

Some deep-water cheilostome Bryozoa from the south coast of South Africa

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(with 1 figure and 1 table)

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Twelve species of deep-water cheilostome Bryozoa are reported from an incidental deep-water collection from the south coast of South Africa. The collection represents nine families and ten genera. One species, *Arthropoma lioneli* sp. nov., is new to science. The results reinforce the need for targeted sampling of South Africa's poorly known deep-water benthic fauna to assist the assignment of offshore marine protected areas within its Exclusive Economic Zone. With the addition of the new species, the bryozoan fauna of South Africa comprises no fewer than 271 valid marine species.

Key words: Bryozoa, Cheilostomata, new species, deep-water, benthic, taxonomy.

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INTRODUCTION

Previous studies on the deep-water (80–1300 m) bryozoan fauna by Hayward & Cook (1979, 1983) have revealed a remarkable diversity of no fewer than 159 species reported from the collections of the South African Museum's *Meiring Naudé* cruises of the late 1970s. The very low-effort collection reported on here revealed 12 species, one of which, *Arthropoma lioneli* sp. nov., is new to science. These findings reaffirm the need for targeted deep-water sampling of benthic bryozoans in order to reveal the potential regional diversity of this phylum. The focus of future surveys should be directed at the south and west coasts of South Africa where there is a paucity of knowledge of bryozoans. Following the remarkable discoveries made by Hayward & Cook (1979, 1983) future targeted work in this region is expected to yield significantly new knowledge of the deep-water fauna.

MATERIALS AND METHODS

General methods closely follow those of Florence *et al.* (2007). Bryozoan specimens were collected from by-catch of one bottom-trawled station (ANO183 – 35°40'S, 22°53'E, depth 95 m) along the south coast of South Africa during a survey of the *Dr Fritjov Nansen* (a demersal trawler) during May 2000. Only species that were not described in Florence

et al. (2007) are here fully described and figured from the current material as all others agreed closely with the descriptions of conspecific species provided by those authors. All material has been deposited in the collections of the Natural History Collections Department, Iziko Museums of South Africa, Cape Town. Catalogue numbers are provided in the 'material examined' sections below. The following abbreviations are used for the tabulated measurements of *Arthropoma lioneli* sp. nov.: autozooid length (Lz), autozooid width (Iz), orifice length (Lso), orifice width (Iso), ovicell length (Lov) and ovicell width (Iov).

SYSTEMATICS

Order **CHEILOSTOMATA** Busk, 1852

Suborder **NEOCHEILOSTOMINA** d'Hondt, 1985

Family **CALLOPORIDAE** Norman, 1903

Genus *Amphiblestrum* Gray, 1848

Amphiblestrum triangularis (O'Donoghue, 1924)

Lepralia triangularis O'Donoghue, 1924: 43, pl. 2, figs 11–12;

O'Donoghue & de Wateville 1944: 424.

Amphiblestrum triangularis O'Donoghue, 1957: 74; Florence *et al.* 2007: 12, figs 4A–B.

Amphiblestrum inermis Hayward & Cook, 1983: 12, fig. 1D–F.
not *Membranipora inermis* Kluge, 1914: 663, pl. 34 fig. 6.

Material examined

Current material: SAMC-A28657, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28569, Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999.

Remarks

The confused synonymy of *Amphiblestrum triangularis* (O'Donoghue, 1924) with *A. inermis* (Kluge, 1914) was resolved by Florence *et al.* (2007). The current specimens agree closely with a specimen from Bakoven (SAMC-A28569) described by Florence *et al.* (2007).

Family **CANDIDAE** d'Orbigny, 1851

Genus **Menipea** Lamouroux, 1812

Menipea ornata (Busk, 1852)

Cellularia ornata Busk, 1852: 20 pl. 20, figs 3–4.

Menipea ornata: Harmer, 1923: 34; Hayward & Cook 1983: 39; Florence *et al.* 2007: 21, figs 7 F–I.

Menipea flabellum Marcus, 1922: 13, fig. 7.

Cellularia infantae O'Donoghue, 1924: 30, pl. 1 (fig. 6); O'Donoghue & de Watteville 1935: 30; O'Donoghue & de Watteville 1937: 12.

Material examined

Current material: SAMC-A28658, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28588, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 15 m, collected by W. Florence, 24 April 1999. SAMC-A28589, Homestead Plateau, Oudekraal (33°58'90"S, 18°21'30"E), depth 10 m, collected by W. Florence, 30 April 1999.

Remarks

The confused synonymy associated with this species has been cleared up by Hastings (1943: 332). The current specimens agree closely with specimens from Oudekraal (SAMC-A28588, SAMC-A28589) described by Florence *et al.* (2007).

Menipea marionensis Busk, 1884

Menipea marionensis Busk, 1884: 21, pl. 4, figs 3, 3a; Harmer 1923: 341, pl. 17, fig. 22; pl. 19 figs 43–45. Hayward & Cook 1983: 40. Florence *et al.* 2007: 23, figs 8E–I.

Material examined

Current material: SAMC-A28659, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28655, Castle Rock, False Bay (34°14'S, 18°29'E), depth 15 m, collected by G. Isaacs, 2 March 2000.

Remarks

This species is very similar to *Menipea triseriata* but differs from it by having a more prominent gymnocyst, one

distolateral spine per outer zooid and nine zooids per internode as opposed to 15. The current specimens agree closely with a specimen from False Bay (SAMC-A28655) described by Florence *et al.* (2007).

Family **ASPIDOSTOMATIDAE** Jullien, 1888

Genus **Aspidostoma** Hincks, 1881

Aspidostoma livida (Hayward & Cook, 1983)

Fig. 1A–C

Aspidostoma livida Hayward & Cook, 1983: 36, fig. 10.

Material examined

Current material: SAMC-A28660, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000.

Description

Colony erect, bilaminar and reticulate, forming broad plates. Deep blue-grey in colour when alive and when dried. Fenestrulae long and oval occurring frequently throughout the colony. Autozooids large and hexagonal, convex, frontal surface granular and separated by distinct grooves. Frontal wall convex but becoming concave towards the opesia; proximal edge of opesia with thick 'axehead-shaped' lip with thick median edge extending proximally from it. Distal end of zooid raised as a prominent hood. Ovicell globose, flattened frontally and coarsely granular; opening *via* a hooded aperture located distal to the zooid operculum. Vicarious avicularia sparsely scattered over the colony; rostrum acute triangular and directed distolaterally. No spines were observed.

Substratum, depth range and ecology

May be found encrusting rocks and stones in sublittoral waters. The older or worn parts of the colony usually colonized by other bryozoans and entoprocts. Depth range: 95–700 m.

Geographic distribution

This species has been reported only from South Africa and is distributed from deeper waters of Mossel Bay to the Wild Coast along the South African coastline.

Remarks

This species is easily identified and is unique from other congeneric species in that the only other erect species of *Aspidostoma* develop cylindrical colonies as opposed to the reticulate anastomosing form of the current specimen. The specimen is consistent with the description and figured specimen of Hayward & Cook (1983).

Family **ADEONELLIDAE** Gregory, 1893

Genus **Adeonella** Busk, 1884

Adeonella pluscula Hayward, 1988

Adeonella pluscula Hayward, 1988: 181, fig. 28A–D; Florence *et al.* 2007: 12, fig. 4A–B.

Material examined

Current material: SAMC-A28661, station ANO183

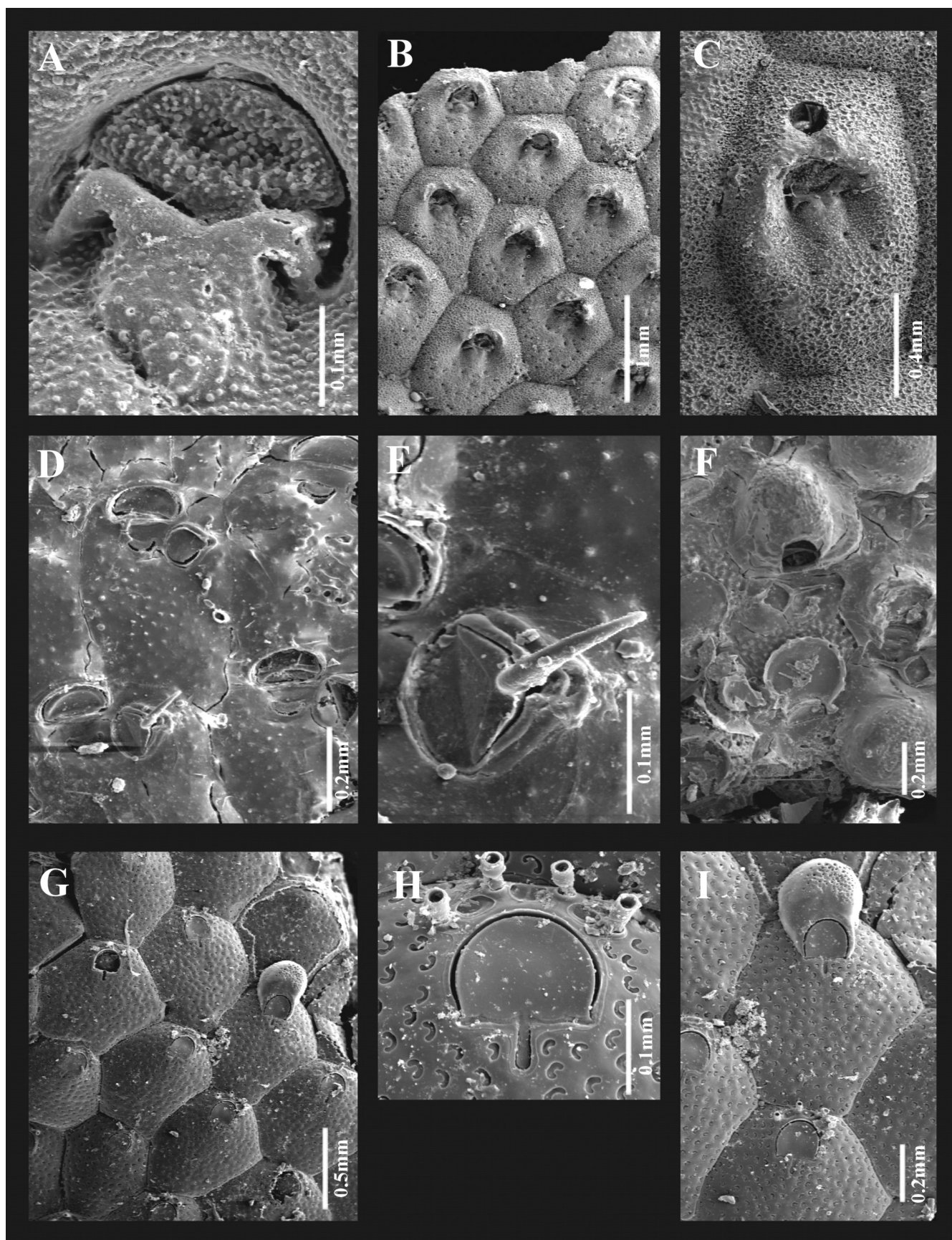


Fig. 1. A–C, *Aspidostoma livida* (Hayward & Cook, 1983). D–F, *Flustramorpha marginata* (Krauss, 1837). G–I, *Arthropoma lioneli* sp. nov. (SAMC-A28665).

(33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28609, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by W. Florence, 12 March 2000. SAMC-A28610, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 15 m, collected by G. Isaacs, 24 April 1999.

Remarks

Adeonella pluscula was first described by Hayward (1988). He noted that the branches of this colony are very broad at the growing margins and consist only of autozooids and gonozooids whereas the lateral edges of the branches consist only of avicularia and kenozooids. The current specimens agree closely with descriptions in Hayward (1988) and specimens from False Bay (SAMC-A28609) and Oudekraal (SAMC-A28610) described by Florence *et al.* (2007).

Family **ROMANCHEINIDAE** Jullien, 1888

Genus ***Escharoides*** Milne Edwards, 1836

Escharoides contorta Busk, 1854

Escharoides contorta Busk, 1854: 89, pl. 108, figs 1–3; O'Donoghue 1957: 88, figs 10–11; Hayward & Cook 1983: 47.
Mucronella contorta: Busk 1884: 155, pl. 20, fig. 9; O'Donoghue & de Watteville 1937: 18.

Material examined

Current material: SAMC-A28662, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28618, Homestead Plateau, Oudekraal (33°58'90"S, 18°21'30"E), depth 12 m, collected by W. Florence, 30 April 1999.

Remarks

Although the current specimen is very worn and collected from the seabed in the region of fragments of other dead colonies it is easily recognizable as *Escharoides contorta*. This species is most similar to *E. distincta* (Hayward & Cook, 1979) but differs from it in the orientation of the oral spines and the morphology of the proximal-median lip. The current specimen agrees closely with a specimen from Oudekraal (SAMC-A28618) described by Florence *et al.* (2007).

Family **MICROPORELLIDAE** Hincks, 1879

Genus ***Flustramorpha*** Gray, 1872

Flustramorpha marginata (Krauss, 1837)

Fig. 1D–F

Flustra marginata Krauss, 1837: 35, fig. 3.
Flustramorpha marginata Busk, 1884: 135, pl. 20, fig. 8; Hayward & Cook 1979: 80; Hayward & Cook 1983: 84, fig. 20B–C.

Material examined

Current material: SAMC-A28663, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000.

Description

Colony erect, bilaminar and foliaceous. Light brown when alive and dark yellow when dry. Autozooids are hexagonal, broad and flat, arranged multiserially alternating; sepa-

rated by distinct raised sutures. Primary orifice semicircular with distinct lateral condyles. Frontal shield granular with numerous small pores and a medially positioned, crescentic ascopore. Avicularium adventitious and positioned proximolaterally to the orifice; rostrum oval with a long setiform mandible. Ovicell prominent.

Substratum, depth range and ecology

Lives erect on hard substrata. Depth range: 80–450 m.

Geographic distribution

This species has been reported only from South Africa and is distributed from offshore of Mossel Bay to Sodwana Bay.

Remarks

Hayward & Cook (1983) pointed out the difficulties in distinguishing between *Flustramorpha* species. *F. marginalis* is most similar to *F. flabellaris* (Busk, 1854) and *F. angusta* (Hayward & Cook, 1979). *F. marginalis* has avicularia with long setiform mandibles and a palate that is orientated at an oblique, or perpendicular, angle to the frontal plane as opposed to short acuminate mandibles and a parallel palate in *F. flabellaris*. *F. angusta* has a proportionally small, narrower and depressed ovicell, which is progressively obscured by secondary calcification, and a semi-elliptical orifice with a straight proximal border that distinguishes it from *F. marginalis*.

Family **PETRALIELLIDAE** Harmer, 1957

Genus ***Mucropetraliella*** Stach, 1936

Mucropetraliella asymmetrica Hayward & Cook, 1983

Mucropetraliella asymmetrica Hayward & Cook, 1983: 67, fig. 18.

Material examined

Current material: SAMC-A28664, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28644 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by W. Florence, 12 March 2000.

Remarks

This species was first described by Hayward & Cook (1983), who discussed its similarities to *M. watersi* (Harmer, 1957). The current specimen agrees closely with Hayward & Cook's (1983) description as well as the type specimen and is easily recognizable. This record represents the most western occurrence of *M. asymmetrica* at rather a shallow depth, suggesting that this species has a wider bathymetric and geographic range than previously thought.

Family **LACERNIDAE** Jullien, 1888

Genus ***Arthropoma*** Levisen, 1909

***Arthropoma lioneli* sp. nov.**

Fig. 1G–I, Table 1

Arthropoma sp. Hayward & Cook 1983: 70, fig. 17D.

Etymology

Honorific for my late father, Lionel Florence, who passed

Table 1. Measurements (in millimetres) of *Arthropoma lioneli* sp. nov. material.

	<i>n</i>	\bar{x}	S.D.	Range
Lz	20	1.01	0.09	0.89–1.20
Iz	20	0.93	0.19	0.60–1.34
Lso	20	0.16	0.02	0.14–0.18
Iso	20	0.18	0.01	0.16–0.20
Lov	10	0.39	0.01	0.37–0.40
lov	10	0.46	0.03	0.43–0.52

away during the drafting of this manuscript and who deserves any credit that this work earns.

Material examined

Holotype: SAMC-A28665, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000.

Paratypes: SAMC-A28666, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000.

Voucher material: *Arthropoma lioneli* determined as *Arthropoma* sp. by Hayward & Cook (1983): SAMC-A26845, station SM163 (33°04.6'S, 28°06.6'E), depth 90 m, collected by SAM Meiring Naudé, 26 May 1978; SAMC-A26763, station SM185 (33°39.3'S, 27°11.6'E), depth 90 m, collected by SAM Meiring Naudé, 31 May 1978;

Other material: *Arthropoma ceciliai*: SAMC-A26611, station SM185 (33°39.3'S, 27°11.6'E), depth 90 m, collected by SAM Meiring Naudé, 31 May 1978; BMNH 97.5.1.730, Port Phillip Heads, Australia. *Phonicosia circinata* determined as *Arthropoma circinatum* by Hayward & Cook (1983): BMNH 1983.11.5.49, station SM163 (33°04.6'S, 28°06.6'E), depth 90 m, collected by SAM Meiring Naudé, 26 May 1978.

Description

Colony encrusting unilaminar; forming irregular patches. White when alive and when dry. Autozooids hexagonal and convex; separated by distinct grooves (*ca.* 1.01 × 0.93 mm). Frontal shield smooth, perforated by numerous small kidney-shaped pores, becoming less distinct in later ontogeny; indistinct imperforate ridge below the primary orifice but not sufficiently developed to be considered an umbo. Primary orifice with D-shaped poster, slightly wider than long (*ca.* 0.16 × 0.18 mm excluding sinus), proximal border straight and indented medially by a deep, narrow, sinus that is approximately longer than half the length of the poster; condyles thick, smooth, rounded towards each other thereby narrowing the entrance of the sinus. Three to six distal oral spines present. Ovicell prominent, globular and wider than long; frontal surface slightly granular and one distinct spine base on either side, distolateral, of the primary orifice. No avicularia observed.

Substratum, depth range and ecology

Forms thick encrustations on mollusc shells. Depth range: 80–95 m.

Geographic distribution

This species is known only from South Africa and has a south-coast distribution range from False Bay to Port Alfred.

Remarks

Arthropoma is a small genus of lacernid Bryozoa that previously comprised just two valid recent species; *A. ceciliai* (Audouin, 1826) and *A. inarmata* Gontar, 1993. The latter has been reported only from the Kuril Islands in Russia (Gontar, 1993). While *A. ceciliai* has a known warm-temperate to circumtropical distribution; it has also previously been reported from South Africa by Hayward & Cook (1983). In addition, these authors also reported on two other species from South Africa; *A. circinatum* (MacGillivray, 1869) and an unnamed species, *Arthropoma* sp. During the current study a re-examination of Hayward and Cook's specimens supports the synonymic treatment of *A. circinatum* (BMNH 1983.11.5.49) with *Phonicosia circinata* (MacGillivray, 1869), in accordance with Gordon (1984). Examination of the fragmentary specimens of *Arthropoma* sp. Hayward & Cook 1983 (SAMC-A26845, SAMC-A26763), reveals that it is consistent in all discernible characters with the current specimens and is herein synonymized with *A. lioneli* sp. nov.

The narrow slit-like oral sinus, small kidney shaped frontal pores and the presence of oral spines primarily distinguishes *Arthropoma lioneli* sp. nov. from all other *Arthropoma* species; *A. ceciliai* and *A. inarmata* possess a wide or U-shaped oral sinus and round frontal pores, and lack oral spines. *A. lioneli* sp. nov. has larger, more hexagonal, autozooids than both *A. ceciliai* (0.7–0.8 × 0.4–0.6 mm) and *A. inarmata* (0.8–0.1 × 0.52–0.60 mm). In addition, *A. lioneli* also differs from *A. ceciliai* as its condyles are rounded towards each other rather than being flat and its ovicell frontal wall is not tessellate but rather only finely granular. The above-mentioned differences are herein considered sufficient to warrant the erection of *A. lioneli* sp. nov.

Family PHIDOLOPORIDAE Gabb & Horn, 1862

Genus *Schizoretepora* Gregory, 1893

Schizoretepora tessellata (Hinks, 1878)

Retepora tessellata Hinks, 1878: 358, pl. 19, figs 9–12; Busk 1884: 112, pl. 27, fig. 8; O'Donoghue & de Watteville 1935: 210; O'Donoghue & de Watteville 1937: 15; O'Donoghue 1957: 91.

Schizoretepora tessellata: Hayward & Cook 1983: 106, fig. 24 H.

Material examined

Current material: SAMC-A28667, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. *Other material*: SAMC-A28648 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by G. Isaacs, 12 March 2000; SAMC-A28649 Homestead Plateau, Oudekraal (33°58'90"S, 18°21'30"E), depth 12 m, collected by G. Isaacs, 30 April 1999; SAMC-A28650 Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by G. Isaacs, 24 April 1999.

Remarks

This species is extraordinary in terms of its variable colony morphology. It is either unilaminar and fenestrate or bilaminar and sheet-like, or both in the same colony, with fenestrulae present at the growing edge. Hayward & Cook

(1983) noted that there is variability in the width of the primary orifice in various specimens from Australia and South Africa. This was also noted in the current specimens. Furthermore the Australian specimens developed long (0.8 mm) antenniform spines, whereas the present specimens from South Africa appear to have consistently shorter spines (mean = 0.5 mm, $n = 20$). The avicularia and ovicells appear to be consistent with the specimens of Hayward & Cook (1983) and therefore also with the Australian specimens.

Genus *Reteporella* Busk, 1884

Reteporella lata (Busk, 1884)

Sertella lata Busk, 1884: 115, pl. 27, fig. 1; Hayward & Cook 1983: 105, fig. 24F–G.

Material examined

Current material: SAMC-A28668, station ANO183 (33°56'S, 18°22'E), depth 95 m, collected by G. Harkins, 30 May 2000. **Other material:** SAMC-A28651 Homestead Plateau, Oudekraal (33°58'90"S, 18°21'30"E), depth 12 m, collected by G. Isaacs, 30 April 1999; SAMC-A28652 Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by W. Florence, 24 April 1999.

Remarks

Hayward & Cook (1983) defined the most characteristic feature of *Reteporella lata* to be the pear-shaped ovicell with its long labellum. These authors suggest that Busk (1884) missed this in his illustration of the type specimen of *R. lata*, but upon re-examination they found that the type was consistent with their Meiring Naudé specimens. The present specimens in this study are consistent with those of the above-mentioned works.

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