Memoirs of Museum Victoria 78: 65–72 (2019) Published 2019

1447-2554 (On-line)
http://museumvictoria.com.au/about/books-and-journals/journals/memoirs-of-museum-victoria/
DOI https://doi.org/10.24199/j.mmv.2019.78.04

Bathyal and abyssal hydroids (Hydrozoa, Leptothecata) from southeastern Australia

(http://zoobank.org/urn:lsid:zoobank.org:pub:D3BA513B-E7D6-41C5-92E4-E643ACA586E1)

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Abstract Watson, J.E. 2019. Bathyal and abyssal hydroids (Hydrozoa, Leptothecata) from southeastern Australia. *Memoirs of Museum Victoria* 78: 65–72.

A biological survey of the zone extending from Tasmania (40 S) to southern Queensland (25 S) and into the Coral Sea (23 S) was carried out along the south-eastern continental margin of Australia in 2017. Hydroids collected included three known species (*Acryptolaria angulata, Cryptolarella abyssicola* and *Zygophylax concinna*), three new species (*Amphisbetia ramifera*, *Hebella macroplana* and *Lytocarpia parvispiralis*) and two genera (*Hebella* and *Halecium*) not identified to species. *C. abyssicola* was the predominant species in terms of abundance and geographical range.

Keywords South-eastern Australia; six bathyal to abyssal species; *Cryptolarella abyssicola*.

Introduction

A biological survey of the bathyal to abyssal zone along the south-eastern continental margin of Australia was carried out in 2017 under the auspices of the Commonwealth Scientific Industrial Research Organisation (CSIRO), the Museum of Victoria (MV) and the Queensland Museum (QM). The objective of the survey was to determine the biodiversity of the lower bathyal (to 2500 m) and abyssal (to 4000 m) seafloor habitats off south-eastern Australia and the deep-water ecosystems of seven Commonwealth Marine Reserves. The survey was undertaken by the Australian research vessel RV *Investigator* (Cruise V IN2017-V03) and comprised 60 benthic stations sampled from May to June from Tasmania (40 S) to southern Queensland (25 S) and the Coral Sea (23 S).

*Field***.** Thecate hydroids were recovered from stations sampled by various trawling methods at depths from 1151 m to 4173 m. Preliminary sorting of invertebrate material was undertaken by scientific staff on board the ship. Samples were preserved in bulk in 95% ethanol.

Laboratory. Bulk collections were sorted in more detail at the Queensland Museum and specimens were provided to the author by the Queensland Museum. Representative specimens were first stained in an aqueous solution of lignin pink and were then dehydrated over three days by passing through three increasingly concentrated washes in isopropanol (30%, 60% and 100%) followed by three days of washes in xylene (30%, 60% and 100%) to harden the material. Specimens were then permanently mounted on microslides in Malinol mountant and heated for one week at 40° C to harden the mount.

Family Lafoeidae A. Agassiz, 1865

Acryptolaria angulata (Bale, 1914)

Figure 1 a, b

Cryptolaria angulata Bale, 1914: 166, pl. 35, fig. 1.– Bale, 1915: 251.– Stranks 1993: 7.

Acryptolaria angulata.– Blackburn 1942: 111.– Vervoort and Watson 2003: 41 (synonymy).

Record. QM G337451, microslide. Coll: off Fraser Island, Queensland, 25.3253 S, 154.0683 E to 25.3513 S, 154.076 E, 2350–2342 m, beam trawl, 11/06/2017.

Description. A small infertile colony 30 mm long with remnant hydrorhizal stolons. Stem fascicled, polysiphonic tubes thin, irregularly parallel, of same diameter as stolon.

Hydrothecae given off all around stem, tubular, a sharp outward bend in hydrotheca at junction of abcauline wall with stem; some hydrothecae widening almost imperceptibly to margin. Margin circular, everted, rim minutely outrolled; margin usually with many replications.

Perisarc throughout (preserved material) thin and lax.

Table 1. Measurements (in μm) of ***Acryptolaria angulata***

Distance between hydrothecae	900–1140
Hydrotheca	
length from abcauline bend, incl. replications	800–1020
diameter of margin	264–272

*Remarks***.** The strengthening buttresses reported in *Acryptolaria angulata* by Vervoort and Watson (2003) are actually abcauline intrathecal septa; these do not occur in the present specimen. Septae probably develop to strengthen the hydrotheca in strong water movement, not encountered by specimens in quieter deep-water conditions. The marginal replications of the hydrothecae considerably extends their length.

*Distribution***.** A widespread deep-water species recorded from the Indian Ocean, New Caledonia and rarely, New Zealand. The deepest previous record for the species is 913 m at the Kermadec Ridge.

Cryptolarella abyssicola (Allman, 1888)

Figure 1c–e

Cryptolaria abyssicola Allman, 1888: 40, pl. 18, fig. 2, 2a.

Cryptolarella abyssicola.– Marques et al. 2005: 711, fig. 1, Table 1, (synonymy, discussion).

Records. QM G337422, microslide. Coll: off Freycinet, Tasmania, 41.626 S, 149.5515 E to 41.6892 S 149.5843 E, 4022–4052 m, beam trawl, 18/05/2017. QM G337426, microslide. Coll: off Flinders Island Tasmania, 40.386 S, 148.928 E to 40.383 S 148.951 E, 932–1151 m, beam trawl, 20/05/2017. QM G337427, microslide. Coll: off Flinders Island Tasmania, 40.464 S, 149.3967 E to 40.464 S, 149.4255 E, 4114–4139 m, beam trawl, 20/05/2017. QM G337438, microslide. Coll: off Jervis Bay, New South Wales, 35.333 S, 151.258 E to 35.332 S, 151.214 E, 2650–2636 m, beam trawl, 29/05/2017. QM G337439, microslide. Coll: off Newcastle, New South Wales, 33.435 S, 152.702 E to 33.435 S, 152.665 E, 4280–4173 m, beam trawl, 30/05/2017. QM G337443, microslide. Coll: off central New South Wales coast, 30.099 S, 153.596 E to 30.128 S, 153.571 E, 1257–1194 m, beam trawl, 5/06/2017. QM G337448, microslide. Coll: off Byron Bay, New South Wales, 28.0544 S, 154.083 E to 28.097 S, 154.081 E, 999–1013 m, beam trawl, 9/06/2017. QM G337452, microslide. Coll: Coral Sea, Queensland, 23.587 S, 154.194 E to 23.617 S, 154.1947 E, 1013–1093 m, beam trawl, 13/06/2017. QM G337421, Coll: off Freycinet Tasmania, 41.7305 S, 140.1197 E, to 41.7913 S, 149.1558 E, 2751– 2820 m, beam trawl, 18/05/2017. QM G337431, Coll: Bass Strait, 39.552 S, 149.553 E, to 39.496 S, 149.598 E, 4197–4133 m, beam trawl, 23/05/2017. QM G337435, Coll: off Bermagui, New South Wales, 36.418 S, 150.8 E, 3980 m, beam trawl, 26/05/2017. QM G337440. Coll: off Newcastle, New South Wales, 32.985 S, 152.952 E, to 33.015 S, 152.913 E, 2704–2902 m, beam trawl, 31/05/2017.

*Description***.** Small lax colonies to several centimetres high; some colonies fertile.

Colonies fasciculated basally, ultimate branches monosiphonic. Hydrothecae numerous, tubular, given off from around branches in fasciculated sections, more or less subalternate on monosiphonic branches. Hydrotheca adherent to branch for more than half of length, abcauline wall variably concave, adcauline wall convex, curving smoothly outwards, free wall shorter than adnate wall. Hydrotheca narrowing basally but without floor. Margin circular, not everted, without replications.

Gonothecae large, sausage-shaped, adnate to outer stem tubes, body narrow proximally, becoming tubular, abcauline wall minutely wrinkled, orifice wide, circular, upturned to varying degrees.

Perisarc soft and thin throughout, colour (preserved material) grey.

Table 2. Measurements (in μm) of *Cryptolarella abyssicola*

Hydrotheca	
length	800–1800
width of margin	136–192
Gonotheca	
length	1700–2200
maximum width	320–600
width of orifice	336–464

*Remarks***.** Without a discernible floor, the length of the hydrothecae is highly variable, making it difficult to provide a precise estimate of length.

Cryptolarella abyssicola was first described from *Challenger* Station 160 from a depth of 4755 m south of Australia (42°42 S, 134°10 E) (Allman 1888). In his description Allman commented on the "vast depth" from which the species came, and the height of the colony, about 2 inches (=4.5 cm). *C. abyssicola* has since been recorded world-wide from Sierra Leone, the Azores, Tierra del Fuego, Peru and the Antarctic (Marques et al. 2005) and from abyssal depths under several specific names. The present specimens conform well to the redescription and dimensions of the holotype given by Marques et al. (2005). This survey indicates that *C. abyssicola* is a dominant abyssal species around southern Australia.

Distribution. Australia (type locality), Sierra Leone, Azores, Tierra del Fuego, Peru, Antarctic.

Family Hebellidae Fraser, 1912

Hebella macroplana sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:CC386770-19A6-4ACE-8F5C-91F9963120B8

Figure 1f

Record. QM G337336. Holotype, one microslide. Coll: eastern Bass Strait, Victoria, 39.552 S, 149.553 E to 39.496 S, 149.598 E, 4197–4133 m, beam trawl, 23/05/2017.

*Description***.** Five stolonal hydrothecae creeping on stem of an antipatharian. Colony entangled with remnants of an unidentifiable anthoathecate hydroid.

Hydrorhizal stolon smooth, thin. Pedicel of hydrotheca short, smooth, curved, passing upwards to diaphragm. Hydrothecae tubular, very large, slightly asymmetrical or symmetrical, adcauline side convex to above diaphragm, walls smooth to margin. Diaphragm a barely discernible transverse or slightly oblique ring. Margin circular, slightly everted, one hydrotheca with two widely separated marginal replications.

Perisarc very thin, smooth.

Table 3. Measurements (in μm) of *Hebella macroplana*

Hydrorhizal stolon, width	60–64
Hydrotheca	
length, diaphragm to margin	1740–1920
diameter of margin	520–584
diameter at diaphragm	160–192
length of pedicel	120–184

Remarks. One hydrotheca contains approximately 10 degenerated tentacles indicating that the structure it is not an empty gonotheca. The unsegmented hydrothecal pedicel is very short, and in some hydrothecae it is slightly curved to accommodate the asymmetry of the hydrotheca. The diaphragm varies from a membranous to a thin perisarcal ring.

Three genera considered were *Hebella, Halisiphonia* and *Scandia*; the latter two genera were rejected because they have long hydrothecal pedicels.

Hebella macroplana most resembles the Antarctic species *Hebella plana* Ritchie, 1907; however, the hydrotheca of *H. plana* is much smaller and has a longer and straighter pedicel [see Totton (1930); Briggs (1938); Boero et al. (1997)]. Although the present material is meagre and without gonothecae, the hydrotheca is extremely large and much bigger than any known species.

Etymology. The name alludes to the large hydrotheca compared with that of *H. plana*.

Hebella sp.

Figure 1g

*Record***.** QM G337403, one microslide. Coll: off Bermagui, New South Wales, 36.418 S, 150.8 E, 3980 m, beam trawl, 26/5/2017.

*Description***.** Three damaged stolonal hydrothecae creeping on stem of *Zygophylax concinna*. Stolon fragmented, very thin, tubular. Hydrothecal pedicel long, unsegmented. Hydrotheca long, expanding from a narrow conical base to diaphragm then gradually becoming tubular. Diaphragm a distinct perisarcal ring. Margin circular, rims fragmented.

Perisarc thin and fragile.

Table 4. Measurements (in μm) of *Hebella* sp.

Hydrorhizal stolon width	40
Hydrotheca	
length, diaphragm to margin	1400
diameter at margin (est.)	368
diameter of diaphragm	144
length of pedicel	240–320

Remarks. Although there are no hydrothecae with intact margins, sufficient remains to provide an estimate of marginal diameter. Although morphologically similar to *Hebella ritchiei* Vervoort, 1966 (=*Lafoea tenellula* Ritchie, 1911) from coastal New South Wales, the hydrothecae of the present material are much larger. The material is inadequate to ascribe it to a new species.

Family Zygophylactidae Quelch, 1885

Zygophylax concinna (Ritchie, 1911)

Figure 2 a, b

Zygophylax concinna Ritchie, 1911: 823, pl. 88, figs 3, 4.

Record. QM G337986, one microslide. Coll: off Bermagui, New South Wales, 36.418 S, 150.8 E, 3980 m, beam trawl, 26/5/2017. QM G337446, one microslide. Coll: off Byron Bay, New South Wales, 28.371 S, 154.6487 E to 28.3875 S, 154.617 E, 3825–3754 m, beam trawl, 9/06/2017.

Description. A broken, heavily fascicled and twisted stem originally about 15 mm long and one stem fragment 8 mm long with one undamaged hydrotheca.

Polysiphonic stem tubes parallel, giving off flaccid monosiphonic branches. Branch internodes long, thin, cylindrical, nodes transverse, narrow, a tumescence above and below node; one or two alternate hydrothecae on internode. Hydrotheca about halfway along internode, inserted on an inflated apophysis, distal node of apophysis transverse.

Pedicel of hydrotheca of one long, rarely two or three cylindrical segments expanding distally to diaphragm. Diaphragm a thin perisarcal ring situated high in hydrotheca; walls of hydrotheca above diaphragm more or less cylindrical or expanding a little to margin. Margin circular, transverse to hydrothecal axis, some slightly inclined, rim everted, often with several strong replications.

Perisarc of polysiphonic tubes thick, hydrocladia thinner, hydrothecae fragile, mostly broken.

Table 5. Measurements (in μm) of *Zygophylax concinna*

Internode	
length	700–780
width at node	40–52
adcauline length of apophysis	40–52
Hydrotheca	
pedicel, length to diaphragm	192–240
pedicel, width	100–140
length, diaphragm to margin excl. replications	320–400
diameter of margin	136–176
diameter of diaphragm	64–76

Remarks. *Zygophylax concinna* was first recorded from a fine sandy bottom at a depth of 100 m off Sydney, New South Wales (Ritchie 1911). Ritchie's small colony (Ritchie 1911, pl. 88, fig. 3) was probably young. The present specimens are probably parts of much larger complexly branched colonies; otherwise the material generally conforms to Ritchie's description of *Z. concinna*.

*Distribution***.** New South Wales, Australia. This is the second record of the species.

Family Haleciidae Hincks, 1868

Halecium sp.

Record. QM G337429, one microslide. Coll: near Flinders Island Tasmania, 39.462 S, 149.276 E to 39.465 S, 149.242 E, 2760–2692 m, beam trawl, 22/05/2017.

Comment. A large lax tangled, fascicled colony with two hydrothecae. Specimen too badly damaged for description.

Family Sertulariidae Lamouroux, 1812

Amphisbetia ramifera sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:0BB245B8-E3F4-421C-928A-CA2C1FB84A30

Figure 2 c, d

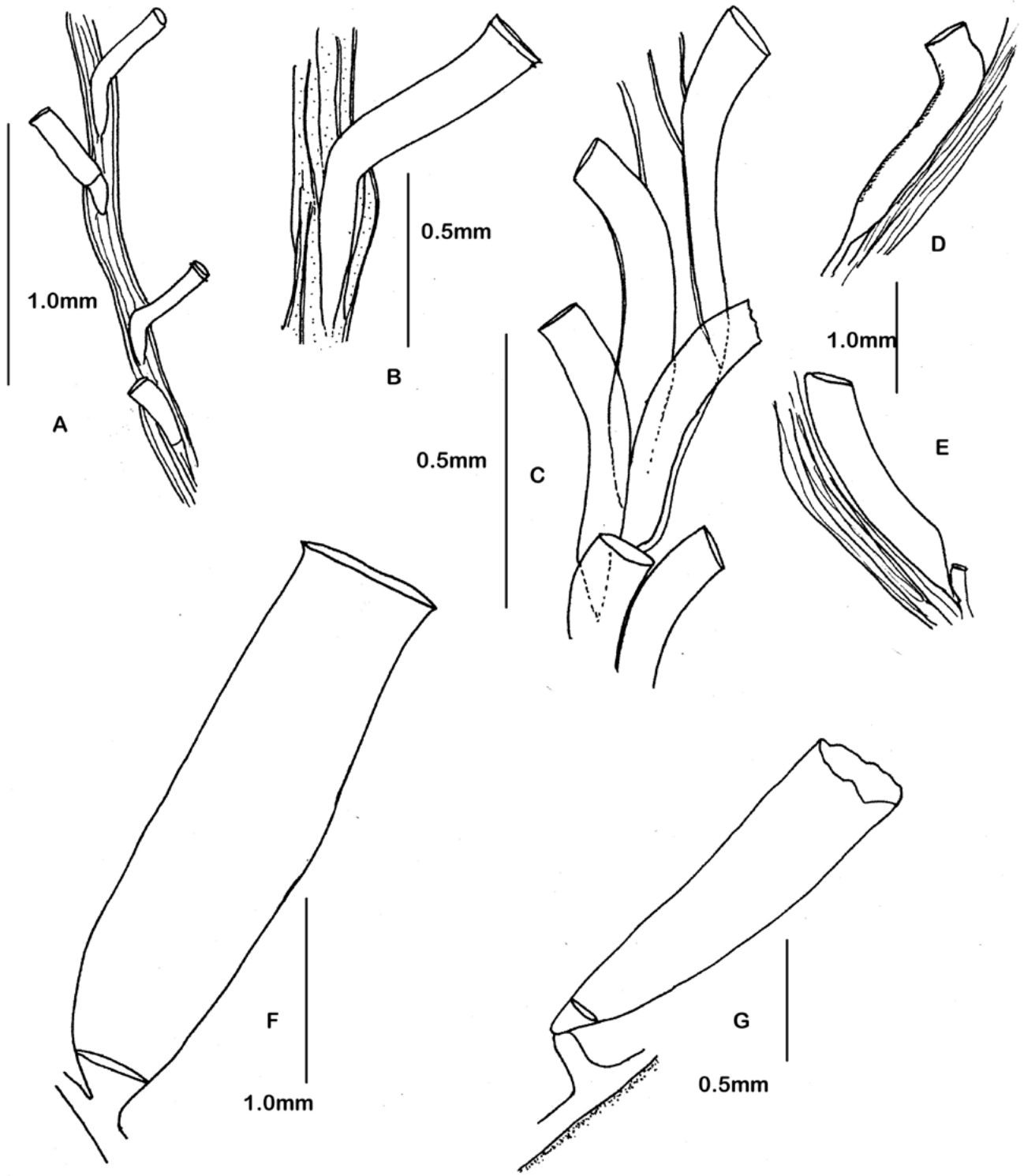

Figure 1. a–g. a, b, *Acryptolaria angulata*. a, distal monosiphonic stem. b, hydrotheca. c–e, *Cryptolarella abyssicola*. c, monosiphonic branch with subalternate hydrothecae. d, gonotheca with wrinkled abcauline wall and upturned margin. e, gonotheca with oblique margin. f, *Hebella macroplana* sp. nov., stolonal hydrotheca. g, *Hebella* sp., stolonal colony and pedicellate hydrotheca.

Record. QM G337425. Holotype, one microslide. Coll: near Flinders Island, eastern Bass Strait, Victoria, 40.386 S, 148.928 E to 40.383 S, 148.951 E, 932–1151 m, beam trawl, 21/05/2017.

Description. A branched stem fragment 5 mm long with four alternate branches on each side; stem and branches monosiphonic. Two tubular subopposite hydrothecae on stem internode, adcauline walls separated, nodes strong, transverse, deeply indented. Apophysis long, narrowing distally to transverse node, an axillar hydrotheca pointing along hydrocladium.

First branch internode long, athecate, expanding slightly to a strong opposed V-shaped joint. Branch internodes same as stem, nodes may be absent but where present transverse to slightly oblique, strongly contracted. Hydrothecae opposite, tubular, base of one hydrotheca usually slightly downwardly displaced with respect to that opposite. Lower adcauline wall of each pair adnate, wall straight to weakly convex basally, the convexity increasing towards free wall; free wall weakly convex or concave to margin. Abcauline wall smoothly concave, some walls slightly bulging just above base. Floor transverse to internode, a small downward septum from adnate wall passing into internode. Margin deep saddle-shaped, flanked by a pair of long, sharp lateral cusps.

Perisarc thick, colour (preserved material) shining golden brown.

Table 6. Measurements (in μm) of *Amphisbetia ramifera*

Stem	
internode length	480–720
width at node	144–200
Branch	
internode length	480–496
width at node	80–108
Hydrotheca	
length of abcauline wall (direct measurement)	176–180
length of adnate adcauline wall (direct measurement)	200–232
length of free adcauline wall	100–112
distance between marginal cusps	116–136
width of floor	112–120

Remarks. The fragment is probably an apical branch of a larger colony. The hydrothecae closely resemble *Amphisbetia minima* (Thompson, 1879), a common shallow water species in Australia and New Zealand. *A. minima* invariably has short unbranched stems unlike the branching habit of *A. ramifera*. In colony size and branching habit, *A. ramifera* resembles *Amphisbetia maplestonei* (Bale, 1884) but in contrast to *A. maplestonei* the hydrocladial hydrothecae of *A. ramifera* are in contact with each other, do not have an abcauline intrathecal septum and the marginal cusps are much more prominent. No other Australian species of *Amphisbetia* has the smoothly outward-curved hydrothecae and such prominent marginal cusps as *A. ramifera*.

Family Aglaopheniidae Marktanner-Turneretscher, 1890

Lytocarpia parvispiralis sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:DD8BF2A6-A3A6-4156-AB1E-1F03B1D2C408

Figure 2 e, f

Record. QM G337453. Holotype, one microslide. Coll: Coral Sea, Queensland, 23.7503 S, 154.5718 E to 23.7739 S, 154.5464 E 2093–2156 m, Brenke epibenthic sled, 14/06/2017. QM G337985. Paratype, one microslide from holotype colony.

Description. Infertile colony 90 mm long, broken in two. Hydrorhiza comprising a group of smooth tubular stolons coalescing to form parallel polysiphonic tubes of lower stem. Colony with three primary branches on upper stem section. Branches monosiphonic, cylindrical, with a row of up to 15 nematothecae below first hydrocladium.

Hydrocladia with many hydrothecae. Hydrocladium long, lax, apophysis large, distal node oblique, two nematothecae in a line below hydrocladium and one beside axil. Hydrocladial internode narrow, node distinct, slightly oblique, two partial septa passing into internode from base of hydrotheca, one below hydranth, the other about halfway along internode.

Hydrotheca occupying much of internode, slipper-shaped, abcauline and adcauline hydrothecal walls gently convex, adcauline wall fully adnate to internode. Margin slightly oblique to internode axis, anterior cusp tongue-shaped, followed by two moderately pointed cusps then three indefinite low cusps, interspaces between very shallow.

Median nematotheca digitate, very short, almost entirely adnate to hydrotheca, terminal orifice small, pointing upwards, open down to hydrotheca. Lateral nematotheca tubular, just reaching margin of hydrotheca, orifice sinusoidal down to internode. Cauline nematothecae the same as laterals. Hydranth with approximately 10 tentacles, hypostome mound-shaped.

Perisarc moderately thick throughout colony.

Table 7. Measurements (in μm) of *Lytocarpia parvispiralis*

Branch	
length of internode	568–648
width at node	144–152
Hydrocladium	
length of internode	608–632
width of node	68–88
Hydrotheca	
depth, posterior to margin (abcauline wall)	320–424
width of margin	208–240
length of median nematotheca	160–168
length of lateral nematotheca	80–112

Remarks. Unfortunately the preserved colony was not examined in detail prior to mounting. Its position on the microslide now prevents determination of whether the hydrocladia were spirally arranged. Its close resemblance to *Lytocarpia spiralis* (Totton, 1930) suggests that the hydrocladia may be spirally arranged. The hydrothecae are much smaller and the marginal cusps less prominent than in *L. spiralis* (see Vervoort and Watson 2003). *Lytocarpia parvispiralis* is clearly an abyssal congener of *L. spiralis,* a species common around New Zealand to depths of 1126 m.

Etymology. The name alludes to the smaller size of *L. parvispiralis* compared to its close congener *L. spiralis*.

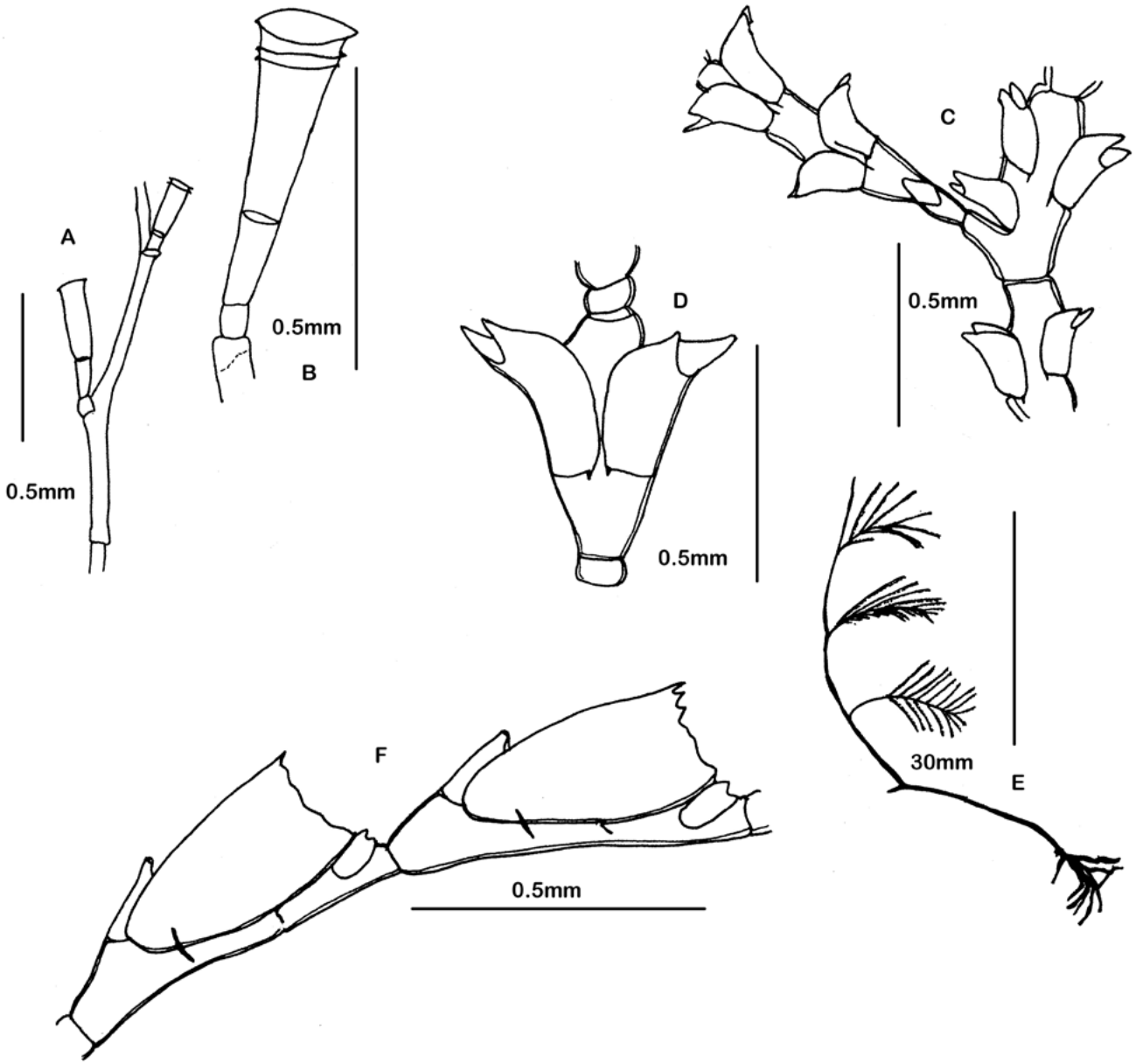

Figure 2. a–f. a, b, *Zygophylax concinna*. a, branch internodes with hydrothecae. b, hydrotheca. c, d, *Amphisbetia ramifera* sp. nov. c, stem with subopposite hydrothecae and axillar hydrotheca. d, branch with opposite hydrothecae. e, f. *Lytocarpia parvispiralis* sp. nov. e, holotype colony. f, hydrothecae, lateral view.

Discussion

Eight species were recovered from depths of 1151–4173 m. Species and their general localities are listed for comparison in Table 8. The list includes three previously known species (*Acryptolaria angulata, Cryptolarella abyssicola* and *Zygophylax concinna*), three newly described species (*Hebella macroplana, Amphisbetia ramifera* and *Lytocarpia parvispiralis*) and two species (*Hebella* sp. and *Halecium* sp.) which were too inadequate or in too poor a condition for identification.

Table 8. Species and their general locations.

Species	Records	General Location
Acryptolaria angulata (Bale, 1914)	1	Off Fraser Island, Queensland
Cryptolarella abyssicola (Allman, 1888)	12	Southern and eastern Australia
Hebella macroplana sp. nov.	1	Eastern Bass Strait, Victoria
Hebella sp.	1	Off Bermagui, New SouthWales
Zygophylax concinna (Ritchie, 1911)	2	Off Bermagui, New SouthWales
Halecium sp.	1	Off Flinders Island, Tasmania
Amphisbetia ramifera sp. nov.	1	Off Flinders Island, Tasmania
Lytocarpia parvispiralis sp. nov.	1	Coral Sea

Abyssal hydroids first recorded from the Australian region were *Cryptolarella abyssicola* and *Halisiphponia megalotheca* from *Challenger* Station 160 from a depth of 4755 m south of Australia (Allman 1888). There are no other published reports of the abyssal hydroid fauna of Australia. Previous moderately deep-water surveys from which hydroids have been reported are from the Great Australian Bight carried out by *F.I.S. Endeavour* (Bale 1914a; 1914b; 1915), the *Thetis* expedition off the coast of New South Wales (Ritchie 1911) and a recent survey of a marine protected area in the eastern Great Australian Bight (Watson 2018). None of these surveys were to depths greater than 100 m.

Cryptolarella abyssicola was by far the most abundant species with 12 records. The species has previously been recorded under various names from Sierra Leone, the Azores, Tierra del Fuego, Peru and the Antarctic (see Marques et al. 2005). It is considered a wide-ranging "true abyssal hydroid" (Vervoort 1985) recorded from 4600 m in the Southern Ocean (Allman 1888), from 2470 m in the Kermadec Trench (Vervoort 1966), from 6328 m from Peru (Vervoort 1972), and 4578 m from the mid-Atlantic Ridge (Calder and Vervoort 1998). The Australian range of *C. abyssicola* is now extended along the south-eastern Australian coast from cool temperate Tasmania in the south to the subtropical Coral Sea in the north.

Acryptolaria angulata is known from deep water in the Indian Ocean, Indo-west Pacific, New Caledonia and New Zealand (Vervoort and Watson 2003). *Zygophylax concinna* has been recorded only once previously from off Sydney (Ritchie 1911); the two new records extend its range south along the New South Wales coast and its depth range from 100 m to 3754 m.

Two newly described species, *Hebella macroplana* and *Amphisbetia ramifera,* were recovered from depths of 4133 m and 4131 m respectively in adjacent localities in eastern Bass Strait, Victoria. The record of *A. ramifera* at such depth is worthy of comment: branched, golden-brown species of *Amphisbetia* are a moderately common component of the shallow coastal water hydroid fauna of southern Australia (Watson 1973; pers. obs.). The present specimen may be a floating fragment from a shallow water colony entrained in the trawl.

The third newly described species, *Lytocarpia parvispiralis* from the Coral Sea, may, when more material is found, prove to be a diminutive subspecies of *Lytocarpia spiralis,* a common deep-water species from around New Zealand (Vervoort and Watson 2003).

There were surprisingly few species and few locality records in the collection considering the extensive latitudinal range of the survey. This may be an artefact of decrease in hydroid diversity with depth, the sampling gear or sampling of predominantly sedimentary substrates.

Acknowledgements

I thank Dr Merrick Ekins of the Queensland Museum and Dr Tim O'Hara of Museum Victoria for the opportunity to examine the hydroid collection. I also thank Josh Hatton of the Queensland Museum for sorting of hydroids and the scientific staff and crew of R.V. *Investigator* for their work during the *Investigator* IN2017-VB03 Cruise.

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