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

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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. pseudocrisina* 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 ooeciostome 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 *Tubulipora liliacea* (Pallas).

Among representatives of the genus *Idmidronea*, Waters (1904) recorded *Idmidronea* [*Idmonea*] *atlantica* (Forbes *in* Johnston), in a collection from the

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Bellingshausen Sea. The same species was recorded by Calvet (1909) from the Graham Region. Thornely (1924) reported *Idmidronea* [*Idmonea*] *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 *Idmidronea* (*I. obtecta, 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 *Idmidronea*. Five Antarctic species of idmoneiform cyclostomes were subsequently described by Androsova (1968): *Idmidronea obtecta* Borg, *Idmidronea magna* Androsova, *Idmidronea hula* Borg, *Idmonea atlantica* Forbes *in* Johnston, and *Idmonea pulcherrima* Kirkpatrick. Moyano (1991a) listed *Idmidronea obtecta* Borg and *I. antarctica* Borg from the Chilean Antarctic. Ostrovsky (1991) reported *Idmidronea hula* Borg and *I. atlantica* (Forbes *in* Johnston) from the Mawson Sea, but specimens originally identified as the former species are now regarded as *Idmidronea 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 *Idmidronea* or the closely similar idmoneiform genus *Exidmonea* which differs from *Idmidronea* 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: *Idmidronea fraudulenta, I. pellucida* and *Exidmonea 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 1. Sampling stations.

Station	Location	Coordinates	Depth	Substratum
1	Ardley Bay, South Shetlands	58°56·17′W, 62°12·6′S	84 m	silt-sand
2/52	Princess Martha Coast	11°4·27′W, 70°51·50′S	394 m	sand with shingle and gravel
4	Princess Martha Coast	10°17·48′W, 70°52·98′S	239 m	
5	Princess Martha Coast	12°2·82′W, 71°40·52′S	279 m	
8/53	Sea of Cosmonauts	46°52·32′E, 66°49·89′S	332 m	clay with shingle and gravel
10	Haswell Is., Davis Sea	92°57·14′E, 66°32·17′S	46 m	rock
15	Fish Tail Bay, Mawson Sea	100°48′E, 66°15′S	7–10 m	silt with gravel

Table 2. Species distributions.

Station	*I. obtecta*	*E. hula*	*E. arcuata*	*I. pseudo-crisina*	*I. antarctica*	*I. fraudulenta*	*I. pellucida*	species richness
1					×			1
2/52	×	×	×	×		×	×	6
4	×	×	×	×	×	×	×	7
5	×	×	×					3
8/53	×	×	×					3
10		×	×		×			3
15					×			1

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 fascicule 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 fascicule 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 obtecta Borg, 1944

(Figs 1A, 2A,B, 3)

Idmidronea obtecta Borg, 1944: 77, text-figs 6–8. Buge, 1948: 184, 188. Androsova, 1968: 48, fig. 1 (I–III). Moyano, 1991b: 321.

Idmidronea magna Androsova, 1968: 49, fig. 2 (I–V).

Table 3. Key to Antarctic species of *Idmidronea* and *Exidmonea*.

1	Branch diameter greater than spacing between autozooidal series	2
	Branch diameter less than or about equal to spacing between autozooidal series	4
2	Branches robust, non-fertile branches more than 1000 μm in diameter	*I. obtecta*
	Branches more delicate, non-fertile branches less than 1000 μm in diameter	3
3	Peristomes with funnel-shaped expanded ends; ooeciopore facing branch lateral surface; content of autozooids sometimes lilac in colour	*I. pseudocrisina*
	Peristomes connate for most of their length; ooeciopore facing distally; autozooids unpigmented	*I. antarctica*
4	Branches curved backwards with reverse sides concave; seldom bifurcating	5
	Branches more-or-less straight; bifurcations common	6
5	Autozooidal apertures greater than 150 μm in diameter	*E. curvata* (see Borg, 1994)
	Autozooidal apertures less than 120 μm in diameter	*E. arcuata*
6	Calcification feeble; autozooids arranged in series of two, exceptionally three; branching irregular; gonozooid occupies a distance of three or fewer autozooidal series; ooeciopore directed outwards	*I. pellucida*
	Calcification strong; autozooids arranged in series of 2–4; branching regular; gonozooid usually occupies a distance of more than three autozooidal series; ooeciopore facing lateral branch surface	7
7	Branch transverse section triangular or pentagonal; sterile branch diameter greater than 500 μm; terminal diaphragms sometimes present	*I. fraudulenta*
	Branch transverse section oval or circular; sterile branch diameter usually less than 500 μm; terminal diaphragms absent	*E. hula*

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

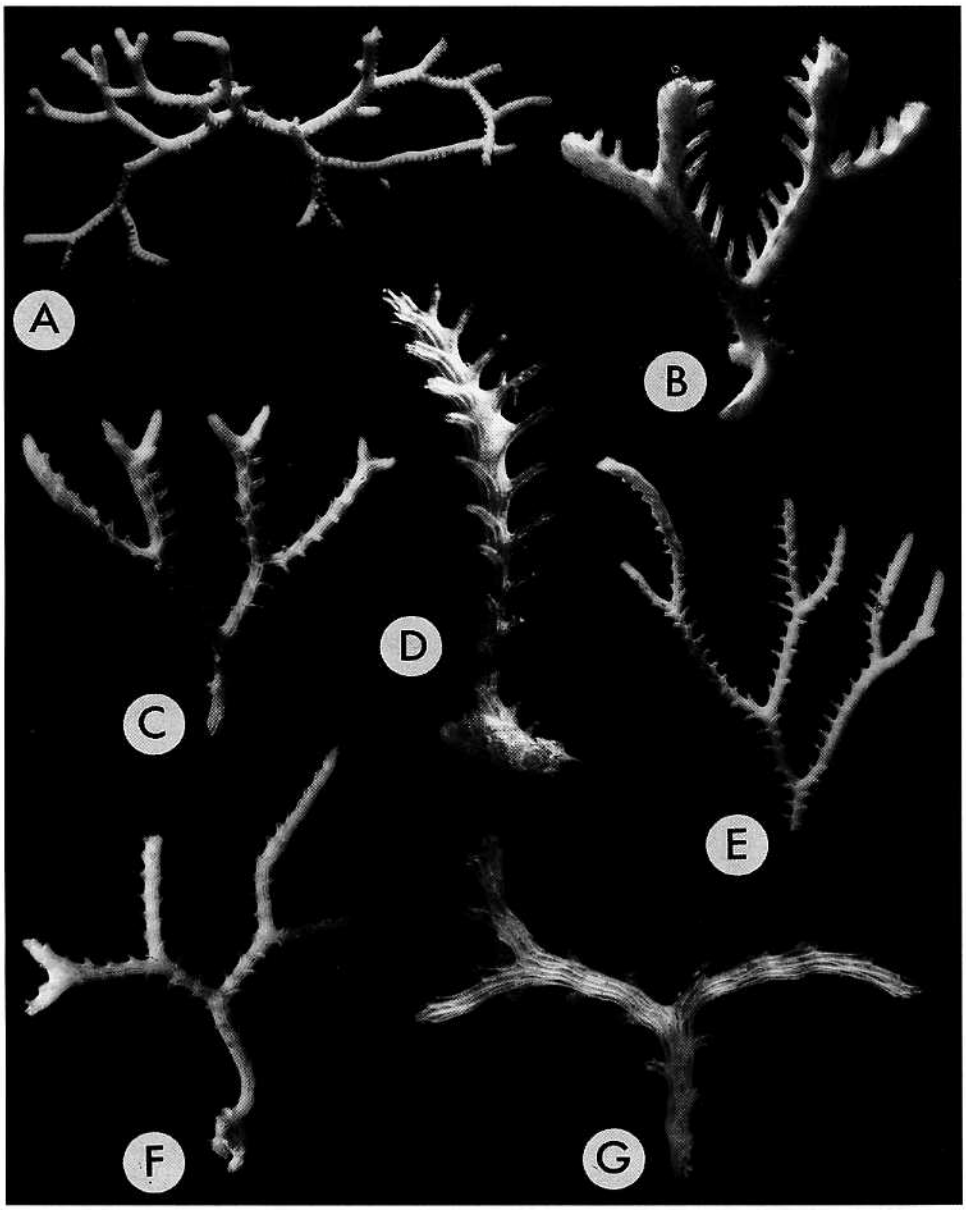

FIG. 1. Colony morphology in Antarctic idmoneiform cyclostomes: (A) *Idmidronea obtecta* Borg, ZIRAS 4/48529, ×1; (B) *I. antarctica* Borg, ZIRAS 2/48511, fertile colony in dorsal view, ×3·6; (C) *I. pseudocrisina* Borg, ZIRAS 1/48541, ×3·5; (D) *Exidmonea arcuata* sp. nov., fertile colony in dorsal 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.

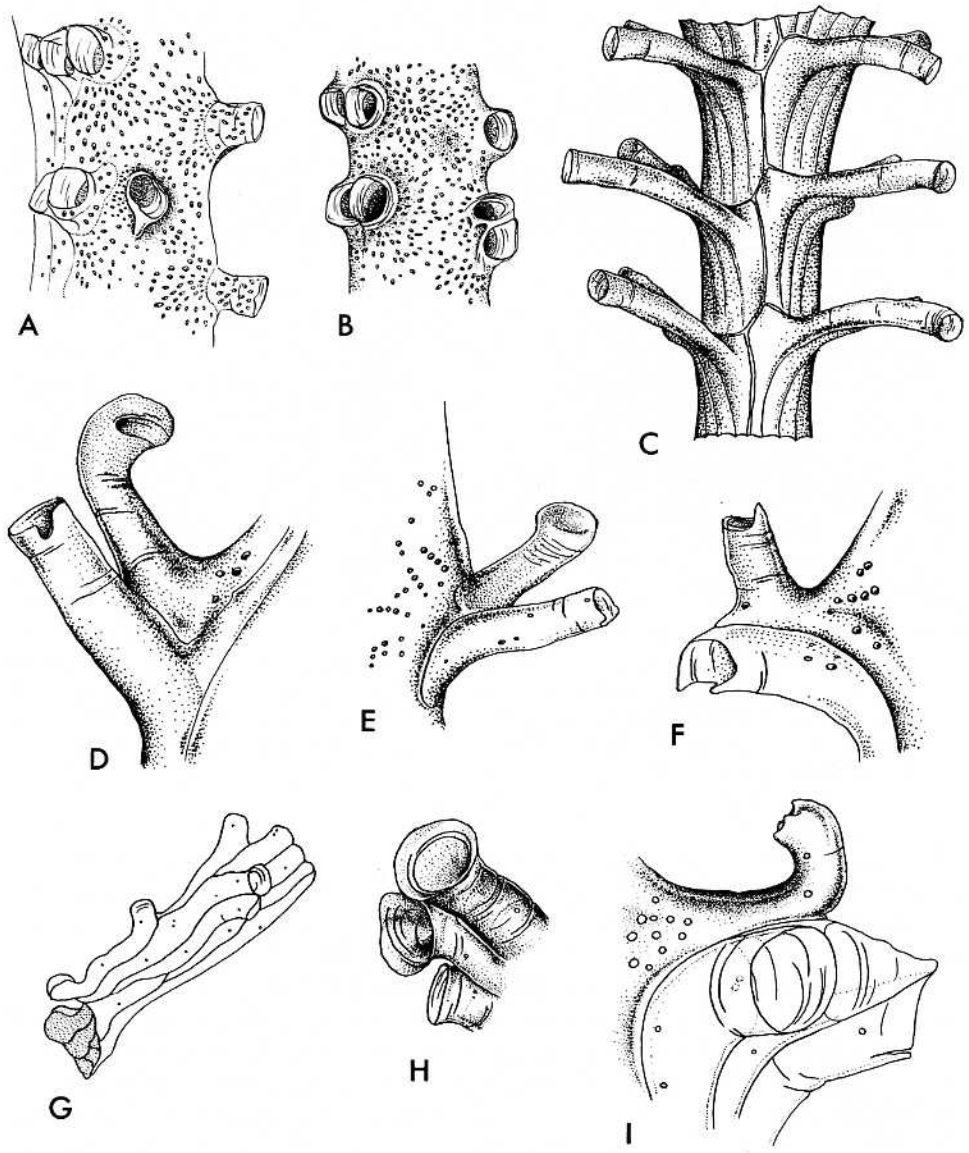

FIG. 2 Line drawings of morphological features in Antarctic idmoneiform cyclostomes. (A)–(B) *Idmidronea obtecta* Borg: (A) ZIRAS 3/48528, gonozooid with ooeciostome located unusually on the frontal surface, ×20; (B) ZIRAS 4/48529, gonozooid with ooeciostome adnate to the upper side of the innermost autozooidal 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, ooeciostomes of varying appearance, ×60. (G)–(I) *I. pseudocrisina* Borg. (G) ZIRAS 6/48546, initial '*Stomatopora*'-stage, ×15·5; (H) ZIRAS 3/58543, three peristomes showing flared ends, ×49; (I) ZIRAS 2/48542, ooeciostome, ×69.