The genus *Sargassum*

Fifteen species of this large brown algal genus were recorded by Womersley for southern Australia; there is also a new species (*S. kendrickii*) not found in the Marine Flora. Some species are endemic (found nowhere else). They form the perennial canopy layer of many shallow water marine communities, providing food and refuges for invertebrates and fish, and changing the microclimate of understorey plants and animals. They can be used by ecologists to determine the health of ecosystems.

Correct identification must necessarily rely on reproductive structures (receptacles), however, these are not always present on specimens. For this reason, the key below attempts to separate species largely on vegetative shape in the hope you can make a quick, but tentative identification, then go to the more technical descriptions, found in the Marine Flora, for verification. Commonest or more easily recognised species are therefore generally treated first.

**Recent reclassification**

Using DNA differences for 3 different gene sources, Dixon et al have been able to reclassify Australian species in the Family: Sargassaceae. The key below, however, retains the names found in Womersley’s Marine Flora so that information about identification based on shape and structure can be found more easily. New combinations of names are placed in brackets.

**Scale and artefacts**

The 10c piece in the images below is 24 mm across or almost 1 inch in diameter. Pressed specimens may distort slightly and are often darken in colour.

**BASIC SHAPES (MORPHOLOGY) OF SARGASSUM**

**Types of axes**

**Upper parts: types of laterals**

vegetative “leaves” and floats (*S. distichum*)

thread-like ultimate branchlets (ramuli) (*S. sonderi*)

tiny, fertile branchlets (receptacles) (*S. spinuligerum*)

branchlets (receptacles) with pits containing eggs and/or sperms (*S. sonderi*)

**Basal parts: types of laterals**

divided “leaves”

un-divided “leaves”

thread-like and obscurely divided laterals

*Dixon, R.R.M., et al (2012)* A morphological and molecular study of austral *Sargassum* (Fucales, Phaeophyceae) supports the recognition of *Phyllorhiza* at the genus level, with further additions to the genus *Sargassopsis*. J. of Phycol. 48 (5) 1119-1129
KEY TO SARGASSUM SPECIES BASED ON SUPERFICIAL FEATURES

1a. the upper reproductive part of plants is rarely seen; the common basal, vegetative part is branched like a candelabra from a stumpy stipe roughened with stiff stubs of denuded branches. Laterals may be slightly flattened in basal parts of the plant, but generally are wiry or thread-like. Figs 1-4. .......................................................... Sargassum (Phyllotricha) decipiens

1b. not as above. Basal laterals are often leaf-shaped, although sometimes they are narrow

2a. main branches (axes) flat, 5-10 mm wide, flanged (winged). Laterals leaf-shaped, from the edges of axes, narrow towards the plant tip. Floats 3-6 mm in diameter, on prominent stalks. Probably a sub-tropical relict species with a western distribution, only drift plants reaching Adelaide shores. Figs 5-8. .......................... Sargassum (Sargassopsis) decurrens

2b. main branches (axes) compressed or angular or 3-sided or cylindrical, not truly flanged, less than 10 mm wide

3a. basal laterals leaf-shaped, divided, and flat-branched (branched in one plane); axes compressed or angular or cylindrical; floats (if present) are small, 1-3 mm in diameter

3b. basal laterals usually undivided, broad and leaf-shaped; axes 3-sided, or angular to cylindrical; floats (if present) are large, 4-10 mm in diameter
4a. plant base is sturdy, up to 10 mm wide. Basal laterals are leaf-shaped with a broad central section 5-10 mm wide, and contrast markedly with upper fine, short ultimate branchlets (ramuli) that are irregularly branched. Figs 9-11.

\[\text{Sargassum (Sargassopsis) heteromorphum}\]

![Fig. 9: detail of a basal lateral (divided “leaf”) with broad parts](image)

![Fig. 10: detail of upper parts, with small floats, and fine, irregularly branched upper laterals (ramuli)](image)

4b. plant base is relatively thin, usually <10 mm wide. Basal laterals have a narrow central part, usually < 5 mm wide, and either rapidly change or gradually merge in width into narrow ultimate branchlets (ramuli) towards plant tips ................................................................. 5.

5a. plant base is cylindrical and flexuous ....................................................... 6.

5b. plant base is compressed and stiff ............................................................ 7.

6a. stubs of denuded laterals point downwards (retroflex), leafy laterals have smooth edges; upper laterals are hair-like, floats are usually present. Figs 12-14. ................. Sargassum (Phyllotricha) verruculosum

![Fig. 11: Sargassum heteromorphum, whole plant](image)

![Fig. 12: basal laterals with narrow, divided parts, axes loosely zigzag, stubs of denuded laterals pointing](image)

![Fig. 13: upper parts, floats and hair-like ultimate branchlets (ramuli)](image)

6b. stubs of denuded laterals point outwards or upwards, leafy laterals have serrated edges; floats are absent. A species with western distribution only. Figs 15-18. ........................................ Sargassum (Sargassopsis) kendrickii

(a new species, not described in the Marine Flora)

![Fig. 14: Sargassum verruculosum, whole plant, divided narrow basal laterals, hair-like upper laterals, flexuous main branches (axes)](image)

![Fig. 15: upper, unbranched, narrow ultimate branchlets (ramuli) with serrated margins](image)

![Fig. 16: basal, leafy, flat, branched laterals with serrated margins (above, left)](image)

![Fig. 17: enlargement of marginal serrations (left)](image)

![Fig. 18: Sargassum kendrickii, whole plant](image)
axis to 6 mm wide, **knobby**, with prominent, lumpy stubs of denuded laterals. Laterals are divided into **narrow** (linear) branches at the plant base then grade **gradually** towards the plant tips into **fine**, long, hair-like branchlets (ramuli). Floats (if present) are **small**, 1-2 mm in diameter. Figs 19-22.

**Sargassum (Phyllotricha) sonderi**

Fig. 19: knobby axis

7a. axis 2-5 mm wide, with stubs of denuded laterals pointing **downwards** (retroflex). Young **basal** laterals at first undivided, soon dividing into **lance-shaped** opposite branches 2-6 mm wide; upper laterals (ramuli) narrow; there is a **sharp change** in size between basal and upper laterals towards the plant tip. Floats **large**, 3-6 mm in diameter, sometimes with a long apical thread. Figs 23-26.

**Sargassum (Phyllotricha) varians**

7b. axis 2-5 mm wide, with stubs of denuded laterals pointing **downwards** (retroflex). Young **basal** laterals at first undivided, soon dividing into **lance-shaped** opposite branches 2-6 mm wide; upper laterals (ramuli) narrow; there is a **sharp change** in size between basal and upper laterals towards the plant tip. Floats **larger**, 3-6 mm in diameter, sometimes with a long apical thread. Figs 23-26.
8a. axes 3-sided, basal laterals leaf-shaped, usually dark brown, markedly larger than those of fertile (deciduous) upper parts

8b. axes not 3-sided, basal laterals usually lighter brown, leaf-shaped or linear, slender and similar to those on upper parts

9a. “leaves” with varying degrees of incised or notched edges at the plant base, narrowing in width gradually towards the plant tip, where they are always deeply incised. Figs 27-29.

Sargassum lacerifolium

9b. “leaves” at the plant base not notched or incised but some with tiny marginal spines. There is a marked and immediate change above the plant base to narrow “leaves” that are not markedly incised

10a. basal “leaves” large, wavy, 20-30 mm wide, margins with varying numbers of tiny spines, upper ultimate “leaves” (ramuli) narrow and sparsely notched or with few spines. Figs 30-34.

Sargassum paradoxum

10b. basal leaves smaller, 5-15 mm wide, smooth (not wavy), often without spines, upper ultimate branchlets (ramuli) narrow, threadlike or cylindrical, spines absent

for confident identification of species in the next steps, fertile upper parts with receptacles are needed

11a. laterals arise **downwards** (retroflex) ................................. 12.

11b. laterals arise at right angles or upwards. Upper ultimate branchlets (ramuli) leafy, but **narrow** and **flat**, floats are absent or when present, 4-8 mm long and egg-shaped. Restricted to SE waters. Figs 35-38. ............................... **Sargassum vestitum**

12a. upper ultimate branchlets (ramuli) **threadlike**, about 1mm wide but lost as the branch ages, floats are **spherical** with an apical point and up to 10 mm in diameter. A common species in rock pools but also at depth. Figs 39-42. ............................... **Sargassum fallax**

12b. upper branchlets (ramuli) **flat, narrow** but **leaf-shaped**, up to 5 mm wide, **distinct** from the wide basal “leaves”. Floats absent or few, 3-6 mm in diameter when present. Figs 43-45. ............................... **Sargassum tristichum**
13a. all laterals linear (narrow with parallel sides), largely undivided, dark brown with few marginal spines. Plants widespread, often in rock pools and shallow rough water. Figs 46-49. Sargassum linearifolium

13b. lower “leaves” lance-shaped with serrated edges, light brown.

14a. plants loosely-branched, laterals distinctly serrate (“holly-leaved”). Side branches generally occur in 2 rows from the edge of thin, angular axes, although more radially towards tips. Figs 50-52. Sargassum distichum

14b. plants more densely tufted, branching pattern radial, “leaves” less distinctly serrate

Identification of species in the next steps requires fertile upper parts with receptacles. They may in future prove to be variations of a single species.
15a. lower “leaves” 35-70 (-120) mm long and 5-12 mm wide; upper “leaves” with few marginal spines, 10-50 mm long and 0.5-7.0 mm wide. Fertile branchlets (receptacles) warty, spines few or only tiny.
Figs 53-56. ................................................................. *Sargassum spinuligerum*

Fig. 53: basal, “leaves”, elongate-lance-shaped laterals with few spines on edges
Fig. 54: elongate-lance-shaped upper “leaves”, dense clusters of fertile branchlets
Fig. 55: cluster of warty, dried, fertile branchlets (receptacles) (left)
Fig. 56: *Sargassum spinuligerum*, whole plant

15a. lower “leaves” 10-40 mm long, and 3-5 mm (to 8mm) wide, upper “leaves” more regularly edged in spines, 10-20 mm long and 1-3 mm wide. Fertile branchlets (receptacles) only slightly warty, but possess several large spines.
Figs 57-59. ................................................................. *Sargassum podacanthum*

Fig. 57: upper leaves distinctly serrated
Fig. 58: preserved (bleached) fertile branchlets (receptacles), several large spines (arrowed)
Fig. 59: *Sargassum podacanthum*, whole plant

State Herbarium of South Australia. flora.sa.gov.au/algae_revealed
Cystoseira (Sirophysalis) trinodis

- Ultimate branches (ramuli) thin but compressed
- Floats thin, compressed, embedded in ultimate branches (ramuli) often pinched along their length
- Sterile plants can be recognised from the numerous branch stubs on denuded main axes
- Main axes bunched from a common base

Caulocystis cephalornithos — floats spindle-shaped (narrowed at both ends)

Caulocystis uvifera — floats spherical*

Some workers consider this to be merely a single species (C cephalornithos) with variation in float shape

Caulocystis — floats attach directly to the main axis

Acrocarpia robusta
- W Australia only

- Fertile ultimate branches cylindrical but bumpy and densely bunched

Acrocarpia paniculata

- Wiry axes arise from a stumpy base.
- Axes often covered with encrusting red algae

Acrocarpia — spirally arranged ultimate branches (ramuli). Floats absent

Cystophora — no leaf parts; stubs of side branches often point downwards and give the axis a zigzag appearance; terminal thread absent on floats

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