

# Taxonomy of shallow-water Bryozoa from the west coast of South Africa

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(with 21 figures and 15 tables)

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Sixty-three species of shallow-water Bryozoa, from 12 localities along the west coast of South Africa, are described and represent three orders (Cyclostomata, Ctenostomata and Cheilostomata), 33 families and 46 genera. Five species are cyclostomes, three are ctenostomes and 55 are cheilostomes. The relative dominance of the Cheilostomata is not surprising considering the relatively low diversity of cyclostomes and ctenostomes in marine habitats. Of the 63 species, 48 are redescribed from current material. Fifteen species (namely *Eurystrotos planus*, *Membranipora rustica*, *Chaperia septispina*, *Klugeflustra jonesii*, *Bicellariella bonsai*, *Beania minuspina*, *Micropora latiavicula*, *Thalamoporella spiravicula*, *Escharoides custodis*, *Bitectipora umboavicula*, *Schizosmittina lizya*, *Microporella madiba*, *Fenestrulina elevora*, *Celleporina solida* and *Rhynchozoon abscondum*) are new to science, of which seven are found in seven genera (*Eurystrotos*, *Klugeflustra*, *Thalamoporella*, *Bitectipora*, *Schizosmittina*, *Fenestrulina* and *Celleporina*) that are newly recorded from South Africa. Thirteen species are recorded from the west coast for the first time, one of which, *Hippomonavella formosa*, is a new record for South Africa. Including the species described here, approximately 270 valid species, representing three orders (Cyclostomata, Ctenostomata and Cheilostomata), 74 families, and 130 genera have been recorded from South Africa. An accurate species number is not yet possible from this region as there are still outstanding problems with synonymies.

**Key words:** taxonomy, systematics, Bryozoa, west coast, South Africa, diversity, scanning electron microscopy.

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## INTRODUCTION

South African marine systems have been severely over-exploited and degraded due to development and pollution.

As a consequence, the biodiversity of this region has been adversely affected through the depletion of key species and the disturbance of ecosystems. Documenting biodiversity is

essential to ensure the sustainable use of the marine resources of South Africa. To date approximately 11 000 coastal protist and animal species have been described from South Africa, with seaweeds constituting some 800 species (Gibbons *et al.* 1999; Gibbons 2000; Bolton & Stegenga 2002). Of these, approximately 17% of protists and animals are endemic to South Africa. The number of South African species previously described may be a gross underestimation of the total biota, as our knowledge of the region's taxonomic richness is largely incomplete (Gibbons *et al.* 1999). This is in part because some taxonomic groups, such as molluscs and fishes, have received considerably more attention than others (Gosliner 1987a, 1987b; Prochazka 1994; Turpie *et al.* 2000). The lack of both suitably trained taxonomists and interest in taxonomy in South Africa has compounded this problem (Gibbons *et al.* 1999). Although they are the most numerous organisms inhabiting the marine environment, certain invertebrate taxa and non-foraminiferan protists have largely been poorly studied and the number of taxonomists working on them in South Africa is minimal when compared to less-speciose larger-bodied taxa (Gibbons *et al.* 1999). There may, thus, be some doubt over the figures quoted above.<sup>1</sup> Even though invertebrates such as polychaetes, hydroids, echinoderms, amphipods, decapods, nudibranchs, octocorals and ascidians have been given much attention (Clark 1923; Day 1967; Millard 1975; Clark & Courtman-Stock 1976; Griffiths 1976; Kensley 1978, 1981; Gosliner 1987a, 1987b; Williams 1992a, 1992b; Monniot *et al.* 2001), experts working on them are unanimous in their opinion that these taxa may be significantly more diverse than those documented (Gibbons 2000). Conversely, other groups such as nematodes, protists, Porifera and bryozoans have been poorly studied in South Africa and the available literature on these taxa has become largely outdated and fragmented.

The global bryozoan fauna is presently unknown. Furthermore, the oft-quoted figure of 4000 appears to be unrealistic, as approximately 1000 species of bryozoans were described in the second half of the twentieth century and the rate of discovery exhibits no signs of decreasing (Hayward & Ryland 1999). The true number of bryozoan species that exist worldwide is possibly more than twice the estimated 4000 (Hayward & Ryland 1999). The known South African bryozoan fauna constitutes approximately 255 species, of which 67 (26%) were reported as new by Hayward & Cook (1979, 1983). The new level of taxonomic accuracy exhibited by modern day bryozoologists, the available technology and the increased number of unexamined habitats being examined, explain these leaps of discovery. (Hayward & Ryland 1999).

The study of the internal anatomy of bryozoans requires light microscopy, making it quite unsurprising that early naturalists were unable to distinguish bryozoans from coelenterates and classified them both as plants. Bryozoological research dates back almost 450 years when Guillaume Rondelet first described the 'animal nature' of bryozoans in 1555 (Wyse Jackson & Spencer Jones 2002). J. V. Thompson first published the name 'Polyzoa' in 1830 and then one year later the name Bryozoa was coined by C.G. Ehrenberg, the German palaeontologist (Wyse Jackson

& Spencer Jones 2002). Busk (1852) erected the orders Ctenostomata, Cyclostomata and Cheilostomata based on specimens he examined at the British Museum and which form the basis of classification for all extant marine bryozoans. Thereafter George Allman erected the Classes Gymnolaemata and Phylactolaemata in 1856 (Wyse Jackson & Spencer Jones 2002). More recently, Soule & Soule (1970) and later Sandberg (1971) were the first authors to publish bryozoan works based on scanning electron microscopy (SEM) and ultrastructural studies. Subsequently SEM has become a fundamental part of morphological studies on the Bryozoa.

Early bryozoologists relied on drawings and light microscopy for identification and descriptions. Earlier works on descriptions of bryozoans are fragmented and are not always accompanied by good illustrations. As an example, Busk (1852, 1854, 1875, 1884, 1886) in his monographs of the Bryozoa included descriptions and illustrations that are often rather stylized and, of course, lack the details that are revealed by SEM. Publications by O'Donoghue & de Wateville in the early 1900s provided drawings and in some cases photographs, but it must be said that these were at times 'cartoonish' and inadequately illustrated, lacking any means of scaling. More recently Hayward & Cook (1979, 1983) used both scaled drawing and scanning electron micrographs. One just has to take a look at the monographs produced by Gordon (1984, 1986, 1989) and Hayward & Ryland (1998, 1999) to appreciate the usefulness of SEM to bryozoan taxonomy. Hayward & Ryland (1999) even go as far as predicting that 'a clear account of all benthic bryozoan faunas, and a new, stable taxonomy will not be achieved until the type species of each genus has been restudied using SEM'.

Taxonomic research on the South African Bryozoa has a brief and fragmented history. Busk (1852, 1854, 1875) described a number of specimens from South Africa that appear to have been collected mainly in the Algoa Bay region and deposited in the Natural History Museum, London. Busk (1884, 1886) subsequently described the bryozoan collections made during the cruises of *HMS Challenger* (1873–1876) and included a few South African species, from around Simon's Bay, the Cape of Good Hope and also Station 142 to the south of the Cape. There have only been a few subsequent reports featuring South African species. These include Hincks (1880), Waters (1904, 1907, 1909, 1916, 1918), Levinsen (1909), Kluge (1914), Canu & Bassler (1920), and Marcus (1922). O'Donoghue (1924) attempted to collate all records of previous work on South African bryozoans and described the collection made by the *S.A. Pickle*, commissioned by the South African Museum, during 1920 and 1921. This study was followed by O'Donoghue & de Wateville (1935, 1937, 1944) and O'Donoghue (1957), which were based on the collections of South African bryozoans by local researchers, T.A. Stephenson and N.A.H. Millard. Day (1974) provided the first list, with a key, for South African bryozoans. More recently, Hayward & Cook (1979, 1983) described the deep-water collections made by the *R.V. Meiring Naude* (which was commissioned by the South African Museum) from the inner and outer shelf along the South African south coast. In addition Hayward (1981), Cook (1982) and Hayward (1988) reported on 25 species of the genus *Adeonella* from South Africa.

<sup>1</sup>Example; estimates of free-living protists around South Africa may be as high as 1000 to 10 000, with fewer than 400 described to date (Gibbons 2000).

Notably, the studies listed above have focussed on the south and east coasts of South Africa, and at depths greater than 100 m.

Between 1852 and 1875, George Busk contributed three volumes of a catalogue on the marine Polyzoa in the collection of the British Museum (Busk 1852, 1854, 1875). These three volumes described, albeit non-comprehensively, some 308 species of bryozoans of which 25 were recorded from Algoa Bay and further east along the South African coastline. Two cyclostome species, *Lichenopora ciliata* (Busk, 1875) and *Tennysonia stellata* (Busk, 1884), were reported from the Cape of Good Hope. Busk (1884, 1886) reported on the scientific results of the voyage of *HMS Challenger* during the years 1873–76. This report produced descriptions of 28 cheilostome and two cyclostome bryozoans from Simon's Bay and south of the Cape of Good Hope, South Africa.

In his account of the history of the British Marine Polyzoa, Hincks (1880) listed some 13 species of bryozoans from South Africa, mainly from the south and east coasts. These specimens appear to have been collected at some stage by W. Oates and some may have been acquired by Eliza Jelly. Hincks (1891) subsequently published a paper on South African (and other) bryozoans (Polyzoa) as part of a 'contribution towards the general history of the marine Polyzoa'. Seven species, *Flustra spinuligera* (Hincks, 1891), *F. nobilis* (Hincks, 1891), *Schizoporella bimunita* (Hincks, 1891), *S. inconspicua* (Hincks, 1891), *S. scabra* (Hincks, 1891), *S. pectinata* (Busk, 1884) and *Lepralia lancifera* (Hincks, 1891), were recorded from Port Elizabeth.

In the early 1900s, A.W. Waters reported on 18 species of Bryozoa from South Africa in six different publications (Waters 1904, 1907, 1909, 1916, 1918, 1919). Seven of these species were recorded in a distribution list for species collected in the Antarctic or Subantarctic regions (Waters 1904). The Antarctic species include *Chaperia cervicornis* (Busk, 1884), *Hippothoa divaricata* (Lamouroux, 1821), *Turritigera stellata* (Busk, 1884), *Idmonea atlantica* (Forbes in Johnston, 1847) and *Heteropora claviformis* (Water, 1904), while *Beania magellanica* (Busk, 1852) and *Microporella malusii* (Audouin, 1826) were from the Subantarctic. Waters (1909, 1918) described eight species from the collections of Cyril Crossland. Many of these works by Waters merely noted the distribution of species present in South Africa and in many instances were erroneous.

Levinsen in his morphological and systematic studies of the cheilostome bryozoans in the early 1900s recorded 12 species from South Africa and where possible made reference to Hincks's and Busk's illustrations (Levinsen 1909). Five years later, G.A. (Herman) Kluge recorded six species of Bryozoa that were collected in South Africa as part of the German South Polar Expedition of 1901–1903 (Kluge 1914). These include *Aetea annulata* (Kluge, 1914), *Bugula calathus* (Norman, 1868), *Beania vanhoffeni* (Kluge, 1914), *Membranipora polystachys* (Kluge, 1914), *Chaperia multifida* (Busk, 1884) and *Chaperia acanthina* (Lamouroux, 1825). Canu & Bassler (1920, 1922) recorded one cheilostome species, *Mastigophora hyndmanni* (Johnston, 1847), and two cyclostome species, *Tennysonia stellata* (Busk, 1867) and *T. contorta* (Busk, 1875), from South Africa. Likewise, Marcus (1922) recorded 20 species of bryozoans from the

Cape of Good Hope in the collection of the Gothenburg Museum.

Charles O'Donoghue, along with Dora de Watteville (in later years), attempted to record comprehensively the bryozoan fauna of South Africa (O'Donoghue 1924, 1957; O'Donoghue & de Watteville 1935, 1937, 1944). O'Donoghue (1924) reported on the bryozoan fauna collected by the *S.S. Pickle*, commissioned by the Fisheries and Marine Biological Survey during 1920–1921 and headed by Dr John Gilchrist. In addition, this work also included specimens collected on the shore and by trawlers.

These specimens were collected from Table Bay, False Bay, Cape Infanta and as far east as the mouth of the Illovo River. In this paper, O'Donoghue recorded 55 species of bryozoans of which 17 species were previously reported from South Africa, 15 were reported from elsewhere and 25 were new to science. O'Donoghue and de Watteville (1935, 1937, 1944) recorded a total of 68 species, collected from South Africa by T.A. Stephenson during ecological studies by the University of Cape Town, of which 17 were new records for this region, and 14 were considered new to science. O'Donoghue (1957) recognized 36 species of which one, *Parasmittina natalense* (O'Donoghue, 1957), was new and three species, *Acanthodesia savartii* (Audouin, 1826), *Conopeum reticulum* (Linnaeus, 1767) and *Cryptosula pallasiana* (Moll, 1803) appeared to be new records for South Africa.

In their account of the bryozoan fauna of the deeper shelf waters of the southeastern South African coast, Hayward & Cook (1979) described a total of one ctenostome, two cyclostomes and 48 cheilostome bryozoans. Of these, 23 species were considered new to science and three new genera, *Notocoryne*, *Leiosalpinx* and *Inversiscaphos*, and one new family, Setosellinidae were introduced. Of the previously reported species, 14 appeared to be new records for South Africa and four for the Indian Ocean. The 1977 and 1979 Meiring Naude cruises, which covered shallower depths with most stations not exceeding 100 m, of the same area yielded a total of 114 cheilostomes and 16 cyclostomes (Hayward & Cook 1983). A total of 44 new species was described and one new genus, *Dactylostega* was introduced. The authors noted that the South African bryozoan fauna includes a high proportion of endemic species, but also exhibits a marked faunal affinity with the Indo-West-Pacific region.

Hayward & Cook (1983) suggested that previous studies on the Bryozoa of South Africa failed to reveal more than a fraction of the potential faunal complexity for this region. Previous studies of the South African bryozoan fauna have recorded ~255 species, mainly from the deep waters of the south and east coasts. This study, therefore, aims to identify and describe the shallow-water bryozoan fauna from the west coast of South Africa.

#### MATERIALS AND METHODS

For details on the dynamics of the west coast region, see Shannon (1985), Branch & Griffiths (1988) and Branch & Branch (1993). The following 12 sites were sampled along the west coast of South Africa (see Fig. 1): **A**, A-Frame (False Bay); location 34°13'S, 18°28'E; average depth: 8 m. **B**, Castle Rock (False Bay); location: 34°14'S, 18°29'E; average depth: 10 m. **C**, Oudekraal; as this locality was examined

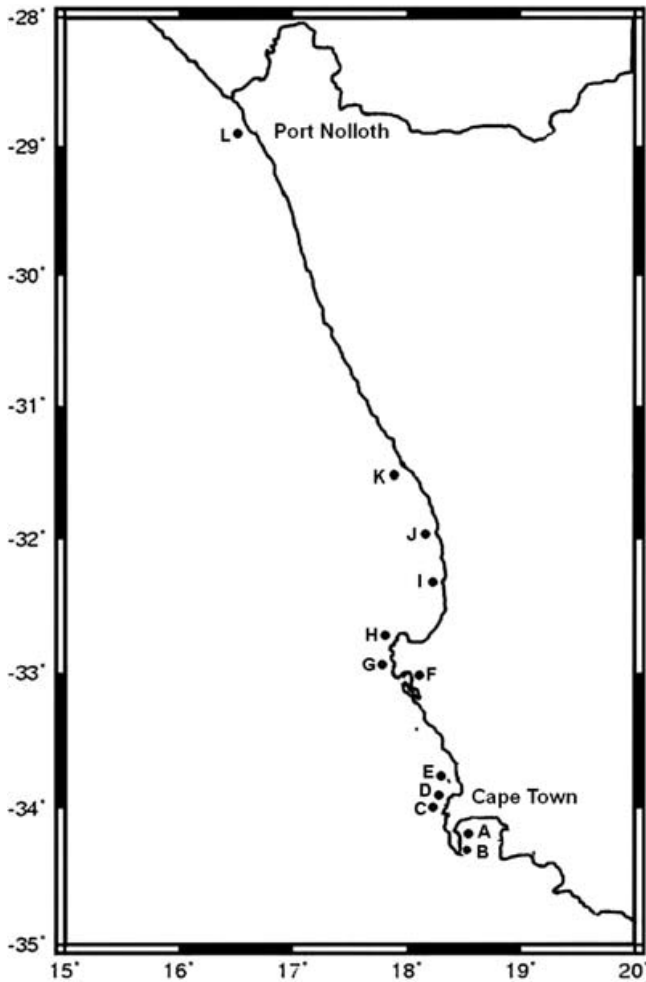


Fig. 1. Map of the sampling localities along the west coast of South Africa. A, A-Frame; B, Castle Rock; C, Oudekraal; D, Bakoven; E, Robben Island; F, Saldanha Bay; G, Jacobs Bay; H, Paternoster; I, Elands Bay; J, Doring Bay; K, Groenrivier Mond; L, Port Nolloth.

as the main focal site it was divided into three areas: Oudekraal Gullies; location: 33°59'S, 18°22'E; average depth: 3 m. Justin's Cave; location: 33°58'90"S, 18°20'65"E; average depth: 12 m. Homestead Plateau; location: 33°58'90"S, 17°15'00"E; average depth: 5 m. D, Bakoven; location: 33°56'S, 18°22'E; average depth: 3 m. E, Robben Island; location: 33°48'S, 18°23'E; average depth: 3 m. F, Saldanha Bay; location: 33°01'S, 17°59'E; average depth: 7 m. G, Jacobs Bay; location: 32°31'S, 17°30'E; average depth: 3 m. H, Paternoster; location: 32°29'S, 17°31'E; average depth: 8 m. I, Elands Bay; location: 32°18'S, 18°19'E; average depth: 2 m. J, Doring Bay; location: 31°48'S, 18°14'E; average depth: 3 m. K, Groenrivier Mond; location: 30°29'S, 17°20'E; average depth: 2 m. L, Port Nolloth; location: 29°11'S, 16°51'E; average depth: 3 m.

#### Collection, preservation and storage of specimens

Specimens of bryozoan colonies were collected using scuba from all the localities listed above. Specimens were collected systematically from the sampling sites. Not only were large overhangs and plateaus investigated, but large stones, kelp holdfasts and kelp blades were also collected for later exami-

nation by teasing them apart in seawater, to ensure that less conspicuous fauna were also represented. Great care was taken not to remove excessive amounts of the same taxa from any one particular site, ensuring that the sampling process caused as little damage as possible to the fragile ecosystems that many of these animals support. Large stones that were moved in search of specimens were returned carefully to their original position. Where possible, whole colonies were removed to enable later examination of the colony form. In some instances, underwater photographs of the specimens removed were taken *in situ*. Field observations of the live appearance, substratum and habitat depth and type were recorded in waterproof booklets. Colour photographs were also taken in the laboratory using a Pentax MZ50 SLR camera. Notes of surface structure and dimensions were taken prior to specimen fixation.

Well-encrusted shell, gravel or stones were washed in fresh water and dried or preserved in 70% ethanol. Wet specimens of cheilostome and cyclostome bryozoans were initially fixed in 4% seawater formalin and then preserved in 70% ethanol. The uncalcified ctenostomes were preserved in 4% seawater formalin. Subsequently it was decided to dry the cheilostome and cyclostome specimens and store them in either wooden cavity slides, with black cardboard background or, in the case of large colonies, wrapped in tissue paper and stored in Perspex boxes. Each specimen was clearly labelled with the site data and date of collection.

#### Taxonomic examination procedures

Ctenostome specimens were preserved and prepared differently to cheilostome and cyclostome specimens for examination. Ctenostomes were examined wet under a Carl Zeiss dissecting light microscope, with an extra incident light source for detailed examination. Cheilostomes and cyclostomes were stored in cavity slides and appropriate voucher specimens were selected from these. These specimens were dried and bleached in a weak NaOCl (domestic bleach) solution to give clearer images of the skeletal structures. Specimens were left to dry for one hour in an oven and then studied using SEM. Specimens with membranes dried and damaged but partly intact were scanned *in situ* on their substrata.

SEM has become a valuable part of investigating bryozoan morphology and is indeed indispensable to elucidate problems in bryozoan taxonomy (Taylor & Jones, 1996). Scanning of specimens was carried out using a high-resolution Hitachi S-800 SEM and an ISI ABT-55 SEM. The Hitachi S-800 requires the specimens to be sputter-coated with a film of gold to ensure reflectivity, thereby causing irreparable damage to it. The specimens examined were mounted on stubs using adhesive strips and then sputter coated before being examined. The ISI ABT-55 was fitted with an environmental chamber and a back-scattered electron detector, precluding sputter-coating, and the specimens were scanned in their bleached condition and housed in wooden cavity slides.

For taxonomic purposes it was essential to obtain appropriate images of the autozooidal arrangement, typical autozooid structure, orifice structure, avicularian structure, sinus structure and ovicell structure, when present. In some

cases the specimens were orientated to examine both the frontal and basal morphology of the autozooids.

### Morphometrics

To determine the level of morphological variation within the new cheilostome species described in this study, autozooidal measurements were taken using an eyepiece graticule in a light microscope. Mean (standard deviations) dimensions of 20 individual autozooids were determined for the following characters: autozooid length (Lz), autozooid width (Iz), orifice length (Lso), orifice width (Iso), vicarious avicularium length (Lvicar), vicarious avicularium width (Ivicar), adventitious avicularium length (Ladav), adventitious avicularium width (Iadav), ovicell length (Lov), ovicell width (Iov), frontal membrane length (Lfm) and frontal membrane width (Ifm). These measurements are tabulated for new cheilostome species.

### Material deposition

Primary type material and paratypes have been deposited in the Natural History Collections Department, Iziko, South African Museum, Cape Town. Registration numbers are provided in the 'material examined' sections for each description.

## SYSTEMATICS

Class **STENOLAEMATA** Busk, 1852  
Order **CYCLOSTOMATA** Busk, 1852  
Suborder **TUBULIPORINA** Johnston, 1838  
Family **TUBULIPORIDAE** Johnston, 1838

Genus ***Exidmonea*** David, Mongereau & Pouyet, 1972

Type species: *Exidmonea atlantica* David, Mongereau & Pouyet, 1972.

***Exidmonea atlantica*** (Forbes in Johnston, 1847)

Figs 2A–B, 20E

*Idmonea atlantica* Forbes in Johnston, 1847: 278. Hincks, 1880: 451. Marcus, 1940: 69. Kluge, 1962: 110.

*Idmidronea atlantica* Harmelin, 1976: 182. Hayward & Cook, 1979: 116. Buge, 1979: 232, pl. 7, fig. 4. Hayward & Cook, 1983: 136.

### Material examined

SAM – A28545, Justin's Caves, Oudekraal (33°58'90"S, 18°20' 65"E), depth 20 m, collected by W. Florence, 24 April 1999.

### Description

Colony erect, branching dichotomously to form a delicate, regular, two-dimensional fan. Colour white when alive and when dried. Autozooids opening on one face of the branch only, in alternating connate series of three to five, peristomes deflected alternately to left and right of axis. Recumbent parts of autozooids convex, boundaries clearly marked by distinct grooves, finely granular, sparsely pseudopunctate. Peristome diverging at about 60° to the axis, gently curved, up to 0.8 mm long, length diminishing in each connate row laterally from the axis; finely annulate, with sparse punctulation, diameter 0.15–0.2 mm, lip of aperture delicate,

flared. Gonozooids frontal, slightly inflated, oecioostome associated with the nearest, most median autozooid aperture. Basal surface of colony flat, with longitudinal striations marking the individual autozooids, and fine pseudo-punctation.

### Substratum, depth range and ecology

Observed growing erect, attached to hard rocky substrata. Depth range 20–100 m.

### Geographic distribution

Britain, Norway, Shetland, the eastern Atlantic to Madeira, Cape Verde, the Gulf of Mexico, Angola and southern Africa.

### Remarks

The genus *Exidmonea* was introduced by Mongereau (1969). It differs from *Idmonea* Lamouroux (1821) in being erect as opposed to predominantly encrusting. Furthermore *Exidmonea* lacks kenozooids on the basal surface of the branches, which essentially differentiates it from *Idmidronea* (Forbes in Johnston, 1847). The current specimens and those previously described from South Africa as *Idmidronea atlantica* should clearly be assigned to *Exidmonea* inasmuch as the erect nature of the colonies and the lack of kenozooids on the basal surface are concerned. The numbers of autozooids in a series, the direction of deflection of the peristome and the oecioostome position distinguishes this species from all others in the genus.

***Exidmonea crassimargo*** (Canu and Bassler, 1929)

Figs 2C–D, 20F

*Idmonea crassimargo* Canu and Bassler, 1929: 545.

*Idmidronea crassimargo* Brood, 1976: 290. Hayward & Cook, 1983: 134, fig. 32C–D.

### Material examined

SAM – A28546, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 20 m, collected by W. Florence, 24 April 1999.

### Description

Colony erect, branching dichotomously, with basal side of branches curved. Colour dusky white when alive and when dried. Autozooids opening on one face of the branch only, in alternating connate series of three, peristome deflected alternately to left and right of axis. Recumbent parts of autozooids convex, boundaries clearly marked by distinct grooves, finely granular, sparsely punctate. Gonozooid short, inflated, frequently placed at a bifurcation; oecioostome small, rounded with a short tube, central or lateral. Basal surface of colony flat, with longitudinal striations marking the individual autozooids, and fine punctulation.

### Substratum, depth range and ecology

Observed growing erect attached to hard rocky substrata. Depth range 20–320 m.

### Geographic distribution

Philippines, east Africa, east coast of South Africa and False Bay.

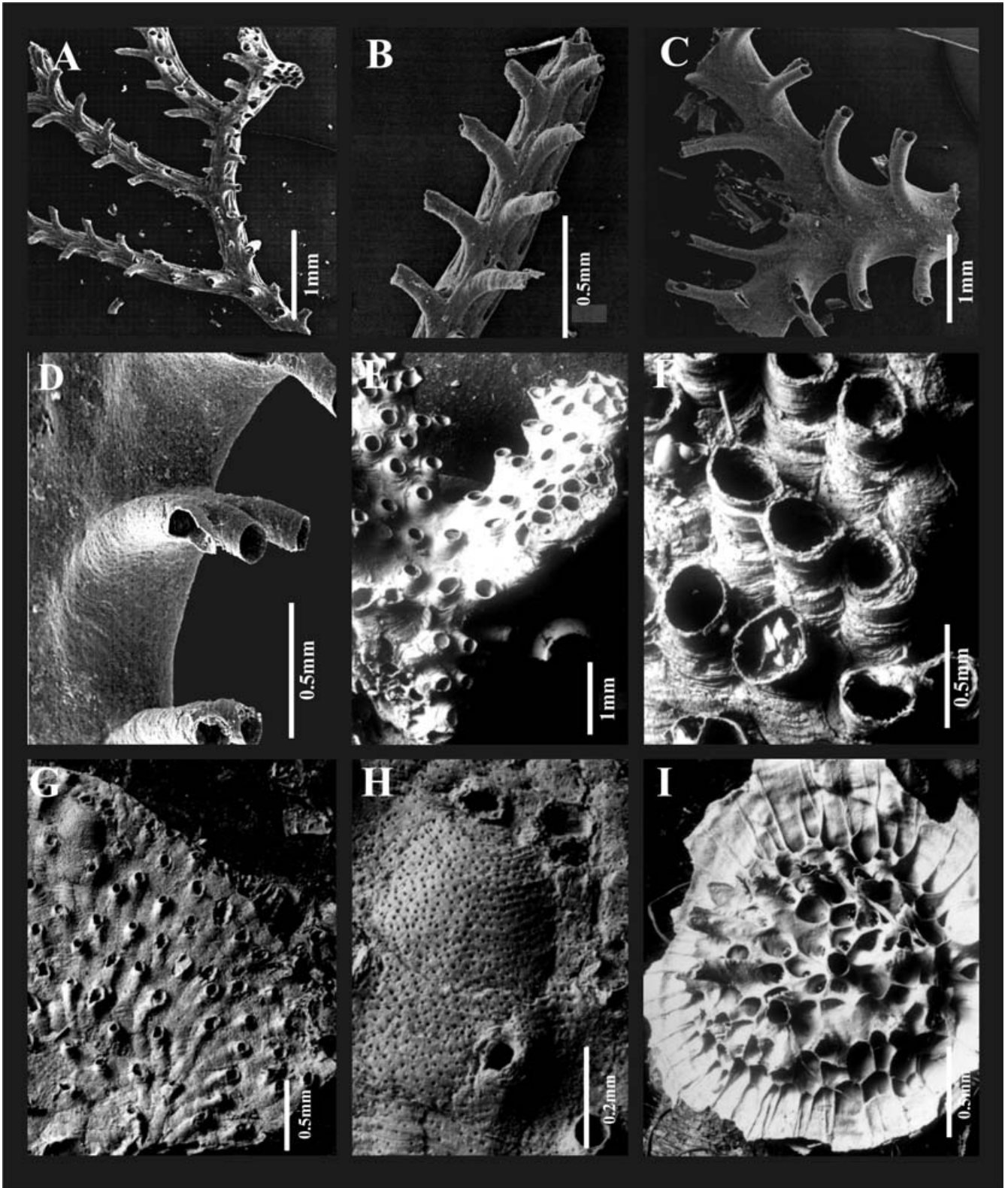


Fig. 2. A, B, *Exidmonea atlantica* (Forbes). C, D, *Exidmonea crassimargo* (Canu & Bassler). E, F, *Nevianipora pulcherrima* (Kirkpatrick). G, H, *Eurystrotos planus* sp. nov. (SAM - A28548). I, *Disporella buski* (Harmer).

## Remarks

The current specimen and those previously described from South Africa as *Idmidronea crassimargo* are here assigned to the genus *Exidmonea* based on the erect nature of the colonies and lack of kenozooids on the basal surface of the branches (see remarks for *E. atlantica* above). The numbers of autozooids in series, the direction of deflection of the peristome and the oeciostome position distinguishes this species from all others within the genus. This species differs from *Exidmonea atlantica* in that it is more robust, with autozooids in series of three only and in the nature of the gonozooid.

Family **FILISPARSIDAE** Borg, 1944

Genus ***Nevianipora*** Borg, 1944

Type species: *Idmonea milneana* d'Orbigny, 1842.

***Nevianipora pulcherrima*** (Kirkpatrick, 1890)

Fig. 2E–F

*Idmonea pulcherrima* Kirkpatrick, 1890: 22, pl. 4, fig. 6.

*Tubulipora pulcherrima*: O'Donoghue & de Watteville, 1944: 409.

*Nevianipora pulcherrima*: Hayward & Ryland, 1995: 534, fig. 2A (*cum. syn.*).

## Material examined

SAM – A28547, A-Frame, False Bay (34°13'S, 18°28'E), depth 8 m, collected by G. Isaacs, 12 March 2000.

## Description

Colony erect, branching dichotomously, with ends of branches lobed; unilaminar. Colour white when alive and when dried. Autozooids arranged in rows of four sometimes five, with simple round orifice; peristome generally not free of the surface but in some zooids may be entirely free. Recumbent parts of autozooids slightly convex, boundaries often not clearly marked by distinct grooves, finely granular, sparsely punctate. Gonozooid occupying whole or part of a lobe, finely punctate; oeciostome with aperture slightly flaired, median in position and adpressed to the zooid. Basal surface of colony flat.

## Substratum, depth range and ecology

Observed growing erect attached to hard rocky substrata only in sheltered areas beneath boulders. Depth range 4–20 m.

## Geographic distribution

This species occurs on the south west coast of South Africa from False Bay to Mossel Bay. Also reported from Australia, east Africa, China, and the Indo-Pacific region.

## Remarks

Harmer (1915) described a considerable amount of polymorphism within the many specimens of this species that he studied. The current specimens have shorter, more robust branches than any of the illustrations that Harmer gave. However, the fundamental characters of the zooids, the gonozooid and oeciostome agree closely with the Harmer specimens and suggest that the variation in colony habit may be environmentally induced.

Family **PLAGIOECIIDAE** Canu, 1918

Genus ***Eurystotos*** Hayward & Ryland, 1985

Type species: *Eurystotos compacta* Norman, 1866.

***Eurystotos planus* sp. nov.**

Fig. 2G–H

## Etymology

*Planus* (L.) – flat.

## Material examined

Holotype: SAM – A28548, Saldanha Bay (33°01'S, 17°59'E), depth 17 m, collected by W. Florence, 15 February 2001.

## Description

Colony encrusting, forming a thin, flat, opaque white, unilaminar, crust. Colour white when alive and when dried. Growing margin of colony with minimal peripheral lamina, rarely more than one generation of developing buds. Autozooids arranged in regular, alternating series radiating from colony origin, more or less quincuncially arranged in flat colonies. Recumbent parts of autozooids flat, boundaries clearly marked by distinct grooves, finely granular, almost evenly punctate. Peristome length very short, tapered distally. Gonozooids elongated and oval, slightly inflated, densely perforated, with transverse folds; found between adjacent rows of autozooids, not enveloping any peristomes. Oeciostome distal, wide, recurved proximally.

## Substratum, depth range and ecology

Observed encrusting mussel shells and may overgrow other bryozoans such as *Micropora* species. Depth range 4–20 m.

## Geographic distribution

This species has been reported only from Saldanha Bay on the west coast of South Africa.

## Remarks

This species resembles *Eurystotos compacta* (Norman, 1866) but differs from it in having a shorter peristome, fewer perforations in the frontal wall and a wider proximally recumbent oeciostome. These differences also make this species unique from any other in the genus and therefore warranting its erection as a new species.

Suborder **RECTANGULATA**

Family **LICHENOPORIDAE** Smitt, 1866

Genus ***Disporella*** Gray, 1848

Type species: *Disporella hispida* Fleming, 1828.

***Disporella buski*** Harmer, 1915,

Fig. 2I

*Disporella ciliata* Busk, 1875: 31, pl. 30, fig. 6.

*Disporella buski* Harmer, 1915: 189.

## Material examined

SAM – A28549, Paternoster (32°29'S, 17°31'E), depth 17 m, collected by W. Florence, 16 April 2000. SAM – A28550, Robben Island (33°48'S, 18°23'E), depth 8 m, collected by G. Isaacs, 12 August 2001.

### Description

Colony discoidal, raised centrally. Zooids not regularly radiating, irregular rows and terminally free peristome ends. Gonozooids central, surrounded by extrazoidal calcification; oeciostome very large and round.

### Substratum, depth range and ecology

Observed living epizoically on other species of Bryozoa. Depth range 4–20 m.

### Geographic distribution

This species has previously been reported from Cape Town (the type locality) and Saldanha Bay on the west coast of South Africa. The current records suggest that its distribution may therefore be considered as ubiquitous from at least the shallows of Cape Town to Saldanha Bay

### Remarks

This species resembles *Lichenopora novaehollandiae* (d'Orbigny, 1853), also reported from South Africa by Hayward & Cook (1983) (as *L. novaezealandiae*), but differs from it in having irregularly arranged zooids, which are free terminally.

Class **GYMNOLAEMATA** Busk, 1852

Order **CTENOSTOMATA** Busk, 1852

Suborder **ALCYONIDIINA** Johnston, 1847

Superfamily **ALCYONIDIOIDEA** Johnston, 1836

Family **ALCYONIDIIDAE** Johnston, 1838

Genus *Alcyonidium* Lamouroux, 1813

Type species: *Ulva diaphana* Hudson, 1778.

*Alcyonidium rhomboidale* O'Donoghue, 1924,

Figs 3A, 20A, 21B

*Alcyonidium rhomboidale* O'Donoghue, 1924: 57, pl. 4, fig. 25.

### Material examined

SAM – A28551, Paternoster (32°29'S, 17°31'E), depth 17 m, collected by W. Florence, 16 April 2000. SAM – A28552, Oudekraal Gullies, Oudekraal (33°59'S, 18°22'E), depth 5 m, collected by G. Isaacs, 30 April 1999. SAM – A28553, Castle Rock, False Bay (34°14'S, 18°29'E), depth 15 m, collected by W. Florence, 2 March 2000.

### Description

Colony erect or semi-erect, forming a flexible and gelatinous bilaminar, foliaceous mass; lobes anastomose irregularly in different planes. Yellow when alive and brown when dry. Autozooids immersed, arranged multiserially, alternating; rhomboidally shaped but may be hexagonal (and delimited by thin distinct walls. Frontal surface smooth and gelatinous. Primary orifice circular and may be raised into a short blunt papilla.

### Substratum, depth range and ecology

Erect colonies found attached to hard rocky substrata. Depth range 4–20 m.

### Geographic distribution

This species has been recorded only from South Africa and is distributed from Paternoster to False Bay.

### Remarks

This account of *Alcyonidium rhomboidale* is only the second from South Africa. It was first described by O'Donoghue (1924), who noted that this species and another, *A. flustroides*, appear 'flustriform', referring to the nature of the colonies resembling that of the cheilostome, *Flustra foliacea*. The immersed zooids, simple papilliform orifice and erect gelatinous colony form are all character states that are consistent between the current specimens and those of O'Donoghue (1924) and thereby warrant their conspecific status.

*Alcyonidium nodosum* O'Donoghue & de Watteville, 1944, Fig. 3B, D

*Alcyonidium nodosum* O'Donoghue & de Watteville, 1944: 428, pl. 16, figs 17–18. O'Donoghue, 1957: 92.

### Material examined

SAM – A28554, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999. SAM – A28555, Port Nolloth (29°11'S, 16°51'E), depth 8 m, collected by G. Isaacs, 10 April 2000.

SAM – A28556, Elands Bay (32°18'S, 18°19'E), depth 8 m, collected by W. Florence, 14 April 2000.

### Description

Colony encrusting, forming an extensive mammillate covering, on the shell of *Burnupena papyracea*; with regularly spaced raised mammillae. Dark red to purple when alive and brownish-grey when dried. Autozooids arranged irregularly; polygonal in shape and delimited by thin distinct walls; the summits of mammillae are occupied by large zooids and the surrounds by smaller zooids. Frontal surface smooth, convex and gelatinous. Primary orifice circular with radiating lines on it and may be raised into a short papilla when opened. No spines, avicularia or ovicells present.

### Substratum, depth range and ecology

Lives exclusively on *Burnupena papyracea* (Bruguère) and *B. pubescens* (Kuster). Depth range 4–20 m.

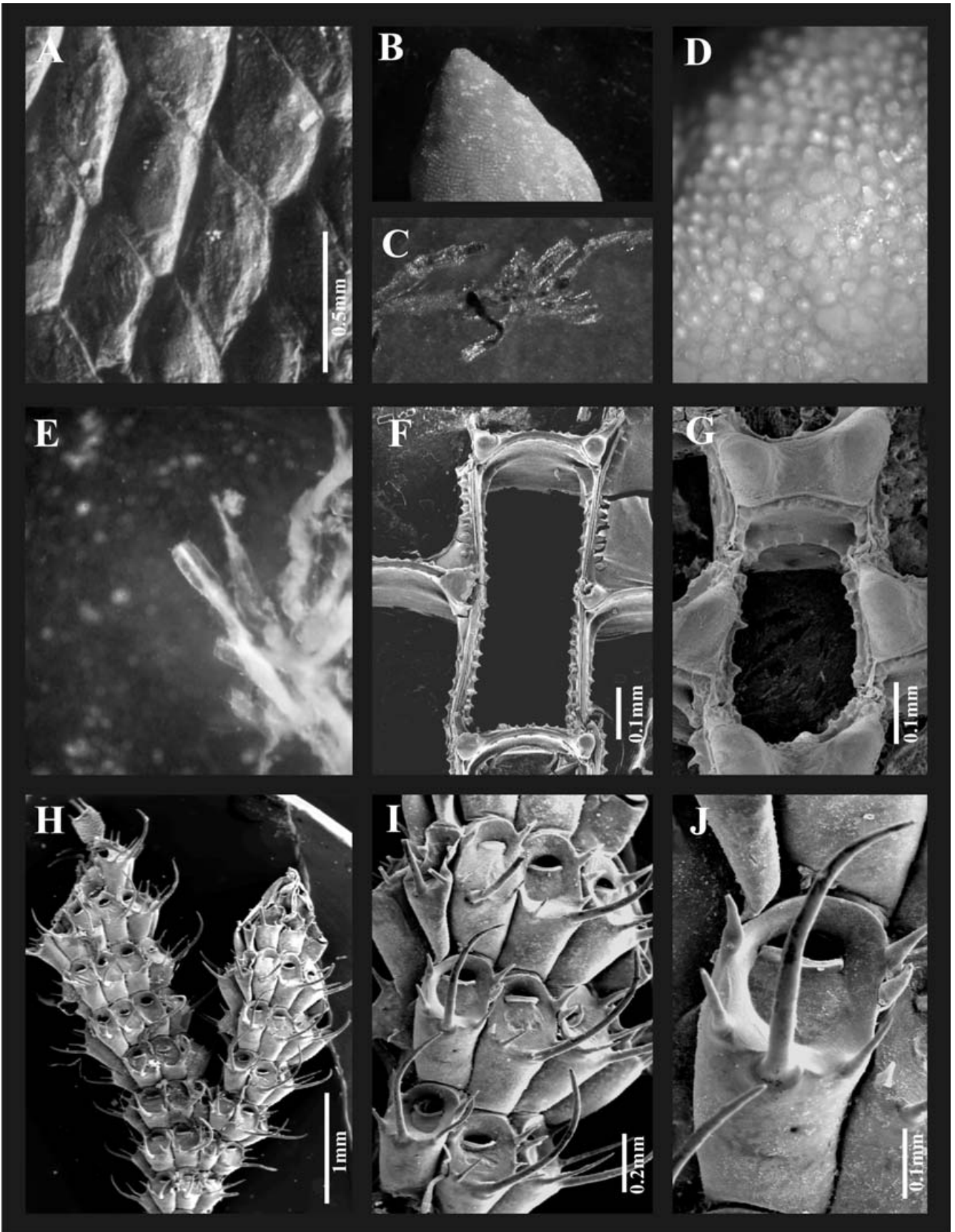
### Geographic distribution

This species occurs from Port Nolloth to False Bay on the west coast of South Africa.

### Remarks

In general, colonies of *A. nodosum* resemble other congeneric species, but the mammillate nature of the surface of the colony is unique to it within *Alcyonidium*. It encrusts mainly *Burnupena papyracea* (Bruguère), which is distributed along the west coast as far east as False Bay, but is also known to encrust *B. pubescens* (Kuster), which is distributed as far east as, at least, Port Elizabeth (Ryland 2001). It is not known what benefit *A. nodosum* obtains from this symbiotic relationship, but it is believed that the whelk is protected against predators due to the highly toxic chemicals found in this bryozoan. Rock lobsters are known to avoid *B. papyracea* because of the above reason. These exclusive associations can accurately be used by field observers to identify this species *in situ*.





**Fig. 3.** A, *Alcyonidium rhomboidale* (O'Donoghue). B, D, *Alcyonidium nodosum* (O'Donoghue & De Watteville). C, E, *Bowerbankia gracilis* (Leidy). F, *Membranipora rustica* sp. nov. (SAM – A28562). G, *Jellyella tuberculata* (Bosc). H–J, *Electra pilosa* (Linnaeus).

The symbiotic relationship recalls that of *Conopeum commensale* and the hermit crab *Petrochirus granulimanus*. To a lesser extent it is also similar to the cryptic sponge crab, *Cryptodromiopsis spongiosa*, which, however, cuts pieces of unpalatable sponge or ascidian off rocks and hold it over its body with its modified fifth pair of legs. Furthermore Ryland (2001) reported on convergent colonization and reproductive function of *A. nodosum* and an unrelated species, *Hippoporidra dictyota* (Ryland, 2001), suggesting that these two species have evolved mammillate surface structures, thereby using identical hydrodynamic feeding systems which as a consequence has been utilized to benefit reproduction.

Family **VESICULARIIDAE** Hincks, 1880

Genus ***Bowerbankia*** Farre, 1837

Type species: *Bowerbankia imbricata* Adams, 1798.

***Bowerbankia gracilis*** Leidy, 1855

Fig. 3C, E

*Bowerbankia gracilis* Leidy, 1855: 142, pl. 11, fig. 38.

O'Donoghue, 1924: 58.

*Bowerbankia caudata* Hincks, 1880: 521, pl. 75, figs. 7–8.

Material examined

SAM – A28557, Saldanha Bay (33°01'S, 17°59'E), depth 3 m, collected by W. Florence, 15 February 2001.

Description

Colony entirely adherent, very diffuse, ramifying, or developing clumps of closely packed autozooids. Stolon slender and thinner than autozooids; uneven and variable in thickness, kinked and indented; branching frequently and irregularly, and budding small kenozooids which subsequently develop new stolons. Transparent to opaque brown when alive. Autozooids arranged randomly, budded from the side of the stolon either singly or in densely packed groups; truncated distally and rounded proximally, often with short adventitious stolons budded from the proximal end. Tentacle sheath apparent as a dark streak; collar well developed; lophophore with eight tentacles; gizzard rounded and conspicuous; caecum oval.

Substratum, depth range and ecology

This species is tolerant of varying salinities and its fouling ability is well known. Commonly found in the shallow sublittoral and often abundant in harbours on pilings and jetties. Depth range 4–20 m.

Geographic distribution

*Bowerbankia gracilis* appears to be a widespread species but this may be a reflection of its fouling ability, and has a known distribution range from Saldanha Bay to False Bay in South Africa.

Remarks

This species is very similar to *Bowerbankia imbricata* (Adams, 1798), and is regularly confused with it but the two differ in tentacle number, embryo colour and the width of the stolon.

Order **CHEILOSTOMATA** Busk, 1852

Suborder **MALACOSTEGINA** Jullien, 1888

Superfamily **MEMBRANIPOROROIDEA** Busk, 1854

Family **MEMBRANIPORIDAE** Busk, 1854

Genus ***Jellyella*** Taylor & Monks, 1997

Type species: *Membranipora eburnea* Hincks, 1891.

***Jellyella tuberculata*** (Bosc, 1802)

Figs 3G, 20K

*Flustra tuberculata* Bosc, 1802: 118.

*Membranipora tuberculata*: Marcus, 1922: 14, fig. 8.

*Jellyella tuberculata*: Taylor & Monks, 1997: 41, figs 3 & 14–15.

Tilbrook, Hayward & Gordon, 2001: 37.

Material examined

SAM – A28558, Saldanha Bay (33°01'S, 17°59'E), depth 7 m, collected by W. Florence, 15 February 2001. SAM – A28559, Oudekraal Gullies, Oudekraal (33°59'S, 18°22'E), depth 5 m, collected by G. Isaacs, 30 April 1999. SAM – A28560, Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999. SAM – A28561, Groen Rivier Mond (30°29'S, 17°20'E) depth 5 m, collected by W. Florence, 11 April 2000.

Description

Colony encrusting, forming an extensive covering on algal fronds. White when dried and living. Autozooids elongate (0.5 × 0.4 mm), arranged multiserially, alternating; gymnocystal tubercle present at each proximal corner of the zooid. Membrane covers almost the entire frontal area. Cryptocystal shelf, found beneath the frontal membrane, with one or two denticles directed distally and/or basally. Operculum located distally; crescent shaped, chitinized sclerite. No avicularia or ovicells observed.

Substratum, depth range and ecology

Forms encrustations on fronds of the broad wine-weed, *Epymenia obtusa*, frequently covering entire fronds. Depth range 4–20 m.

Geographic distribution

This species has a cosmopolitan distribution, occurring in all warm seas and has, locally, been reported only from the west coast of South Africa.

Remarks

Taylor & Monks (1997) assigned *Membranipora tuberculata* (Bosc, 1802) to the genus *Jellyella* on the basis of skeletal characters (branched spinules projecting into the zooid chamber, and calcitic ultrastructure of transversely arranged spindles), lack of cracks of the lateral walls and the absence of tower cells, all of which differ from *Membranipora sensu stricto*. Tilbrook *et al.* (2001) points out that due to the many variations noted for this species between geographic areas it may be feasible to presume a complex of species exists. The current specimen agrees closely with the figure of Tilbrook *et al.* (2001). Whereas *J. tuberculata* is historically thought to be associated with *Sargassum* in warm seas (Osburn 1950), the specimens from South Africa appear to be confined to the cold Benguela region of the west coast, encrusting the broad wine-weed, *Epymenia obtusa*.

Genus *Membranipora* de Blainville, 1830Type species: *Flustra membranacea* Linnaeus, 1767.*Membranipora rustica* sp. nov.

Fig. 3F, Table 1

*Membranipora membranacea*: O'Donoghue, 1924: 37. O'Donoghue and de Watterville, 1935: 204; O'Donoghue and de Watterville, 1937: 12. O'Donoghue and de Watterville, 1944: 413.

## Etymology

*rusticus* (L.) – coarse, referring to the coarse or granular nature of the inner vertical walls.

## Material examined

Holotype: SAM – A28562, Oudekraal Gullies, Oudekraal (33°59'S, 18°22'E), depth 5 m, collected by G. Isaacs, 30 April 1999.

Paratype: SAM – A28563, Castle Rock, False Bay (34°14'S, 18°29'E), depth 15 m, collected by W. Florence, 2 March 2000.

Other material: SAM – A28564, Elands Bay (32°18'S, 18°19'E), depth 8 m, collected by W. Florence, 14 April 2000.

## Description

Colony encrusting, forming an extensive covering on kelp fronds. Cream when dried and living. Autozooids rectangular (see Table 1 for autozoid morphometrics), arranged multi-serially, alternating; short tubercles, with uncalcified apices, present in each distal corner and no spines. Membrane covers almost the entire frontal area. Cryptocyst thin at the proximal end and denticulate becoming smoother distally and more pronounced, forming a slightly raised distal rim; denticles of uniform size. Orifice covered by a flap. Tower zooids absent in all specimens.

## Substratum, depth range and ecology

Forms large encrustations on fronds of the kelp *Ecklonia maxima*. Depth range 4–20 m.

## Geographic distribution

This species has been reported only from South Africa and occurs from Port Nolloth to Durban.

## Remarks

*Membranipora rustica* sp. nov. appears to be very similar to *M. membranacea* (Linnaeus, 1767), *M. villosa* Hincks, 1880, and *M. isabelleana* (d'Orbigny, 1847). O'Donoghue (1924) and O'Donoghue & de Watterville (1935, 1937, 1944) erroneously described *M. membranacea* (Linnaeus, 1767) from False Bay in South Africa. Examination of these False Bay specimens suggest that they are more consistent with the current specimens and are indeed not *M. membranacea* (Linnaeus, 1767), which has a smoother or weakly serrate cryptocyst, smaller autozooids (average = 0.42 × 0.13 mm) and tower zooids (Hayward & Ryland 1998). *M. villosa*, which consist of the morphs '*membranacea*', '*villosa*', and '*serrilamella*' is considered to be distinct from European *M. membranacea* (Linnaeus, 1767) (Dick *et al.* 2005). *M. villosa* differs from the current specimens in that it has a denticulate cryptocyst with denticles of various sizes, larger autozooids (range = 0.53–1.20 mm length, 0.23–0.41 mm

**Table 1.** Measurements (in millimetres) of *Membranipora rustica* sp. nov. material.

|    | Sample size | Mean | S.D. | Range     |
|----|-------------|------|------|-----------|
| Lz | 20          | 0.80 | 0.03 | 0.73–0.86 |
| lz | 20          | 0.21 | 0.02 | 0.15–0.25 |

width) and may have distal cuticular spines (Dick *et al.* 2005). *M. isabelleana* differs from the current specimens in that it has a denticulate cryptocyst with denticles of various sizes, tower zooids and may have large, acute, distal cuticular spines. These differences are here considered sufficient to warrant a new placement for the current specimens and those of O'Donoghue (1924) and O'Donoghue & de Watterville (1935, 1937, 1944).

## Family ELECTRIDAE Stach, 1937

Genus *Electra* Lamouroux, 1816

Type species: *Flustra verticillata* Ellis & Solander, 1786 = *Flustra pilosa* Linnaeus, 1767.

*Electra pilosa* (Linnaeus, 1767)

Fig. 3H–J

*Flustra pilosa* Linnaeus, 1767: 1301.*Flustra verticillata* Ellis & Solander, 1786: 15.*Electra verticillata*: O'Donoghue & de Watterville, 1937: 12.

O'Donoghue &amp; de Watterville, 1944: 413. O'Donoghue, 1957: 73. Cook, 1985: 88.

*Electra pilosa*: Hayward & Ryland, 1998: 128 (Figs 26, 27).

## Material examined

SAM – A28565, Groen Rivier Mond (30°29'S, 17°20'E), depth 5 m, collected by W. Florence, 11 April 2000. SAM – A28566, A-Frame, False Bay (34°13'S, 18°28'E), depth 4 m, collected by G. Isaacs, 12 March 2000. SAM – A28567, Elands Bay (32°18'S, 18°19'E), depth 8 m, collected by G. Isaacs, 14 April 2000. SAM – A28568, Groen Rivier Mond (30°29'S, 17°20'E), depth 5 m, collected by G. Isaacs, 11 April 2000.

## Description

Colony encrusting, forming cylindrical growths around algal stems or broad patches on hard flat substrata. Cream when alive and when dry. Autozooids arranged in rows in a spiral whorl; elongated, rectangular or oval, narrower proximally. The gymnocyst translucent and occupies almost half of the frontal surface; perforated by numerous large pores. Opesia oval, almost rectangular at times; surrounded by a distinct rim that is thickened by a cryptocyst. Five spines surround the opesia; one very long proximo-medial spine and four shorter spines at each corner. Operculum transparent with a thin chitinous sclerite. No ovicells or spines present.

## Substratum, depth range and ecology

Forms cylindrical growths around thinly branched algae such as *Gracillaria* and *Caulerpa filiformis* or flat colonies on red algal fronds. Occurs in shallow water and even in the intertidal zone. Depth range 0–20 m.

#### Geographic distribution

This species has a temperate to warm-water distribution. Reported from Port Nolloth to East London.

#### Remarks

*Electra pilosa* is an interesting species as it exhibits specific morphs in relation to the various substrata that it colonizes. Growth patterns of this species have been described by Silén (1987). The current specimens all exhibit the 'verticillata' morph, which is characterized by the lack of alternation of autozooid rows thereby presenting a banded appearance, visible to the naked eye, along the length of the algal frond it colonizes (see fig. 26 E in Hayward & Ryland 1998).

Suborder **NEOCHEILOSTOMINA** d'Hondt, 1985

Infraorder **FLUSTRINA** Smitt, 1868

Superfamily **CALLOPOROIDEA** Norman, 1903

Family **CALLOPORIDAE** Norman, 1903

Genus **Amphiblestrum** Gray, 1848

Type species: *Membranipora flemingii* Busk, 1884.

**Amphiblestrum triangularis** (O'Donoghue, 1924)

Fig. 4A–B

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

*Amphiblestrum triangularis*: O'Donoghue, 1957: 74.

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

#### Material examined

SAM – A28569, Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999.

#### Description

Colony encrusting, unilaminar, forming small irregular patches. Cream when alive and dry. Autozooids hexagonal or irregularly shaped; about 0.51 × 0.42 mm. Opesia trifoliate with proximal portion about one-third of total length and occupying 40–50% of the autozooids. Cryptocyst flat, granular and occupying almost half the length of the zooids; surrounded by a striated rim especially marked distally, where it develops coarse crenulations. Gymnocyst smooth. A single adventitious avicularium is attached to the proximal end of the zooids; orientated transversely and acutely to the frontal plane; rostrum hooked with an acute triangular mandible. Ovicell is prominent with triangular entooecium; uncovered and granular, forming proximolateral processes.

#### Substratum, depth range and ecology

Forms small encrustations on mussel shells, tubeworms and bivalves. Depth range 4–100 m.

#### Geographic distribution

This species was first reported from Antarctica. Subsequently it has been found in South Africa and is distributed from Port Nolloth to Durban.

#### Remarks

O'Donoghue (1924) introduced *Lepralia triangularis*, noting its resemblance to the Antarctic *Membranipora inermis*. O'Donoghue (1957) assigned *L. triangularis* to

*Amphiblestrum*. Hayward & Cook (1983) described and figured material which appeared to be consistent with O'Donoghue's species but noted that the type was fragmentary and so accorded *A. triangularis* synonymy with *A. inermis*. However, Hayward & Thorpe (1989) and Hayward (1995) redescribed and figured Antarctic *A. inermis* and their figures are clearly not consistent with the South African specimens figured here. The present specimens appear to be most similar to those collected in False Bay and described by O'Donoghue (1924) (BMNH 1962.6.4.6), which has numerous ovicells showing the triangular, granular frontal area and proximolateral processes, which are characteristic of the type. Almost all the zooids scanned by SEM were ovicelled and no lateral spines were evident.

Genus **Crassimarginatella** Canu, 1900

Type species: *Membranipora crassimarginata* Hincks, 1880.

**Crassimarginatella?** sp.

Fig. 4C

#### Material examined

SAM – A28570, A-Frame, False Bay (34°13'S, 18°28'E), depth 8 m, collected by W. Florence, 12 March 2000.

#### Description

Colony encrusting or erect, unilaminar, forming small irregular patches. Cream when alive and dry. Autozooids oval. Opesia large and oval. Cryptocyst flat, granular and with proximal portion broader than distal end. Gymnocyst smooth and reduced. Six pairs of spines border the cryptocyst and curve across the opesia. Ovicells prominent. Avicularia not seen.

#### Substratum, depth range and ecology

Forms small encrustations on mussel shells. Depth range 8 m.

#### Geographic distribution

The current specimen is the only known record of this species from South Africa and was collected from False Bay, Saldanha.

#### Remarks

The current specimen is badly worn and is composed of a fragment of a colony. It agrees with the diagnosis of *Corbulella* Gordon, 1984 with respect to the arrangement of the spines but no avicularia were observed. Until more specimens of this species are sourced, the condition of the current specimen precludes a complete description and precise generic placement.

Family **CHAPERIIDAE** Jullien, 1888

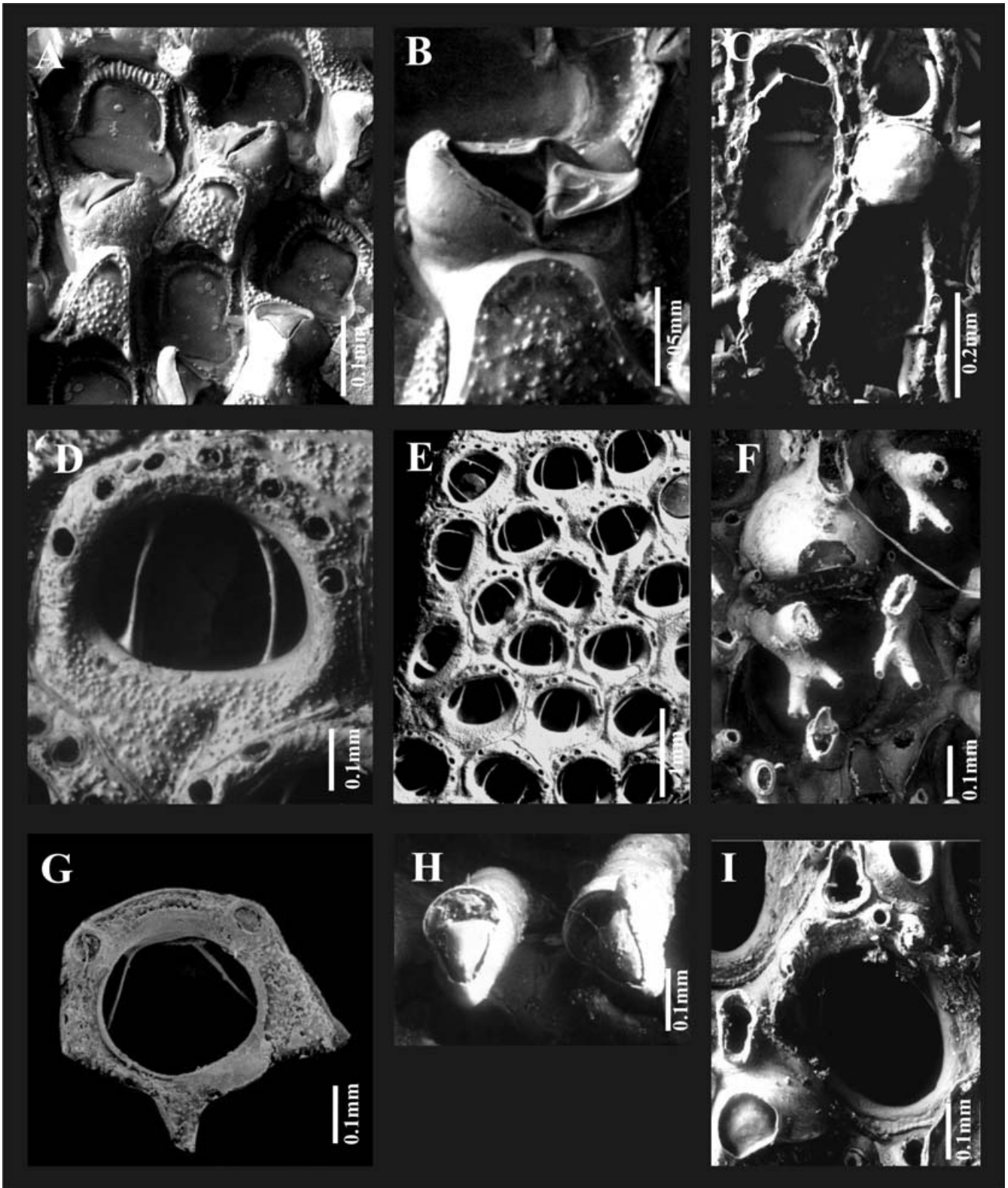
Genus **Chaperia** Jullien, 1881

Type species: *Chaperia australis*, Jullien, 1881, *nom. nov.* for *Membranipora spinosa* Busk, 1879, a synonym of *Flustra acanthina* Lamouroux, 1825.

**Chaperia capensis** (Busk, 1884)

Fig. 4G

*Amphiblestrum capense* Busk, 1884: 67, pl. 23, fig. 3.



**Fig. 4.** A, B, *Amphiblestrum triangularis* (O'Donoghue). C, *Crassimarginitella* sp. (SAM – A28570). D, E, *Chaperia septispina* sp. nov. (SAM – A28573). F, H, I, *Chaperiopsis (Chaperiopsis) multifida* (Busk). G, *Chaperia capensis* (Busk).

*Chaperia acanthina* var. *australis* Marcus, 1922: 6, fig. 2.  
*Membranipora galeata* var. *inermis* O'Donoghue, 1924: 38,  
 pl. 1, fig. 9.  
*Chaperia acanthina* var. *australis*: O'Donoghue & de Watterville,  
 1944: 415.  
*Chaperia capensis*: Hayward & Cook, 1983: 22, fig. 3F.

#### Material examined

SAM – A28571, Homestead Plateau, Oudekraal (33°58'90"S,  
 17°15'00"E), depth 12 m, collected by W. Florence, 30 April  
 1999.

#### Description

Colony encrusting; developing cylinders around erect  
 substrata. Brown in colour when alive and when dried.  
 Autozooids arranged multiserially, alternating; hexagonal  
 and almost as long as broad; 0.5–0.6 mm long by 0.6 mm  
 broad. Opesia oval, occupying 60% of the total front length of  
 the autozooids. Occlusor laminae well developed, originating  
 distally, almost converging, and angled proximolaterally  
 ending almost entirely at the proximal edge of the opesia.  
 Cryptocyst concave, finely granular and broad proximally  
 but narrowing at the distal end. Two distolateral spines;  
 variable in length but never longer than the opesial window.  
 No avicularia or ovicells present.

#### Substratum, depth range and ecology

Forms cylindrical encrustations around hydroid stems.  
 Depth range 4–100 m.

#### Geographic distribution

This species appears to be endemic to South Africa and is  
 distributed from Oudekraal to East London.

#### Remarks

The confused synonymy of this species was cleared up by  
 Hayward & Cook (1983). Only one small specimen of this  
 species is present in the current collection. The orientation  
 of the occlusor laminae and the paired distolateral spines are  
 characteristic of this species.

#### *Chaperia septispina* sp. nov.

Fig. 4D–E, Table 2

#### Etymology

*Septem* (L.) – seven, referring to the maximum number of  
 spines.

#### Material examined

Holotype: SAM – A28573, A-Frame, False Bay (34°13'S,  
 18°28'E), depth 8 m, collected by W. Florence, 12 March  
 2000.

#### Description

Colony encrusting; developing unilaminar patches. Cream  
 when dried. Autozooids arranged multiserially, alternating;  
 hexagonal and almost as long as broad; 0.4 mm long by  
 0.5 mm broad. Opesia oval, flattened proximally, wider than  
 long, occupying 60% of the total front length of the  
 autozooids. Occlusor laminae well developed and originate  
 distally, not fully converging, nor prominently slanted,  
 reaching the proximal edge of the opesia. Cryptocyst concave,

**Table 2.** Measurements (in millimetres) of *Chaperia septispina*  
 sp. nov. material.

|     | Sample<br>size | Mean | S.D. | Range     |
|-----|----------------|------|------|-----------|
| Lz  | 20             | 0.58 | 0.02 | 0.55–0.63 |
| Iz  | 20             | 0.54 | 0.02 | 0.52–0.58 |
| Lso | 20             | 0.27 | 0.02 | 0.20–0.29 |
| Iso | 20             | 0.35 | 0.02 | 0.28–0.38 |

granular and narrowing proximally. Gymnocyst absent. A  
 row of five to seven distal spines, each articulated at the  
 base. No avicularia or ovicells.

#### Substratum, depth range and ecology

Forms encrustations on or around rhodophytes. Depth  
 range 8 m.

#### Geographic distribution

This species is known only from A-Frame, False Bay.

#### Remarks

The current specimen is most similar to *Chaperia*  
*acanthina* (Lamouroux, 1825), which is well characterized  
 and is also the type species of the genus *Chaperia*. The con-  
 fusion that existed over the taxonomic status of *C.*  
*acanthina* has been addressed by Hayward & Cook (1983)  
 and also Gordon (1986). *C. acanthina* differs from the cur-  
 rent specimens in that it only has five distal oral spines, a  
 greater proportion of cryptocyst and occlusor laminae that  
 are prominently slanted while not completely reaching the  
 proximal edge of the opesia. The current specimen consists  
 of a single fragment of a colony, but enough of it is in good  
 condition for an accurate diagnosis.

#### Genus *Chaperiopsis* Uttley, 1949

Type species: *Membranipora galeata* Busk, 1854.

#### Subgenus *Chaperiopsis* Uttley, 1949

Type species: *Membranipora galeata* Busk, 1854.

#### *Chaperiopsis (Chaperiopsis) multifida* (Busk, 1884),

Figs 4F, H–I, 21K

*Membranipora galeata* var. *multifida* Busk, 1884: 64.

*Chaperia multifida*: Kluge, 1914: 673, fig. 44. Marcus, 1922: 7,  
 fig. 3. Hayward & Cook, 1983: 20, fig. 6.

*Membranipora galeata* var. *multifida*: O'Donoghue & de  
 Watterville, 1935: 205.

#### Material examined

SAM – A28574, A-Frame, False Bay (34°13'S, 18°28'E),  
 depth 8 m, collected by W. Florence, 12 March 2000. SAM –  
 A28575, Justin's Cave, Oudekraal (33°58'90"S, 18°20'65"E),  
 depth 15 m, collected by G. Isaacs, 24 April 1999. SAM –  
 A28576, Robben Island (33°48'S, 18°23'E), depth 8 m,  
 collected by W. Florence, 12 August 2001.

#### Description

Colony encrusting; developing as an erect bilaminar  
 sheath or solid branching cylinders. Dark red/maroon in

colour when alive and when dried. Autozooids arranged multiserially, alternating; hexagonal and separated by shallow sutures. Opesia large; circular or oval, occupying 75% of the total front length of the autozooids. Occlusor laminae originate distally on each side below the point of the spines and end approximately half way down the lateral sides of the opesia. Cryptocyst concave, forming a narrow, finely granular rim; proximal end tapering towards spine bases. Gymnocyst highly reduced and smooth. Two pairs of distolateral spines, which are thick, jointed at base and hollow; distalmost spines are erect and cylindrical while proximalmost pair develops as multibranched palmate structures obscuring most of the frontal surface of the autozooid. A single sessile avicularium found at median distal end of each zooid, situated just above the distalmost pair of spines; rostrum triangular, pointed distally, with an incomplete cross bar and foramen about half the length of the rostrum. Erect pedunculate avicularia present adjacent to the sessile avicularium, sometimes on either side. Ooecia prominent; hemispherical with an oval or irregular frontal area; suppresses the distal pair of spines and the avicularia.

#### Substratum, depth range and ecology

May be erect or form cylindrical encrustations around hydroid stems. Erect colonies provide habitats for small sponges, polychaete worms and molluscs. Depth range 4–100 m.

#### Geographic distribution

Distributed from Robben Island to Durban on the east coast of South Africa. Also St Helena Islands.

#### Remarks

The current specimens are consistent with the descriptions of this species by Busk (1884), Kluge (1914), O'Donoghue & de Watteville (1935) and Hayward & Cook (1983). Gordon (1984) described New Zealand specimens with bifurcating distalmost spines, which is not consistent with *Chaperiopsis* (*Chaperiopsis*) *multifida* s. s. and the current specimens.

Superfamily **FLUSTROIDEA** Fleming, 1828

Family **FLUSTRIDAE** Fleming, 1828

Genus *Klugeflustra* (Moyano, 1972)

Type species: *Flustra vanhoeffeni* Kluge, 1914.

#### *Klugeflustra jonesii* sp. nov.

Fig. 5A–B, Table 3

#### Etymology

*Jones* – Named after Mary Spencer-Jones, current curator of the bryozoan collection at the Natural History Museum, London. Her invaluable contributions to bryozoology are hereby acknowledged.

#### Material examined

Holotype: SAM – A28577, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999.

#### Description

Colony erect, forming broad bilaminar fronds, widening at

**Table 3.** Measurements (in millimetres) of *Klugeflustra jonesii* sp. nov. material.

|     | Sample size | Mean | S.D. | Range     |
|-----|-------------|------|------|-----------|
| Lz  | 20          | 0.60 | 0.02 | 0.55–0.63 |
| lz  | 20          | 0.18 | 0.01 | 0.16–0.21 |
| Lov | 20          | 0.21 | 0.01 | 0.19–0.24 |
| lov | 20          | 0.17 | 0.01 | 0.14–0.19 |

the distal end. Attached to the substratum by a holdfast. Light brown to dark yellow when both dry and alive. Autozooids arranged multiserially, alternating; elongate and rectangular, with rounded distal end and lateral walls thin, lightly calcified; proximal end thickened with cryptocyst present. A short reduced spine at the distal corner of each zooid. Orifice is small, located distally closed by chitinized operculum. Ovicells prominent, hyperstomial and almost round with thin but distinct median suture; ectooecial fenestrae occupying about one third frontal area. Avicularia not present.

#### Substratum, depth range and ecology

Forms erect colonies that provide habitats for small molluscs. Depth range 4–30 m.

#### Geographic distribution

This species is known only from Oudekraal along the west coast of South Africa.

#### Remarks

This species is similar to *Carbbasea carbbasea* (Ellis & Solander, 1786), which is a boreal and Arctic species, circumpolar in its distribution. It differs from *C. carbbasea* by having a more foliose colony morphology (this may be environmentally induced), smaller autozooids that are rectangular with distal spines and an ovicell that is hyperstomial and not endozooidal with a median suture and ectooecial fenestrae. The ovicell structure is, however, more characteristic of *Klugeflustra* (Moyano, 1972) and the current specimen agrees so closely with respect to the other characters of this genus that its placement here is warranted.

Genus *Gregarinidra* Barroso, 1949

#### *Gregarinidra spinuligera* (Hincks, 1891)

Fig. 5C–D

*Flustra spinuligera* Hincks, 1891: 150, pl. 6.

*Spiralaria spinuligera*: Marcus, 1922: 8, fig. 4.

#### Material examined

SAM – A28578, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999.

#### Description

Colony erect, forming broad bilaminar lobate fronds, which widen at the distal end thus resembling an alga. Attached to the substratum by a holdfast. Fronds are irregularly jointed. Cream to yellow when dry and alive. Zooids arranged multiserially, alternating. Zooids are elongate and rectangular, with a rounded distal end; narrowed at proxi-

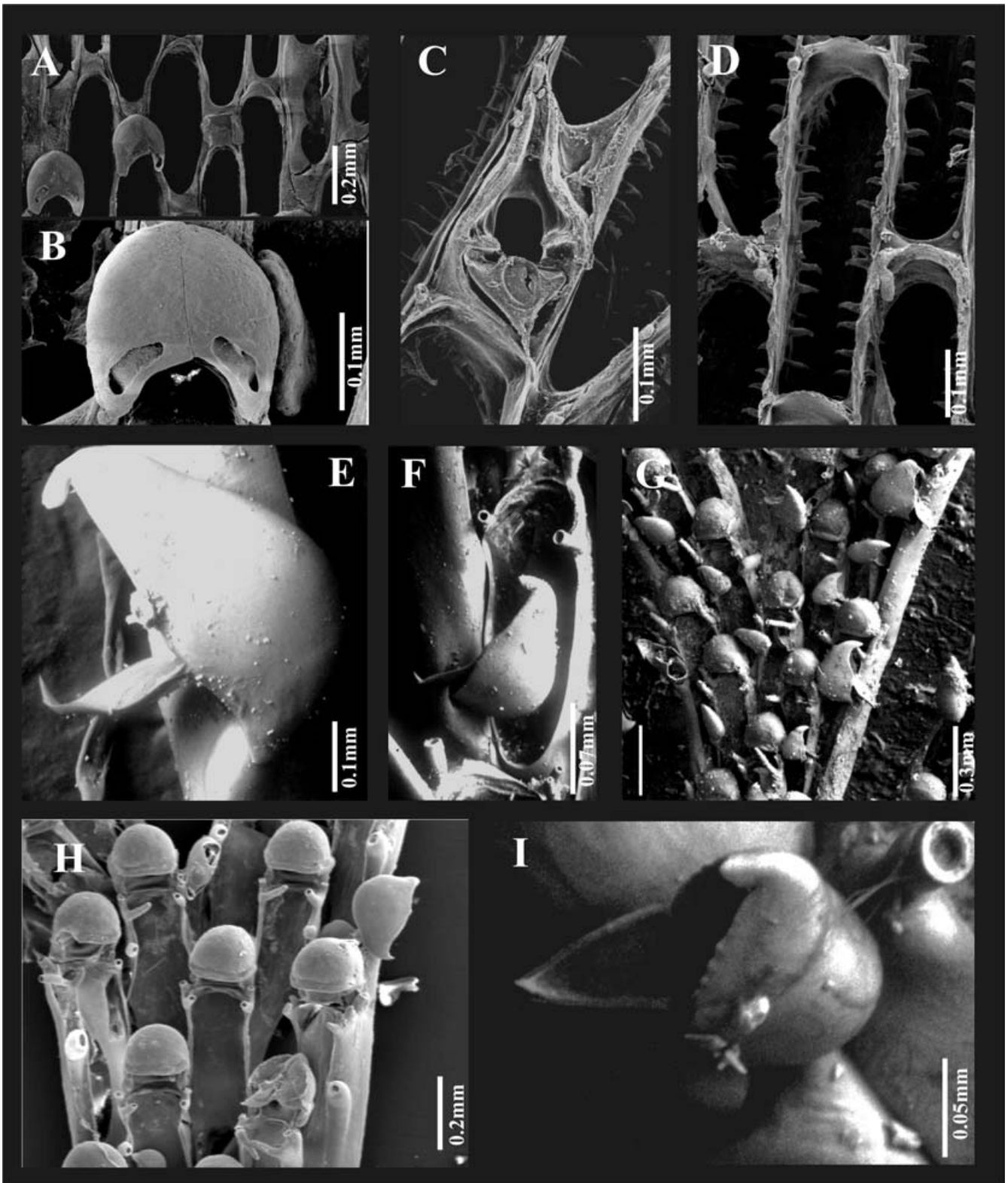


Fig. 5. A, B, *Klugeflustra jonesii* sp. nov. (SAM – A28577). C, D, *Gregarinidra spinuligera* (Hincks). E, F, *Bugula dentata* (Lamouroux). G–I, *Bugula flabellata* (Thompson)



mal end. The lateral margins of the zooids are thick with a continuous row of rather short and stout spines on either side. Orifice is small located distally. Vicarious avicularia distributed over the entire colony. Rounded at the base with a large triangular mandible.

#### Substratum, depth range and ecology

Forms erect colonies, which provide habitats for small sponges, polychaete worms and molluscs. Depth range 4–20 m.

#### Geographic distribution

This species is known only from the west coast of South Africa.

#### Remarks

This species has been described before from South Africa by Busk (1852) and Hincks (1891) and is well defined.

Superfamily **BUGULOIDEA** Gray, 1848

Family **BUGULIDAE** Gray, 1848

Genus *Bugula* Oken, 1815

Type species: *Sertularia neritina* Linnaeus, 1758.

*Bugula dentata* (Lamouroux, 1816)

Figs 5E–F, 20B, 21L

*Acamarchis dentata* Lamouroux, 1816: 35, pl. 3, figs 3a–b.

*Bugula dentata* Busk, 1852: 46, pl. 35, figs 1–5. O'Donoghue, 1924: 33. Harmer, 1926: 439, pl. 30, figs 5–6, pl. 32, figs 21–25. O'Donoghue, 1957: 82. Hayward & Cook, 1983: 43.

#### Material examined

SAM – A28579, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 10 m, collected by G. Isaacs, 30 April 1999. SAM – A28598, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 12 m, collected by G. Isaacs, 24 April 1999.

#### Description

Colony erect, forming branching tufts spreading from the original point of settlement by a stoloniferous network from which secondary colonies arise. Greenish-grey in colour when alive and grey to cream when dried. Branches with type 4 autozooidal dichotomy arrangement (see Harmer 1923) and slender but widening at the tips where the tightly packed, biserially arranged and alternating autozooids flare open. Autozooids are long and slender with the distal end rounded; the frontal membrane occupies 60–90% of the zooid length. One short spine present on the inner distal angle of all autozooids. The outer gymnocystal margins are curved frontally almost covering the entire frontal membrane; three spines appear on the outer distal end of the margin; two most distal spines are shorter and point outward and the longer third spine inward. However, autozooids F and G have only two spines on their outer distal angle. A single large avicularium attached to the outer edge of the proximal end of all autozooids except zooid F; longer than the width of the zooid; the beak is hooked rectangularly. Ooecia globular with proximal margin entire.

#### Substratum, depth range and ecology

Bushy tufts provide habitats for sponges and small molluscs. Depth range 4–100 m.

#### Geographic distribution

This species has a pan-warm temperate–tropical distribution as it has been reported from Australia–New Guinea, the Celebes sea, South Africa, New Zealand, Japan, Madeira and more recently from Brazil.

#### Remarks

Ryland (1974) noted morphological variation throughout the range of *B. dentata*. Specimens from Victoria and New Zealand varied from those described from Heron Island in terms of the positioning of the avicularia. However, as all other characters were homogeneous throughout, the Heron Island *B. dentata* were reported as conspecific with that of Victoria and New Zealand, but the variation noted points to *B. dentata* perhaps being distinguishable at some infra-specific level (Ryland 1974). Furthermore, to support Ryland's doubt over the conspecificity of specimens of this taxon, an investigation of specimens from the central Indo-Pacific demonstrated avicularial dimorphism (Ryland 1974). Here 'giant' avicularia are found in place of standard avicularia (present in specimens from other areas) on some of the autozooids (Harmer 1926, pl. 22, fig. 21–22). Ryland (1974) noted that the Indo-Pacific specimens also have 'oblique' inwardly orientated ovicells whereas those from the Heron Island, Victoria and New Zealand all have a more horizontal orientation of their ovicells. South African specimens of *B. dentata* have proximally positioned avicularia that are as large as the 'giant' avicularia described from the Indo-Pacific but lack the dimorphism described above (see Mackie *et al.* 2002 for a figure showing dimorphism between Williamstown, Heron Island, Albany and Oahu).

*Bugula flabellata* (Thompson in Gray, 1848)

Fig. 5G–I

*Avicularia flabellata* Thompson in Gray, 1848: 106.

*Bugula flabellata*: Busk, 1852: 44, pls 51, 52. Hincks, 1880: 80, pl. 11, figs 1 & 3. Ryland & Hayward, 1977: 158, fig. 76. Gordon, 1986: 45 pl. 15B. Hayward & Ryland, 1998: 216, fig. 66.

*Bugula calathus*: O'Donoghue, 1957: 79 figs 3–5.

#### Material examined

SAM – A28580, Saldanha Bay (33°01'S, 17°59'E), depth 20 m, collected by W. Florence, 15 February 2001.

#### Description

Colony erect, forming branching tufts 2–3 cm in height. Beige in colour when alive and grey when dried. Branches broad, with autozooids alternating, arranged multiserially in series of three to five. Autozooids are long and slender; the frontal membrane extends the entire zooid length with gymnocyst only visible in outer zooids. Inner zooids have two spines on distal corners while outer zooids have three spines on the outer and two on the inner distal corners and are commonly larger than inner spines. Avicularia vary in size from large on marginal zooids to small on the inner zooids; attached one-third of the way down the side; beak hooked rectangularly. Ooecia

subglobular with proximal margin straight and the opening broad.

#### Substratum, depth range and ecology

A well-known fouling species commonly attached to the hulls of ships. Also epizootic on other cheilostome bryozoan species. Depth range 4–100 m.

#### Geographic distribution

This species is alleged to have a widespread geographic distribution in both warm and cold temperate waters of both hemispheres (Gordon & Mawatari 1992). Locally, *B. flabellata* has a known distribution from Port Nolloth to Plettenberg Bay but may be more widely spread around South Africa, as it is a common fouling organism, which is notorious for colonizing the hulls of ships.

#### Remarks

This species is similar to *Bugula dentata* and is very well characterized, but has multiserial rows of autozooids.

#### *Bugula neritina* (Linnaeus, 1758),

Fig. 6A–C

*Sertularia neritina* Linnaeus, 1758: 815.

*Bugula neritina*: Busk, 1852: 44, pl. 43. O'Donoghue & de Watteville, 1944: 419. O'Donoghue, 1957: 83. Ryland & Hayward, 1977: 162, fig. 78. Gordon, 1986: 45 pl. 15A. Hayward & Ryland, 1998: 220, fig. 68.

#### Material examined

SAM – A28581, Saldanha Bay (33°01'S, 17°59'E), depth 20 m, collected by W. Florence, 15 February 2001.

#### Description

Colony erect, forming delicate branching tufts; seven to nine cms in height. Reddish-purple in colour when alive and brown when dried. Branches narrow with autozooids arranged biserially, alternating; bifurcations of type four or five (see Harmer 1923). Autozooids are long and slender; the frontal membrane extends almost the entire zooid length, with gymnocyst only exposed proximally; outer distal corners acute and project slightly. Spines and avicularia absent. Ooecia, globular, attached to the inner distal corner of zooids; opening not visible.

#### Substratum, depth range and ecology

A common fouling species commonly attached to the hulls of ships. Attaches to other cheilostome bryozoan species. Depth range 4–100 m.

#### Geographic distribution

This species is nearly cosmopolitan, probably through anthropogenic introduction, but not found in cold polar and subarctic/subantarctic regions (Gordon & Mawatari 1992). Locally it is prevalent in all areas with a harbour, from Port Nolloth to Durban, and is a common fouling organism found on the hulls of ships.

#### Remarks

This species is unique in the genus *Bugula* as it lacks avicularia, but conforms to all the other characters repre-

sented in this genus. It is a common fouling organism and has been studied extensively. *B. neritina* is native to an unknown locality as it is assumed to be introduced via shipping to most areas (Ryland & Hayward 1977). *B. neritina* is also a source of the novel anticarcinogenic biochemical compound bryostatin (Newman 1996).

#### Genus *Bicellariella* Levinsen, 1909

Type species: *Sertularia ciliata* Linnaeus, 1758.

#### *Bicellariella bonsai* sp. nov.

Fig. 6D–E, Table 4

*Bicellaria ciliata* Hincks, 1880: 68, pl. 8, figs 1–5. Waters, 1909: 135. O'Donoghue & de Watteville, 1935: 207.

*Bicellariella ciliata*: O'Donoghue & de Watteville, 1944: 412. O'Donoghue, 1957: 77.

#### Etymology

So named because of the colony appearance, which resembles a delicate Japanese bonsai tree.

#### Material examined

Holotype: SAM – A28582, A-Frame, False Bay (34°13'S, 18°28'E), depth 8 m, collected by W. Florence, 12 March 2000.

Other material: SAM – A28583, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 10 m, collected by W. Florence, 24 April 1999.

#### Description

Colony erect and delicate, forming feathery tufts. Pale white in colour when alive and when dried. Branches slender but widening at the tips where the tightly packed, biserially arranged and alternating autozooids flare outward. Autozooids with proximal gymnocyst regions slender and contiguous, and distal regions free and flared outward; the frontal membrane occupies 30% of the zooid length and is not entirely oval; distal end rounded and tapers to the more slender proximal end. One long spine originates laterally to the frontal membrane on some autozooids and four to seven very long incurved spines originate on the distal end of the membrane. A single large avicularium attached to the outer edge, proximal to the frontal membrane and above the gymnocyst fold; its length almost equal to the width of the zooids; the beak is slightly hooked and the inner margin serrate. Ooecia deep, helmet shaped and covers most of the frontal membrane so that the opening faces the membrane.

**Table 4.** Measurements (in millimetres) of *Bicellariella bonsai* sp. nov. material.

|       | Sample size | Mean | S.D.  | Range       |
|-------|-------------|------|-------|-------------|
| Lz    | 20          | 0.57 | 0.02  | 0.52–0.60   |
| lz    | 20          | 0.07 | 0.002 | 0.065–0.073 |
| Lfm   | 20          | 0.23 | 0.02  | 0.19–0.26   |
| lfm   | 20          | 0.16 | 0.02  | 0.10–0.20   |
| Ladav | 20          | 0.15 | 0.02  | 0.12–0.19   |
| Lov   | 20          | 0.18 | 0.02  | 0.13–0.23   |
| lov   | 20          | 0.24 | 0.02  | 0.20–0.29   |



Fig. 6. A–C, *Bugula neritina* (Linnaeus). D, E, *Bicellariella bonsai* sp. nov. (SAM – A28582). F, G, *Beania magellanica* (Busk). H–J, *Beania minuspina* sp. nov. (SAM – A28585).

**Substratum, depth range and ecology**

Lives beneath rocky overhangs low on the shore and in the subtidal. Sometimes colonized by tiny molluscs. Depth range 4–10 m.

**Geographic distribution**

This species is distributed from Lamberts Bay to Isipingo Beach, Durban, and has been reported only from South African waters.

**Remarks**

*Bicellaria ciliata* (Linnaeus, 1758) was previously described from South Africa (Hincks 1880; Waters 1909; O'Donoghue & de Watteville 1935, 1944; O'Donoghue 1957). It is clear from comparison with the descriptions and figures of the above authors that the current specimen is indeed conspecific with theirs. However, these specimens all differ from *B. ciliata* (~0.67 mm measured from fig. 77 in Hayward & Ryland 1998) by virtue of having shorter zooids that are more tightly packed, a frontal window that is not oval but the distal end is wider than the proximal half, the proximal region under the fold is shorter, the long inner spine always originates laterally and the avicularia are larger. Hincks (1880) raised concern over differences between the South African specimens and *B. ciliata sensu stricto*. Furthermore, O'Donoghue (1957) described polymorphism within the characters that Hincks highlighted and concludes that there is not sufficient constancy of difference between the two forms to erect a new species. Examination of the current specimens support the erection of a new species and this becomes increasingly clear when comparing them with the description and figures of *B. ciliata* given by Hayward & Ryland (1998).

Family **BEANIIDAE** Canu & Bassler, 1927

Genus *Beania* Johnston, 1840

Type species: *Beania mirabilis* Johnston, 1840.

*Beania magellanica* (Busk, 1852)

Fig. 6F–G

*Diachoris magellanica* Busk, 1852: 54, pl. 67, figs 1–3.

*Beania magellanica*: Hastings, 1943: 414, figs 34C & 35G.

O'Donoghue, 1924: 33. O'Donoghue & de Watteville, 1944:

419. O'Donoghue, 1957: 83. Hayward & Cook, 1983: 42.

**Material examined**

SAM – A28584, A-Frame, False Bay (34°13'S, 18°28'E), depth 8 m, collected by G. Isaacs, 12 March 2000.

**Description**

Colony semi-erect; delicate and lacy. Beige in colour when alive and when dried. Elongate and oval autozooids arranged multiserially and alternating but surrounding walls not touching; each zooid connected to six other zooids surrounding it by six long tubes. A pair of avicularia present distolateral to each autozooid; pointed distally, mandibles acute and rostrum insubstantially hooked. A single attachment pore is located medially between the points where the distalmost lateral tubes connect to the zooid on the basal side. No spines or ovicells present.

**Substratum, depth range and ecology**

Encrusts algae, rocks and other bryozoans. Depth range 4–100 m.

**Geographic distribution**

This species is distributed from Table Bay to East London on the south coast of South Africa. Also believed to be widespread, as it has been reported from the Mediterranean to the Falkland Islands, from Australia to Japan, and throughout the Indian Ocean.

**Remarks**

This well-characterized species was first reported from South Africa by Jullien (1881). All records for South Africa have been documented by O'Donoghue (1957).

*Beania minuspina* sp. nov.

Fig. 6H–J, Table 5

**Etymology**

*Mino* (L.) – less, referring to the fewer number of spines in this species.

**Material examined**

Holotype: SAM – A28585, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 10 m, collected by W. Florence, 24 April 1999.

**Description**

Colony semi-erect; delicate and lacy. Beige in colour when alive and when dried. Autozooids elongate, oval, arranged multiserially and alternating, tightly packed with lateral walls almost in contact, with each zooid connected to the six other zooids surrounding it by six short tubes. Four to five tubular marginal spines on each side, extending across the front of the zooid overlapping slightly; two additional pairs of erect hollow oral spines. A single attachment pore is located medially on the basal side just below the distalmost connection tube. No avicularia or ovicells.

**Substratum, depth range and ecology**

Encrusts certain rhodophyte algae. Depth range 4–20 m.

**Geographic distribution**

This species is only known from Oudekraal in South Africa.

**Remarks**

*Beania minuspina* sp. nov. is most similar to *Beania paucispinosa* (O'Donoghue & de Watteville, 1935) but differs from it by having fewer spines and more-compactly arranged autozooids. These characters also distinguish it from any other species in the genus.

**Table 5.** Measurements (in millimetres) of *Beania minuspina* sp. nov. material.

|    | Sample size | Mean | S.D. | Range     |
|----|-------------|------|------|-----------|
| Lz | 20          | 0.32 | 0.02 | 0.27–0.36 |
| lz | 20          | 0.25 | 0.02 | 0.20–0.29 |

Family **CANDIDAE** d'Orbigny, 1851

Genus ***Menipea*** Lamouroux, 1812

Type species: *Cellularia cirrata* Ellis & Solander, 1786 = *Cellularia crispa* Pallas, 1766.

***Menipea triseriata*** Busk, 1852,

Fig. 7A–E

*Menipea triseriata* Busk, 1852: 22, pl. 23, figs 2–4. Harmer, 1923: 342, pl. 17, fig. 18, figs 40–42. O'Donoghue, 1957: 76. Hayward & Cook, 1983: 39.

*Cellularia triseriata*: O'Donoghue, 1924: 31.

Material examined

SAM – A28586, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 15 m, collected by W. Florence, 24 April 1999. SAM – A28587, A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by G. Isaacs, 12 March 2000.

Description

Colony erect, forming branching tufts. Autozooids arranged biserially at the proximal end of the branch becoming triserial after a short distance (three zooids). Remains triserial till the end of the branch or internode (15 zooids per internode). Cream to pale orange when alive, cream to yellow when dried. Autozooids are oblong; longer than wide, rounded proximally. Appear box-shaped from the basal side. Opesia elongated and occupies up to 70% of the zooid. Cryptocyst granular, narrows laterally but widens proximally. Gymnocyst smooth and almost negligible. Two spines present on the outer distal side, one to two spines on the inner opposite side of lateral outer zooids. Median zooids have one, rarely two, spines on either side distally. Lateral zooids have a single marginal avicularium on the outer distal corner and a single frontal avicularium on the proximal end near the inner margin. The proximal-most median zooids of a single node have a single proximal median avicularium, the rest have a pair of proximal frontal avicularia. Ooecia rounded; the ectooecium smooth, non-porous, sometimes with small fenestra and a single frontal avicularium distally.

Substratum, depth range and ecology

Erect colonies found on rocky substrata. Depth range 4–100 m.

Geographic distribution

This species is only known from South Africa.

Remarks

Two colony forms of *Menipea triseriata* seem to prevail in the current specimens. Specimens from Justin's Caves have a spiral whorl-like arrangement of the branches whereas the branches of other specimens are arranged loosely without whorling. The Justin's Caves specimens also appear to be more slender in growth and not as bushy. This is consistent with the description of O'Donoghue (1924) for this species from Cape Agulhas on the south coast. However, SEM imagery indicates that autozoid detail, and avicularia and ovicell structure are too similar throughout the specimens to warrant the erection of a new species.

***Menipea ornata*** (Busk, 1852)

Fig. 7F–I

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

*Menipea ornata*: Harmer, 1923: 340. Hayward & Cook, 1983: 39.

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

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

Material examined

SAM – A28588, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 15 m, collected by W. Florence, 24 April 1999. SAM – A28589, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 10 m, collected by W. Florence, 30 April 1999.

Description

Colony erect, forming dichotomously branching tufts. Cream to pale orange in colour when alive and when dried. Divided into internodes of eight to ten zooids, separated by a pale brown node or joint. Autozooids arranged biserially, alternating, but immediately below the node a median zooid appears making the internode end triserially. The joint forms the bottom of the outer zooid but passes through the inner zooid (basal portion of the internode, upper portion of the zooid above joint). Zooids are oblong in shape (longer than wide). Opesia are elongated and occupy up to 90% of the autozooids and have flattened C-shaped opercula. Cryptocyst granular and almost consistently wide, surrounding the opesial window. Gymnocyst almost completely negligible. No real spines are present but the two lateral zooids just below the joint bear a short spinous process at the disto-lateral angle. The median zooid at the distal end of the internode and the first zooid at the proximal end of an internode bear a small sessile avicularium, hence the median zooid has one avicularium below it and two above on either side. No other avicularia persist. Ovicells not present.

Substratum, depth range and ecology

Erect colonies found on rocky substrata but also observed living epizooically on other bryozoan species like *Turbicellepora valligera*. Depth range 4–100 m.

Geographic distribution

This species has been recorded only from South Africa.

Remarks

The confused synonymy associated with this species has been cleared up by Hastings (1943: 332).

***Menipea crispa*** (Pallas, 1766)

Fig. 8A–D

*Cellularia crispa* Pallas, 1766: 71.

*Cellularia cirrata* Ellis & Solander, 1786: 29, pl. 55, fig. D.

*Menipea cirrata*: Busk, 1852: 21, pl. 20, figs. 1–2.

*Menipea crispa*: Marcus, 1922: 11. Hastings, 1943: 332. O'Donoghue, 1957: 75, figs 1–2. Hayward & Cook, 1983: 39.

Material examined

SAM – A28590, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 10 m, collected by W. Florence, 30 April 1999. SAM – A28591, Saldanha Bay (33°01'S, 17°59'E), depth 7 m, collected by W. Florence, 15 February 2001. SAM – A28592, Paternoster (32°29'S, 17°31'E), depth 15 m,

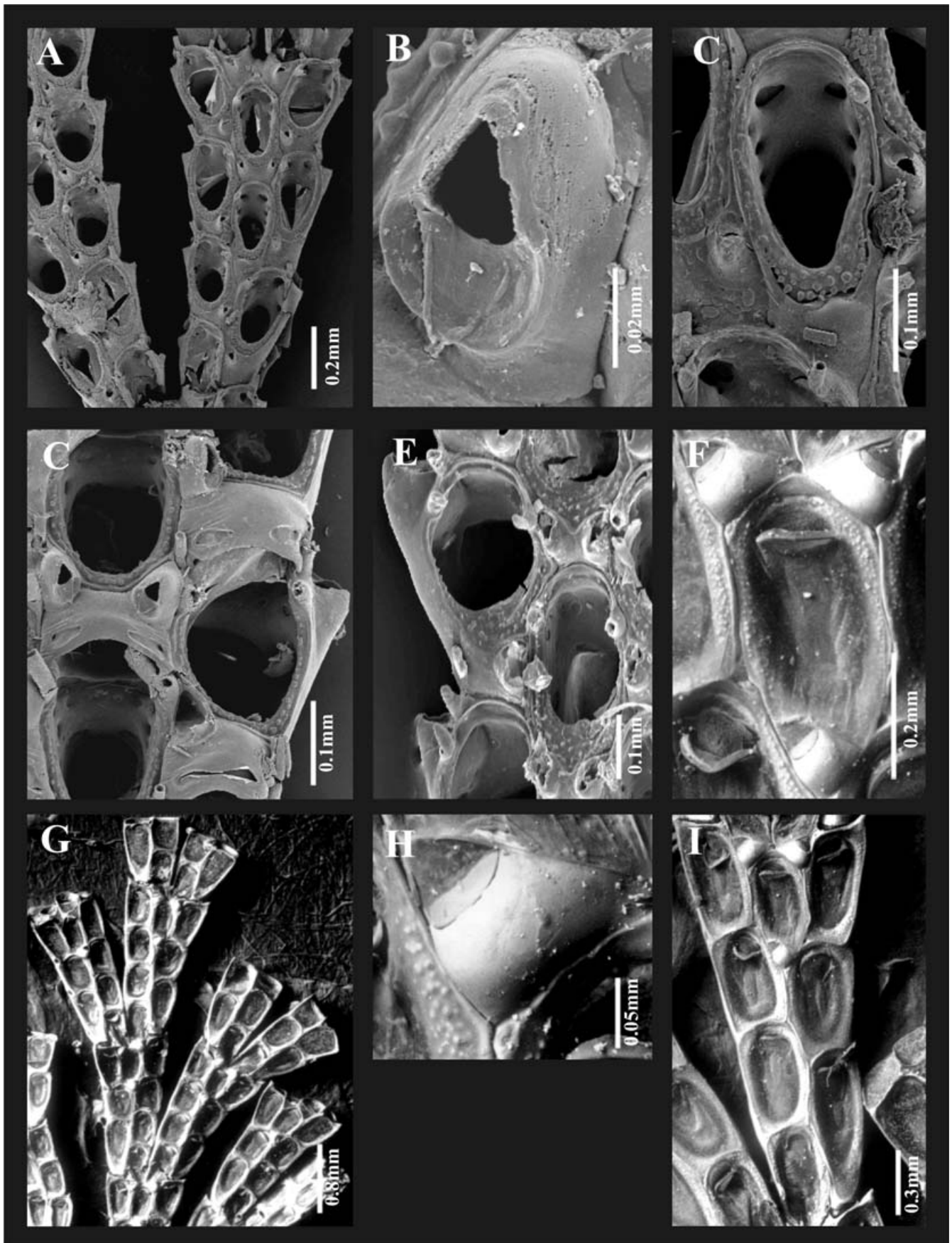


Fig. 7. A–E, *Menipea triseriata* (Busk). F–I, *Menipea ornata* (Busk).

collected by G. Isaacs, 16 April 2000. SAM – A28593, Port Nolloth (29°11'S, 16°51'E), depth 8 m, collected by G. Isaacs, 10 April 2000.

#### Description

Colony erect, bushy tuft, branching. Ends of branches curled inward. Branch jointed, divided into internodes (six zooids in each internode). Proximal end of internode starts with one autozooid then leads to two and then to three before next joint. Yellow to brown when dry. Autozooids are pyriform. Opesia oval and occupies 60% of the autozooid. Cryptocyst, granular and thin, almost completely absent distally. Gymnocyst smooth and shorter than the opesia. The autozooids of one internode collectively have up to 18 spines present, of which 11 are long and seven are very short mural spines. Median zooid has one to two long spines distally and paired mural spines distolaterally on either side. The two outer, most distal autozooids of an internode have two to three very long spines at their outer distolateral corners and one mural spine on their inner distolateral corner. The first three autozooids of an internode have one long spine at the outer distolateral corner and one short mural spine on the inner distolateral corner. All except the first autozooid have a prominent frontal avicularium situated proximally to the opesia, which is columnar, curving distally above the frontal membrane with a triangular mandible. Lateral avicularia found on the outer lateral margin of first three autozooids from the proximal end of the internode; the lateral avicularium of the second autozooid is relatively much larger than that of the other two. Ooecia not seen.

#### Substratum, depth range and ecology

Attached to hard rocky substrate and colonized by small molluscs. Depth range 4–100 m.

#### Geographic distribution

Distributed from Saldanha Bay on the west coast of South Africa to Madagascar.

#### Remarks

The synonymy of this species is indeed confusing. Pallas (1766) first described this species as *Cellularia crispa*. Ellis & Solander (1786) must have overlooked the work of Pallas, although agreeing that the genus *Cellularia* be retained and instead used the specific name *cirrata*. Busk (1852) redirected *Cellularia cirrata* to the genus *Menipea*, but also probably overlooked the previous description of *C. crispa* by Pallas. Marcus (1922), Hastings (1943) and O'Donoghue (1957) all correctly used the name *M. crispa* as Pallas (1766) takes preference. None of the above authors described the short mural spines found in *M. crispa*. These spines are hardly visible under light microscopy but clearly visible under SEM and may have been overlooked for this reason.

#### *Menipea marionensis* Busk, 1884

Fig. 8E–I

*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.

#### Material examined

SAM – A28655, Castle Rock, False Bay (34°14'S, 18°29'E), depth 15 m, collected by G. Isaacs, 2 March 2000.

#### Description

Colony erect, forming branching tufts. Autozooids arranged biserially at the proximal end of the branch, becoming triserial after a short distance (three zooids); remains triserial till the end of the branch or internode (nine zooids in internode). Cream to pale white when alive and when dried. Autozooids are oblong, longer than wide, rounded proximally. Appear box shaped from the basal side. Opesia elongated and occupies up to 50–70% of the zooid. Cryptocyst granular narrows laterally but widens proximally. Gymnocyst smooth and more prominent in lateral zooids. One spine present on the outer distal side. Median zooids have one spine on either side distally. Lateral zooids have a single marginal avicularium on its outer distal corner and a single frontal avicularium on the proximal end near the inner margin. The proximal median zooid, of a single node, has a single frontal avicularium located proximo-medially, whereas the distal median zooid has a pair of proximal frontal avicularia. Ooecia not seen.

#### Substratum, depth range and ecology

Erect colonies found on rocky substrata. Depth range 4–100 m.

#### Geographic distribution

This species is only known from South Africa.

#### 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.

#### Superfamily MICROPOROIDEA Gray, 1848

#### Family MICROPORIDAE Gray, 1848

#### Genus *Micropora* Gray, 1848

Type species: *Flustra coriacea* Johnston, 1847.

#### *Micropora latiavicula* sp. nov.

Fig. 8J–L, Table 6

#### Etymology

*Latus* (L.) – broad, referring to the very broad interzooidal avicularia.

#### Material examined

Holotype: SAM – A28594, Saldanha Bay (33°01'S, 17°59'E), depth 15 m, collected by W. Florence, 15 February 2001.

**Table 6.** Measurements (in millimetres) of *Micropora latiavicula* sp. nov. material.

|        | Sample size | Mean | S.D. | Range     |
|--------|-------------|------|------|-----------|
| Lz     | 20          | 0.46 | 0.04 | 0.39–0.52 |
| Iz     | 20          | 0.26 | 0.03 | 0.19–0.33 |
| Lso    | 20          | 0.06 | 0.01 | 0.03–0.09 |
| Iso    | 20          | 0.13 | 0.03 | 0.09–0.19 |
| Lvicar | 20          | 0.20 | 0.03 | 0.15–0.26 |
| Ivicar | 20          | 0.14 | 0.02 | 0.10–0.19 |

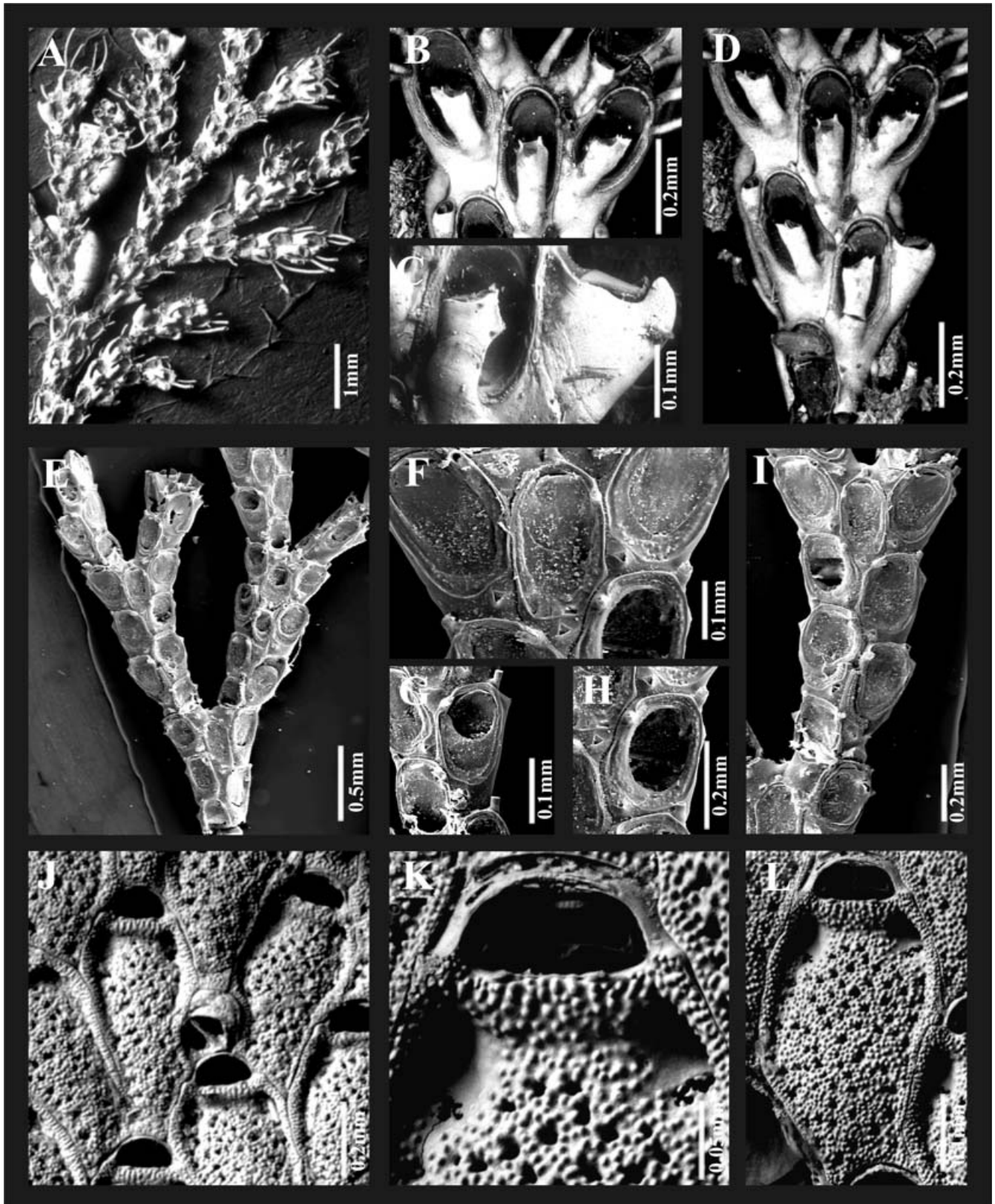


Fig. 8. A–D, *Menipea crispa* (Pallas). E–I, *Menipea marionensis* (Busk). J–L, *Micropora latiavicula* sp. nov. (SAM – A28594).



Other material: SAM-A26418, holotype of *Micropora similis* (Hayward & Cook 1983).

**Description**

Colony encrusting, forming irregular sheets. Cream when dry. Autozooids arranged multiserially, alternating and separated by distinct shallow grooves; elongated, rectangular to oval, and fairly flat. Lateral walls raised and crenellate, thickening towards the distal end of the zooid. Cryptocyst proximally flat but becomes distally convex and dips off gently toward the opesiules; coarsely granular and finely punctured by numerous small round pores. Opsiules deep and rounded, placed just proximal to the orifice on either side; irregularly shaped, finely toothed, irregularly shaped accessory opsiule present subjacent to each opsiule. Opsiule raised slightly above the level of the cryptocyst; narrow (about three times as wide as long) with straight proximal edge. Interzooidal avicularia with broad, sloping rostra, directed obliquely distally. No ovicells or spines present.

**Substratum, depth range and ecology**

Encrusts mussel shells and other hard rocky substrata. Depth range 4–10 m.

**Geographic distribution**

This species has been reported only from Saldanha Bay on the west coast of South Africa.

**Remarks**

This species is characteristic of the genus *Micropora* and recalls *M. similis* (Hayward & Cook, 1983), an Indian Ocean species known from the east coast of South Africa. On comparison with the holotype of *M. similis* (SAM-A26418), *M. lativavicula* is distinguished on the basis of its long slender zooids, vicarious avicularia with broad, sloping rostra, which are directed obliquely distally and the conspicuous round opsiules with irregularly shaped subjacent accessory opsiule openings. These differences appear to be sufficient to warrant the erection of this new species.

Family **STEGINOPORELLIDAE** Hincks, 1884, emend. Bassler, 1953

Genus ***Steginoporella*** Smitt, 1873

Type species: *Membranipora magnilabris* Busk, 1854.

***Steginoporella buskii*** Harmer, 1900

Fig. 9A–B

*Steginoporella* [*sic*] *buskii* Harmer, 1900: 272, pl. 12, fig. 13.

Cook, 1964: 46, pl. 1, figs 1–3.

*Steginoporella buskii*: Pouyet & David, 1979: 771, pl. 1, fig. 9, text-fig. 2. Hayward & Cook, 1983: 32.

**Material examined**

SAM – A28595, Castle Rock, False Bay (34°14'S, 18°29'E), depth 15 m, collected by G. Isaacs, 2 March 2000.

**Description**

Colony encrusting, multilaminar and erect, bilaminar and anastomosing. Pale yellow when alive and white when dried. Autozooids large with large oral shelf, with granular

cryptocyst covering almost entire zooid and inserted into the distal wall; polypide tube simple and operculum without teeth. Avicularia (B zooids) infrequent, mandible wider than long, with an inverted 'Y' shaped sclerite and 25 small sub-peripheral teeth. No spines or ovicells observed.

**Substratum, depth range and ecology**

May be found encrusting rock and stones in sublittoral waters. The older or worn parts of the colony usually colonized by other bryozoans and entoprocts. Depth range 0–20 m.

**Geographic distribution**

This species has a cosmopolitan distribution in all warm seas (see Cook 1964, Map) and is distributed from Port Nolloth to Durban along the South African coastline.

**Remarks**

This species is easily identified and is characterized by having a fairly low level of insertion of the cryptocyst in the distal wall. The current specimen agrees closely with those of Hayward & Cook (1983).

Family **THALAMOPORELLIDAE** Levinsen, 1902

Genus ***Thalamoporella*** Hincks, 1887

Type species: *Flustra rozieri* Audouin, 1826.

***Thalamoporella spiravacula* sp. nov.**

Fig. 9C, E–F, Table 7

**Etymology**

*Spira* (L.) – spiral, referring to the spiral nature of the basal insertion of the polypide tube and the broad nature of the avicularium.

**Material examined**

Holotype: SAM – A28596, A-Frame, False Bay (34°13'S, 18°28'E), depth 10 m, collected by G. Isaacs, 12 March 2000.

Other material: SAM – A28597, Oudekraal Gullies, Oudekraal (33°59'S, 18°22'E), depth 10 m, collected by W. Florence, 30 April 1999.

**Description**

Colony encrusting, forming large unilaminar patches. Cream when alive and when dried. Autozooids arranged multiserially, alternating; rectangular, 0.78–0.86 mm in length, mean 0.82 mm, width 0.37–0.46 mm, mean 0.41 mm, with cryptocyst granular covering almost entire zooid. Primary orifice wider than long; condyles present about two

**Table 7.** Measurements (in millimetres) of *Thalamoporella spiravacula* sp. nov. material.

|        | Sample size | Mean | S.D. | Range     |
|--------|-------------|------|------|-----------|
| Lz     | 20          | 0.82 | 0.02 | 0.78–0.87 |
| lz     | 20          | 0.41 | 0.02 | 0.37–0.46 |
| Lso    | 20          | 0.18 | 0.02 | 0.15–0.23 |
| lso    | 20          | 0.26 | 0.03 | 0.20–0.31 |
| Lvicar | 20          | 0.76 | 0.01 | 0.74–0.79 |

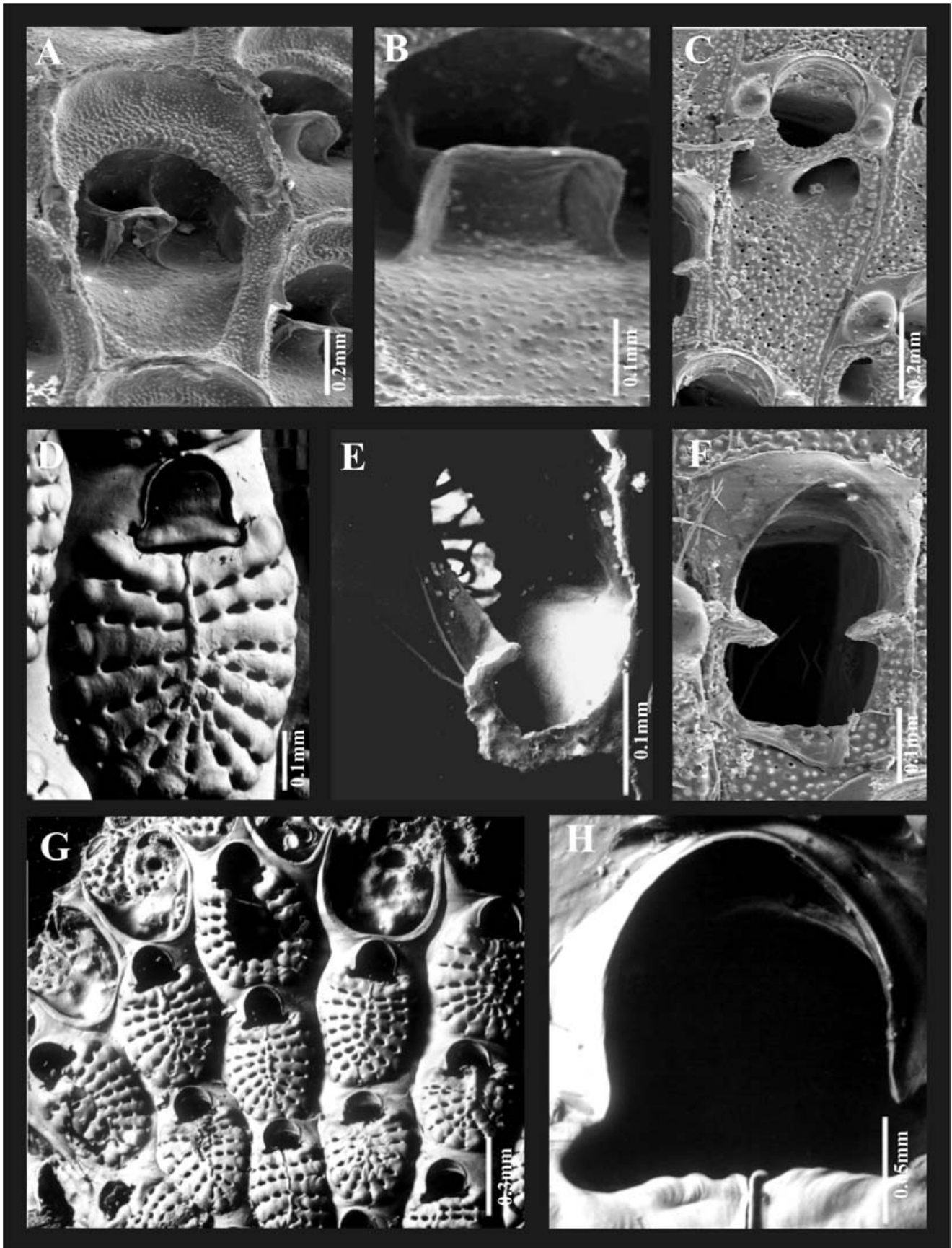


Fig. 9. A, B, *Steginoporella buskii* (Harmer). C, E, F, *Thalamoporella spiravicula* sp. nov. (SAM – A28596). D, G, H, *Cribrilina dispersa* (O'Donoghue & De Watteville).

thirds of the way from distal end; anter forms thick peristomial rim and the poster is shallow and curved. Polypide tube and opesiules depressed, with only one descending into the basal wall; insertion a small distally curved bar, almost spiral at times, forming a single open hook. Strong aboral tubercles or spines present on either side of orifice. Vicarious avicularia 0.74–0.79 mm in length, mean 0.76 mm, ratio of mean zooid length to mean zooid avicularium length about 1:0.92; rostrum raised, lateral margins curving inward to notch of distal tip of acute mandible. Spicules present; small and medium compasses. Ovicells not seen.

#### Substratum, depth range and ecology

Very large encrustations of uprights and boulders are common for this species. Also observed out-competing coralline algae for space. Depth range 4–20 m.

#### Geographic distribution

This species has been reported only from South Africa and is distributed from Oudekraal to False Bay.

#### Remarks

There are more than 50 described species of *Thalamoporella*. Even though these species have been rigorously studied, the high levels of polymorphism within taxa have cast some doubt over their taxonomic validity. The current specimen appears to be allied with the *T. gothica* complex discussed in detail by Soule *et al.* (1999) and is very similar to *T. afrogothica* from northwestern Africa but some differences do exist. In *T. spiravacula* sp. nov. the mean length ratio of the zooid to the avicularium is consistent with *T. gothica* which ranges from 1:0.80 to 1:1.00 and greater than that for *T. afrogothica* (ratio 1:0.62). *T. spiravacula* has a single, open, hooked basal insertion, which is almost spiral at times, and many small, medium and large compasses with no callipers. *T. gothica* has a L-shaped insertion with callipers and compasses, while *T. afrogothica* has a single bar or small hook for a basal insertion and also has callipers and compasses. Furthermore the avicularium of *T. spiravacula* has a larger, broad, rounded proximal opesium and a more rounded rostral apex and a shorter broader mandible than the two species discussed above. Given the taxonomic weight assigned to the characters of the avicularium by previous authors the present form appears to be distinctive enough to regard it as a new species.

Infraorder **ASCOPHORA** Levinsen, 1909

Superfamily **CRIBRILINOIDEA** Hincks, 1879

Family **CRIBRILINIDAE** Hincks, 1879

Genus ***Cribrilina*** Gray, 1848

Type species: *Lepralia punctata* Hassall, 1841.

***Cribrilina dispersa*** O'Donoghue & de Watteville, 1937

Fig. 9D, G–H

*Cribrilina dispersa* O'Donoghue & de Watteville, 1937: 14, fig. 1.

#### Material examined

SAM – A28599, A-Frame, False Bay (34°13'S, 18°28'E), depth 10 m, collected by W. Florence, 12 March 2000.

#### Description

Colony encrusting, forming small patches. Brownish grey when alive and cream when dry. Autozooids oval, convex and separated by thickened margins. Frontal shield consisting of seven to eight pairs of costae, with three to four intercostal spaces between each successive costa, on each side. A raised, distinct, nodular ridge develops along the midline of the shield. Orifice bordered proximally by a thickened official bar; trifoliate with proximal portion constituting one fifth of total length. No avicularia, spines or ovicells present.

#### Substratum, depth range and ecology

Forms small patches on other erect bryozoans, namely *Adeonella* and *Chaperia*. Depth range 4–20 m.

#### Geographic distribution

This species is known only from South Africa and is distributed from Oudekraal to False Bay.

#### Remarks

*Cribrilina dispersa* was first described by O'Donoghue & de Watteville (1937). In their paper they draw similarity to *C. simplex* (O'Donoghue & de Watteville, 1935) found off the southern coast of South Africa but differentiate the two on the basis of larger nature of the autozooids, the numbers of rows of costae and the numbers of intercostal spaces between them, and also the proportion of length to breadth of the orifice and the autozooid dimensions appear to be larger in *C. dispersa*. The current specimen appears to be allied with *C. dispersa*, however, further examination of the specimens of *C. dispersa* and *C. simplex* is required to elucidate the status of these species.

Superfamily **HIPPOTHOOIDEA** Busk, 1859

Family **HIPPOTHOIDAE** Busk, 1859

Genus ***Hippothoa*** Lamouroux, 1821

Type species: *Hippothoa divaricata* Lamouroux, 1821.

***Hippothoa musivaria*** Hayward & Fordy, 1982

Fig. 10A–C

*Hippothoa musivaria* Hayward & Fordy, 1982: 769, fig. 1–2.

#### Material examined

SAM – A28600, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by W. Florence, 12 March 2000.

#### Description

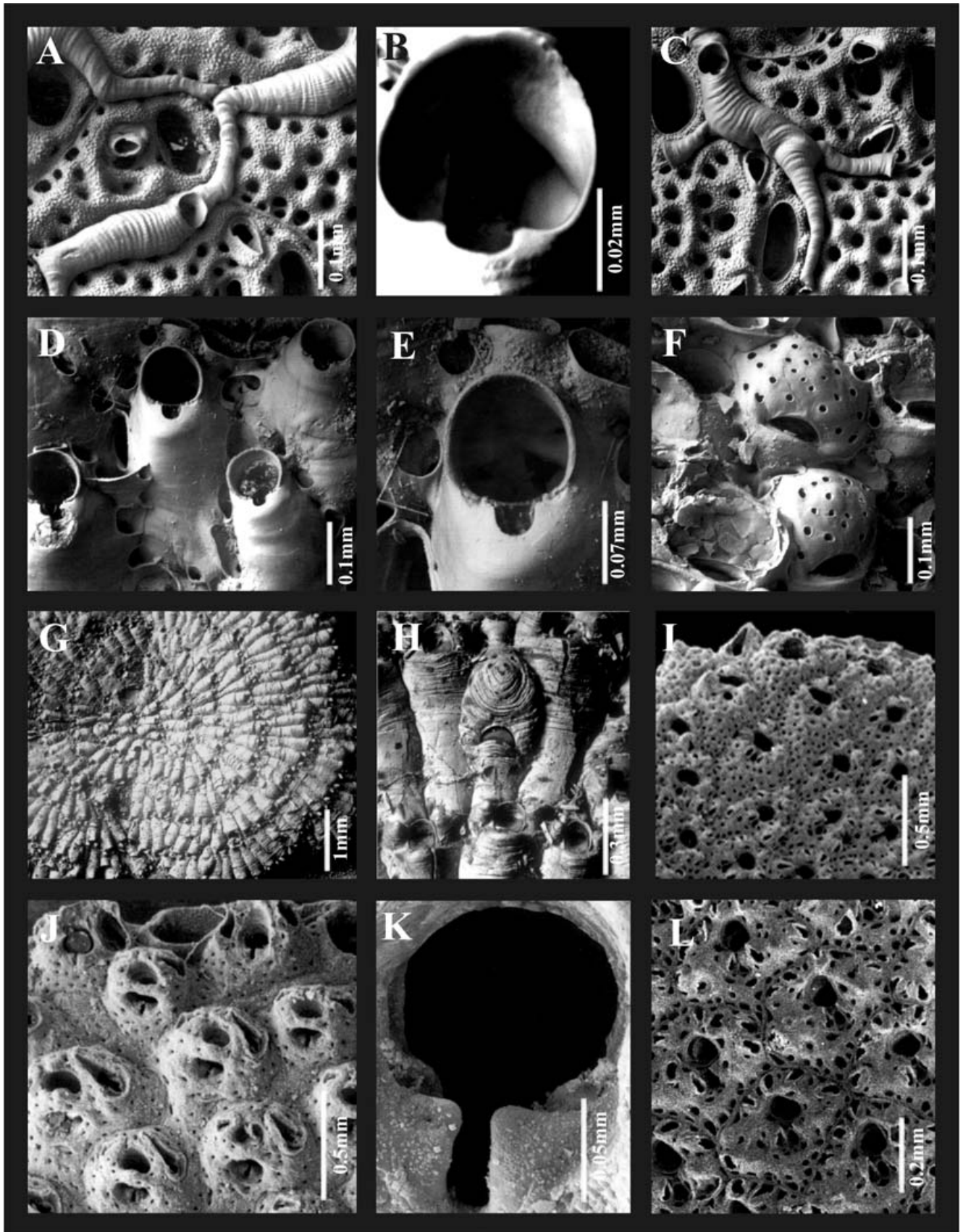
Colony encrusting, uniserial. Autozooids slender, club-shaped; each has a distal dilatation terminating in a long, slender, cauda. Frontal wall gymnocrystal, finely granular, almost smooth, with thick transverse striations. Orifice circular, almost as long as wide, with a shallow U-shaped sinus; without condyles. No ovicells observed.

#### Substratum, depth range and ecology

Lives epizoically in the grooves between zooids of *Adeonella pluscula*. Depth range 4–20 m.

#### Geographic distribution

This species is only known from South Africa.



**Fig. 10.** A–C, *Hippothoa musivaria* (Hayward & Fordy). D–F, *Celleporella hyalina* (Linnaeus). G, H, *Celleporella annularis* (Pallas). I, L, *Adeonella circumspecta* (Hayward). J, K, *Adeonella regularis* (Busk).

**Remarks**

This species is easily identified and its exclusive association with *Adeonella pluscula* species is common.

**Genus *Celleporella* Gray, 1848**

Type species: *Cellepora hyalina* Linnaeus, 1767.

***Celleporella hyalina* (Linnaeus, 1767)**

Fig. 10D–F

*Cellepora hyalina* Linnaeus, 1767: .1286.

*Celleporella hyalina*: Gray, 1848: 128. Hayward & Ryland, 1999: 94, fig. 21.

*Schizoporella hyalina*: Hincks, 1880: 271, pl.18, fig. 1.

*Hippothoa hyalina*: O'Donoghue, 1924: 41. O'Donoghue & de Watteville, 1937: 15. O'Donoghue & de Watteville, 1944: 424. O'Donoghue, 1957: 84. Ryland & Gordon, 1977: 38.

**Material examined**

SAM – A28601, Saldanha Bay (33°01'S, 17°59'E), depth 10 m, collected by W. Florence, 15 February 2001. SAM – A28602, Doring Bay (31°48'S, 18°14'E), depth 8 m, collected by W. Florence, 12 April 2000.

**Description**

Colony encrusting, forming small circular patches. Transparent alive and dried. Three types of zooids – autozooids, female zooids and male zooids. Autozooids arranged multiserially with narrow lacunae visible; elongated with convex gymnocystal frontal wall that is transversely striated and often with a lunate umbo below the orifice. Orifice circular with a broad, shallow sinus. Tubular pore chambers present with septular end projecting into the parent autozooid; lacunae present between adjacent tubes. Female zooids develop by frontal budding; very short, orifice much wider than long, bearing prominent globular ovicell with nine to 11 frontal pores. Male zooids are replicas of autozooids but smaller. Ancestrula oval and shorter than autozooids with similar orifice; budding unilateral with spiral astogeny. No spines or avicularia.

**Substratum, depth range and ecology**

Forms small encrustations on the fronds of kelp, especially *Laminaria pallida* and *Ecklonia maxima*. Also found colonizing pelagic plastic debris. Depth range 4–20 m.

**Geographic distribution**

Distributed from Doring Bay on the west coast to Durban on the east coast of South Africa. Mainly found in cold water – Arctic down the European coast as far as the Bay of Biscay, down the Pacific coast of America to California, upwelling areas of Mexico and Chile, eastern seaboard of Canada, Maine and Massachusetts.

**Remarks**

*Celleporella hyalina* is a species complex comprising a large but unknown number of genetic species (Navarrete *et al.* 2005).

***Celleporella annularis* (Pallas, 1766)**

Fig. 10G–H

*Eschara annularis* Pallas, 1766: 48.

*Reptolatereschara annularis*: d'Orbigny, 1852: 418; Hastings, 1979: 535 (*cum syn.*).

*Reptolatereschara capensis* d'Orbigny, 1852.

*Lepralia annularis*: Busk, 1854: 85.

*Hippothoa annularis*: Levinsen, 1909: 277, pl. 21, fig. 7a–f.

*Schizoporella annularis*: O'Donoghue, 1924: 5.

*Celleporella annularis*: Gordon & Hastings, 1979: 577.

**Material examined**

SAM – A28603, Justin's Caves (33°58'90"S, 18°20'65"E), depth 15 m, collected by W. Florence, 24 April 1999.

**Description**

Colony encrusting, forming small radiating patches. White when alive and dried. Three types of zooids; autozooids, female zooids and male zooids. Autozooids arranged multiserially; elongated with convex gymnocystal frontal wall, which is transversely striated and a low suboral umbo. Orifice circular with a small round sinus, which is separated from it by a narrow slit formed by condyles, on the proximal side. A pair of prominent tubercles distal to each orifice. Female or ovicelled zooids as long or slightly longer than autozooids, orifice wider than long and proximal rim strongly convex; ovicell with frontal surface striated by circular rings emanating from a central point, perforated by five to six pores. Male zooids are replicas of autozooids but narrower. Ancestrula smooth, unornamented; orifice appears crescent shaped due to being obscured by prominently convex proximal rim of distolateral first zooid. No spines or avicularia.

**Substratum, depth range and ecology**

Forms small encrustations on the fronds of the brown alga *Fucus*. Depth range 4–20 m.

**Geographic distribution**

This species has been reported only from Justin's Caves in the Oudekraal region on the west coast of South Africa.

**Remarks**

The most distinctive feature of *Celleporella annularis* is that daughter zooids are budded simultaneously, resulting in concentric rows of zooids (Hastings 1979). No other species of *Celleporella* has this character.

**Superfamily ADEONOIDEA Busk, 1884****Family ADEONELLIDAE Gregory, 1893****Genus *Adeonella* Busk, 1884**

Type species: *Adeonella polymorpha* Busk, 1884 (= *Eschara lichenooides* Lamarck, 1816).

***Adeonella regularis* Busk, 1884**

Figs 10J, K, 20I

*Adeonella regularis* Busk, 1884: 186, pl. 20, fig. 2; Hayward, 1988: 155, fig. 15E–F.

**Material examined**

SAM – A28604, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by G. Isaacs, 12 March 2000.

**Description**

Colony erect, branching, bilaminar and stout with short, lobed branches. White when alive and dried. Autozooids

arranged multiserially, alternating; hexagonal or diamond-shaped in later ontogeny and separated by deep grooves. Primary orifice semicircular with a long, narrow, deep sinus. Peristome thickened, raised and granular; secondary orifice semicircular. Frontal shield convex, smooth, containing a few widely spaced small pores; spiramen large and circular, located proximally to the peristome with a narrow bridge, usually with a small median umbo, separating it from the secondary orifice; sinus visible through spiramen. Adventitious avicularia paired, unequally sized and situated lateral to the secondary orifice; rostrum triangular and long, projecting frontally of the zooids and directed distomedially above the distal side of peristome. In later ontogeny, avicularia may be developed elsewhere on the zooid frontal wall and the peristome may become thickened and prominent. Vicarious avicularia present on the margins of the colony in linear sequence; rostrum slightly hooked and projects from the edge of the branch. Dimorphic brooding zooids absent.

#### Substratum, depth range and ecology

Lives on rocky substratum. Depth range 4–30 m.

#### Geographic distribution

This species has been reported only from False Bay in South Africa.

#### Remarks

The genus *Adeonella* is a difficult one, containing 41 living species with quite high levels of similarity between them. Hayward (1988) gave an account of these 41 species, of which 26 were previously described and 15 were new. However, given the difficulty associated with identifying the different species within the genus *Adeonella*, this species is fairly easily recognized and is most similar to *Adeonella coralliformis* and *A. decipiens*. The smaller-sized autozooids and the shape of the primary orifice, which has a longer deeper sinus, distinguishes it from *A. coralliformis*. In contrast, *A. decipiens* is the smallest of the three species and may be distinguished by a more elongated primary orifice and its colony shape, which is slender.

#### *Adeonella circumspecta* Hayward, 1988

Fig. 10I, L

*Adeonella circumspecta* Hayward, 1988: 160, fig. 17.

#### Material examined

SAM – A28605, Castle Rock, False Bay (34°14'S, 18°29'E), depth 7 m, collected by W. Florence, 2 March 2000.

#### Description

Colony erect, irregularly branching, bilaminar with anastomosing lobed branches. White when alive and dried. Autozooids arranged multiserially, alternating; small, hexagonal or lozenge-shaped. Primary orifice circular with a broad U-shaped sinus and condyles small but distinct. Peristome thickened and granular with secondary orifice oval becoming circular in later ontogeny. Frontal shield convex, smooth, containing numerous closely spaced pores; spiramen small, circular, and close to the proximal edge of the peristome. Adventitious avicularia initially paired and situated distolateral to the spiramen; rostrum triangular and long, projecting perpendicular to the frontal wall and

directed distally. In later ontogeny additional avicularia develop, four to five in total, situated around the peristomial rim and directed medially. Large vicarious avicularia present on the margins of the colony in linear sequence; rostrum slightly hooked and projects from the edge of the branch. Gonozooids present at branch margins of dichotomies, with secondary orifice transversely elongated, with small circular spiramen and numerous small peristomial avicularia.

#### Substratum, depth range and ecology

Lives on rocky substratum. Depth range 4–30 m.

#### Geographic distribution

This species has been reported only from South Africa and is distributed from False Bay to Natal.

#### Remarks

*Adeonella circumspecta* was first described by Hayward (1988). The current specimen agrees closely with Hayward's description and was also collected in the Western Cape Province.

#### *Adeonella guttata* Hayward, 1988

Fig. 11A–C

*Adeonella guttata* Hayward, 1988: 182, fig. 29.

#### Material examined

SAM – A28606, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by W. Florence, 12 March 2000.

#### Description

Colony erect, forming flat branches, bilaminar and robust. Dark purple when alive and dried. Autozooids arranged multiserially, alternating; large, oval to hexagonal, strongly convex. Primary orifice semicircular; broader than long with a shallow U-shaped sinus occupying almost the entire proximal border; condyles not conspicuous. Peristome completely hiding primary orifice, with secondary orifice semicircular. Frontal shield convex, smooth, containing numerous large closely spaced pores; spiramen small, circular, centrally placed. Avicularia single or paired, directed distally, and situated lateral to the spiramen; rostrum triangular and short, plane parallel to the frontal wall. Autozooids may terminate at the ends of branches with kenozooids that bear avicularia. Gonozooids and vicarious avicularia absent.

#### Substratum, depth range and ecology

Lives on rocky substrata. This species has also been observed as the habitat for another bryozoan, *Hippothoa musivaria* (Hayward & Fordy, 1982). Depth range 4–30 m.

#### Geographic distribution

This species has been reported only from False Bay, South Africa.

#### Remarks

Hayward (1988) first described *Adeonella guttata* from Cape Hangklip in False Bay, South Africa, and noted that the colony morphology remained unknown, but is inferred to consist of broad, stout lobes. The current specimen is consistent with this remark. *A. guttata* is most similar to *A. expansa* (O'Donoghue, 1924) inasmuch as the latter

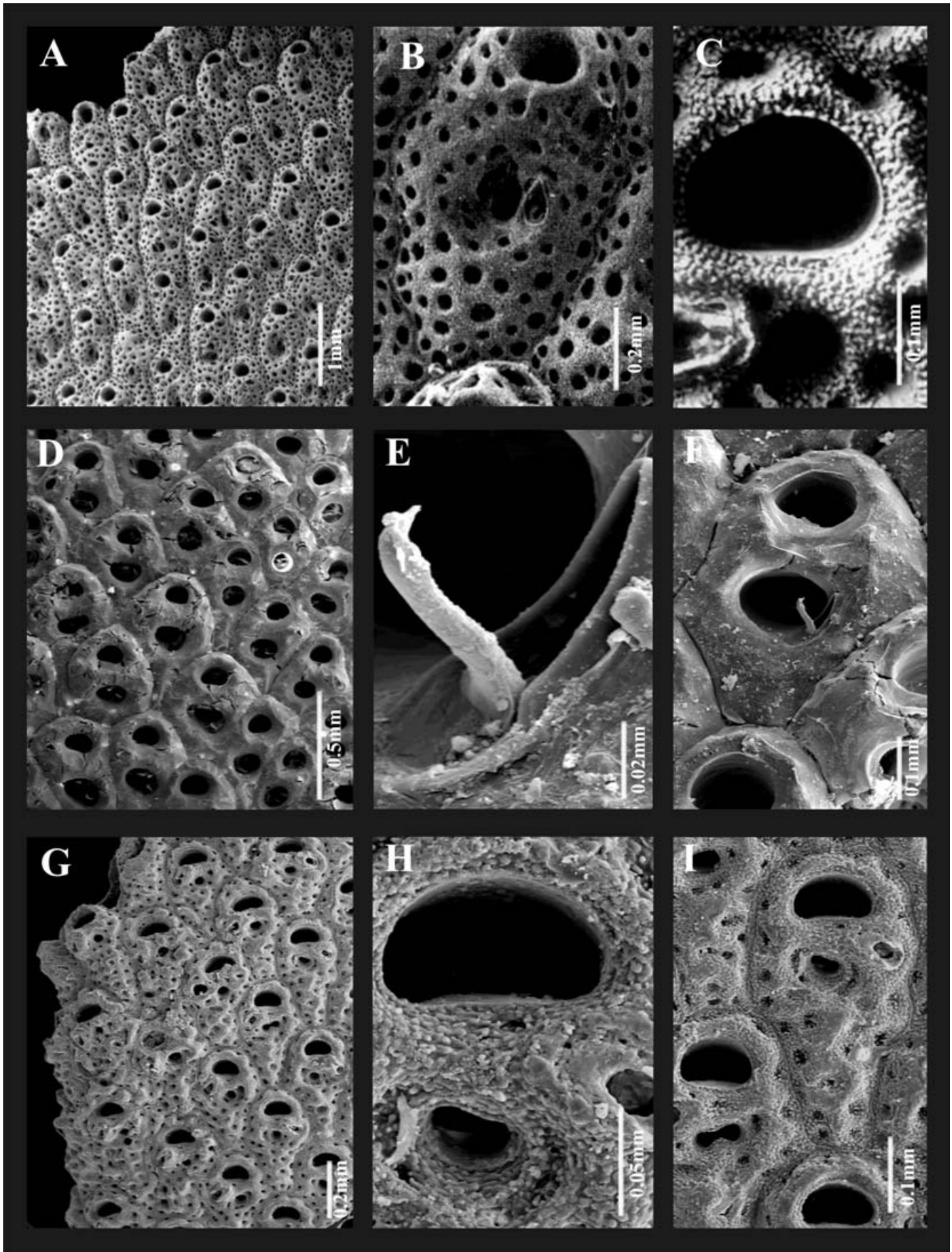


Fig. 11. A–C, *Adeonella guttata* (Hayward). D–F, *Adeonella purpurea* (Hayward). G–I, *Adeonella conspicua* (Hayward).

develops broad, folded, and anastomosing plates. The spiramen of *A. expansa* however, has a hood which originates laterally in early ontogeny, which is a characteristic not seen in *A. guttata*.

***Adeonella purpurea* Hayward, 1988**

Fig. 11D–F

*Adeonella purpurea* Hayward, 1988: 182, fig. 29.

**Material examined**

SAM – A28607, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by G. Isaacs, 12 March 2000. SAM – A28608, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 10 m, collected by W. Florence, 24 April 1999.

**Description**

Colony erect, bilaminar, forming folded anastomosing plates with broad crenulate margins. Purple when alive and bleaching slightly when dried. Autozooids arranged quincuncially; oval or lozenge shaped. Primary orifice lepralioid; as wide as long with a broad concave poster, condyles small, distinct. Peristome a thickened perforated rim, with a smooth inner lining; secondary orifice slightly oval, wider than long, with a convex proximal rim. Frontal shield flat but raised into umbones adjacent to spiramen, slightly granular, containing numerous large pores; spiramen almost the same size as secondary orifice but may become obscured by continued frontal calcification; a narrow bridge separates it from the secondary orifice. Avicularia may be present or absent, single or paired and situated distolateral to the spiramen; rostrum triangular, directed distally or distomedially. Additional avicularia may develop adjacent to spiraminal bridge and on the proximal portion of the frontal wall, in later ontogeny; directed variably. Large vicarious avicularia present at random in the colony, always associated with a group of gonozooids; inflated cystid larger than the gonozooids, triangular rostrum which is acute to the frontal plane of the colony and directed distally. Gonozooids larger than autozooids and present in groups of six or seven over the whole colony, frontal wall convex, perforated by numerous pores; primary orifice proportionately longer and wider than those of the autozooids, secondary orifice of similar length but wider than that of the autozooids. Spiramen transversely elongated; small avicularia scattered on the frontal wall.

**Substratum, depth range and ecology**

Lives on rocky substratum. Depth range 15–30 m.

**Geographic distribution**

This species has been reported only from False Bay, South Africa.

**Remarks**

*Adeonella purpurea* was first described from Vulcan Rock in False Bay, South Africa, by Hayward (1988). This species is unique in *Adeonella* in that it has groups of gonozooids that are regularly spaced throughout the colony and always associated with a large vicarious avicularium. Hayward (1988) remarked on the similarity in the colony habit of *A. purpurea* and a British species, *Pentapora foliacea* (Ellis & Solander, 1786), erroneously reported from South Africa by O'Donoghue (1924).

***Adeonella conspicua* Hayward, 1988**

Figs 11G–I, 20J

*Adeonella conspicua* Hayward & Cook, 1983: 93, fig. 22A–D. Hayward, 1988: 153, fig. 14A–D.

**Material examined**

SAM – A28613, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by W. Florence, 12 March 2000.

**Description**

Colony erect, branching, bilaminar and robust. White when alive and dried. Autozooids arranged multiseriably, alternating; hexagonal or irregularly shaped and separated by distinct grooves. Primary orifice semicircular with a short, wide shallow sinus. Peristome thickened, depressed and granular; secondary orifice semicircular to completely circular. Frontal shield convex, granular, containing small pores; spiramen circular, located close to the base of the peristome. Avicularia single or paired and situated lateral to the spiramen; rostrum triangular and short, projecting frontally on the zooids and directed disto-medially. In later ontogeny, avicularia may be developed elsewhere on the zooid frontal shield; some zooids may lack an orifice and spiramen but contain a single avicularium. Large vicarious avicularia present on the margins of the colony; rostrum slightly hooked and projecting from the edge of the branch. Gonozooids present at branch margins with secondary orifice transversely elongated and frontal wall with numerous relatively smaller pores; avicularia commonly paired but may be single.

**Substratum, depth range and ecology**

Lives on rocky substratum. Depth range 4–140 m.

**Geographic distribution**

This species has been reported only from South Africa and is distributed from False Bay to Durban.

**Remarks**

The previous description of *Adeonella conspicua* Hayward, 1988, taken in Simon's Bay, was based on juvenile colonies. The present specimens are also juvenile and all characteristics are consistent with these descriptions. *A. pluscula* resembles this species but appears to be larger in colony form and more reticulate. The autozooids of *A. pluscula* (Hayward, 1988) are also more lozenge-shaped and the frontal shield has larger pores than *A. conspicua*. Given these differences it is quite clear that the taxonomic status of these two species is correct.

***Adeonella pluscula* Hayward, 1988**

Figs 12A–E, 21F

*Adeonella pluscula* Hayward, 1988: 181, fig. 28A–D.

**Material examined**

SAM – A28609, A-Frame, False Bay (34°13'S, 18°28'E), depth 12 m, collected by W. Florence, 12 March 2000. SAM – A28610, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 15 m, collected by G. Isaacs, 24 April 1999.

**Description**

Colony erect, branching, bilaminar, reticulate and robust. Dark purple when alive and dried. Autozooids arranged



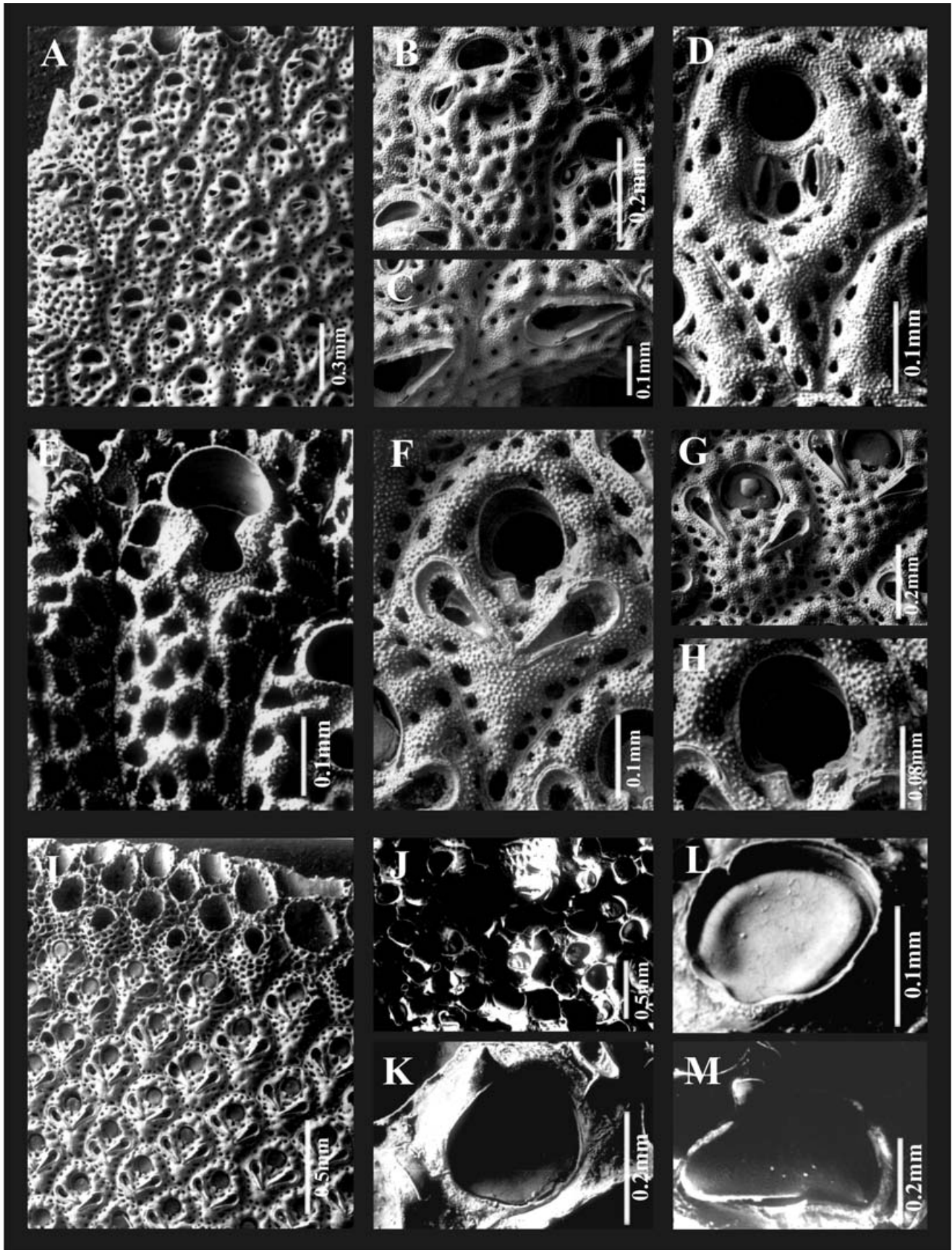


Fig. 12. A–E, *Aeonella pluscula* (Hayward). F–I, *Laminopora jellyae* (Levinsen). J–M, *Celleporaria capensis* (O'Donoghue & De Watteville).

multiserially, alternating; small, oval or pyriform, very broad distally and becoming lozenge-shaped in later ontogeny. Primary orifice semicircular; wider than long with a broad U-shaped sinus and condyles not distinct. Peristome thickened, raised and granular. Frontal shield convex, granular, containing numerous large pores, each in a shallow pit; spiramen small, circular, with a narrow bridge linking the lateral walls of the peristome in later ontogeny. Avicularia single or paired and situated distolateral to the spiramen; rostrum triangular and short, projecting frontally from the zooids and directed medially or distomedially. Large vicarious avicularia present on the margins of the colony; rostrum triangular, slightly hooked and projecting from the edge of the branch. Gonozooids present at branch margins with secondary orifice transversely elongated and frontal shield with numerous relatively smaller pores; avicularia commonly paired but may be single.

#### Substratum, depth range and ecology

Lives on rocky substratum. Depth range 4–30 m.

#### Geographic distribution

This species has been reported only from South Africa and is distributed in False Bay only.

#### 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 only consist of autozooids and gonozooids whereas the lateral edges of the branches only consist of avicularia and kenozooids. The current specimens agree closely with Hayward's description and were also collected in the same area of False Bay.

#### Genus *Laminopora* Michelin, 1842

Type species: *Laminopora contorta* Michelin, 1842.

#### *Laminopora jellyae* (Levinsen, 1909)

Fig. 12F–I

*Adeonella crassa* Busk, 1884: 180 *nom. nud.* Waters, 1912: 494 footnote (not *A. bimunita* as stated).

*Adeonella jellyae* Levinsen, 1909: 286, pl. 14, figs 4A–L. Marcus, 1922: 20, fig. 12. O'Donoghue & de Wateville, 1944: 434.

*Laminopora bimunita*: Harmer, 1957: 820, pl. 54, fig. 3, fig. 87B (*cum syn.*). Cook, 1973: 255. Cook, 1982: 839, figs 4 & 7.

#### Material examined

SAM – A28611, Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by W. Florence, 24 April 1999. SAM – A28612, Castle Rock, False Bay (34°14'S, 18°29'E), depth 15 m, collected by W. Florence, 2 March 2000.

#### Description

Colony encrusting or erect, forming foliaceous, anastomosing and convoluted, bilaminar twisted plates. Dark brown to purple when alive and light brown when dried. Autozooids arranged multiserially, alternating; hexagonal in early ontogeny but the distal end becoming rounded and the proximal end narrower in older zooids. Primary orifice wide, rounded distally and has a deep sinus proximally.

Frontal shield finely granular with numerous pores; more pores in early ontogeny. Avicularia paired and situated proximo-lateral to the orifice; rostrum triangular and long, directed proximo-medially; some zooids may lack an orifice but contain one to three scattered avicularia. Gonozooids larger than autozooids; orifice occupies approximately 50–60% of the brooding zooid.

#### Substratum, depth range and ecology

Lives beneath boulders and in very dark, inconspicuous, habitats. Depth range 2–50 m.

#### Geographic distribution

This species has been reported only from South Africa and is distributed from False Bay to East London.

#### Remarks

Levinsen (1909) first described this species noting that it is distinguished from other congeneric species in that its rounded orifice is wide and its paired avicularia have a proximo-median orientation. Levinsen sent some of his specimens, which he received from Eliza Jelly, to Marcus. Marcus (1922) only figured ontogenetically thickened zooids, but the orifice shape and the presence of one vicarious avicularium supported the alignment with *L. jellyae*. Given the weight of the characters above and the consistency between the current specimens and those of O'Donoghue & de Wateville (1944) (BMNH: 1942.8.6.32.36, 1968.1.16.1), it is clear that the current specimens are indeed *L. jellyae*.

#### Superfamily LEPRALIELLOIDEA Vigneaux, 1949

#### Family LEPRALIELLIDAE Vigneaux, 1949

#### Genus *Celleporaria* Lamouroux, 1821

Type species: *Cellepora cristata* Lamouroux, 1816.

#### *Celleporaria capensis* (O'Donoghue & de Wateville, 1935)

Fig. 12J–M

*Holoporella capensis* O'Donoghue & de Wateville, 1935: 203, pl. 5, figs 9–10, pl. 6, fig. 15.

*Celleporaria capensis*: Hayward & Cook, 1983: 126, fig. 15I–J.

#### Material examined

SAM – A28614, Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by G. Isaacs, 30 April 1999. SAM – A28615, Robben Island (33°48'S, 18°23'E), depth 8 m, collected by W. Florence, 12 August 2001. SAM – A28616, Saldanha Bay (33°01'S, 17°59'E), depth 10 m, collected by W. Florence, 15 February 2001. SAM – A28617, Jacob's Bay (32°31'S, 17°30'E), depth 8 m, collected by G. Isaacs, 15 April 2000.

#### Description

Colony encrusting, forming thick nodular crusts. Dark purple to black when alive and when dried. Autozooids oval, convex, thinly calcified; frontal shield finely granular with inconspicuous marginal pores. Primary orifice almost semicircular; proximal border slightly concave. Peristome forming a thin raised proximal lip, occasionally overarching the orifice in older zooids; rarely peaked medially to form a short columnar umbo. Two thick and hollow, distal oral spines

present in young zooids. Adventitious avicularia proximo-lateral to the orifice, mandibles elongate, semi-elliptical, mostly directed distally; one or two present in newly budded zooids, later proliferating. Vicarious avicularia irregularly present, mandible elongate, semi-elliptical or slightly spatulate. No ovicells present.

#### Substratum, depth range and ecology

Forms thick encrustations on hard rocky substrata. Depth range 4–100 m.

#### Geographic distribution

This species has been reported only from South Africa and is distributed from Oudekraal to Port Elizabeth.

#### Remarks

The current specimens agree closely with the descriptions of O'Donoghue & de Wateville (1935) and Hayward & Cook (1983). The nature of the colony form and the shape of the orifice are characteristic of *Celleporaria*. The lack of denticles, the inconspicuous proximal umbo and the short hollow spines are all characteristic of *C. capensis*.

#### Family ROMANCHEINIDAE Jullien, 1888

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

Type species: *Cellepora coccinea* Abildgaard, 1806.

#### *Escharoides contorta* Busk, 1854

Fig. 13A–B

*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 Wateville, 1937: 18.

#### Material examined

SAM – A28618, Homestead Plateau, Oudekraal (33°58'90"S; 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999.

#### Description

Colony encrusting, forming small patches. Greyish white when alive and dry. Autozooids arranged multiserially, alternating; oval to rectangular and convex. Frontal shield umbonuloid, perforated by numerous pores or imperforate centrally with a row of marginal pores in early ontogeny. Orifice broader than long with a raised, medially pointed, proximo-median lip. Four long distal oral spines present in younger zooids, each consisting of a short proximal portion giving rise to a much longer, thinner distal portion that may bifurcate at the ends; no oral spines persist in later ontogeny. A pair of avicularia found on both sides of the orifice, facing inward and pointed distally with outward, obliquely, opening spatulate mandibles. Small avicularia, varying in number, randomly scattered on the frontal wall. Ovicell, hyperstomial, regularly perforated, with heavy calcification immersing it in the distal wall of the peristome.

#### Substratum, depth range and ecology

Lives on hard substrata and found encrusting the shells of mussels. Depth range 4–20 m.

#### Geographic distribution

This species is potentially endemic to South Africa and only known to occur from Oudekraal to just north of Durban.

#### Remarks

Although the current specimen was 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.

#### *Escharoides custodis* sp. nov.

Fig. 13C–F, Table 8

#### Etymology

*Custodia* (L.) – guard, referring to the paired avicularia that 'guard' the orifice.

#### Material examined

Holotype: SAM – A28619 Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999.

Other material: SAM – A28620 Castle Rock, False Bay (34°14'S, 18°29'E), 15 m, collected by W. Florence, 2 March 2000.

#### Description

Colony encrusting, forming small patches. Cream when dry. Autozooids arranged multiserially, alternating; oval and convex. Frontal shield umbonuloid, perforated by numerous pores or imperforate centrally with a row of marginal pores in newly budded zooids. Orifice broader than long with a raised, straight-edged, proximo-median lip. Three long distal and two lateral oral spines present in younger zooids; either no oral spines persist in later ontogeny or the two lateral spines can seldom be observed. A pair of avicularia found on either side of the orifice facing inward and pointed distally; rostrum hooked with an acute mandible. Small avicularia, varying in number, randomly scattered on the frontal wall; rostrum with a finely toothed edge and mandible oval. Ovicells not seen.

#### Substratum, depth range and ecology

Encrusts the shells of mussels. Depth range 4–20 m.

#### Geographic distribution

This species is known only from Oudekraal to A-Frame in False Bay.

**Table 8.** Measurements (in millimetres) of *Escharoides custodis* sp. nov. material.

|        | Sample size | Mean | S.D. | Range     |
|--------|-------------|------|------|-----------|
| Lz     | 20          | 0.71 | 0.03 | 0.65–0.78 |
| Iz     | 20          | 0.31 | 0.02 | 0.26–0.36 |
| Lso    | 20          | 0.14 | 0.02 | 0.09–0.19 |
| Iso    | 20          | 0.18 | 0.02 | 0.14–0.22 |
| Lvicar | 20          | 0.06 | 0.01 | 0.03–0.09 |
| Ivicar | 20          | 0.05 | 0.01 | 0.03–0.08 |

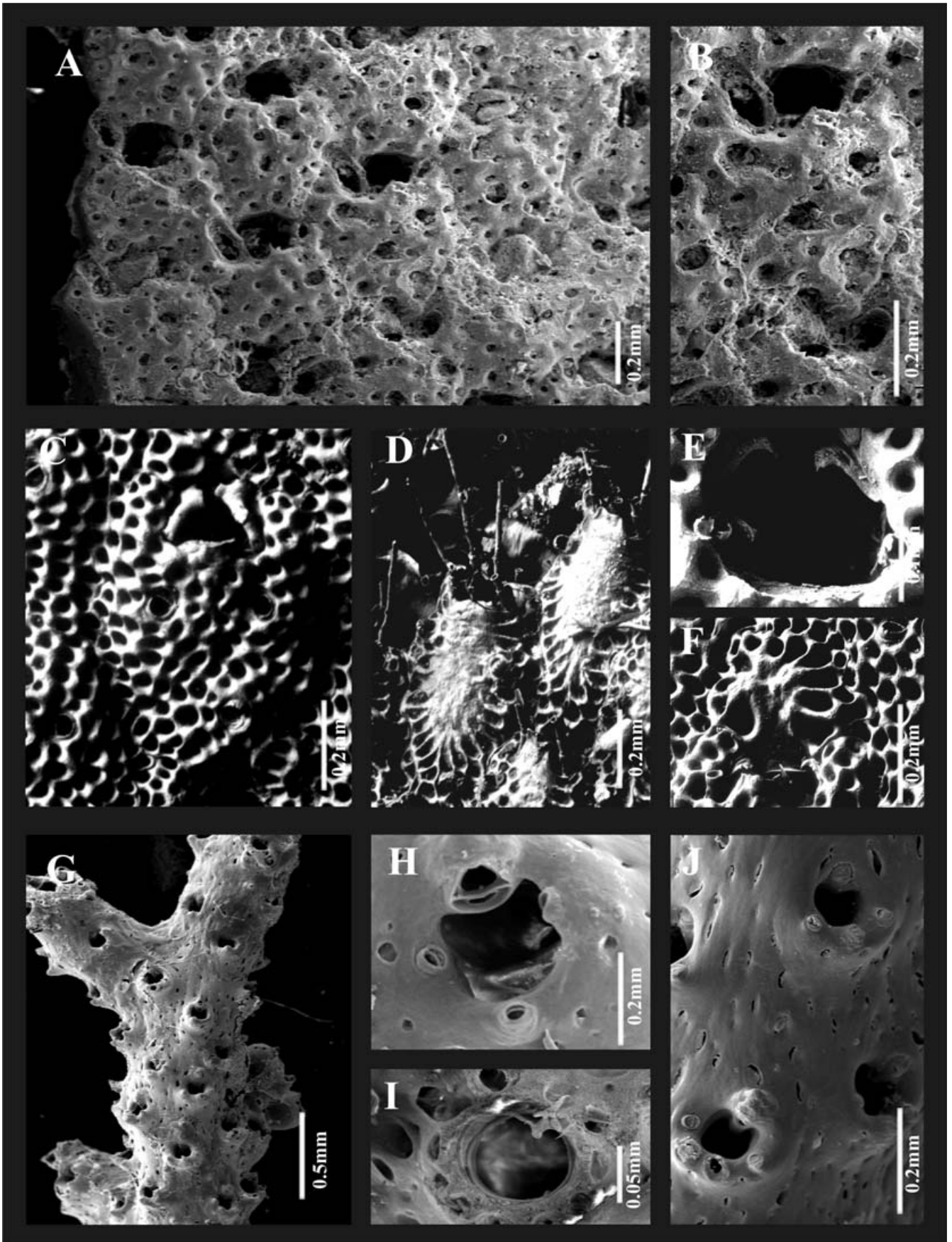


Fig. 13. A, B, *Escharoides contorta* (Busk). C–F, *Escharoides custodis* sp. nov. (SAM – A28619). G–J, *Turritigera stellata* (Busk).

## Remarks

This species is most similar to *Escharoides contorta* (Busk, 1854) and *E. distincta* Hayward & Cook, 1979, also described from South Africa. *E. custodis* differs from *E. contorta* by having three long distal and two lateral oral spines and a straight edged, proximo–median lip compared to four distal spines only, with the outer spines bifurcating in some instances, and a less pronounced, medially pointed, proximo–median lip in the latter. *E. distincta* has two distal and two lateral oral spines, but also has a straight edged proximo–median lip. *E. custodis* has larger paired avicularia on either side of the orifice, facing inward and directed distally with an acute mandible whereas the other two species have smaller avicularia with spatulate to oval mandibles which may be directed distolaterally and borne on a raised surface. On the basis of these characters *E. custodis* may be distinguished from all known presently known species in this genus.

Superfamily **SMITTINOIDEA** Levinsen, 1909  
Family **BITECTIPORIDAE** MacGillivray, 1895

Genus *Hippomonavella* Canu & Bassler in Bassler, 1934  
Type species: *Lepralia praeclara* MacGillivray, 1895.

*Hippomonavella formosa* (MacGillivray, 1887)

Fig. 14A–D

*Porella formosa* MacGillivray, 1887: 69, pl. 2, fig. 6.

## Material examined

SAM – A28621 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999. SAM – A28622 Saldanha Bay (33°01'S, 17°59'E), depth 10 m, collected by W. Florence, 25 February 2001.

Other material: Type-MOV F45812 Queenscliff (Victoria, Australia).

## Description

Colony encrusting, forming unilaminar patches. Cream when dried. Autozooids arranged multiserially, alternating; sub-rectangular, frontal shield almost smooth and slightly convex with 6–12 conspicuous areolae along each margin depending on the length of the zooid. Primary orifice rounded but sub-quadrate, the proximal rim straightened and slightly convex at times; a pair of proximally slanted condyles about one quarter of the way from the proximal side and reduced peristome and lyrula. A pair of oral spine bases is present in marginal zooids. Avicularium median, proximal to the orifice, circular with a complete crossbar and rostrum rounded and directed proximally. Ovicells sub-immersed, frontally flattened somewhat, with 52–61 irregularly sized pores; bordered by a thin band of secondary calcification.

## Substratum, depth range and ecology

Encrusts other bryozoan species and tubes of polychaete worms. Depth range 4–20 m.

## Geographic distribution

This species is only known from Saldanha Bay and Bakoven on the west coast of South Africa and also Victoria in Australia.

## Remarks

The current specimens compare well with SEM images of the type material of *Hippomonavella formosa* (MacGillivray, 1887) (MOV F45812 Queenscliff: Victoria, Australia). The conspicuous marginal areolae, the position and slope of the condyles, the orientation of the avicularium with its rounded rostrum and the number of pores in the frontal surface of the ovicell distinguishes this species from all other congeneric species. The current specimens represent the first record of this species from South Africa. One juvenile colony was observed living on a tube of a polychaete worm and the other specimen comprises a fragment of an adult colony with numerous ovicelled zooids.

Genus *Bitectipora* MacGillivray, 1895

Type species: *Bitectipora lineata* Hall in MacGillivray, 1895.

*Bitectipora umboavricula* sp. nov.

Fig. 14E–H, Table 9

## Etymology

Alluding to the prominent umbo and suboral avicularia characteristic of this species.

## Material examined

Holotype: SAM – A28623 Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999.

## Description

Colony encrusting, forming large unilaminar patches. Orange in colour when alive and cream when dried. Autozooids arranged multiserially, alternating; hexagonal and almost as long as broad; separated by distinct sutures. Primary orifice semicircular with conspicuous condyles present about one third of the way up from proximal end: poster short, straight, flattened and broad, anter rounded and almost twice as long as poster. Frontal shield lepralioid, convex, finely granular, with large pores that penetrate it; smaller pseudopores seen in younger zooids. No oral spines present. A median suboral avicularium is present; originating from the flattened flange of the poster. The avicularium faces perpendicular to the frontal plane of the zooid and is divided by a complete crossbar into a semicircular opesia and an elongated triangular rostrum; cystid broad-based produced as a stout conical umbo. Ovicells prominent, longer than wide, flattened frontally punctured by numerous irregular pores.

**Table 9.** Measurements (in millimetres) of *Bitectipora umboavricula* sp. nov. material.

|       | Sample size | Mean | S.D. | Range     |
|-------|-------------|------|------|-----------|
| Lz    | 20          | 0.40 | 0.02 | 0.36–0.45 |
| lz    | 20          | 0.39 | 0.02 | 0.35–0.45 |
| Lso   | 20          | 0.13 | 0.02 | 0.10–0.16 |
| lso   | 20          | 0.17 | 0.02 | 0.13–0.19 |
| Ladav | 20          | 0.16 | 0.02 | 0.12–0.19 |
| Lov   | 20          | 0.30 | 0.02 | 0.25–0.35 |
| lov   | 20          | 0.44 | 0.02 | 0.41–0.49 |

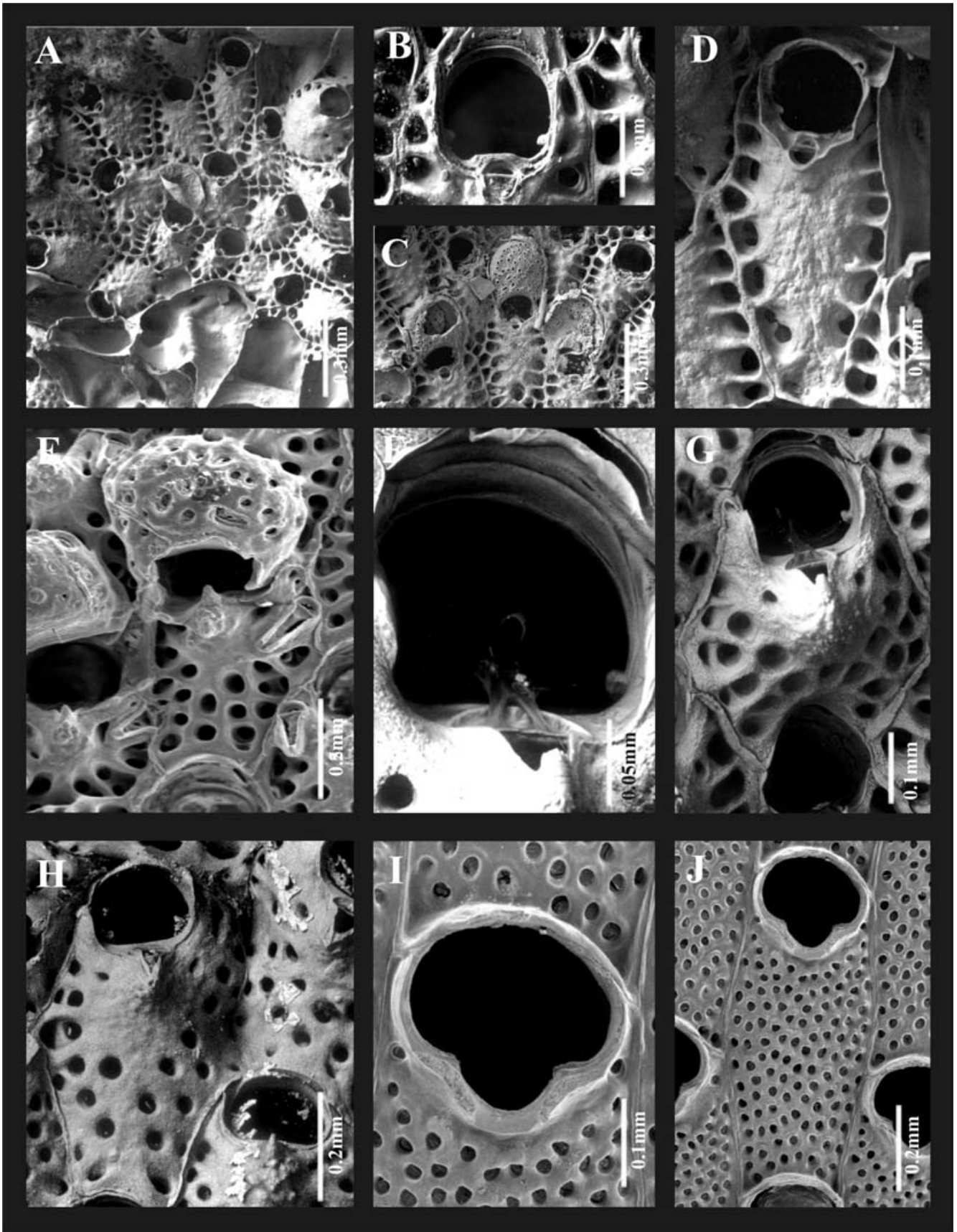


Fig. 14. A–D, *Hippomonavella formosa* (MacGillivray). E–H, *Bitectipora umboavicularis* sp. nov. (SAM – A28623). I, J, *Watersipora subtorquata* (d'Orbigny).

**Substratum, depth range and ecology**

Encrusts rocks and mussel shells. Depth range 2–20 m.

**Geographic distribution**

This species has been reported only from Oudekraal in South Africa.

**Remarks**

Prior to Gordon (1994) the genus *Bitectipora* was thought to be monotypic, represented only by *Bitectipora lineata*, an extinct species known from the Miocene. In his paper Gordon raises the question whether any living species may be included in *Bitectipora* and assigns *Schizomavella mucronifera* to this genus. The reassigning of *S. mucronifera* is based on the following similarities with *B. lineata* – similar frontal shield, variable orificial poster, elevated avicularium chamber derived from a pair of areolar septula, absence of oral spines, similar arrangement of ectoocelial pores and ovicellular lappets. With the exception of the frontal shield perforated by large pores, seen in later ontogeny, when one considers the above characters it is clear that the placement of *Bitectipora umboavicularis* within this genus is warranted and further supports Gordon's statement that *Bitectipora* has a range from the Chattian (Upper Oligocene) (Taylor 1993) to the Holocene.

**Genus *Schizosmittina* Vigneaux, 1949**

Type species: *Schizosmittina planovicellata* Vigneaux, 1949.

***Schizosmittina lizzya* sp. nov.**

Fig. 15A–F, Table 10

**Etymology**

*lizzy* – Named after my wife Tracey Elizabeth ('Lizzy') Florence. Her patience and tremendous strength contributed so much to the completion of this study and are hereby acknowledged.

**Material examined**

Holotype: SAM – A28624 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999.

Other material: SAM – A28656 Saldanha Bay (33°01'S, 17°59'E), depth 10 m, collected by W. Florence, 15 February 2001.

**Description**

Colony encrusting, forming irregular patches. White when alive and when dry. Young zooids elongate-oval, lepralioid frontal shield convex, separated by distinct raised rims, evenly perforated by 60–70 large pores. Orifice longer than wide and narrowing from the distal toward the proximal end; sinus transversely elongated, almost oval, in a slightly convex proximal rim that supports an elongated corrugated condyle on each side, lyrula absent. No oral spines. Peristome inconspicuous in younger zooids then acquired from adjacent distal and distolateral zooids with secondary calcification in older zooids; smooth, raised and thickened. Ovicells flattened, sub-immersed in adjacent distal and distolateral zooids, with a median, large, 'pear-shaped' foramen, the raised margins of these zooids clearly visible in the frontal surface giving it a tripartite appearance. No avicularia observed.

**Table 10.** Measurements (in millimetres) of *Schizosmittina lizzya* sp. nov. material.

|     | Sample size | Mean | S.D. | Range     |
|-----|-------------|------|------|-----------|
| Lz  | 20          | 0.56 | 0.02 | 0.52–0.58 |
| Iz  | 20          | 0.41 | 0.03 | 0.35–0.48 |
| Lso | 20          | 0.16 | 0.02 | 0.10–0.19 |
| Iso | 20          | 0.11 | 0.02 | 0.08–0.15 |
| Lov | 20          | 0.17 | 0.01 | 0.14–0.19 |
| Iov | 20          | 0.19 | 0.02 | 0.13–0.23 |

**Substratum, depth range and ecology**

Forms thick encrustations on mussel shells. Depth range 4–20 m.

**Geographic distribution**

This species is known only from Saldanha Bay in South Africa.

**Remarks**

The specimens conform well to the characteristics of *Schizosmittina* as it has an evenly perforated frontal wall, does not have a lyrula but instead the orifice is sinuate with distinct corrugated condyles. Indeed it compares well with the species of *Schizosmittina* figured by Gordon (1984, 1989). Its similarities with *S. cinctipora*, both having an orifice with a curious sinus and enormous corrugated condyles, are especially striking. However, the lack of avicularia and oral spines, and especially the subimmersed tripartite nature of the ovicell with a single, almost median, foramen that has not been seen in other species of *Schizosmittina*, distinguishes it as a new species.

**Family WATERSIPORIDAE Vigneaux, 1949****Genus *Watersipora* Neviani, 1895**

Type species: *Lepralia cucullata* Busk, 1854.

***Watersipora subtorquata* (d'Orbigny, 1852)**

Fig. 14I–J

*Escharina torquata* d'Orbigny, 1842: pl. 4, fig. 3; 1847: 11.

*Cellepora subtorquata* d'Orbigny, 1852: 399. Waters, 1905: 6.

*Watersipora cucullata*: Marcus, 1937: 118; 1938: 46.

*Watersipora subtorquata*: Ryland, 1974: 345. Soule & Soule, 1976: 299; 1985: 295; Gordon, 1989: 40.

**Material examined**

SAM – A28657 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 2001. SAM – A28658 Saldanha Bay (33°01'S, 17°59'E), depth 10 m, collected by W. Florence, 15 February 2001. SAM – A28659 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by G. Isaacs, 12 March 2000.

**Description**

Colony encrusting, forming, crusty round plates. Orange-brown to dark purple-black when alive and greyish-black when dried. Autozooids arranged multiserially, alternating; large, elongated and rectangular with frontal shield perforated by numerous pseudopores. Orifice rounded, with anter rounded and a deep, wide, almost V-shaped poster;

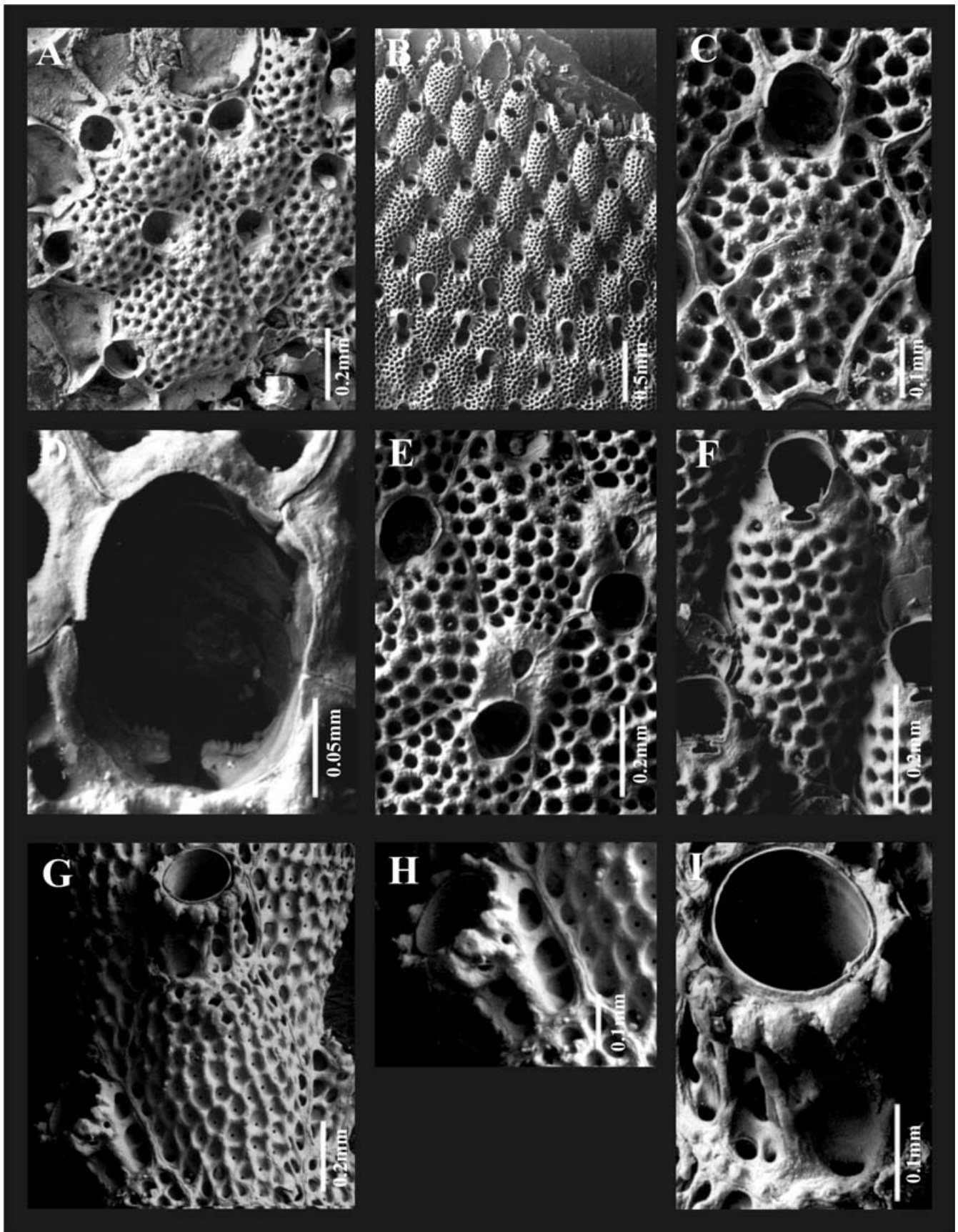


Fig. 15. A–F, *Schizosmittina lizzya* sp. nov. (SAM – A28624). G–I, *Margarettia levinseni* (Canu & Bassler).



condyles weakly developed, occurring one third of the way up from the proximal end; the orificial rim thin and raised almost entire around the distal end but reduced at the proximal end and peaking on either side lateral to the condyles. Operculum with a dark-brown median area and two transparent lateral areas. No spines, avicularia or ovicells.

#### Substratum, depth range and ecology

Forms crusty patches on rocks and forms cylindrical growths around thinly branched red algae. Found in very shallow water and even in the intertidal zone. Depth range 8–15 m.

#### Geographic distribution

*Watersipora subtorquata* is a common fouling bryozoan and has probably been dispersed worldwide via anthropogenic mechanisms (Gordon & Mawatari 1992). Distributed from Saldanha Bay to A-frame, False Bay in South Africa.

#### Remarks

Just what characterizes the genus *Watersipora* and the problems associated with it has been discussed at length by Gordon (1989). With respect to the skeletal structures, the current specimens are consistent with the description and figures of *Watersipora subtorquata* Gordon, 1989. The confusion caused by the weakly characterized *Watersipora subovoidea* should be cleared up using conventional molecular techniques, so that species boundaries within this genus can be determined accurately.

Superfamily **SCHIZOPORELLOIDEA** Jullien, 1883

Family **MARGARETTIDAE** Harmer, 1957

Genus *Margaretta* Gray, 1843

Type species: *Cellaria cereoides* Ellis & Solander, 1786.

*Margaretta levinseni* Canu & Bassler, 1930

Figs 15G–I, 21J

*Margaretta levinseni* Canu & Bassler, 1930: 78.

#### Material examined

SAM – A28629 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by W. Florence, 12 March 2000.

#### Description

Colony erect, forming bushy tuft-like colonies. Bright orange when alive and beige when dried. Autozooids urn-shaped, two alternating whorls of four; frontal shield convex with a network of granular ridges separated by shallow concave sulci which contain minute pseudopores. Primary orifice circular, obscured by a thickened granular rimmed peristome that is spout like. A small circular ascopore present mid-frontally just proximal to the base of the peristome. No avicularia or oral spines present. Brood chamber peristomial; peristome swollen proximally, with a narrow, upturned, spout-like distal portion.

#### Substratum, depth range and ecology

Lives erect on hard substrata in areas that are sheltered from strong wave action. The nature of the colony form

allows sponges and hydroids to colonize it. Depth range 4–20 m.

#### Geographic distribution

This species is only known from False Bay to Port Elizabeth on the South African south coast.

#### Remarks

*Margaretta levinseni* is most similar to *M. triplex* from Australia. However, the much smaller, minute, pseudopores in the sulci, the fused distal rim of the peristome, the conspicuous ascopore, all of which are characteristic of *M. levinseni*, distinguish it from *M. triplex*. Another similar species, *M. barbata*, uniquely has bristles next to the ascopore.

Family **GIGANTOPORIDAE** Bassler, 1935

Genus *Gigantopora* Ridley, 1881

Type species: *Gigantopora lyncooides* Ridley, 1881.

*Gigantopora polymorpha* (Busk, 1884)

Figs 16A–D, 20C, 21G

*Gephyrophora polymorpha* Busk, 1884: 167, pl. 34, fig. 2.

*Adeonella ponticula* O'Donoghue, 1924: 54, pl. 4, fig. 23.

*Gigantopora polymorpha*: Brown, 1952: 208, figs 145–146.

Hayward & Cook, 1979: 81. Hayward & Cook, 1983: 86.

#### Material examined

SAM – A28630 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by W. Florence, 12 March 2000. SAM – A28631 Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by G. Isaacs, 30 April 1999. SAM – A28632 Robben Island (33°48'S, 18°23'E), depth 8 m, collected by W. Florence, 12 August 2001.

#### Description

Colony encrusting or erect and robust; branches bilaminar, cylindrical, foliaceous and ending in lobes. Dull orange when alive and light yellow when dried. Autozooids are broad flat, rectangular and separated by sutures; frontal wall granular with irregularly scattered small pores. Primary orifice is orbicular; proximal edge is fairly concave. Elongated avicularia, directed medially, arch on either side of the primary orifice and fusing to form a slender bridge; mandible acutely triangular and rostrum slightly hooked.

#### Substratum, depth range and ecology

Mostly lives erect on hard rocky substratum. Provides sheltered habitats for small molluscs and polychaete worms. Depth range 4–600 m.

#### Geographic distribution

Although Tertiary fossil specimens of *Gigantopora polymorpha* have been reported from New Zealand by Brown (1952), the only extant specimens of this species have been reported from South Africa. *Gigantopora polymorpha* is locally distributed from Port Nolloth to Cape Infanta.

#### Remarks

*Gigantopora polymorpha* has been well characterized.

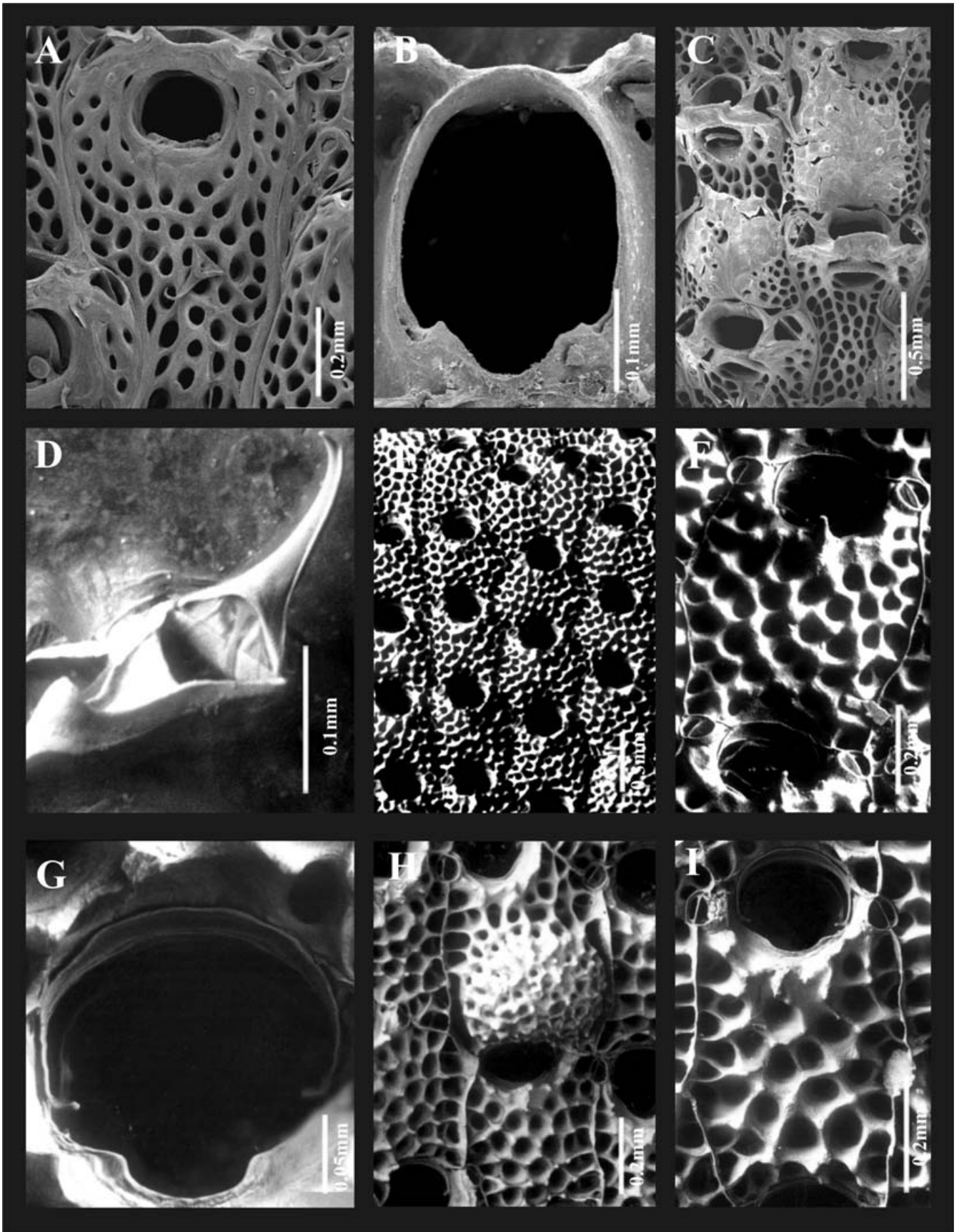


Fig. 16. A–D, *Gigantopora polymorpha* (Busk). E, F, *Calyptotheca porelliformis* (Waters). G–I, *Calyptotheca nivea* (Busk).

O'Donoghue (1924) erroneously reported this species as a new species, *Adeonella ponticula*, from Cape Infanta. It is clear from his description and figure that this specimen is indeed *Gigantopora polymorpha*.

Family **LANCEOPORIDAE** Harmer, 1957

Genus ***Calyptotheca*** Harmer, 1957

Type species: *Schizoporella nivea* var. *wasinensis* Waters, 1913.

***Calyptotheca porelliformis*** (Waters, 1918)

Figs 16E–F, 21A

*Schizoporella porelliformis* Waters, 1918: 15 (footnote), pl. 2, figs 19–21.

*Calyptotheca porelliformis*: Harmer, 1957: 1008; 1020. Hayward & Cook, 1983: 73, fig. 17J–K.

Material examined

SAM – A28633 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by G. Isaacs, 12 March 2000. SAM – A28634 Robben Island (33°48'S, 18°23'E), depth 8 m, collected by W. Florence, 12 August 2001.

Description

Colony encrusting or erect, multilaminar. Bright peach to orange when alive and light orange when dried. Autozooids arranged multiserially; broad, quadrangular, flat or convex and separated by raised sutures. Primary orifice wider than long with blunt downcurved prominent condyles; D-shaped anter and concave poster have almost equal length. Frontal wall rugose and regularly punctured by numerous round pores each in a pit; nodular ridge developed around the proximal half of the orifice. Small, oval avicularia, with mandibles that are semi-elliptical, situated lateral to the orifice; may be single or completely absent in very few zooids. Ovicell hyperstomial, round, frontally flattened, punctured, rugose and closed by the zooid operculum; anter shorter than in autozooids.

Substratum, depth range and ecology

Encrusts large boulders and commonly overgrows kelp holdfasts. Depth range 4–100 m.

Geographic distribution

This species has been reported only from South Africa and is distributed from False Bay to Port Elizabeth.

Remarks

*Calyptotheca porelliformis* has been reported only from the south east coast of South Africa by Waters (1918) and Hayward & Cook (1983). The present specimens are thus the first record of this species on the west coast. The shape of the primary orifice with the down-curved prominent condyles, the hyperstomial ovicell with flattened punctured surface and the shorter anter in ovicelled zooids distinguishes this species from all others in the genus.

***Calyptotheca nivea*** (Busk, 1884)

Figs 16G–I, 21D

*Schizoporella nivea* Busk, 1884: 163, pl.17, fig. 1. Marcus, 1922: 25, fig. 15.

*Schizoporella tenuis* O'Donoghue & de Watteville, 1935: 214.  
*Emballothecha nivea*: O'Donoghue & de Watteville, 1944: 424.  
O'Donoghue, 1957: 87.

*Calyptotheca nivea*: Hayward & Cook, 1983: 72, fig. 17H.

Material examined

SAM – A28635 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by W. Florence, 12 March 2000. SAM – A28636 Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by W. Florence, 24 April 1999. SAM – A28637 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999.

Description

Colony encrusting or erect, multilaminar. Cream or white when alive and dried. Autozooids arranged multiserially; broad, quadrangular, flat or convex and separated by raised sutures. Primary orifice, orbicular, as wide as long with conspicuous lateral quadrate condyles; poster forms a shallow U-shaped sinus. Frontal shield rugose and regularly punctured by numerous round pores, each in a pit; short cylindrical umbones may be present proximo-medially of the orifice. Small, oval avicularia, with mandibles that are semi-elliptical directed variably, situated lateral to the orifice. Ovicell hyperstomial, rounded, convex, regularly punctured, rugose and closed by the zooid operculum; poster sinus is wider and shallower than in non-ovicelled zooids.

Substratum, depth range and ecology

Forms large encrustations, growing erect at times, on large boulders and commonly overgrows kelp holdfasts. Depth range 4–100 m.

Geographic distribution

This species has been reported only from South Africa and is distributed from False Bay to East London.

Remarks

Astogenetic differences may be observed within and between colonies of this species. The proximal sinus of the orifice may be shallower in early astogeny, a proximal umbo may be present, or more prominent, in some colonies and scattered adventitious avicularia, in varying numbers, may be present in some zooids. However, the similarities between the colonies are not sufficient to warrant their separation into different species. The shape of the orifice with conspicuous lateral quadrate condyles, the hyperstomial ovicell with convex evenly perforated frontal surface and the wider shallower poster sinus of ovicelled zooids, distinguishes this species from all others.

Family **MICROPORELLIDAE** Hincks, 1879

Genus ***Microporella*** Hincks, 1877

Type species: *Eschara ciliata* Pallas, 1766.

***Microporella madiba* sp. nov.**

Fig. 17A–C, Table 11

Etymology

*Madiba* – Xhoza clan name (sometimes used to refer to elder men of the clan). Named after the great South African

**Table 11.** Measurements (in millimetres) of *Microporella madiba* sp. nov. material.

|       | Sample size | Mean | S.D. | Range     |
|-------|-------------|------|------|-----------|
| Lz    | 20          | 0.76 | 0.02 | 0.72–0.80 |
| lz    | 20          | 0.59 | 0.02 | 0.53–0.64 |
| Lso   | 20          | 0.12 | 0.01 | 0.09–0.15 |
| lso   | 20          | 0.13 | 0.02 | 0.10–0.16 |
| Ladav | 20          | 0.24 | 0.02 | 0.20–0.27 |

president Nelson Rholihlala Mandela who spent 28 years on the type locality, Robben Island, owing to the injustices of Apartheid.

#### Material examined

Holotype: SAM – A28638 Robben Island (33°48'S, 18°23'E), depth 8 m, collected by W. Florence, 12 August 2000.

#### Description

Colony encrusting, forming patches. Bright white, almost silver, when alive and cream when dry. Autozooids arranged multiserially, alternating and separated by deep grooves; oval to hexagonal in shape and convex. Frontal shield thick, coarsely granular and perforated by numerous round pores. Primary orifice semicircular with proximal edge straight. Two or four distal oral spines present. Ascopore prominent, crescentic, inner rim with small inconspicuous denticulations; situated proximo-medially (~0.065 mm) to the orifice and at times surrounded entirely by a raised rim. A pair of avicularia lateral, almost proximal, to the orifice; rostrum short and triangular supporting a long setiform mandible, directed distally. Ovicell not observed.

#### Substratum, depth range and ecology

Forms small encrustations on the shells of mussels. Depth range 4–20 m.

#### Geographic distribution

This species is known only from Robben Island on the west coast of South Africa.

#### Remarks

The semicircular orifice with a straight proximal edge, the distinct ascopore with raised rim, the oral spines and the acute adventitious avicularia with setiform mandibles are all characteristic of the genus *Microporella*. Furthermore, the completely straight edge of the proximal edge of the orifice, the number of distal oral spines and the paired adventitious avicularia lateral, almost proximal to the orifice, with long setiform, distally-directed, mandibles distinguishes *M. madiba* from all other species within *Microporella*.

#### Genus *Fenestulina* Jullien, 1888

Type species: *Cellepora malusii* Audouin, 1826.

#### *Fenestulina elevora* sp. nov.

Fig. 17D–F, Table 12

#### Etymology

*Elevo* (L) – raised. *Ora* (L) – rim.

**Table 12.** Measurements (in millimetres) of *Fenestulina elevora* sp. nov. material.

|     | Sample size | Mean | S.D. | Range     |
|-----|-------------|------|------|-----------|
| Lz  | 20          | 0.54 | 0.02 | 0.50–0.59 |
| lz  | 20          | 0.43 | 0.02 | 0.39–0.49 |
| Lso | 20          | 0.15 | 0.01 | 0.09–0.16 |
| lso | 20          | 0.12 | 0.02 | 0.08–0.16 |

#### Material examined

Holotype: SAM – A28639 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by G. Isaacs, 5 May 1999.

#### Description

Colony encrusting, forming patches. Pale white when alive and cream when dry. Autozooids arranged multiserially, alternating and separated by indistinct shallow grooves; hexagonal in shape and convex. Frontal shield smooth, punctured by numerous large round sieve-like pores. Orifice semicircular with proximal edge straight and a thickened raised rim. Three or four short distal oral spines present. Ascopore prominent, crescentic, inner rim with small but conspicuous denticulations; situated proximo-medially to the orifice almost exactly at the centre point of the zooid and surrounded entirely by a thickened raised rim. Ovicells not observed and avicularia absent.

#### Substratum, depth range and ecology

Found encrusting the shells of mussels. Depth range 4–20 m.

#### Geographic distribution

This species is only known from Bakoven on the west coast of South Africa.

#### Remarks

Even though *Fenestulina* has much in common with *Microporella*, namely the semicircular orifice, distinct ascopore with raised rim, perforated frontal shield and hyperstomial ovicell, it is distinguished from it by the absence of avicularia. The current specimens exhibit all the above-mentioned characters and can accurately be assigned to *Fenestulina*. The exaggerated, thick raised rims around the orifice and ascopore, number of oral spines, scattered pores that are not confined to any area of the frontal shield and the position of the ascopore distinguishes it from all other species in this genus. The sieve-like pores scattered over the entire frontal shield are uncommon for this genus but are consistent with *F. catastictos* (Gordon, 1984) and *F. multicava* (Gordon, 1989).

#### Family CALWELLIIDAE MacGillivray, 1887

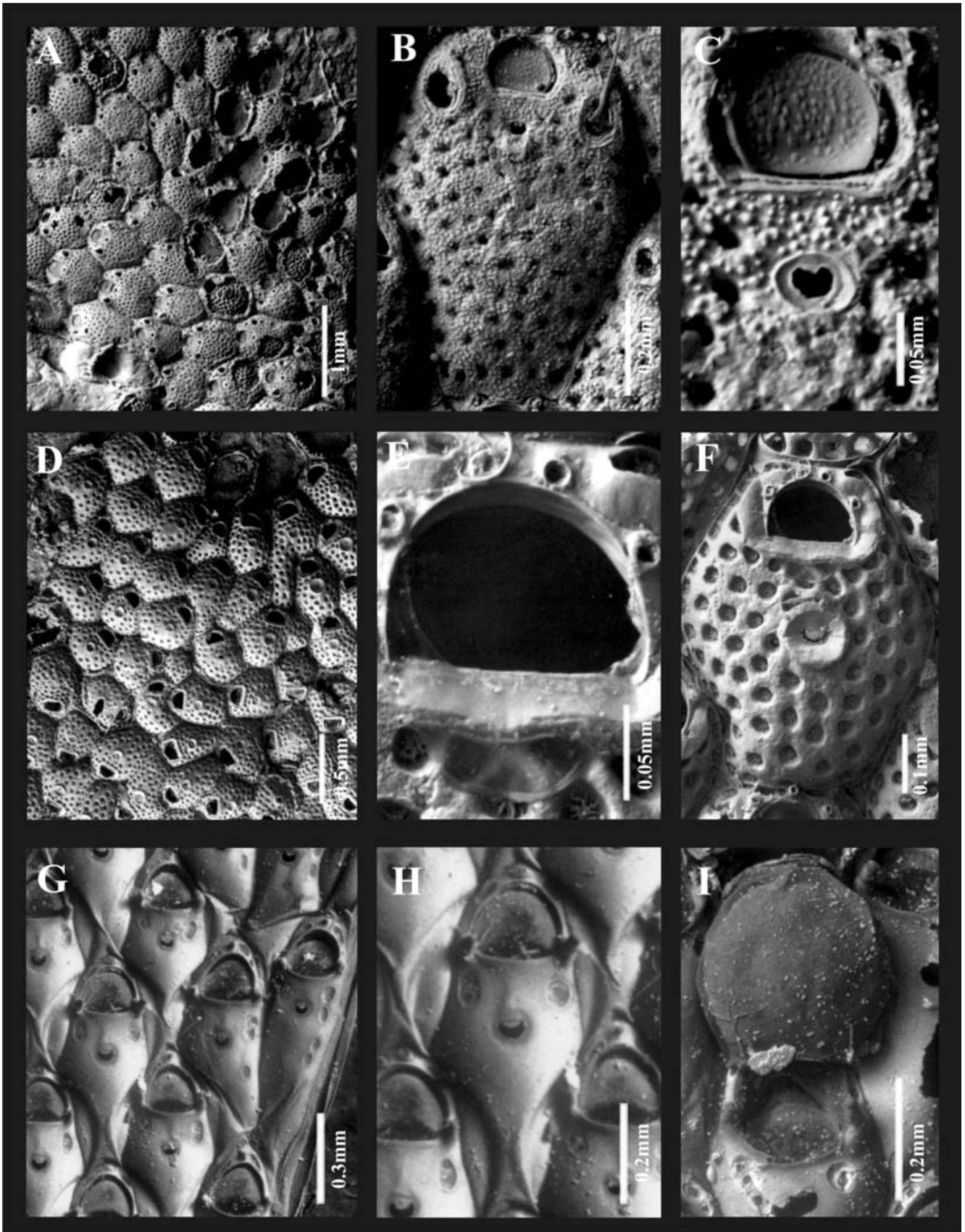
#### Genus *Onchoporella* Busk, 1884

Type species: *Carbasa bombicina* Busk, 1852 (not *Flustra bombicina* Ellis & Solander, 1786); = *Onchoporella buskii* Harmer, 1923 by synonymy.

#### *Onchoporella buskii* Harmer, 1923

Figs 17G–I, 20L, 21C

*Carbasa bombicina* Busk, 1852: 52: pl. 48, figs 4–7.



**Fig. 17.** A–C, *Microporella madiba* sp. nov. (SAM – A28638). D–F, *Fenestulina elevora* sp. nov. (SAM – A28639). G–I, *Onchoporella buskii* (Harmer).

*Onchoporella bombycina*: Busk, 1884: 104. O'Donoghue, 1924: 39. O'Donoghue & de Watteville, 1944: 423. O'Donoghue, 1957: 86, figs 6–7.  
*Onchoporella buskii* Harmer, 1923: 314.

#### Material examined

SAM – A28640 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by G. Isaacs, 12 March 2000. SAM – A28641 Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by W. Florence, 24 April 1999. SAM – A28642 Paternoster (32°29'S, 17°31'E), depth 15 m, collected by G. Isaacs, 16 April 2000. SAM – A28643 Port Nolloth (29°11'S, 16°51'E), depth 8 m, collected by W. Florence, 10 April 2000.

#### Description

Colony erect and bushy, a broad tuft; branches unilaminar and dichotomous. White or pale blue to green when alive and pale yellow when dry. Autozooids are pyriform, cylindrical and smooth; arranged multiserially, alternating. Primary orifice is large, ~25% of zooid length. Two short spines present on either proximo-lateral side of the orifice. Small spinous structure at the median distal end of the orifice; two pores present on either side. Frontal shield smooth with median lunate ascopore proximal to the primary orifice. The frontal shield is further perforated by between one to four pores in a series on either side of the zooid. Ovicell globular, not closed by the zooid aperture but overhanging it.

#### Substratum, depth range and ecology

Usually lives on algae or attached to other bryozoans. Depth range 4–60 m.

#### Geographic distribution

This species is known only from South Africa and is distributed from Port Nolloth to Algoa Bay.

#### Remarks

Busk (1852) named specimens of this species as *Carbasea bombycina* and associated it with *Flustra bombycina* (Ellis & Solander, 1786). There is no doubt that from Busk's 1884 descriptions and illustrations that a species he later described as *Onchoporella bombycina* was indeed the same as *C. bombycina* and he recognized that it was not the same as *F. bombycina* of Ellis & Sollander (1786). Harmer (1923) suggested a new name, *Onchoporella buskii*, for Busk's species, as it was now the type species for a new genus, and thus eliminated confusion. The pores located distal to the primary orifice have not been described before but it is clear that these specimens are indeed *O. buskii* as all other characters are consistent with previous works but this character has probably been overlooked in the past.

#### Family PETRALIELLIDAE Harmer, 1957

#### Genus *Mucropetraliella* Stach, 1936

Type species: *Lepralia ellerii* MacGillivray, 1869.

#### *Mucropetraliella asymmetrica* Hayward & Cook, 1983

Fig. 18A–C

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

#### Material examined

SAM – A28644 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by W. Florence, 12 March 2000.

#### Description

Colony loosely encrusting, unilaminar, and anchored by rhizoids which originate from basal pore plates. Primary orifice wider than long with two to three spines. Lyrula short and wide; lateral denticles point proximally. Lateral sinus unequal and asymmetrical, the larger one occurring basally to the rostrum of the avicularium. Suboral mucro long and stout; proximal portion of orifice and frontal shield raised. Suboral avicularium small, completely hidden at the base of the mucro, which is directed frontally and distally; rostrum curved, directed laterally, palate vertical to frontal plane, mandible rounded, hinged on a stout curved bar and directed medially. Oral avicularia present, either one or two pairs; mandibles rounded, directed laterally acute to the frontal plane. Ovicells elongated, finely tuberculate with one or two scattered frontal avicularia.

#### Substratum, depth range and ecology

Lives epizooically on the hard shells of other organisms. Depth range 4–90 m.

#### Geographic distribution

This species is only known from South Africa and has a wide distribution range from False Bay to just north of Durban.

#### 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.

#### Superfamily CELLEPOROIDEA Johnston, 1838

Family CELLEPORIDAE Johnston, 1838

#### Genus *Celleporina* Gray, 1848

Type species: *Lepralia hassallii* Johnston, 1847.

#### *Celleporina solida* sp. nov.

Fig. 18D–G, Table 13

#### Etymology

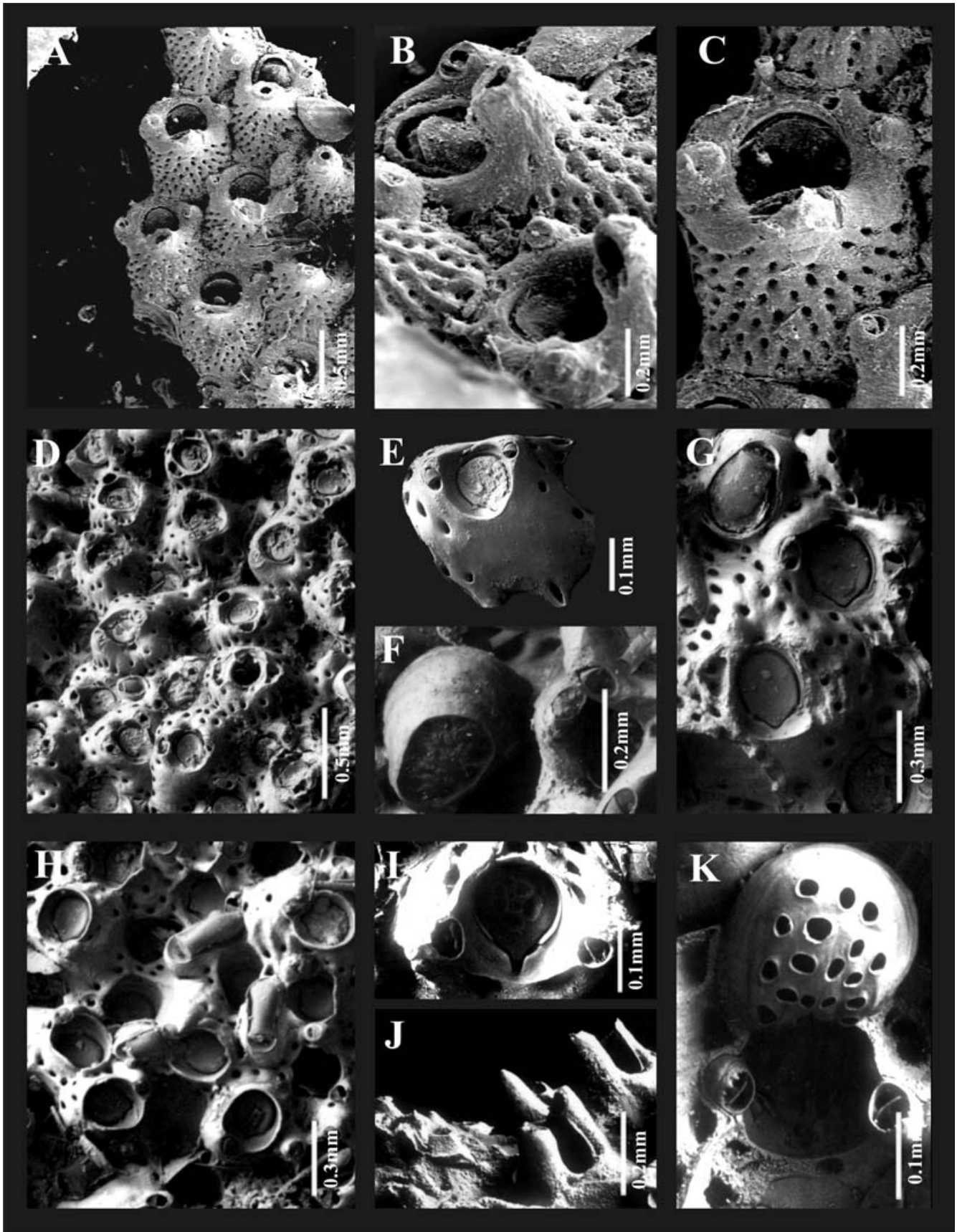
*Solidus* (L.) – compact, referring to the crowded arrangement of the zooids.

#### Material examined

Holotype: SAM – A28645 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by G. Isaacs, 5 May 1999.

#### Description

Colony encrusting, forming thickly calcified irregularly shaped patches. Orange when alive and cream when dry. Autozooids irregularly and compactly arranged; distinct, erect at the distal end. Frontal shield smooth with a few



**Fig. 18.** A–C, *Mucropetraliella asymmetrica* (Hayward & Cook). D–G, *Celleporina solida* sp. nov. (SAM – A28645). H–K, *Turbicellepora valligera* (Hayward & Cook).

**Table 13.** Measurements (in millimetres) of *Celleporina solida* sp. nov. material.

|        | Sample size | Mean | S.D. | Range     |
|--------|-------------|------|------|-----------|
| Lso    | 20          | 0.15 | 0.02 | 0.11–0.19 |
| Iso    | 20          | 0.24 | 0.02 | 0.19–0.28 |
| Ladav  | 20          | 0.12 | 0.02 | 0.10–0.16 |
| Lvicar | 20          | 0.53 | 0.02 | 0.47–0.58 |

marginal pores. Primary orifice longer than wide, proximal end with a shallow V-shaped sinus occupying one-third of the orifice width; condyles found two-thirds of the way down from the distal end sloping proximally into the sinus. An erect peristomial rim surrounds the orifice entirely. Paired avicularia lateral to the orifice; rostrum oval with distal rim finely toothed, prominently pointed disto-laterally but also proximally in a few zooids; crossbar slender without a columella. Vicarious avicularia scattered irregularly over the colony; almost as large as the primary orifice, and in some cases larger, with a spatulate rostrum. Ovicell prominent, hemispherical; tabula with large irregular peripheral pores.

#### Substratum, depth range and ecology

Forms thick encrustations on rocky hard substrata. Depth range 4–20 m.

#### Geographic distribution

This species is known only from Bakoven on the west coast of South Africa.

#### Remarks

The shallow V-shaped sinus of the orifice, paired avicularia lateral to the orifice with oval disto-laterally directed mandibles and very large vicarious avicularia, each with a spatulate rostrum distinguishes *Celleporina solida* from all other congeneric species. *Celleporina solida* resembles *C. hassallii*, which, however, has a deep U-shaped sinus with inconspicuous condyles and proximo-laterally directed avicularia.

#### Genus *Turbicellepora* Ryland, 1963

Type species: *Cellepora coronopus* Wood, 1844.

#### *Turbicellepora valligera* Hayward & Cook, 1983

Figs 18H–K, 20G

*Turbicellepora valligera* Hayward & Cook, 1983: 124, fig. 31G–H.

#### Material examined

SAM – A28646 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by W. Florence, 12 March 2000. SAM – A28647 Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by W. Florence, 30 April 1999.

#### Description

Colony erect, originating from an encrusting base and then developing a slender cylindrical growth. Orange when alive and cream when dry. Autozooids distinct, heavily calci-

fied and convex; frontal wall finely granular, almost smooth, with large marginal pores. Primary orifice round but for a deep v-shaped poster; an erect peristomial rim surrounds the orifice almost entirely but often peaked medially or forming two or more processes. Paired, cylindrical avicularia with semicircular mandibles present lateral to the orifice; connected distally by the peristome. Two type of vicarious avicularia are present: may be small, oval, with a semicircular mandible; large, spatulate, cross bar slender with a thick median columella, palate with a small foramen. Ovicell prominent, calcified, with frontal surface perforated by numerous pores sometimes of irregular shape.

#### Substratum, depth range and ecology

Found growing erect on hard rocky substrata and large colonies are sometimes overgrown by *Schizoretepora tessellata*. Depth range 4–100 m.

#### Geographic distribution

This species is only known from South Africa and is distributed from Port Nolloth to the east coast.

#### Remarks

*Turbicellepora valligera* was first described by Hayward & Cook (1983) based on specimens collected on the inner shelf of the east coast of South Africa by the R.S. Meiring Naude. These authors noted that this species is very similar to *Osthimosia bicornis* (Busk) but differs in the position of the oral avicularium and also the ovicell structure. While *O. bicornis* has a single opening in the frontal wall of the ovicell *T. valligera* has numerous perforations in the frontal wall of the ovicell. Hayward & Cook (1983) explain that they only found one partly immersed ovicell, but examination of the present material has yielded numerous ovicells with the typical *Turbicellepora* structure supporting their erection of this species.

#### Family PHIDOLOPORIDAE Gabb & Horn, 1862

#### Genus *Schizoretepora* Gregory, 1893

Type species: *Relepora tessellata* Hincks, 1878.

#### *Schizoretepora tessellata* (Hincks, 1878)

Figs 19A–D, 20D, 21H

*Relepora tessellata* Hincks, 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

SAM – A28648 A-Frame, False Bay (34°13'S, 18°28'E), depth 15 m, collected by G. Isaacs, 12 March 2000. SAM – A28649 Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by G. Isaacs, 30 April 1999.

SAM – A28650 Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by G. Isaacs, 24 April 1999.

#### Description

Colony erect and delicate, forming a folded and contorted



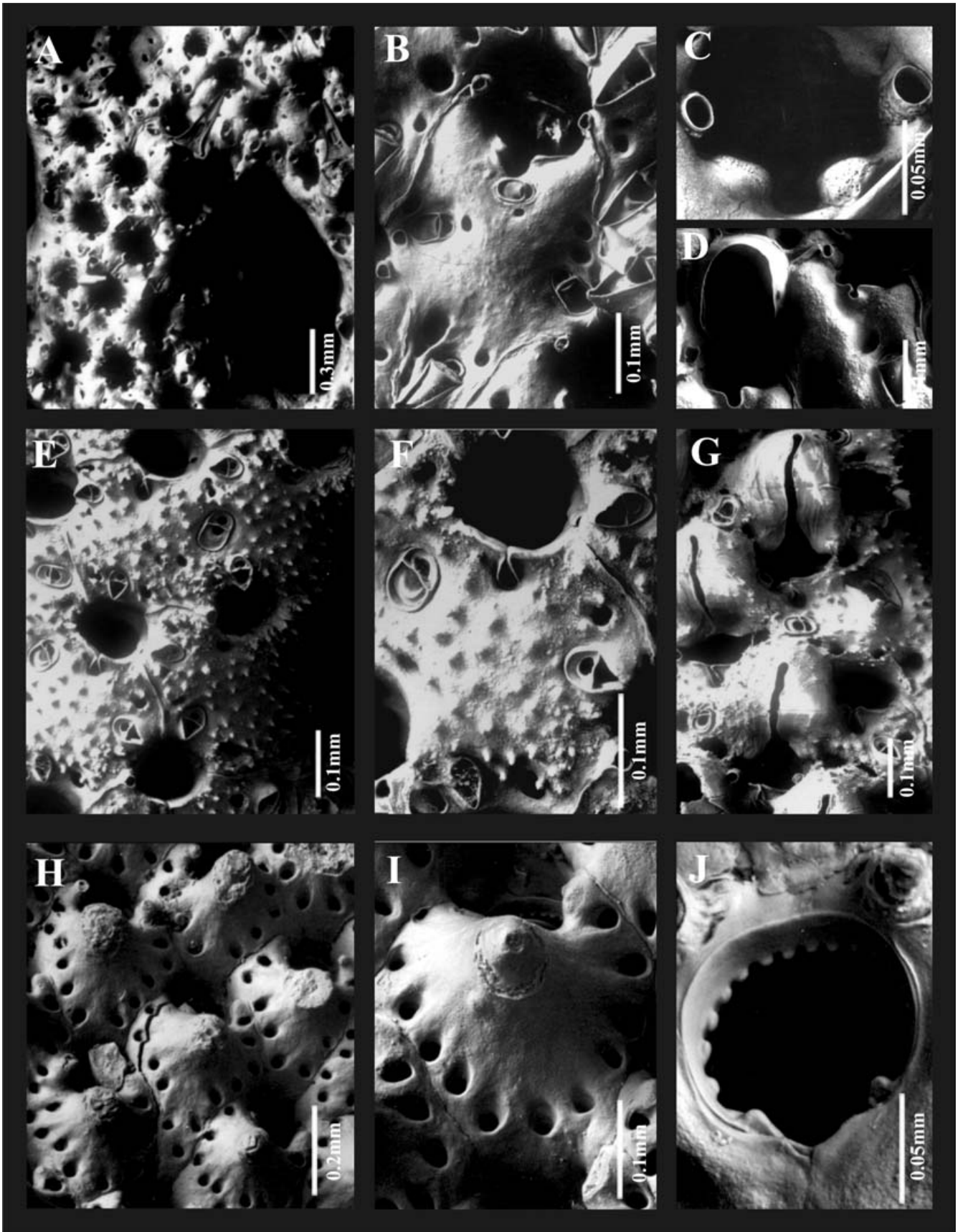
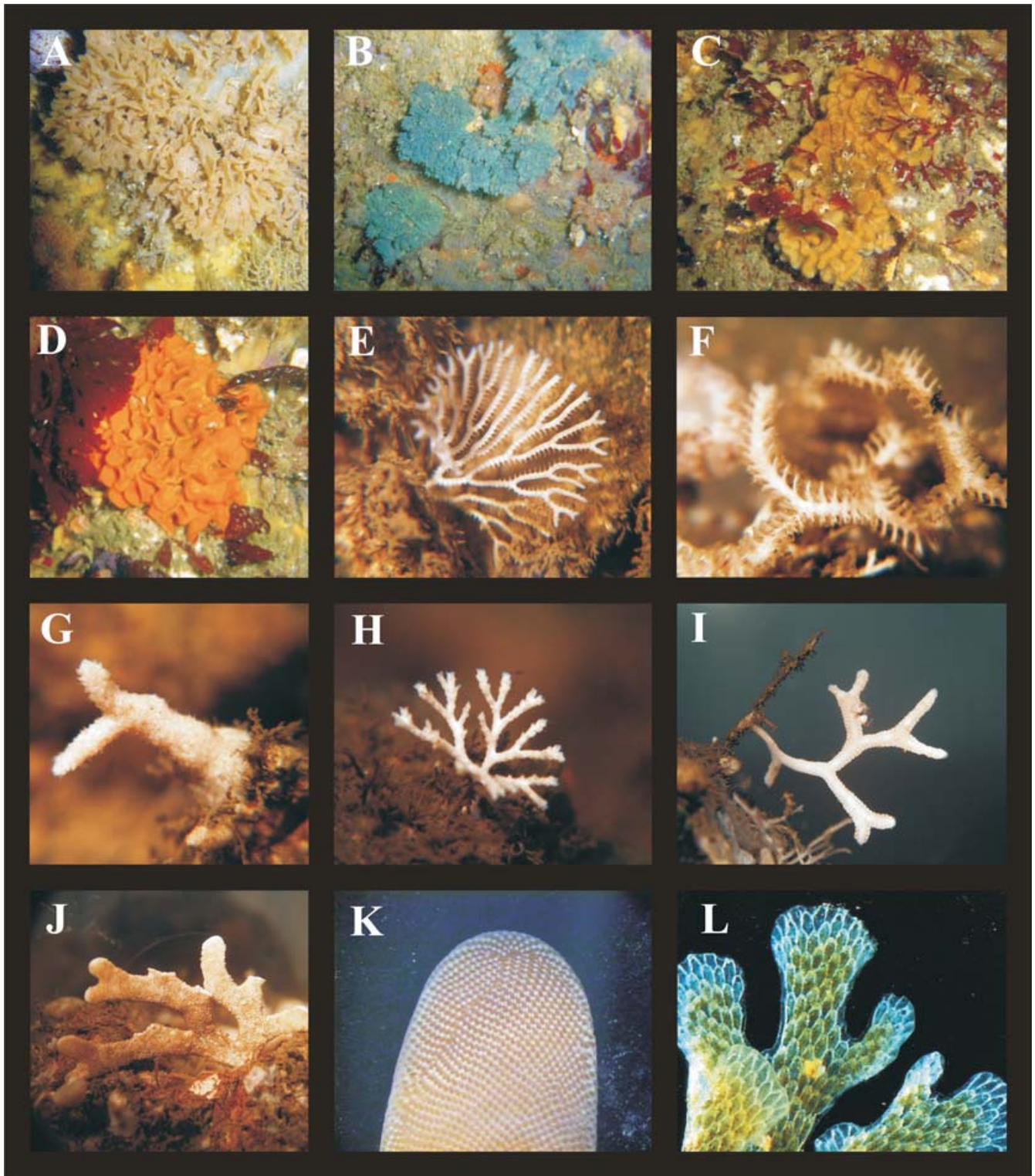
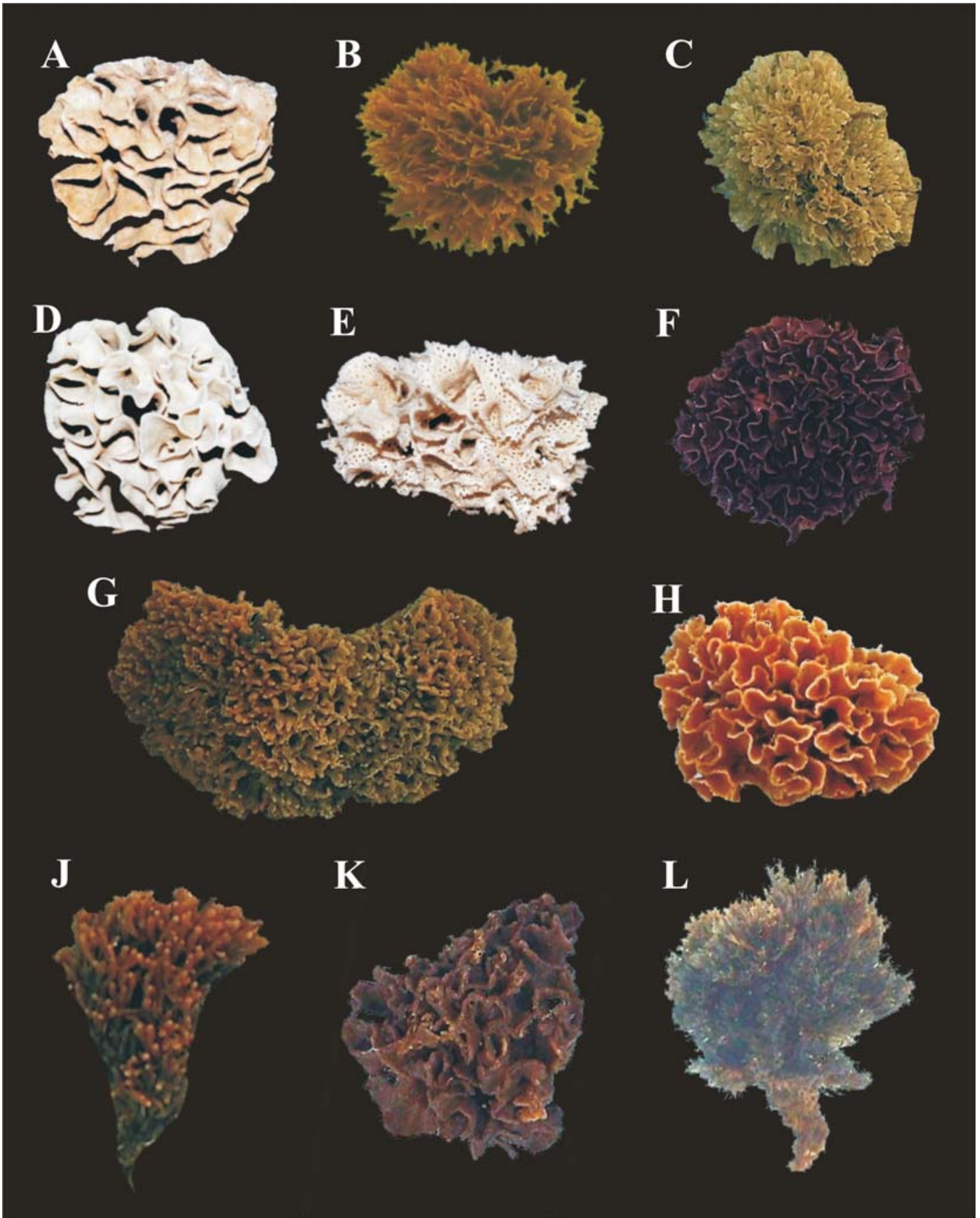


Fig. 19. A–D, *Schizoretopena tessellata* (Hincks). E–G, *Reteporella lata* (Busk). H–J, *Rhynchozoon abscondum* sp. nov. (SAM – A28653).



**Fig. 20.** A, *Alcyonidium rhomboidale* (O'Donoghue). B, *Bugula dentata* (Lamouroux). C, *Gigantopora polymorpha* (Busk). D, *Schizoretepora tessellata* (Hincks). E, *Exidmonea atlantica* (Forbes). F, *Exidmonea crassimargo* (Canu & Bassler). G, *Turbicellepora valligera* (Hayward & Cook). H, *Turritigera stellata* (Busk). I, *Adeonella regularis* (Busk). J, *Adeonella conspicua* (Hayward). K, *Jellyella tuberculata* (Bosc). L, *Onchoporella buskii* (Harmer).



**Fig. 21.** A, *Calyptotheca porelliformis* (Waters). B, *Alcyonidium rhomboidale* (O'Donoghue). C, *Onchoporella buskii* (Harmer). D, *Calyptotheca nivea* (Busk). E, *Reteporella lata* (Busk). F, *Aeonella pluscula* (Hayward). G, *Gigantopora polymorpha* (Busk). H, *Schizoretepora tessellata* (Hincks). I, *Aeonella regularis* (Busk). J, *Margaretta levinseni* (Canu & Bassler). K, *Chaperiopsis (Chaperiopsis) multifida* (Busk). L, *Bugula dentata* (Lamouroux).

reticulate mass. Plates are unilaminar and fenestrate. Fenestrulae are oval and small. The trabecular fusion is hexagonal and irregular. Autozooids rather flat, separated by distinct sutures. Primary orifice semi-elliptical, longer than wide, proximal notch-like sinus present. Younger zooids closer to the growing edge have a peristome developing as an erect projection around the entire orifice but later the orifice becomes immersed with the proximal side still distinct. Initially four distal and lateral oral spines may be present with only the two lateral spines remaining as secondary calcification advances. Frontal calcification finely granular at first with marginal pores rarely present whereas older zooids have a smoother frontal shield with distinct marginal pores and a few scattered pores. Avicularia are variable; small avicularia, with semi-elliptical mandibles, and larger ones with acute mandibles are present and scattered proximally to the orifice on the frontal shield of the autozooids. Large vicarious avicularia with acute triangular rostra scattered frequently throughout the colony and typically line the inside of the fenestrula. Ovicell prominent, spherical; conspicuous oval orifice with labellum situated well above peristome rim.

#### Substratum, depth range and ecology

Erect colonies found on rocky substrata. Associated with other species of Bryozoa, e.g. by overgrowing *Turbicellepora valligera*. Also provides habitats for other invertebrates like hydroids and polychaetes. Depth range 4–100 m.

#### Geographic distribution

South Africa and also reported from Australia.

#### 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

Type species: *Reteporella flabellata* Busk, 1884.

*Reteporella* is now considered a senior synonym of *Sertella* (see Gordon 1989).

#### *Reteporella lata* (Busk, 1884)

Figs 19E–G, 21E

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

#### Material examined

SAM – A28651 Homestead Plateau, Oudekraal (33°58'90"S, 17°15'00"E), depth 12 m, collected by G. Isaacs, 30 April 1999. SAM – A28652 Justin's Caves, Oudekraal (33°58'90"S, 18°20'65"E), depth 18 m, collected by W. Florence, 24 April 1999.

#### Description

Colony erect and robust, forming a thick, folded and contorted, reticulate mass; trabeculae comprising three to six longitudinal rows of zooids, fenestrulae oblong, small, 0.7–0.9 mm long. Cream when alive and pale white when dried. Autozooids arranged multiserially, alternating; frontal calcification papillate in later ontogeny. Primary orifice wider than long without a denticulate rim. Peristome thin bisected by a central fissure and a small proximal pseudosinus. One to two spines present on the edge of the peristome. Numerous small adventitious avicularia distributed irregularly over the surface of the colony; mandible either semi-elliptical or acute triangular. Ovicell prominent, convex, bearing a longitudinal median fissure and a long labellum extending deep into the peristome.

#### Substratum, depth range and ecology

Erect colonies found on rocky substrata. Provides habitats for other invertebrates like hydroids and polychaetes. Depth range 4–100 m.

#### Geographic distribution

This species is only known from South Africa and is distributed from Oudekraal to East London.

#### Remarks

Hayward & Cook (1983) define 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 Naude* specimens. The present specimens in this study are consistent with those of the above-mentioned works.

#### Genus *Rhynchozoon* Hincks, 1895

Type species: *Lepralia bispinosa* Johnston, 1847.

#### *Rhynchozoon abscondum* sp. nov.

Fig. 19H–J, Table 14

#### Etymology

*Abscondo* (L.) – to hide, referring to the hidden avicularia.

#### Material examined

SAM – A28653 Bakoven (33°56'S, 18°22'E), depth 8 m, collected by W. Florence, 5 May 1999.

#### Description

Colony encrusting, forming small irregular patches. White when alive and cream when dried. Autozooids arranged multiserially, alternating. Autozooids hexagonal, convex; frontal shield almost smooth with nine to 12 promi-

**Table 14.** Measurements (in millimetres) of *Rhynchozoon abscondum* sp. nov. material.

|     | Sample size | Mean | S.D. | Range      |
|-----|-------------|------|------|------------|
| Lz  | 20          | 0.30 | 0.02 | 0.28–0.35  |
| lz  | 20          | 0.31 | 0.02 | 0.27–0.37  |
| Lso | 20          | 0.10 | 0.02 | 0.08–0.014 |
| lso | 20          | 0.10 | 0.02 | 0.07–0.13  |

ment marginal pores. Primary orifice wider than long; anterorbicular and finely denticulate, poster U-shaped and flanked by a pair of condyles. Two distal oral spines present in young zooids. Peristome thickened with one to two short knobs at the distal rim. Suboral avicularium distinct but hidden by a prominent central conical umbo; rostrum hooked, with an elongated triangular mandible. One frontal avicularium present on the proximal end of the frontal wall of each zooid in later ontogeny; directed proximally. No ovicells present.

#### Substratum, depth range and ecology

Encrusting colonies found on rocky substrata. Provides habitats for other invertebrates like hydroids and polychaetes. Depth range 4–20 m.

#### Geographic distribution

This species is only known from Bakoven on the west coast of South Africa.

#### Remarks

*Rhynchozoon abscondum* sp. nov. resembles *R. documentum* (Hayward & Cook, 1983), also described from South Africa, but differs from it by the narrower primary orifice, number of denticles, the downward sloping condyles and the prominent conical umbo that obscures the distally directed suboral avicularium. Another species, *R. beatulum* (Hayward & Cook, 1983), has a wider primary orifice, a larger number of denticles and an apically developed umbo with a laterally directed sub-oral avicularium.

#### Family LEKYTHOPORIDAE Levinsen, 1909

#### Genus *Turritigera* Busk, 1884

Type species: *Turritigera stellata* Busk, 1884.

#### *Turritigera stellata* Busk, 1884

Figs 13G–J, 20H

*Turritigera stellata* Busk, 1884: 130, pl. 24, fig. 1. Waters, 1904: 18.

#### Material examined

SAM – A28654 Port Nolloth (29°11'S, 16°51'E), depth 8 m, collected by W. Florence, 10 April 2000.

#### Description

Colony erect, forming rigid branching colonies. White when alive and dry. Autozooids arranged irregularly; elongate, slightly convex and boundaries indistinct. Frontal shield longitudinally striated and perforated by a few scattered pores. Primary orifice obscured by a long thick peristome that projects almost perpendicular to the frontal surface. Peristomial orifice, almost quadrate in shape, with its distal border somewhat obscured by an adventitious avicularium which has an acute triangular mandible, directed distally. Three smaller oral avicularia usually present, two laterally and one proximo-medially, rostrum elliptical and almost semicircular. No spines or ovicells observed.

#### Substratum, depth range and ecology

Colonies found living erect on hard substratum. Depth range 4–30 m.

#### Geographic distribution

This species has been reported from South America and South Africa and is distributed locally from Port Nolloth to East London.

#### Remarks

The current specimen agrees with the description of *Turritigera stellata* inasmuch as the irregular colony morphology and having the distal border of its quadrate orifice obscured by a larger distally directed oral avicularia and surrounded by three smaller avicularia, one each on each lateral and proximal side.

#### DISCUSSION

The classification utilized here incorporates the most recent taxonomic opinions, favouring those of Gordon (1984, 1986, 1989, 1993), Hayward (1985) and Hayward & Ryland (1985, 1998, 1999). This classification is by no means comprehensive as research on the Bryozoa is continuing at an accelerated pace, which will undoubtedly reflect further changes in their classification.

The value of the current collection lies in the fact that it was collected from the shallow waters (< 30 m) off the west coast of South Africa. This area has been neglected in terms of bryozoan studies, as the previous works were predominantly undertaken in the deeper waters of the south and east coasts, with few incidental collections scattered around the Cape Peninsula and even fewer northwards. The present collection was taken from a number of sampling sites from Port Nolloth (29°11'S, 16°51'E) to False Bay (34°13'S, 18°28'E) with maximum depths raging from 3–30 m. By contrast, previous collections, such as those collected by the R.S. *Meiring Naude* (1975–1976), covered the east coast of South Africa to maximum depths ranging 80–1300 m. With great depth range and geographical variation between the few previous studies and the present collection, overlap in the species recorded would be unexpected and although this holds largely true, some of the South African species described here (*Exidmonea atlantica*, *Exidmonea crassimargo*, *Chaperia capensis*, *Chaperiopsis* (*Chaperiopsis*) *multifida*, *Bugula dentata*, *Beania magellanica*, *Menipea triseriata*, *Menipea ornata*, *Menipea crispa*, *Menipea marionensis*, *Steginoporella buskii*, *Aeonella conspicua*, *Celleporaria capensis*, *Escharoides contorta*, *Gigantopora polymorpha*, *Calyptotheca porelliformis*, *Calyptotheca nivea*, *Mucropetraliella asymmetrica*, *Turbicellepora valligera*, *Schizoretepora tessellata* and *Reteporella lata*) appear to have large bathymetric and geographical ranges, as they were also reported in the *Meiring Naude* collection (Hayward & Cook 1979, 1983).

The present collection comprises 63 species of Bryozoa representing three orders (Cyclostomata, Ctenostomata and Cheilostomata), 33 families and 46 genera (Table 15). Five species are cyclostomes, three are ctenostomes and 55 are cheilostomes. The relatively low number of cyclostomes and ctenostomes is not surprising when considering the ratio of described species between the three orders, e.g. other southern polar regions (See Table I, in Barnes & De Grave 2000). Similarly, the *Meiring Naude* collections comprised 114 cheilostomes, 16 cyclostomes and only one ctenostome (Hayward & Cook 1979, 1983). These low

**Table 15.** Bryozoan species richness for the West Coast of South Africa, according to taxonomic group.

|          | Total | Cyclostomata | Ctenostomata | Cheilostomata |
|----------|-------|--------------|--------------|---------------|
| Families | 33    | 4            | 2            | 27            |
| Genera   | 46    | 4            | 2            | 40            |
| Species  | 63    | 5            | 3            | 55            |

numbers of cyclostomes and ctenostomes may be related to their general low abundance in marine habitats and inconspicuousness. This may have resulted in collection bias as in the case of ctenostomes where intertidal and brackish-water assemblages have been poorly studied. The family Adeonellidae contained the most species; seven in two genera, namely *Adeonella* and *Laminopora*. This is not surprising as 71% of all known species of the genus *Adeonella* are endemic to South Africa and are well represented in other collections from this region (Hayward 1988). Fifteen species are new to science (~24% of the total species described in this study), of which seven species are found in seven genera (*Eurystrotos*, *Klugeflustra*, *Thalamoporella*, *Bitectipora*, *Schizosmittina*, *Fenestrulina* and *Celleporina*) that are newly reported from South Africa. Thirteen species are reported from the west coast for the first time, of which one, *Hippomonavella formosa*, is a new record for South Africa, having only previously been reported from Australia.

Forty-eight of the species described here have previously been recorded from South Africa. Eighteen of these were reported from the Meiring Naude collection, of which most occur at depths shallower than 100 m and a few exhibit broad geographic and bathymetric distribution patterns (e.g. *Gigantopora polymorpha*, *Exidmonea atlantica* and *Calyptotheca nivea*).

Including the species described here, approximately 270 nominal bryozoan species have been reported from South Africa to date. An accurate species count is not yet possible from this area as there are still outstanding problems with synonymies. Hayward & Cook (1983) pointed out that many forms of South African bryozoans have been assigned the names of European species, which appears improbable because of the known geographic distribution of these species. The current study highlights two such European species, *Membranipora membranacea* (reported by O'Donoghue 1924; O'Donoghue & de Watteville 1935, 1937, 1944) and *Bicellariella ciliata* (reported by O'Donoghue 1957), which have been previously reported from South Africa, but in light of the current study were misidentified by the above mentioned authors and have been erected as new species. While the systematic status of some of these species has been resolved, others may never be resolved without a comprehensive revision of some prior works and redescription of the original specimens, notably those of O'Donoghue and O'Donoghue & de Watteville (q.v). In addition a future survey of the entire South African coast would not only be essential to assess accurately the bryozoan fauna of South Africa but also provide an opportunity to investigate affinities of the fauna with that of other regions.

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