PICTURED KEY TO SOME SOUTHERN AUSTRALIAN ALGAE: SPHACELARIA (including HERPODISCUS)

What are they?
Fifteen species of Sphacelaria are found in southern Australia, commonly growing on sea grasses and Brown algae. They have:
- brown, stiff, upright threads or filaments in tufts, only about 10 mm tall
- prominent tip cells when growing actively (see Fig. 4)
- lines of cells dividing lengthwise forming prominent bands along threads.
2 types of spore sacs on different plants may be present

Purpose of the key
Formal classification of algae relies on investigating microscopic reproductive features in detail. Often a complete set of reproductive stages is unavailable in the specimens to be investigated, making identification very difficult if the technical systematic literature is used. Fortunately some algae grow in specific places and some have recognisable shapes that allow them to be sorted 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 searching for a name. Then you can proceed to the appropriate fact sheets or further keys to refine your identification.

Limitations
Unfortunately, microscopic investigation will be needed for definite identifications.

Images used below
These come from pressed specimens or the extensive slide collection of the algal unit, State Herbarium of S Australia, 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.

Scale
The coin used as a scale is 23 mm or almost 1” across

Recent name changes
Classification of species in the Flora has been retained below as it relies solely on shape and anatomy of plants. Recent name changes made on the basis of genetic markers and life cycles are annotated § and the new names listed in the appendix.

1a. rare, known from plants attached to Cystophora botryocystis at Brighton Victoria. Branching in 2 opposite rows. Figs 1-3. see also the separate information sheet
.................................Sphacelaria spuria§

1b. branching forked, radial or irregular
.................................2.

2a. filaments ≤ 25μm across, plants usually ≤10mm tall ....................... 3.

2b. filaments >25μm across, plants usually >10mm tall ....................... 7.

3a. cells divide across, forming brick-like patterns within the filament bands of cells (as in Fig. 2.); dark cells (pericysts) present
.................................4.

3b. cells divide across rarely or not at all; dark cells (pericysts) absent
.................................6.

4a. rare, only known on Platythalia angustifolia, WA. Figs 4-7. see also the separate information sheet
.................................Sphacelaria multiplex§

4b. more common and widespread, on larger Brown algae, some on seagrasses ....................... 5.
5a. plants form dense, light-brown patches on *Carpoglossum confluens*. From West Coast SA to Tasmania. Figs 8-11.

.............. *Sphacelaria carpoglossi*§

5b. plants form patches 1-3mm across on *Cystophora* spp. From near Pt Lincoln SA to Tasmania. Figs 12-14.

.............. *Sphacelaria bracteata*§

6a. plants form patches 1-3mm across on *Cystophora* spp. From near Pt Lincoln SA to Tasmania. Figs 12-14.

.............. *Sphacelaria bracteata*§

6b. rare. Plants form dense “turfs” 2-3mm tall, probably exclusively on *Cystophora monilifera*. From Rottnest I and near Busselton WA. Figs. 15-18.

see also the separate information sheet

.............. *Sphacelaria chorizocarpa*

7a. cells divide across, forming brick-like patterns within the filament bands (as in Fig. 2.); dark cells (pericysts) present ........................ 8.

7b. cells divide across rarely or not at all; dark cells (pericysts) absent; propagules (short 2- or 3-armed branches on stalks) found usually in summer are needed for confident species identification in this section of the key ............................... 9.
8a. plants densely tufted tall; branching forked or alternate; many-compartmented spore sacs on numerous short side branches at right angles to filaments. A New Zealand species found only on a drift Cystophora monilifera plant at Aldinga SA, but possibly more widespread. Figs 19-21. 
.......................... Sphacelaria implicata§

8b. plants form small clumps 2-6mm tall; branching radial or irregular, main filaments with short side branches; many-compartmented spore sacs on short side branches at acute angles to filaments. From upper Spencer Gulf SA to Tasmania usually on Cystophora spp. Figs 22-24.

............................. Sphacelaria reinki§

9a. plants form a low turf on rock, rarely grow on seagrasses

.................................................. 10.

9b. plants usually grow on large algae or seagrasses

.......................................................... 11.

10a. maximum of 2-3 cells seen in side views of filament bands; propagules (short-armed branches on stalks, found usually in summer) triangular, 2(-3) Armed, apex arms may initially bear a hair. Figs 25-27.

............................. Sphacelaria tribuloides

10b. maximum of 4-5 cells seen in side views of filament bands; propagules with 2 rounded arms. Figs 28-30.

............................. Sphacelaria brachygonia

Fig. 19. Sphacelaria implicata: forked filaments, numerous side branches bearing sporangia

Fig. 20. Sphacelaria implicata: filament bands (bracketed) with cells dividing across; dense pericysts

Fig. 21 Sphacelaria implicata: spore sacs on numerous short side branches at right angles to filaments

Fig. 19. Sphacelaria implicata: filament bands (bracketed) with cells dividing across; dense pericysts

Fig. 20. Sphacelaria implicata: forked filaments, numerous side branches bearing sporangia

Fig. 21 Sphacelaria implicata: spore sacs on numerous short side branches at right angles to filaments

Fig. 22: Sphacelaria reinki on Cystophora xiphocarpa

Fig. 23. Sphacelaria reinki: pericysts (pcys) prominent

Fig. 24. Sphacelaria reinki: spore sacs on numerous short side branches at acute angles to threads

Fig. 22: Sphacelaria reinki on Cystophora xiphocarpa

Fig. 23. Sphacelaria reinki: pericysts (pcys) prominent

Fig. 24. Sphacelaria reinki: spore sacs on numerous short side branches at acute angles to threads

Fig. 25: Sphacelaria tribuloides

Fig. 26. Sphacelaria tribuloides: propagules in various aspects

Fig. 27. Sphacelaria tribuloides: prominent tip cell; hairs

Fig. 25: Sphacelaria tribuloides

Fig. 26. Sphacelaria tribuloides: propagules in various aspects

Fig. 27. Sphacelaria tribuloides: prominent tip cell; hairs

Fig. 28-30: Sphacelaria brachygonia

Figs 29, 30. Sphacelaria brachygonia two magnifications of propagules; prominent tip cells

Fig. 28-30: Sphacelaria brachygonia

Figs 29, 30. Sphacelaria brachygonia two magnifications of propagules; prominent tip cells

Pictured key: Sphacelaria; “Algae revealed”, R N Baldock, State Herbarium SA; November 2014
11a. maximum width of mature filaments 25-30μm; plants, rarely on rock, form dense tufts on *Myriodesma harveyanum*; propagules (short-armed branches on stalks, found usually in summer) triangular, the two arms of mature propagules have prominent tip cells with angular internal walls. A Noumea species (on *Turbinaria*), found from the West Coast to Kangaroo I. SA, but possibly more widespread. Figs 31, 32.

......... *Sphacelaria novae-caledoniae*

11b. maximum width of mature filaments >25μm; plants on seagrass and large Brown algae, occasionally on rock

...................................................... 12.

12a. propagules triangular, arms short and rounded or shortly conical. Figs 34-36.

......... *Sphacelaria novae-hollandiae*

From Indian, Atlantic & Pacific Ocean tropical waters, Rottnest I. WA to near Adelaide SA.

12b. propagules thin, arms 2-3, relatively thin and long ....................... 13.

13a. maximum of 5-8 cells seen in side views of filament bands that are stubby (L:B ≤1); propagule arms 2, produced simultaneously, pinched basally, propagules often with a terminal hair. Figs 37-39.

......... *Sphacelaria biradiata*

Common, on large algae and seagrasses from SW WA to Tasmania

13b. cell bands with max. of 5 cells across, L:B >1 ................... 14.

---

**Fig. 31** *Sphacelaria novae-caledoniae*: dense tufts on upper parts of dark fronds of *Myriodesma harveyanum*

**Fig. 32** *Sphacelaria novae-caledoniae*: multi-compartmented spore sac

**Fig. 33** *Sphacelaria novae-caledoniae*: propagules: the two arms of the mature (LHS) propagule have prominent tip cells with angular internal walls (arrowed)

**Fig. 34** *Sphacelaria novae-hollandiae*

**Fig. 35** *Sphacelaria novae-hollandiae*: branching pattern; propagule

**Fig. 36** *Sphacelaria novae-hollandiae*: propagule

**Fig. 37** *Sphacelaria biradiata* on a blade of the seagrass *Posidonia*

**Fig. 38** *Sphacelaria biradiata*: cell bands with 5-8 cells seen in side views

**Fig. 39** *Sphacelaria biradiata*: three propagules with prominent terminal hairs

Pictured key: *Sphacelaria*; “Algae revealed”, R N Baldock, State Herbarium SA; November 2014
14a. filaments about the same width throughout the plant, maximum of 30-40μm wide, most branches reaching the same height; propagules thin, arms linear ≈ length of the stalk. Figs 40-44.

……………… Sphacelaria rigidula
Commonest species in southern Australia on Brown algae and rock in intertidal pools, but also worldwide in temperate seas

14b. filaments broader towards the plant base, maximum of 40-80μm wide, branches consisting of continuously growing ones and shorter side branches; propagules with 3 (2-4) arms.

………………………………….. 15.

15a. short branches usually spreading; propagule arms usually 3, produced successively, slightly pinched at the base. Figs 45-48.

……………… Sphacelaria cirrosa
Widespread in temperate and subtropical seas; from Fremantle, WA to Port Jackson NSW, on large algae and seagrasses.

15b. branching radial or irregular; propagule arms usually 3, slender, narrow. Figs 49-51.

………………… Sphacelaria fusca
Widespread in temperate seas; and from SW WA to Victoria on stalks of Caulocystis and seagrass blades

Pictured key: Sphacelaria; “Algae revealed”, R N Baldock, State Herbarium SA; November 2014
APPENDIX:

| Sphacelaria bracteata | Herpodiscus bracteatus (Reinke) Draisma, Prud’homme & H. Kawai |
| Sphacelaria carpoglossi | Herpodiscus carpoglossi (Womersley) Draisma, Prud’homme & H. Kawai |
| Sphacelaria implicata | Herpodiscus implicatus (Sauvageau) Draisma, Prud’homme & H. Kawai |
| Sphacelaria multiplex | Herpodiscus multiplex (Womersley) Draisma, Prud’homme & H. Kawai |
| Sphacelaria reinki | Herpodiscus reinkei (Sauvageau) Draisma, Prud’homme & H. Kawai |
| Sphacelaria spuria | Herpodiscus spurius (Sauvageau) Draisma, Prud’homme & H. Kawai |

SPHACELARIA LOOK ALIKES

Members of the Families Stypocaulaceae and Cladostephaceae also have prominent tip cells that produce branched threads with bands of cells. They generally grow as relatively large plants on rock, often producing turfs in shallow waters.

In these Families, a sheath (cortex) of small cells develops, obliterating the original bands of cells.

Family: Stypocaulaceae
Halopteris

- 5 species
- filaments sheathed (corticated) with small, box-shaped cells (arrowed)

Phloiocaulon

- 2 species
- filaments initially sheathed (corticated) with small, box-shaped cells, later infiltrated with numerous rhizoids forming a wide outer layer of equal-sized cells

Family: Cladostephaceae
Cladostephus spongiosus

- sheathed with small, box-shaped cells
- main branches densely ringed with short side branches