Pictured Key to some algae of southern Australia: strap-like & small-leaved red algae. 3rd 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. Collections of algae that are sterile present a problem, particularly as 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 to verify identifications.

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

This key is ***restricted*** to red algae with

- compressed or flat, ribbon- or strap-shaped blades of similar size throughout the plant (about 5-15 mm wide)
- internal structure of many cells, often equal-sided ("parenchymatous")
- side blades often forked (dichotomous)

Excluded are algae where

- branches are cylindrical in cross-section and only a few mm in width. (For these, see the pictured key "Narrow-branched red algae"
- where small side branches form a regular, feathery (pinnate) pattern. (See the pictured key "Feathery/flat/fishbone-branched red algae")
- if whole plant is plate-shaped or broad-bladed (≥ 20 mm wide). See the pictured key: "Broad-bladed red algae")
- where the internal construction consists of strings of cells (threads and meshes), seen clearly at plant tips or found by investigating cross sections microscopically. (Find these in other pictured keys, such as "Filamentous red algae: Master Key" or "…. Red mesh-algae".)

PICTURED KEY

1a. plants ***filmy***, almost transparent, blade edges may be only 1-2 cells thick; some blades have a thicker mid-rib and faint, branched veins. Branching occurs from blade edges or from mid-ribs. Figs 6, 7. …… 2.

1b. plants ***not filmy,*** some are paper thin, but ***not*** semi-transparent; others are slimy, gristly (cartilaginous), or firm in texture, smooth or with a rough or warty surface due to a coating of sponge or a crusty layer of bryozoan animals. …… 4.

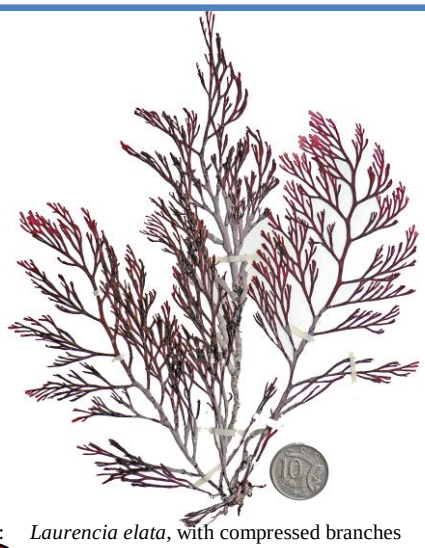


Fig.1: *Laurencia elata*, with compressed branches but < 5mm wide: **excluded** from this key. **(see the pictured key: "*Laurencia* and *Chondrophycus*")**

Fig.2: *Hypnea*, with narrow, cylindrical branches: **excluded** from this key. **(see the pictured key: "Narrow branched red algae")**

Fig. 3: *Sarcothalia radula*, with broad blades: **excluded** from this key. **(see the pictured key: "Broad-bladed red algae")**

Fig.4: *Gigartina pinnata*, with broad main branches and pinnate side branches: **excluded** from this key. **(see the pictured key: "Feathery flat, fishbone-branched red algae")**

Fig.5: *Thuretia quercifolia*, blades with chains of cells forming a meshwork: **excluded** from this key. **(see the pictured key: "Red mesh-algae")**

Fig.6: *Hypoglossum harveyanum* in the Delesseriaceae, filmy, strap-like fronds with a mid-rib, side branches arise from the mid-ribs

Fig.7: *Haraldiophyllum notii* in the Delesseriaceae, filmy fronds, mid-rib absent, flat-branched, spore patches embedded in blades

Baldock, R.N. (2020). Strap-like & small-leaved red algae. 3rd edition, 15 pp. *Algae Revealed*. Adelaide: State Herbarium of South Australia. flora.sa.gov.au/algae_revealed

2a. blades are long and narrow (linear), narrower basally; fertile structures delicate, ***protruding*** ……..... 3.

2b. blades broader, lance- , leaf-shaped, or forked; fertile structures ***embedded*** in blades. Figs 6, 7 (previous page) …….
See ***"Southern Australian Groups at a glance: Delesseriaceae"***

3a. plants grow on the feathery red alga *Ballia*; blades are 1-cell thick, older blades have irregular shorter blades arising from mid-ribs; surface cells are in ***rows***, and ***6-sided***; sporangia occur in small, dense linear structures (stichidia) along mid-ribs. Figs 8, 9.
……..... *Sonderella linearis*
Family: Rhodomelaceae
Tribe: Sonderelleae

3b. plants grow on rock or other algae, have a short stalk, are delicate, often quickly disintegrating after collection; mature female structures (cystocarps) are on short stalks protruding in dense masses from blade surfaces. Figs 10, 11.
…… *Sarcomenia delesserioides*
Family: Sarcomeniaceae

4a. blades are thin, often only 1-2 cells thick and branching is usually regular; fertile structures are ***embedded*** in blades. Figs 6, 7.
See "***..... Groups at a glance: Delesseriaceae"***

4b. blades are thicker and long and narrow (linear), forked or irregular; fertile structures ***protrude*** from the blade surface or edge …..... 5.

5a. plants are ***slimy***. (example, Fig. 12)
See ***"Pictured key: slimy/mucilaginous red algae"***

5b. plants are firm, surfaces smooth, slippery ***or*** rough, (may be covered with sponge or animal growth), but ***not*** slimy ……..... 6.

6a. blades are ***rough,*** or warty, some extensively coated with ***sponge***, or a scale of microscopic bryozoan animals ..... 7.

6b. blades ***smooth***, or with only small, restricted patches of sponge or other animal growth ..... 10.

7a. the majority of the plant is covered in a thick coating of sponge and hardly recognisable as an alga, only the uppermost narrow blades protrude. Figs 13, 14.
..... *Carpopeltis spongeaplexus*
Family: Halymeniaceae

7b. blades easily recognisable, even though they are partially or entirely thinly coated with sponge or bryozoan colonies. ..... 8.

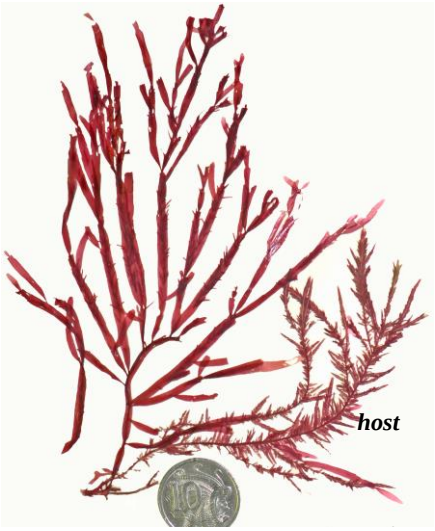


Fig. 8: *Sonderella linearis* on *Ballia callitricha* (host)

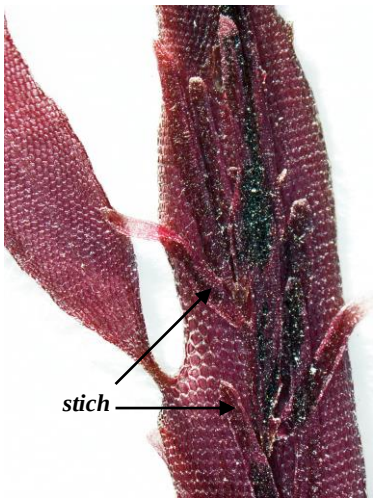


Fig. 9: *Sonderella linearis*, cells 6-sided, in rows. Linear sporangial structures (stichidia, *stich*) occur along the mid-rib


Fig.10: *Sarcomenia delesserioides*. Insert: detail of blades


Fig.11: *Sarcomenia delesserioides*, side branch with clusters of stalked cystocarps


Fig.12: *Gloiophyllis barkeriae*

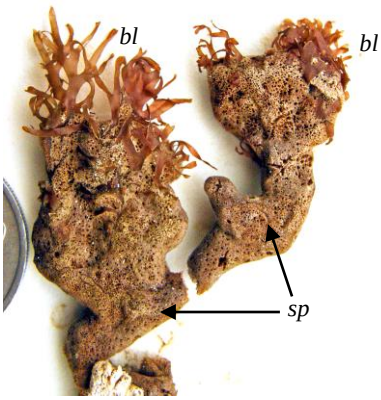


Fig. 13: *Carpopeltis spongeaplexus*, thick sponge coating (*sp*), protruding narrow algal blades (*bl*)


Fig. 14: *Carpopeltis spongeaplexus*

8a. blades are covered with regular rows of a Bryozoan colony (usually *Bathypora nitens*); exposed blade-ends are chisel-like, with in-rolled margins. Figs 15-18.
..... *Amansia pinnatifida*
Family: Rhodomelaceae. Tribe: Amansieae

8b. blades with a warty covering of sponge ..... 9.

9. blades long and narrow (linear) ≈ 10 mm wide, ***twisted,*** edged with blunt teeth; side branches arise from mid-ribs; tips are often yellow to greenish under water. Figs 19-22.
…… *Osmundaria prolifera*
Family: Rhodomelaceae. Tribe: Amansieae
(Also in "***Pictured keys..... sponge-covered red algae***")

9b. blades spatula-shaped, ≈ 5 mm wide; sponge occurs between flat surface growths that face forwards. Figs 23-25. (next page)
……. *Epiglossum smithiae*
Family: Rhodomelaceae. Tribe: Amansieae

Fig. 15: *Amansia pinnatifida*,

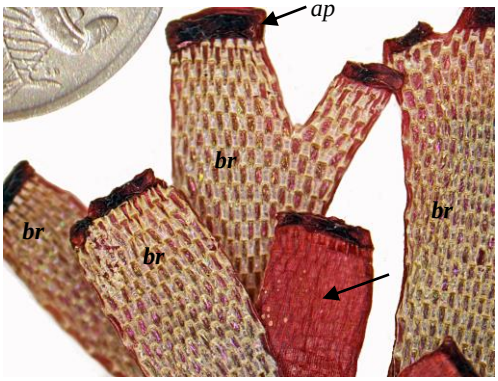


Fig.16: *Amansia pinnatifida*, in-rolled blade ends (apex, *ap*) bryozoan coat (*br*), uncoated blade (arrowed)

Fig.17: *Amansia pinnatifida*, detail of differences in texture of the bryozoan coating (left) and naked blade (right)

Fig. 19: *Osmundaria prolifera* underwater image, blades twisted, tips greenish

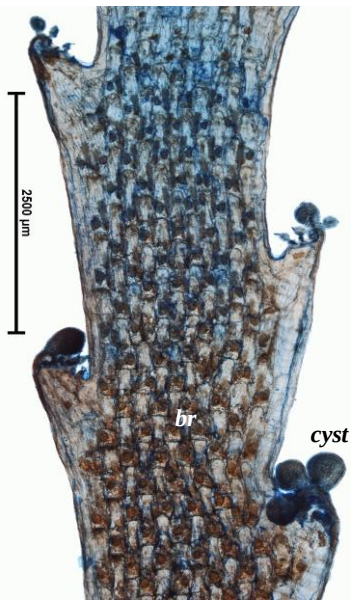


Fig.18: *Amansia pinnatifida*, blade edges smooth except for teeth bearing clusters of stalked, bulb-shaped cystocarps (*cys*); bryozoan coat (*br*)

Fig. 20: *Osmundaria prolifera*, blades with warty surfaces, branching from mid-ribs

Fig.21: *Osmundaria prolifera*, dried specimen, exaggerating the surface wartiness, bluntly toothed margins towards blade ends

Fig.22: *Osmundaria prolifera*, dried specimen, knobby marginal outgrowths bearing reproductive organs

Fig. 23: *Epiglossum smithiae*

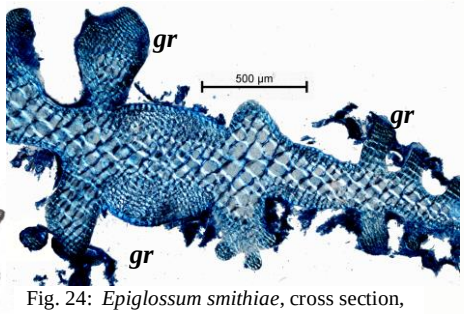


Fig. 24: *Epiglossum smithiae*, cross section, detail of surface outgrowths (*gr*)

Fig. 25: *Epiglossum smithiae*, sponge-covered spatula-shaped blades, bunches of minute reproductive structures on surfaces and edges

10a. blade edge prominently ***saw-toothed***; mid-rib vein prominent, side veins extend to tips of marginal teeth ..... 11.

10b. saw-tooth edges ***absent***, although minute teeth may be present; side veins absent .....12.

11a. blades spirally twisted, teeth single Figs 26, 27. .....*Vidalia spiralis*
Family: Rhodomelaceae; Tribe: Amansieae

11b. blades ***not*** spirally twisted, teeth may divide into 3's, or appear single if blade is denuded. Figs 28-30. ..... *Dictyomenia*
4 spp (3 with strap-like blades)
Family: Rhodomelaceae; Tribe Pterosiphonieae
See *"**Algae at a glance: Dictyomenia**"*

Fig. 26: *Vidalia spiralis*

Fig. 27: *Vidalia spiralis*, detail of twisted blades with saw-toothed edges

Fig. 28: *Dictyomenia tridens*

Fig.:29: *Dictyomenia tridens*, detail of branched teeth; blades with ring cell-patterns

Fig. 30: *Dictyomenia sonderi*

12a. blade ***edges*** show numerous forked lines of dividing cells; blade surfaces with delicate diverging veins one cell wide; tufts of branched hairs (trichoblasts) often occur on blade surfaces and sometimes bear reproductive organs at their bases Figs 27-35.
Pollexfenia 3 spp ..... 13.
Family: Rhodomelaceae; Tribe: Pterosiphonieae
See also ***"Algae at a glance: Pollexfenia"***
12b. not as above ..... 15.

13a. plants small, 20-50 mm tall, on Sea nymph (*Amphibolis*) stems. Fig. 28.
..... *Pollexfenia crispata*
13b. plants on rock or algae, 100-250 mm tall ..... 14.

14a. mid-ribs absent. Figs 30-32, 35.
..... *Pollexfenia pedicellata*
14b. mid-ribs prominent. Figs 27, 33, 34.
..... *Pollexfenia lobata*

15a. blade surfaces with definite ***cell patterns*** (diamonds, rows of polygonal cells, large, ghost-like rounded images, small cells in rings around large ones) ..... 16.
15b. definite patterns of cells ***absent*** or indefinite (see also step 34, Fig. 98)
..... 24.

16a. surface cell pattern of diamond-shaped or box-shaped cells often in lines at acute angles to the mid-rib
..... 17.
16b. surface cell pattern at right angles to the mid-rib ..... 21.

17a. tips ***notched***, a microscopic ***cone*** in each notch. See Figs 39-44, next page.
.....*Lenormandia*, 5 spp ..... 18.
Family: Rhodomelaceae; Tribe: Amansieae
(*L. latifolia*, which is broad-bladed, can be found in the " Broad-bladed red algae" key)
17b. blade tops rounded, or curled-over. Figs. 36-38 (next page, from W.A., rare in S.A.) ..... *Kuetzingia canaliculata*.
Family: Rhodomelaceae; Tribe: Amansieae

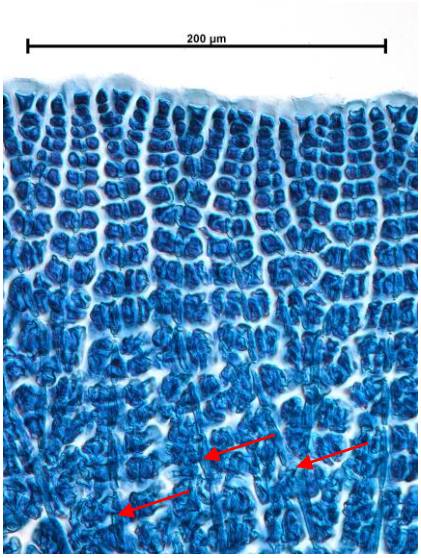


Fig. 27: *Pollexfenia lobata*, dividing lines of cells

Fig. 28: *Pollexfenia crispata* on a stem of seagrass

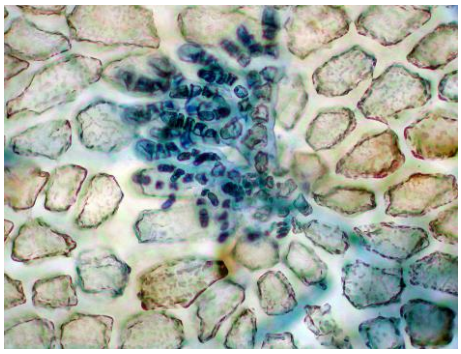


Fig. 29: *Pollexfenia pedicellata*, highly magnified view of a trichoblast of the blade surface

Fig. 30-32: *Pollexfenia pedicellata*
Left: specimen with narrow, semi-transparent blades spotted with trichoblasts
Above: broad-bladed specimen
Right: surface with trichoblast clusters, these bearing sporangial structures

Figs 33, 34: *Pollexfenia lobata*,
Above: specimen with ruffled blades
Above, right: with linear blades

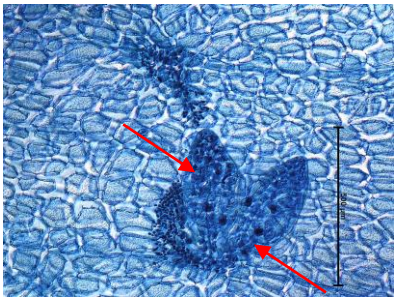


Fig. 35: Right: *Pollexfenia pedicellata*
surface view of spore structures (stichidia, arrowed) at base of a trichoblast

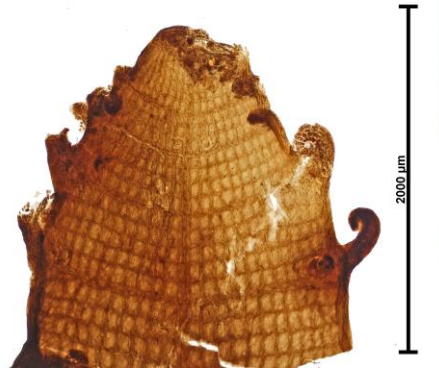


Fig. 36, 37: *Kuetzingia canaliculata*
Above: surface cell pattern, curled sporangial structures on the blade edge
Right: whole plant, encrusted with sponge

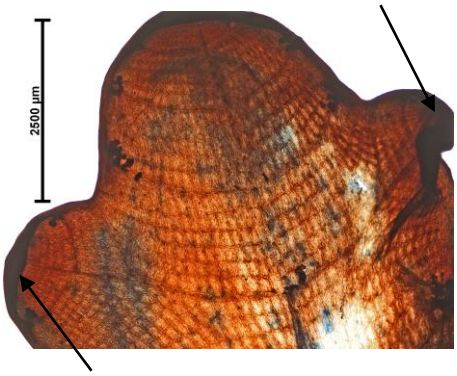


Fig. 38: *Kuetzingia canaliculata* plant tips, with in-rolled edges (arrowed)

Fig. 39: *Lenormandia muelleri*, mid-ribs ***conspicuous***, thick; long basal stalks to blades

Fig. 40: *Lenormandia spectabilis*, blades 20-40 mm wide, mid-ribs ***inconspicuous***; short basal stalks to blades

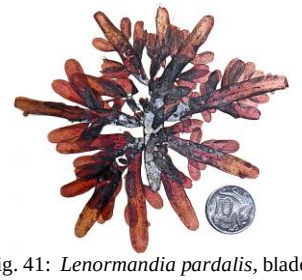


Fig. 41: *Lenormandia pardalis*, blades arising from blade mid-ribs; dark female structures (cystocarps) scattered on the surface

18a. blades 20-40 mm wide, plants often over 200 mm tall. ..... 19.
18b. blades 10-20 mm wide, plants 50–150 mm tall …… 20.

19a. blades red-brown, mid-ribs ***conspicuous***, thick; basal stalks long. Figs 39, 42 .... *Lenormandia muelleri*
19b. blades dark red, mid-ribs of side blades ***inconspicuous***; basal stalk short. Fig. 40.
.....… *Lenormandia spectabilis*

20a. blade edges ***without*** teeth; branches and reproductive structures grow from ***blade mid-ribs***. Fig. 41.
……..... *Lenormandia pardalis*
20b. blade edges ***minutely toothed***; branches and reproductive structure from ***blade edges***. Figs 43, 44.
..... *Lenormandia marginata*

Fig. 42: *Lenormandia muelleri*: minute cone (arrowed) in the notched blade tip, sweeping arcs of diamond

Figs 43, 44: *Lenormandia marginata*
Above, right: whole plant;
insert of magnified minute teeth along blade margins
Immediate right: spore structures (stichidia) fringing two slightly overlapping blades, rows of diamond-shaped cells in surface view

21a. large, ghost-like cell images lie beneath the blade surface, distorting it into a pebble-like surface when the blade dries; blades twisted when fresh, drying almost black. Figs 45-49. (⚠ can be mistaken for a member of the Delesseriaceae) ..... *Hennedya crispa*
Family: Acrotylaceae

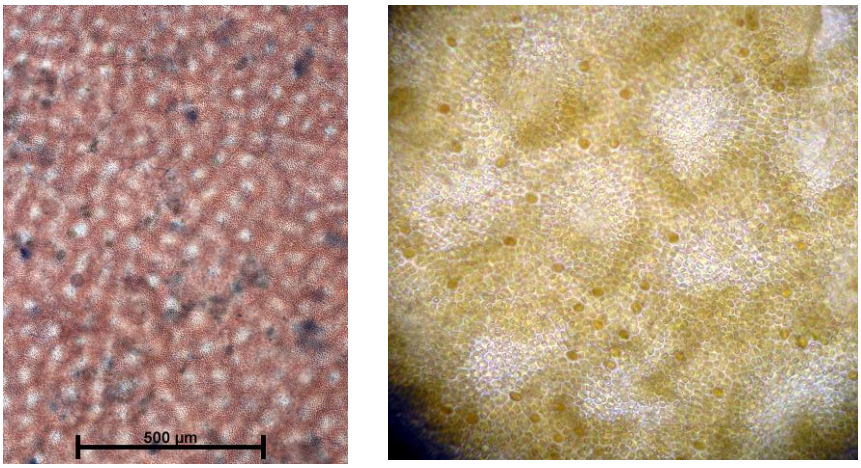
21b. cell rosettes (rings of small cells around larger ones) seen on blade surface .. 22.

22a. blade edges smooth; tissue squash shows large cells mixed with many fine threads; female structures (cystocarps) form pustules on blade surfaces; asexual spores occur in pyramidal stacks of 4 (tetrahedral). Figs 50-53. ..... *Leptosomia rosea*
Family: Rhodymeniaceae

22b. blade edges smooth or fringed, single threads in cores may appear as veins in some species; cystocarps occur on blade surface or edges; asexual spores are divided into stacks of 4 (zonate) ..... 23.

23a. blade edges fringed with minute outgrowths; female structures fringe blades. Figs 54-59 (next page). ..... *Craspedocarpus* 4 spp
Family: Cystocloniaceae
See "*… Groups at a glance: Cystocloniaceae*"

23b. blade edges smooth or fringed; cystocarps occur on blade surfaces or edges; cell rings (rosettes) and veins usually only weakly developed. Figs 60-63 (next page). ..... *Rhodophyllis* 3 spp
Family: Cystocloniaceae
See "*… Groups at a glance: Cystocloniaceae*"



Figs 45, 46: *Hennedya crispa*
two microscopic surface views of blades at different magnifications showing ghost-like images of large cells lying beneath the surface

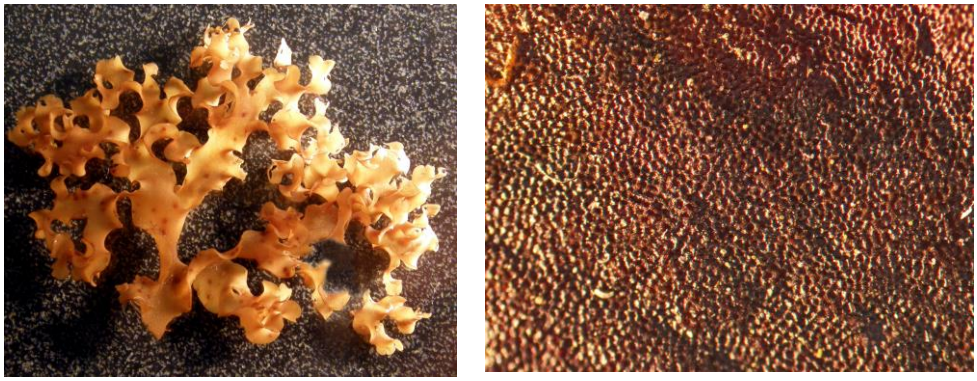


Fig. 47, 48: *Hennedya crispa*
Above, left: fresh specimen with crinkled blades
Above, right: dried specimen, showing the microscopic pebble-like surface view

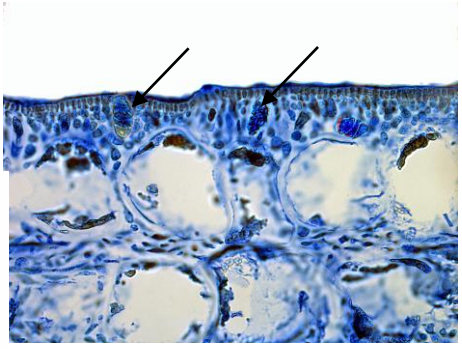


Fig. 49: *Hennedya crispa*
partial cross section with large inner cells and spores in the outer surface layer (arrowed)

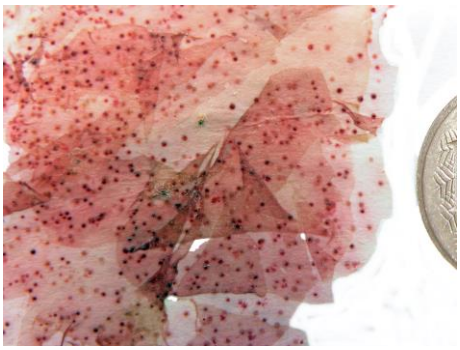
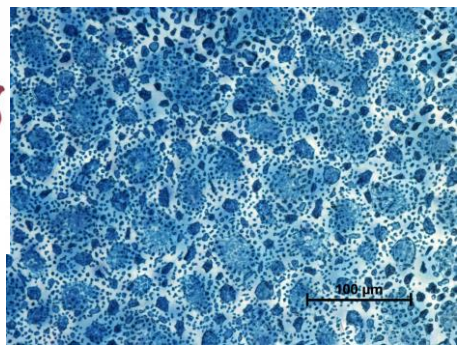


Fig. 50: *Leptosomia rosea* scattered embedded female structures

Fig. 51-53: *Leptosomia rosea*
Above: whole plant on a seagrass stem
Right surface view of cell rings (rosettes)
Far right: tissue squash, fine threads amongst other cells



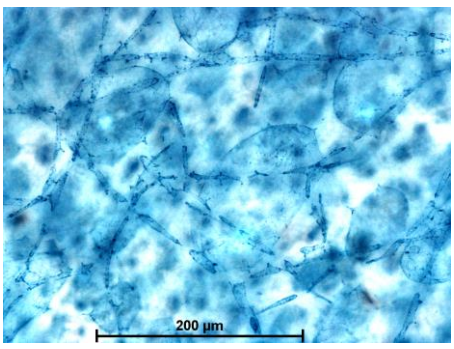


Fig. 54: *Craspedocarpus venosus* surface view of clearly defined cell rosettes, veins

Fig. 55: *Craspedocarpus ramentaceus* fringed with short blades

Fig. 56: *Craspedocarpus blepharicarpus*

Fig. 57: *Craspedocarpus blepharicarpus*, female structures (cystocarps) on blade edge

Fig. 58: *Craspedocarpus venosus*

Fig. 59: *Craspedocarpus venosus* detail of marginal female structures

Fig. 60: *Rhodophyllis volans*

Fig. 61: *Rhodophyllis membranacea*

Fig. 63: *Rhodophyllis membranacea*, weakly developed cell rosettes; veins

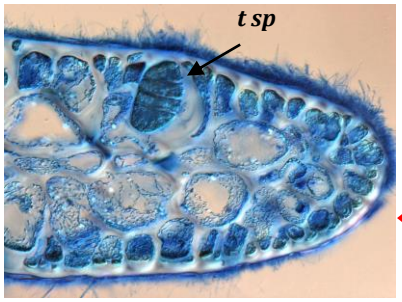


Fig. 62 *Rhodophyllis multipartita*, cross section with large zonate tetrasporangium (*t sp*)

24a. cross sections of blades, or tissue squashes show a core (medulla) of fine threads, outer layers with rounded or box-shaped cells ..... 25.
24b. cross sections of blades show a core of large oval-shaped cells, grading to surface smaller cells. See Fig. 81. ..... 30.

25a. cross sections of blades show a ***narrow*** core of threads ..... 26.
25b. cross sections show a ***broad*** core of threads ..... 29.

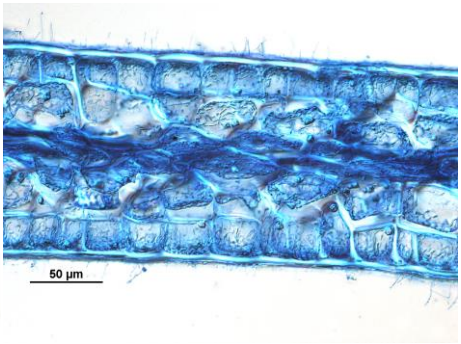
26a. in cross section, core cells are flanked by large box-shaped cells at the blade surface; blade margins have minute teeth. Figs 64-67.
..... *Stictosporum nitophylloides*
Family: Cystocloniaceae
26b. core threads are flanked by oval cells, decreasing in size toward the surface of the blade; blade edges are smooth.
..... *Carpopeltis*.. 3 spp ... 27.
Family: Halymeniaceae

27a. blades covered in a thick coating of sponge, only the uppermost narrow blades protruding (also at step 7a). Figs 13, 14.
..... *Carpopeltis spongeaplexus*
27b. blades generally naked .....28.

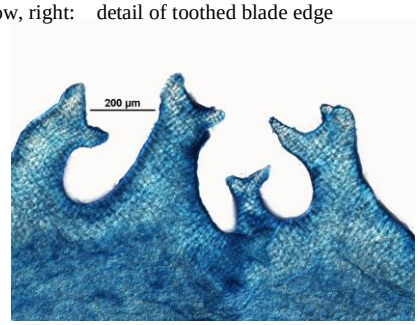
28a. blades 3-5 mm wide, fan-shaped, narrowing towards the base. Figs 68, 69.
..... *Carpopeltis phyllophora*
28b. blades 1-2 (-3) mm wide, plants are often basally denuded of side branches . Figs 67-69.
..... *Carpopeltis elata*

29a. tissue squashes show spidery (ganglionic) cells amongst extremely fine threads; outer layers (cortex) have chains of outward-facing cells; female structures (cystocarps) are sunken in blade surfaces. Figs 73-77 (next page).
……..... *Cryptonemia* 5 spp
Family: Halymeniaceae
See "Algal groups at a glance: Halymeniaceae"

29b. ganglionic cells ***absent*** although core threads have many arms; cortex of an inner, dense cell layer and distinct outer layer of outward-facing cells; cystocarps occur along blade edges Figs 73-72 (next page).
..... *Sarcodia marginata*
Family: Sarcodiaceae



Figs 64-67: *Stictosporum nitophylloides*
Above, left: whole plant
Below, left: toothed edges of blades
Above, right: cross section, core of threads, surface cells box-shaped
Below, right: detail of toothed blade edge



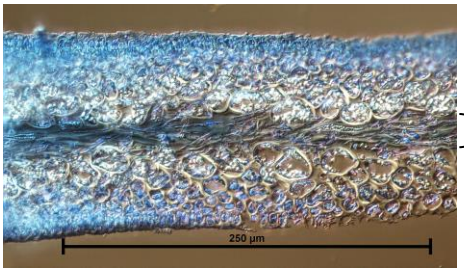
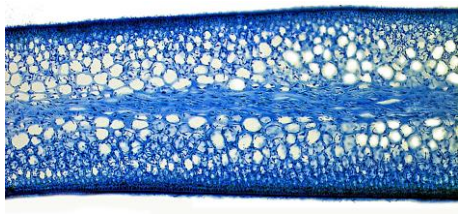


Fig. 68, 69: *Carpopeltis phyllophora*,
Above: cross section, ***narrow*** core of threads (medulla, *med*)
Right: whole plant



Figs 70-72: *Carpopeltis elata*,
Above, right: whole plant
Right: cross section
Far right: detail of branches

Fig. 70: *Sarcodia marginata*

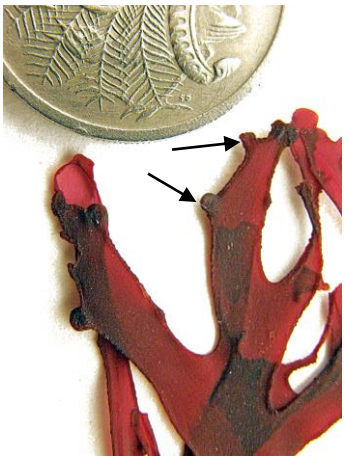


Fig. 71: *Sarcodia marginata*, detail of cystocarps (arrowed) along blade margins

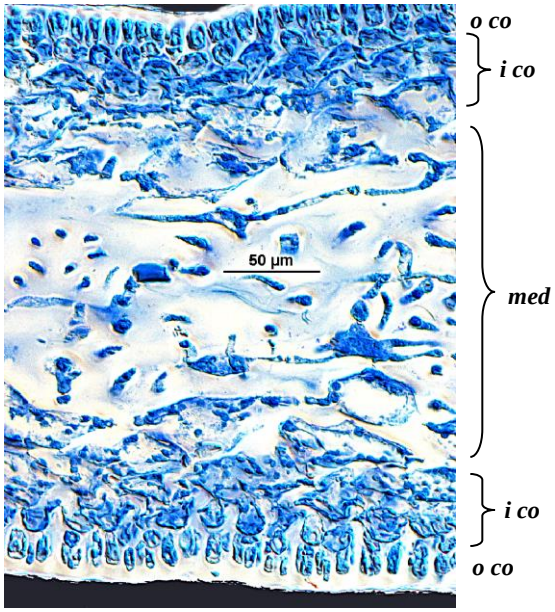


Fig. 72: *Sarcodia marginata*, cross section, medulla, (*med*) of many-armed threads, inner cortex (*i co*), outer cortex (*o co*)

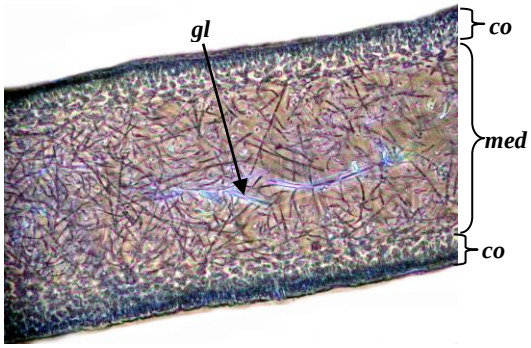


Fig. 73: *Cryptonemia digitata*, cross section, ***wide*** core (medulla, *med*) of fine threads, spidery (ganglionic) cell (*gl*), outer layers (cortex, *co*) of chains of outward facing cells

Fig. 74: *Cryptonemia digitata*, tissue squash, fine core threads, bright, spidery (ganglionic) cells

Fig. 75: *Cryptonemia nitophylloides*

Fig 76: *Cryptonemia digitata*

Fig 77: *Cryptonemia kallymenioides*

(core of large circular cells)

30a. plants ***leathery***, forked or with a flat, thick, broad, central main branch (axis) and smaller side branches. ..... 31.

30b. plants ***softer,*** flexible, main branches regularly forked ***or*** with a wide main branch and short side-branches forked or toothed ..... 32.

31a. plants usually upright (except *Curdiea crassa*); female structures (cystocarps) form pimple-like bumps near blade margins. Figs 78-83. ..... *Curdiea* 3 spp
Family: Gracilariaceae
See ***" ...groups at a glance: Gracilariaceae"***

31b. plants grow flat on rocks, attached by short outgrowths (haptera); cystocarps generally scattered on blade surfaces. Figs 84-88. .....*Tylotus obtusatus*
Family: Dicranemataceae

Fig. 78: *Curdiea crassa* lies flat on rocks

Fig. 79: *Curdiea crassa*, edge of the blade lifted to reveal a white layer of bryozoan animals on the underside

Fig. 80: *Curdiea angustata*

Fig. 81: *Curdiea angustata*

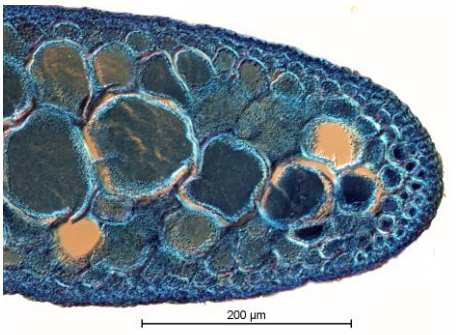


Fig. 82: *Curdiea angustata*, cross section showing core of large cells grading outwardly to smaller ones

Fig. 83: *Curdiea obesa*

Fig. 84: *Tylotus obtusatus* lies flat on rock

Fig. 85: *Tylotus obtusatus*, cross section through a female structure (cystocarp)

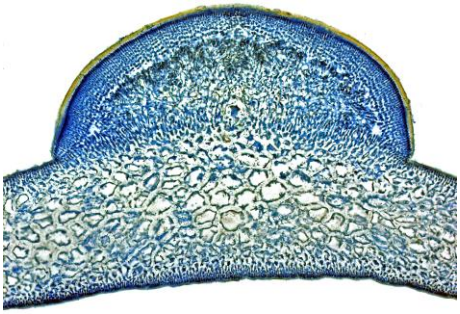


Fig. 86: *Tylotus obtusatus*, root-like attachment structures

Fig. 87: *Tylotus obtusatus*, peg-like attachment structures on the blade underside

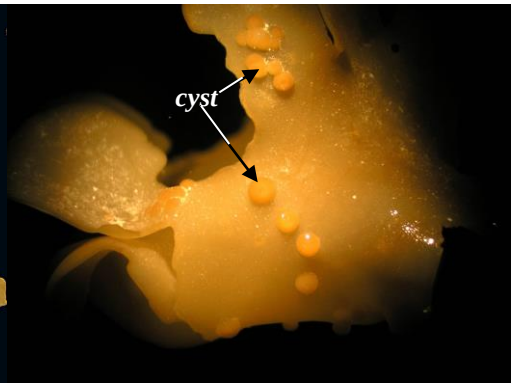


Fig. 88: *Tylotus obtusatus*, cystocarps (*cyst*) on the blade surface

32a. blades ***forked***. Figs 89-94.
……. *Rhodymenia* in part, *Halopeltis*
See **" *Southern Australian groups at a glance: Rhodymeniaceae*"**

32b. main blades with short, small ***side blades*** ..... 33.

Fig. 89: *Rhodymenia obtusa* (Some specimens collected from Victoria and Tasmania and placed in this species include a new species, *Rhodymenia wilsonis*)

Fig. 90: *Halopeltis cuneata* (= *Rhodymenia cuneata* and *Rhodymenia halymenioides* in the Marine Benthic Flora of southern Australia)

Fig. 91: *Halopeltis australis* (= *Rhodymenia australis* in the Marine Benthic Flora of southern Australia)

Fig. 92: *Halopeltis verrucosa* (= *Rhodymenia verrucosa* in the Flora), with a basal coating of whitish bryozoans

Fig. 93: *Rhodymenia leptophylla*

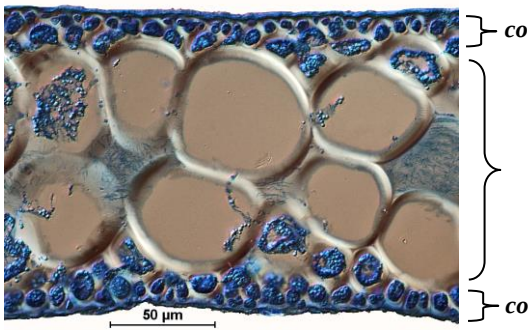


Fig. 94: *Halopeltis cuneata* (= *Rhodymenia cuneata* and *Rhodymenia halymenioides* in the Flora), cross section, wide core (medulla, *med* of large cells, rapidly grading to small cells of the narrow outer layers (cortex, *co*)

33a. short side blades fringing the main blade (axis) are narrow, usually un-branched themselves. Figs 94-96.
Rhodymenia prolificans, *Rhodymenia stenoglossa*
See **" *Southern Australian groups at a glance: Rhodymeniaceae*"**

33b. side branches toothed or branched
..... 34.

Fig. 95: *Rhodymenia prolificans*

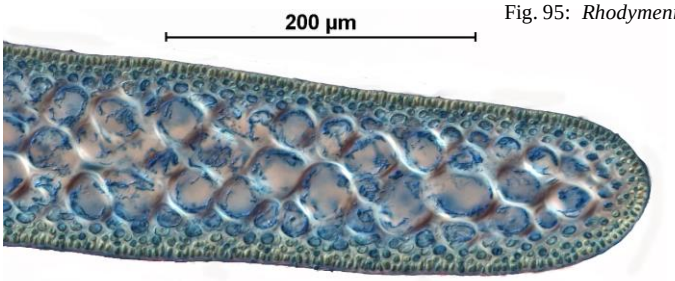


Fig. 96: *Rhodymenia prolificans*, cross section

Fig. 97: *Rhodymenia stenoglossa*

34a. side blades usually spiky, arranged in alternating sets of 2's, or 3's, 4's and 5's; some may be serrated on the outer edge. Tetrasporangia occur in finger-like structures tufted in branch angles. In cross section, the large cells of the core have ***no*** obscure threads wrapped around them . Figs 98-102. .....*Plocamium*
Family: Plocamiaceae
See ***" Southern Australian groups at a glance: Plocamium"***

34b. side blades not as above, ends usually forked, rounded or horn-like. Tetrasporangia are scattered, and embedded in the blade. In cross section, the large cells of the core are ringed by obscure, extremely thin threads. See Figs 102, 103. .....*Callophyllis, Austrophyllis* ..... 35.
Family: Kallymeniaceae
(next 2 pages)

Fig. 98: *Plocamium cartilagineum*

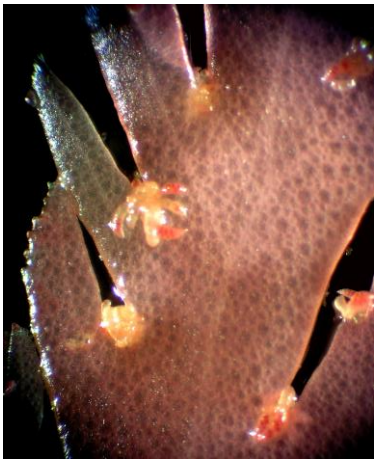


Fig. 99: *Plocamium preissianum*, tufts of reproductive structures in blade angles and ghost-like large cells of the core showing through the surface

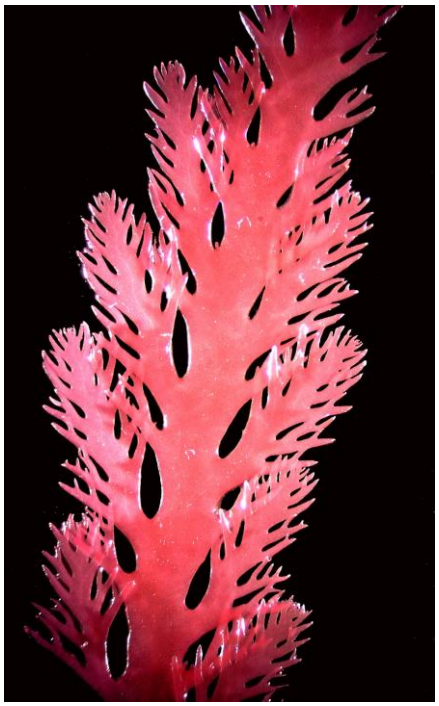


Fig. 100: *Plocamium mertensii*

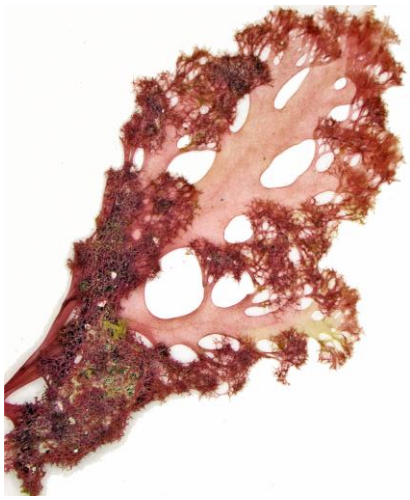


Fig. 101: *Plocamium mertensii*, The alternating sets of spiky blades seen in Fig. 99 can be obscured sometimes by bunches of tree-like branches (proliferating branchlets)

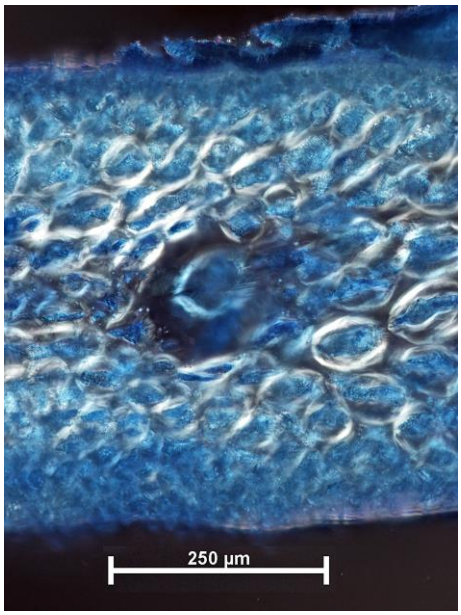


Fig. 102: *Plocamium patagiatum*, cross section through the midrib of the blade, absence of fine threads around egg-shaped cells

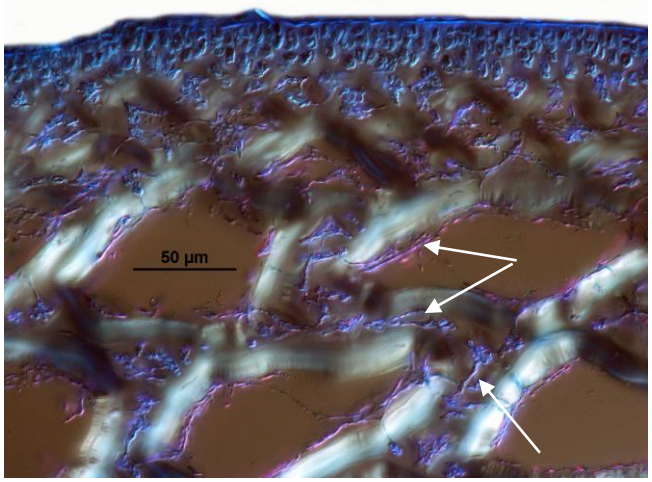


Fig. 103: *Austrophyllis harveyana*, cross section showing large, thick-walled core cells ringed by delicate threads (arrowed)

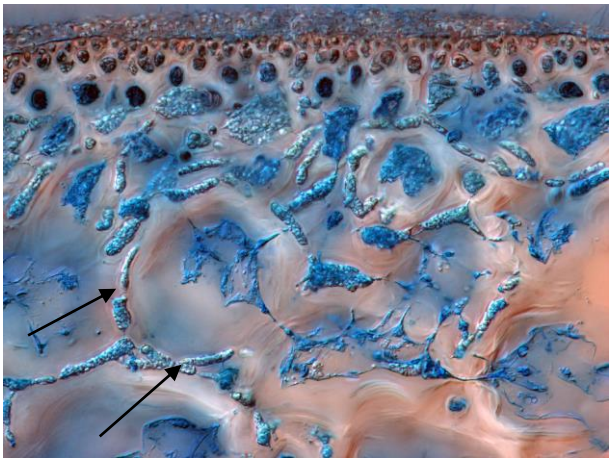


Fig. 104: *Callophyllis lambertii*, cross section showing large core cells ringed by delicate threads (arrowed)

35a. branching fairly regular; edges of main blades largely smooth, tips lance-shaped and parallel ..... 36.

35b. branching more irregular, edges of main blades (axes) with small antler-like or spiny side prongs, tips spiny, or spreading ..... 37.

36a. blades 10-50 mm wide, forked about every 10-30 mm; female reproductive structures (cystocarps) pimple-like, scattered throughout blades. Figs 105, 106, 116.
.....*Austrophyllis harveyana*

36b. blades < 10 mm broad, cystocarps restricted to branch tips. Figs 107, 108.
..... *Callophyllis cervicornis*

37a. plants large, robust, commonly >150 mm tall; tips rounded and about 2 mm wide, prongs on blade margins if present > 1 mm wide. Figs 109-111.
..... *Callophyllis lambertii*

37b. plants thinner, more delicate, usually < 150 mm tall; tips ≤ 1mm wide for some distance.
..... *Callophyllis rangiferina* Figs 112, 113.
.....*Austrophyllis alcicornis* Figs 114, 115.

(similar vegetatively, these 2 spp are separated on female reproductive features – see individual Fact Sheets and Fig. 115)

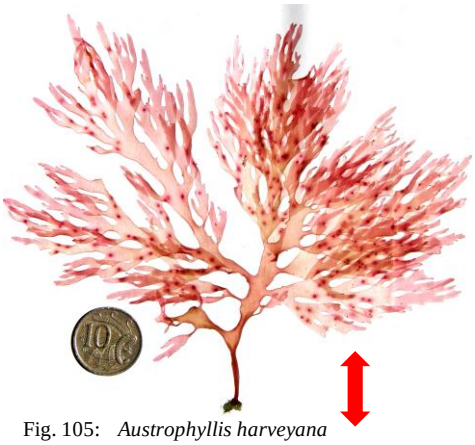


Fig. 105: *Austrophyllis harveyana*

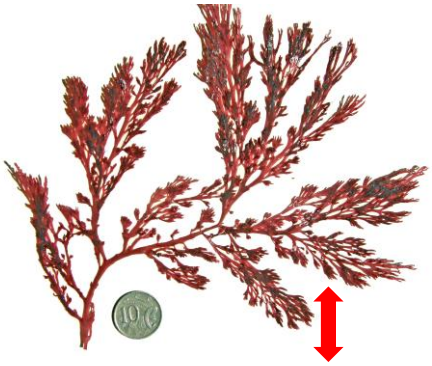


Fig. 107: *Callophyllis cervicornis*

Fig. 106: *Austrophyllis harveyana* detail of branches at tips,:scattered, pimple-like cystocarps

Fig. 108: *Callophyllis cervicornis*, branch tips with cystocarps

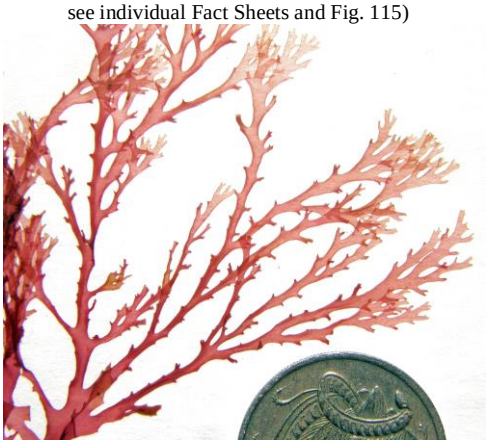


Fig. 109: *Callophyllis lambertii*, prongs on the margins of blades

Fig. 110: *Callophyllis lambertii*

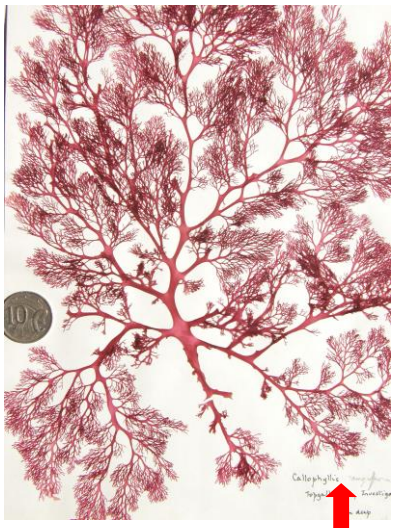


Fig. 112: *Callophyllis rangiferina*

Fig. 111: *Callophyllis lambertii* tips

Fig. 113: *Callophyllis rangiferina* tips

Fig 114: *Austrophyllis alcicornis*

Fig. 115: *Austrophyllis alcicornis* tips

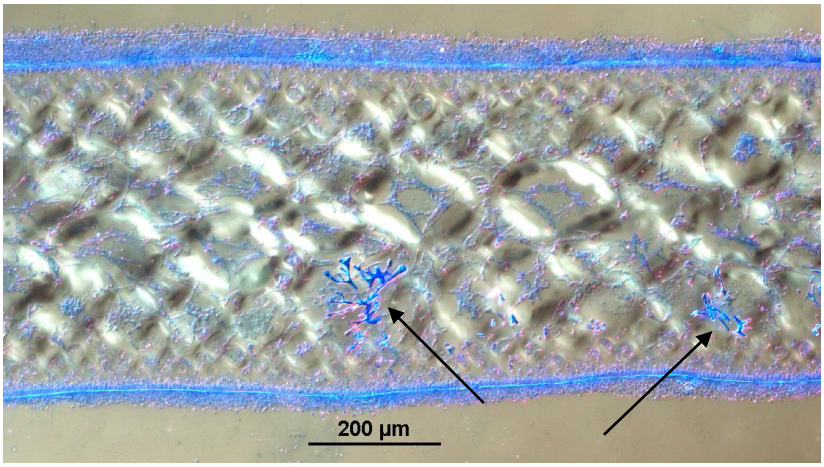


Fig. 116: *Austrophyllis harveyana*, cross section of young female stage, showing heavily stained, amoeba-like cells (arrowed) involved in reproduction, a feature separating the genus from *Callophyllis*