Systematics of some Antarctic *Idmidronea* and *Exidmonea* (Bryozoa: Cyclostomata)

A. N. OSTROVSKY† and P. D. TAYLOR‡

†Department of Invertebrate Zoology, Faculty of Biology and Soil Sciences, St Petersburg State University, Universitetskaya nab. 7/9, 199034 St Petersburg, Russia
‡Department of Palaeontology, The Natural History Museum, Cromwell Road, London SW7 5BD, UK

(Accepted 18 December 1995)

Descriptions are given of seven Antarctic species of cyclostome bryozoans belonging to the genera *Idmidronea* and *Exidmonea*, of which *I. fraudulenta*, *I. pellucida* and *E. arcuata* are new. The gonozooids of *I. pseudorosina* Borg are described for the first time, and all species are newly illustrated using SEM. The large sample size available has permitted particular attention to be given to intraspecific variability, especially of the ooeistome which is shown to be more variable than has been previously acknowledged.

**Keywords:** Bryozoa, Cyclostomata, *Idmidronea*, *Exidmonea*, taxonomy, new species, Antarctica.

---

**Introduction**

Bryozoans are an important element of benthic faunas in the Antarctic. Most recent taxonomic studies (Hayward 1993, 1995; Hayward and Thorpe 1990) have focused on the highly diverse cheilostomes. Winston and Hayward (1994) found that cheilostomes comprised 85% of bryozoan species in the samples they studied from the US Antarctic Research Program. In contrast, cyclostomes, which comprised only 13% of bryozoan species in Winston and Hayard's samples, have been largely overlooked in modern taxonomic revisions. Rosso (1991), however, noted that the paucity of data available on cyclostomes might be partly responsible for their subordinate status, and it is clear that cyclostomes can attain high local abundances in the Antarctic.

Representatives of the Order Cyclostomata from the Antarctic were first mentioned by Kirkpatrick (1902) who described two species—*Lichenopora canaliculata* Busk and *Idmonea organisans* (d'Orbigny)—from the Ross Sea. Calvet (1904) subsequently recorded *Idmonea serpens* (L.) from the area of South Georgia but, as there are no descriptions or figures, it is impossible to confirm the identification of this species (Borg, 1944, p. 86) which is nowadays (Hayward and Ryland, 1985) placed in synonymy with *Tabulipora illiacea* (Pallas).

Among representatives of the genus *Idmidronea*, Waters (1904) recorded *Idmidronea [Idmonea] atlantica* (Forbes in Johnston), in a collection from the
Bellingshausen Sea. The same species was recorded by Calvet (1909) from the Graham Region. Thornely (1924) reported Idmiidiana [Idmitonia] australis MacGillivray from the d'Urville Sea. Unfortunately, descriptions of these species are very short, with at best only schematic illustrations.

Detailed descriptions of four new species of Idmiidiana (I. obtea, I. hula, I. curvata, I. antarctica) from the Graham Region and the Weddel Sea were given by Borg (1944) in a monograph which is still the most complete and detailed work on Antarctic cyclostome bryozoans. All of Borg's species were mentioned again by Buge (1948) in his revision of Idmiidiana. Five Antarctic species of idmoneiform cyclostomes were subsequently described by Androssova (1968): Idmiidiana obtea Borg, Idmiidiana magna Androssova, Idmiidiana hula Borg, Idmiidiana atlantica Forbes in Johnston, and Idmiidiana pulcherrima Kirkpatrick. Moyano (1991a) listed Idmiidiana obtea Borg and I. antarctica Borg from the Chilean Antarctic. Ostrovsky (1991) reported Idmiidiana hula Borg and I. atlantica (Forbes in Johnston) from the Mawson Sea, but specimens originally identified as the former species are now regarded as Idmiidiana antarctica Borg.

Among the cyclostome bryozoans collected by Dr Alexander F. Pushkin on the R. V. Akademik Fedorov during the 34th Soviet Antarctic Expedition (1988–1989) are seven species belonging to Idmiidiana or the closely similar idmoneiform genus Exidinoa which differs from Idmiidiana in lacking overgrowths of kenozooids on the dorsal (reverse) sides of branches (Taylor and Voigt, 1993). These seven species are described here, including three new species: Idmiidiana fraudulenta, I. pelvica and Exidinoa arcuata. The large sample size has enabled original descriptions of established species to be revised and enlarged, principally through the use of SEM and incorporating a better appreciation of intraspecific variability. This is particularly important in view of the difficulties that such variability presents when identifying cyclostome species; comprehensive systematic description is impossible without knowledge of the morphological variants present within a species.

<table>
<thead>
<tr>
<th>Station</th>
<th>Location</th>
<th>Coordinates</th>
<th>Depth</th>
<th>Substratum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ardley Bay, South</td>
<td>58°56′17″W, 62°12′6″S</td>
<td>84 m</td>
<td>silt-sand</td>
</tr>
<tr>
<td>2/52</td>
<td>Princess Martha</td>
<td>11°4′27″W, 70°51′50″S</td>
<td>394 m</td>
<td>sand with shingle and gravel</td>
</tr>
<tr>
<td>4</td>
<td>Princess Martha</td>
<td>10°17′48″W, 70°52′98″S</td>
<td>239 m</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Princess Martha</td>
<td>12°2′82″W, 71°40′52″S</td>
<td>279 m</td>
<td></td>
</tr>
<tr>
<td>8/53</td>
<td>Sea of Cosmonauts</td>
<td>46°52′32″E, 66°49′29″S</td>
<td>322 m</td>
<td>clay with shingle and gravel</td>
</tr>
<tr>
<td>10</td>
<td>Haswell Is., Davis</td>
<td>92°57′14″E, 66°32′17″S</td>
<td>46 m</td>
<td>rock</td>
</tr>
<tr>
<td>15</td>
<td>Fish Tail Bay, Mawson</td>
<td>100°48′E, 66°15′S</td>
<td>7–10 m</td>
<td>silt with gravel</td>
</tr>
</tbody>
</table>
Antarctic Idmidronea and Exidmonea

Table 2. Species distributions.

<table>
<thead>
<tr>
<th>Station</th>
<th>E. obeccta</th>
<th>huto</th>
<th>E. arcuata</th>
<th>E. arcuata</th>
<th>I. pseudo-cristina</th>
<th>I. antarctica</th>
<th>I. fraudulenta</th>
<th>I. pelticida</th>
<th>species richness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>6</td>
</tr>
<tr>
<td>2/52</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>3</td>
</tr>
<tr>
<td>8/53</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>x</td>
<td></td>
<td></td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>1</td>
</tr>
</tbody>
</table>

Material
The location of sampling stations and species recorded are summarized in Tables 1 and 2. All specimens studied have been deposited in the collections of the Polychaeta and Bryozoa Section, Marine Research Laboratory, Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia (abbreviated ZIRAS).

Systematic descriptions

Order CYCLOSTOMATA Borg
Suborder TUBULIPORINA Milne Edwards
Family TUBULIPORIDAE Johnston
Genus IDMIDRONEA Canu and Bassler, 1920

Idmidronea Canu and Bassler, 1920: 784.

Type species. Idmonea maxillaris Lonsdale, 1845.

Remarks
Idmidronea was introduced in two different publications dated 1920—Canu (1920) and Canu and Bassler (1920)—each giving different type species. Authorship of the genus is usually attributed to Canu and Bassler (1920) which was published on 30 June, 1920 (Walcott 1921, p. 201). However, Canu (1920) is the earlier publication having appeared in fascicle 4–6 of the 1919 volume of the Bulletin de la Société Géologique de France which was published during May 1920, according to both the cover of the fascicle and the publication dates given on the back of the 1919 volume. Therefore, Canu (1920) has priority with regard to authorship of Idmidronea. Whereas Canu and Bassler (1920) gave Idmonea coronopus Defrance, 1822 as the type species of Idmidronea, the valid type species given by Canu (1920) is Idmonea maxillaris Lonsdale, 1845. (Brood, 1972 attributed authorship of Idmidronea to Canu and Bassler, 1920 but gave the type species as Idmonea maxillaris Lonsdale, 1845.)

Antarctic species of Idmidronea and Exidmonea can be distinguished using the key shown in Table 3.

Idmidronea obecta Borg, 1944
(Figs 1A, 2A–B, 3)
Idmidronea magna Androsova, 1968: 49, fig. 2 (I–V).
Table 3. Key to Antarctic species of *Idiodineae* and *Exidiomenea.*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Branch diameter greater than spacing between autozooidal series</td>
</tr>
<tr>
<td></td>
<td>Branch diameter less than or about equal to spacing between autozooidal series</td>
</tr>
<tr>
<td>2</td>
<td>Branches robust, non-fertile branches more than 1000 μm in diameter</td>
</tr>
<tr>
<td></td>
<td>Branches more delicate, non-fertile branches less than 1000 μm in diameter</td>
</tr>
<tr>
<td>3</td>
<td>Peristomes with funnel-shaped expanded ends; ooeiopore facing branch lateral surface; content of autozooids sometimes lilac in colour</td>
</tr>
<tr>
<td></td>
<td>Peristomes connate for most of their length; ooeiopore facing distally; autozooids unpigmented</td>
</tr>
<tr>
<td>4</td>
<td>Branches curved backwards with reverse sides concave; seldom bifurcating</td>
</tr>
<tr>
<td></td>
<td>Branches more-or-less straight; bifurcations common</td>
</tr>
<tr>
<td>5</td>
<td>Autozooidal apertures greater than 150 μm in diameter</td>
</tr>
<tr>
<td></td>
<td>Autozooidal apertures less than 120 μm in diameter</td>
</tr>
<tr>
<td>6</td>
<td>Calcification feeble; autozooids arranged in series of two, exceptionally three; branching irregular; gonozoid occupies a distance of three or fewer autozooidal series; ooeiopore directed outwards</td>
</tr>
<tr>
<td></td>
<td>Calcification strong; autozooids arranged in series of 2-4; branching regular; gonozoid usually occupies a distance of more than three autozooidal series; ooeiopore facing lateral branch surface</td>
</tr>
<tr>
<td>7</td>
<td>Branch transverse section triangular or pentagonal; sterile branch diameter greater than 500 μm; terminal diaphragms sometimes present</td>
</tr>
<tr>
<td></td>
<td>Branch transverse section oval or circular; sterile branch diameter usually less than 500 μm; terminal diaphragms absent</td>
</tr>
</tbody>
</table>

**Material**

ZIRAS 3/48528-7/48532. Number of colonies and fragments investigated: 56 (6 fertile).

**Description**

Colony large, erect, with massive cylindrical branches (Fig. 1A) superficially resembling *Hornera.* Branching dichotomous, rather frequent but not very regularly-spaced. Branches in transverse section oval, subcircular or rounded trapezoidal (Fig. 3C). Reverse sides of branches with arcuate growth lines (Fig. 3D), sometimes overgrown by kenozooids originating either as isolated patches or from the colony base. Kenozooidal overgrowth extending over the entire surface of older branches, covering autozooidal apertures and increasing branch thickness appreciably.

Autozooids large, arranged in rows, with apertures forming transverse series alternating on either side of the flattened branch frontal surface (Fig. 3A); number of apertures per series increasing from 2 proximally to 3-4 distally (Fig. 3F). Peristomes connate (Fig. 3B), except for rare examples with the distal part of the innermost peristome free. Apertures of connate zooids almost square, those of free zooids circular or oval. Older parts of colonies characterized by longer peristomes with distal
FIG. 1. Colony morphology in Antarctic idmoneiform cyclostomes: (A) *Idmionea obtecta* Borg, ZIRAS 4/48529, ×1; (B) *I. antarctica* Borg, ZIRAS 2/48511, fertile colony in dorsal view, ×3-6; (C) *I. pseudocrista* Borg, ZIRAS 1/48541, ×3-5; (D) *Exidionea arctata* sp. nov., fertile colony in dorsal view, ZIRAS 6/48538, ×7-2; (E) *I. fraudulenta* sp. nov., ZIRAS 7/48562, ×7; (F) *E. hula* (Borg), fertile colony in frontal view, ZIRAS 11/48524, ×4-6; (G) *I. pellucida* sp. nov., ZIRAS 1/48552 (holotype), fertile colony in dorsal view, ×10-5.
Fig. 2. Line drawings of morphological features in Antarctic idmonelliform cyclostomes. (A)-(B) *Idmonella oblonga* Borg: (A) ZIRAS 3/48528, gonozooioid with oocistome located unusually on the frontal surface, ×20; (B) ZIRAS 4/48529, gonozooioid with oocistome adnate to the upper side of the innermost autozoooidal peristome, ×20. (C)-(F) *I. fraudulenta* sp. nov.: (C) ZIRAS 2/48557, frontal view of branch showing long innermost peristomes, ×39; (D)-(F) ZIRAS 1/48556, 7/48562, oocistomes of varying appearance, ×60. (G)-(I) *I. pseudocrisina* Borg. (G) ZIRAS 6/48546, initial 'Siornatopora'-stage, ×15; (H) ZIRAS 3/58543, three peristomes showing flared ends, ×49. (I) ZIRAS 2/48542, oocistome, ×69.
ends very often dilated. Terminal diaphragms often present, flat (Fig. 3B). Innermost peristomes of each series are the longest, outermost peristomes frequently extending only slightly above branch surface. Longitudinal spacing of autozoidial series always less than sterile branch width.

Gonozooid (Fig. 3E) with dilated part usually situated near to a branch bifurcation, typically dividing with the branch, occasionally located in unbranched parts of colonies; occupying median area of branch frontal surface for the length of 4–9 (very rarely 14) autozoidial series; small lateral lobes may surround innermost autozooids. Ooeiostome transversely elongate, strongly compressed, situated either directly on gonozooid surface (Fig. 2A) or, rarely, adnate to upper side of innermost autozoidial peristome (Fig. 2B); ooeiostope oval.

Pseudopores small, oval, sparsely scattered over entire colony surface, more numerous on gonozooids.

**Measurements**

- Branch diameter (with kenozooidal overgrowth) = 1900–2400 \( \mu \text{m} \);
- Branch diameter (without kenozooidal overgrowth) = 1150–1710 \( \mu \text{m} \);
- Distance between series of apertures = 627–770 \( \mu \text{m} \);
- Innermost autozooid peristome diameter (proximal) = 313–385 \( \mu \text{m} \);
- Innermost autozooid peristome diameter (distal) = 299–383 \( \mu \text{m} \);
- Innermost autozooid aperture diameter (distal) = 242–285 \( \mu \text{m} \);
**Discussion**

The entire surface of old branches is covered by a layer of overgrowing kenozooids seen to form a polygonal network when specimens are viewed in alcohol. This layer is absent from young branches, and in middle-aged branches is patchy, covering only the reverse and lateral sides. As a result of their kenozooidal overgrowths, old branches are almost circular or oval in transverse section whereas younger branches are more trapezoidal. Calcification of the terminal diaphragms occluding these dorsal kenozooids is centripetal, and the diaphragms appear to thicken with age.

The dilated part of the gonozooid occupies the frontal area between the peristomes, often extending for 8–9 autozooidal series, and occasionally 14 series, although it is very difficult to identify its exact limits. Usually the gonozooid first appears 3–4 series before a bifurcation and forks with the dividing branch. Alternatively, it may appear well proximal of a bifurcation and terminate the axil between branches, or originate in an axil and extend along one branch only without forking.

It should be emphasized that the diameters of fertile branches in *Idmidronea obtecta* are similar to sterile branches, contrary to many other species of this genus. The short ooeiostome is located in the middle or in the distal part of gonozooid. In three studied examples it occurs on the frontal surface of the colony, but in one case it is attached to the upper side of the innermost zooid of a series (Fig. 2B). The oval ooeiopore faces frontally or fronto-laterally, and is similar in size to an autozooidal aperture. Three fertile colonies in the sample lack ooeiostomes, probably as a result of breakage and sealing by a calcareous diaphragm. Sometimes the surface of the gonozooid is uneven or marked by 'sutures'. These features may reflect seasonality of growth (cf. the conspicuous growth cheeks seen in Antarctic cheiostomes: Winston, 1983; Barnes, 1995) and/or repair of damage.

**Remarks**

Examination of specimens of *Idmidronea obtecta* Borg and *I. magna* Androsova from the Androsova Collection has allowed their synonymy to be confirmed.

*Idmidronea obtecta* is here recorded from the Princess Martha coastal waters and the Sea of Cosmonauts for the first time.

*Idmidronea fraudulenta* sp. nov.

(Figs 1E, 2C–F, 4)

**Material**

**Holotype:** ZIRAS 1/48556. **Paratypes:** 2/485577/48562. Total number of colonies and fragments investigated: 426 (16 fertile).

**Etymology**

The species name *fraudulenta* (L.-deceptive) refers to the similarity with *Idmidronea atlantica* (Forbes in Johnston).
Antarctic *Idmiodonea* and *Exidmonea*

Fig. 4 *Idmiodonea fraudulenta* sp. nov., scanning electron micrographs. ZIRAS 7/48562: (A) frontal view of branch, ×20; (B) lateral view showing long peristomes in autozooids opening on the far side of the branch, and autozooidal apertures without peristomes on the near side of the branch, ×44; (C) fertile branch, ×27; (D) pair of autozooidal apertures, ×150; (E) ooeiopore closed by a broken terminal diaphragm and adnate to the distal side of an autozooidal aperture, ×112.

**Diagnosis**

Colony erect, delicate, branching dichotomously (Fig. 1E). Branches triangular or pentagonal in transverse section when old; frontal, lateral and reverse sides grading smoothly into one another. Frontal branch surface narrow, slightly arched, without a mid-line keel. Reverse sides of branches with arcuate growth lines.

Autozooids arranged in transverse series of 2–4, usually 3, peristomes alternating on either side of branch (Fig. 4A). Peristomes sharply curved, longest in the innermost zooids (Figs 2C, 4B), connate for no less than half of their lengths. Alternating series of peristomes on opposite sides of branch often close together. Apertures oval (Fig. 4D) or circular. Longitudinal spacing of autozooidal series similar to or smaller than sterile branch diameter.

Gonozooids occupy axial position on frontal surface of branches, extending for 2–5 autozooidal series; paired lateral lobes well-developed. Dilated frontal wall causing only a slight increase in fertile branch width (Fig. 4C). Ooeiostome short, gently curved, adnate to the base of innermost peristome (Fig. 2D–F). Ooeiopore
oval, facing branch lateral surface, sometimes occluded by a terminal diaphragm (Fig. 4E).

Pseudopores oval or circular, more numerous on gonozooid frontal wall than elsewhere. Exterior wall calcification striated.

Kenozooids sometimes forming an overgrowth on the branch reverse, usually in continuity with the basal disc, mostly directed proximally but those furthest away from the basal disc directed distally; occasional isolated patches of kenozooids not connected with the basal disc and sometimes associated with growth checks.

**Measurements**

Height and width of complete colonies = 14940 × 15100 μm, 18090 × 12610 μm, 19420 × 11280 μm. 20080 × 8960 μm; branch diameter (sterile) = 498–742 μm; branch diameter (fertile) = 599–728 μm; distance between series of apertures = 456–599 μm; autozooid peristome diameter (distal) = 142–156 μm (when circular), 126–133 × 142–170 μm (when oval); autozooid aperture diameter (distal) = 112–126 μm (when circular), 112–1190 × 133–142 μm (when oval); ooeicistosome diameter = 112–184 μm; ooeicistopore diameter = 56–128 μm.

**Discussion**

Proximal parts of colonies have a ‘Stomatopora-stage’ consisting of the ancestrula and several (2–4) alternating autozooids adhering to the substratum for the most part of their lengths. A supporting disc of kenozooids is always formed at the transition to the erect portion of the colony.

All of the deviations from regular dichotomous branching described for *Exidionea hula* below have been found in this new species. Transverse sections of branches are triangular, but in older branches the shape may change to pentagonal. The reasons for this shape change are unclear, although the formation of dorsal kenozooids may be responsible.

The number of autozooidal peristomes constituting a series is usually three, more rarely two or four. Peristomes are sharply curved, even when compared with those of *Idmiidionea pseudocrisia*. The regularity of series alternation very often fails and neighbouring series on opposite sides of a branch are brought close together. The narrow frontal surfaces of branches are formed by the innermost autozooids with the longest peristomes. Peristomes within a series are connate for no less than half of their lengths, and apertures are orientated in the pattern typical for idmioneiform cyclostomes: apertures of innermost zooids are directed fronto-laterally, those of outermost zooids latero-basally. Apertures are oval (Fig. 4D), rarely circular. In some old branches all of the autozooids in a series are closed by thin calcareous diaphragms, but in other cases diaphragms are present only in the innermost autozooids.

Gonozooids are located equally frequently on bifurcating and undivided branches. They cause little increase in branch width (Fig. 4C), occupy the median space on the branch frontal surface, extend for 2–5 autozooidal series, and have well-developed paired lateral lobes. Keels are absent. In one specimen, an abnormal gonozood was found on the lateral side of a branch. It was formed from one of the other zooids and its dilated portion separated the innermost autozooid of the series from all of the others, and was penetrated by one of the lower peristomes. Two colonies in the material available have two gonozooids.

The ooeiciostome is located in the middle or distal portion of the gonozooid, either forming a small additional lobe or arising directly from the main part of the gonozooid.
In all cases (Fig. 2D–F) it adheres to the upper side of the innermost peristome or rarely to its neighbour. One colony has an ooeiostome in the proximal portion of a gonozoid. Unfortunately, there was only one unbroken ooeiostome in our material. This is short, gently curved, and has a slightly flattened end with the oval ooeiopore facing laterally.

**Remarks**

There is considerable similarity between *Idmidronea fraudulenta* and *I. atlantica* (Forbes in Johnston), a characteristically European species which has also been reported from the Gulf of Mexico (Harmelin 1976a). However, the following differences support their distinction: (1) *I. fraudulenta* generally has three rows of autozooidal apertures, rarely up to four, whereas *I. atlantica* typically has four rows (e.g. syntypes in the NHM collections registered as 47.9.15.17) and sometimes up to five (Hayward and Ryland, 1985); (2) the gonozoid of *I. fraudulenta* is much less bulbous than that of *I. atlantica* and never has a keel of the sort sometimes developed in the European species; and (3) the ooeiopore is oval in *I. fraudulenta* but circular in *I. atlantica*.

**Idmidronea pseudocrisina** Borg, 1944

(Figs 1C, 2G–I, 5)

*Idmidronea pseudocrisina* Borg, 1944: 81, text-fig. 9, pl. 5, figs 3–4. Buge, 1948: 184, 188.


**Material**

ZIRAS 1/48541–6/48546. Number of colonies and fragments investigated: 286 (21 fertile).

**Description**

Colony erect, delicate, weakly calcified; branching dichotomous (Fig. 1C). Branches triangular in transverse section; frontal surface very narrow; reverse surface (Fig. 5B) flat or concave, bearing arch-shaped growth bands pointing distally (Fig. 5E), with one or two layers of kenozoooids located close to the colony base (rarely reaching as far as the first bifurcation) usually growing proximally but occasionally also distally in the distal parts of the same overgrowth.

Autozooids arranged in transverse series of two to four, usually three (Fig. 5A), peristomes, alternating on either side of the branch. Peristomes sharply curved, longest in the innermost zoooids, connate except for a free distal third, with expanded, funnel-shaped distal ends (Figs 2H, 5D). Apertures oval, very rarely circular. Longitudinal spacing of autozooidal series always smaller than sterile branch diameter.

Gonozoids with distal inflated regions normally located at branch forks (Fig. 5C), more rarely away from bifurcations, occupying median space on branch frontal surface, extending for 3–4 autozooidal series; paired lateral lobes well developed. Ooeiostome (Figs 2I, 5F) short, curved, flattened, adnate to upper side of innermost peristome or, infrequently, its neighbour. Ooeiopore oval, facing branch lateral surface.

Pseudopores (Fig. 5E) tear-drop shaped, pointed distally, significantly denser on gonozoid frontal wall than elsewhere.
Fig. 5. *Idniidronca pseudocrisina* Borg. scanning electron micrographs, ZIRAS 2/48542: (A) lateral view of a slightly twisted branch, ×10; (B) dorsal surface of a bifurcating branch, ×13; (C) gonozooid located at branch bifurcation, ×17; (D) peristomes with funnel-shaped ends, ×108; (E) arch-shaped growth lines and pseudopores on branch dorsal surface, ×155; (F) curved ooeiotic stem, ×75.

**Measurements**

Branch diameter (sterile) = 498–968 μm; branch diameter (fertile) = 912–1013 μm; distance between series of apertures = 512–669 μm; innermost autozooid peristome diameter (distal) = 184–247 × 156–219 μm; innermost autozooid aperture diameter (distal) = 170–226 × 142–170 μm; ooeiotic stem diameter = 226 × 63 μm; ooeopoore diameter = 205 × 56 μm.

**Discussion**

All colonies examined are characterized by a very abbreviated *Stomatopora* stage (Fig. 2G). Erect growth begins immediately after the ancestrula or following the budding of two or three encrusting zooids. Kenozooids of the supporting disc bud from these primary autozooids.

The expanded, funnel-shaped distal ends of the peristomes (Figs 2H, 5D) are a characteristic feature of this species. In some old branches all of the autozooids in a series are closed by thin calcareous diaphragms, but in other cases diaphragms are only present in the innermost autozooid.

Autozooid contents of specimens preserved in ethanol often retain a lilac
coloration. *Idmidronea pseudocrisina* is the only idmoneiform species among those here described with this colour.

**Borg** (1944), who had only infertile specimens on which to base his original description, was able accurately to predict the form and location of the gonozooid. This is rather short and extends for no more than four autozooidal series. The material examined for this study included 19 colonies with one gonozooid and two colonies with two gonozooids.

**Remarks**

*Idmidronea pseudocrisina* is recorded here from the Princess Martha coastal waters for the first time.

*Idmidronea antarctica* Borg, 1944

(Figs 1B, 6A–B, 7)


?*Idmirolea serpens* Calvet, 1904: 36.


**Material**

ZIRAS 2/48511–7/48516. Number of colonies and fragments investigated: 190 (86 fertile).

**Description**

Colony erect, stout (Fig. 1B), branching dichotomously, rarely irregularly. Branches short (especially the first erect branch), straight, broadening distally, triangular in transverse section, latero-basal edges well-marked; frontal surface narrow; reverse surface of colony flat or slightly arched with kenozooidal overgrowths originating as isolated patches in older branches, sometimes where seasonal growth checks are apparent; kenozooids of varying shapes and orientations, initially open but becoming closed by thickened terminal diaphragms eventually giving the overgrowth the appearance of a continuous calcified layer. Kenozooids also produced from the supporting disc, extending a short distance up the stem.

Autozooids arranged in transverse series of 2–6, usually 3–5, peristomes alternating one either side of branch. Peristomes sharply curved (Fig. 7A), connate within a series except for a short free distal portion, longest in innermost autozooid. Apertures oval, rarely circular. Longitudinal spacing between autozooidal series always smaller than sterile branch diameter.

Gonozooids numbering up to five per colony, sometimes occurring very close to colony base (Fig. 6A), occupying axial position on narrow branch frontal surface; paired lateral lobes well-developed. Ooeiostome (Figs 6B, 7B) short, adnate to upper side of innermost peristome or rarely its neighbour, slightly expanded distally. Ooeiopore oval, facing distally.

Pseudopores elliptical, sparse on peristomes. Frontal wall calcification rugose with longitudinal striations.

**Measurements**

Branch diameter (sterile) = 313–641 μm; branch diameter (fertile) = 470–
Fig. 6. Line drawings of morphological features in Antarctic idmoneiform cyclostomes. (A)–(B) *Idmiidroma antarctica* Borg, ZIRAS 3/48512. (A) initial stage of fertile colony showing supporting disc and two partly-formed gonozooids, ×16.5; (B) ooeicostome, ×57. (C)–(F) *I. pellucida* sp. nov., ZIRAS 2/48555. (C) initial stage of young colony with supporting disc, ×15. (D)–(F) variations in gonozooid shapes and locations, ×18.5.

798 μm; distance between series of apertures = 355–498 μm; autozooid peristome diameter (distal) = 142–163 × 119–142 μm; autozooid aperture diameter (distal) = 112–156 × 84–126 μm; ooeicostome diameter = 142–163 × 105–126 μm; ooeicopore diameter = 98–142 × 84–112 μm.

Discussion

The number of autozooids in a series may vary even on opposite sides of a single branch. For example, a series comprising four autozooids may occur opposite one comprising five autozooids.

A large proportion of the branch frontal surface in *I. antarctica* is occupied by gonozooids. Boundaries between different gonozooids in the same colony are obscure. However, it is possible to calculate the number of gonozooids present from the number of ooeicostomes. As a rule, the first gonozooid begins to form in the early stages of colony development (Fig. 6A). The dilated parts of gonozooids are narrow relative to many idmoneiform species, and their presence does not result in a significant increase in branch width.
As with *Idmidronea hultii*, Borg (1944, p. 86) incorrectly asserted that in *I. antarctica* the innermost autozooiids are wholly connate and have rectangular apertures. In the material described by Borg this condition can be interpreted as a result of peristome breakage because distal portions of well-preserved peristomes are always free and have oval apertures. These apertures face in different directions: the innermost fronto-laterally, the outermost latero-basally or sometimes basally, and the others laterally. This arrangement may minimize interference between tentacle crowns.

An additional peculiarity in this species is the frequent development of very narrow ‘collars’ around the tips of the peristomes.

**Remarks**

*Idmidronea antarctica* is here recorded for the first time from the Ardley Bay (King George Is.), Princess Martha coastal waters and the Davis Sea (Haswell Is.).

*Idmidronea pellucida* sp. nov.

(Figs 1G, 6C–F, 8)


**Material**

**HoloTYPE:** ZIRAS 1/48552. **ParATYPES:** ZIRAS 2/48553–48555. Total number of colonies and fragments investigated: 48 (13 fertile).

**Etymology**

The species name *pellucida* (L.-transparent) refers to the extremely thin calcification.
Fig. 8. *Idiadromea peltacea* sp. nov., scanning electron micrographs, ZIRAS 2/48553: (A) frontal view of fertile branch, ×44; (B) gonozoid, ×90.

**Diagnosis**

Colony erect, very delicate, with feeble calcification (Fig. 1G). Branching irregular, branches narrow (Fig. 8A), oval in transverse section. Frontal branch surface arched, without a mid-line keel. Reverse branch surface rounded, not well demarcated from frontal surface. Kenozooidal overgrowths may extend along the reverse and lateral sides of branches in continuity with the basal disc, forming a calcified, semi-transparent layer.

Autozooids arranged in transverse series of two, exceptionally three, peristomes alternating on either side of branch. Peristomes gently curved upwards and outwards, connate within a series except for a free distal portion. Apertures oval, longest in the innermost zooid of a series. **Longitudinal spacing** of autozooidal series the same as or slightly greater than sterile branch diameter.

Gonozoid (Fig. 8B) short, originating frontally at or near bifurcation (Fig. 6D–F), occupying frontal median space for a distance of 1–3 autozooidal series, visible from reverse side of branch when situated at a bifurcation. Dilated frontal wall swollen with well-developed paired lobes extending between series of peristomes. Ooeiostome short, slightly flattened distally, located frontally, rarely adnate to peristome base of innermost autozooid. Ooeiopore oval, directed almost horizontally and outwards (Fig. 8B).

Pseudopores oval, sparse, more numerous on gonozoid. Frontal wall calcification strongly rugose with discontinuous longitudinal striations.

**Measurements**

Height and width of complete colonies = 2900 × 5500 μm, 3150 × 2250 μm; 3625 × 4375 μm, 3800 × 3875 μm, 4200 × 5700 μm, 4400 × 6050 μm, 4500 ×
1600 μm, 4800 × 2900 μm, 5200 × 2000 μm; branch diameter (sterile) = 285–428 μm; branch diameter (fertile) = 313–641 μm; distance between series of apertures = 341–498 μm; autozooid peristome diameter (distal) = 126–156 × 112–149 μm; autozooid aperture diameter (distal) = 119–149 × 105–142 μm; ooeiostome diameter = 126–163 × 56 μm; ooeiopore diameter = 70–142 × 28–42 μm.

Discussion

The early stages of the colony are typical of idmoneiform cyclostomes and incorporate a 'Stomatopora-stage' (Fig. 6C). The ancestrula is followed by five encrusting autozooids, bending alternatively to the right and to the left. Initial erect growth comprises two autozooids and a supporting disc of kenozooids which may be in continuity with a kenozooidal overgrowth on the reverse side of the branch. Kenozooids within these overgrowths are oriented proximally close to the base but distally higher up the branch.

Irregularities in branching growth include high variabilities in the angles between daughter branches and between these branches and the long axis of the first erect branch or stem originating from the basal disc. In one young colony the angle of the first bifurcation is 180° and the two daughter branches so formed are perpendicular to the stem. Rarely, branching is more typical of idmoneiform cyclostomes with angles of about 90°.

Transverse sections of branches are oval. There is a smooth transition between the arched frontal surface, lateral slopes and the rounded reverse surface of the branch.

The number of autozooidal peristomes constituting a series is usually two, occasionally three, but in one specimen only one. Series alternate on either side of the branch. Peristomes are small, gracile, and curve gently away from the mid-line of the branch. The longest peristomes are the innermost of a series which have oval apertures directed laterally and, sometimes, fronto-laterally. The outermost peristomes are shorter and their apertures open laterally or, rarely, latero-basally. The two peristomes are conuate except for their terminal portions.

Gonozooids are rather short but broad, sometimes almost circular in outline (Figs 6D–F, 8B). They are usually formed on frontal surfaces of branches near to bifurcations. The inflated portion of the gonozooid commonly lies in the axil between the branches and is clearly visible from the basal side of the colony. Sometimes gonozooids originate at bifurcations and extend for a distance equivalent to one or two series of autozooids (Fig. 6D). Alternatively, they may be situated just below bifurcations and occupy the space in the median area of the branch for one, two or three autozooidal series (Fig. 6E). Gonozooids are occasionally found on non-branching parts of colonies. The paired lobes of the gonozooid are broad, nearly reaching the latero-basal edge of the branch. In one specimen an abnormal gonozooid was found on the lateral edge of a branch, and in another the proximal portion of a gonozooid was found in the same location. Both suggest formation of the gonozooid from one of the outer zooids. There were two colonies with two gonozooids.

Lines interpreted as seasonal interruptions of growth are often present on the surfaces of gonozooids. The ooeiostome occurs on the frontal side of the colony, and is very rarely attached to the basal portion of the peristome of the innermost autozooid. There is no distinct boundary between the gonozooidal frontal wall and the ooeiostome, the former passing gradually into the latter. The ooeiostome tapers gradually and its distal end is flattened. Curvature of the ooeiostome means that the ooeiopore, which is oval in shape, is orientated almost in a horizontal plane and faces outwards.
Pseudopores are sparse on both frontal and basal sides of branches; however, in common with other cyclostomes, they are more numerous on the dilated frontal walls of gonozooids. All pseudopores are oval in shape, gonozooidal pseudopores being a litter larger than the autozooidal pseudopores.

Remarks

There is some similarity between *Idmionoea pellucida* and *Idmionoea pauper* Canu and Bassler, 1929, described from deep waters in the Philippines. However, the description of *Idmionoea pauper* is short and exact comparisons are difficult to make. Nevertheless, the smaller diameter of the autozooidal peristomes in *I. pauper* suggests that the two species are distinct, a conclusion consistent with their considerable geographical/latitudinal separation.

Another similar species was described as *Idmionoea* sp. by Harmelin (1977) from the Conception Seamount north of the Canary Is. Like *I. pellucida* this species has narrow branches with autozooids arranged in connate series of two peristomes. However, the small gonozooid is globular and is attached to a peristome.

The East African species *Idmionoea biparata* Brood, 1976 resembles *I. pellucida* but has a large ooeicyopore and trumpet-shaped ooeicyostome.

It is possible that our new species is conspecific with the *Idmionoea* sp. of Moyano (1991a). Moyano’s specimens were collected from deep waters off Chile and have alternating autozooidal series with two peristomes per series, although the spacing between series seems to be larger in the Chilean material judging from Moyano’s illustration. Unfortunately, gonozooids were absent in the colonies investigated by Moyano.

*Idmionoea pellucida* is easily distinguished from other Antarctic idmionoeiform cyclostomes by its very slender branches and the near circular shape of the small gonozooid.

Exidionoea David, Mongereau and Pouyet, 1972


Remarks

The problems of the authorship of this genus and the identity of the type species were discussed by Taylor and Voigt (1993). Provisionally, the genus is used for *Idmionoea*-like species which appear never to develop an overgrowth of dorsal kneozooids.

Exidionoea hula (Borg, 1944)

(Figs 1F, 9A–E, 10)


Material

Fig. 10. *Exidmonea hula* (Borg), scanning electron micrographs, ZIRAS 11/48524: (A) frontal view of branch, ×17; (B) gonozoid, ×30; (C) dorsal surface of branch showing longitudinal striations and growth banding, ×65; (D) transversely fractured branch, ×97; (E) ooeistome, ×102.

Fig. 9. Line drawings of morphological features in Antarctic idmoneiform cyclostomes. (A)–(E) *Exidmonea hula* (Borg), ZIRAS 6/58519-11/48524. (A) Frontal view of branch with gonozoid, ×26; (B) initial stage with supporting disc, ×40; (C) hole remaining after breakage of an ooeistome, ×33. (D)–(E), variably curved ooeistomes adnate to a peristome, ×66. (F)–(K) *E. arcuata* sp. nov., ZIRAS 3/48535, 6/48538. (F) Initial stage with three erect stems arising from the basal disc, ×14-5. (G)–(J), variations in ooeistome morphology and location: (G) unusual cylindrical ooeistome, ×41-5; (H) unusual ooeistome adnate to the underside of a peristome, ×43; (I) rare example of branching with a gonozoid possessing a cylindrical ooeistome, ×20; (J) ooeistome with a basal constriction, ×36; (K) initial stage of a colony showing the small supporting disc, ×22.
Description

Colony erect, very delicate (Fig. 1F). Branching dichotomous, infrequent. Branches ovular or circular in transverse section (Fig. 10D); frontal, lateral and reverse sides smoothly grading into one other. Reverse surface with longitudinal ridges at zooidal boundaries and arcuate growth lines (Fig. 10C).

Autozooids arranged in transverse series of 2–4 peristomes, series alternating on either side of the branch (Fig 10A). Longitudinal spacing of autozooidal series about equal to sterile branch width. Peristomes curved rather gently upwards and outwards, connate within a series except for short free distal portions. Apertures circular or oval, longest in the innermost zooids of a series.

Gonozooids (Figs 9A, 10B) occurring equally frequently on bifurcating and undivided branches. Dilated region causing fertile branches to be considerably wider than sterile branches, occupying the median space on branch frontal surface, extending for 2–6, sometimes eight, autozooidal series, with well-developed paired lateral lobes. Ooeioistome short, gently curved, adnate to the base of the innermost or rarely an adjacent peristome (Figs 9D–E, 10E). Ooeioiopore oval, facing distally and laterally.

Pseudopores circular to oval, moderately densely scattered over all exterior walls including peristomes, a little larger and more closely-spaced on gonozooidal frontal walls and smaller on autozooidal peristomes.

Measurements

- Branch diameter (sterile) = 313–571 μm; branch diameter (fertile) = 498–1013 μm; distance between series of apertures = 397–571 μm; innermost autozooid peristome diameter (distal) = 84–133 μm (circular), 84–98 × 112–133 μm (oval); innermost autozooid aperture diameter (distal) = 37–132 μm (circular), 70–84 × 98–112 (oval) μm; outermost autozooid aperture diameter (distal) = 37–132 × 63–84 μm; ooeioistome diameter = 112–170 × 70–91 μm; ooeioiopore diameter = 91–133 × 61–84 μm.

Discussion

Proximal portions of colonies always have a 'Stomatopora-stage' (sensu Borg 1926) and consist of several alternating autozooids adhering to substrate for the greater part of their lengths (Fig. 9B). Rarely two zooidal series bud from the ancestrula. A supporting disc of kenozooids is always present at the transition from the 'Stomatopora-stage' to the erect part of the colony. Colonies growing on sponge spicules or on hydroids may have two or occasionally three stems arising from the same base.

Deviations from regular dichotomous branching, like those described by Borg (1944) for I. obleta, were found. Sterile branches very often gradually widen distally, attaining a maximum width just before bifurcation. Some parts of colonies are twisted around their longitudinal axis. Twisting may affect entire branches or just parts of branches, occurs gradually, and may be through 90° or more.

All of the variations described above for the origin and location of gonozooids in I. obleta are also recorded in E. hula. In addition, two abnormal gonozooids on the lateral sides of two colonies were found. There is usually only one gonozooid in each colony. Very rarely two gonozooids may occur, sometimes on the same branch, and one colony has four well-developed gonozooids. The short, slightly flattened ooeioistome is located on a small lobe in the middle or distal portion of the
gonozooid (Figs 9D, E, 10E). This lobe adheres to the upper side of the innermost peristome or rarely to its neighbour. In one case, however, the lobe adheres to the lower side of a peristome, and in another colony the lobe is absent and the ooeioiroid arises directly from the main part of the gonozooid. Ooeciostomes are often broken-off (Fig. 9C) and the resultant holes may be closed by calcareous diaphragms.

Remarks

We disagree with Borg's opinion (1944) that this species is typified by entirely connate autozooidal apertures. It is likely that the colonies investigated by him were damaged, as the distal portions of unbroken peristomes are always free in our material.

This species is recorded from the Princess Martha coastal waters, the Sea of Cosmonauts and the Davis Sea for the first time.

Exidmonea arcuata sp. nov.
(Figs 1D, 9F–K, 11)

Material


Etymology

In reference to the curved shape of the branches.

Diagnosis

Colony erect, delicate, feebly calcified. Branching irregular, occurring exceptionally rarely. Colony base characteristically gives rise to 2–3 erect branches, exceptionally up to 7. Branches narrow, backwardly curved (Fig. 1D), oval, circular or rarely subtriangular in transverse section; frontal, lateral and reverse sides smoothly grading into one another. Branch width two or three times greater at location of gonozooid than elsewhere.

Autozooids arranged in transverse series of 2–5, usually three or four peristomes. Peristomes long, curved (Fig. 11A), connate except for a free distal third, longest in the innermost zooids. Apertures of connate zooids almost square (Fig. 11B), those of free zooids oval, rarely circular. Longitudinal spacing of autozooidal series similar to sterile branch diameter.

Gonozooids (Fig. 11C) occupying axial location on frontal surface in the middle or distal parts of branches, coinciding with more pronounced branch curvature. Dilated region greatly inflated, extending for 2–5, rarely 7 or even 11, autozooidal series, with well-developed paired lateral lobes sometimes reaching basal side of branch. Ooeiostome adnate, usually to the innermost peristome (Fig. 11D). Ooeiopore oval, sometimes slit-like, facing distally and laterally.

Pseudopores circular to oval, fairly constant in size, sparse, absent or rare on frontal sides of innermost peristomes.

Measurements

Branch diameter (sterile) = 355–540 μm; branch diameter (fertile) = 683–856 μm; distance between series of apertures = 358–498 μm; height of complete
colony sizes = 6500, 7750, 9200, 10050 μm; autozoid peristome diameter (distal) = 126–142 μm (circular), 119–126 × 134–142 μm (oval); autozoid aperture diameter (distal) = 84–112 μm (circular), 84–98 × 98–112 μm (oval); oocystome diameter = 84–140 × 56–70 μm; oocystopore diameter = 56–126 × 42–49 μm.

Discussion

The bases of *Exidmonea arctica* colonies have an initial 'Stomatopora-stage' (Fig. 9K) followed by a supporting disc of kenozooids from which two or three erect stems are characteristically formed (Fig. 9F). One exceptional specimen has seven erect stems arising from what appears to be the base of a single colony.

Backward curvature is greater in fertile than sterile branches, the former sometimes resembling an open ring. Forward curvature of branches is very rarely observed but curvature is often complicated by bending in other planes.

Several interesting peculiarities of the gonozooid were observed in this species: (1) the gonozooid never divides, even on those rare occasions when the colony branches; (2) the paired lateral lobes of the gonozooid often reach the edge of
the basal side of the branch, sometimes meeting and coalescing behind the outermost peristome so that the peristomial series is surrounded by the gonozooid on all sides; (3) peristomes located where the gonozooid is at its broadest are the longest in the colony; (4) the presence of gonozooids may lead to a change in peristome orientation, for example with apertures of the innermost autozooids directed frontally and those of the outermost zooids laterally; and (5) a narrow groove is frequently formed around the bases of peristomes where they are surrounded by gonozooids.

Usually, there is only one gonozooid per colony, but 15 colonies were found with two gonozooids and two colonies with three gonozooids within the same branch. When more than one gonozooid is present the proximal gonozooid is always smaller than the distal gonozooid.

Many gonozooids lack an ooeicostome or ooeiopore. Of the 15 colonies with two gonozooids, in eight an ooeicostome was absent in only the proximal gonozooid, in two it was absent in only the distal gonozooid, and in two it was absent in both gonozooids. The life-histories of this and other Antarctic cyclostome bryozoans remain unknown, and we can only suppose that the ooeistomes were broken-off and their openings closed by calcareous diaphragms.

As in *Exididroma hula*, the ooeicostome of *E. arcuata* is located on a small lobe formed in the middle or distal part of the gonozooid (Fig. 1D). All variations in ooeicostome location described for the *E. hula* are also recorded for *E. arcuata* but deviations from the normal ooeicostome position on the upper side of the innermost peristome are more frequent. For instance, the lobe bearing the ooeicostome often does not attach to the innermost peristome but instead to other peristomes, sometimes even the outermost peristome. In these cases the orientation of ooeiopores may be different, e.g. some ooeiopores face proximally. The shape of the compressed ooeicostome may vary, sometimes tapering (Fig. 9H) slightly but in other cases widening distally. Three colonies had non-compressed ooeistomes with circular ooeiopores. As a rule ooeiopores are oval, elliptical or slit-like. Sometimes a distinct suture or salient ring is seen on the ooeicostome, with later growth atypical or at a smaller diameter (Fig. 9J). These may be reparative structures.

There were only five branched colonies among the 342 specimens studied. Branching was irregular in four specimens, and nearly dichotomous in one. All new branches were in an early stage of development. The formation of several stems from the encrusting base may compensate for the rarity of branching.

Young colonies of *E. arcuata* and *E. hula* may be difficult to distinguish. However, even fragmentary material of the two species can be separated on the basis of pseudopore distribution. In *E. arcuata* pseudopores are absent or rare on the frontal sides of innermost autozooidal peristomes, whereas in *E. hula* pseudopores are present in high densities on all of the peristomes.

Remarks

This new species resembles *Idmibidroma curvata* Borg, 1944, particularly in the backwardly curved branches, but the dimensions of Borg's species are appreciably larger. For example, *E. arcuata* has autozooidal apertures measuring 84–112 μm in diameter, whereas Borg gives a range of 155–180 μm for *I. curvata*. The ooeiopore of *E. arcuata* measures 56–126 × 42–49 μm compared with 220 × 110 μm in *I. curvata* according to Borg (1944).
Discussion

Colonies of cyclostome bryozoans characteristically display considerable intraspecific variability (Harmelin 1976a, b). Colony form may be ecophenotypically plastic according to the biotope occupied. For example, Harmelin (1973) described variations in the stoutness of the branches and frequency of bifurcation in ‘Idmionea’ [= Idmionea] atlantica Forbes in Johnston: colonies inhabiting caves have thin branches which bifurcate infrequently, whereas those on exposed surfaces have thick branches which bifurcate more often.

The present study has underlined the intraspecific variability present both within and between colonies of Antarctic idmoneiform cyclostomes. All of the species investigated show variations in bifurcation patterns, branch curvature and branch twisting about the longitudinal axis. Most have a variable number of autozooids per series. There are also some striking variations in the locations and shapes of gonozoids and ooeiospores. All of the gonozoidal variants described above for Idmionea obtecta were recorded for the other species investigated except E. arenata and I. antarctica. Ooeiosome shape and position are often regarded as the most reliable features for identification of cyclostomes. However, these too have been shown to vary greatly within a species. In E. lutea, for example, the ooeiosome ranges from almost straight to strongly twisted, although the end members of this range were very rarely encountered.

Another variable feature is the number of stems originating from the supporting disc. Except in Exidmionea arcuata where two or three and exceptionally as many as seven stems may originate from the supporting disc, the usual number is one per colony. However, rare colonies of E. lutea, Idmionea pellucida and I. fraudulenta possess three stems.

A comparison of the spacing between autozooidal series and sterile branch diameter can be useful for the identification of idmoneiform cyclostomes. In three Antarctic species (I. obtecta, I. pseudocristina and I. antarctica) branch diameter is always greater than series spacing. In two species (E. lutea and I. pellucida) these dimensions are either similar or branch diameter is slightly smaller. In E. arcuata and I. fraudulenta branch diameter is similar to or sometimes greater than series spacing.

The genera Idmionea and Exidmionea are currently distinguished by the respective presence and absence of kenozooidal overgrowths on the reverse sides of the branches. However, the origin and taxonomic significance of these overgrowths is as yet poorly understood and their use in classification may be artificial. Some overgrowths are in continuity with the basal disc and seem to have originated by growth of the kenozooids of the basal disc distally onto the erect parts of the colony. Other overgrowths, however, are separated from the basal disc and appear to have originated by the formation of new budding zones on the exterior wall-covered proximal portions of the autozooids. In I. obtecta and I. antarctica, the overgrowths have the appearance of a network of polygonal kenozooids, whereas in I. pseudocristina, I. pellucida and I. fraudulenta they resemble canals. Kenozooidal overgrowths are relatively rare in all of the Antarctic idmoneiform species studied, and their absence in particular colonies of Idmionea spp. may prompt incorrect assignment to the genus Exidmionea, underlining the desirability of having a large suite of specimens for study.
Acknowledgements

We thank the Marine Research Laboratory, Zoological Institute of the Russian Academy of Sciences, St Petersburg for the opportunity to study their collections of Antarctic cyclostomes. We are grateful to M. L. Feduk and D. B. Volkov (St Petersburg State University) for photomicrographic assistance, and Dr V. I. Gontar (Zoological Institute, St Petersburg) for general help and discussion. ANO thanks the George Soros Foundation and Lerner Gray Fund for Marine Research for financial support, and N. V. Lentsman and O. G. Manylov for helpful comments on the English of the first draft manuscript. PDT thanks the Royal Society for a grant to visit Russia.

References


CALVET, L., 1909, Bryozoaires, in Expédition Antarctique Française (1903–1905), commandee par le Dr. Jean Charcot, Paris, pp. 1–49.


THORNELY, L. R., 1924. Polyzoa, in Australian Antarctic Expedition 1911–1914 (under the leadership of Sir Douglas Mawson), Series C, Zoology and Botany, 6(6), 1–23.


