HYDROIDS OF BRUNY ISLAND, SOUTHERN TASMANIA

by JEANETTE E. WATSON*

Summary

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A systematic collection of the sublittoral hydroids of Bruny Island, southern Tasmania, using SCUBA, yielded 34 species, including three newly described, three new records for Australian waters and 11 new records for Tasmania.

Most Haleciidae, including two new species, are epizoic, occupying sheltered microhabitats. Few species of Sertulariidae are recorded, and *Amphisbetia operculata* is now rare in a former habitat. The Plumulariidae is represented mainly by small epiphytic forms, and *Plumularia angusta*, *P. crateriformis* and *P. wilsoni* are recorded for the first time from one locality. Two species newly described, *Halecium bruniensis* and *H. luteum*, are each closely related to endemic New Zealand species. The occurrence of these, and the first record of *Salacia farquhari* outside New Zealand waters (where it also occurs south of 43°S) suggests active progress of speciation and dispersal across the Tasman Sea.

Introduction

Bruny Island (43°25'S, 140°20'E) is situated off the east coast of Tasmania, 25 km south of Hobart. The island is approximately 50 km long and is separated from the Tasmanian mainland by the narrow waters of the D'Entrecasteaux Channel. The indented coastline of Bruny Island provides a range of environmental conditions varying from the sheltered but swift flowing tidal waters of the D'Entrecasteaux Channel to the rough-water eastern coastline of Adventure Bay and Penguin Island, open to the Tasman Sea.

Systematic collecting of the sublittoral hydroid fauna was undertaken during two weeks in February, 1972. Sampling, using SCUBA equipment, was carried out over the entire depth range (0–20 m) presented by the rocky sublittoral along the coastline at Satellite Island, Great Taylor Bay, Simpsons Bay, the adjacent D'Entrecasteaux Channel, and at Fluted Cape, Penguin Island and Adventure Bay on the eastern coastline of Bruny Island.

No collection was made of hydroids from the littoral zone, as these localities comprise either steep rocky cliffs facing the Tasman Sea or the sandy beaches of the D'Entrecasteaux Channel. It is unlikely that either of these biotopes would make any significant contribution to the hydroid fauna of Bruny Island.

In his revision of the hydroid fauna of Tasmania, Hodgson (1950) listed 64 species known from the deep and shallow waters of the Tasmanian coast and Bass Strait. His list includes 22 species from the D'Entrecasteaux Channel and the adjacent Derwent Estuary, and one species from Adventure Bay.

The present survey yielded 34 species (including two identifiable only to genus) and 2 varieties of one species. There are 11 new records for Tasmania, including 3 new records for Australia, and 3 species are newly described. Only 19 species of Hodgson's list appear in the present collection.

Holotype and paratye microslides of new species, and other microslides and material, are lodged in the National Museum of Victoria, Melbourne (referred to as NMV).

No athecate hydroids were recorded from Bruny Island. The Campanulariidae is represented by 5 species, Lafoeidae by 1, Haleciidae 6, Syntheciidae 1, Sertulariidae 9, and the Plumulariidae by 12 species, including 2 varieties of one species.

LIST OF SPECIES

* Denotes a new record for Tasmania
† Denotes a new record for Australia

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THECATA

Family CAMPANULARIIDAE

* *Campanularia ambiplica* Mulder & Trebilcock.
* *Campanularia pulcratheca* Mulder & Trebilcock.
Clytia sp.
Orthopyxis caliculata Hincks.
Silicularia rosea Meyen.

Family LAFOEIDAE

* *Hebella ?furax* Millard.

Family HALECIIDAE

Halecium delicatulum Coughtrey.
Halecium sp.
* *Halecium beanii* (Johnston).
Halecium bruniensis n.sp.
Halecium luteum n.sp.
Phylactotheca armata Stechow.

Family SYNTHECIIDAE

Synthecium patulum Busk.

Family SERTULARIIDAE

* *Salacia farquhari* (Bale).
Stereotheca elongata (Lamouroux).
Sertularella robusta Coughtrey
Symplectoscyphus pygmaeus Bale.
Sertularia acuta (Stechow).
* *Sertularia macrocarpa* Bale.
Amphisbetia minima var. *intermedia* Bale.
Amphisbetia operculata (Linnaeus).
Amphisbetia avia n.sp.

Family PLUMULARIIDAE

Halicornopsis elegans (Lamarck).
* *Antenella campanuliformis* (Mulder & Trebilcock).
Pycnotheca mirabilis var. *mirabilis* (Allman).
Halopteris campanula var. *campanula* (Busk).
Plumularia filicaulis Kirchenpauer.
* *Plumularia hyalina* Bale.
* *Plumularia angusta* Stechow.
* *Plumularia crateriformis* Stechow.
* *Plumularia wilsoni* Bale.
Aglaophenia plumosa Bale.
Thecocarpus divaricatus var. *typica* (Busk).
* *Thecocarpus divaricatus* var. *briggsi* Bale.
Halicornaria longirostris (Kirchenpauer).

Systematic Section

Family **CAMPANULARIIDAE**

Campanularia ambiplica Mulder & Trebilcock, 1914a: pl. 2, figs 3, 4. Shepherd & Watson, 1970: 140.

Paracalix ambiplica Stechow, 1925: 209, fig. E.

Record: Penguin I., on a red alga and sponge in crevices on rough-water side of island, 16–20 m deep.

Material: Colonies infertile. Hydrothecae with 7 fairly sharp teeth, the embayments between wider than the teeth.

Remarks: Although occurring on the rough-water side of the island, this small delicate species occupied a microhabitat in sheltered crevices at a depth below turbulence due to surge.

This is the first record of *C. ambiplica* from Tasmania. Other localities: Victoria; Champion Bay, W. Aust.

Campanularia pulcratheca Mulder & Trebilcock, 1914a: 11, pl. 2, figs 1, 2. Blackburn, 1942: 105.

Paracalix pulcratheca (Mulder & Trebilcock, 1914a). Stechow, 1923a: 3.

Record: Satellite I. (no depth recorded), on red alga *Delisea*.

Material: Colonies infertile. *Hydrorhiza* tubular. *Stems* 0.83–1.33 mm long, 0.06–0.09 mm diam., perisarc thick, a spherule between stem and hydrotheca. *Hydrothecae* long and tubular, perisarc thickening distally, a distinct diaphragm near base and a flexure almost two-thirds the distance up the hydrothecal wall from the base. *Margin* with 8-10 teeth. Diam. of hydrotheca at margin 0.32–0.41 mm, depth to diaphragm (including teeth) 0.77–0.92 mm.

Remarks: The Tasmanian material compares well with the holotype of *C. pulcratheca* (in NMV), although the present specimens have fewer marginal teeth.

This is the first record of *C. pulcratheca* from Tasmania. Other localities: Victoria; S. Aust.

Clytia sp.

FIG. 1

Record: Adventure Bay, 10 m deep on stem of *Thecocarpus divaricatus* var. *typica*.

Material: A few infertile stems. *Stems* of variable length, 0.70–1.90 mm, irregularly undulated, in some places smooth. *Hydrothecae* campanulate, expanding from base to margin, perisarc fairly thick, and a well defined diaphragm with a thickening of the thecal wall below. Depth to diaphragm 0.30–0.40 mm. A small spherule between hydrothecae and pedicel. *Margin* 0.20–0.32 mm diam., with 12 bluntly pointed teeth, the embayments between slightly wider than the teeth.

Remarks: The hydrotheca of this relatively small species corresponds in some respects with *C. hemisphaerica* (Linnaeus, 1767), but the stem lacks the typical proximal and distal annulations of this species. In the absence of gonosome it is not possible to further identify the material.

Orthopyxis caliculata (Hincks, 1853). Bale, 1914b: 74, Pl. 11, fig. 1, pl. 12, fig. 1;

1924: 232. Hodgson, 1950: 7, figs 14-16. Shepherd & Watson, 1970: 140.

Campanularia caliculata Hincks, 1853: 178, pl. 5, fig. 5.

Eucopella caliculata (Hincks). Hirohito, 1969: fig. 6.

Record: Penguin I., 15–20 m deep, on a red alga and on sponge in a crevice.

Material: A few fertile colonies. *Hydrothecae* very shallow and expanding; hydrothecal pedicels spirally annulated, a few with smooth regions. *Hydranth* with 24 tentacles. *Gonotheca* smooth with thick perisarc, containing mature gonophores.

Remarks: The specimens from sponge possess longer pedicels and have a thinner perisarc than those epiphytic on algae.

O. caliculata was not abundant at Bruny Island, occurring only in a sheltered crevice on the rough-water side of the island at a depth below major turbulence. This accords with previous findings on habitat preferences of this species (Shepherd & Watson 1970; Watson 1973).

Silicularia rosea Meyen, 1834: 204, pl. 35, figs 1–11. Millard, 1968: 259.

Silicularia bilabiata (Coughtrey, 1875). Ralph, 1957: 842.

Eucopella campanularia von Lendenfeld, 1883, Bale, 1888: 751, pl. 13, figs 9–15.

Silicularia campanularia (von Lendenfeld, 1883). Hodgson, 1950: 6, figs 12, 13.

Record: Fluted Cape (no depth recorded) on the brown algae *Seirococcus axillaris* and *Scytothalia dorycarpa*.

Material: Luxuriant fertile male and female colonies on the algae. Developing gonophores present.

Remarks: The present material conforms to descriptions given by Ralph (1956, 1957) for *Silicularia bilabiata* forma *subtropica* (demonstrated by Millard (1968) to be a synonym of *S. rosea* Meyen), a form occuring only north of the Subtropical Convergence, and typical of the southern Australian coastline, including Tasmania.

Family LAFOEIDAE

Hebella ? furax Millard, 1957: 200, fig. 8; 1964: 10, figs 2B–D. Millard & Bouillon, 1973: 59.

FIG. 2

Record: Penguin I., on stem of *Thecocarpus divaricatus* var. *typica*, depth 20 m.

Material: One small colony. *Hydrorhiza* a loosely winding tube. *Hydrothecae* large, campanulate, perisarc delicate, smooth. Hydrotheca asymmetrical, one side convex, the other straight or slightly concave, this side always inclined to the hydroid host. *Margin* entire, with a thin slightly everted rim. Pedicel of variable length, perisarc thick, strongly undulated to smooth, widening distally to pass into base of hydrotheca below diaphragm. Immature hydrothecae truncated with a thin cap-like operculum.

Dimensions (mm):	Bruny I.	South Africa
Hydrotheca—		
depth to diaphragm	0.80–0.92	0.74–0.84
diam. at margin	0.50–0.68	0.55–0.65
diam. at diaphragm	0.14–0.18	0.22–0.28
Pedicel		
length from diaphragm	0.20–0.29	0.52–0.72
minimum diam.	0.05–0.08	0.08–0.10

Remarks: Comparison of the Bruny I. material with paratype microslides of *Hebella furax* Millard from False Bay, South Africa (provided by Dr N. A. H. Millard) shows that although similar in shape to the South African specimens, the hydrothecae of the Tasmanian material are generally deeper and narrower at the diaphragm, lack the distinct thickening of the lower thecal wall, and have a more pronounced eversion of the margin than the South African specimens. However, in the absence of gonophores it is difficult to determine the specific status of hydroids of simple morphology, hence the present specimens are provisionally assigned to *H. furax*.

This is a new record for Australia.

Family HALECIIDAE

Halecium delicatulum Coughtrey, 1876a: 299; 1876b: 26, pl. 3, figs 4, 5, Ralph, 1958: 334, figs 11, 12 (synonymy).

Halecium flexile Allman, 1883: 11, pl. 5, fig. 2. Hodgson, 1950: 16, figs 25–27.

Records: Adventure Bay, Penguin I., Satellite I., on the kelp *Macrocystis pyrifera*, 2–7 m deep; Fluted Cape, 10 m deep, on *Thecocarpus divaricatus* var. *typica* (Busk).

Material: Luxuriant fertile colonies. *Stems* to 1 cm long, simple and branched. Many hydrophores with marginal replications; secondary hydrophores arising from the pedicel of primary hydrophores. Colonies dioecious with mature gonophores arising from proximal parts of stem and on hydrorhiza. Distal parts of blastostyle cap-shaped in both sexes. Colour, trophosome yellow, gonophore bright orange.

Remarks: Hodgson (1950) described and figured *H. flexile* Allman (= *H. delicatulum*)

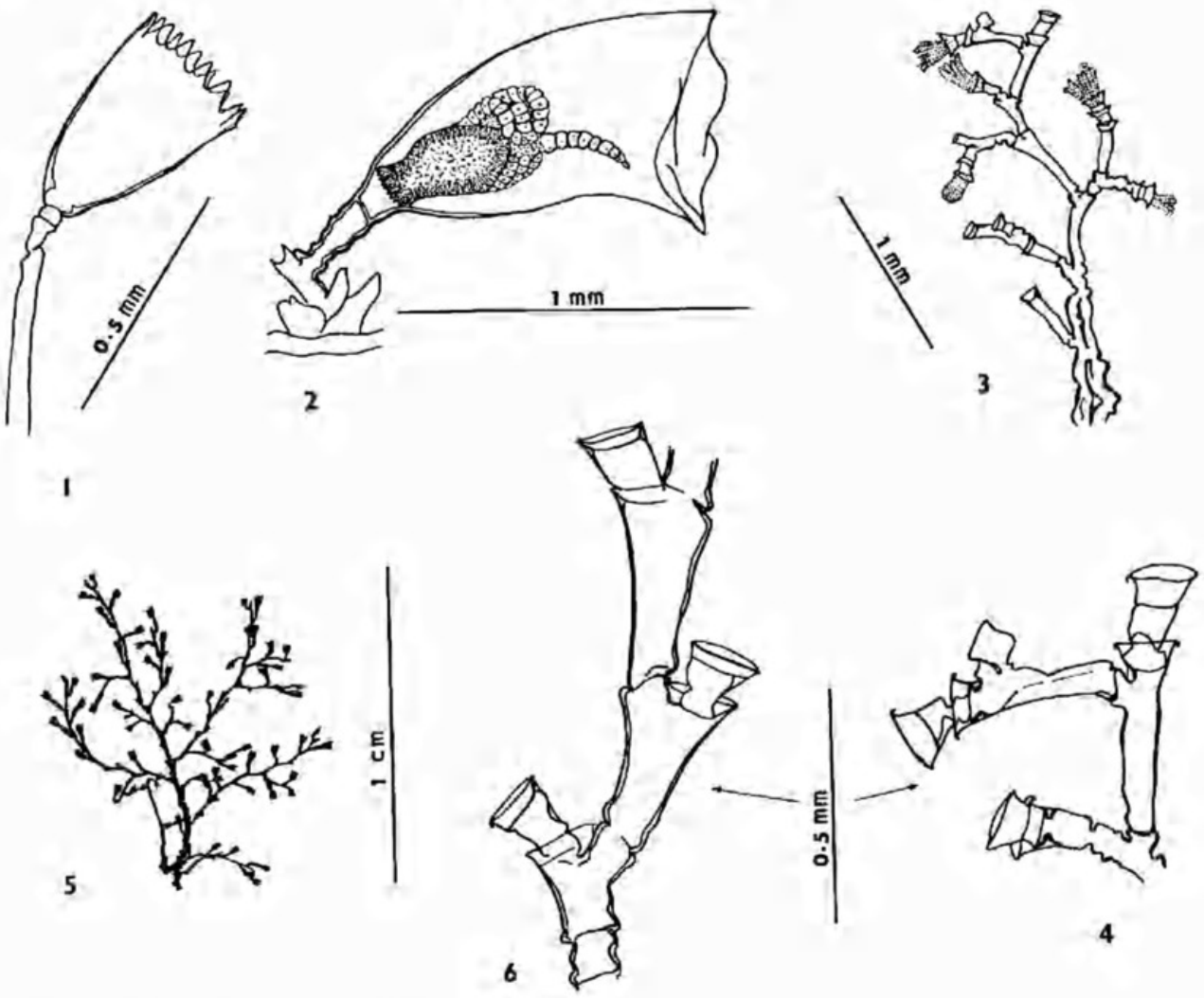


Fig. 1. *Clytia* sp, Hydrotheca.
Fig. 2. *Hebella ?furax* Millard. Hydrotheca epizoic on *Thecocarpus divaricatus*.
Figs 3, 4. *Halecium* sp. Fig. 3.—Whole colony. Fig. 4—Distal part of colony enlarged.
Figs 5, 6. *Halecium beanii* (Johnston). Fig. 5.—Whole colony. Fig. 6.—Part of stem showing hydrophores.

from Eaglehawk Neck, but did not record the substrate.

The colonies of *H. delicatulum* in the present collection, while very abundant on *Macrocystis* and other brown algae, were, however, strictly epizoic, always growing on the surface of the crustose bryozoan *Membrinopora membrinacea*, a common epiphyte on the aging fronds of *Macrocystis*.

Halecium sp.

FIGS 3, 4

Record: Penguin I., on a red alga in sheltered water, no depth recorded.

Material: One infertile stem. *Stem* 3 mm high, lightly fascicled at the base, branching irregularly sympodial. Stem internodes of variable length, 0.30–0.40 mm, narrow, perisarc fairly thick, with one proximal annulation and a distal apophysis giving rise to the succeeding internode. *Hydrophore* fairly deep, expanding to margin, slightly asymmetrical, adcauline wall more expanding than abcauline wall. Depth to diaphragm, 0.06–0.07 mm, depth to base of hydranth, 0.05–0.06 mm. *Margin* 0.12–0.14 mm diam., with a distinct outwardly rolled rim. *Diaphragm* concave, approximately 0.01 mm below line of attachment of hydranth, usually a strong thickening of the inner wall immediately below diaphragm, best seen in older hydrophores, often absent in younger terminal hydrophores. Punctae not visible; if present, obscured by hydranths. Pedicels of hydrophores of variable length; shorter pedicels usually annulated, longer pedicels smooth. Hydrophores regenerated 1–3 times, regenerated pedi-

cels often with a deep proximal constriction. *Hydranth* short and stubby, with approximately 14 tentacles.

Remarks: The single specimen from Bruny I. resembles *H. tenellum* Hinks, 1861, and *Halecium* sp. recorded from Pearson I. (Watson 1973, p. 167). However, *H. tenellum* is monosiphonic and the dimensions given by Millard (1957, p. 193) and Ralph (1958, p. 340) for *H. tenellum* are greater than those of the present material. The specimen from Pearson I., while similar in habit, is monosiphonic, the margin of the hydrophore is more everted, and the overall dimensions are smaller. Without adequate fertile material it is not possible to make a decision on the specific status or relationships of the specimen from Bruny I.

Halecium beanii (Johnston, 1838). Millard, 1957: 188; 1966: 464; 1968: 256, fig. 9A–F. Ralph, 1958: 332, fig. 10a, b, e–k.

FIGS 5, 6

Records: Adventure Bay (no depth recorded) on encrusting sponge on underside of the red alga *Sonderophycus australis:* Penguin I., 15 m deep, on sponge in crevice.

Material: Busby infertile colonies to 15 mm long. Proximal parts of the colonies fascicled, becoming monosiphonic distally, usually where regrowth has occurred from broken polysiphonic tubes. *Branching* irregular, occasionally tendrils given off distal ends of branches through the orifice of the terminal hydrophore. *Stem* internodes of variable length, 0.28–0.52 mm, narrowest at node, 0.08–0.12 mm, widening distally to 0.18–0.23 mm to accommodate hydrophore. Nodes distinct, with a slightly oblique slope alternately right and left, occasionally straight. *Hydrophores* alternate, shallow, saucer-shaped, adnate to internode, diam. at margin 0.12–0.14 mm. Diaphragm distinct, 0.02–0.04 below margin, tilted towards node, marked by a thickening of perisarc, a ring of punctae (frequently not well seen) above. *Secondary hydrophores* given off on a short pedicel from diaphragm of primary hydrophore, adcauline wall convex, abcauline wall straight or very slightly bulged. Body of hydranth delicate, with approximately 14–16 long filiform tentacles borne on a long peduncle, a deep constriction between peduncle and hypostome.

Remarks: Since the Bruny I. specimens conform to descriptions, and fall well within the range of dimensions given for *H. beanii* by Millard (1957) and Ralph (1958), the specimens, although infertile, are assigned to this species.

An unusual microhabitat is the epizoic growth on crustose sponge on the underside of the thick, plate-like thallus of *Sonderophycus*.

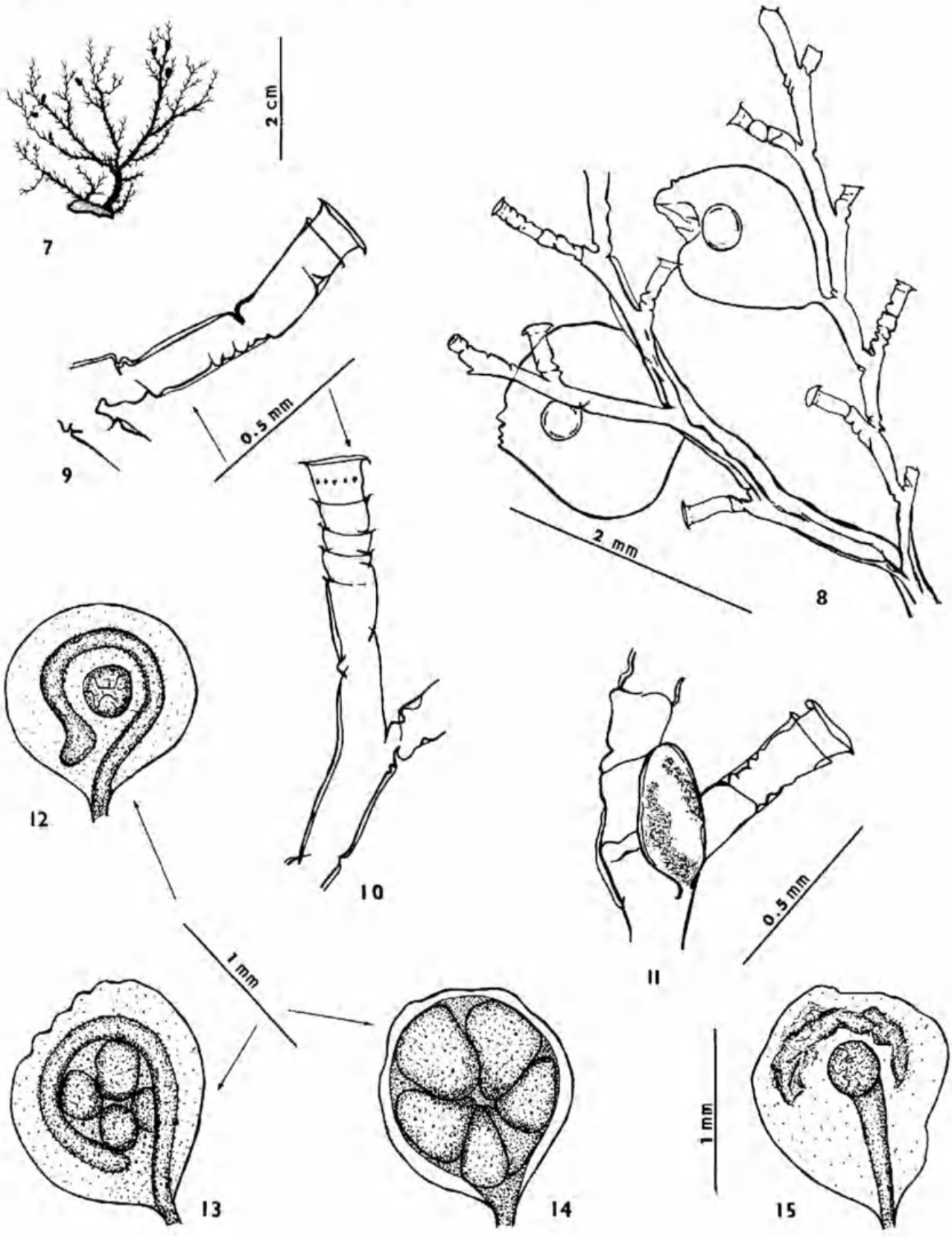
H. beanii is a cosmopolitan species, not previously recorded from Australian waters. It is rare at Bruny I.

Halecium bruniensis n. sp.

FIGS 7–15

Type material and records: Holotype, NMV, G2494–microslide; G2495–preserved material, remainder of holotype colony; Penguin I., 20 m deep, on sponge and bryozoa in crevice.

Description from holotype: Erect stem 3 cm high, growth habit arborescent, in one plane, stems sparingly fascicled at base, woody, the polysiphonic tubes running up stem, forming the branches. *Branches* monosiphonic distally, with markedly sympodial growth. *Stem* internodes of ultimate branches of fairly constant length, 0.48–0.64 mm, narrower proximally, widening distally to 0.10–0.12 mm at node. *Nodes* oblique, well defined, sloping alternately left and right, often 1 or 2 annulations above node. *Pedicel* of hydrophore given off distally from a well defined apophysis 0.04–0.14 mm long, at the same level as the node. Pedicel tubular, 0.13–0.20 mm long (node to diaphragm), perisarc of younger parts smooth, in older regenerated parts heavily internally ridged, a deep fold just above apophysis giving pedicel an offset appearance. *Hydrophore* fairly deep, 0.06–0.08 mm margin to diaphragm, slightly expanding with an everted margin, 0.15–0.18 mm in diam., and distinct rim. Diaphragm well defined, thin, with a ring of punctae just above and a pseudodiaphragm below, frequently only marked by a thickening of the adcauline wall. Secondary and tertiary regenerations of the pedicel from the orifice of the preceding hydrophore common, each succeeding pedicel usually shorter than the last; in some instances regeneration is reduced to a mere replication of the hydrophore. Secondary branching of pedicels rare. *Hydranth* elongated, slender, with 10–16 long filiform tentacles. *Female gonotheca* very large, flattened, lenticular, but somewhat variable in shape, usually slightly longer than wide; greatest width 0.98–1.33 mm; length (excluding pedicel) 1.20–1.43 mm, tapering proximally into a short pedicel arising at base of hydrophore, usually at junction with main stem. Perisarc very delicate,



Figs 7–15.

distal extremity puckered, a small circular orifice sealed by an operculum situated in the distal third of the abcauline wall. *Male gonotheca* small, sausage-shaped, 0.25 mm long, 0.10 mm wide, arising from a short pedicel at base of hydrophore. Both sexes arising only on younger, monosiphonic parts of colony, the males more distal than females. Colour, stems straw coloured, female gonophores pink.

Remarks: Halecium bruniensis is closely allied to *H. lenticulare* Trebilcock, 1928, in sympodial habit, shape of female gonotheca and hydrotheca. However, *H. lenticulare* as known at present (Ralph 1958, p. 331) is a monosiphonic species with smaller stems (less than 1 cm high), a considerably smaller female gonotheca, and a male gonotheca of somewhat different shape.

The type material of *H. bruniensis* shows growth stages of the female gonophore from earliest development to maturity (Figs 12–15). Development of the gonophore begins with formation of a hook-shaped blastostyle surrounding a central body (Fig. 12). Further growth and differentation into 6–8 large bodies, possibly larvae (but material insufficiently well preserved for positive identification), then occurs, filling gonotheca (Figs 13, 14). A small circular aperture with slightly thickened rim then develops in the distal third of the abcauline wall through which the reproductive products escape (Fig. 15). The orifice of the now empty gonotheca then becomes resealed by a very thin operculum.

Only one group of colonies of *H. bruniensis* was found. These were epizoic on sponge and encrusting bryozoa in a sheltered crevice.

Halecium luteum n. sp.

FIGS 16–18

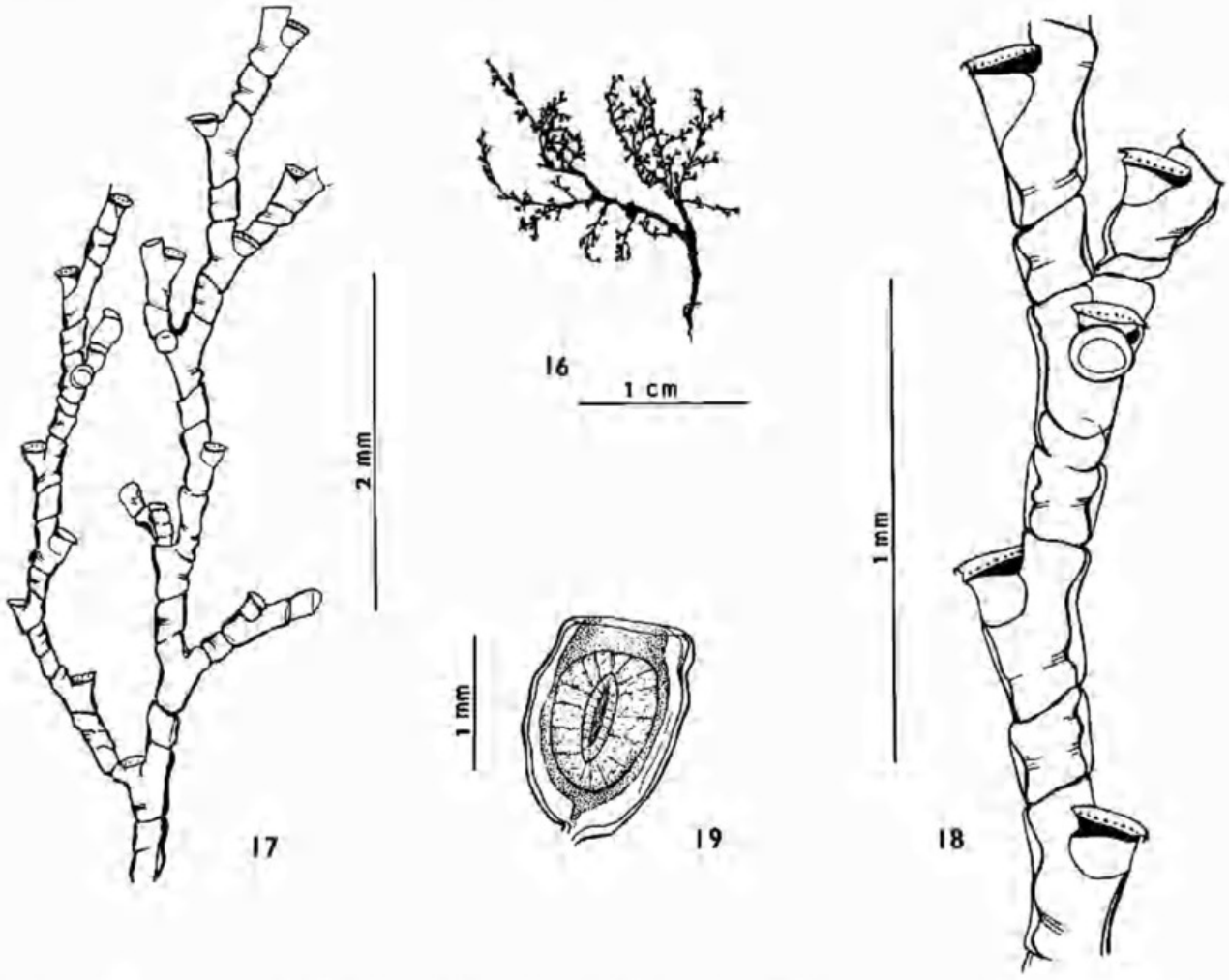
Type material and Records: Holotype, NMV, G2496–microslide (KOH cleared preparation); G2497–preserved material, remainder of holotype colony; paratype G2498–microslide; Penguin I., 15 m deep on sponge and rock.

Description from holotype and paratype: Colonies to 2.5 cm high, growth arborescent, main stem strongly fascicled, woody and stiff. *Branching* more or less in one plane, the ultimate branches in any one part of the colony all directed anteriorly; in other parts they may face in other directions. *Stem internodes* of variable length, 0.40–0.65 mm, expanding distally, with 1, occasionally 2, extra nodes. *Nodes* distinct, oblique, parallel in each internode, sloping alternately left and right in adjacent internodes; perisarc indistinctly internally ridged. Width at proximal node, measured parallel to node, 0.12–0.14 mm. *Hydrophore* seated on distal third of distal segment of internode, well below node. Hydrophore sessile, very flat and shallow, walls thin and strongly constricted just above diaphragm, abcauline wall more concave than adcauline. *Margin* circular, 0.14–0.16 mm in diam., with outrolled rim. Depth from margin to punctae, 0.015–0.02 mm; depth from margin to diaphragm, 0.025–0.035 mm. Diaphragm very strong, with a distinct ring of punctae above, and a wedge-shaped thickening of the perisarc of the internode below. Below the wedge the wall of the internode thins into a large circular fenestration from which the apophysis of a branch may arise. *Hydranth* large with an annular hypostome and 25-28 tentacles. Colour, bright yellow. Gonotheca, absent.

Remarks: Halecium luteum is superficially similar to *H. corrugatissimum* Trebilcock, 1928, from New Zealand, as it has strongly ridged internodes and shallow hydrophores characteristic of this species. In the latter species, however, the ridges of the stem are merely strong annular constrictions, not definite oblique nodes as in *H. luteum*. Furthermore, the hydrophores, while shallow, are somewhat deeper than those of the new species. Also, *H. corrugatissimum* is a monosiphonic species, while *H. luteum* has a strongly fascicled habit.

H. luteum displays several unusual morphological features. One is the presence of supplementary nodes, so well defined that the stems could almost be described as being alternately athecate and thecate; another feature is the extraordinarily shallow hydrophore, which seems to offer negligible support to the very

Figs 7–15. *Halecium bruniensis* n.sp. Fig. 7.—Holotype colony, natural size. Fig. 8.—Distal part of colony, showing fasciculation of stem and empty female gonothecae. Figs 9, 10.—Hydrophores enlarged, showing offset pedicel and replications of the hydrophore. Fig. 11.—Male gonotheca. Figs 12–15.—Development of the female gonophore. Fig. 12.—Early stage of development showing hook-shaped blastostyle with developing central mass. Fig. 13.—Later stage of development. Fig. 14.—Mature gonophore. Fig. 15.—Gonotheca after discharge of reproductive products. Note residual mass remaining at site of the circular orifice through which contents have been discharged.



Figs 16–18. *Halecium luteum* n.sp. Fig. 16.—Paratype colony, twice natural size. Fig. 17.—Distal part of branch. Fig. 18.—Stem internodes with hydrophores enlarged.
Fig. 19. *Phylactotheca armata* Stechow. Gonotheca with developing male gonophore.

bulky hydranth. The extreme thinning of the wall of the internode in the fenestration below the hydrophore must produce a serious structural weakness of the hydrocaulus. This is, however, offset by the support given to the hydrophore by the very strong wedge of perisarc extending across the base of the hydrophore from the stem.

The group of colonies were both epizoic and epilithic, growing down from the roof of a cavern in sheltered conditions.

Phylactotheca armata Stechow, 1924: 59; 1925: 204, fig. C. Blackburn, 1942: 106. Hodgson, 1950: 17, fig. 31. Watson, 1973: 166. *Ophiodissa fragilis* Blackburn, 1937: 365, fig. 1.

FIG. 19

Records: Penguin I. and Adventure Bay; epizoic on solitary ascidians, bryozoa and sponge; epiphytic on crustose coralline algae and on holdfasts of *Phyllosporn comoca*, 10–22 m deep.

Material: Luxuriant colonies, some fertile. *Stems* of variable length, 4–15 mm, usually simple, occasionally branched. Colonies dioecious, gonophores borne thickly on hydrorhiza at base of stems, gonothecae large, flatly ovate, both sexes of same size and shape, widest at middle or top, perisarc thick, slightly undulating, borne on a very short pedicel, length 1.14–1.56 mm (excluding pedicel), maximum width 0.90–1.17 mm Gonophores mature, of creamy white colour, almost filling gonothecal cavity, male surrounded by a thin blastostyle, female packed with mature ova. *Hydranths* with a single row of large lenticular nematocysts (probably stenoteles) alternate with the tentacles surrounding the hypostome. These also occur in the nematocyst batteries in the capi-

tulum of the retracted dactylozooids, and are scattered throughout the hydrocaulus in some stems. No discharged nematocysts were seen.

Remarks: Blackburn (1937) described the gonophore of "*Ophiodissa fragilis*" (= *P. armata*) as being "subspherical, arising at the junction of stem and peduncles, as well as stem and hydrorhiza". Blackburn's type microslide of "*O. fragilis*" (NMV collection) shows three extremely delicate structures which appear to be either directly attached to, or enveloping the hydrocaulus. Although two of these contain a central mass which could possibly be a developing gonophore, they resemble neither in shape or structure the immature and mature gonophores of *P. armata* as seen in the present material. They do, in fact, closely resemble egg capsules of certain minute gastropods.

P. armata shows a wide range of substrate. The epiphytic colonies, particularly those from the rough-water sites among *Phyllospora* holdfasts, were usually short and robust, with heavily ridged cauline perisarc. Epizoic colonies, particularly those from more sheltered situations under ledges in deeper water, were lax, branched, with a more delicate perisarc and fewer internodal ridges. All stems, however, show a tendency towards thickening of the perisarc and increase in cauline ridges with age.

This is the most abundant occurrence of *P. armata* so far recorded in Australian waters, and demonstrates a greater variability in stem characteristics than formerly known.

Family **SYNTHECIIDAE**

Synthecium patulum (Busk, 1852). Hodgson, 1950: 18, figs 32, 33.

Sertularia patula Busk, 1852: 390.

Records: Satellite I., 14 m deep, under ledge; Simpsons Bay, 11 m deep, on scallop *Equichlamys bifrons;* Penguin I., 20 m deep, on sponge.

Material: A few infertile colonies. *Stems* to 25 mm long, some stems immature. Proximal internodes of stems short, with 1 pair of opposite hydrothecae, followed by an internode with 2 pairs of opposite hydrothecae and distal hydrocladia; distal internodes with either 1 pair or 2 pairs of hydrothecae. *Hydrothecae* on older stems with thick perisarc and replications of the margin. Colour, purple and white.

Remarks: The present material conforms to descriptions of *Synthecium patulum* given by Bale (1914a, p. 5) and Hodgson (1950). However, it is very difficult (Watson 1973, p. 167) to distinguish between *Synthecium elegans* f. *subventricosum* and *S. patulum* on characters of the hydrothecae alone. The present material is thus provisionally assigned to *S. patulum*. Further work may eventually prove that the two are conspecific.

No morphological differences could be detected between stems growing in the environmental extremes of exposure to current (Simpsons Bay), sheltered situations under ledges (Satellite I.) or exposure to surge (Penguin I.).

Family **SERTULARIIDAE**

Salacia farquhari (Bale, 1924). Ralph, 1961a: 769, fig. 7.

FIGS 20–22

Thuiaria farquhari Bale, 1924: 244, fig. 10. Trebilcock, 1928: 19, pl. 8, fig. 4.

Records: Penguin I., 15 m deep; Satellite I., 3 m deep, on sponge under ledge.

Material: Two infertile colonies. *Stems* monosiphonic, to 18 mm long, simple and branched, the simple stems shortest. Stem internodes tapering proximally and distally, with one pair of opposite hydrothecae adnate in front, widely separated behind. *Branching* regularly alternate from an apophysis of the internode 0.25–0.4 mm long, usually 2 pairs of hydrothecae between branches. Branches given off at an upward angle with a distinct proximal geniculation at the apophysis and a V-shaped distal joint. Some secondary branching, but where developed, these branches carry few hydrothecae.

Remarks: The specimens compare well with microslides of *Thuiaria farquhari* Bale (NMV collection) and with the redescription of *S. farquhari* given by Ralph (1961a). The present material does, however, exhibit certain differences from the species as described from New Zealand. These are the greater length and the proximal geniculation of the first branch internode, as well as the tendency towards thickening and loss of the stem internodes in older parts of the colonies, features recognized by Ralph as being more characteristic of *Salacia bicalycula* (Coughtrey, 1876a) than *S. farquhari*. Since the present material agrees in most respects with the latter species, particularly in the size of the colonies, it is assigned to *S. farquhari*.

This is the first record of *S. farquhari* for Australia, and the first record of the species outside New Zealand waters, where it occurs only south of 43°S, the same latitude as Bruny I.

Stereotheca elongata (Lamouroux, 1816). Ralph, 1961a: 762, fig. 4. Watson, 1973: 170.

Sertularia elongata Lamouroux, 1816: 189, pl. 5. Bale 1884: 75, pl. 6, figs 7, 8, pl. 19, fig. 7; 1915: 277. Hodgson, 1950: 23, figs 38, 39.

Record: Penguin I., 15 m deep, on rough-water side of island, on a red alga.

Material: Several fertile colonies. *Stems* short, 2.5 cm. *Gonothecae* long and narrow, horned processes very much elongated.

Remarks: Hodgson's Oyster Bay material from storm-drifted weed is the "long-stemmed" form of *S. elongata*. The Bruny I. material is the "short-stemmed" ocean form frequently associated with red algae.

Sertularella robusta Coughtrey, 1876a: 300, fig. 2. Hodgson, 1950: 33, fig. 58. Ralph, 1961a: 824, fig. 22a-d. Watson, 1973: 171, fig. 21.

FIGS 23, 24

Records: Satellite I., 3 m deep, on sponge under ledges, and 6 m deep on the red alga *Sonderophycus australis;* D'Entrecasteaux Channel, 11 m deep on dead seawhip *Primnoella australasiae*, and on old scallop shells, *Equichlamys bifrons;* Adventure Bay, 5 m deep on sponge under ledges; Fluted Cape (no depth recorded) on stem of a brown alga.

Material: Stems 3–4 mm long, the longer stems flexuous, with long internodes, occasionally branched. Shorter stems robust, with short internodes, each stem type occurring in separate colonies. *Hydrothecae* of the "long internode" form large with smooth, very faintly undulated walls, hydrothecae of the "short internode" form distinctly smaller (see dimensions), with thinner perisarc, heavily ridged with 3–4 annulations and a strong submarginal constriction of the thecal neck on the abcauline side. All material infertile except for one stem of the "short internode" form.

Dimensions (mm):	long internode form	short internode form
Length, abcauline wall	0.55–0.60	0.33–0.45
Length, free adcauline wall	0.35–0.43	0.28–0.38

Remarks: Specimens of *S. robusta* from Bruny I. show a complete range of variability between the extremes of the long and short internode forms, and large and small hydrothecae. Some correlation appears to exist between stem type, environmental conditions and habital preferences, the long flexuous stems growing epizoically on dead shell and other material in the D'Entrecasteaux Channel in situations of good current flow, those of intermediate stem length being from cryptic habitats beneath ledges and on the underside of *Sonderophycus*, while the more robust stems occurred on the lower parts of brown algae in moderately turbulent open water. Dimensions given by Hodgson (1950) for his material correspond to the "short internode" form, although the stems of his material were 15 mm long, and were epiphytic.

Except for the greater thickness of stem and very faint thecal undulations, the "long internode" form of the Bruny I. material corresponds very closely with *Sertularella simplex* (Hutton, 1873) described from Pearson I. (Watson 1973). A specific distinction based on thickness of perisarc and faintness of undulations of the thecal wall as defined by Ralph (1961a, p. 820) seems to be somewhat artificial. Thus, if further material with smooth hydrothecae and thin perisarc is found, *S. robusta* must be referred to the synonymy of *S. simplex*.

Symplectoscyphus pygmaeus (Bale, 1881). Watson 1973: 176.

Sertularella pygmaea Bale, 1881: 25, pl. 12, fig. 9; 1884: 108, pl. 3, fig. 8, pl. 19, fig. 19. Hodgson, 1950: 36, figs 63, 64.

Record: Penguin I., 16 m deep on bryozoa in sheltered situations.

Material: Sparse infertile colonies. *Stems* to 7 mm long, simple, or with one branch. A delicate 3-flapped operculum visible in most hydrothecae.

Remarks: The line of small dots in the thecal wall diagnostic of *S. pygmaeus* is obscured by the hydranths. However, the material corresponds closely with specimens of *S. pygmaeus* in the Bale collection (NMV) and for this reason is assigned to this species.

Sertularia acuta (Stechow, 1921). Millard, 1958: 192, fig. 8. Shepherd & Watson, 1970: 140.

Tridentata acuta Stechow, 1921: 231.
Sertularia loculosa Bale, 1884: 91, pl. 4, figs 5, 6; 1913: 121 pl. 12, figs 7, 8; 1915: 272. Hodgson, 1950: 25, figs 43, 44.

Record: Adventure Bay, 10–22 m deep, on red algae.

Material: Luxuriant fertile colonies. *Stems* to 7 mm long. *Gonothecae* with 4–6 strong annulations, arising from stem internode below proximal hydrotheca. Gonophores mature.

Remarks: Hodgson's infertile specimens came from storm-drifted *Macrocystis*. *S. acuta* was not associated with this kelp at Bruny I.

Sertularia macrocarpa Bale, 1884: 80, pl. 5, fig. 2, pl. 19, fig. 11; 1914a: 14; 1915: 277. Mulder & Trebilcock, 1914b: 42. Hodgson, 1950: 27, fig. 47. Shepherd & Watson, 1970: 140. Watson, 1973: 177.

Record: Penguin I., sheltered side, 10–22 m deep, among algal holdfasts.

Material: Rare colonies, comprising a few stems each. Stems to 8 cm long, infertile.

Remarks: The internal submarginal tooth is not as well developed in these specimens as in those from the Australian mainland.

This dark brown species with distinctive white-tipped hydrocladia has previously been recorded among the holdfast fauna of red algae at Pearson I. (Watson 1973).

This is the first record of *S. macrocarpa* from Tasmanian waters.

Amphisbetia minima var. **intermedia** Bale, 1915. Watson, 1973: 179, fig. 29.

FIG. 25

Sertularia minima Thompson, 1879: 104, pl. 17, fig. 3. Bale, 1881: 21, 45, pl. 12, fig. 2; 1884: 89, pl. 4, figs 9, 10, pl. 19, figs 12, 13; Mulder & Trebilcock, 1914b: 39. Hodgson, 1950: 23, figs 41, 42.

Records: Adventure Bay, 4–6 m deep, on red alga *Rhodymenia* and on sponge under ledges; Penguin I., 16 m deep, on red algae and in crevices in rough water; Satellite I., 1 m deep, on *Laurencia*.

Material: Luxuriant fertile colonies, mainly on red algae, some on sponge. *Stems* to 5 mm long, internode length 0.30–0.38 mm; diam. at node 0.03–0.06 mm. *Hydrotheca* 0.19–0.28 mm long. *Tubular nematothecae* present in the base of proximal infrathecal chamber.

Remarks: Although the hydrothecae are larger than those recognized as var. *intermedia* (Watson 1973, p. 181), the present material is referable to this variety on the basis of the shape of the hydrothecae and the presence of the characteristic tubular nematothecae. However, several of the stems have rather robust hydrothecae and the wedge of perisarc between hydrocaulus and hydrotheca considered typical of the var. *pumiloides*. Furthermore, one stem (Fig. 26) from sponge, shows distinct transitional features between the *pumiloides* and *intermedia* types. The stem of this specimen has four broad, robust, proximal hydrothecae of "*pumiloides*" type, and a distal regrowth of three hydrothecae of unmistakably "*intermedia*" type following stem breakage. The basal pair of "*intermedia*" hydrothecae have well developed tubular nematothecae. Dimensions of the proximal and distal groups of hydrothecae on this stem are given for comparison:

Dimensions (mm):	*pumiloides* type	*intermedia* type
Internode—		
length	0.33–0.35	0.30–0.34
width at node	0.06	0.04
Hydrotheca—		
length	0.20	0.21
width across base	0.24–0.25	0.18–0.20
width across margin	0.43–0.52	0.32–0.37

The finding of two varieties of *A. minima* on one stem lends support to evidence (Watson 1973) that these varieties are in reality ecomorphs, the development of which may be dependent upon the type of substrate available, or environmental conditions prevailing during growth.

Hodgson (1950) did not differentiate between the varieties of *A. minima* in his collections; however, according to his measurements, and the absence of nematothecae, as well as the material having come from *Macrocystis* and "drift" (brown?) algae, the material may be ascribed to the "var. *pumiloides*".

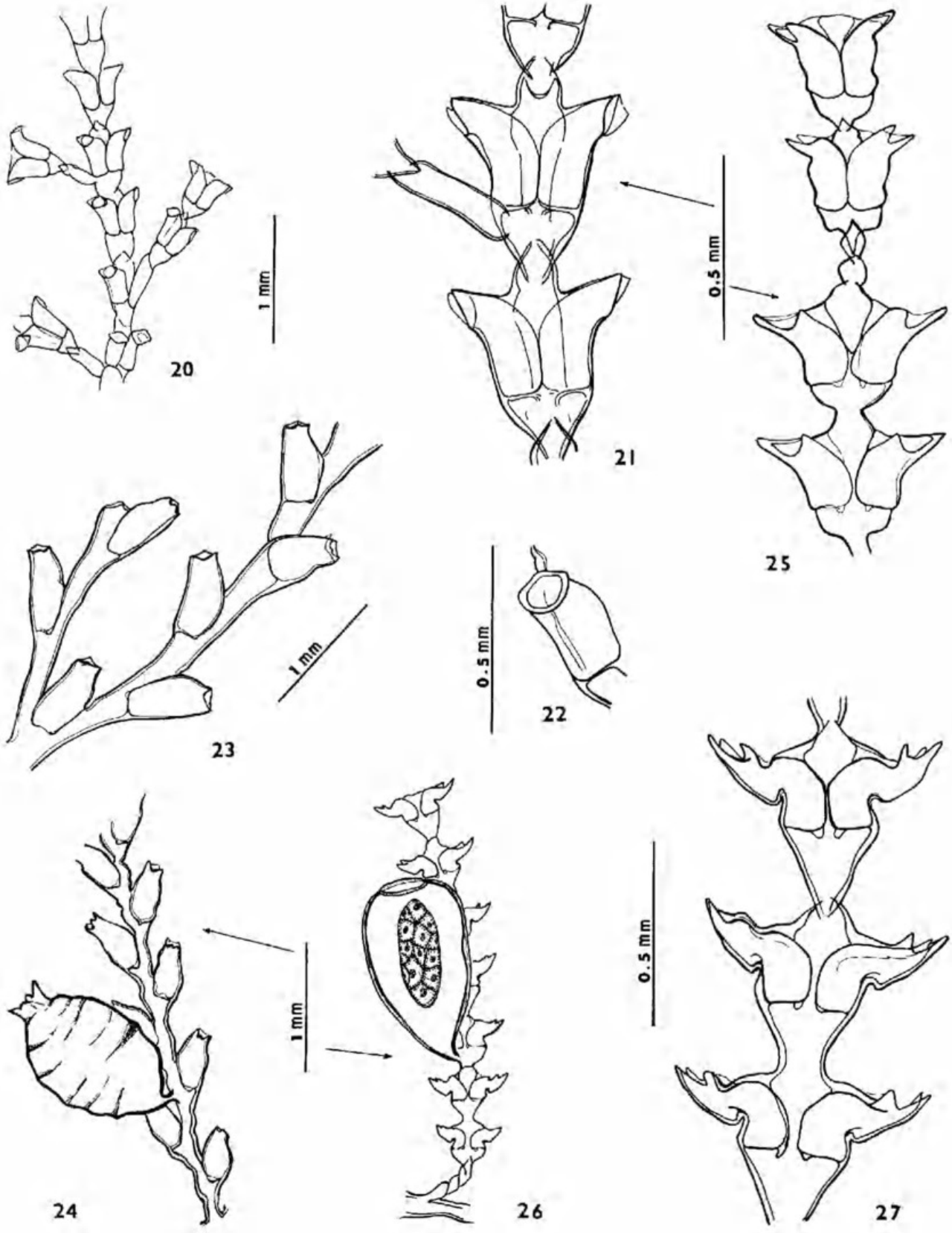
Amphisbetia operculata (Linnaeus, 1758). Ralph, 1961a: 775, fig. 8.

Sertularia operculata Linnaeus, 1758: 808. Bale, 1884: 67, pl. 6, fig. 1, pl. 19, fig. 3. Hodgson, 1950: 22, figs 36, 37.

Record: Simpsons Bay, 11 m deep on stem of dead seawhip *Primnoella australiasiae*.

Material: One small infertile colony of a few short stems.

Remarks: Although Hodgson remarks that "this species is very abundant in the D'Entrecasteaux Channel, being constantly taken in the form of large tangled masses in scallop dredges", only one colony was found in the present survey. This apparent rarity may be due to seasonal growth (Hodgson's material was collected in August) or to permanent changes in the environmental equilibrium caused by scallop dredging. The substrate of old shells preferred by *A. operculata* (pers. observ.) is no longer available as the seafloor of the estuary has now been invaded by enormous numbers of the New Zealand gastropod *Maoricolpus roseus*. Since no colonies of *A. operculata* were found associated with *M. roseus*, it may be concluded that the smooth



Figs 20–27.

shell of this gastropod is unsuitable for settlement of larvae of *A. operculata*.

Amphisbetia avia n. sp.

FIGS 26, 27

Type Material and Records: Holotype, NMV, G2499–microslide; G2500–preserved material, remainder of holotype colony; Adventure Bay: paratypes, G2501, G2502–microslides; Satellite I., all colonies on the brown alga *Carpoglossum confluens*, 3 m deep.

Description from holotype and paratypes: Hydrorhiza tubular, 0.09 mm diam., reticulate, very loosely wound on algal surface. *Stems* arising at stolonic junctions, simple, unbranched, to 5 mm long, beginning with 1 or 2 twists, then a V-shaped proximal joint, followed by first thecate internode. Perisarc of stem and hydrothecae thick and very brittle. *Stem internodes* 0.38–0.46 mm long, with one pair of hydrothecae, nodes slender, 0.06–0.08 mm wide, distal node collar-shaped, proximal node V-shaped and socketted into the collar of preceding internode; if node absent, it is replaced by a narrowing of the internode. *Hydrothecae* opposite, on distal half of internode, tubular, narrowing to margin, adnate for one third of length, proximal adcauline wall more or less parallel to axis of internode, in contact or slightly separated, base of hydrotheca horizontal; a very deep notch, and occasionally a short oblique intrathecal fold about one third distance up abcauline wall from base of hydrotheca, and a corresponding, but not so deep inflexion (sometimes missing altogether) of the adcauline wall, opposite, but more distally situated, just behind margin. Width of internode just below hydrotheca, 0.24–0.29 mm; length of fixed adcauline thecal wall (measured diagonally) 0.15–0.19 mm, length of free adcauline wall (to end of tooth) 0.12–0.18 mm; length of abcauline wall (measured diagonally from base to end of tooth) 0.26–0.31 mm. *Margin* horizontal, facing upwards, with two long, sharp, laterally placed teeth with a deep horizontal embayment between, connected to the internode by a thick wedge of perisarc. Width across margin between teeth 0.07–0.09 mm; width across paired hydrothecae (outermost teeth) 0.52–0.69 mm. A delicate internal sheath often present within margin. *Gonothecae* large, obovate, 1.15–1.33 mm long (including pedicel) expanding from base to summit; max. width 0.75–0.83 mm, tapering evenly into a narrow pedicel arising from the infrathecal chamber of hydrotheca on lower stem. *Aperture* circular, 0.35 mm in diam., centrally situated at distal end, with a slightly raised collar, a ring of minute denticles within, and a flat operculum. *Gonothecae* identical in both sexes, only one borne on each stem; male and female gonophore on same colony. Female gonophore narrowly elliptical, not filling gonothecal cavity, with 16–20 eggs; male gonophore of same shape and size as female, spermatogenic mass surrounded by a thin blastostyle.

Remarks: Amphisbetia avia is closely related to the *Amphisbetia minima* group in size, colour, habit, and preference for algal substrate, and is not easily distinguished from the varieties of *A. minima* in the field. However, the deep retroflexion of the abcauline wall, the horizontally directed distal part of the hydrotheca, and the long marginal teeth immediately distinguish *A. avia* from *A. minima*.

A. avia was associated only with one species of alga, *Carpoglossum confluens*, growing in shallow water.

Family **PLUMULARIIDAE**

Halicornopsis elegans (Lamarck, 1816). Bale, 1914a: 56; 1915: 303; Briggs, 1914: 296; 1915: 309. Blackburn, 1942: 107. Hodgson, 1950: 48, fig. 79. Watson, 1973: 195.

Plumularia elegans Lamarck, 1816: 129.

Record: Adventure Bay, 15 m deep, epilithic on vertical face.

Material: One fertile colony. *Stems* short, to 7 cm. *Gonothecae* borne prolifically on main stems and occasionally at base of branches on the apophysis of the hydrocladium. *Gonothecae* mature, irregularly ovate, flattened distally or slightly flattened on one side, aperture closed by a thin membrane. Only female gono-

Figs 20–22. *Sulacia farquhari* (Bale). Fig. 20.—Part of stem. Fig. 21.—Stem internodes, enlarged. Fig. 22.—Single hydrotheca, anterior view.

Figs 23, 24. *Sertularella robusta* Coughtrey. Fig. 23.—"Long internode" form with large hydrothecae and smooth thecal walls. Fig. 24.—"Short internode" form, showing smaller hydrothecae with undulated walls.

Fig. 25. *Amphisbetia minima* var. *intermedia* Bale. Aberrant stem with both "*pumiloides*" (proximal part of stem) and "*intermedia*" (distal) hydrothecae.

Figs 26, 27. *Amphisbetia avia* n.sp. Holotype. Fig. 26.—Stem with female gonophore. Fig. 27.—Stem internodes, enlarged.

phores present, spherical, half filling gonothecal cavity, packed with mature ova surrounded by a thin granular blastostyle.

Remarks: Only one small colony of *H. elegans* was found growing in a relatively exposed situation.

Mature gonophores of *H. elegans* have not previously been described.

Antennella campanuliformis (Mulder & Trebilcock, 1909). Watson, 1973: 182, figs 43, 44.

Plumularia campanuliformis Mulder & Trebilcock, 1909: 31, pl. 1, figs 6, 9, 10; 1910: 115.

Record: Satellite I., on *Lenormandia marginata* and other red algae; no depth recorded.

Material: Luxuriant infertile colonies. Erect stems to 8 mm high. Colour, trophosome pinkish-yellow, stolons dark brown.

Remarks: This material conforms reasonably well with the description of Mulder & Trebilcock (1909). However, the hydrothecae are slightly more campanulate and delicate, with no thickening of the abcauline thecal wall as in specimens described from Pearson I. (Watson 1973).

The hydroid was found on one side only of the algal fronds.

This is the first record of *A. campanuliformis* from Tasmania. Other localities: Victoria; S. Aust.

Pycnotheca mirabilis (Allman, 1883) var. **mirabilis** Stechow, 1925: 241. Ralph, 1961b: 50, fig. 7a, b.

FIG. 28

Pycnotheca mirabilis (Allman, 1883). Hodgson, 1950: 50, figs 81, 82.

Diplocheilus mirabilis Allman, 1883: 49, pl. 8, figs 4–7.

Kirchenpaueria mirabilis (Allman, 1883). Bale, 1894: 109, pl. 6, figs 4–7. Briggs, 1915: 308. Blackburn, 1942: 106.

Records: Satellite I., 9 m deep; Adventure Bay, 10–22 m deep, on red algae.

Material: Fertile stems to 5 cm high. *Stems* monosiphonic, arising singly from hydrorhiza, lower stems devoid of hydrocladia. Gonothecae large, adnate to lower stem, hydrorhiza, or algae. Perisarc very thick, strongly ridged with up to 9 ridges, more prominent on abcauline side. Colour of gonotheca, deep red brown. Gonophores, female.

Remarks: It is difficult to distinguish between infertile stems of *P. mirabilis* and *P. producta* Bale, 1881. Examination of fertile material of both species in the Bale collection (NMV), shows that the Bruny I. specimens correspond closely to a microslide of *P. mirabilis* from Bass Strait. Gonothecae of *P. producta* collected at Port Jackson, in 1886, are smaller (1.56–1.86 mm long, 0.75–0.84 mm wide), have a thinner perisarc, and are only faintly undulating. These are similar to Hodgson's (1950) figure and dimensions of "*P. mirabilis*". Ralph (1961a) noted the discrepancy between Hodgson's description, figures, and the actual dimensions of the gonotheca of *P. mirabilis* and suggested that it may represent a new varietal form of *P. producta*. It seems more likely, however, that the numbers of the two figures of the gonothecae of *P. producta* and *P. mirabilis* have been confused in Hodgson's paper.

Halopteris campanula var. **campanula** (Busk, 1852). Ralph, 1961b: 47. Watson, 1973: 184.

Plumularia campanula Busk, 1852: 401. Bale, 1884: 124, pl. 10, fig. 5; 1913: 133. Hodgson, 1950: 40.

Record: Satellite I., 14 m deep, under ledge.

Material: One infertile colony. Stems to 2.5 cm long, sparingly branched, lax. Colour, yellow.

Remarks: H. campanula var. *campanula* is represented in this collection by only one sparse epilithic colony, which was growing in reduced light in a crevice.

Plumularia filicaulis Kirchenpauer, 1876: 28, pl. 5, fig. 6. Bale, 1884: 134, pl. 11, figs 6, 7, pl. 19, figs 41, 42. Léloup, 1934: 4. Hodgson, 1950: 42, fig. 72. Millard, 1958: 209, fig. 13D, E. Shepherd & Watson, 1970: 140.

Record: Adventure Bay, 10–22 m deep, on red algae.

Material: Luxuriant infertile colonies. *Hydrorhiza* pegged, forming a reticular network on the algal frond. *Stems* short, simple and pinnate on the one colony. Simple stems to 2 mm, pinnate stems to 4 mm high.

Remarks: P. filicaulis is a common epiphyte on several species of red algae (Shepherd & Watson 1970).

Plumularia hyalina Bale, 1881: 41, pl. 15, fig. 9; 1884: 141, pl. 12, figs 4, 5. Ralph, 1961b: 41.

FIG. 29

Record: Fluted Cape, 16 m deep, on a red alga.

Material: Abundant, sparingly fertile colonies. *Stems* to 3 mm long, stems and hydrocladial

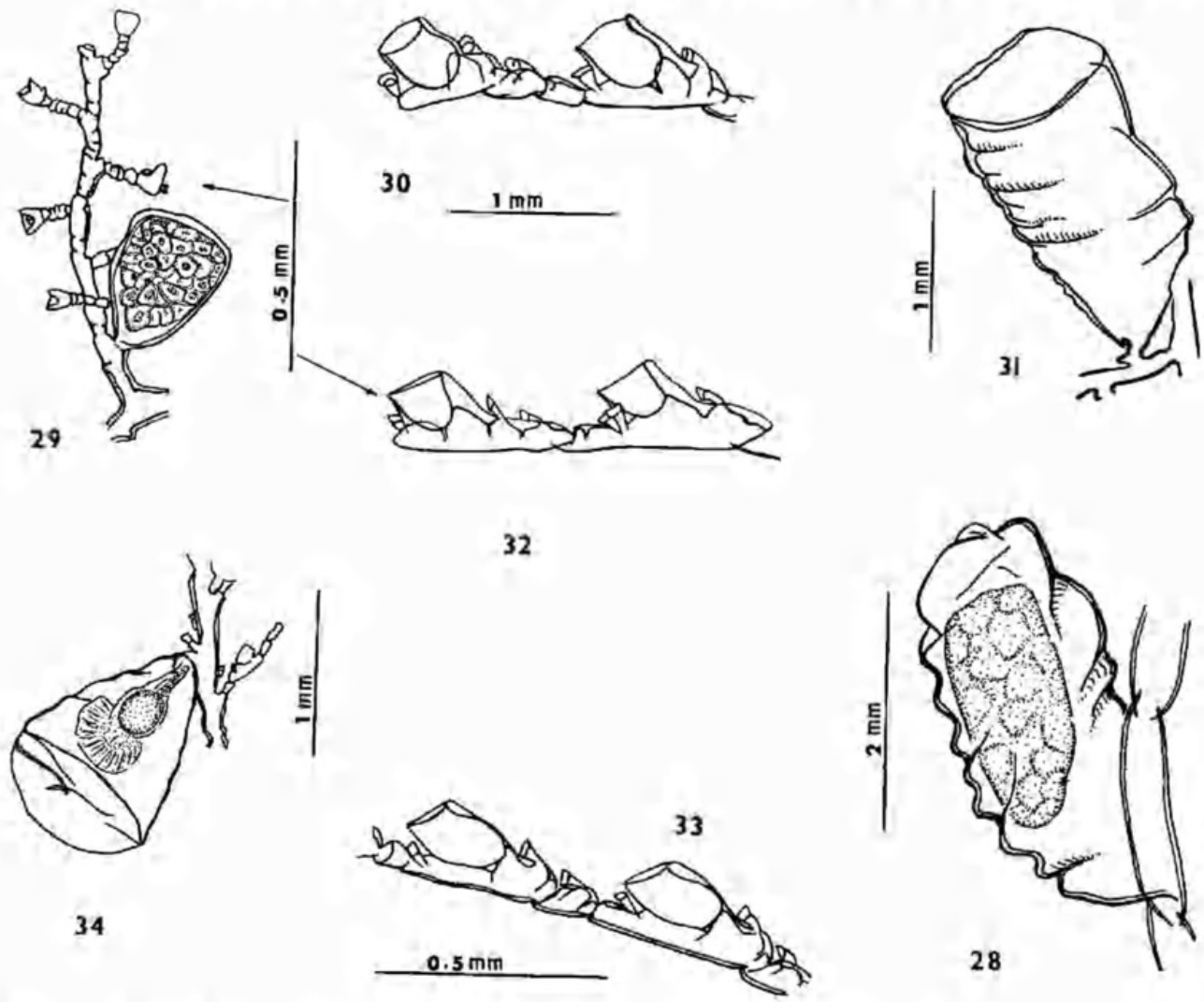


Fig. 28. *Pycnotheca mirabilis* var. *mirabilis* (Allman). Gonotheca with heavily ridged perisarc and female gonophore.
Fig. 29. *Plumularia hyalina* Bale. Stem with ripe female gonophore.
Figs 30, 31. *Plumularia angusta* Stechow. Fig. 30.—Part of hydrocladium. Fig. 31.—Gonotheca.
Fig. 32. *Plumularia crateriformis* Stechow. Part of hydrocladium.
Figs 33, 34. *Plumularia wilsoni* Bale. Fig. 33.—Part of hydrocladium. Fig. 34.—Gonotheca, showing downwardly directed growth habit.

internodes strongly ridged, hydrocladia with one terminal hydrotheca. *Gonothecae* large, top-shaped, greatest width distally, 0.7 mm wide, 0.9 mm long; gonophores mature, female only, completely filling gonothecal cavity. Colour, stems white to yellow; gonophores bright yellow.

Remarks: This is the first record of mature *P. hyalina* in Australian waters. Ralph (1961b) described much longer (1.3–1.7 mm) and slightly narrow (0.5–0.65 mm) gonothecae for her mature specimens from New Zealand. Judging by this considerable difference in size of gonothecae, it seems that an as yet undocumented range of geographic variants of *P. hyalina* may exist.

Some stems of the material from Bruny I. have a well developed "stolonic plate" identical with that described for *Plumularia epibracteolosa* Watson, from Pearson I.

This is a new record for Tasmania. Other localities: Vic.; S. Aust.; New Zealand.

Plumularia angusta Stechow, 1923b: 226. Blackburn, 1942: 108.

FIGS 30, 31

Plumularia setaceoides vars a, b, d, Mulder & Trebilcock, 1910: 117, pl. 2, fig. 9, pl. 3, figs 3, 6.

Records: Penguin I., 15 m deep, on *Macrocystis* holdfast and sponge; Adventure Bay, on *Macrocystis* holdfasts and the brown alga *Myriodesma quercifolium.*

Material: Abundant fertile stems to 1 cm long. *Hydrothecae* pitcher-shaped, but variable, some with a pronounced concavity of the adcauline wall and a constriction behind margin, others with a thickening of the abcauline wall. Colour, straw-coloured, gonothecae bright orange.

Remarks: The hydrothecae are very variable in shape even on the one hydrocladium, the thecal walls ranging from pitcher-shaped to almost straight, often closely approaching the shape of the hydrotheca of *P. setaceoides*.

Plumularia crateriformis Stechow, 1923b: 227.

FIG. 32

Plumularia setaceoides var. *crateriformis* Mulder & Trebilcock, 1910: 118, pl. 3, figs 8, 8a; 1915: 51, pl. 7, figs 3, 3a.

Record: Adventure Bay, 4–6 m, on the brown alga *Xiphophora gladiata*.

Material: Infertile stems to 1 cm long.

Remarks on P. angusta and P. crateriformis: Stechow (1923b, pp. 226, 227) raised Mulder & Trebilcock's varieties of *P. setaceoides* (the unnamed vars a, b, d, and var. *crateriformis*) to specific rank, his distinction between the two species resting largely on the shape of the hydrotheca, a character of considerable variability in this group and thus of doubtful diagnostic value. The material from Bruny I., although showing some intergradation, can, however, be fairly readily assigned to one or other of these two species.

This, together with the fact that the two species occur together in the one locality, although at different depths and on different algal substrates (and one, *P. angusta*, was fertile, while *P. crateriformis* was not) indicates that these are valid, although closely related species radiating from the central *P. setaceoides* stock.

Neither *P. angusta* and *P. crateriformis* have previously been recorded from Tasmania. They may have been confused with *P. setaceoides*. *P. angusta* is known from Victoria and S. Aust.; *P. crateriformis* from Victoria.

Plumularia wilsoni Bale, 1926: 21. Ralph, 1961b: 31, figs 2, 3.

FIGS 33, 34

Plumularia delicatula Bale, 1881: 28, pl. 15, fig. 2; 1884: 137, pl. 11, fig. 5. Mulder & Trebilcock, 1910: 115, pl. 2, fig. 2.

Records: Penguin I.; Adventure Bay: Satellite I., 3 m deep, on sponge.

Material: Sparse fertile stems to 2 cm long. *Gonothecae* top-shaped, 1 or 2 arising on a very short pedicel from proximal part of stem, distal end directed downwards towards substrate. Perisarc delicate, very faintly undulated, no operculum. Gonophores—male.

Remarks: The trophosome of the Bruny I. specimens corresponds very closely with Bale's material of *P. wilsoni* from Griffiths Point, Victoria. The submarginal constriction behind the hydrothecae of the present material is rather variable, being more pronounced in some hydrothecae than in others even on the same hydrocladium. The hydrothecae with a shallow constriction closely approach those forms of *P. setaceoides* with more recumbent hydrothecae.

The gonothecae of the Bruny I. specimens are identical with those of Mulder & Trebilcock's (1910) microslide from which they described the gonotheca of *P. wilsoni*. Their figure is, however, misleading, as the walls of the figured specimens, like those of the present material, are only faintly undulated, not heavily ridged, as may be inferred from their figure.

A new record for Tasmania. Other localities: Victoria; New Zealand.

Aglaophenia plumosa Bale, 1881: 25, pl. 14, fig. 6; 1884: 153, pl. 14, fig. 5, pl. 17, fig. 12; 1924: 257. Blackburn, 1942: 110. Hodgson, 1950: 56, fig. 87. Shepherd & Watson, 1970: 140.

Record: Fluted Cape, 20 m deep, on sponge.

Material: Rare infertile colonies. Stems to 1 cm long.

Remarks: This is the robust form of *A. plumosa* with short hydrocladial and stem internodes. Hodgson notes that his material collected from *Macrocystis* and drift had shorter stems (i.e. the short internode form) than those stems collected from the seagrass *Zostera*, which grows in sheltered waters.

Thecocarpus divaricatus var. **typica** (Busk, 1852). Shepherd & Watson, 1970: 140.

Aglaophenia divaricata Busk, 1852: 398.

Records: Adventure Bay, 1–10 m deep, on horizontal faces among holdfasts of brown alga *Phyllospora comosa*; 10–22 m deep, epilithic in sheltered situations.

Material: Stems infertile, to 10 cm in height, branched. Cauline nematothecae similar in shape to those of *T. divaricatus* var. *cystifera*, but much smaller. *Hydrocladia* close-set, hydrothecae crowded on hydrocladium, no oblique intranodal septa on thecate hydrocladial internode. Colour, dark brown.

Thecocarpus divaricatus (Busk) var. **briggsi** Bale, 1926: 22, fig. 5, Watson, 1973: 194.

Record: Satellite I., on the red alga *Thamnoclonium dichotomum*. No depth recorded.

Material: Straggling, irregularly branched, stems to 15 cm long. Colonies infertile. Colour, black.

This is the first record of var. *briggsi* from Tasmanian waters. Other localities, Port Jackson, N.S.W. (Bale); Pearson I., S. Aust. (Watson).

Remarks on the varieties of T. divaricatus at Bruny Island: The two varieties of *T. divaricatus* recorded at Bruny I. are easily distinguishable by the presence of an intranodal ridge in the hydrocladium of var. *briggsi*, as well as in differences in habit and substrate preferences of each.

The var. *briggsi* was found only in sheltered reefs near Satellite I., in the D'Entrecasteaux Channel, where it was a common epiphyte on *Thamnoclonium*. The more robust var. *typica* occurred on rock faces and as a common epiphyte on *Phyllospora* holdfasts in situations of moderate exposure to surge.

Although showing affinities with var. *cystifera*, the latter form does not display the distinctive planar growth habit recorded for this variety (Watson 1973), nor the enlarged cauline nematothecae. In microstructures it most closely resembles a fragment of Busk's type of *Aglaophenia divaricata* from Bass Strait (NMV collection) and is thus recognized here as var. *typica*.

T. divaricatus is a common and variable species of the southern Australian coast. Further study is necessary to elucidate the systematic status and ecological relationships of the varieties of this species.

Halicornaria longirostris (Kirchenpauer, 1872). Bale, 1884: 181, pl. 13, fig. 7, pl. 16, fig. 3, pl. 19, fig. 30. Hodgson, 1950: 51 fig. 83. Watson, 1973: 197.

Records: Penguin I., 10–20 m deep, on *Thecocarpus divaricatus;* Adventure Bay, 10–20 m deep, on red algae and epilithic on vertical faces; Satellite I., 12 m deep, on *T. divaricatus* var. *briggsi*.

Material: Luxuriant colonies, stems 3–8 cm long, unbranched, infertile.

Remarks: The material from Bruny I. displays the same range in substrate as already noted for *H. longirostris* at Pearson I. (Watson 1973). Epilithic colonies from faces exposed to surge have the longest and most robust stems, while epizoic colonies on *T. divaricatus* var. *briggsi* from both Penguin I. and Satellite I. (i.e. from protected and relatively rough-water situations) had somewhat shorter, lax stems, given off singly from a stolon creeping on the stem of the hydroid host. The cauline internodes of these latter stems are long, with distant hydrocladia, the hydrocladia themselves having long internodes, and the mesial nematotheca extends well over the mouth of the hydrotheca. Rare epiphytic colonies on red algae at Adventure Bay had the shortest stems. There were no discernible differences in microstructures between these three ecomorphs. Briggs (1915) mentions that his specimens from Storm Bay were "86 mm in height (and) were found associated with *Aglaophenia divaricata*". Hodgson (1950) did not record the substrate of his material from Blackman's Bay in the Derwent Estuary.

Discussion

Ecology

Campanulariidae were recorded from all depths, being epiphytic on red algae growing mostly in sheltered places. One exception, *Silicularia rosea*, was associated with the brown algae *Scytothalia dorycarpa* and *Seirococcus axillaris* in situations of moderate water movement.

The only representative of the Lafoeidae, *Hebella furax*, provisionally recorded for the first time in Australian waters, is a small form epizoic on the stems of *Thecocarpus divaricatus* var. *briggsi* Bale. The majority of species of the Lafoeidae known from Tasmanian and mainland Australian waters are larger forms from the deeper continental shelf, hence are unlikely to be found in a shallow water collection such as the present one from Bruny I.

With the exception of *Phylactotheca armata* and *Halecium* sp., all haleciid species in the collection are epizoic forms. *Halecium delicatulum* Coughtrey [*H. flexile* of Hodgson (1950)] is one of the most abundant hydroids at Bruny I., the luxuriant orange-yellow colonies growing on the crustose bryozoan *Membrinopora membrinacea* epiphytic on old stipes of the large kelp *Macrocystis pyrifera*. The two species newly described, *Halecium bruniensis* and *H. luteum*, as well as *H. beanii*, are of cryptic habit, the two new species growing on sponge, bryozoa, and rock in crevices, while *H. beanii* occurs on the underside of the large plate-like alga *Sonderophycus australis*. While fertile colonies of *Phylactotheca armata* were recorded abundantly at all rough-water sites, they in fact

also occupied a relatively sheltered microhabitat among the holdfasts of the brown alga *Phyllospora comosa*.

Remarkably few species of Sertulariidae were recorded. Of greatest interest is the first record of *Salacia farquhari* (Bale) outside New Zealand waters (see further discussion below). *S. farquhari* was, however, rare at Bruny I. *Sertularia acuta* Stechow, while one of the most abundant epiphytes in the collection, was associated only with red algae, and not with *Macrocystis* as were Hodgson's specimens. Hodgson (1950) also recorded very abundant colonies of *Amphisbetia operculata* on old scallop shells from the D'Entrecasteaux Channel. Careful search in the area of the D'Entrecasteaux Channel covered in this survey produced only one attenuated colony. Although *A. operculata* is known to display strong seasonal growth, some of the rootstock and parts of the colonies usually persist from one season to another (pers. observ.). The virtual absence of this species from a former habitat may be explained by permanent changes in the ecosystem brought about by invasion of the gastropod *Maoricolpus roseus*, following the collapse of the scallop dredging industry. Probably the shell of *M. roseus* does not offer an attractive substrate to the larvae of *A. operculata*.

Of particular interest is the occurrence in one locality of three species, *Plumularia angusta*, *P. crateriformis* and *P. wilsoni*, all of which are known from Victoria. *P. angusta* is also recorded from South Australia (Blackburn 1942) and *P. wilsoni* from New Zealand (Ralph 1961b), where it is, however, rare. These species are closely related to one another and to *Plumularia setaceoides* Bale, endemic to southern Australian and New Zealand waters, from which central stock they may have radiated.

None of the larger Plumularians were of common occurrence. *Halicornopsis elegans* and *Thecocarpus divaricatus* var. *typica* were found in sheltered situations. The association of *T. divaricatus* var. *briggsi* with a bluish coloured sponge investing the warty surface of the alga *Thamnoclonium dichotomum* has not previously been observed. *Halicornaria longirostris* was moderately abundant at all sampling sites, the three ecomorphs of this species displaying an identical choice of substrate with that reported from Pearson I. (Watson 1973).

Zoogeography

The Bruny I. material, although collected from a restricted locality, yielded 11 new records for Tasmania, including 3 new records for Australian waters. Seven of these species are already known from the Victorian coastline of Bass Strait, so would be expected to occur among the Tasmanian fauna. *Thecocarpus divaricatus* var. *briggsi*, now known from N.S.W. (Bale 1926), Tasmania and South Australia (Watson 1973) has not yet been recorded from Victoria.

Of the 3 new records for Australia, *Halecium beanii* is cosmopolitan, *Hebella furax* is known only from South Africa, while *Salacia farquhari* is a New Zealand species recorded only from the South Island, where it does not, however, occur north of 43°S. The absence of *S. farquhari* from mainland Australian waters may thus be attributable to this southern distribution, as Bruny I. also lies close to 43°S.

The profound influence of the East Australia Current and the West Wind Drift in the dispersal of species and the biological and zoogeographic relationships of the trans-Tasman hydroid fauna have been discussed at length by Ralph (1961c). In this regard, three species recorded from Bruny I. are of considerable interest. These are the two haleciids newly described, and the occurrence of *S. farquhari*. *Halecium brunicola* bears a strong resemblance to *H. leniculare*, a species known from the South Island of New Zealand and Cook Strait, while *H. luteum* displays close affinities with *H. corrugatissimum*, a rare species recorded from both North and South Islands. The striking similarities in stem morphology between the members of these two pairs, as well as the gross differences in habit (both Australian species are polysiphonic, and the colonies are larger), strongly suggests active progress of speciation from a common stock in addition to dispersal across the Tasman Sea.

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