Pictured Key to some algae of southern Australia: slimy/mucilaginous red algae. 2nd Edition

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 sheet to verify identification.

Scale and stains: The coin used as a scale is 24 mm or almost 1" wide. Microscope images of algae are usually blue stained, or have a black background.

This key is *restricted* to algae with a *slimy/mucilaginous/"gooey" consistency.*
Although this characteristic is pretty subjective and includes widely different and un-related groups it can get you a possible species or genus name. Unavoidably, as with many algae, microscope work will be needed to separate species.

PICTURED KEY

1a. a cross section shows large oval or equal-sided cells (parenchyma) in the core of branches. See Figs 1, 6. ..... 2.

1b. a cross section or a tissue squash shows fine threads or filaments in the core of branches. See Fig. 2. ..... 6.

2a. plants flat, leafy; major branches (axes) >10mm wide, fronds sparsely fringed with ***microscopic teeth***; small cells appear in vague rings (***rosettes***) about larger, deeper cells in surface microscope views. Figs 3-7. .....*Gloiophyllis barkeriae*
Family: Cystocloniaceae (in part)

2b. axes flat or cylindrical, <10mm wide, ***teeth absent***, although female reproductive structures (cystocarps) may have *horns*; ***rosettes absent***. .....3.
Family: Rhodymeniaceae (in part)

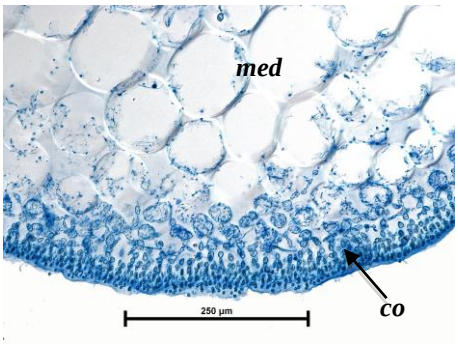


Fig. 1: *Gloiocladia fruticulosa*, cross section, large ovoid cells in the core (medulla, *med*) and branched tufts of small cells in the outer layer (cortex, *co*)

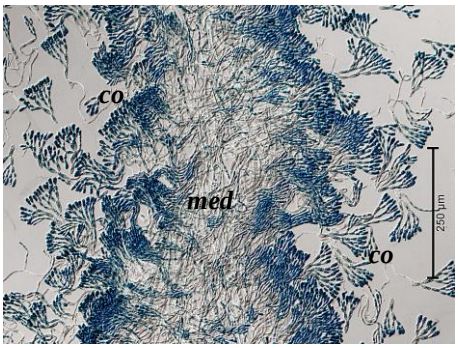


Fig. 2: *Helminthocladia*, tissue squash, fine filamentous core (medulla, *med*), branched tufts of cells in the outer layer (cortex, *co)*

Fig. 3: *Gloiophyllis barkeriae*

Fig. 4: *Gloiophyllis barkeriae*

Fig. 5: *Gloiophyllis barkeriae*, detail of minute teeth along blade edges and dark female structures (cystocarps) embedded in the blades

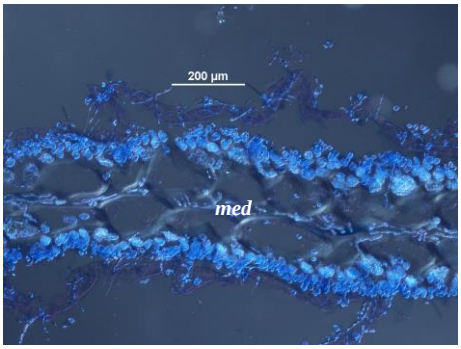
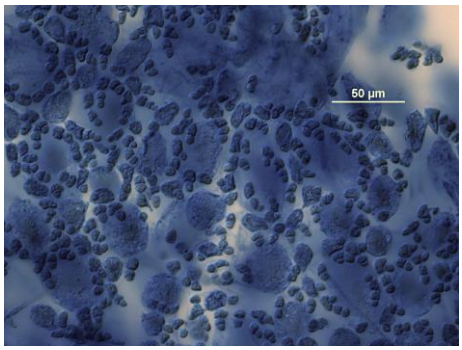


Fig. 6: (left) *Gloiophyllis barkeriae* cross section, large oval cells in the frond core (medulla, *med*)

Fig. 7: (right) *Gloiophyllis barkeriae*, cells in surface view show patterns of small cells ringing larger lower ones (rosettes)



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3a. branches generally flat, 4-10 mm wide, smaller side branches arise from branch edges …… 4.

3b. branches cylindrical or slightly flanged, generally radially branched, 1-2 mm wide. Figs 8, 9.
..... *Gloiocladia fructiculosa*

4a. branching mainly forked, small proliferations on margins and blade surfaces often occur. Figs 10-12.
……..…… *Gloiocladia polycarpa*

4b. branching in 2 rows from branch edges (pinnate) …….. 5.

5a. branching irregular, plants usually growing on sea-grasses. Figs 13, 14.
……. *Gloiocladia australis*
(as *G. australe* in the Benthic Flora)

5b. branching regular, branches narrowing near tips, plants usually on rocks. Figs 15, 16.
……..…. *Gloiocladia halymenioides*

Fig. 8: *Gloiocladia fructiculosa*

Fig. 9: *Gloiocladia fructiculosa*, cylindrical branches, female reproductive organs (cystocarps) with 2-4 horns

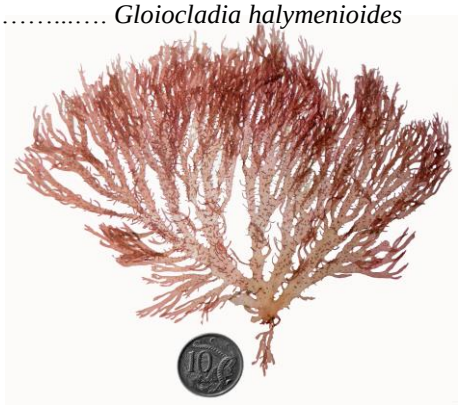

Fig. 10: *Gloiocladia polycarpa*, main branches forked

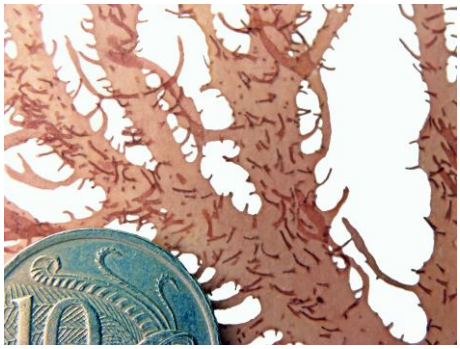

Fig. 11: *Gloiocladia polycarpa*, detail of small proliferations

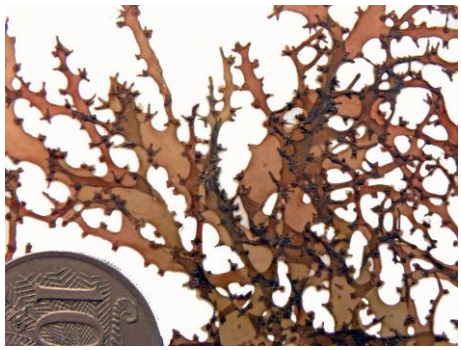

Fig. 12: *Gloiocladia polycarpa*, horned cystocarps at branch margins

Fig. 13: *Gloiocladia australis*, attached to a seagrass

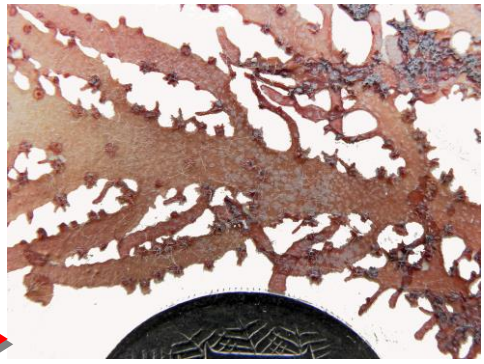

Fig. 14: *Gloiocladia australis* flat branches without proliferations, female reproductive organs (cystocarps) horned, at branch edges

Fig. 15: *Gloiocladia halymeniodes*

Fig. 16: *Gloiocladia halymeniodes*, narrow branch endings, spiky cystocarps

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6a. branches cylindrical (terete, circular in cross section), or narrow-compressed (ovoid in cross section), ≈ 4 mm wide. See Fig. 17, but also step #14a for *Gibsmithia womersleyi*, a species in which the branches flatten on drying
..... 7

6b. algae consisting of flat blades (foliose) ≥ 10 mm wide. See Fig. 18.
..... 14.

Fig. 17: *Helminthocladia australis*

Fig. 18: *Platoma foliosum*

7a. branches internally a core of *loose* microscopic threads, embedded in gel, ending in bunches or chains of outward-pointing cells, readily separated when making a tissue squash for microscopic examination. See Fig. 19.
..... 8.

7b. tissue squash shows a large central thread in the branch core, mixed with fine rhizoids and radiating threads in rings, ending in outward pointing bunches of small cells. See Fig. 20.
..... 12.
Family: Dumontiaceae (in part)

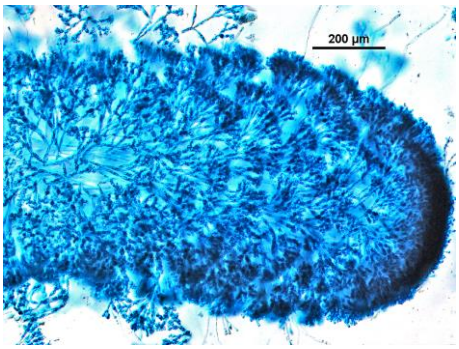

Fig. 19: *Helminthora*, tissue squash, numerous fine threads ending in radiating branched tufts of small cells

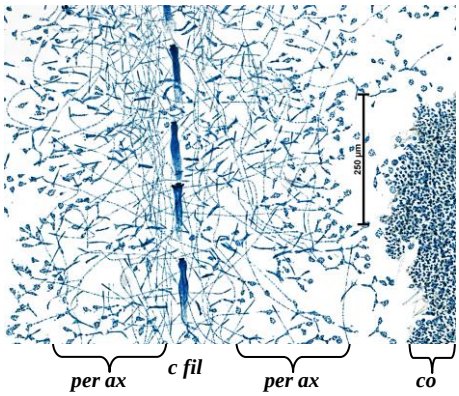

Fig. 20: *Dasyphloea insignis*, tissue squash, central thread (*c fil*) loosely wrapped in rhizoids, radiating threads (*per ax*) ending in small surface cells (cortex, *co*, seen here in face view)

8a. outer layers (cortex) ending in relatively ***compact*** hemispherical cells; cores, initially of branched threads, may become hollow. Figs 21,22.
..... *Nothogenia fastigiata*
Family: Galaxauraceae

8b. outer layers ***loosely*** held together; branches ***not*** truly hollow, although the sparsity of core filaments can give that impression in cross sections
..... 9.

Fig. 21: *Nothogenia fastigiata*

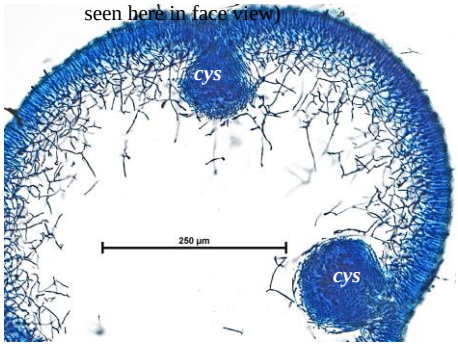

Fig. 22: *Nothogenia fastigiata*, cross section; compact outer cells (cortex, *co*), core of branched threads (medulla, *med*), hollow centre, embedded female structures (cystocarps, *cys*)

9a. ***no*** star-shaped (stellate) cells found in tissue squashes
..... 11.

9b. ***stellate cells*** found in tissue squashes see Fig. 23.
..... 10.

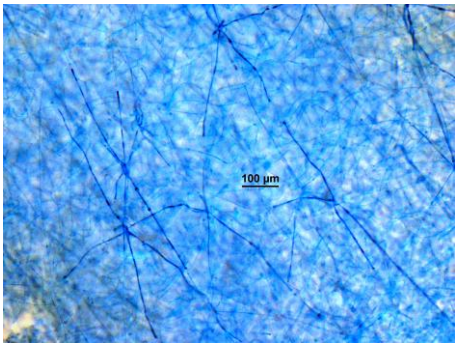

Fig. 23: *Halymenia floresia*, surface of a branch, focussed through surface cells to view thin star-shaped (stellate) cells

10a. plants thin, with long, worm-like main branches (axes). Figs 24, 25
…….…….. *Grateloupia intestinalis*
Family: Halymeniaceae

10b. plants with broad, flat axes and feathery (pinnate) shorter side branches. Figs 26-30.
..... *Halymenia floresia*
Family: Halymeniaceae

Fig. 24: *Grateloupia intestinalis*

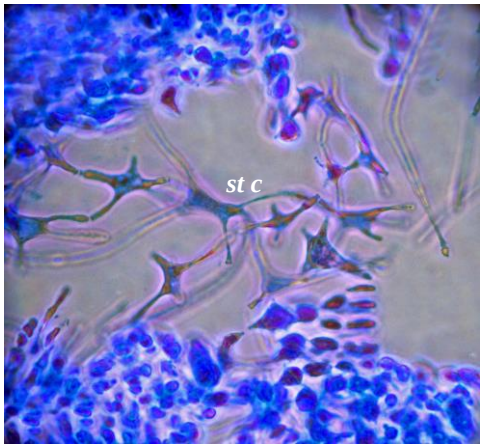

Fig. 25: *Grateloupia intestinalis*, tissue squash, star-shaped cells (*st c*)

Fig. 26: *Halymenia floresia* ssp. *floresia*

Fig. 29: *Halymenia floresia* ssp. *harveyana*

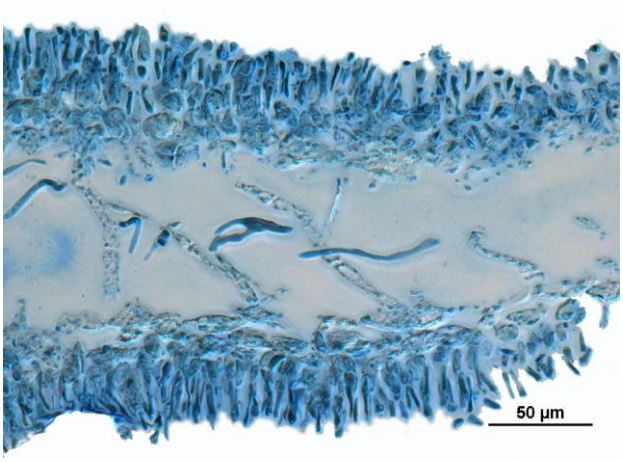

Fig. 27: *Halymenia floresia* ssp. *floresia*, cross section

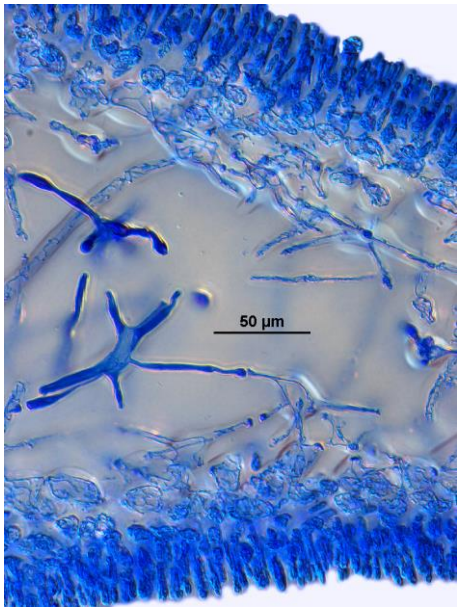

Fig. 30: *Halymenia floresia* ssp. *harveyana* cross section

11a. plants “stringy”, branching sparsely and irregularly forked, usually from near the plant base, Figs 30, 31.
..... *Nemalion helminthoides*
Helminthora lindaurei
Family: Liagoraceae

11b. branching more dense, branches either regularly forked and wide *or* in 2 rows from the edge of axes. Figs 32-37.
…….. *Helminthora australis*
Helminthocladia beaugleholei,
Helminthocladia dotyi,
Helminthocladia australis
Helminthocladia densa
Family: Liagoraceae

WARNING: correct separation of genera depends on female reproductive features. See individual Fact Sheets in the Web.
See also step #20a of this key

Fig. 30: *Nemalion helminthoides*

Fig. 31 : *Helminthora lindaurei*

Fig. 32 *Helminthora australis*, from a region of moderate water movement

Fig. 33: *Helminthora australis*, from the intertidal exposed to rough water

Fig. 34: *Helminthocladia beaugleholei*

Fig. 35: *Helminthocladia dotyi*

Fig.36: *Helminthocladia australis*

Fig. 37: *Helminthocladia densa*

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12a. axis 2-5 mm wide; large central thread in the branch core, outer layers (cortex) of loose branches ***hairs absent***. Figs 7, 38-40.
..... *Acrosymphyton taylori*

12b. axis 1-2 mm wide; central thread small, wrapped in fine rhizoids; outer layers (cortex) compact; ***hairs present*** ..... 13.

13a. short ***icicle-like*** hairs protrude from tightly packed outer layers. Figs 20, 41-43.
..... *Dasyphloea insignis*

diagnosis can be difficult

13b. extremely fine, *long*, single-celled hairs with swollen tips protrude from loosely packed outer layers. Figs 44-46.
..... *Dudresnaya australis*

Fig. 38: *Acrosymphyton taylori*

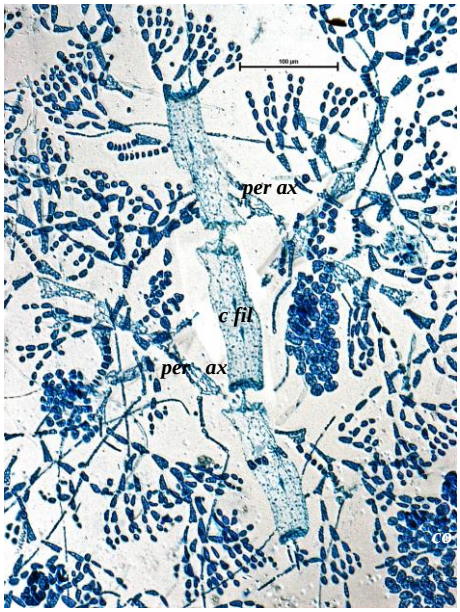

Fig. 39: *Acrosymphyton taylori*, tissue squash; central filament (*c fil*) radiating threads (periaxials, *per ax*), loose surface branches (cortex, *co*)

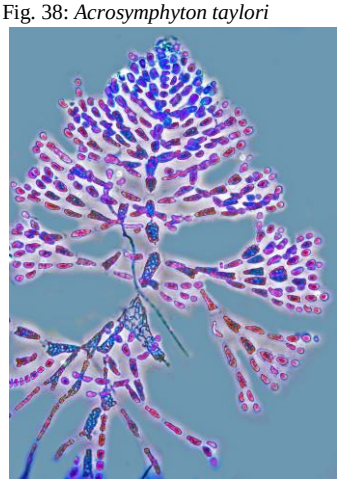

Fig. 40: *Acrosymphyton taylori*, branch tip showing development of the central thread and radiating periaxials

Fig. 41: *Dasyphloea insignis*

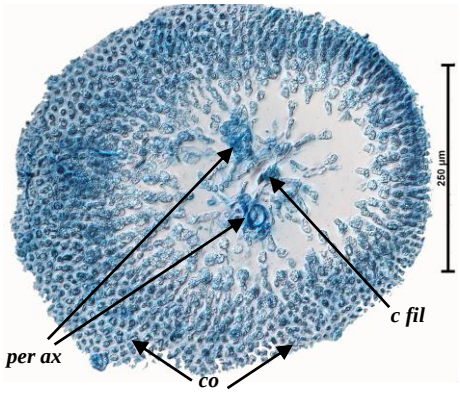

Fig. 42: *Dasyphloea insignis*, cross section; central filament (*c fil*), radiating branches (periaxials, *peri*), ending in small, tightly-packed cortical cells (*co*)

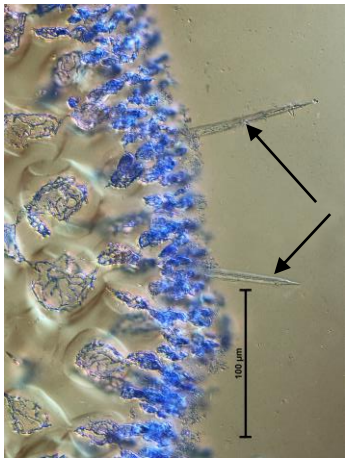

Fig. 43: *Dasyphloea insignis*, outer layer (cortex) with icicle-like hairs (arrowed)

Fig. 44: *Dudresnaya australis*

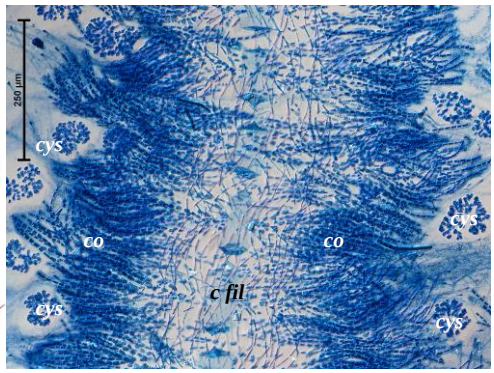

Fig. 45: *Dudresnaya australis*, tissue squash; central filament (*c fil*), radiating loosely-packed cortical cells (*co*), female reproductive structures (cystocarps, *cys*)

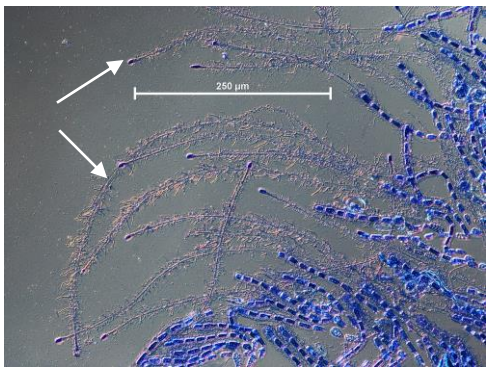

Fig. 46: *Dudresnaya australis*, loosely-packed outer layer (cortex), branches ending in extremely fine, single-celled hairs (arrowed) with swollen tips

14a. branches cylindrical but drying flat, 2-30 mm wide, branching mainly from a ***gristly basal knob*** up to 10 mm across; tissue squash shows a wide core of fine threads and chains of small cells in outer layers. Figs 47-49.
..... *Gibsmithia womersleyi*
rare, Family: Dumontiaceae

14b. plants unbranched, *or* branching forked *or* arising from edges of a flat axis; basal knob ***absent***
..... 15.

15a. blades large, broad, flat, >50 mm wide ..... 16.
15b. blades narrower ..... 20.

16a. plants leaf- or blade-like, blades unbranched, or with small marginal lobes or blades arising mainly ***from the base of the plant***, often drying gristly (cartilaginous)
..... 17.
(found also in "Pictured Key to some common broad bladed red algae of southern Australia")

16b. plants strap-like, *forked* once or twice, blade edges *crinkled*, surfaces ***mottled*** or marked with faint "***rivulets***". Figs 50, 51.
..... *Tsengia laingii*
Family: Nemastomataceae

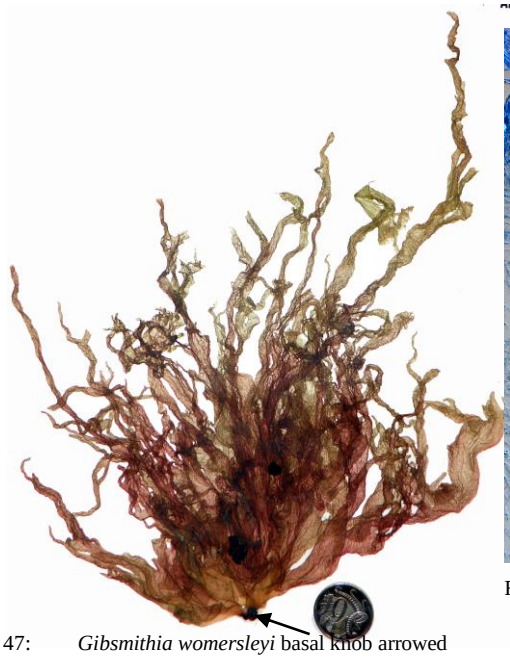

Fig. 47: *Gibsmithia womersleyi* basal knob arrowed

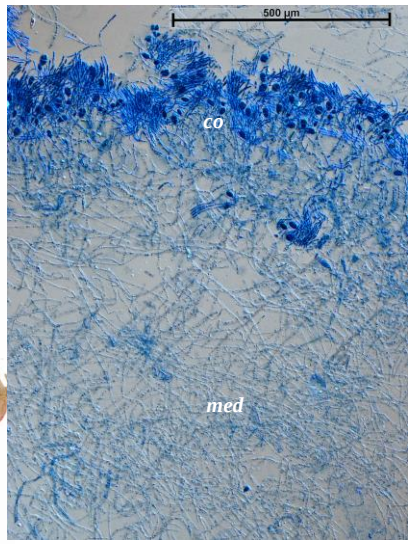

Fig. 48: *Gibsmithia womersleyi*, tissue squash, mass of fine threads in core (medulla, *med*) outer layer (cortex, *co*) with tetrasporangia

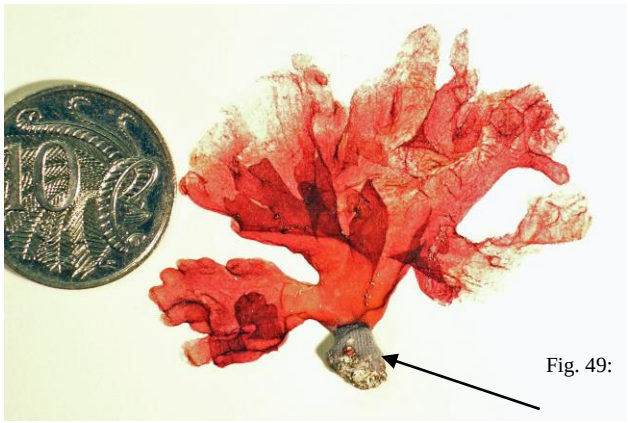

Fig. 49: *Gibsmithia womersleyi*, basal knob arrowed

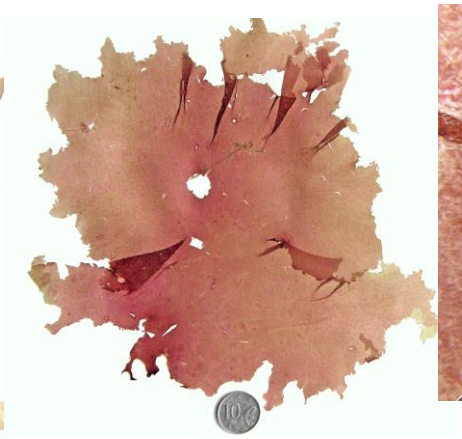

Fig. 50: *Tsengia laingii*, two plants with contrasting shapes

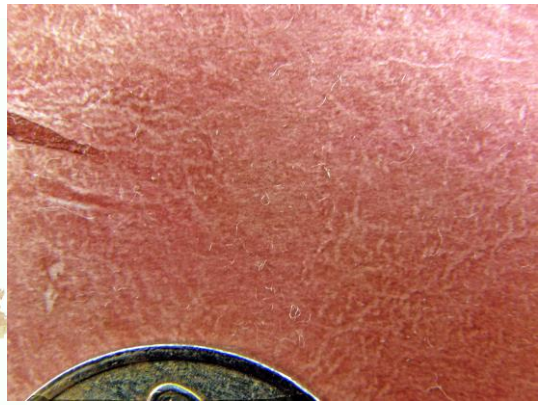

Fig.51: *Tsengia laingii*, mottled surface, with some "rivulets"

17a. plants large, oval-shaped, ***undivided,*** arising from a small cylindrical stalk, drying gristly; female structures (cystocarps) embedded in the blade. Figs 52, 53.
..... *Grateloupia ovata*
Family: Halymeniaceae

17b. plants branching usually only from the short base
…….. 18.
Family: Nemastomataceae (in part)

18a. ***small lobes*** at blade edges, blade surface with "rivulet" markings. Figs 54, 55.
……*Platoma foliosum*

18b. small lobes ***absent,*** although the blade may be torn into large pieces when old; rivulet markings absent or present ……..…. 19.

19a. rivulet markings on surface ***absent***; minute ***gland cells*** usually but not always present in the outer cell layer (cortex); female structures sunken, opening by a ***pore***. Figs 56-58.
……. *Schizymenia dubyi*

19b. rivulet markings ***present***; gland cells ***absent***, female structures ***without pores***. Figs 59-61.
……..…… *Platoma australicum*

Fig. 52: *Grateloupia ovata*, close-up of the small basal stalk

Fig. 53: *Grateloupia ovata*

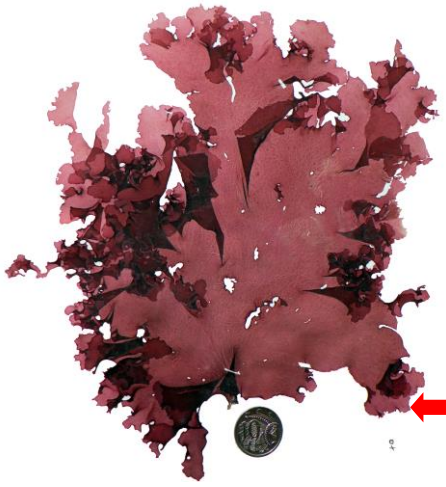

Fig. 54: *Platoma foliosum*, rivulet markings on the blade surface

Fig. 55: *Platoma foliosum*

Fig. 56: *Schizymenia dubyi*

Fig. 57: *Schizymenia dubyi*, plant base with short stalk, surface mottling *absent*

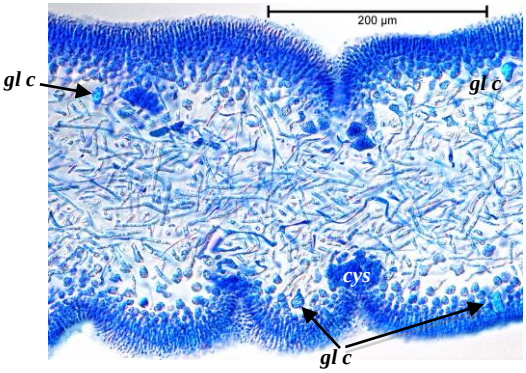

Fig. 58: *Schizymenia dubyi*, cross section, bright gland cells (*gl c*), cystocarps (*cys*) with sunken pores

Fig. 59: *Platoma australicum*

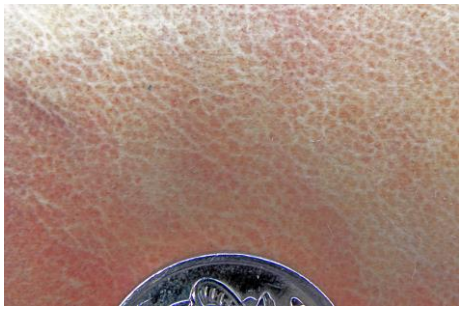

Fig. 60: *Platoma australicum*, surface mottled, with rivulets

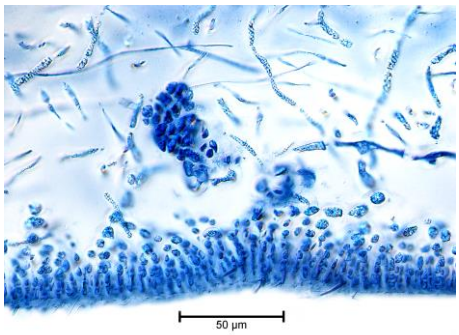

Fig. 61: *Platoma australicum*, cross section, (*cys*) sunken, pore *absent*

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20a. main branches (axes) regularly forked, narrow 3-5 mm wide. Figs 67-69.
..... *Tsengia feredayae*
Family: Nemastomataceae

20b. axes wider; short side branches arise at their edges ..... 21.

21a. spidery (ganglionic) cells ***present*** in tissue squashes; plants regularly branched in 2 opposite rows (***pinnate***) throughout. Figs 62, 63.
..... *Gelinaria ulvoidea*
Family: Halymeniaceae

21b. ganglionic cells ***absent***, main branches (axes) ***forked***, with numerous short side branches 2-2 mm wide at edges, giving the plant a fluffy appearance. Figs 64-66.
..... *Tsengia comosa*
Family: Nemastomataceae

Fig. 62: *Gelinaria ulvoidea*

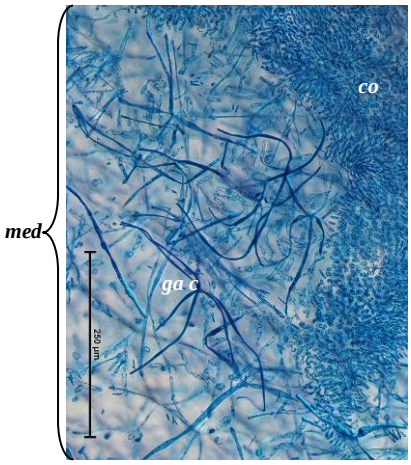

Fig. 63: *Gelinaria ulvoidea*, cross section, outer, compact layer of small, out-ward pointing cells (cortex, *co*), wide core of intertwined threads (medulla, *med*) with large, spidery (ganglionic) cells (*ga c*)

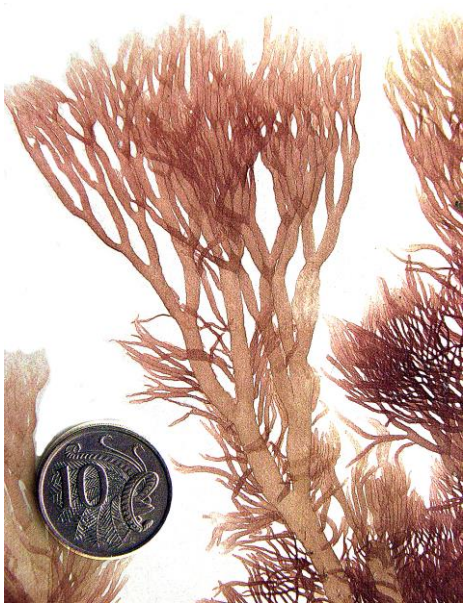

Fig. 64: *Tsengia comosa*, detail of forked main branches fringed by small side branches

Fig. 65: *Tsengia comosa*

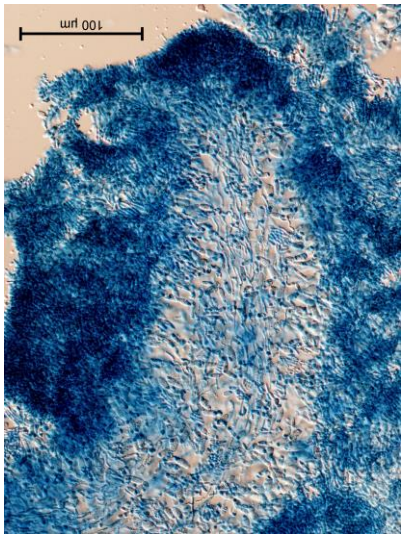

Fig. 66: *Tsengia comosa*, tissue squash of branch tip

Fig. 67: *Tsengia feredayae*, regularly forked pressed plants with branches that have shrunk and darkened during preparation

Fig. 68: *Tsengia feredayae*

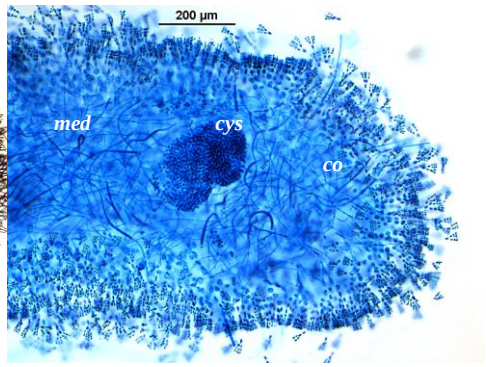

Fig. 69: *Tsengia feredayae*, tissue squashes; core of threads (medulla, *med*) tufts of small cells (cortex, *co*), female structure, (cystocarp, *cys*)