

SLIMY/MUCILAGINOUS 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 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

Names

These generally follow Womersley, 1994 and 1996 as these continue to provide the most accessible and comprehensive accounts of the relevant algal groups. Recent updates of names in *Algaebase* are provided within the key and are found in the table on page 11.



This key is *restricted* to algae with a *slimy/mucilaginous/"gooey" consistency*. Although this characteristic is 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. cross sections show large oval or equal-sided cells (parenchyma) in the core (medulla) of fronds Figs 1, 6
..... 2.

- 1b. cross sections or tissue squashes show fine threads or filaments in the core of fronds. 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)
as *Gloiophyllis barkeriae* in Womersley 1996

- 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. 3: *Gloiophyllis barkeriae*

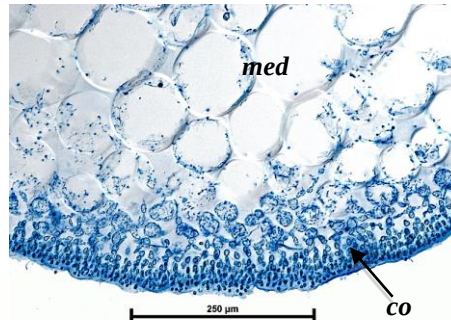


Fig. 1: *Gloiocladia fruticulosa*, cross section, large ovoid cells in the core (medulla, med) and branched tufts of small cells in the outer layer (cortex, co)

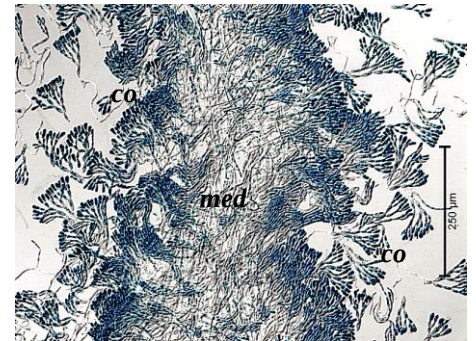


Fig. 2: *Helminthocladia*, tissue squash, fine filamentous core (medulla, med), branched tufts of cells in the outer layer (cortex, co)



Fig. 4: *Gloiophyllis barkeriae*



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

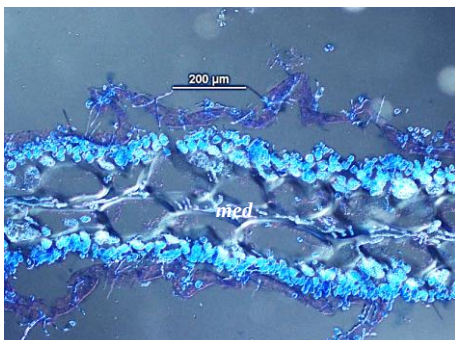
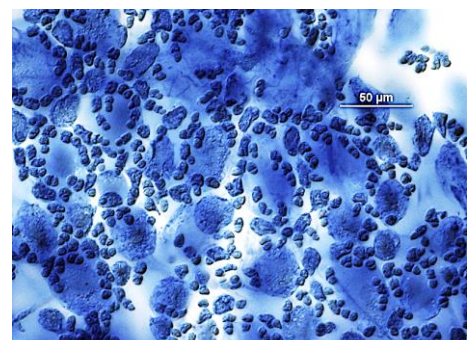


Fig. 6: (left) *Gloiophyllis barkeriae* cross section, large oval cells in the frond core (medulla, med)

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



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 fruticulosa*

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.
..... *Gloioderma australe*
(as *Gloiocladia australe* in Womersley 1996)

5b. branching regular, branches narrowing near tips, plants usually on rocks. Figs 15, 16.
..... *Gloioderma halymenioides*
(as *Gloiocladia halymenioides* in Womersley 1996)



Fig. 8: *Gloiocladia fruticulosa*



Fig. 9: *Gloiocladia fruticulosa*, 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*, homed cystocarps at branch margins



Fig. 13 (left): *Gloioderma australe*, previously *Gloiocladia australis* attached to a seagrass

Fig. 14 (right): *Gloioderma australe*, previously *Gloiocladia australis* flat branches without proliferations, female reproductive organs (cystocarps) homed, at branch edges



Fig. 15 (left): *Gloioderma halymenioides* previously *Gloiocladia halymenioides*

Fig. 16 (right): *Gloioderma halymenioides* previously *Gloiocladia halymenioides*, narrow branch endings, spiky cystocarps



- 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*, and *Tsengia* spp in which the branches flatten on drying



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

- 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)

- 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.

- 9a. **stellate cells** (densely staining cells with “spidery: radiating arms”) found in tissue squashes see Fig. 23.
..... 10

- 9b. stellate cells **absent** in tissue squashes
..... 11.



Fig. 17: *Helminthocladia australis*



Fig. 18: *Platoma foliosum*

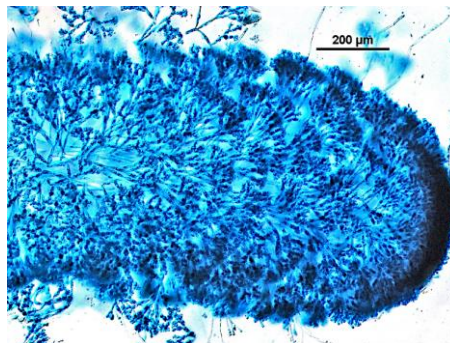


Fig. 19: *Helminthocladia australis*, tissue squash, numerous fine threads ending in radiating branched tufts of small cells

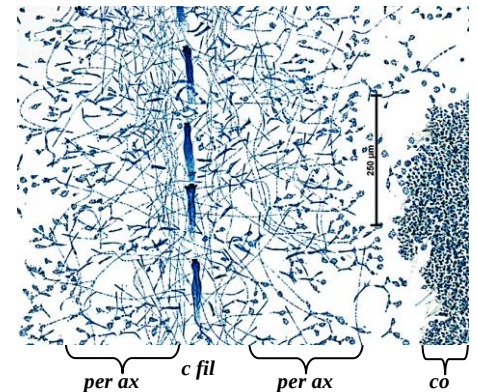


Fig. 20: *Dasyphloea insignis*, tissue squash, central thread (*c fil*) loosely wrapped in rhizoids, radiating threads (*per ax*) ending in small surface cells (cortex, *co*, seen here in face view)



Fig. 21: *Nothogenia fastigiata*

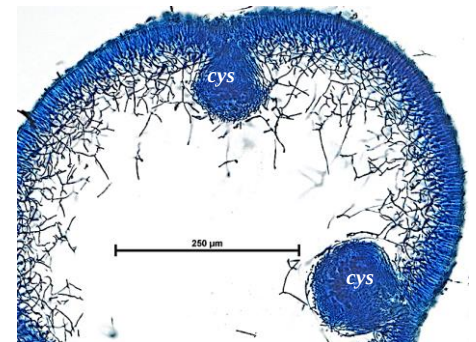


Fig. 22: *Nothogenia fastigiata*, cross section; compact outer cells (cortex, *co*), core of branched threads (medulla, *med*), hollow centre, embedded female structures (cystocarps, *cys*)

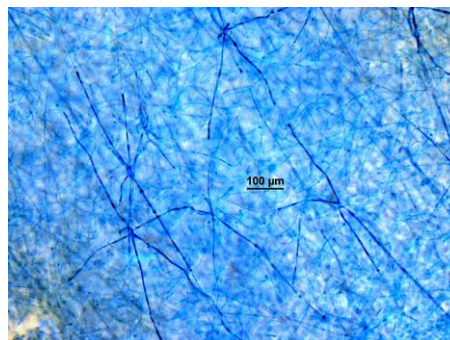


Fig. 23: *Halymenia floresia*, surface of a branch, focussed through surface cells to view thin stellate cells

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

Family: **Halymeniaceae**

Glaphyrosiphon intestinalis in Algaebase

- 10b. plants with broad, flat axes and
feathery (pinnate) shorter side
branches. Figs 26-30.

..... *Halymenia floresia*

Family: **Halymeniaceae**



Fig. 24: *Grateloupia intestinalis*

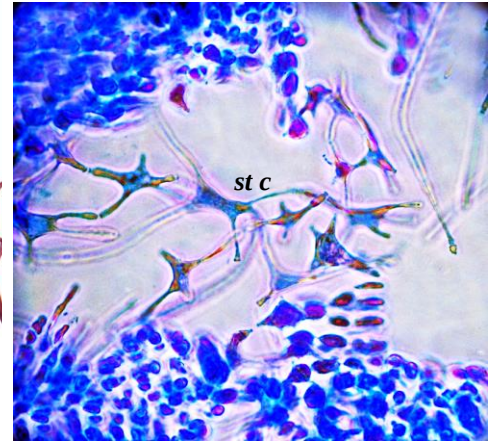


Fig. 25: *Grateloupia intestinalis*, tissue squash, stella cells (st c)



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



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

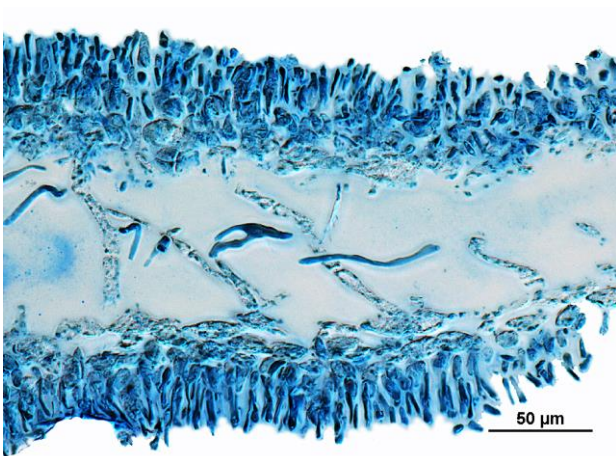


Fig. 27: *Halymenia floresia* ssp. *floresia*, cross section

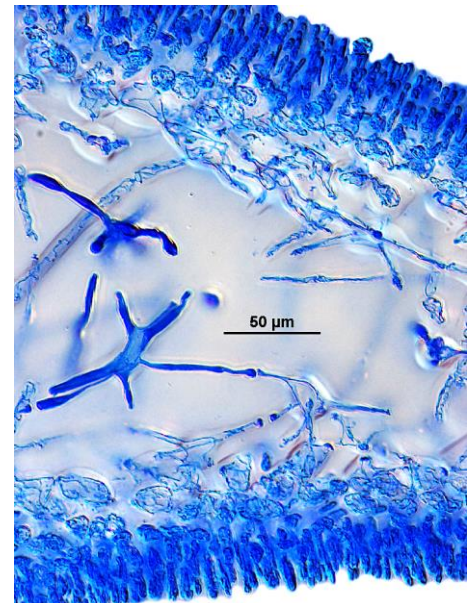


Fig. 30: *Halymenia floresia* ssp. *harveyana* cross section

- 11a. plants “stringy”, branching sparsely and irregularly forked, usually from near the plant base. Figs 30, 31.

..... *Nemalion helminthoides*

Nemalion elminthoides in *Algaebase*

Helminthora lindauerei

Family: Liagoraceae

- 11b. branching denser, 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 *Algae Revealed*

See also step #20a of this key

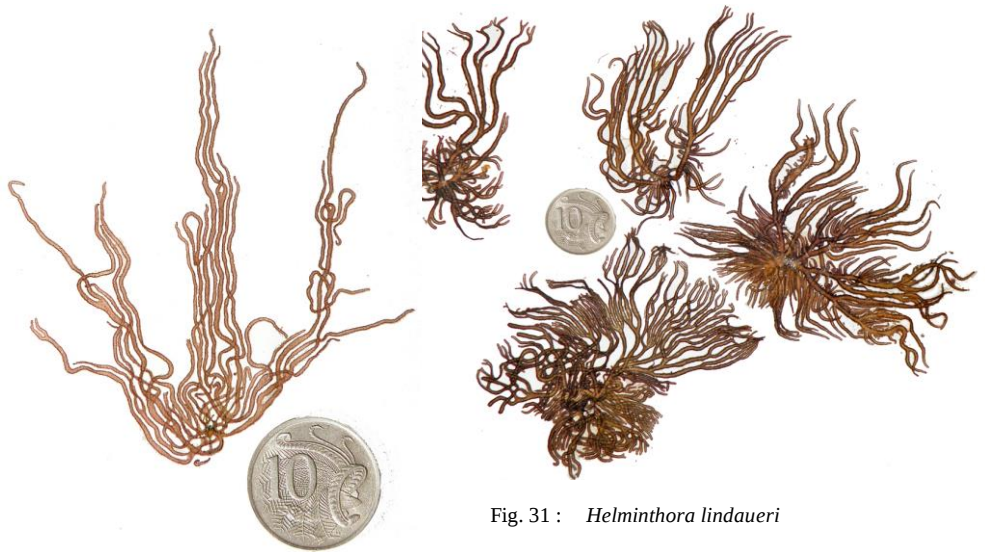


Fig. 31 : *Helminthora lindauerei*

Fig. 30: *Nemalion helminthoides*
as *N. elminthoides* in *Algaebase*



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



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

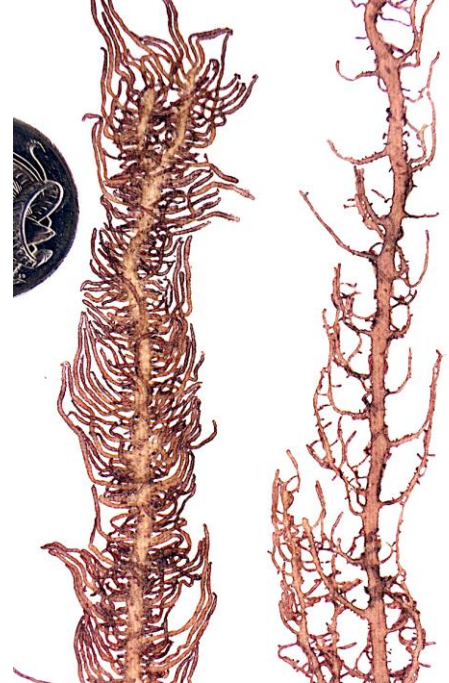


Fig. 34 (right): *Helminthocladia beaugleholei*



Fig. 35: *Helminthocladia dotyi*

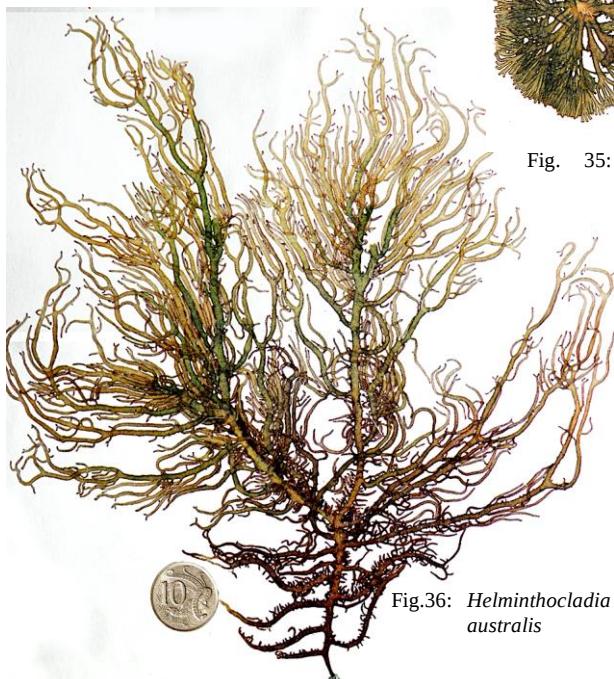


Fig.36: *Helminthocladia australis*



Fig. 37: *Helminthocladia densa*

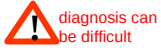
12a. axis 2-5 mm wide; large central thread in tbranch cores, outer layers (cortex) of **loose** branches, **hairs absent**. Figs 7, 38-40.

..... *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*



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*

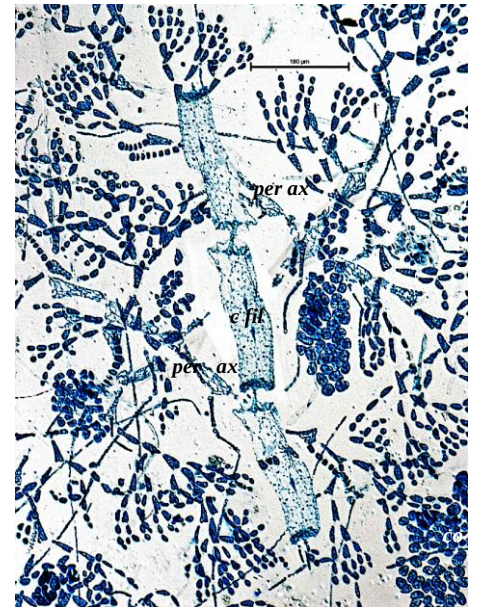
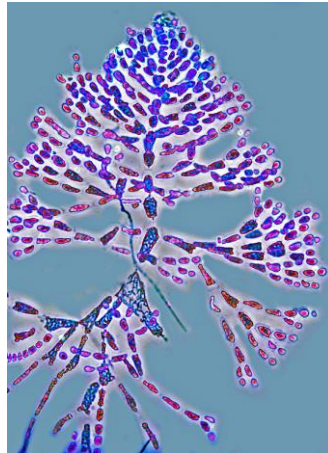


Fig. 39: *Acrosymphyton taylori*, tissue squash; central filament (c fil) radiating threads (periaxials, per ax), loose surface branches (cortex, co)

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



Fig. 41: *Dasyphloea insignis*

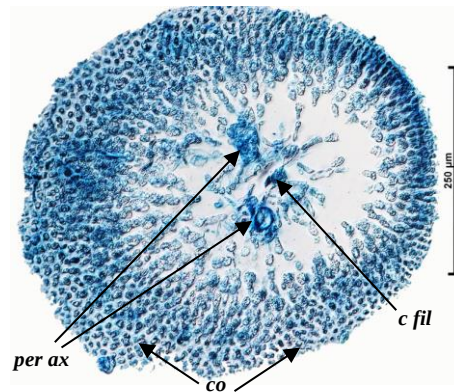


Fig. 42: *Dasyphloea insignis*, cross section; central filament (c fil), radiating branches (periaxials, peri), ending in small, tightly-packed cortical cells (co)

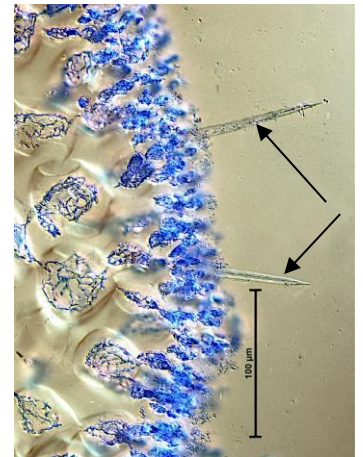


Fig. 43: *Dasyphloea insignis*, outer layer (cortex) with icicle-like hairs (arrowed)



Fig. 44: *Dudresnaya australis*

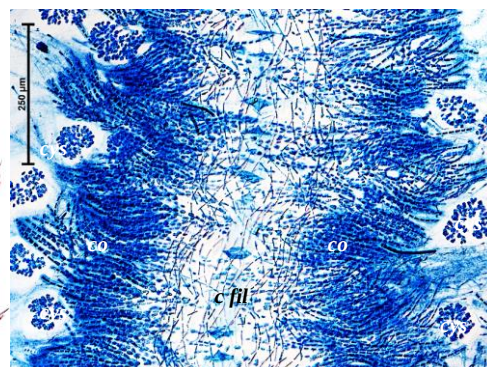


Fig. 45: *Dudresnaya australis*, tissue squash; central filament (c fil), radiating loosely-packed cortical cells (co), female reproductive structures (cystocarps, cys)

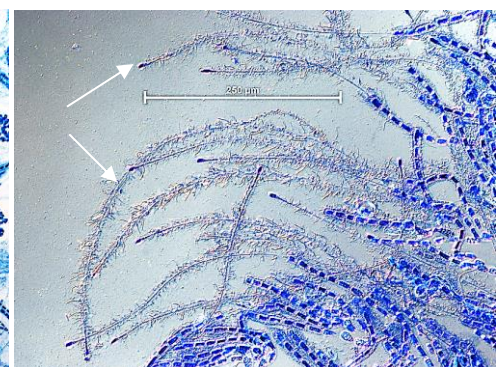


Fig. 46: *Dudresnaya australis*, loosely-packed outer layer (cortex), branches ending in extremely fine, single-celled hairs (arrowed) with swollen tips

- 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*
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 21.

- 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 **broad bladed red algae**)

- 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

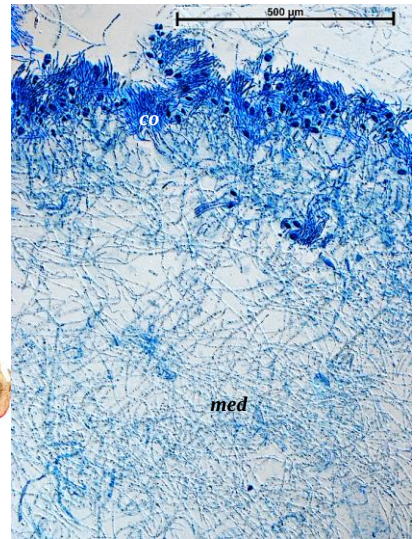
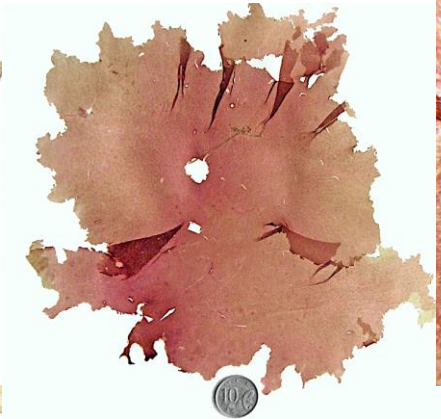


Fig. 48: *Gibsmithia womersleyi*, tissue squash, mass of fine threads in core (medulla, *med*) outer layer (cortex, *co*) with tetrasporangia



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



Figs 50 a,b: *Tsengia laingii*, two plants with contrasting shapes

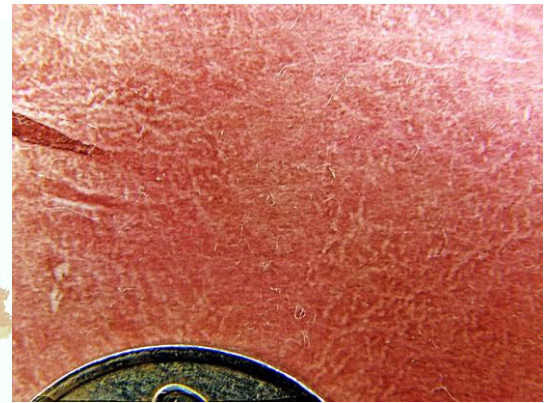


Fig.51: *Tsengia laingii*, mottled surface, with some "rivulets"

- 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**

Family: **Grateloupiaceae** in Algaebase
see Kim *et al* (2021)

- 17b. plants branching usually only from the short base
..... 18.

- 18a. **small lobes** occur at blade edges, blade surface with “rivulet” markings, tissue squashes show **ganglioid** cells Figs 54–57.

..... *Wetherbeella foliosa*
as *Platoma foliosum* in Womersley 1994

Family: **Nemastomataceae**

- 18b. small lobes **absent**, although old blades may be torn into large pieces; rivulet **markings absent or present**
..... 19.

- 19a. rivulet surface markings **present**; female structures **without pores**. Figs 57–59.

..... *Wetherbeella australica*
as *Platoma australicum* in Womersley 1994

Family: **Nemastomataceae**

- 19b. rivulet markings on surface **absent**, female structures **with obvious or obscure pores**
..... 20.



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

Fig. 53 (left): *Grateloupia ovata*



Fig. 54: (above): *Platoma foliosum*



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

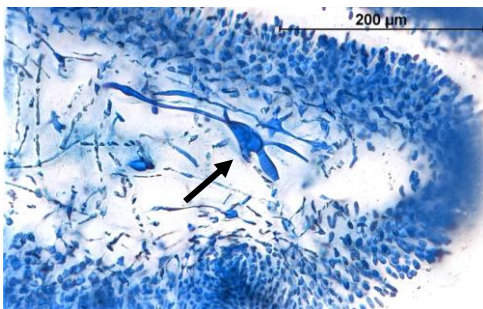


Fig. 56 (left): *Platoma foliosum*
Cross section showing ganglioid cell (arrowed)

Fig. 56 (right): *Platoma foliosum*
Surface view of opening of female cystocarp)

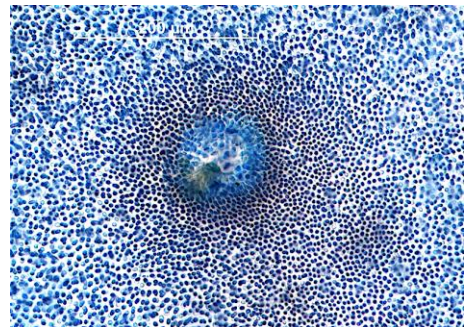


Fig. 57: *Platoma australicum*



Fig. 58: *Platoma australicum*, surface mottled, with rivulets

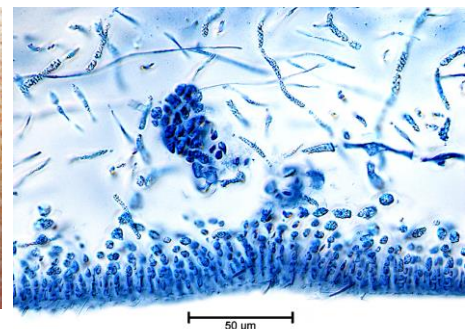


Fig. 59: *Platoma australicum*, cross section, (cys) sunken, pore absent

20a. blade drying tough, edge straight, minute **gland cells** usually but not always **present** in the outer cell layer (cortex); female structures sunken, opening by a **pore**, wrapping (involucre) of filaments **absent**. Figs 60-63.

..... *Schizymenia dubyi*

20b. blade soft, edge rippled, gland cells **absent**; female structures completely imbedded, wrapped in an **involucre of filaments** and with obscure openings. An aggressive introduced pest. Figs 64-67.

..... **Grateloupia turuturu*



Fig. 61 *Schizymenia dubyi*, plant base with short stalk, surface mottling **absent**

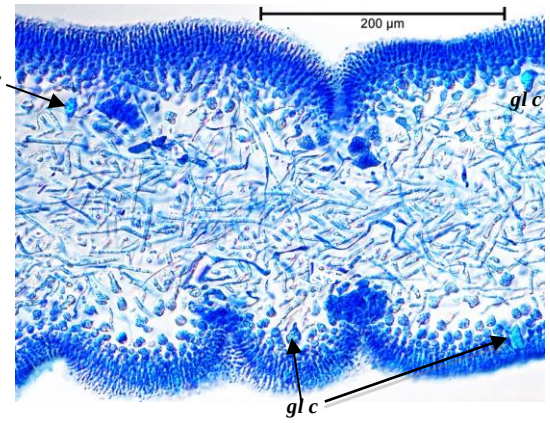


Fig. 62: *Schizymenia dubyi*, cross section, bright gland cells (gl c), cystocarps (cys) with sunken pores



Fig. 60: *Schizymenia dubyi*

Fig. 63 (left): *Schizymenia dubyi*, cross section of outer parts of a blade showing compact rows of small cells and a single heavily stained gland cell

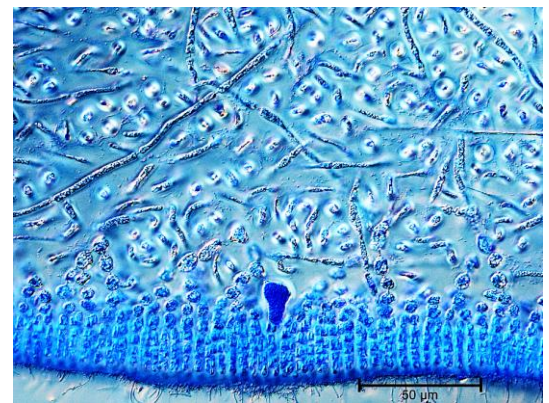
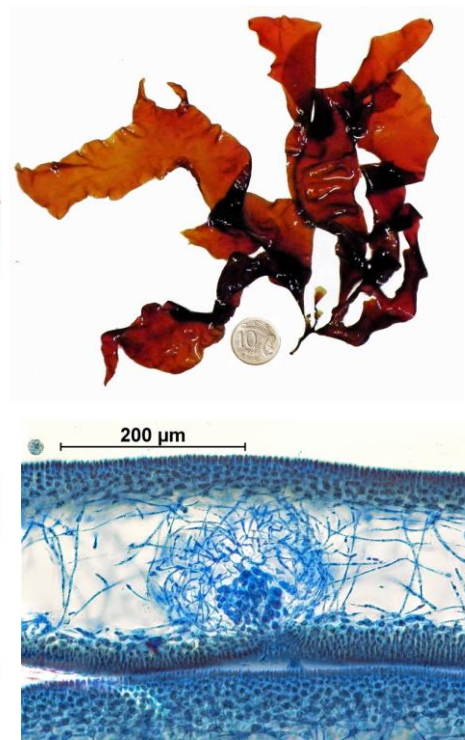


Fig. 64: **Grateloupia turuturu*



Figs 65-66: **Grateloupia turuturu*
Above small plant with divided lobes
Below cross section through a female structure that is fully imbedded and wrapped in an involucre



Fig. 67: **Grateloupia turuturu*
Large, single bladed plant

21a. main branches (axes) regularly **forked**, narrow 3-5 mm wide. Figs 73-75.

..... *Tsengia feredayae*
Family: **Nemastomataceae**

21b. axes wider; short side branches arise at their **edges** 22.

22a. spidery (ganglionic) cells **present** in tissue squashes; plants regularly branched in 2 opposite rows (**pinnate**) throughout. Figs 68, 69.

..... *Gelinararia ulvoidea*
Family: **Halymeniaceae**

22b. 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 70-72.

..... *Tsengia comosa*
Family: **Nemastomataceae**



Fig. 68: *Gelinararia ulvoidea*

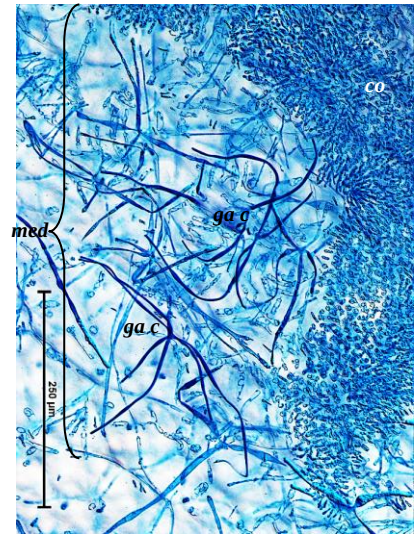


Fig. 69: *Gelinararia ulvoidea*, cross section, outer, compact layer of small, out-ward pointing cells (cortex, *co*), wide core of intertwined threads (medulla, *med*) with large, spidery (ganglionic) cells (*ga c*)



Fig. 70 *Tsengia comosa*, detail of forked main branches fringed by small side branches



Fig. 71 *Tsengia comosa*

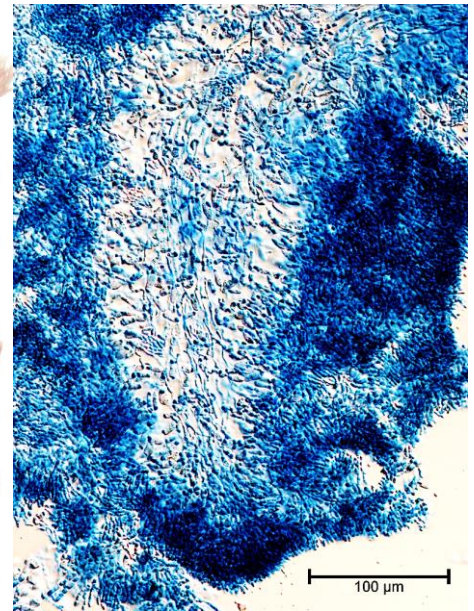


Fig. 72: *Tsengia comosa*, tissue squash of branch tip



Fig. 73: *Tsengia feredayae*, regularly forked pressed plants with branches that have shrunk and darkened during preparation



Fig. 74: *Tsengia feredayae*

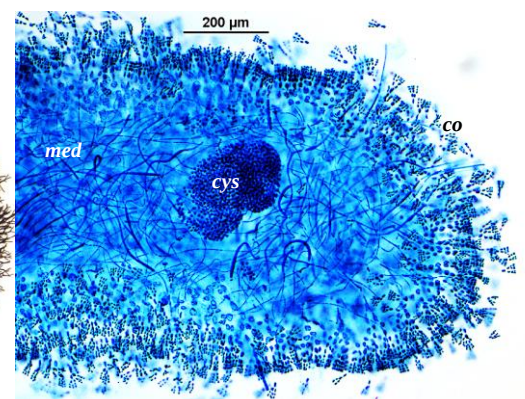


Fig. 75: *Tsengia feredayae*, tissue squashes; core of threads (medulla, *med*) tufts of small cells (cortex, *co*), female structure, (cystocarp, *cys*)

SPECIES INCLUDED IN THIS KEY

species	author/s	page/s	Name in <i>Algaebase</i>	author/s
<i>Acrosymphyton taylori</i>	I. Abbott	6		
<i>Dasyphloea insignis</i>	Montagne	3		
<i>Dudresnaya australis</i>	J. Agardh ex Setchell	6		
<i>Gelinaria ulvoidea</i>	Sonder	10		
<i>Gibsmithia womersleyi</i>	Kraft & Ricker ex Kraft	7		
<i>Glaphyrosiphon intestinalis</i>	(Harvey) Leister & W.A.Nelson	4		
<i>Gloiocladia australis</i>	(J. Agardh) R.E. Norris	2	<i>Gloioderma australe</i>	J. Agardh
<i>Gloiocladia fruticulosa</i>	(Harvey) R. E. Norris	1, 2		
<i>Gloiocladia halymenioides</i>	(Harvey) R. E. Norris	2	<i>Gloioderma halymenioides</i>	(Harvey) J. Agardh
<i>Gloiocladia polycarpa</i>	(Harvey) Womersley	2		
<i>Gloiophyllis barkerae</i>	(Harvey) J. Agardh	1	<i>Gloiophyllis barkerae</i>	(Harvey) J. Agardh
<i>Grateloupia intestinalis</i>	(Harvey) Setchell ex P.G.Parkinson	4	<i>Glaphyrosiphon intestinalis</i>	(Harvey) Leister & W.A.Nelson
<i>Grateloupia ovata</i>	Womersley & J. Lewis	8		
<i>*Grateloupia turuturu</i>	Y. Yamada	9		
<i>Halymenia floresia</i>	(Clemente) C. Agardh	4		
<i>Helminthocladia australis</i>	Harvey	1		
<i>Helminthocladia beaugleholei</i>	Womersley	5		
<i>Helminthocladia densa</i>	(Harvey) Schmitz & Hauptfleisch	5		
<i>Helminthocladia dotyi</i>	Womersley	5		
<i>Helminthora australis</i>	J. Agardh ex Levring	5		
<i>Helminthora lindaueri</i>	Desikachary	5		
<i>Nemalion helminthoides</i>	(Vellay) Batters	5	<i>Nemalion elminthoides</i>	(Vellay) Batters
<i>Nothogenia fastigiata</i>	(Bory) P.G.Parkinson	3		
<i>Platoma australicum</i>	Womersley & Kraft	8	<i>Wetherbeella australica</i>	(Womersley & Kraft) Saunders & Kraft
<i>Platoma foliosum</i>	Womersley & Kraft	8	<i>Wetherbeella foliosa</i>	(Womersley & Kraft) Saunders & Kraft
<i>Schizymenia dubyi</i>	(Chauvin ex Duby) J. Agardh	9		
<i>Tsengia comosa</i>	(Harvey) Womersley & Kraft	10		
<i>Tsengia feredayae</i>	(Harvey) Womersley & Kraft	10		
<i>Tsengia lainqii</i>	Womersley & Kraft	7		

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