Pictured Key to some common filamentous red algae of southern Australia. Part VI: Family: Sarcomeniaceae

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 sheets within this website.

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

This key is *restricted* to algae in the Family: Sarcomeniaceae. These have:-

- often a gelatinous texture and plants ***rapidly decay*** after collecting
- protruding and ***obvious tip cells***. There are no delicate, branched hairs (trichoblasts) associated with tip cells as there are in the Family: Rhodomelaceae which they closely resemble
- a basic ***filamentous construction***. Cells grow in a single line (algae are *uniseriate*), although this may be visible only near plant tips, or by cutting a cross section of to find a central filament microscopically
- at plant tips ***4 cells*** (pericentral cells) equal in length to each filament cell which give filaments a characteristic banded appearance (see Fig. 5). The banded appearance may be later obliterated by additional cells (cortical cells) running lengthwise or rhizoids running between or on top of existing cells
- in some, additional ***pairs of flanking cells*** equal in length to each pericentral cell are cut off near branch tips (see Fig. 18)
- fine, unbranched chains of cells (***monosiphonous filaments***) protruding at the surface of some species (see Figs 9, 10)
- ***flask-shaped*** mature female structures (cystocarps, see Fig. 25) and special lance-shaped branches (***stichidia***) containing tetrasporangia (both features shared by the Rhodomelaceae). Tetrasporangia occur in ***2 definite columns*** (see Fig. 19) and are not spirally arranged as in the Rhodomelaceae

Check in the "algal look-alikes" panel at the end of this key to exclude other filamentous algae with cortication and bands of pericentral cells.
The key below follows that in the Flora of southern Australia Part IIID, and requires that plant tips and reproductive structures be viewed microscopically.

1a. plants grey-iridescent under water, rose-red and decomposing when collected; fronds strap-like; with central mid-rib and flat, filmy flanges; to 30mm wide; side branches arising between mid-rib and frond edge, narrow at base; reproductive structures on frond surface. Figs 1, 2. (also included in "Pictured key to strap-like red algae", currently in preparation)
…….…… *Sarcomenia delesserioides*

1b. plants completely filamentous/cylindrical. At plant tips, rings of cells equal in length to each filament cell (***pericentral cells***) give filaments a banded appearance; some plant bases thickened (corticated) with additional cells; branching forked or tufted, reproductive structures within filaments ..…….…..…… 2.

2a. main branches (axes) cylindrical or slightly compressed; additional, minute, hairlike, unbranched (***monosiphonous***) filaments, one cell wide occur on plant surfaces ……..…….…….. 3.

2b. main axes compressed; monosiphonous filaments ***absent*** .....……. 6.

3a. from a variety of habitats; may decompose rapidly, pairs of additional (flanking) cells, equal in length to pericentral cells occur ……..…… 4.

3b. from calm waters, rare? or overlooked; grey-iridescent, rapidly decomposing on collection. At branch tips additional flanking cells cells ***absent*** except in special tetrasporangial branches (stichidia). Figs 3-6. ……..…… *Malaconema roeanum*

Fig. 1: *Sarcomenia delesserioides*: Insert: detail of origin of side branches

Fig.2: *Sarcomenia delesserioides*: detached side frond with stalked mature female structures (cystocarps) on the surface

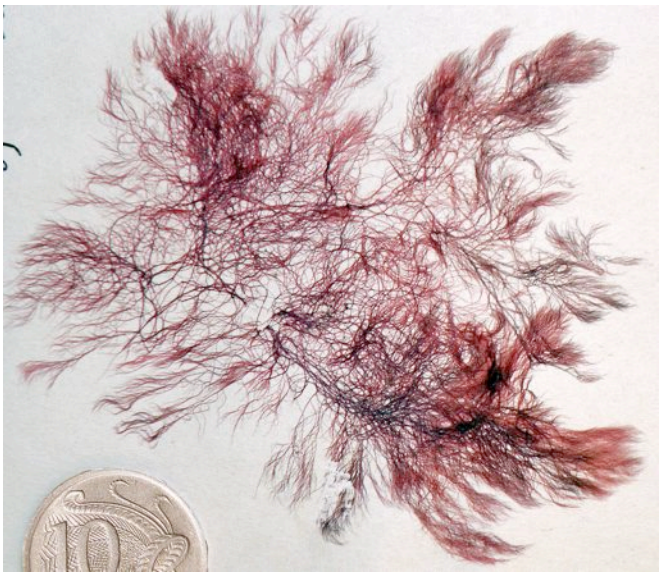

Fig. 3 *Malaconema roeanum*

Fig. 4: *Malaconema roeanum* : detail of branching and lower branches thickened by corticating cells

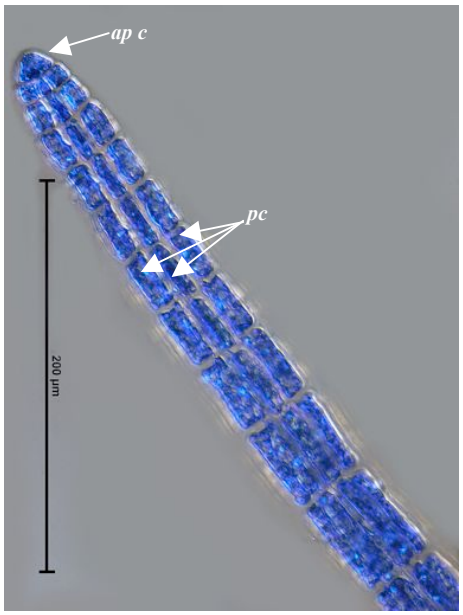

Fig. 5: *Malaconema roeanum*: prominent rounded tip cell (apical cell, *ap c*); monosiphonous filaments ***absent***; pericentral cells (*pc*) (3 of 4 in view) ***lacking*** paired flanking cells

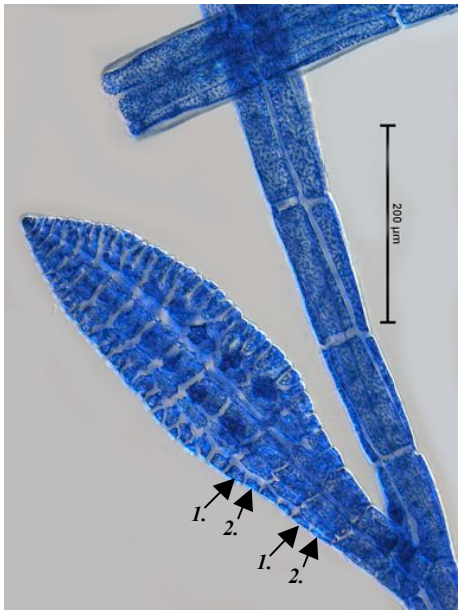

Fig. 6: *Malaconema roeanum*: tetrasporangial branch (stichidium, *stich*)): young sporangia in 2 columns; pairs of flanking cells (*1, 2*) forming from pericentral cells

4a. branch ends curved, additional hair-like (monosiphonous) filaments on their inner sides, in pairs, arising from the cells of the central filament. Possibly an introduced species (see also the fact sheet on this species). Figs 7-9.
…… *Cottoniella fusiformis*

4b. branch ends relatively straight, additional monosiphonous filaments in 2 or 4 rows, arising from the upper of each pair of flanking cells
…… 5.

Fig. 7: *Cottoniella fusiformis*

Fig. 8: *Cottoniella fusiformis*: hair-like monosiphonous filaments on insides of curved branches

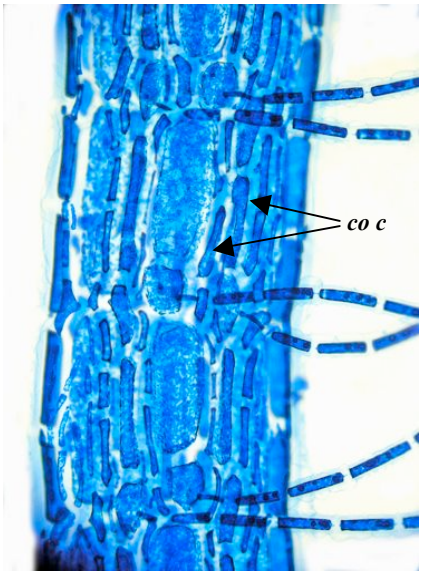

Fig. 9: *Cottoniella fusiformis*: pairs of monosiphonous filaments arising from the central filament; chains of elongate corticating cells (*co c*) running between pericentral cells

5a. corticated main branches (axes) soft, stout about 2mm wide, cylindrical, hairy with numerous monosiphonous filaments near axis tips, arising in 4 rows from outer cells. Figs 10-12
…….. *Sarcotrichia tenera*

5b. axes soft, thin, generally < 2mm wide, less hairy, monosiphonous filaments near axis tips in 2 rows from outer cells. Figs 13- 15 (next page).
…… *Sarcotrichia dolichocystidea*

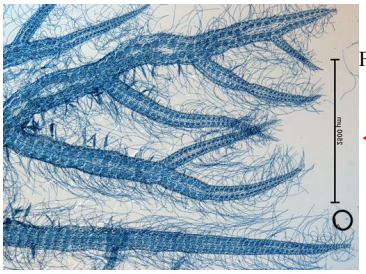

Fig. 10: *Sarcotrichia tenera:* hairy axis tips

Fig. 11: *Sarcotrichia tenera*

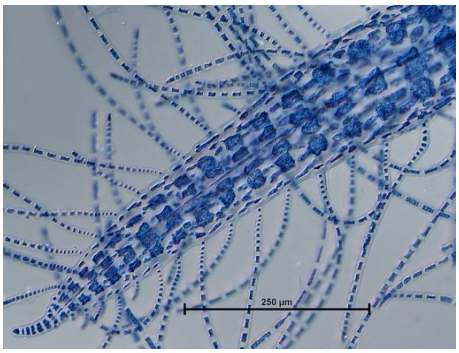

Fig. 12: *Sarcotrichia tenera*: numerous monosiphonous filaments at tips

Fig. 13: *Sarcotrichia dolichocystidea*

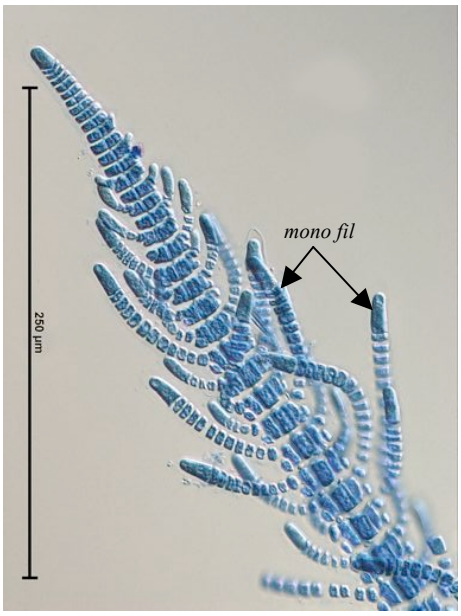

Fig. 14: *Sarcotrichia dolichocystidea*: prominent tip cells; monosiphonous filaments (*mono fil*) from the upper cell of pairs of flanking cells, in 2 opposite rows

Fig. 15: *Sarcotrichia dolichocystidea*: two developing tetrasporangial structures (stichidia) and axis wrapped in corticating cells

6a. plants about 15mm tall, not or only slightly wrapped with corticating filaments at the bases. Figs 16-20.
..... *Platysiphonia delicata*

6b. plants 60-400mm tall, axes corticated basally.
..... 7.

Fig. 16: *Platysiphonia delicata* on a piece of brown alga, *Caulocystis*

Fig. 17: *Platysiphonia delicata* of contrasting colour

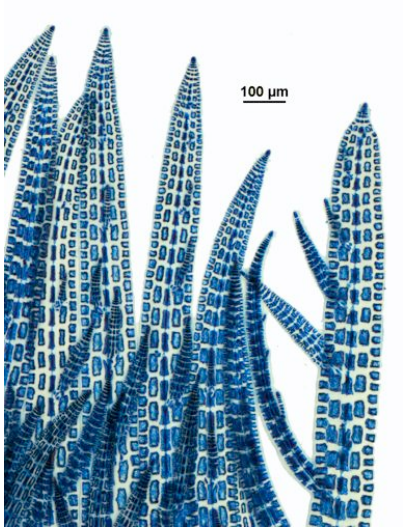

Fig. 18: *Platysiphonia delicata*: prominent tip cells; pairs of small flanking cells on only the two opposite pericentral cells, extending the axis sideways

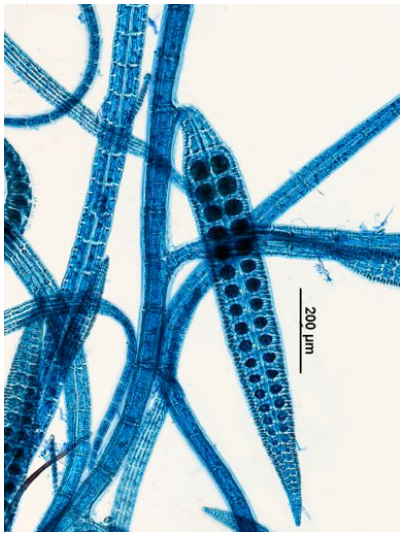

Fig. 19: *Platysiphonia delicata*: regular columns of tetrasporangia in a lance-shaped branch (stichidium); monosiphonous filaments *absent*

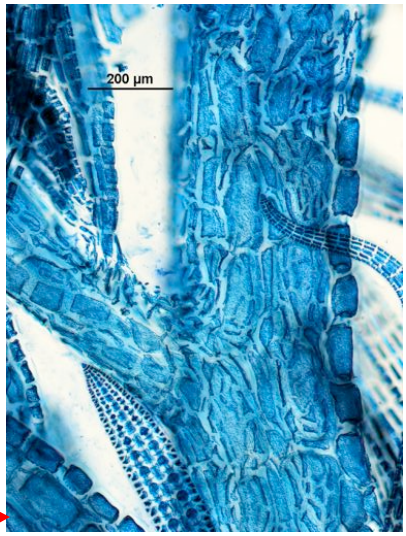

Fig. 20: *Platysiphonia delicata*: plant base with chains of elongate corticating cells running between pericentral cells

7a. plants slender, branches wrapped with corticating filaments only near their bases. Figs 21, 22 ..... *Platysiphonia mutabilis*

7b. plants more robust, main branches (axes) 1-2mm wide below; branches corticated close to the tips. Figs 23-26 ..... *Platysiphonia victoriae*

Fig. 25: *Platysiphonia victoriae*: bulbous mature female structures (cystocarps); heavily corticated branch bases

Fig. 21: *Platysiphonia mutabilis*

Fig. 23: *Platysiphonia victoriae*

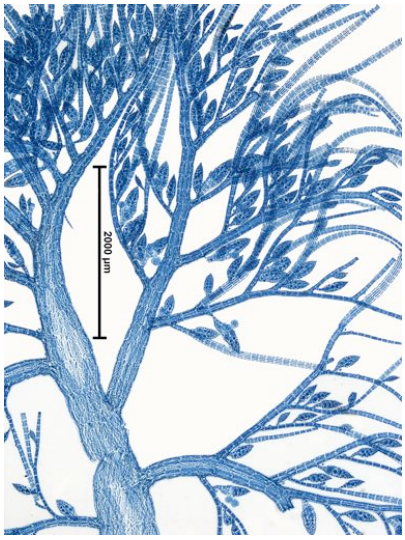

Fig. 26: *Platysiphonia victoriae*: heavily corticated branch bases; numerous lance-shaped tetrasporangial structures (stichidia)

Fig. 22: *Platysiphonia mutabilis*: slender branch tufts

Fig. 24: *Platysiphonia victoriae*: more robust and divergent branch tufts

Look-alike algae − filamentous Rhodomelaceae

Filamentous members of this Family may superficially look like the Sarcomeniaceae. They have:-

- pericentral cells, giving filaments a banded appearance, although there are often more than 4 pericentral cells to each central cell
- flask or ball-shaped cystocarps
- tetrasporangia in specialized branches (stichidia), however, sporangia are in a single spiral column in the Rhodomelaceae
- if actively growing, the Rhodomelaceae have unique terminal, delicate, naked, branched filaments called trichoblasts, colourless in *Polysiphonia*

The Sarcomeniaceae differ in having:-

- a prominent tip cell
- pairs of flanking cells on pericentral cells
- some genera with hair-like monosiphonous filaments
- and decompose readily

Polysiphonia decipiens: colourless trichoblasts at growing tips (shown here also with male structures)

Polysiphonia senticulosa: bands of pericentral cells; stichidia with a single, twisted column of sporangia