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 reproducively 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”)
- small side branches form a regular, feathery (pinnate) pattern. (See the pictured key of the same name.)
- the whole plant is plate-shaped or broad-bladed (20+ mm wide). See the pictured key: “Broad-bladed red algae”
- the internal construction consists of strings of cells (threads and meshes). This may be obscured by the later development of additional (corticating) cells and can then only be 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-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
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 “Southern Australian 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, partially or entirely thinly coated with sponge or bryozoan colonies. ……… 8.

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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 *Pict. 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

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

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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*
12a. blade edges show numerous lines of dividing cells (see Fig. 27); tufts of branched hairs (trichoblasts) often occur on blade surfaces (Fig. 28).

*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. 30. .......................... *Pollexfenia crispata*

13b. plants on rock or algae, 100-250 mm tall .......................... 14.

14a. mid-ribs absent. Figs 27-29. .......................... *Pollexfenia pedicellata*

14b. mid-ribs prominent. Figs 31, 32. .......................... *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. patterns of cells absent or indefinite (see also step 34, Fig. 98) ........................ 24.

16a. surface cell pattern consists 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 32, 33. .......................... *Lenormandia*, 5 spp .......................... 18.
Family: Rhodomelaceae; Tribe: Amansieae

17b. blade tops rounded, or curled-over. Figs. 39-41 (next page, from W.A., rare in S.A.) .......................... *Kuetzingia canaliculata.*
Family: Rhodomelaceae; Tribe: Amansieae

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 32-34. .......................... *Lenormandia muelleri*

19b. blades dark red, mid-ribs of side blades inconspicuous; basal stalk short. Fig. 35. .......................... *Lenormandia spectabilis*

20a. blade edges without teeth; branches and reproductive structures grow from blade mid-ribs. Figs 36, 37. .......................... *Lenormandia pardalis*

20b. blade edges minutely toothed; branches and reproductive structure from blade edges. Fig. 38. .......................... *Lenormandia marginata*

Fig. 34: *Lenormandia muelleri*, mid-ribs *conspicuous*, thick; long basal stalks to blades

Fig. 35: *Lenormandia spectabilis*, blades 20-40 mm wide, mid-ribs *inconspicuous*; short basal stalks to blades

Fig. 36: *Lenormandia pardalis*, blades arising from blade mid-ribs; dark female structures (cystocarps) scattered on the surface

Fig. 37: *Lenormandia pardalis*, minute pointed tip in the notch of a blade, radiating cell rows, (diamond cell-patterns not yet established)

Fig. 38: *Lenormandia marginata*, blades arising from blade edges

Fig. 39: *Kuetzingia canaliculata*, blades heavily coated with whitish bryozoans

Fig. 40: *Kuetzingia canaliculata*, blade tops rounded and curled over

Fig. 41: *Kuetzingia canaliculata*, surface cell pattern, curled sporangial structures on the blade edge
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 42-46. (can be mistaken for a member of the Delesseriaceae)

.......................... **Hennedya crispa**
Family: Acrotylaceae

21b. Cell rosettes (rings of small cells around larger ones) 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 47-50.

.......................... **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 51-56 (next page).

.......................... **Crasedocarpus** 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 57-60 (next page).

.......................... **Rhodophyllis** 3 spp
Family: Cystocloniaceae
See “... Groups at a glance: Cystocloniaceae”

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.

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 61-64.

26b. core threads are flanked by oval cells, decreasing in size toward the surface of the blade; blade edges are smooth. (See Fig. 65).

27a. blades covered in a thick coating of sponge, only the uppermost narrow blades protruding (also at step 7a). Figs 13, 14.

27b. blades generally naked ............... 28.

28a. blades 3-5 mm wide, narrowing towards the base. Figs 64, 65.

28b. blades 1-2 (-3) mm wide, plants are often basally denuded of side branches. Figs 67-69.

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).

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 70-72 (next page).

See “Algal groups at a glance: Halymeniaceae”

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 kallymenoides*


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

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

31a. plants usually upright (except *Curdiea crassa*); female structures (cystocarps) form pimple-like bumps near blade margins. Figs 78-83.

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

33a. short side blades fringing the main blade (axis) are narrow, usually unbranched themselves. Figs 94-96.

Rhodymenia prolificans, Rhodymenia stenoglossa
See “Southern Australian groups at a glance: Rhodymeniaceae”

33b. side branches toothed or branched

............................................. 34.

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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.

.........Callophyliis, Austrophyliis

.........35.

Family: Kallymeniaceae

(next 2 pages)
35a. branching fairly regular; edges of main blades largely smooth, tips lance-shaped and parallel

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.

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

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.

37b. plants thinner, more delicate, usually < 150 mm tall; tips ≤ 1mm wide for some distance.

Fig. 108: Callophyllis cervicornis, branch tips with cystocarps

Fig. 110: Callophyllis lambertii

Fig. 112: Callophyllis rangiferina

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

Fig. 111: Callophyllis lambertii tips

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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*.  

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