SEA-GRASS EPIPHYTES ("HANGERS-ON")

BACKGROUND

Sea-grasses are grass-like, aquatic, flowering plants, with true leaves, stems and roots. They grow in sand and mud (sedimentary aquatic environments, or soft "bottoms") trapping sediment, their horizontal stems helping to prevent mobile substrates from washing away during storms.

Algae require harder, stable surfaces on which to grow – they attach to hard "bottoms", — rock, shells, port structures such as jetty piles or even ships hulls.

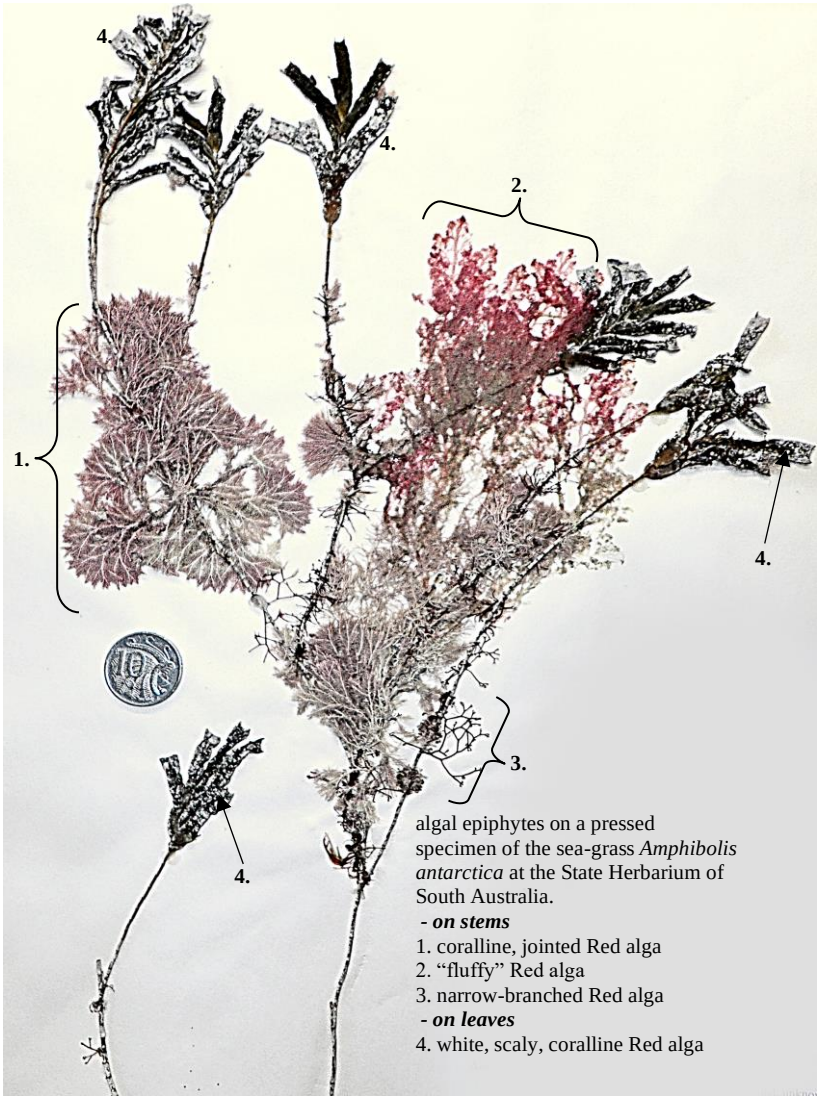
In addition, some algae and also some animal colonies either preferentially or incidentally grow ***permanently attached*** to already-established algae or sea-grasses, a "lifestyle" or niche called epiphytism.

The series of pictures below is designed to introduce you to some sea-grass epiphytes of southern Australian seas — certainly not all of them, as there may be as many as 117 algal species according to one worker.[1.] Also, small, mobile animals that graze microscopic films of living organisms that grow on sea-grasses are not included.

Below, you will find pictures of only the commonest and more easily observable epiphytes, posted as a series of panels containing similar-looking organisms. To locate the sea-grasses that act as substrates for them, go to Pictured Keys.....-Major Groups - sea grasses, on this Website

FACTS ABOUT SEA-GRASS EPIPHYTES

- [1.]most attach to the surface of sea-grasses and do not use them for nutrition (however, for parasites and intimate anatomical connections, see Algal intimates)
- [1.]in some sea-grass meadows, epiphytes may be only 25% of the total weighable material (the biomass) but perform more than 60% of the photosynthesis (the productivity)
- [2.]sea-grasses host similar epiphytes
- some epiphytes prefer shallow water communities, others the plant tips, some the jointed parts of the stem
- [3.]epiphytes harbor a diverse community of cryptic crustaceans and molluscs, food for economically important fish species
- [4.]unfortunately, epiphytes may grow so densely, particularly if plant nutrients are released into coastal waters from sewage outfalls, they smother their host sea-grasses. For example, some 4,000 - 5,000 ha of sea-grass meadows have been lost along metropolitan Adelaide S.A. coastline as a consequence of over-supply (eutrophication) of nutrients
- because they are small and inconspicuous, many epiphytes may be undescribed



algal epiphytes on a pressed specimen of the sea-grass *Amphibolis antarctica* at the State Herbarium of South Australia.

- on stems

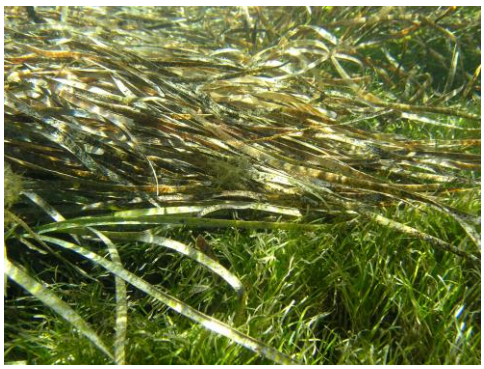
1. coralline, jointed Red alga
2. "fluffy" Red alga
3. narrow-branched Red alga

- on leaves

4. white, scaly, coralline Red alga

Broad-leaved Tape-grass, *Posidonia* in sand at 20m depth, the "Hotspot" West Coast SA. The horizontal stem or runner connecting the two tufts of leaves is buried beneath the coarse sand

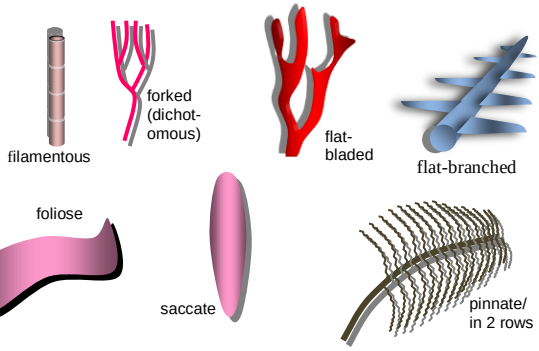
Wiry Sea nymph, *Amphibolis* in 2m of water, Cape Jervis SA. Twisted leaves arise from upright stems. Horizontal runners have collected sediment forming a bank about 400 mm tall. The warty brown alga *Scaberia* is growing attached to pebbles in an eroded part of the bank at right



Sea-grass meadows at Encounter Bay SA, about 1m deep:
broad-leaved Tape-grass, *Posidonia* at left,
narrow-leaved Eel grass, *Heterozostera* on the right

The panels below illustrate only epiphytes large enough to be discerned in the field, that is, larger than about 10 mm in total length. For some of the smaller, and inconspicuous epiphytes usually needing magnification, see Groups at a glance: marine plant crusts, stains, scums and scales and also Turf and fouling algae. I-III on this Website.

Some useful terms



Baldock, R N (2024). Seagrass epiphytes. 28 pp. *Algae Revealed*

SCALE, MICROSCOPE VIEWS, NAMES AND FOLLOW-UP SEARCHES

The coin used as a scale is 24 mm or almost 1" across.

Unless acknowledged otherwise, all images have been made by the author and come from pressed specimens or the extensive slide collection of the algal unit, State Herbarium of S Australia, collections generated by the late Professor Womersley and his workers over some 60 years.

Images with dark backgrounds have been taken using phase contrast or interference microscopy to highlight transparent structures. Other images may be stained dark blue.

Scientific names follow those found in Womersley, H B S. (1984-1988). *The Marine Benthic Flora of southern Australia Parts I- III* as it continues to provide the most comprehensive and accessible account. Recent name changes can be found in https://algaebase.org/
Adelaide: State Herbarium of South Australia, 2009– 2020.

ACKNOWLEDGEMENT

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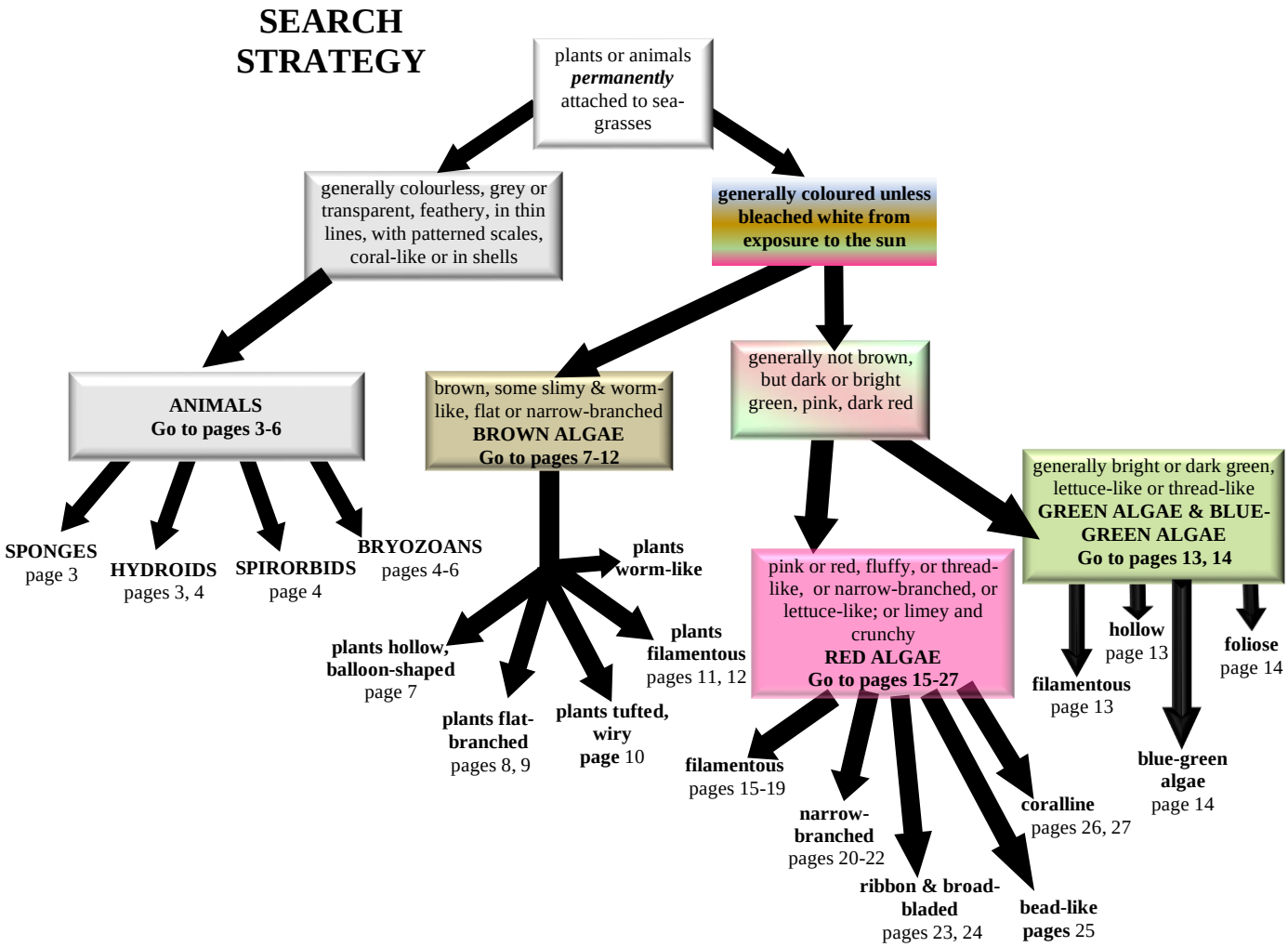

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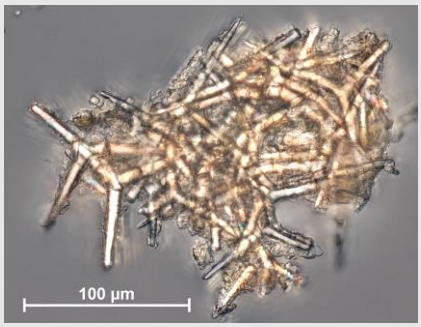
ANIMALS

SPONGES

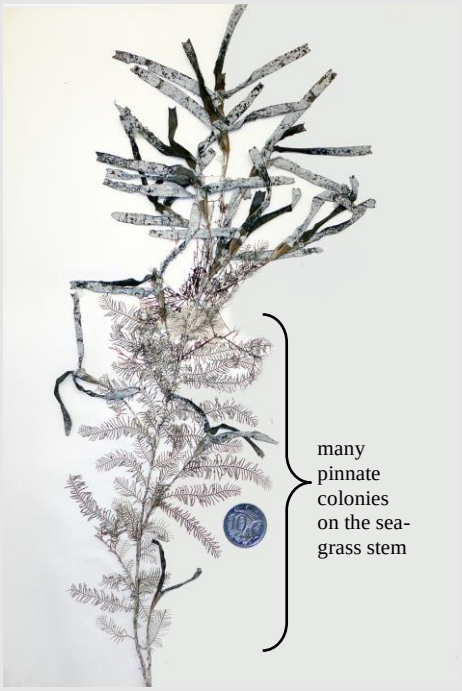
[6,10.] irregular masses on sea-grass stems, often punctured with visible but tiny pores, and with a rough texture due to the needle-like internal skeleton

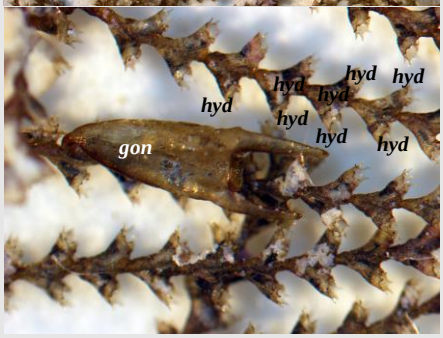


Right: one of many possible sponges that grow on sea-grass stems
Far right, above: magnified view, tiny pores visible
Far right, below: sponge skeleton of spicules, in this example, made of limey material that dissolves in acid
Other sponges have spicules made of glassy material that is not acid soluble

HYDROIDS

[10.] minute hydra-like individuals (polyps) living in cups in small or large, flexible colonies





pinnate colonies, polyps on opposite sides of flexible branches

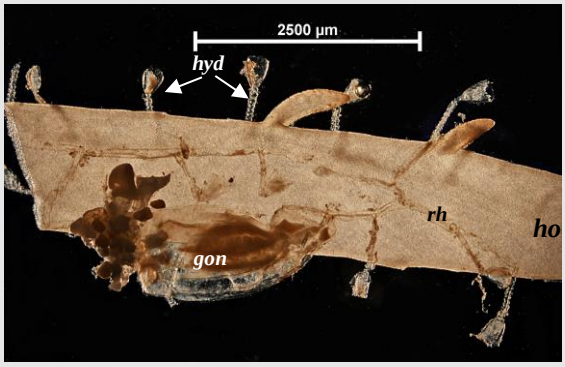
pinnate/ in 2 rows

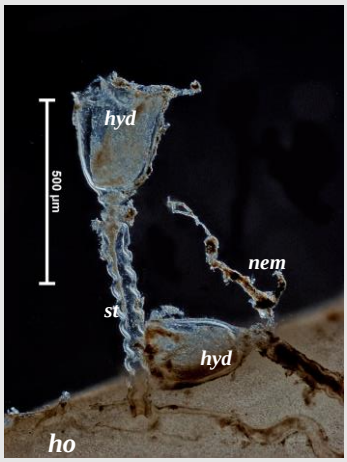
Stereotheca elongata

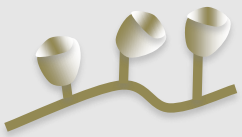
[1.] Elongate seagrass hydroid on the sea-grass *Amphibolis griffithii*

- cups holding feeding polyps (hydrothecae, ***hyd***) occur on both sides of the "stem" bearing them, about 5 teeth at the rims, their bases sunken into the "stem"
- large reproductive cups (gonotheca, ***gon***) have prominent "horns"

colonies creeping on sea-grass (also algal) surfaces, stalked polyps on one side of branches







Campanularia sp

- host (***ho***)
- creeping runner (hydrorhiza, ***rh***)
- cups holding feeding polyps (hydrothecae, ***hyd***)
- large reproductive cup (gonotheca, ***gon***)
- chain containing minute stinging individuals (nematothecae, ***nem***)
- stalk (***st***) with ***wavy margins*** diagnostic of the genus

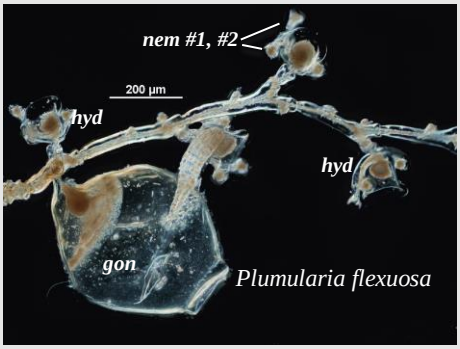
continued next page

[1.] One study places the following Bryozoans (not illustrated above) as common on sea-grass stems:- *Adeonellopsis portmarina,, Pyripora polita*

polyps on one side of side of branches, partly embedded in them or on short jointed stalks

Plumularia sp

- cups holding feeding polyps (hydrothecae, ***hyd***)
- paired stinging individuals (nematothecae, ***nem #1, #2***) at rim of hydrotheca
- large reproductive cup (gonotheca, ***gon***)



SPIRORBIDS

[6.] spiral, limey tubes, about 1 mm across, sometimes in great number, flat on surfaces of sea-grasses

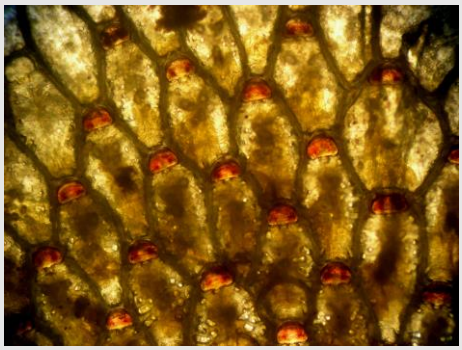
Left: *Metalaeospira tenuis*, formerly *Janua* sp, with tight clockwise spiral. An almost identical species, *Neodexiospira* also occurs, and has an anti-clockwise spiral to its shell[6.]

BRYOZOANS

[9.] limey or horny colonies punctured with small pores; cups containing the individual animals often with lids and spines

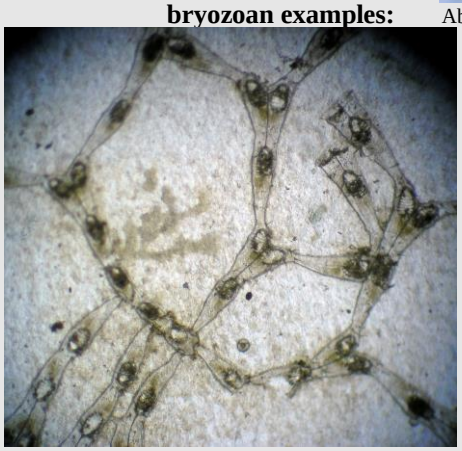
See also "*bryozoans*"

Above: unknown colony with horned zooid cups



Above, right: *Microporella*; cups with coloured lids

bryozoan examples:



bryozoan examples:

Left, and above:
two magnifications of *Corbullela*

Right: encrusting Bryozoan, probably *Electra flagellum* (on the Red alga *Rhodymenia foliifera* but also [1.] found on seagrass leaves)

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Celleporaria cristata
Above: two magnifications of a colony of an undulate nodule of calcified cups, some still with intact horns at the margins of their orifice, wrapped around the stem of a pressed specimen of the sea-grass, *Amphibolis antarctica*

?***Densipora corrugata***
Right: detail of an eroded, nodular colony wrapped about the stem of *Amphibolis antarctica*. The colonies of this species and *Celleporaria cristata* are very [9] similar, and require detailed examination of the cups to separate them

Diploporella alata (formerly ***Thairopora cincta***)
Above: two magnifications of a colony, fractured in places, wrapped about the stem of *Amphibolis antarctica*. The zooid cups form distinctive rings about the stem

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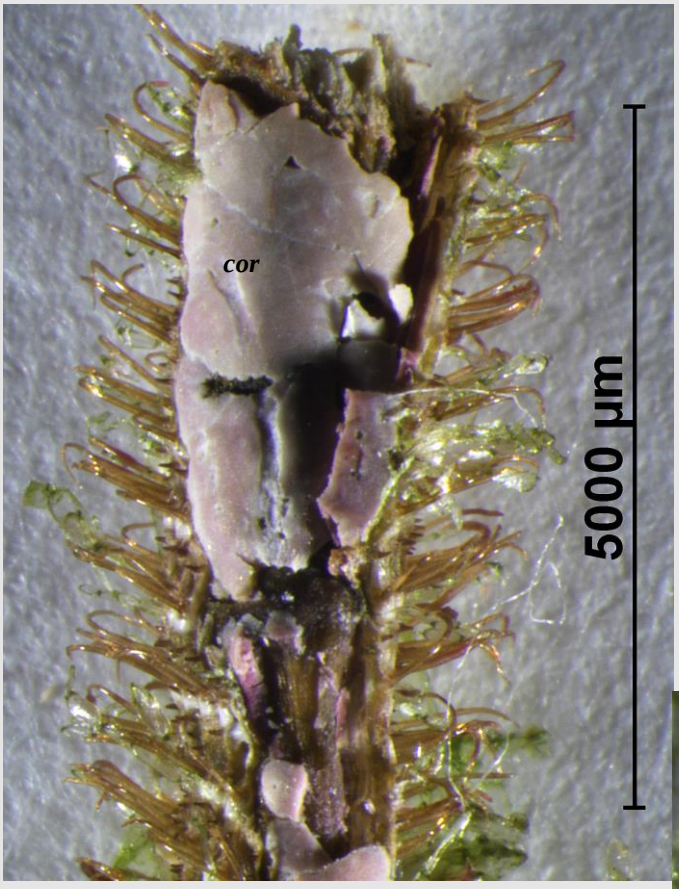
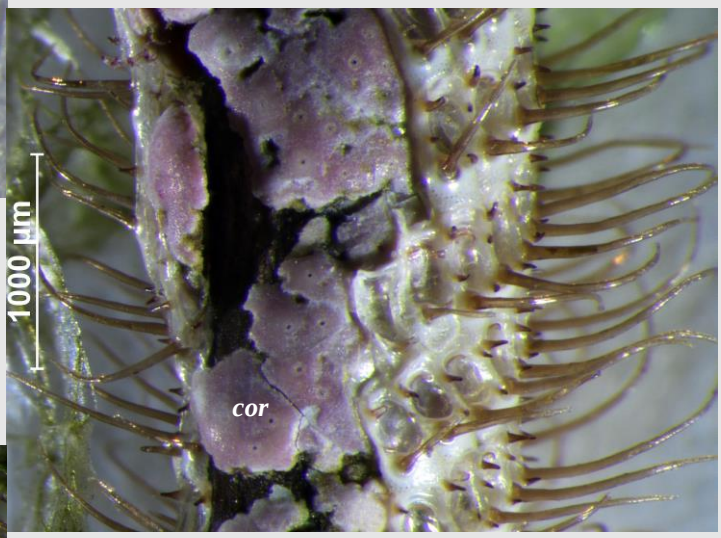


Electra flagellum

Images above and below:
zooids embedded in rows of calcified “cups”, 4 small, thorn-like spines on the shared cup rims, a larger “apron” below, punctured by pores and the large “whiplash” extending outwards

Electra flagellum

below: colony encrusting a stem of *Amphibolis* seagrass together with a Red coralline alga (***cor,*** probably *Pneophyllum coronatum*).
The bryozoan is easily recognized from its relatively enormous, protruding, whiplike spines.



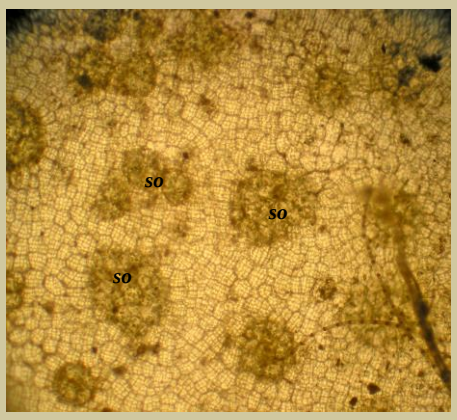
BROWN ALGAE - PHAEOPHYTA

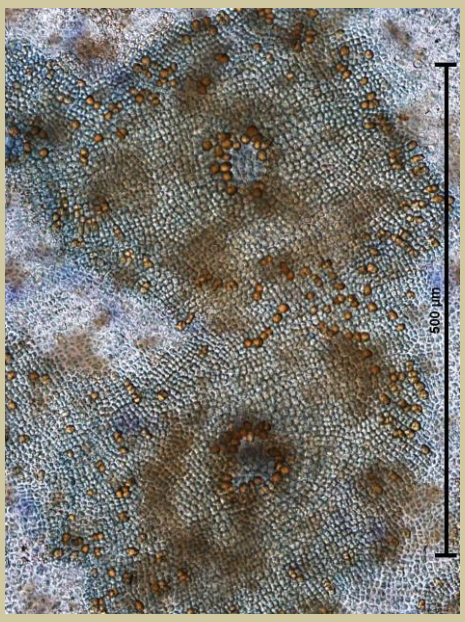
PLANTS HOLLOW, BALLOON-SHAPED (SACCATE)
also found in *"hollow Brown algae shaped like bubbles, balloons or thin tubes"*

***Asperococcus* 2 species**
on *Posidonia* sea-grass

Asperococcus bullosus
Right: several pressed plants on a sea-grass leaf
Below, left: two plants showing characteristic "puckering" of the tubular plant bodies
Below, centre: surface microscopic view, spore patches (sori, ***so***)

Above:
Asperococcus fistulosus (above)
on *Zostera* sea-grass





Above: surface view of patches of spores of *Colpomenia peregrina*

***Colpomenia* species**
ball-shaped, wrinkled and often with the surface layer torn; three species possible, identified from features of the hair patches on the surface of the plant body

Right, above: two plants of *Colpomenia*
Right, below: many plants strung along a sea-grass stem

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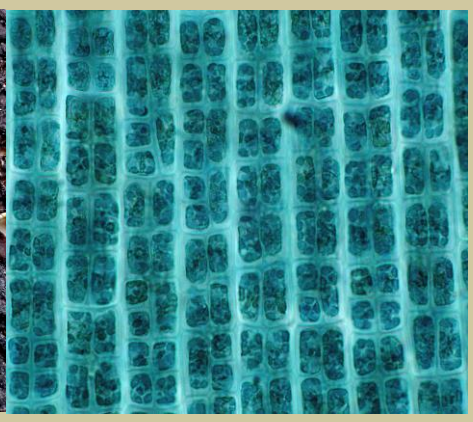
PLANTS FLAT-BRANCHED – FAMILY: DICTYOTACEAE

also found in "Dictyotaceae"

Zonaria turneriana
occurs on *Amphibolis* sea-grass

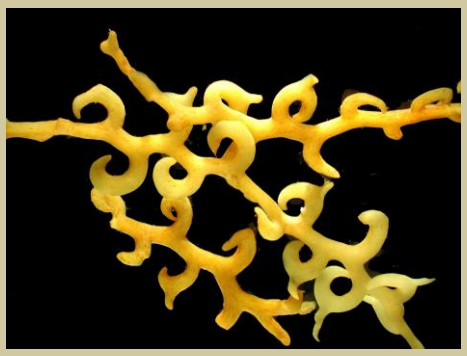
Right: tips of a plant, flat forked blades
Far right: microscopic surface view, cells stained blue: cells in rows, in groups of 2-4



Dictyopteris muelleri occurs on *Amphibolis* sea-grass. Below: two magnifications of plants, prominent mid-rib, spore patches scattered

Lobospira bicuspidata

Left: tendrils found at the plant base attach the plant to the host
Centre: branches densely clothed with tiny, twisted, pointed blades
Right: detail of blades, each with a pair of apical points



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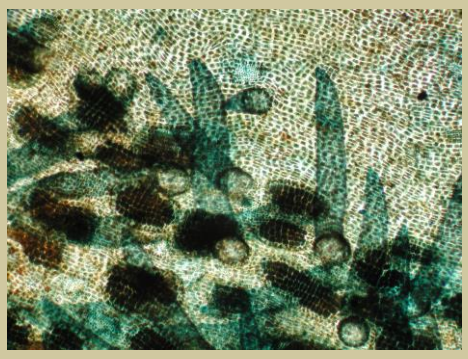
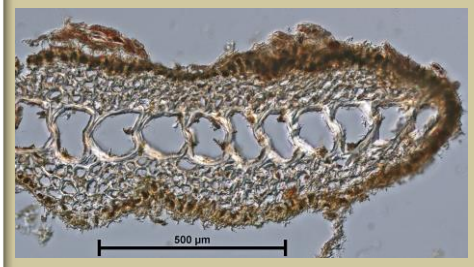
Glossophora nigricans **(as *Dictyota nigricans* in *Algaebase*)**
on *Amphibolis* sea-grass



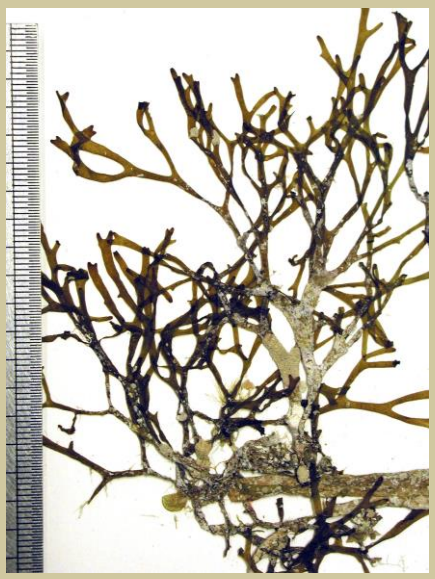
Left: microscopic surface view, stained blue. Protrusions making the surface appear rough
Far right:
whole plant

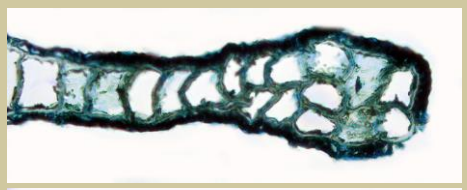
Below: Pachydictyon paniculatum **(as *Dictyota paniculata* in *Algaebase*)**
on *Amphibolis* sea-grass

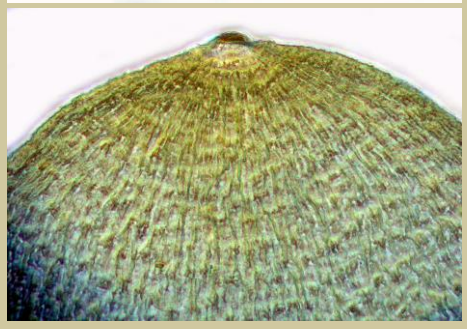


Pachydictyon paniculatum **(as *Dictyota paniculata in* Algaebase)**
Above: cross section:
Right: whole plant

Dilophus angustus **(as *Dictyota fastigiata* in *Algaebase*)**
on *Posidonia* sea-grass



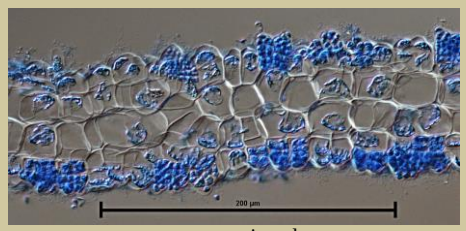




Immediate right: whole plants on a seagrass leaf
Far right, above: cross section; blade edge 2-3 cells thick
Far right, below: microscopic surface view of blade tip, single tip-cell protruding

PLANTS FLAT-BRANCHED
FAMILY- PUNCTARIACEAE

Punctaria latifolia on *Amphibolis* sea-grass



Right: whole plants on a sea-grass stem
Far right: cross section showing similar sized vegetative cells throughout the section, and small clusters of deeply-stained sporangia

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PLANTS TUFTED, WIRY
see also **"wiry brown alga "**

Phloiocaulon spectabile
on *Amphibolis* sea-grass

Right: whole plant
Far right: microscopic views:
apical cells (***a c***) dark and swollen;
branches divided into segments
(***seg***)

Carpomitra costata
on sea-grass

Right: whole plants
Far right: detail of tufted tips

***Sporochnus* species**
on sea-grass;
there are 6 *Sporochnus* species that could be epiphytes of sea-grasses. The nature of the fertile side tufts is used to identify them.

EXAMPLE:
Sporochnus pedunculatus from Marino Beach, SA
Right: whole plant
Far right: detail of short fertile branchlets ending in a hair tuft

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FILAMENTOUS BROWN ALGAE

see also "turf and fouling algae III: thread and wormlike brown algae"

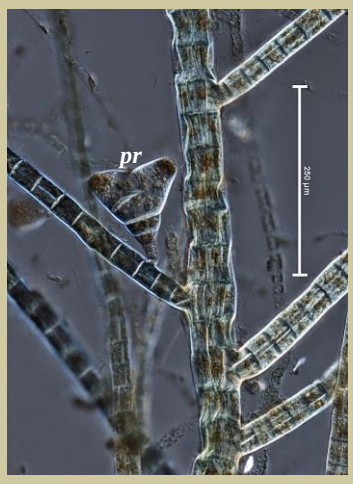
***Sphacelaria* spp**

Brown algae forming tufts, cells of filaments divided in bands or segments; many produce triangular-shaped packets of cells (propagules) seasonally, by which some species can be relatively easily identified. Only 3 of a possible 14 species are illustrated below.

Sphacelaria novae-hollandiae

Right: whole plants forming tufts

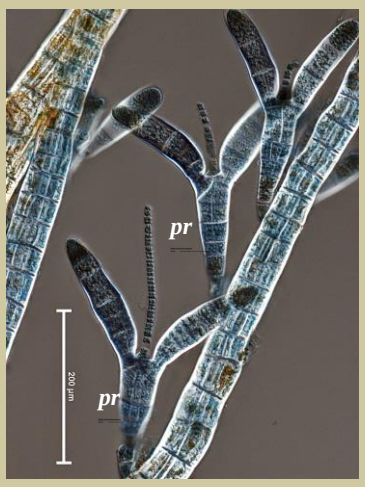
Far right: microscopic view of branching pattern of segmented filaments; triangular propagule (***pr***)

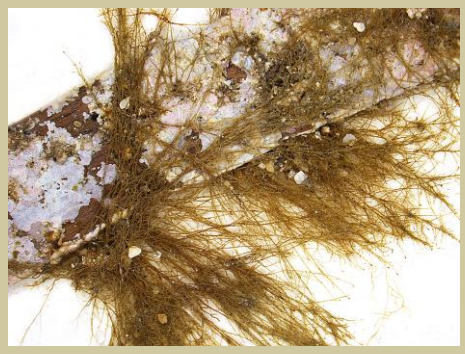


Sphacelaria biradiata

Right: microscopic view of segmented filaments; triangular propagule (***pr***) with long arms and a terminal hair

Far right: whole plants forming tufts, on *Posidonia*



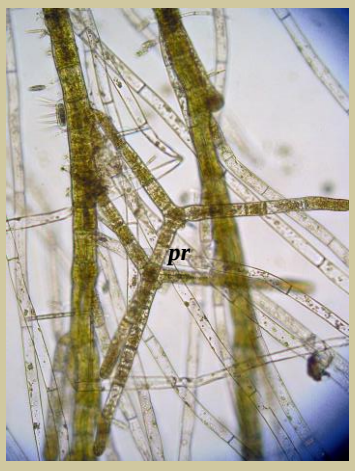


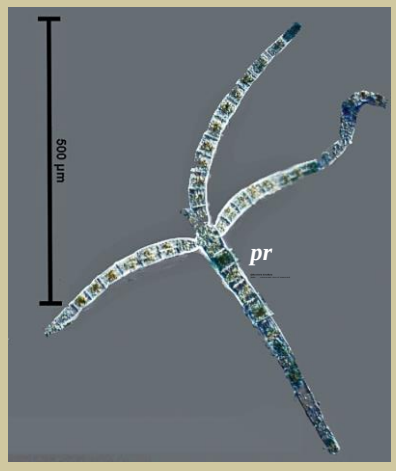
Sphacelaria rigidula

Left: whole plants forming tufts

Centre: microscopic view of segmented filaments; triangular propagule (***pr***) with extremely long arms

Far right: extracted propagule





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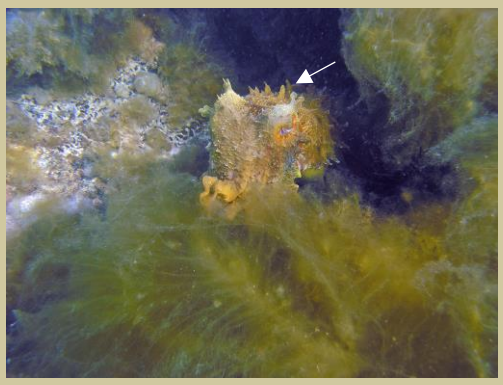
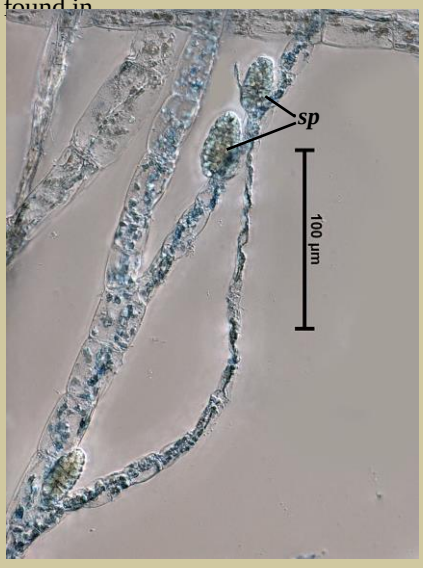
OTHER FILAMENTOUS BROWN ALGAL EPIPHYTES OF SEAGRASSES

examples: *Ectocarpus, Hincksia,* and *Elachista, Giraudia.*
These are found largely as small tufts, <10 mm across, on sea-grass and algal surfaces, and are not illustrated below, but can be found in in **"Turf and fouling algae. I-III"**





***Hincksia* species (**as *Giffordia* in the Marine Flora); commonly *Hincksia sordida* with the local name of "snot-grass"
Plants form cloud-like masses, obscuring both sea-grasses and large Brown algae, towards the end of summer, especially in SA Gulf waters. Fresh specimens feel slimy when handled
Left: cloudy masses of *Hincksia* obscuring large Brown algae, at a cave occupied by a camouflaged Giant Cuttlefish (arrowed), Stony Point Spencer Gulf, SA
Centre: pressed masses of *Hincksia*
Right: branched filaments, two stalkless sporangia (***sp***)

Polycerea nigrescens on *Posidonia* sea-grass

Left: chains of cells of a tissue squash of the surface layers (cortex) with diagnostic swollen tip cell
Centre: plants on *Posidonia* leaves, slippery, worm-like and largely un-branched
Right: dense growth on *Posidonia* leaf, plants with short side branches

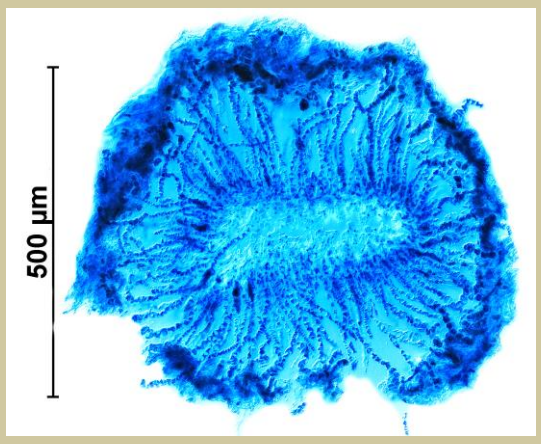
WORM-LIKE BROWN ALGAE

also found in "turf and fouling algae: III. thread and wormlike brown algae"

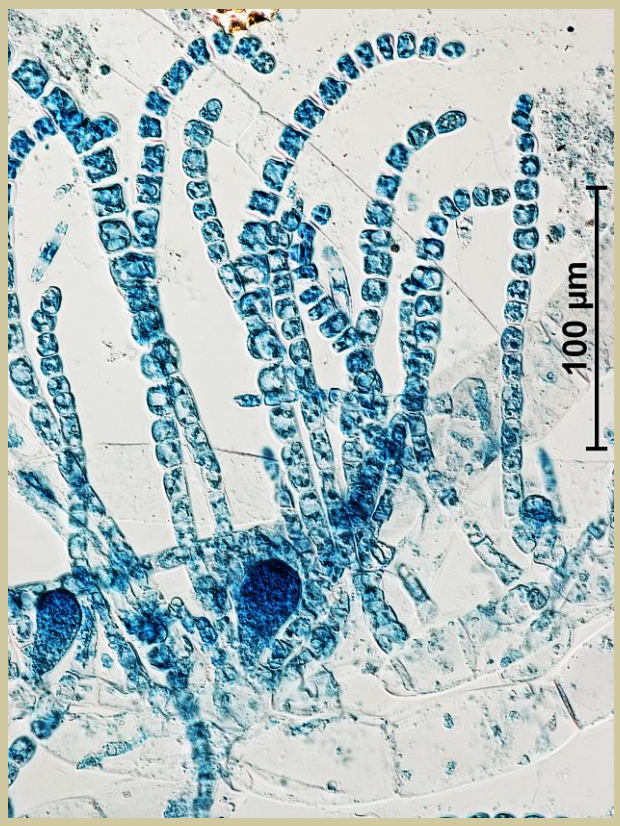
Cladosiphon filum

on *Posidonia* sea-grass

whole plants on a sea-grass leaf



cross section: small core of loose filaments, outer layer (cortex) of out-ward pointing chains of cells



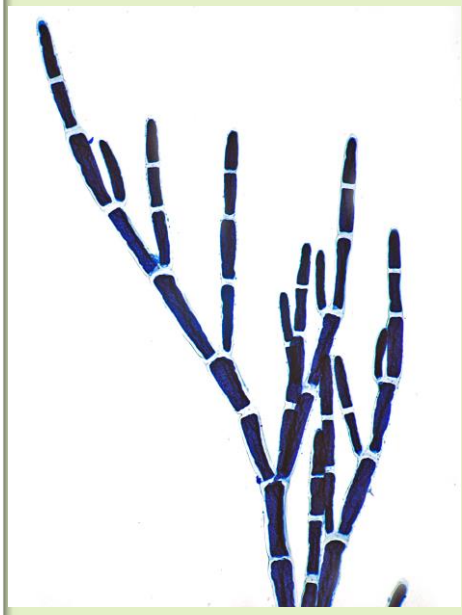
tissue squash of the surface layers (cortex) with diagnostic curved chains of cells

GREEN ALGAE (CHLOROPHYTA) AND BLUE-GREEN ALGAE (CYANOPHYTA)

FILAMENTOUS GREEN ALGAE

***Cladophora* species.**
Also found in **"Cladophora species groups I, II, IIA, IIB"**
There are 19 species all of which are possible epiphytes of sea-grasses. Those illustrated below are specifically listed in publications found in the Literature section on page 2.

Cladophora prolifera
Right: whole plant
Far right: microscopic detail of elongate tip cell and forks of branches tending to be parallel



Cladophora vagabunda
(as *C. fascicularis* on *Posidonia* in[2].)

Left: stained microscope preparation showing rounded tip cells and branching tending to occur on one side of axes
Right: whole plant

HOLLOW GREEN ALGAE

G2.1: [§]*Enteromorpha* species
also found in .... **"Ulva at a glance"**

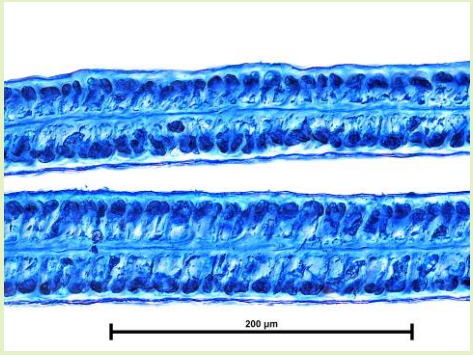
Enteromorpha flexuosa
Right: whole plant, found on *Posidonia australis*
Far right: microscopic surface view of cells in lines and prominent single, clear structure (pyrenoid) in the chloroplast, characteristic of the species

[§]recent workers have merged *Enteromorpha* (in which the plant body is hollow) with *Ulva*, (which was originally restricted to lettuce-leaf-like plants with solid blades)

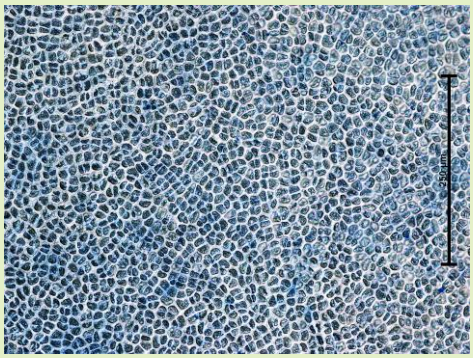
continued next page

FOLIOSE (LETTUCE-LEAF-LIKE) GREEN ALGAE

***Ulva* species**
also found in .....
"Ulva at a glance"



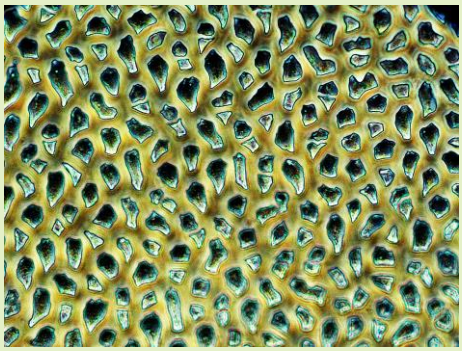
Ulva australis
Right: whole plant, found on *Amphibolis antarctica*
Far right, above: cross sections of two blades showing the 2 closely adhering layers of rectangular cells
Far right, below: surface view of small cells in random, short lines



***Ulvaria* species**
Two species are found in southern Australia.
Unlike *Ulva*, blades are a *single cell thick*.
Fuller descriptions can be found under ..... **"Green algae "**on this Website

Ulvaria oxysperma
(as *Gayralia oxysperma* in *Algaebase*)
Right: whole plant, found originally attached to *Amphibolis antarctica*

Far right: surface view of small, angular cells in random arrangement, characteristic of the species



BLUE-GREEN ALGAE - CYANOPHYTA.

Also found in "**Pictured Keys ..... Blue-green algae"**

Rivularia polyotis
colonies loosely attached to *Heterozostera* in shallow water, Encounter Bay SA

Rivularia polyotis detached colony

Rivularia polyotis squash of the gelatinous colony: fine filaments, basal specialist cells (arrowed)

RED ALGAE - RHODOPHYTA

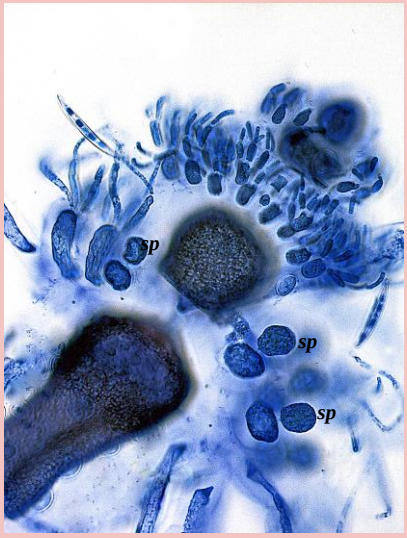
FILAMENTOUS RED ALGAE

See also "filamentous Red algae: Master key"

Anotrichium tenuis

whole plants

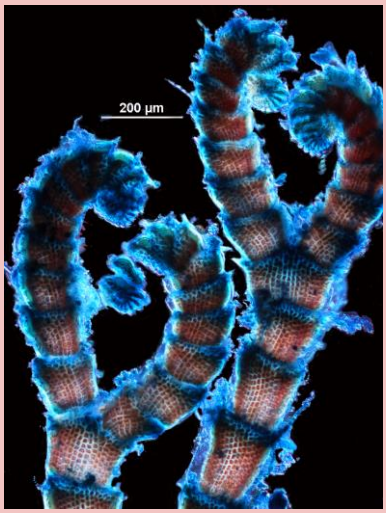
side branch arising from the *lower* end of a cell (arrowed), a characteristic of the species

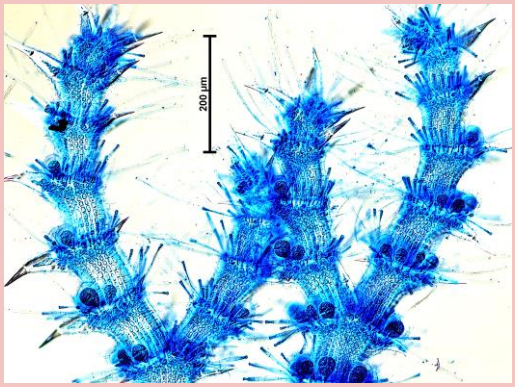


filament tip with dense rings of hairs and immature, stalked spores (***sp***), also in rings

Centroceros species

there are several species (some unnamed), of which the commonest, *C. clavulatum*, is shown here





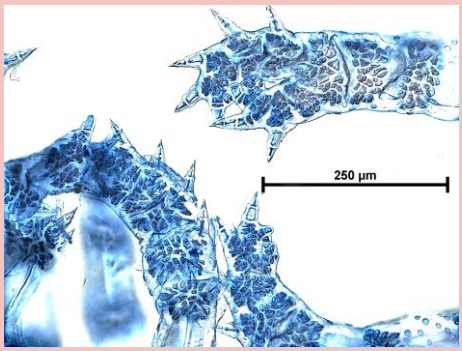
Left: several plants
Centre: incurved tips backlit to highlight rings of cells at nodes (arrowed) and columns of cells between nodes
Right: stained specimen, thorny cells and hairs prominent at nodes; sporangia present at nodes

Ceramium species

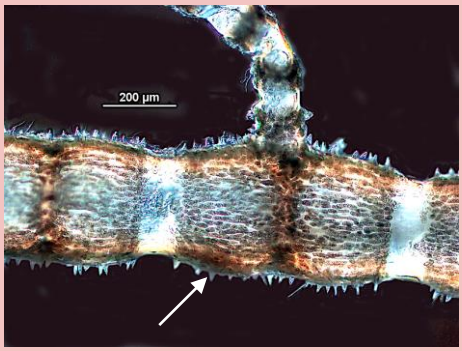
There are 17 possible epiphyte species of *Ceramium*, but only two [2] reported as epiphytes of sea-grasses namely *C. puberulum* and *C. shepherdii*

Ceramium puberulum

Right: whole plants on a *Posidonia* leaf



Centre: details of multicellular spines, on outer side of curved tips



Right: backlit filament highlighting rows of cells at nodes with minute hairs (arrowed)

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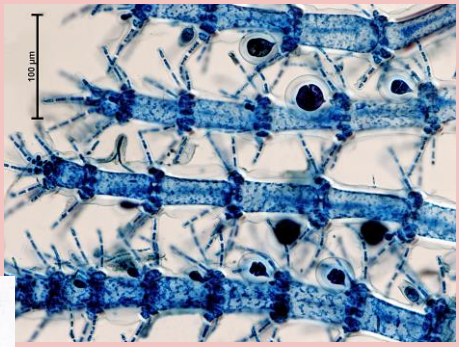
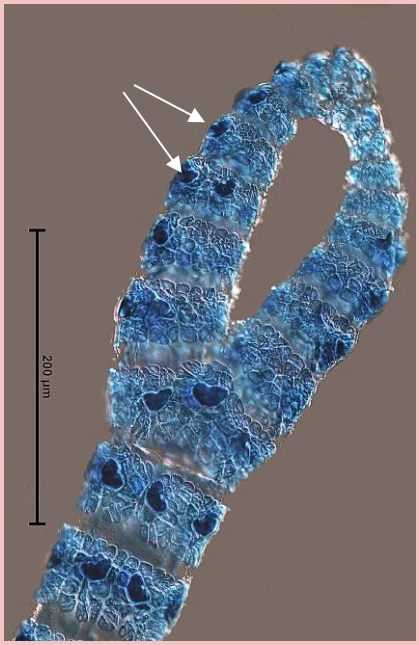
Ceramium shepherdii

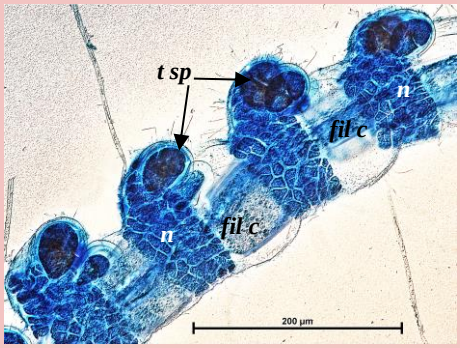
Right: whole plants on a *Posidonia* leaf
Far right: detail of rings of prominent, multicellular hairs at nodes; deeply stained sporangia also present





Ceramium australe

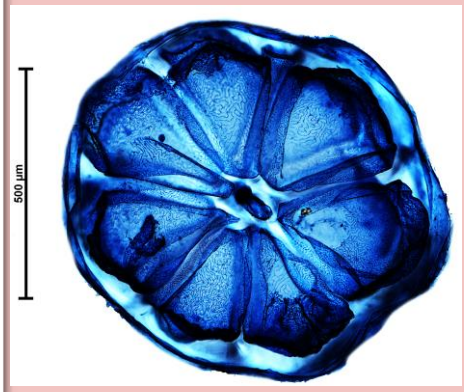
Above: whole plants on *Amphibolis* stems
Above, right: magnified branches showing prominent banding
Right: detail of large cells of the central filament (***fil c***), bands of small cells at nodes (***n***), spores (terasporangia, ***t sp***) on one side of filaments
Far right: filament tips, bent inwards and touching apically, prominent glands (***gl***) immersed in nodal cells

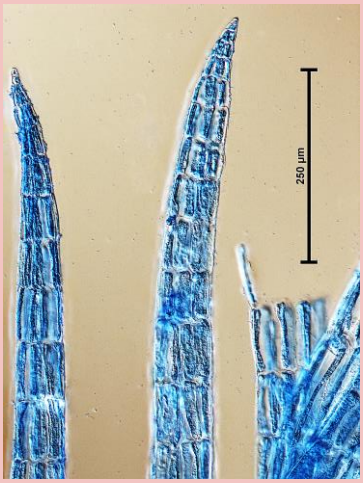


***Polysiphonia* species**

There are 27 possible *Polysiphonia* epiphytes of sea-grasses of which only *P. decipiens* has been [2] listed from two areas along the southern Australian coast (as *P. nigrita*).

Polysiphonia decipiens





Top, left: whole plants
Top, centre: hooked tendrils at plant base
Top, right: plant tip; colourless, branched hairs (trichoblasts), bands of cells, finger-shaped clusters of spermatia (***sp***)
Bottom, far left: cross section ; central filament, 7 encircling pericentral cells
Bottom, left: tips denuded of trichoblasts, cells in bands

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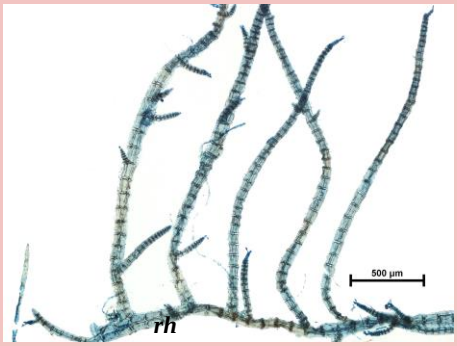
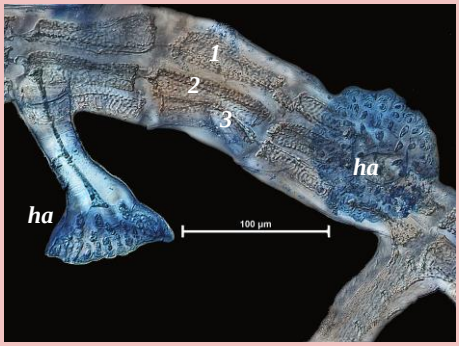




Polysiphonia amphibolis

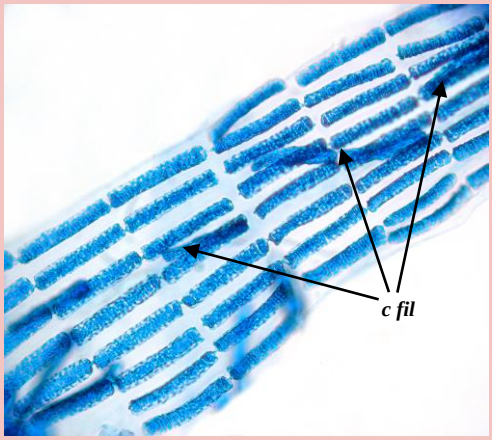
Left: whole plants on *Amphibolis* stems

horizontal runner (rhizome, ***rh***), erect branches

detail of the characteristic pad (hapteron. ***ha***) attaching the runner to the substrate; bands with rings of 4 cells (pericentrals, ***1....***), 3 in side view

Herposiphonia species

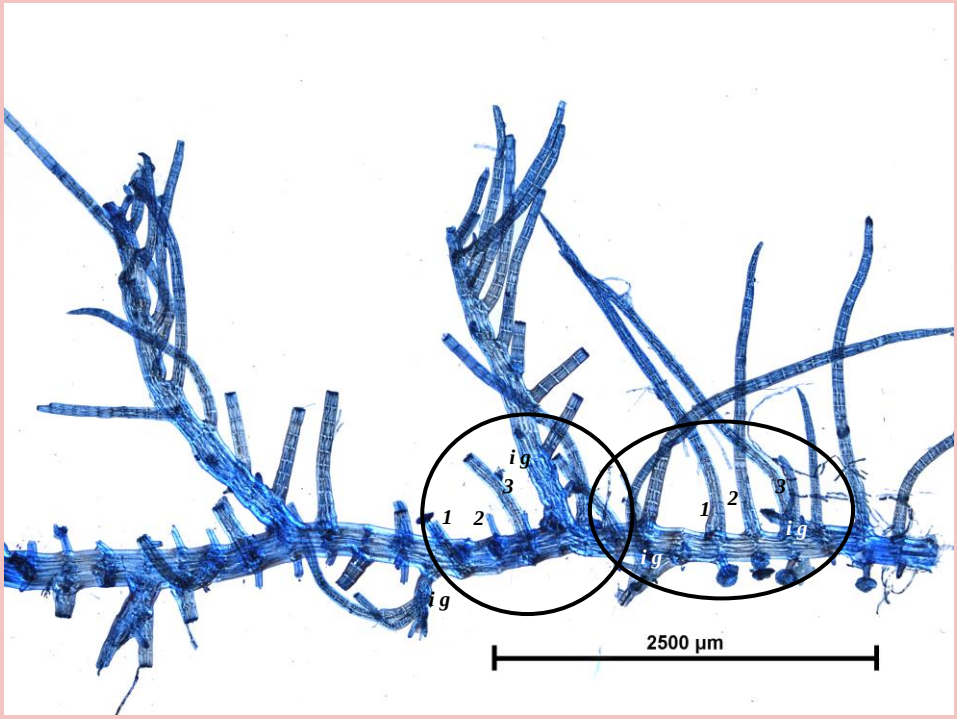
There are 6 possible epiphyte species of *Herposiphonia*. Each has a creeping, horizontal rhizome giving rise to short upright branches (of limited growth) that alternate in a definite sequence with branches capable of continued growth . For information on the group to which this genus belongs go to filamentous red algae : Part V



Above, left: *Herposiphonia versicolor*: plants on a sea-grass stem

Above, right: *H. calothrix*: tissue squash of branch displaying all 8 (pericentral) cells in a band, and the central filament (***c fil***) slightly displaced

H. filipendula: 2 branching sequences illustrated. Continually-growing branch (indeterminate growth, ***i g***), branches of determinate growth (***1-3***) of a branch sequence



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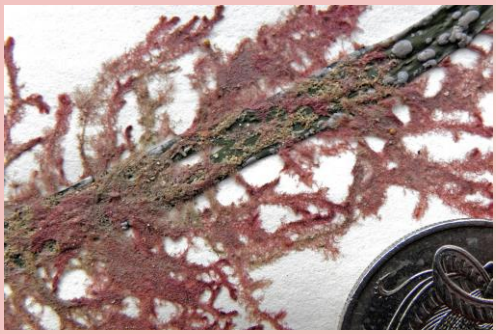
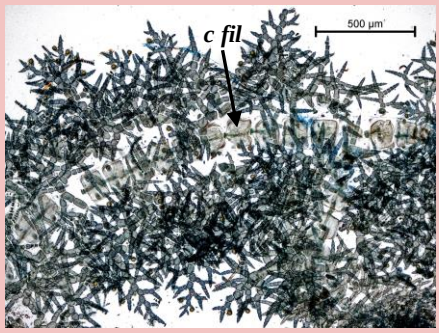
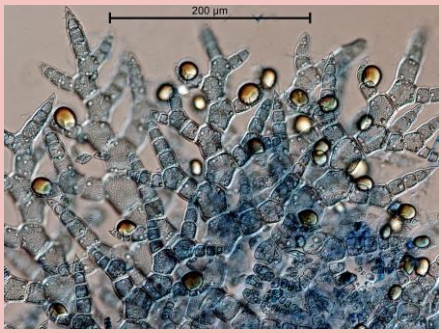
Antithamnion species

There are 11 possible epiphyte species of *Antithamnion*. Each has opposite side branches and most have bright gland cells. Particular species can be found in Pictured keys.... filamentous red algae : Part III







Antithamnion hanovioides

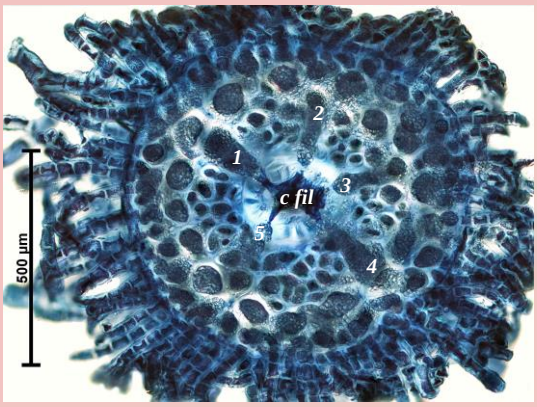
whole plants on an algal host

central filament (***c fil***) of box-shaped, large cells; opposite side branch clusters

side branches; divergent pointed tips, typical of the species; bright glands

Wrangelia species

There are several possible epiphyte species of *Wrangelia*. Go to Filamentous red algae.... Part II on this Website for further information. *Wrangelia velutina* on *Amphibolis* has been recorded [7] for the Isles of St Francis, SA.

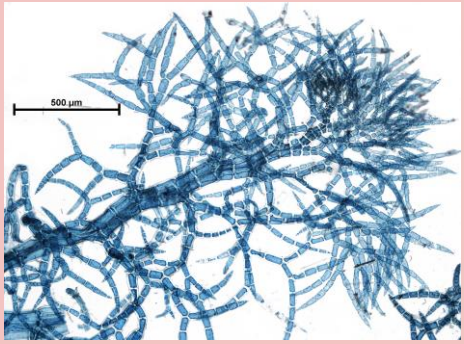


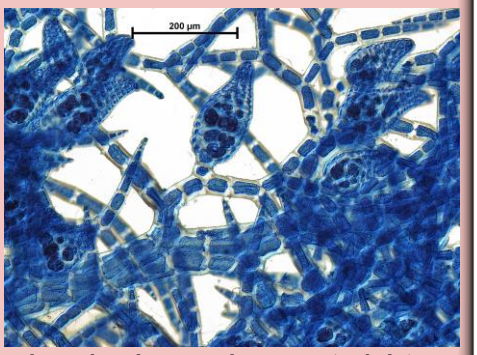
***Wrangelia nobilis*:** detail of "fluffy" branches

central filament of large cells just visible through enveloping whorl branchlets

cross section, basal cells of 5 whorl branchlets (***1-5***) radiating from the central filament **(*c fil*)**

Heterosiphonia callithamnium





numerous "fluffy" plants on sea-grass leaves

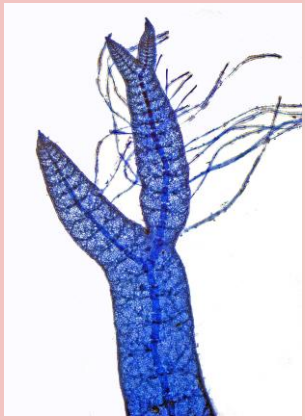
divergent side branches ending in pointed cells

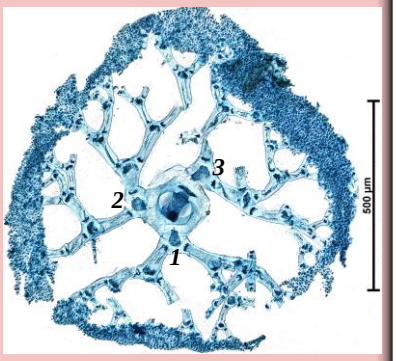
lance-shaped sporangial structures (stichidia)

Gattya pinella and other members of the Tribe Crouanieae,

Go to Filamentous red algae.... Part II on this Website.

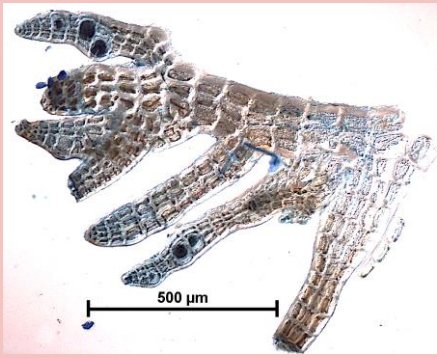
Right: plant on *Amphibolis*
Centre: tips stained to show the central filament, regular, radiating whorl-branchlets (also extraneous filaments extending from the main plant body are present)
Far right: cross section, with three whorl-branchlets (***1,2,3***) radiating out from the central, large filament





Dipterosiphonia prorepens

sea-grass stems completely smothered by creeping plants of *Dipterosiphonia prorepens*



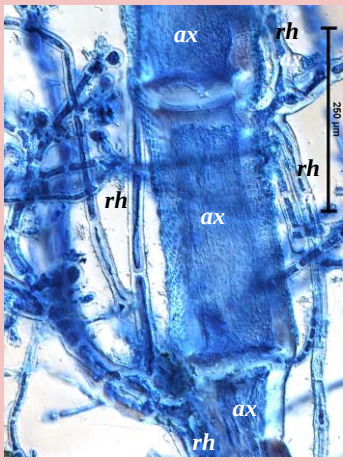
branching pattern, bands of cells, short side branches with spores (***sp***)

mix of branches side view and a cross section showing a ring of 5 cells

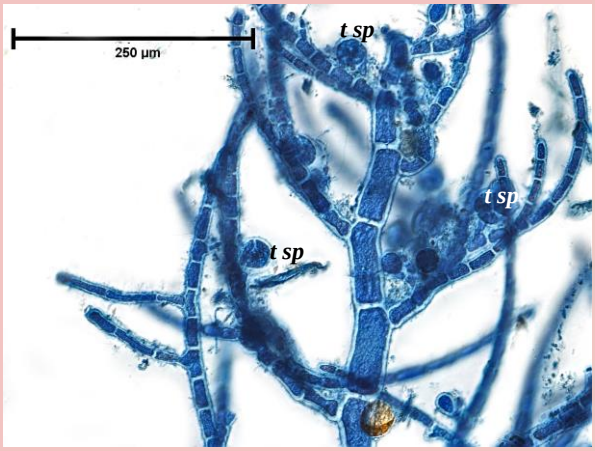
Spongoclonium species

S. australicum and *S. fasciculatum* have been recorded as sea-grass epiphytes.

Spongoclonium australicum
Left: whole plants



Centre: main branch (axis, ***ax***) of large cells producing upward- & downward growing rhizoids (***rh***) from basal cells of side branches



Right: side branches, stalkless sporangia (***t sp***)

Spyridia species

Also found in Filamentous red algae …..Part IV: nodally corticated algae on this Website

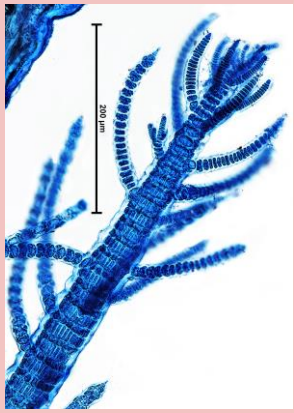
Right: shallow, sandy rock pool with ***Spyridia filamentosa***, a common epiphyte of Sea-grasses

bleached Eel-grass, *Heterozostera* in sand, exposed at low tide

green (unbleached) Eel-grass, in shallow water

bleached, fluffy *Spyridia filamentosa* obliterating the Eel grass beneath it, in a shallow pool with Tape-grass (*Posidonia*) detritus

Spyridia filamentosa: whole plant



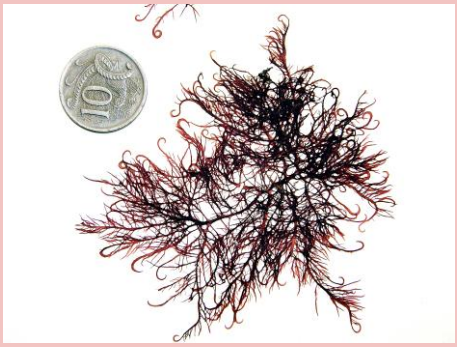
Spyridia filamentosa corticated main branch (axis) and naked short side filaments

continued next page

NARROW BRANCHED RED ALGAE – plants with firm surfaces

Hypnea species

there are 4 species all of which are possible sea-grass epiphytes. To separate species go to **" narrow branched red algae"** **and** **"Hypneaceae"**



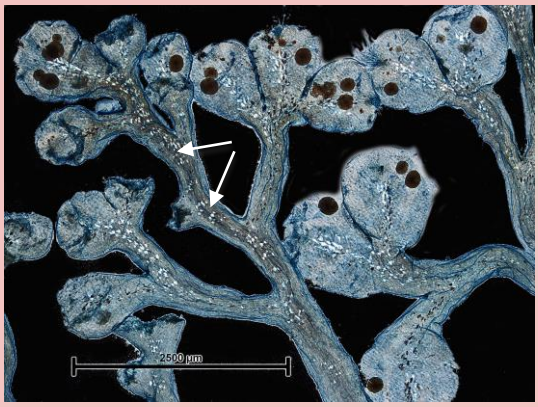
Hypnea ramentacea whole plant

Hypnea ramentacea detail of curled tips to branches

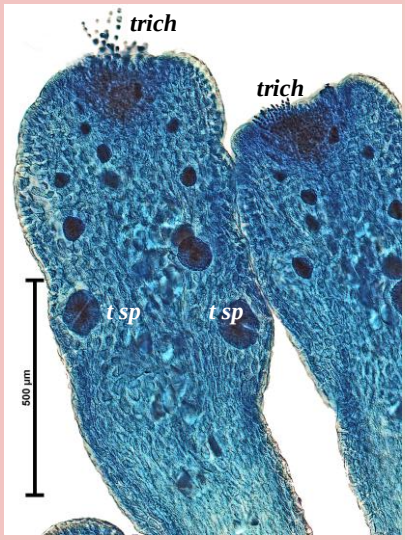
Hypnea charoides, numerous short spines on main branches

Laurencia forsteri

there are 13 other species some of which may be possible sea-grass epiphytes. To separate species go to **"narrow branched red algae"** and **"Laurencia and Chondrophycus"**



fertile terminal branches, deeply stained spores , bright flecks along branches (arrowed) due to cell wall thickenings in core cells



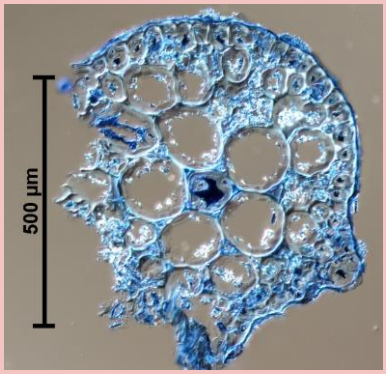
spores (tetrasporangia, ***t sp***) in lines down branches, hair-tufts (trichoblasts, ***tr***) protruding out of terminal pits

whole plants on a sea-grass leaf

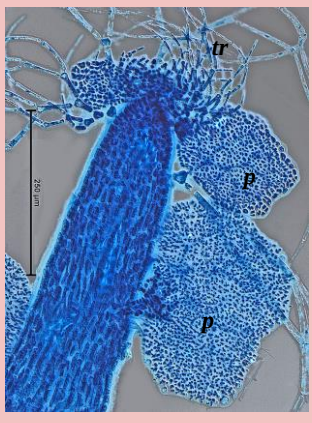
Chondria species

there are 16 other species some of which may be possible sea-grass epiphytes. To separate species go to **"narrow branched red algae"** **and** **"Chondria and Husseya "**

Chondria angustissima
plants on a sea-grass leaf



partial cross section: central filament ringed by 5 large (pericentral) cells



male plant: tuft of hairs (trichoblasts, ***tr***), pads (***p***) producing spermatia, unique to the genus

continued next page

Mychodea pusilla

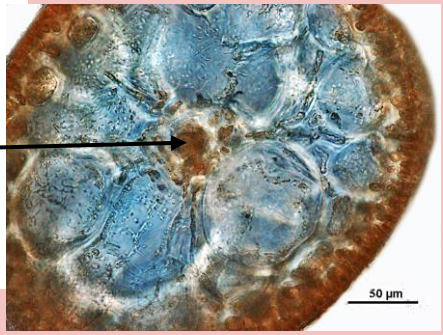
Right: plants on *Amphibolis* stems

Far right, upper:
colourised magnified view of a preserved (bleached) specimen
showing pointed tips**,** swellings containing female organs (cystocarps)

Far right, lower:
cross section, central filament (***c fil***) partly obscured by a ring of fine threads,
few large inner cells,
smaller coloured outer cells

⚠ can easily be mistaken for the next genus, *Dicranema*

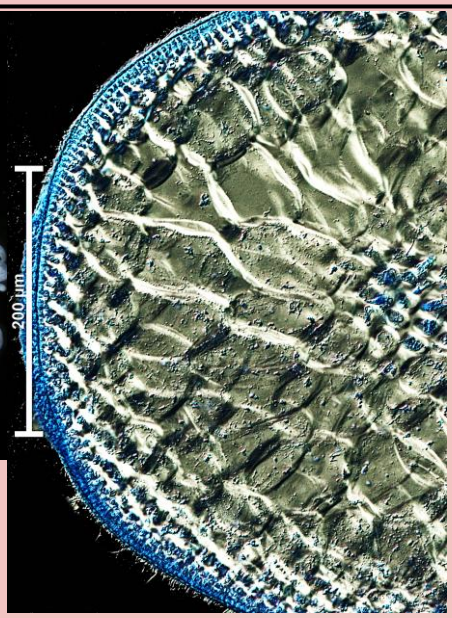
c fil



Dicranema cincinnalis

Right:
preserved (bleached) plants on *Amphibolis* stems, hooked tips prominent

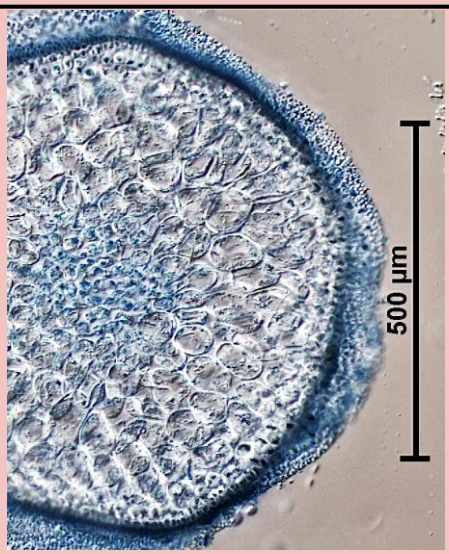
Far right:
cross section, central region of many filaments, numerous larger cells, outer layer of small coloured cells



Dicranema revolutum

Right:
plants on *Amphibolis* stems, hooked tips ***absent,*** plants generally **larger** than *D. cincinnalis*

Far right**:**
cross section, central region of many filaments, numerous larger cells, outer layer of small coloured cells



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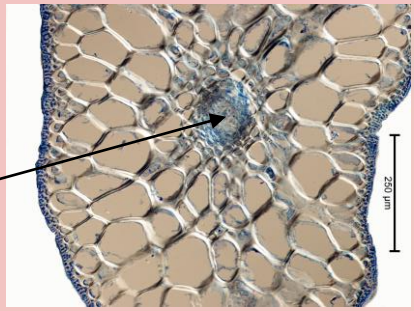
Delisea hypneoides

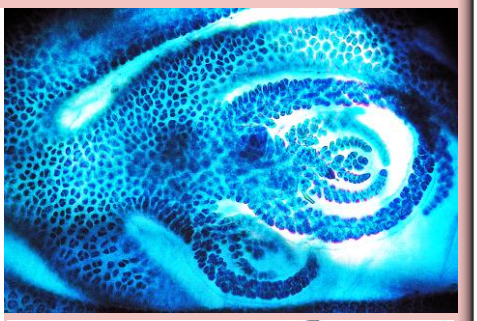
there are 4 other species some of which may be possible sea-grass epiphytes.

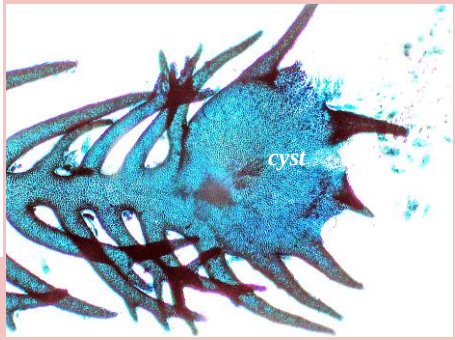
Go to

"narrow branched red algae" and

"Bonnemaisoniaceae"







Left : cross section, central filament (arrowed) ringed by smaller cells Centre: whole plants
Far right, upper: growing tip Far right lower: female organ (cystocarp, ***cyst***) embedded in tip

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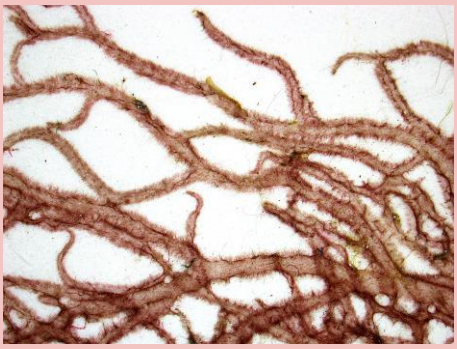
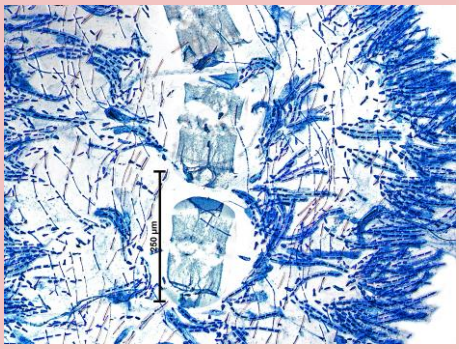
Dudresnaya australis on *Amphibolis* stems





Dudresnaya australis
Left: whole plants Centre: magnified surface view Right: tissue squash, central filament of large cells, branched chains of small cells at the surface

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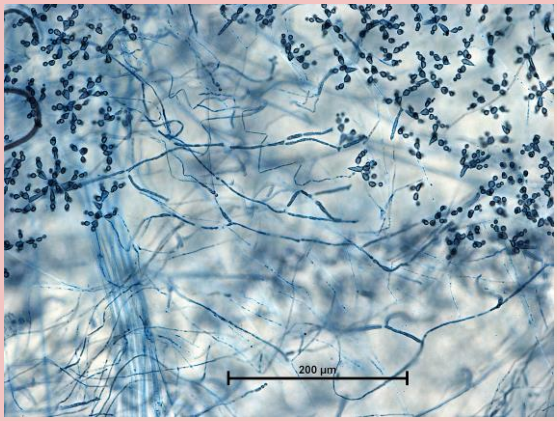
Gloiophloea scinaioides on *Amphibolis* stems. Also found in Pictured keys slimy red algae in this Webpage

plants slimy when fresh

Right: whole plant
Far right: tissue squash, core of twisted filaments branching outwards, ending in branched chains of coloured cells



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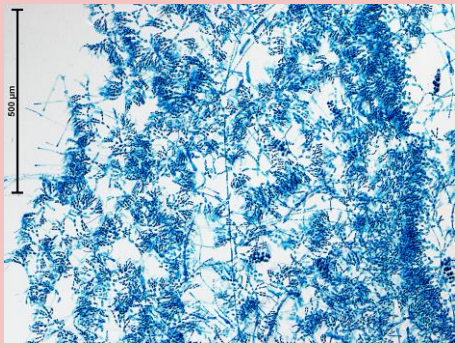
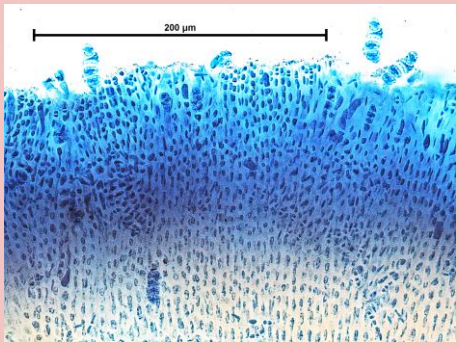
RIBBON AND BROAD BLADED RED ALGAE

go to "strap-like and broad-leaved Red algae"

***Kraftia dichotoma*:** 2 disparate stages – sexual and may occur on *Amphibolis* stems



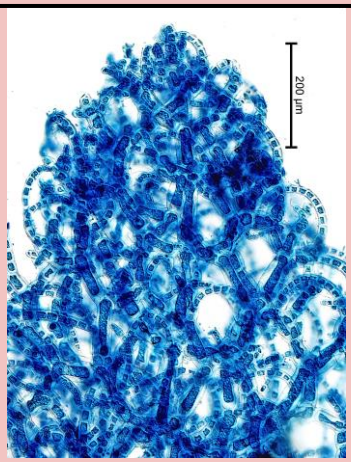


Upper images: ***sexual plant***, on an *Amphibolis* stem
- Left: whole ***sexual*** plant on *Amphibolis* stem
- Centre: tissue squash, central fine filament, mass of branched chains of small coloured cells at the surface
- Right: prominent hairs emerging from surface cells

Lower images: ***spore*** plant, encrusting an *Amphibolis* stem
- Far left: whole plants
- Left: cross section through the crust consisting of columns of small cells and spore sacs (some extruded in this image), each sac containing a stack of 4 spores

Haloplegma preissii on *Amphibolis* stems, also common on coralline algae

Right: flat-branched, felty plants
Far right: stained detail of the plant tip showing the filamentous web-like structure



Thuretia quercifolia on *Amphibolis* stems

Right: whole plants

Centre: detail of jagged edges and veins of blades

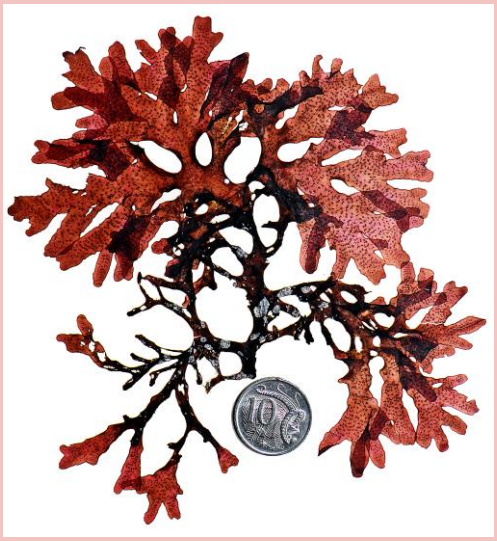
Right: blade tip

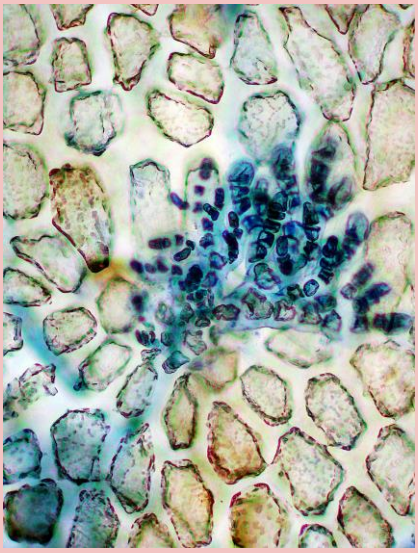
continued next page

Dictyomenia tridens on *Amphibolis* stems

Left: detail of blades pointed margins, veins running to the ends of the points

Right: whole plant





Pollexfenia pedicellata on *Amphibolis* stems

Left: whole plant

Centre: detail of blade, flecked with hair-tufts (trichoblasts)

Right: microscopic surface view of a hair tuft tufts (trichoblasts)

Callophyllis rangiferina on *Amphibolis* stems

Right: whole plant

Far right: detail of flat branching pattern

continued next page

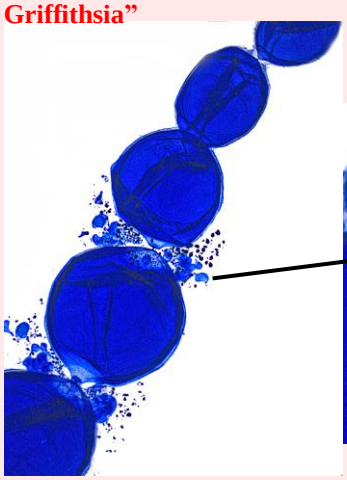
BEAD-LIKE RED ALGAE

Found also in "bead- sausage- and sac-shaped red algae"

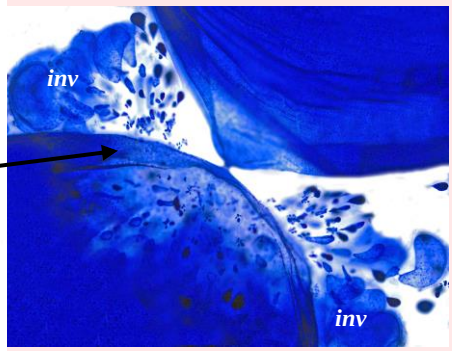
Griffithsia. Several small species separated mainly on sporangial features are possible epiphytes. The whole plant consists of chains of ***large, naked cells*** (see also **" Griffithsia"**

Griffithsia monilis

Whole plant



Detail of stained cells, sporangial clusters in the constriction between vegetative cells

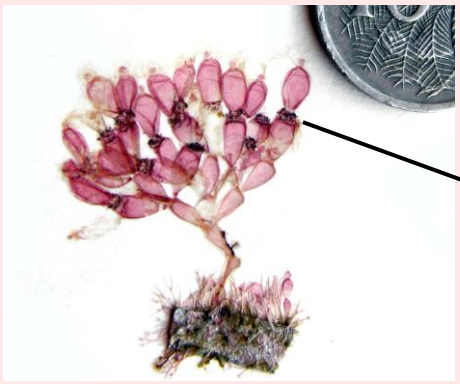


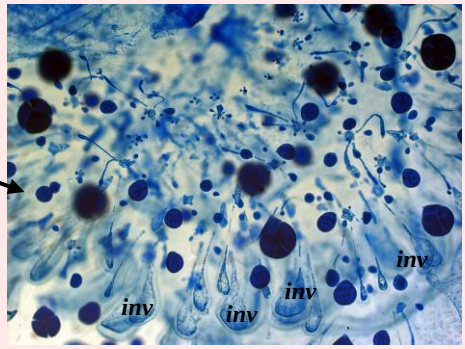
Highly magnified, minute sporangial clusters from the constriction between vegetative cells: showing the peripheral involucral cells (***inv***)

Griffithsia ovalis

Right: whole plant on sea-grass leaf

Far right:
highly magnified, minute, darkly stained sporangial clusters from the constriction between vegetative cells: showing the peripheral involucral cells (***inv***)



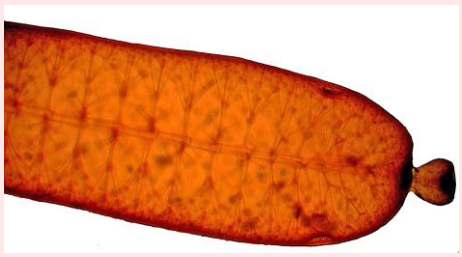


Coeloclonium umbellatum (as ***C. umbellula*** in the Flora**)** on a *Posidonia* leaf

Coeloclonium. Three species are found commonly on Sea-grasses. Branches are ***multi-cellular*** and pinched into bead-like segments.

Coeloclonium verticillatum with rings of segments

Coeloclonium tasmanicum
Left: whole plant. branching irregular



Centre: magnified segment, back-lit to expose internal spreading filaments arising from a central filament

Right: backlit segments

CORALLINE RED ALGAE

ENCRUSTING CORALLINE RED ALGAE

see also **"coralline red algae"** **and** **"crusts, stains, scums and scales"**

***Pneophyllum* sp**
crusts on leaves, initially at leaf edges[1]. There are several possible epiphyte species on sea-grasses, and definitive identification requires intricate sectioning of tiny sporangial pustules.
(see [8]Harvey *et al* for crustose species, which, although for New Zealand, are still relevant for southern Australia)

Pneophyllum coronatum crusts on leaves

***Hydrolithon* sp** crusts on stems
Right: plant not long after germination from a spore (arrowed) divided in a cross-shaped pattern
Far right: mature crusts wrapped around stems of *Amphibolis*

JOINTED CORALLINE RED ALGAE

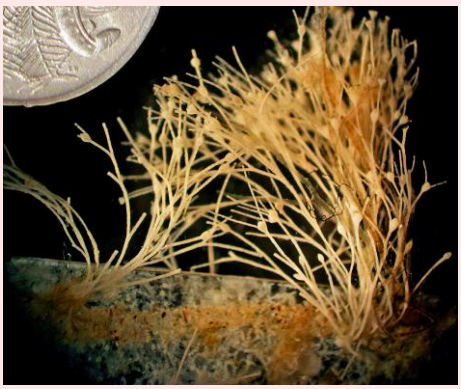
see also "coralline red algae"

***Jania* species**

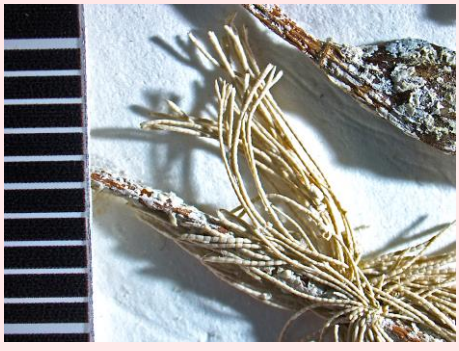
plants with ***forked*** branching, reproductive swellings at the join of forks

Right: *Jania minuta*

Far right: *Jania micrarthrodia*



Jania minuta
two magnifications of bleached, matted clumps on stems of *Amphibolis antarctica* (scale is in mm)



***Metagoniolithon* species**

Side branches ***form in rings*** from joints on the cylindrical main (axial) branches

Metagoniolithon stelliferum

Right: preserved (bleached) specimen

Far right: detail of branching pattern with up to 8 ***radiating***, short, side branches arising in a ring

Metagoniolithon chara (not illustrated) is a similar species also found on sea-grasses.

2-3 short side branches arise ***almost vertically*** in a ring at each joint of main branches (axes), and each of the axial cells is about the same length, so that side branches end at the same level, producing a banding effect in the plant overall, although this is often difficult to detect because the fragile plant is easily damaged and side branches may be lost.

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§Haliptilon roseum

Plants with flat ***branched/pinnate*** main branches (axes), side branches forked, ***cylindrical***, sometimes so prolific that the pinnate main branches are obscured.

A common epiphyte of sea-grasses, and ***highly variable*** in form.

Left: crowded plants, pinnate branching obvious

Centre: detail of flat main branches and short, cylindrical side branches

Right: detail of reproductive swellings topped by cylindrical branches

Right: plant in which the prolific side branches obscure the pinnate branching of axes

Far right: male plant, spindle-shaped reproductive organs, prolific side branches

§ recent DNA analysis has indicated ***Haliptilon roseum*** is more closely allied to the genus ***Jania*** and should have the binomial ***Jania rosea***

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