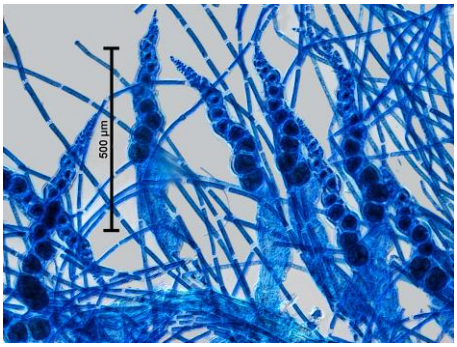


Fig. 37: *Lophocladia kuetzingii*, special spore structures (stichidia), spores slightly spiral

Fig. 38: *Holotrichia comosa*, with feathery branches

Fig. 39: *Holotrichia comosa*, 2 plants with large, branched holdfasts

Fig. 40: *Holotrichia comosa*, detail of the feathery branching pattern, densely corticated axis

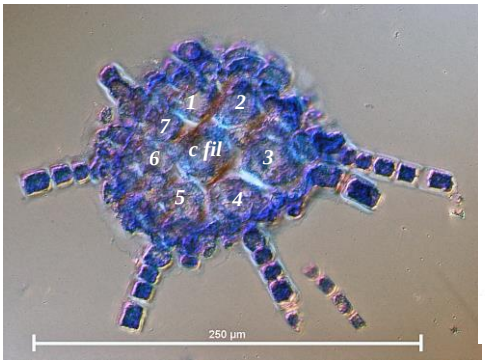


Fig. 41: *Holotrichia comosa*, cross section near axis tip; central thread (***c fil***), pericentral cells (***1-7***)

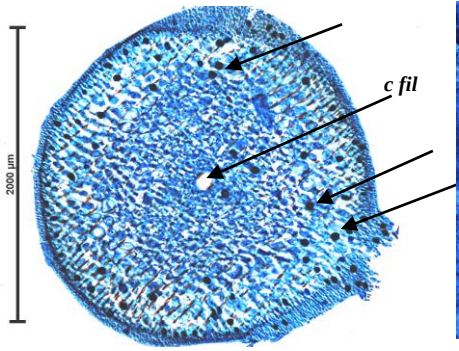


Fig. 42: *Holotrichia comosa*, cross section mature axis; central thread (***c fil***), pericentral cells obscured by numerous threads some with darkly stained gland cells (arrowed)

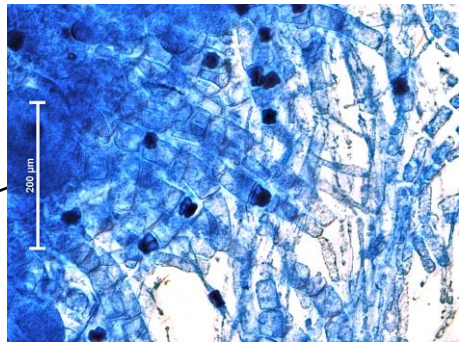


Fig. 43: *Holotrichia comosa*, numerous external threads with darkly stained gland cells

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed*.. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

12a. axes with 5 pericentral cells in cross section; branchlets of naked cells branched; mature female structures (cystocarps) with a long neck. Figs 45-49.
..... *Micropeuce feredayae*

12b. axes with 7 pericentral cells, or pericentral cells obscured by additional cells (cortication); cystocarps lacking long necks
..... 13.

13a. irregular main branches, branchlets of naked cells, curved upwards, stiff, ending in a point. Figs 50-53.
..... *Erythrostachys strobilifera*

13b. branching more regular, branchlets of .naked cells with or without pointed tips ..... 14.

Fig. 45: *Micropeuce feredayae*

Fig. 46: *Micropeuce feredayae*, partially denuded plant

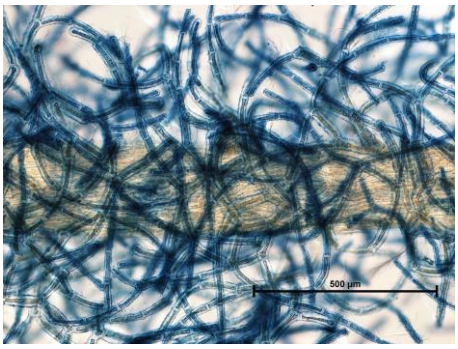


Fig. 47: *Micropeuce feredayae*, axis near plant tip, branched curved threads of naked cells

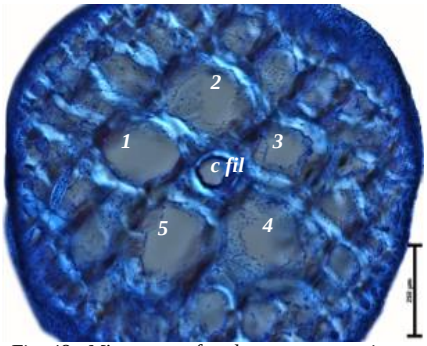


Fig. 48: *Micropeuce feredayae*, cross section, central thread (***c fil***), pericentral cells (***1-5***)

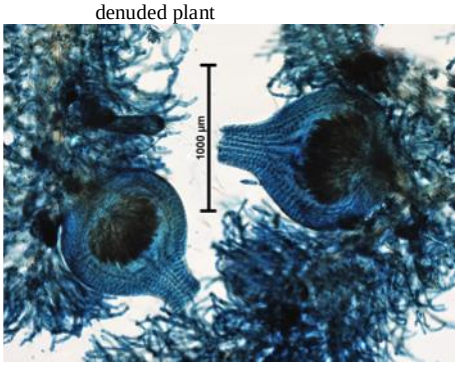


Fig. 49: *Micropeuce feredayae*, mature female structures, amongst branched, hair-like threads

Fig. 50: *Erythrostachys strobilifera*

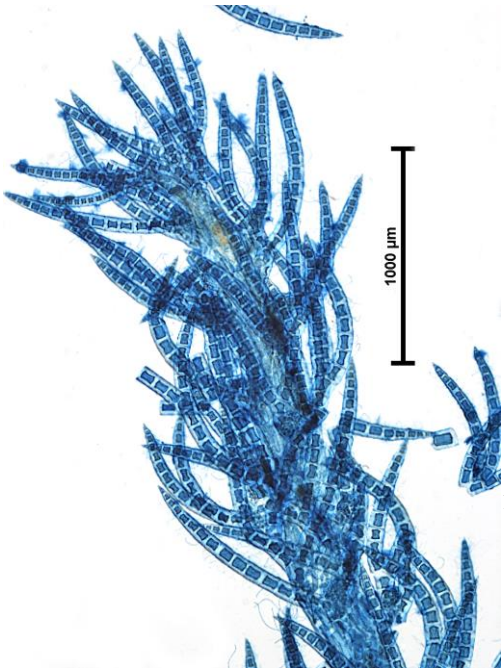


Fig. 51: *Erythrostachys strobilifera*, pointed, stiff, branchlets

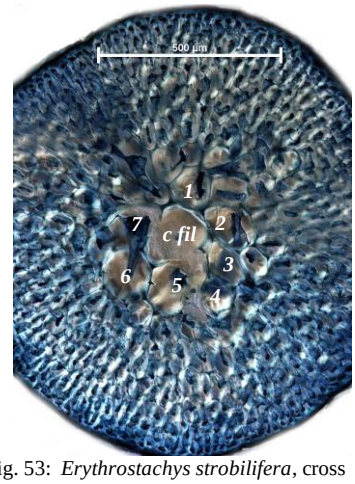


Fig. 53: *Erythrostachys strobilifera*, cross section mature axis, central thread (***c fil***), large pericentral cells (***1-7***)

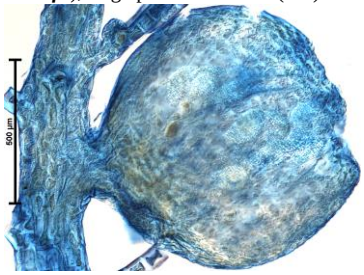


Fig. 52: *Erythrostachys strobilifera*, mature female structure (cystocarp)

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed*.. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

14a. hair-like branchlets with a bead-like chain of small cells basally. Reproductive organs occur in the angles between branchlets and axes (axillary). Figs 54-58.
..... *Gonatogenia subulata*

14b. basal cells of branchlets elongate, similar to other cells. Reproductive organs occur throughout branchlets
..... 15.

15a. hair-like branchlets simple (unbranched); axes in cross section with 5-7 pericentral cell
..... *Lophothalia* (2 spp.) ..... 16.

15b. hair-like branchlets usually branched, at least basally; young axes with 4-7 pericentral cells, obscured soon by other large cells;
..... 17.

16a. branchlets thin, 30-50 µm wide, in rings around bands of pericentral cells; additional un-branched coloured hairs often numerous obscuring the rings; pericentral cells 5, remaining clear in cross section. Figs 59-61.
..... *Lophothalia verticillata*

16b. branchlets larger, 50-130 µm wide, single from bands of pericentral cells, usually infested with the hydroid *Halecium*; unbranched coloured hairs rare or absent; pericentral cells 6 or 7, but obscure except near plant tips. Figs 62-68 (next page).
..... *Lophothalia hormoclados*

Fig. 54: *Gonatogenia subulata*

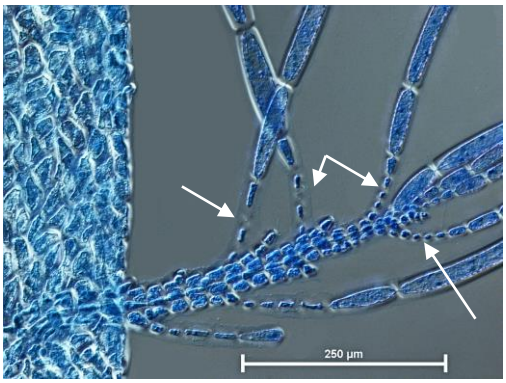


Fig. 55: *Gonatogenia subulata*, axis with hair-like branchlet, beadlike chains of cells basally (arrowed)

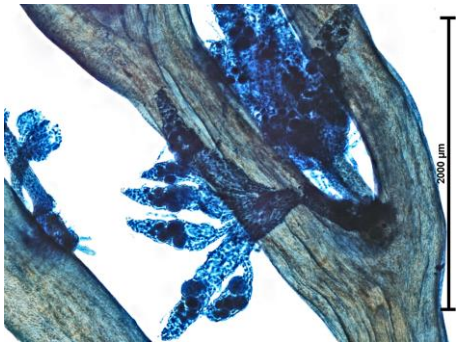


Fig. 56: *Gonatogenia subulata*, clusters of spore producing branches in the angle between axes (axillary)

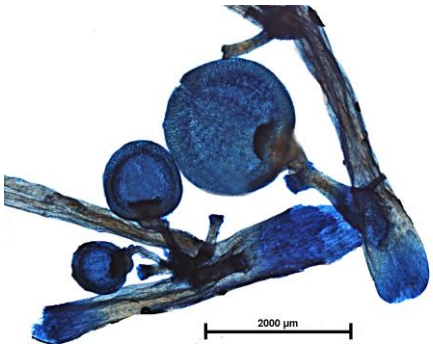
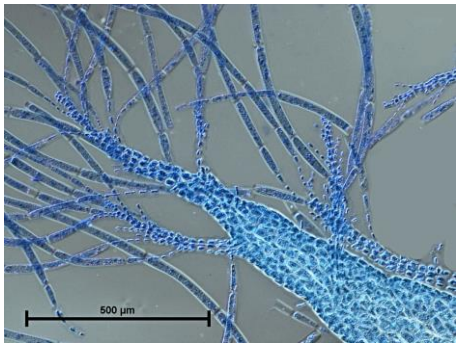


Fig. 57: *Gonatogenia subulata*, clusters of mature female structures (cystocarps) in the angle between axes (axillary)

Fig. 58: *Gonatogenia subulata*, plant tip, axis rapidly coated with additional cells (corticated); hair-like branchlets



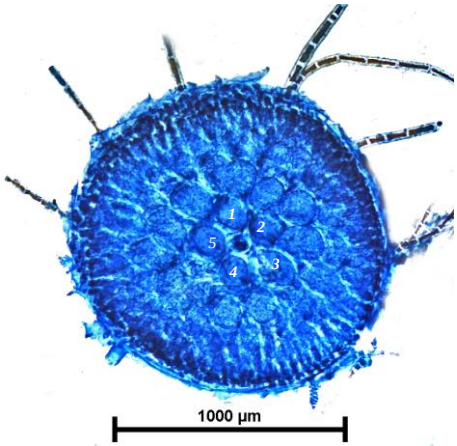


Fig. 59: *Lophothalia verticillata*, cross section, pericentral cells (***1-5***)

Fig. 60: *Lophothalia verticillata*

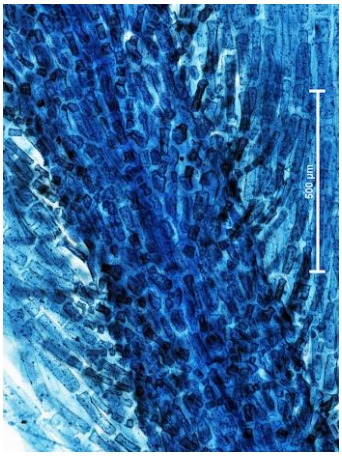


Fig. 61: *Lophothalia verticillata*, axis densely wrapped with hair-like branchlets (in rings, although obscure)

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed*.. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

Fig. 62: *Lophothalia hormoclados*

Fig. 63: *Lophothalia hormoclados*, denuded plant

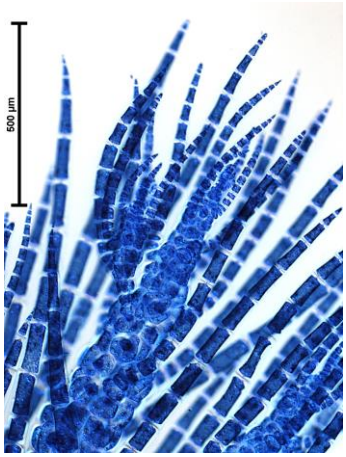


Fig. 64: *Lophothalia hormoclados*, pointed tips of simple (unbranched) branchlets, spores in a branchlet

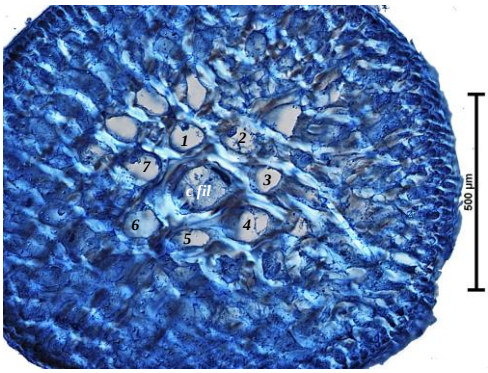


Fig. 65: *Lophothalia hormoclados*, cross section, central thread (***c fil***), pericentral cells (***1-7***)

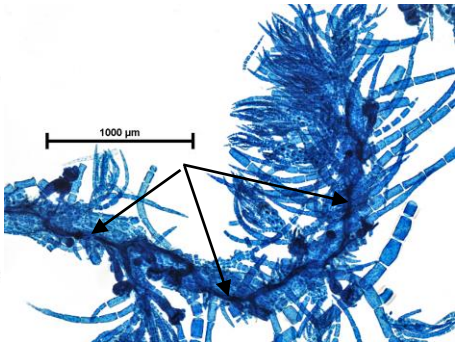


Fig. 66: *Lophothalia hormoclados*, axis clothed in additional cells (corticated), unbranched branchlets, runner of the infesting colony of *Halecium* hydroid (arrowed)

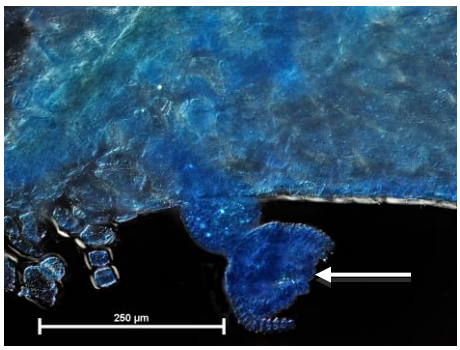


Fig. 67: detail of an *Halecium* hydroid (arrowed) on an axis of *Lophothalia hormoclados*

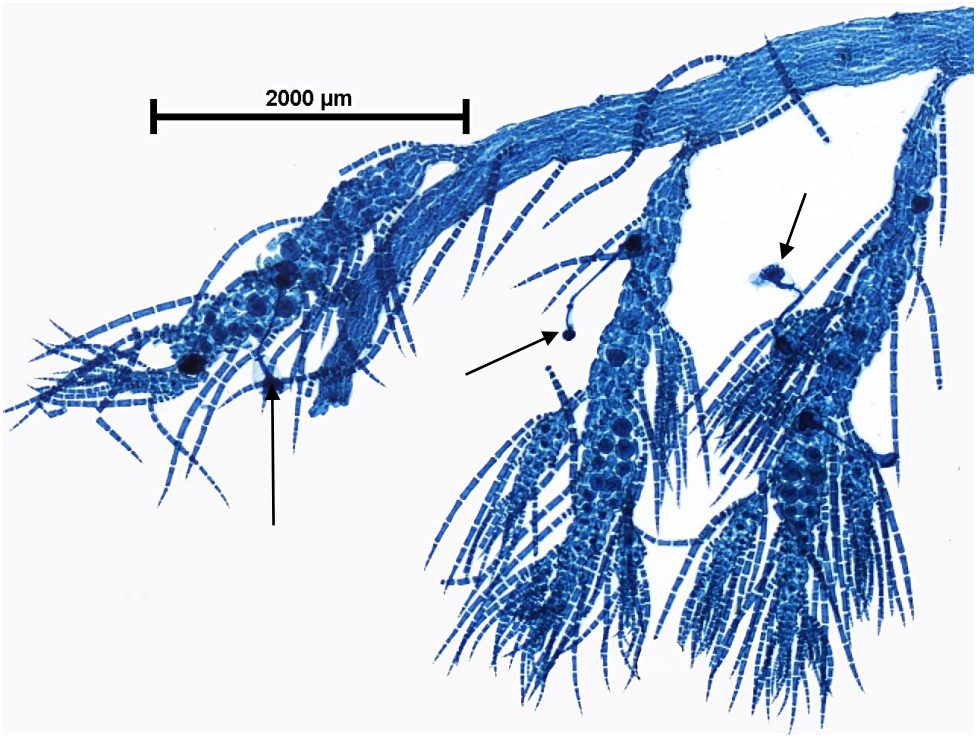


Fig. 68: *Lophothalia hormoclados*, branch ends bearing sporangia, infesting long-stalked hydroid (arrowed)

17a. upper axes rapidly coated with additional cells (corticated), ***woolly*** (unless denuded), due to a dense covering of branchlets consisting of small cells basally, elongate cells towards the tips, and additional unbranched threads of elongate cells. Mature female structures (cystocarps) stalked, ***without a neck*** Figs 69-75.
..... *Doxodasya lanuginosa*

17b. upper axes with exposed pericentral cell bands for some distance from tips; branchlets spreading, rigid basally, consisting of oblong cells throughout except for ***pointed*** tip cells. Cystocarps with a short neck. Figs 76-78.
..... *Doxodasya hirta*

Fig. 69: *Doxodasya lanuginosa*

Fig. 70: *Doxodasya lanuginosa*, detail of woolly axes

Fig. 71: *Doxodasya lanuginosa*, denuded plant with stalked cystocarps

Fig. 72: *Doxodasya lanuginosa*, part of a cross section of an older axis (corticated), initial 4 pericentral cells (***1-4***) ringing a central thread (***c fil***) becoming obscured by threads and large cells

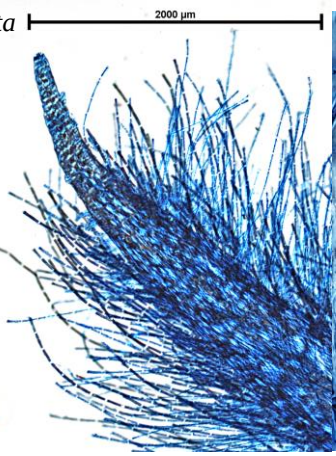


Fig. 73: *Doxodasya lanuginosa*, axis tip

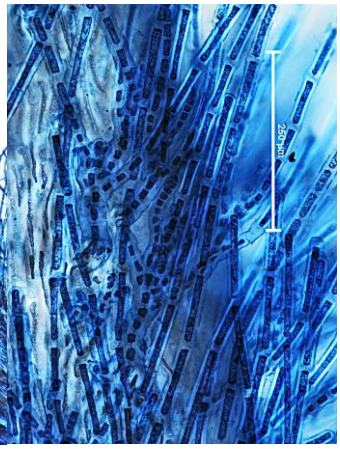


Fig. 74: *Doxodasya lanuginosa*, branchlets and unbranched threads

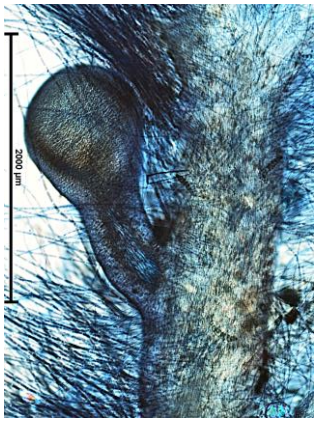


Fig. 75: *Doxodasya lanuginosa*, stalked mature female structure (cystocarp)

Fig. 76: *Doxodasya hirta*

Fig. 77: *Doxodasya hirta*, upper branches; spreading, stiff, pointed branchlets

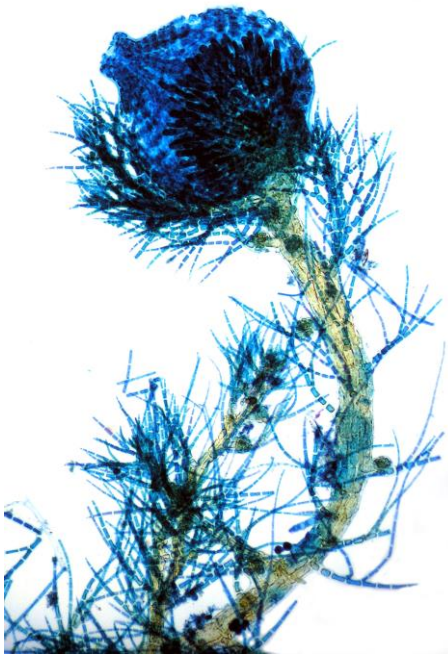


Fig. 78: *Doxodasya hirta*, cystocarp amongst spreading, stiff, pointed branchlets

Baldock, R.N. (2019). Pictured key to some common filamentous red algae of southern Australia. Part IX. Tribe: Lophothalieae of the Family: Rhodomelaceae. 9pp. *Algae Revealed*.. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed