

# Pictured Key to some common filamentous red algae of southern Australia.

## *Polysiphonia* species

**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

**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 the genus *Polysiphonia*, a common filamentous or thread-like group of red algae with 26 species in Southern Australia. Similar red algae, especially those also in the Tribe: Polysiphonieae of the Family: Rhodomelaceae can easily be confused with this genus. To help separate these from *Polysiphonia*, you can refer to the "[Master Key to the Filamentous Red Algae](#)" and from that go to associated Keys in this Website. The key below for *Polysiphonia* uses more superficial characteristics of species than that described in the Flora, vol. IIID p. 170.

**Features of the genus *Polysiphonia*:**

- plants are often dark red-brown, almost black. All vegetative (non-reproductive) branches are about equal in size, that is, there is very little separation into main or axial filaments and shorter side branches as there is in other members of the Polysiphonieae
- threads end in microscopic, branched, *colourless* hairs (*trichoblasts*)
- a central, single line of cells (central filament) is ringed by cells of equal length called *pericentral cells* giving young branches a banded (segmented) appearance when magnified. The number of pericentral cells per band is important in defining species, so microscopic investigation is necessary. In wet microscope preparations with soft threads, pericentral cells can be floated free of the central filament and more easily counted by applying gentle pressure to the coverslip (a procedure called making a tissue squash). Tougher plants require cross sections to view the number of pericentral cells.
- in some species, older branches become thickened (*corticated*) by cells additional to pericentral cells
- thread-like attachment organs (rhizoids), ending in pads or *haptera* some with extremely finely-divided cells, may be present
- sporangial plants produce modified branches called *stichidia* containing tetrasporangia divided in a tetrahedral pattern
- female plants produce mature flask-shaped structures called *cystocarps*
- male plants form cigar-shaped masses of minute *spermatangia*

**Key to *Polysiphonia*:**

- 1a. plants rare, tiny, < 2 mm tall, growing as minute tufts (epiphytic) on the red alga *Haplodasya urceolata*. Figs 1, 2.  
..... *Polysiphonia haplodasya*
- 1b. not as above ..... 2.

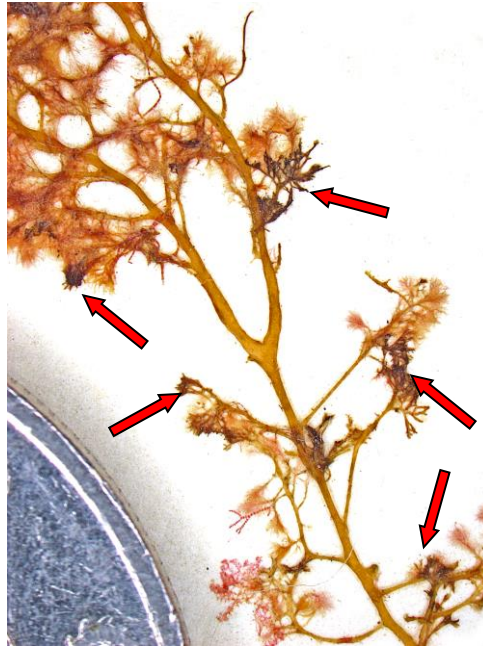


Fig. 1: *Polysiphonia haplodasya* (dark minute tufts, arrowed) on the host *Haplodasya urceolata*

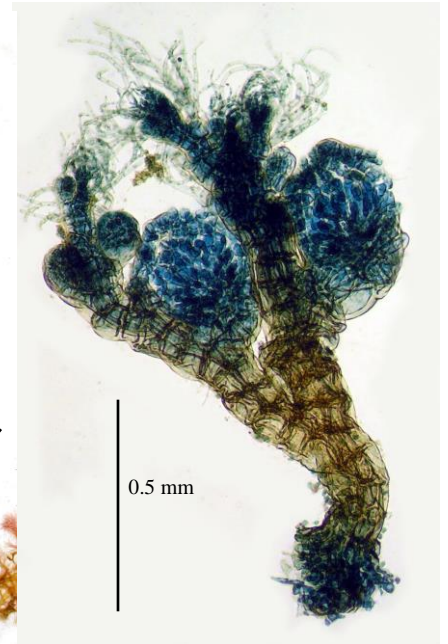


Fig. 2. *Polysiphonia haplodasya*: terminal trichoblasts, flask-shaped cystocarps, attachment pads of many cells

Fig 3. *Polysiphonia abscissoides*

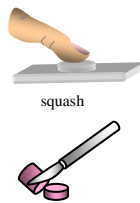


Fig. 4. *Polysiphonia abscissoides*: branch tips trichoblasts (*tr*) (with many triangular diatoms attached)

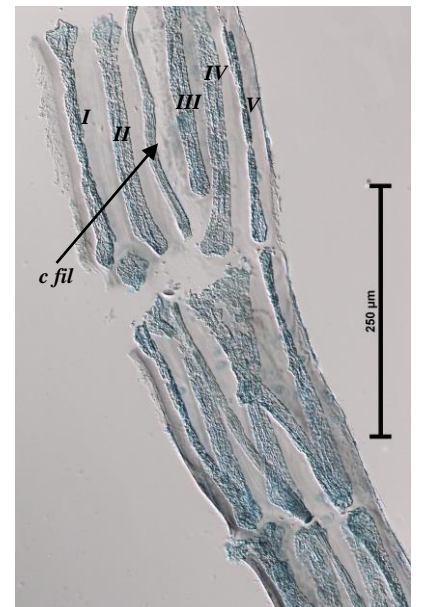


Fig. 5. *Polysiphonia abscissoides* tissue squash: central filament (*c fil*), ring of pericentral cells (*I-V*)



- 2a. pericentral cells per band = 5-12 ..... 3.
- 2b. pericentral cells per band = 4 ..... 12.
- 3a. pericentral cells per band usually 5-6 (rarely 4) ..... 4.
- 3b. pericentral cells per band usually  $\geq 7$  ..... 6.
- 4a. pericentral cells per band = 5 (rarely 4); band heights elongate, 2-6 times greater than band widths; plants with numerous erect branches. Figs 3-7. .... *Polysiphonia abscissoides*
- 4b. pericentral cells per band = 6 (rarely 7); band heights squat, only 0.3 to 1 times the size of band widths ..... 5.
- 5a. rare (only known from Albany WA and Spencer Gulf SA); plants forming very low mats to 10 mm tall of basal runners and upright threads 50-70  $\mu\text{m}$  wide, in the intertidal; pericentral cells rectangular; branch tips straight. Figs 8-10. .... *Polysiphonia teges*
- 5b. plants only from Rottnest I. WA, with single basal threads 300-500  $\mu\text{m}$  wide, from clumped rhizoids; upper branches often one-sided; pericentral cells box-shaped; branch tips often claw-like. Figs 11-14. .... *Polysiphonia forfex*
- 6a. pericentral cells per band usually 7 (occasionally 8) ..... 7.
- 6b. pericentral cells per band usually 9-12 ..... 10.
- 7a. branches corticated (coated with cells additional to pericentral cells), except on upper parts of the plant, Figs 15-17. .... *Polysiphonia brodiei*
- 7b. branches not corticated, except at the very base of the plant ..... 8.
- 8a. plants forming dense, low turfs in the intertidal (see also step 11). Figs 18-21. .... *Polysiphonia isogona*
- 8b. plants generally separate and distinct ..... 9.

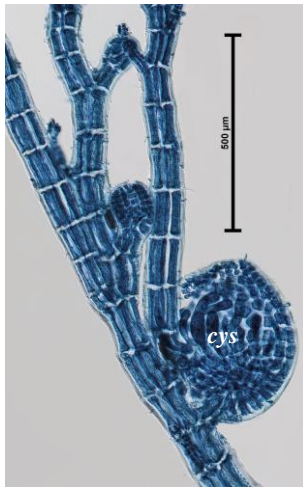


Fig. 6. *Polysiphonia abscissoides*: young and mature cystocarps (cys)

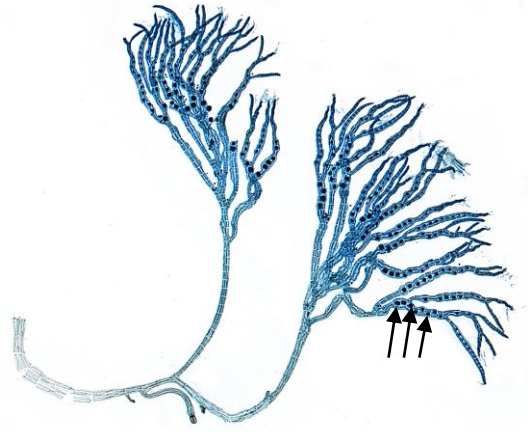
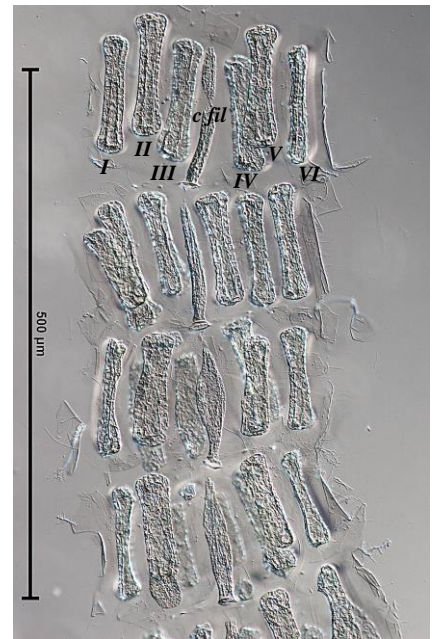


Fig. 7. *Polysiphonia abscissoides*: basal runner, erect branches with tetrasporangia (arrowed)



8. *Polysiphonia teges*: piece of algal turf



10. *Polysiphonia teges*, tissue squash: central filament (c fil), pericentral cells (I-VI)



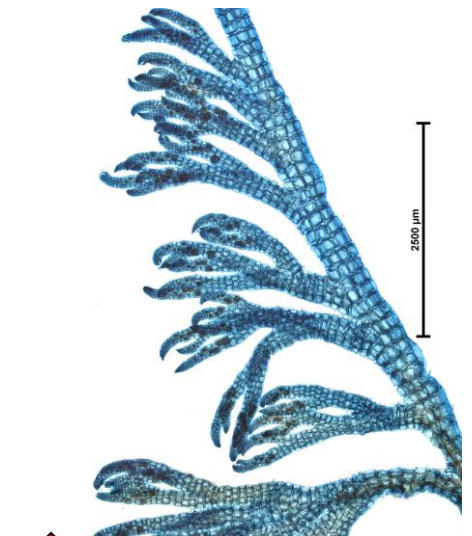
9. *Polysiphonia teges*: basal runner, erect branches, trichoblasts at tips



11. *Polysiphonia forfex*



12. *Polysiphonia forfex*: branch tips pincer-like, hair-like trichoblasts, sporangia divided tetrahedrally



13, 14. *Polysiphonia forfex* branching mainly on one side, pericentral cells box-shaped, tips curved inwards

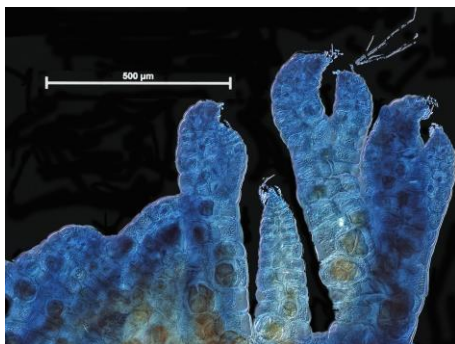






Fig. 15: *Polysiphonia brodiei*

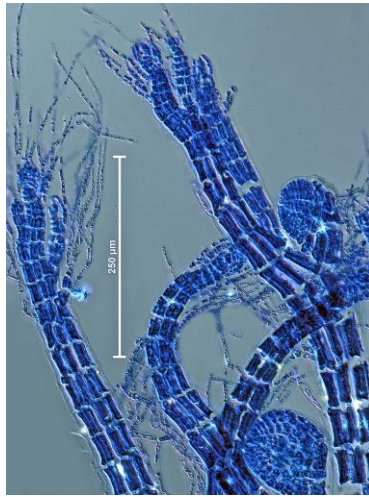


Fig. 16. *Polysiphonia brodiei*: branch tips with trichoblasts, bulbous cystocarps

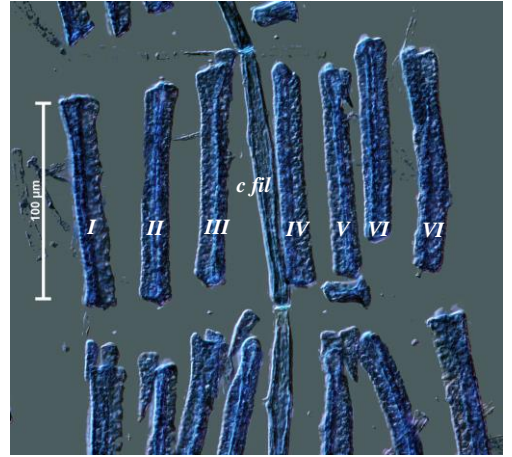


Fig. 17. *Polysiphonia brodiei* tissue squash: central filament (*c fil*), pericentral cells (*I-VII*)

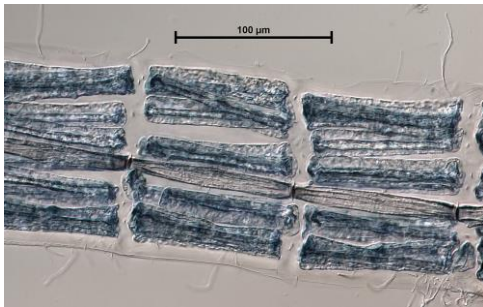


Fig. 18. *Polysiphonia isogona*: central filament; 9 pericentral cells per band

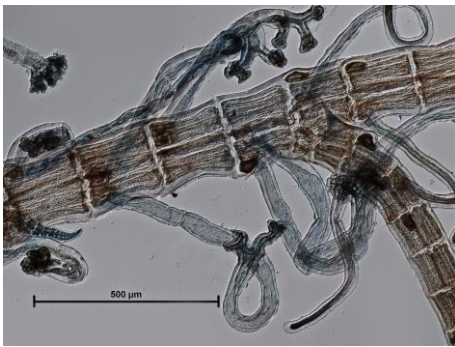


Fig. 19. *Polysiphonia isogona*: runner with rhizoids ending in haptera



Fig. 20: *Polysiphonia isogona* growing on a sea-squirt

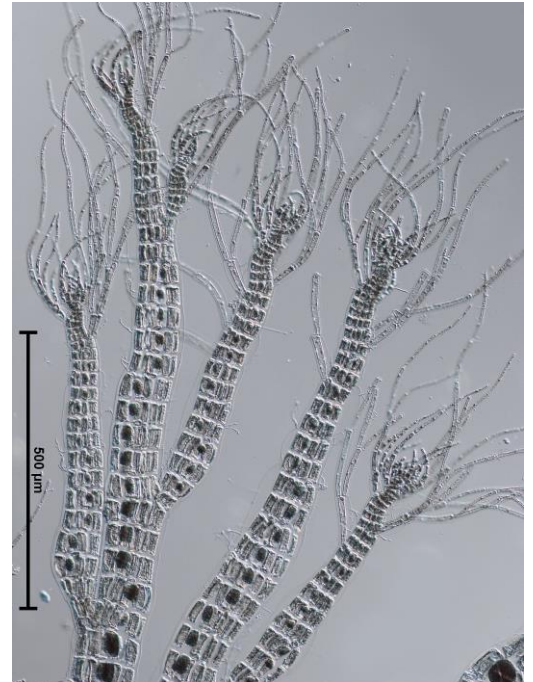


Fig. 21. *Polysiphonia isogona*: branches bearing tetrasporangia



Fig. 22: *Polysiphonia constricta* 2m deep on boat ramp



Fig. 23. *Polysiphonia constricta*: 4m deep on shell

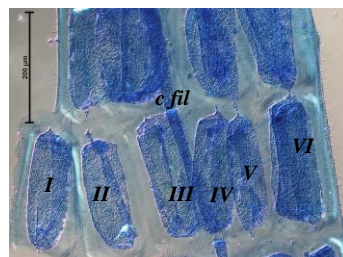
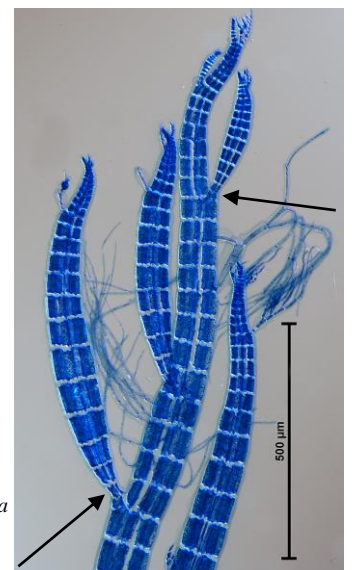


Fig. 24. *Polysiphonia constricta* tissue squash: central filament (*c fil*), pericentral cells (*I-VI*)

Fig. 25. *Polysiphonia constricta* tips: branches basally constricted (arrowed)





9a. branches tending to be of equal length and parallel (“fastigate”), **pinched basally**; plants with a short basal runner and single basal threads, found in sheltered bays and harbours. Figs 22-25.

..... *Polysiphonia constricta*

9b. plants with long branches and spreading (“patent”) shorter side tufts **not** basally constricted; threads clumped and tangled basally, often with **minute hooks**; common and widespread.

Figs 26-28.

..... *Polysiphonia decipiens*

10a. plants often on the seagrass *Amphibolis*; with single basal upright threads from disc-shaped holdfasts, side branches coarse, tufted and spreading; threads over 300 µm wide.

Figs 29, 30.

..... *Polysiphonia atricapilla*

10b. plants often occur as turfs in the intertidal; threads tangled basally, upright branches parallel, equal sized, about 100 µm wide

..... 11.

11a. widespread, common, pericentral cells per band = 9 (varying from 8-10, occasionally 7); plants forming mats, often in sand, 30-150 mm tall; rhizoids **separated** from lower parts of pericentral cells. Figs 31, 32 (see also, step 8)

..... *Polysiphonia isogona*

11a. plants from Tasmania only, pericentral cells per band = 11 (varying from 10-12); plants forming mats 5-30 mm tall, on rock; rhizoids **continuous** with lower ends of pericentral cells. Figs 33-35

..... *Polysiphonia adamsiae*

12a. branches **not** corticated (not coated with cells additional to pericentral cells), except on the very lowermost parts of the plant

..... 13.

12b. branches corticated (coated with cells additional to pericentral cells), except on uppermost parts of the plant

..... 23.

13a. band heights 2-6 (-16) times greater than band widths

..... 14.

13b. band heights mostly less than widths of bands

..... 16.



Fig. 26: *Polysiphonia decipiens*



Fig. 29: *Polysiphonia atricapilla*



Fig. 31. *Polysiphonia isogona*: turf form



Fig. 27. *Polysiphonia decipiens*: minute basal hooks



Fig. 28. *Polysiphonia decipiens* cross section: central filament, 7 pericentral cells

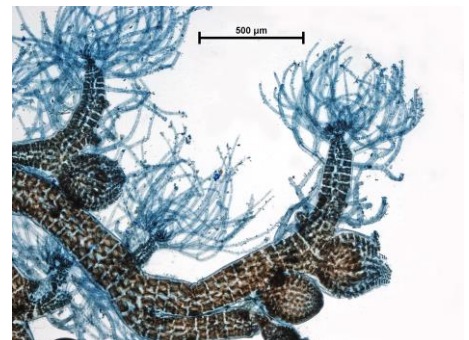


Fig. 30. *Polysiphonia atricapilla*: branch tips, cystocarps



Fig. 32. *Polysiphonia isogona* basal runner: rhizoids separate (arrowed) from the pericentral cells

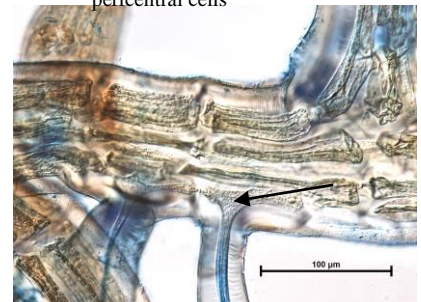


Fig. 35. *Polysiphonia adamsiae* basal runner: rhizoids continuous with a pericentral cell (arrowed)



Fig. 33. *Polysiphonia adamsiae*

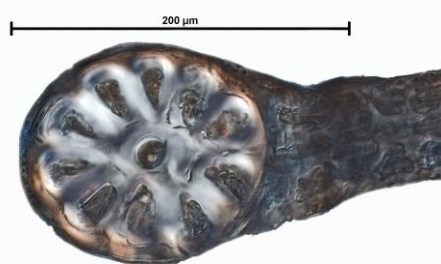


Fig. 34. *Polysiphonia adamsiae*: cross section: central filament, 10 pericentral cells



- 14a. deep-water species, curled tendrils present, side branches relatively long, branch tips gradually narrowing to a point. Figs 36, 37.  
 ..... *Polysiphonia shepherdii*
- 14b. tendrils **absent**  
 ..... 15.
- 15a. SE Australian and Tasmanian distribution; relatively rare; branch tips gradually coming to a blunt point; bands in middle parts of plants 12-16 times longer than wide. Figs 38-40.  
 ..... *Polysiphonia perriniae*
- 15b. from Victorian harbours, probably introduced; side branches relatively short, branch tips **spiny**; bands in middle parts of plants 4-10 times longer than wide. Figs 41, 42.  
 ..... *Polysiphonia senticulosa*
- 16a. plants small, < 20 mm tall, forming intertidal mats with well-developed creeping runners and upright threads about 120  $\mu\text{m}$  wide. Figs 43-45 (next page).  
 ..... *Polysiphonia scopulorum*
- 16b. plants larger, 40-120 mm tall, consisting of several threads 40-60  $\mu\text{m}$  wide arising from weak basal runners. Figs 46-48 (next page).  
 ..... *Polysiphonia subtilissima*



Fig. 36: *Polysiphonia shepherdii*

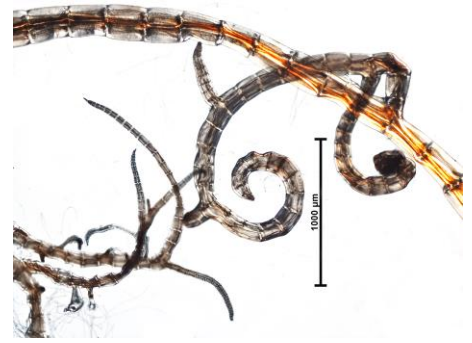


Fig. 37. *Polysiphonia shepherdii*: basal tendrils



Fig. 38: *Polysiphonia perriniae*



Fig. 39. *Polysiphonia perriniae* middle part of the plant: elongate bands (bracketed)

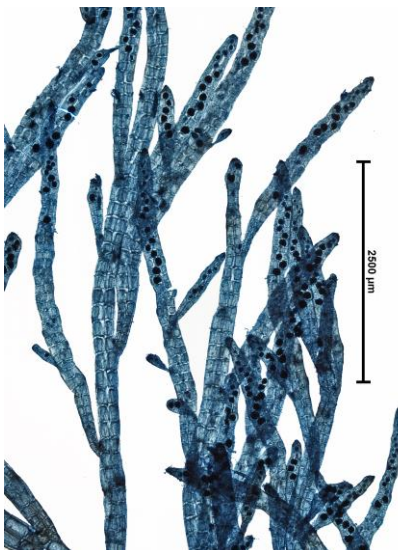


Fig. 40. *Polysiphonia perriniae*: blunt branch tips, tetrasporangia



Fig. 41: *Polysiphonia senticulosa*

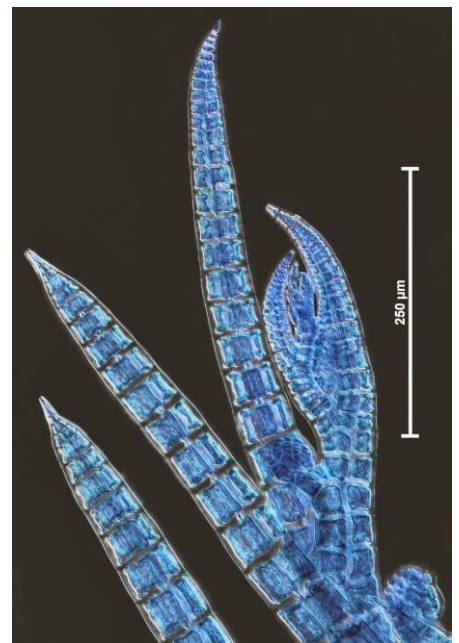


Fig. 42. *Polysiphonia senticulosa*: spiny branch tips



- 21a. branch tips pincer-like ..... 22.
- 21b. branch tips straight ..... 23.
- 22a. rare deepwater plants; pericentral cells squarish; stalked, multicellular vegetative organs (propagules) and curled tendrils present. Figs 61-64. .... *Polysiphonia propagulifera*
- 22b. widespread and common; usually on Tape Grass, *Posidonia*; pericentral cells can be elongate; propagules and tendrils **absent**. Figs 65-68. .... *Polysiphonia succulenta*
- 23a. plants very dark red-brown, usually on rock with several upright, branches; pericentral cells walls coloured brown. (Possibly a variant of *P. succulenta*). Figs 69, 70. .... *Polysiphonia blandii*
- 23b. plants red-brown, on rock or other plants; pericentral walls colourless ..... 24.



Fig. 61: *Polysiphonia propagulifera*

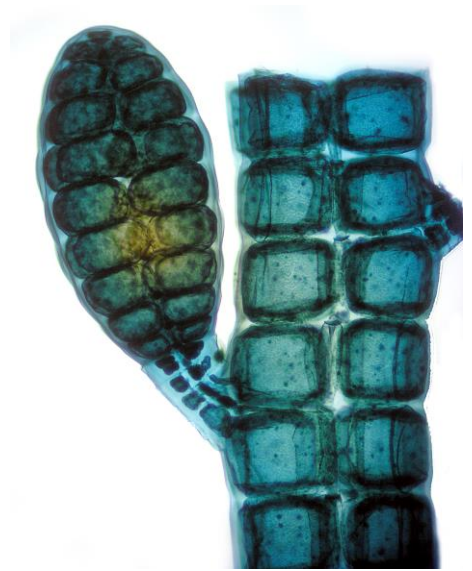


Fig. 62. *Polysiphonia propagulifera*: squarish pericentral cells, stalked propagule

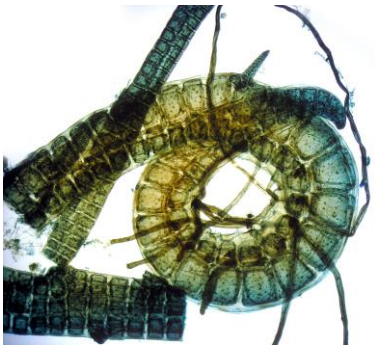


Fig. 63. *Polysiphonia propagulifera*: basal tendril

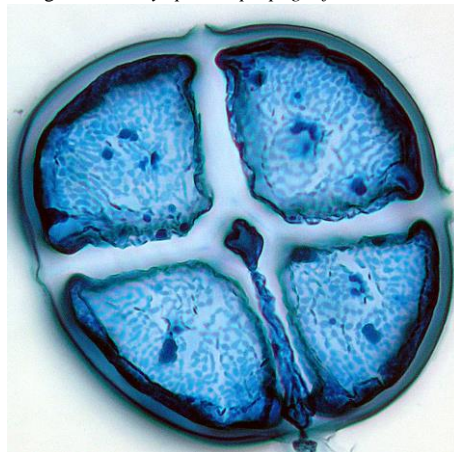


Fig. 64. *Polysiphonia propagulifera*: cross section

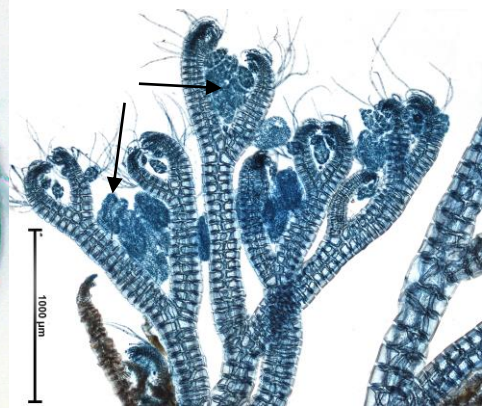


Fig. 65 *Polysiphonia succulenta*: pincer-like branch tips, male heads (arrowed)



Fig. 66 *Polysiphonia succulenta*:



Fig. 67: *Polysiphonia succulenta*:

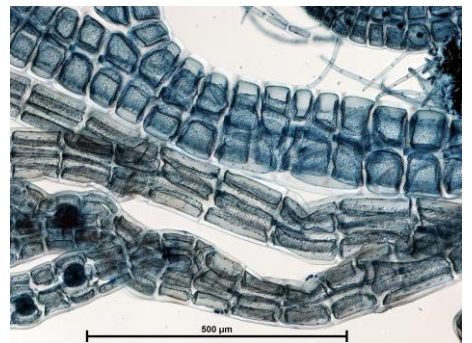
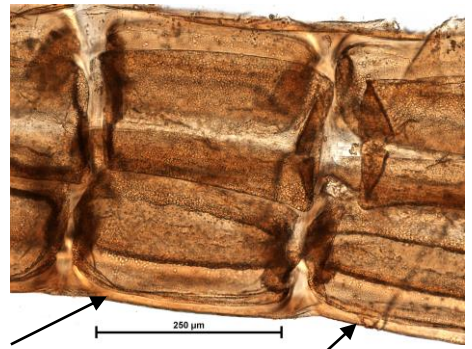


Fig. 68. *Polysiphonia succulenta*: variation in lengths of pericentral cells



Fig. 69: *Polysiphonia blandii*

Fig. 70. *Polysiphonia blandii* preserved, unstained specimen: coloured pericentral cell walls (arrowed)





24a. usually intertidal in rough waters; base clumped giving rise to several upright main branches, side tufts spreading, about 1 mm long; pericentral cells longer than wide. Fogs 71-73.

..... *Polysiphonia australiensis*  
 24b. usually deep-water; base a disc or clumped rhizoids forming a pad; single basal branch (axis); side branches > 1mm long, pericentral cells elongate **or** equal-sided ..... 25.

25a. shorter branches tufted, pinched basally, major branches to 1 mm wide. Figs 74-77

..... *Polysiphonia crassiuscula*  
 25b. on other algae, several spreading long side axes, shorter side branches **not** pinched basally, major branches 150-250 µm wide. Figs 79-82.

..... *Polysiphonia daveyae*

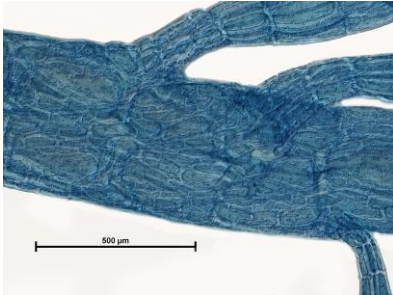


Fig. 74. *Polysiphonia crassiuscula*: corticated main branch



Fig. 71: *Polysiphonia australiensis*

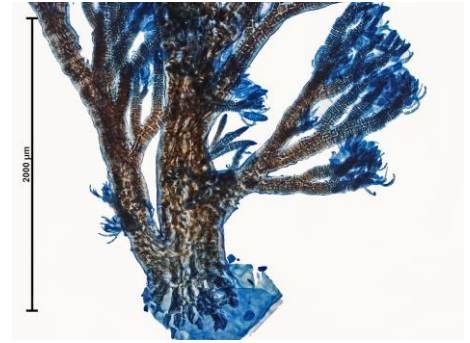


Fig. 72. *Polysiphonia australiensis*: clumped base

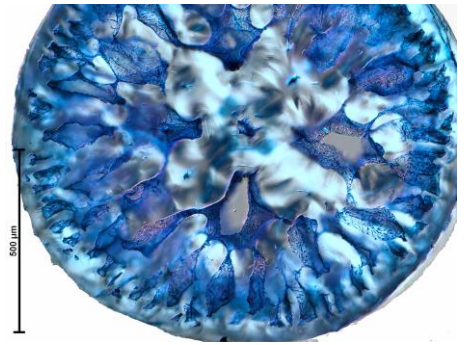


Fig. 73. *Polysiphonia australiensis* cross section: extremely thick-walled central filament and pericentral cells, additional (corticating) cells

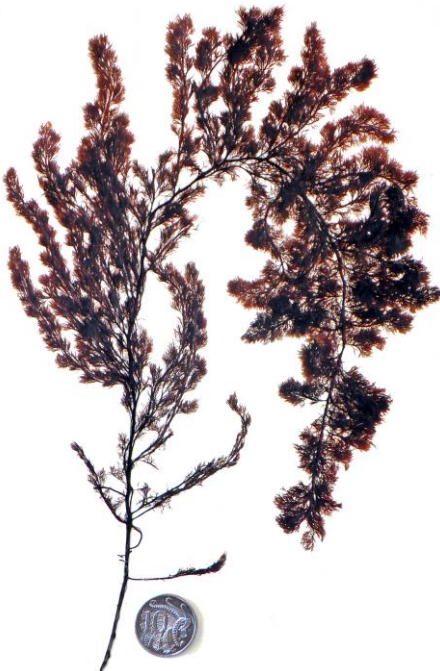


Fig. 75: *Polysiphonia crassiuscula*



Fig. 76: *Polysiphonia crassiuscula*

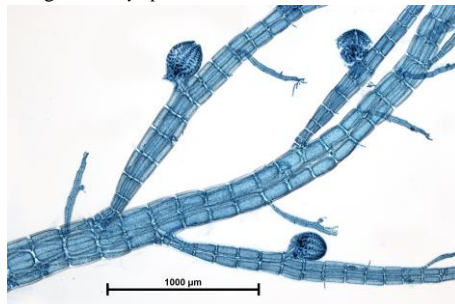


Fig. 77. *Polysiphonia crassiuscula*: numerous side branches forming along an upper branch, narrowed basally; young cystocarps

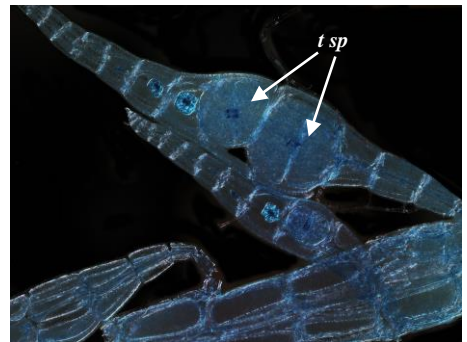


Fig. 78: *Polysiphonia crassiuscula*: branch bulging with large tetrasporangia (*t sp*)

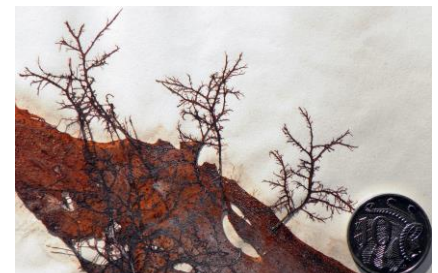


Fig. 79: *Polysiphonia daveyae* on the broad-bladed host, *Lenormandia spectabilis*



Fig. 80: *Polysiphonia daveyae*

Fig. 81. *Polysiphonia daveyae*: branching pattern

Fig. 82. *Polysiphonia daveyae*: cross-section

