PICTURED KEY TO SOME RED ALGAE OF SOUTHERN AUSTRALIA: COMMON CORALLINE ALGAE

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, making correct identification very difficult.

Corallines: One group — the corallines, have hard, limy skeletons that make recognition of the group easier. They are pink to grey-pink in colour, bleaching white in the sun. Below is a key to a few of the common ones.

Coralline look-alikes Unfortunately, some odd members of other algal families also resemble corallines. These are posted at the end of this key.

Scale: the coin used as a scale is 23mm or almost 1" wide. Microscope images of algae are usually blue stained

1a. plants are ***jointed***, with flexible joints between solid segments (see Figs 1 and 19) …….. 2.

1b. plants are ***un-jointed***, pebble-like (see Fig. 2) or leaf-like (see Fig. 8.) ..... 9.

2a. side branches in ***rings*** from each of the joints. Branch tips have microscopic gelatinous caps. (Fig. 5.) ……..... ***Metagoniolithon***

2b. branching forked or feathery ..... 3.

3a. side branches arise in a ***feather-like*** pattern (branching is opposite, in one flat surface), although tips may be forked. (see Fig. 6.) ……..…….…..….. 4.

3b. branching pattern of the ***whole*** plant is ***forked*** (dichotomous). (see Fig. 7.) ..... 7.

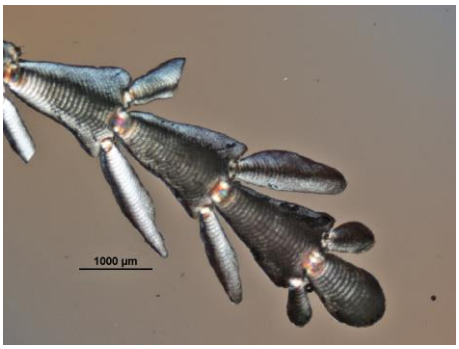


Fig.1: magnified view of *Corallina* showing jointed segments

Fig. 2: knobby, unbranched, pebble-like *Lithophyllum*

Fig. 3: magnified view of *Metagoniolithon radiatum* showing forked branching at tips but rings of side branches below

Fig. 4: *Metagoniolithon stelliferum*, narrow side branches in rings about each joint of the main branches (axes)

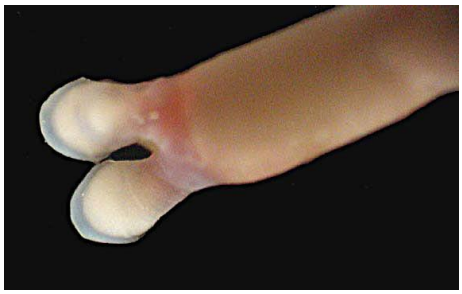


Fig. 5: microscope view of gelatinous caps of *Metagoniolithon*

Metagoniolithon radiatum, Fig. 3, grows on rock. *M. stelliferum*, (Fig. 4) has many branches at each joint and *M. chara* has 2-3 branches: both these latter species grow on other plants, often on the seagrass *Amphibolis*.

See Womersley & Johansen 1996, p.31

Fig. 6: feather-like branching pattern in *Corallina*

Fig. 7: forked (dichotomous) branching in *Jania*

Fig. 8: leaf-like branching in *Metamastophora flabellata*

4a. the solid segments in upper parts of main stems are ***flat*** and ***wedge-shaped***, with rounded edges
…….....… 5.

4b. the solid segments on the main stems (Figs 9-11), are fairly ***straight-sided***. Forked, cylindrical ultimate branches that look like antennae often occur
…… ***Haliptilon roseum***

5a. plants commonly form a dense turf from the lower intertidal to shallow water on reefs, often bleached white in summer and often growing with *Haliptilon*. Segments de-calcified with acid each show10-20 dark bands under the microscope. Figs 12-14
……. ***Corallina officinalis***

5b. plants usually grow in low light conditions either at depth or in shaded intertidal pools. Segments de-calcified with acid each show20-50 bands under the microscope. (see Fig. 16, next page)
…… 6.

6a. plants 50-120mm tall, main segments about 2mm wide and as tall as wide. Figs 15, 16.
…….. *Arthrocardia wardii*

6b. plants 20-40mm tall, main segments about 1mm wide and 2-4 times taller than wide. Fig. 17.
……. *Arthrocardia flabellata* subsp. *australica*

Fig. 9: *Haliptilon roseum* growing as a turf in shallow water at reef's edge.
Photo: D Muirhead

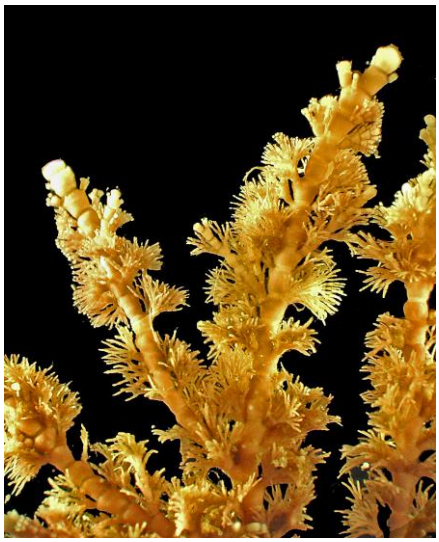


Fig. 10: flat segments of main branches and prominent sprays of side branches of *Haliptilon roseum*

Fig. 11: detail of the fairly straight-sided segments of main branches of *Haliptilon roseum* and cylindrical, antennae-like side branches

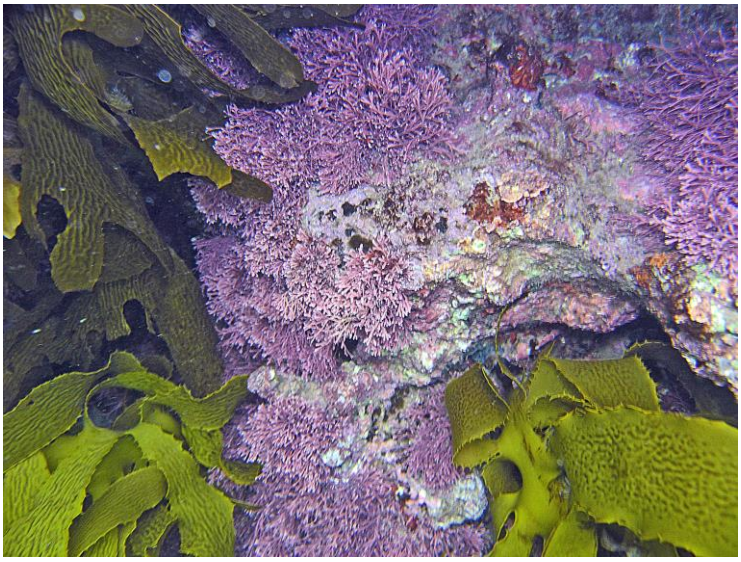


Fig. 12: *Corallina* turf amongst leafy brown *Ecklonia* at the reef edge, Aldinga

Fig. 13: *Corallina officinalis* grows as a turf, from about low water mark

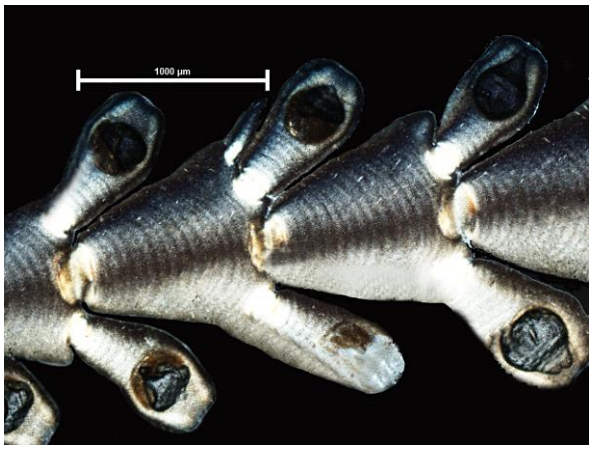


Fig. 14 wedge-shaped solid segments of main branches of *Corallina officinalis* when de-calcified with acid show about 20 dark bands (the swellings in side branches are female structures - cystocarps)

Fig. 15: *Arthrocardia wardii*

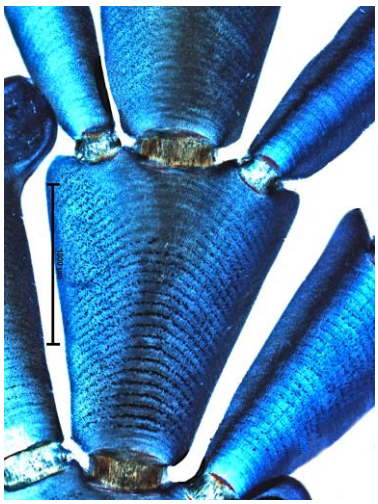


Fig. 16: wedge-shaped solid segments of main branches of *Arthrocardia wardii* when de-calcified with acid show about 30 dark bands

Fig. 17: *Arthrocardia flabellata* subsp. *australica*

7a. solid segments in ***upper*** parts are ***cylindrical*** and slender. Female organs form swellings in the ***forks*** of branches. Figs 6, 18-22 ……..…….. ***Jania***

7b. solid segments ***throughout*** the plant are ***flat*** or compressed ……..…….. 8.

J. parva, J. micrarthrodia (Fig. 22) and *J. minuta* (Fig. 18) have narrow segments (<200µm wide). Branch forks of *J. verrucosa* (Fig. 19) occur in all planes while in *J. pusilla* and *J. pulchella* (Fig. 21) they are generally in one plane. There are only 4-10 segments in the whole plant in *J. pusilla* (not illustrated).

Fig. 18: *Jania minuta* on the blade of a seagrass

Fig. 19: bleached *Jania verrucosa*

Fig. 20: pink and bleached *Jania* amongst other algae and sea grass, forming rounded turf on rock in shallow water

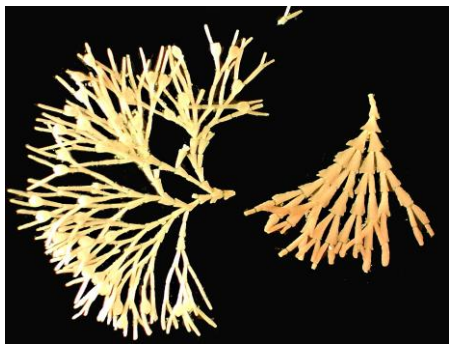


Fig. 21: *Jania pulchella* with flattened wedge-shaped segments below, but cylindrical segments in upper parts

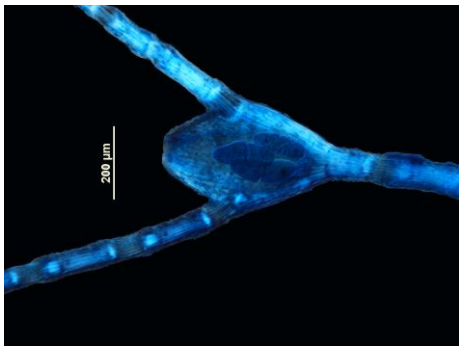


Fig. 22: *Jania micrarthrodia* with female structure in the angle between forked branches, a characteristic of the genus

8a. solid segments are shaped like arrow-heads (Figs 22, 23). Female organs (cystocarps) form swellings in the arms of the arrows.
…..…. ***Cheilosporum sagittatum***

8b. solid segments are rectangular or elongate and regularly forked. (Figs 25-27).
……..…. ***Amphiroa*** spp

9a. plants consist of thin, fragile ***discs*** (Fig. 24) about 10mm wide attached at one edge to red algae (especially *Ballia*)
…….. ***Synarthrophyton patena***

9b. plants not as above ..... 10.

10a. plants of thin, upright, brittle, leaf-like branches ..... 11.

10b. plants pebble-like ***or*** form crusts on other plants, ***or*** brittle sheets on rocks ..... 12.

11a. leafy parts curled (Figs 8, 28, 29)
…..… ***Metamastophora flabellata***

11b. leafy parts flat, tips small, fan-shaped. Fig. 30.
..... ***Mastophoropsis canaliculata***

12a. plants form scaly patches on other algae or seagrass leaves and stems. (next page) ……
encrusting epiphytic coralline algae
..... 13.

12b. plants consist of flat crusts, sheets or granular bumps ***on rocks*** sometimes forming pink, lumpy pebbles about 50mm wide or becoming coral-like
..... ***lithothamnions and**
****rhodoliths**
..... 14.
(see the table, next page)

Fig. 22: *Cheilosporum sagittatum*

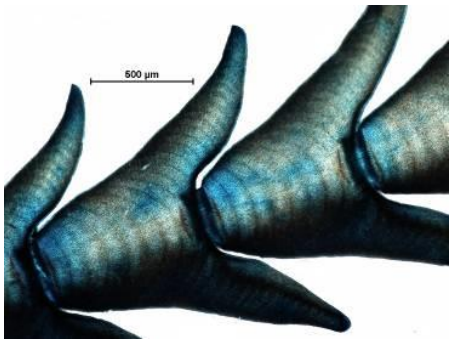


Fig. 23: *Cheilosporum sagitattum*, detail of segments

Fig. 24: *Synarthrophyton patena* on *Ballia*

Fig. 25: *Amphiroa gracilis*

Fig. 26: *Amphiroa anceps*

Fig. 27: *Amphiroa* segments with pustule-like female structures

Fig. 28: *Metamastophora flabellata*

Fig. 29: detail of *Metamastophora* branches with scattered, pustule-like female structures

Fig. 30: detail of *Mastophoropsis canaliculata*

*lithothamnion = in this key, a general term used for non-jointed, stony or scaly coralline alga. e.g. Figs 34, 37.

**rhodolith = an un-attached, commonly nodular plant body resembling a pebble, that develops by fragmentation or envelopment of a stone or other solid object. e.g. Figs 41, 46.

13. some encrusting, epiphytic coralline red algae

diagnosis on superficial features alone can be difficult

Fig. 31 *Pneophyllum coronatum* forming pink scaly patches on leaves of sea grasses

Fig 32: *Pneophyllum coronatum* (arrowed) on the brown alga *Glossophora nigricans*

Fig. 33: *Hydrolithon farinosum* growing as chalky scales on the thin leaves of Eelgrass, *Heterozostera*

Fig. 34: encrusting form of *Synarthrophyton patena* (compare this with the totally different disc-shaped form in Fig. 20). Unfortunately, only detailed microscope investigation can truly separate this encrusting form from several other species

Fig. 35: *Melobesia membranacea* forming a scaly coating on the Green alga *Apjohnia*

Fig. 32: *Melobesia membranacea* coating the balloon-shaped surface structures of the Green alga *Caulerpa simpliciuscula*

Fig. 36: *Melobesia membranacea* showing the highly magnified crater-like reproductive structures by which this species can be distinguished from other encrusting coralline algae

Woelkerling, W. ***in*** the Flora, part IIB page 151 has put together a field guide to some of the non-jointed coralline algae using features observable with a hand lens. The more obvious of such species are illustrated above and in the next page. Identifications made using these images can only be tentative because anatomical investigation, especially of reproductive features, is required for valid identification.

PLANTS WITH DISTINCTIVE GROWTH FORMS

- plants upright, to 230mm tall, of a stalk and spreading , flat, ribbon or fan-shaped leafy branches: *Mastophoropsis canaliculata* and *Metamastophora flabellata* (see also above)
- plants flat on rock (prostrate), forming shiny discs or sheets 20-1500mm across and 1-3mm thick ***loosely*** attached to rock, commonly with root-like struts underneath: *Phymatolithon masonianum*
- plants forming overlapping, flat, fan-shaped layers: *Lithophyllum prototypum*
- plants delicate, very thin and encrusting other algae and sea grasses, often in large numbers: *Melobesia membranacea*, *Pneophyllum* spp, *Hydrolithon farinosum*

PLANTS WITH DISTINCTIVE REPRODUCTIVE STRUCTURES

- reproductive structure in patches on the surface of bumps: *Sporolithon durum*
- reproductive structures in crater-like bumps, plants often on holdfasts of large algae, of lumpy, layered or with short upright branches: *Mesophyllum macroblastum* and *M. printzianum*

14a. PLANTS FORM BRITTLE SHEETS LYING ON ROCK

Fig. 37: *Phymatolithon masonianum* has a shiny surface and can be stripped off the rock on which it lies

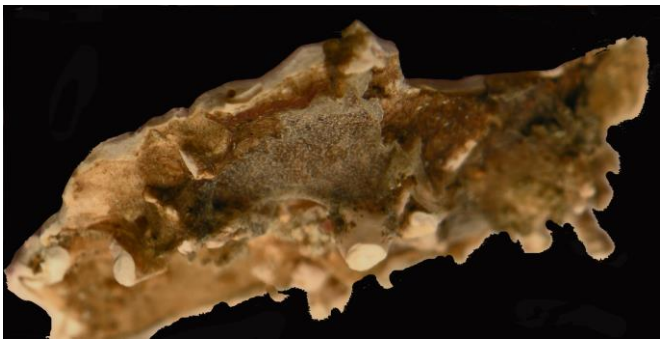


Fig. 38: the underside of *Phymatolithon masonianum* often has small projections

14b. PLANTS FORM LAYERED SHEETS TIGHTLY ADHERING TO ROCK

Fig. 39: *Mesophyllum* showing layered flat lobes

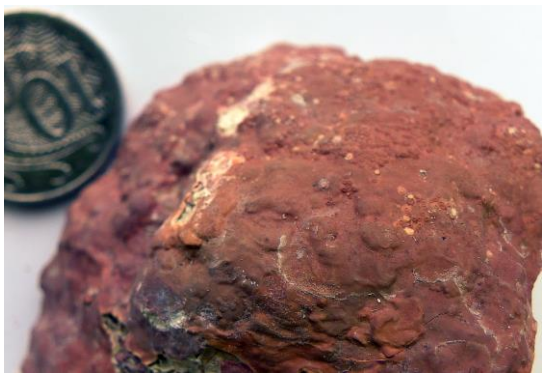


Fig. 40: *Mesophyllum macroblastum* showing layered flat lobes

14c. PLANTS ARE PEBBLE- OR BOULDER-LIKE

Fig. 41: *Sporolithon durum* with a lumpy surface

Fig. 42: the lumps of *Sporolithon durum* magnified, showing sunken patches of spores

Fig. 43: *Lithophyllum corallinae* with knobby, branched ridges similar to animal coral

Fig. 44: the porous *Spongites hyperellus* can form boulder-sized masses of tall branches

Fig. 45: the tall branchesand porous nature of *Spongites hyperellus* are exposed in broken surfaces of the plants

Fig. 46: *Neogoniolithon brassica-florida* with intermediate-sized bumps

CORALLINE LOOK-ALIKES

Unfortunately, another unrelated genus – *Rhodopeltis* - also has chalky or limey deposits in its tissues and is segmented like the articulated red coralline algae, but has a prominent mid-vein

Figs 47 48: two views of *Rhodopeltis* at different scales

Two other groups – the Families Hildenbrandiaceae and Peyssonneliaceae - encrust rocks and may be confused with encrusting red coralline algae, but they do not produce knobby or crater-like reproductive structures

Go to the separate fact sheets for each of these Families for further information

Fig. 49: *Hildenbrandia rubra*

Fig. 50: *Hildenbrandia lecannellieri*

Generally:
The members of the Hildenbrandiaceae (Figs 49-52) have no limey material, and are red or dark red rather than pinkish like the corallines.

Fig. 51: *Hildenbrandia crouaniorum*

Fig. 52: *Hildenbrandia patula*

The members of the Peyssonneliaceae (Figs 53-55) have some lime, but are dark red to red-brown in colour.

Fig. 53: *Peyssonnelia dubyi* on a shell

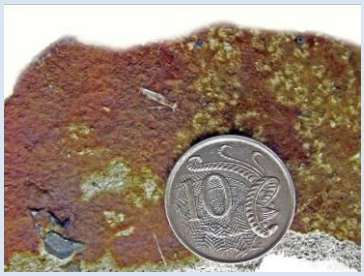


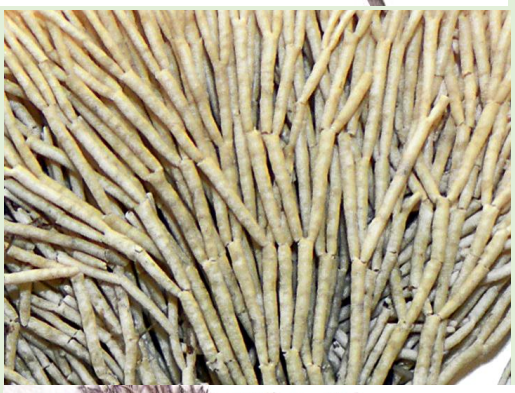
Fig. 54: *Peyssonnelia splendens*

Fig. 55: *Peyssonnelia boudouresquei*

Groups of the Order: Nemaliales also have limey representatives. Go to the Fact Sheets for members of these Families for further information.

Dichotomaria obtusata has flat segments when dried, and is pink in colour similar to *Amphiroa*. Internally, it has a completely different anatomy, and does not produce stony, pustule-like female structures.

Tricleocarpa cylindrica is a rare plant from Rottnest I., WA that looks like a large *Jania* species, but is structurally and reproductively different



Liagora has a chalky surface but the branches are flexible and plants do not produce stony, pustule-like female structures.

References:

- Edgar, G.J., 2008. **Australian Marine Life: the plants and animals of temperate waters**. **2nd Edition**. Reed, Victoria.
- Womersley, H.B.S., & Johansen, H.W. **in** Womersley, H.B.S 1996. **The Marine Benthic Flora of Southern Australia. Part III.** Govt. Printer, S. Australia