

## New species and new genera of Cheilostomata from the Weddell Sea, Antarctica (Bryozoa)

V.I. Gontar

Gontar, V.I. 2002. New species and new genera of Cheilostomata from the Weddell Sea, Antarctica (Bryozoa). *Zoosystematica Rossica*, 10(2), 2001: 285-292.

Two new genera (*Aequilumina* and *Pseudodelascopora*) and five new species (*Camptolites diaphanus*, *Cornucopina flexuosa*, *Aequilumina cavitis*, *Kymella articulata*, and *Pseudodelascopora weddellae*) are described from deep waters of the Weddell Sea. All species have erect colonies with transparent autozooids. In this paper, a possible way of origination of chitinous joints is discussed.

V.I. Gontar, Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, St.Petersburg 199034, Russia.

Bryozoa are uniquely a major part of benthic communities over large areas of the Antarctic continental shelf. They dominate in the Antarctic shelf both in terms of species number and sessile benthic biomass. Nevertheless, our knowledge of Bryozoa of this region is inadequate, inasmuch as taxonomic research of the Antarctic Bryozoa has a shorter history than in other parts of the World Ocean. Therefore, Bryozoa collected by the expedition on the ship "Polarstern" in 1996 in the Weddell Sea is an important contribution to describing and defining the Antarctic Bryozoan fauna.

This paper describes two new genera and five new species with erect growth. Only one species, *Aequilumina cavitis* sp. n., was found in the deep Antarctic shelf. All other species were found in the Antarctic slope. They belong to two suborders, three superfamilies, four families, and five genera. All genera are endemic to Antarctic waters. All type specimens are deposited at the Zoological Institute, St.Petersburg.

Suborder NEOHEILOSTOMATINA d'Hondt, 1985

Superfamily BUGULOIDEA Gray, 1848

Family BUGULIDAE Gray, 1848

Genus **Camptolites** Harmer, 1923

**Camptolites diaphanus** sp. n.  
(Fig. 1)

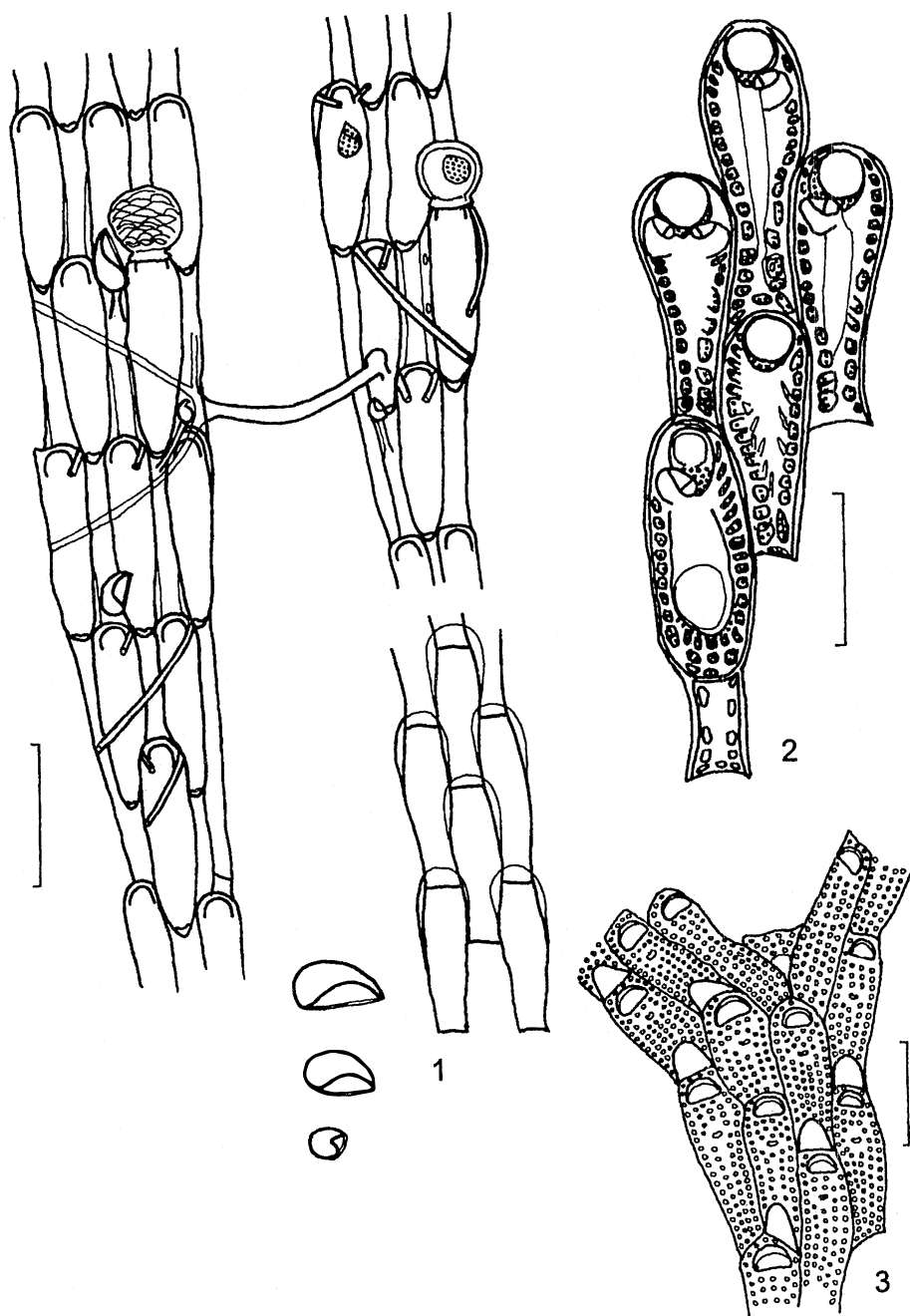
*Holotype*. No. 1/49433. Colony fragment 25×25 mm. The Weddell Sea, SW of Cape Norwegia, 71°42'S – 12°29'W, depths 440-449 m, 20.II.1996. ANT XIII/3, "Polarstern" 39, station 4/AGT, gear AGT 5, sample 5, collectors B.I. Sirenko, I.S. Smirnov.

*Paratypes*. No. 2/49434. Fragments of different sizes (one colony or more), very numerous. They cannot be counted being connected with each other by rhizoids without regular pattern and intertangled. Same data as in holotype.

*Description*. Colony erect, tufted, although its exact shape unclear. Branches connected by slender rhizoids so that delicate network is formed. Branches long, narrow, transparent, with relatively straight margins, single-layer, dichotomously branching. Autozooids arranged in transverse biserial and triserial rows, rarely in four-serial and in quincunx (Fig. 1). Axial kenozooids small (0.4 × 0.4 mm), situated at branch bifurcation.

Autozooids absolutely transparent, membranous, elongated (1.5-2.3 mm long), narrow, slightly dilated in the distal part (0.2-0.25 mm wide) and tapered in the proximal part (0.1-0.05 mm). Frontally, distal part of autozooid usually rounded, but sometimes rectangular, with or without spines in the corners. Proximal end of autozooid tetrahedral. Spines either short (0.1-0.2 mm), one in each corner, or very long, in one of the corners (0.4-0.5 mm and up to 1-1.5 mm long), whereas one short spine developed on the other corner. All variations in spine size observed in closely spaced autozooids. Autozooid aperture occupying more than half-length of autozooidal frontal (0.95-1.25 mm); its width 0.1 mm in proximal part and 0.2-0.25 mm in distal part. A bean-shaped structure present at proximal border of aperture. Each lateral vertical wall with four multiporous oval septulae. Operculum of autozooid semicircular, situated at a short distance from distal apertural border.

Avicularia of three types, relatively small, absent in some branches, on elongated peduncle



Figs 1-3. 1, *Camptolites diaphanus* sp. n.; 2, *Aequilumina cavitis* sp. n.; 3, *Pseudoadelascopora weddellae* sp. n. Scale bar: 1 mm.

(0.2 mm) or without peduncle: (1) relatively large, elongated, with tapering hooked rostrum (0.25-0.3 mm in size); (2) middle-sized, with long hooked rostrum (0.2 mm); (3) small, rounded

(0.1 mm). Avicularia attached approximately in the centre of proximal part at non-apertural frontal part of autozooid.

Ovicell hyperstomial, globose, transparent, or

sometimes with reticulate calcification (height 0.175–0.2 mm, width 0.3 mm), with narrow proximal collar around its orifice and appearing as “put on” the distal end of autozooids.

Distolateral kenozooids ramifying at the basal part of branch and reaching its opposite lateral side, or stretching along marginal autozooid. Rhizoids (0.1 mm wide) originate from these kenozooids and connect neighbouring branches. In all probability, colony attached by means of rhizoids.

Basal walls of autozooids narrow rectangular, slightly widening in distal part. No data available on ancestrula.

*Remarks.* Orange larvae of different sizes are visible in ovicells. Contracted polypides can be seen through the apertural membrane. In some autozooids, there are other white small rounded numerous formations.

*Comparison.* The new species differs from *C. rectilinearis* Hastings, 1943 in the smaller autozooidal sizes, presence of spines, presence of three types of avicularia, small axial kenozooids, presence of collar in ovicell, and absolutely transparent autozooids.

*Etymology.* From *diaphanus*, Latin for transparent.

Genus **Cornucopina** Levinsen, 1909

**Cornucopina flexuosa** sp. n.  
(Fig. 4)

*Holotype.* No. 1/49435. Branch 1 cm in height. The Weddell Sea, W of Cape Norvegia, 71°23'S – 14°19'W, depths 615–634 m, 23.II.1996. ANT XIII/3, “Polarstern” 39, station 25, gear AGT 7, sample 7, collectors B.I. Sirenko, I.S. Smirnov.

*Paratypes.* No. 2/49436. 92 fragments of different size. Same data as in holotype.

*Description.* Colony shape unknown, probably bush-like, although only numerous branches (1 cm and more in height) preserved. Slender branches as a rule consisting of two rows of alternating autozooids often attached to a thick stem constituted by numerous rhizoids. Branches sometimes bifurcate (Fig. 4).

Autozooids relatively large, transparent. Proximal part of autozooids (axial) 0.75–1 mm long, 0.05–0.075 mm wide, meandering. Distal part of autozooids 0.75–0.85 mm long and 0.25–0.35 mm wide outside aperture. Aperture oval or with widened yoke-shaped distal margin (height of aperture 0.35–0.5 mm, width 0.35–0.45 mm). Near the distal border of aperture, operculum semicircular. Distobasal process reduced, with two long spines (1.5 mm in length), often broken and therefore shorter. Such spines, four and more in

number, situated on the basal surface of autozooid and arranged slantwise downwards and parallel to external margin of autozooid.

Avicularium occurring rarely, 0.75 mm long, situated even lower than the last spine, with hook-shaped rostrum and yellowish chitinous triangular-elongated mandible (Fig. 4). Small avicularian chamber situated in its proximal part and smoothly passing into a relatively short thin peduncle. One larger avicularium (Fig. 4) was found broken among branches. Its length exceeding total length of five successive autozooids. Length of rostrum of this avicularium exceeding width of autozooid aperture. This larger avicularium with pointed hooked rostrum, yellowish chitinous triangular-elongated mandible, and large conical avicularian chamber passing into a long peduncle near the centre.

Ovicells not found. No data available on ancestrula.

*Comparison.* The new species differs from other species of this genus in the absolutely transparent autozooids. It differs from the closely related species *C. lata* (Kluge, 1914) in the number of spines, shape and size of autozooids, and having two types of avicularia.

*Etymology.* From *flexuosus*, Latin for meandering.

Suborder ASCOPHORINA Levinsen, 1909

Infraorder UMBONULOMORPHA Gordon, 1989

Superfamily LEPRALIELLOIDEA Vigneaux, 1949

Family METRABDOTOSIDAE Vigneaux, 1949

Genus **Aequilumina** gen. n.

Type species: *Aequilumina cavitis* sp. n.

*Diagnosis.* Colony erect, branching. Branches oval, cylindrical. Autozooids arranged around branch axis in alternating longitudinal series, with relatively small opened opesial membrane and umbonuloid shield bordered by conspicuous marginal areolae and not perforated centrale. Aperture of autozooid incorporating a medio-proximal pseudosinus and with one or two proximolaterally situated adventitious avicularia. Operculum rounded, slightly convex, chitinous. No articulated oral spines. Pseudoovicells present. No ovicells.

The frontal shield occupying almost all autozooidal length except small suboral opesial area

(Fig. 2) and opercular area. Outwardly, the shield surface textured with small ridges and bordered by 17-20 relatively large areolar pores along each lateral margin (10 pores at margin where avicularium located). One or two oral proximolateral adventitious avicularia with large prominent avicularian chamber present. Avicularium with transverse bar, with triangular chitinous mandible and directed slantwise laterodistally. Mandible of avicularia raised by avicularial chamber. Avicularium sometimes absent. Second aperture with medioproximal V-shaped pseudosinus.

In a part of autozooids, non-porous central part of the frontal shield forms a convex thin-walled chamber of indefinite shape. Removal of the upper wall of the chamber disclosed a white rounded structure, probably, embryo. This suggested that it is a peculiar brooding chamber analogous to acanthostegal ovicells. Because only one colony is available, and its preservation state is not so good, this chamber is not examined in detail, and communicative connections between autozooids remain unclear. This chamber is presumably named as pseudoovicell; however, its role as a brooding chamber must be confirmed in future.

*Etymology.* From *aequiluminatus*, Latin for meshy structure consisting of equal cells.

### ***Aequilumina cavitis* sp. n.**

(Fig. 2)

*Holotype.* No. 1/49437. Branch 3.5 cm in height, in transversal section oval with maximum diameter 2.3-5 mm. The Weddell Sea, SW of Cape Norvegia, 71°41'S - 12°46'W, depth 227-232 m, 7.II.1996. ANT XIII/3, "Polarstern" 39, GSN No. 2, station 5, ground: stones, collectors B.I. Sirenko, I.S. Smirnov.

*Description.* Colony slender, oval cylindrical, dichotomously branching. Autozooids in alternating longitudinal series around axis, elongated, narrowed proximally, broadest distally, separated by well-marked sutures (length 1.5-1.9 mm; width 0.25-0.4 mm proximally, 0.5-0.6 mm distally) (Fig. 2).

Frontal shield thin, smooth, semitransparent in young autozooids, but calcareous white, tuberculate along areolae margins in autozooids at later ontogenetic stages. 17-20 marginal areolae, along each lateral margin, but only 10 ones large (when avicularian chamber exists laterally), closely spaced and separated by thickened ridges. Areolae sometimes situated also near the distal margin; in that case, areolae very small. Operculum rounded (0.3-0.35 mm in width), chitinous, surrounded both lat-

erally and distally by frontal shield forming secondary apertura (0.25-0.35 mm in height), and with a small opened part of opesia membrane at proximal border owing to V-shaped frontal pseudosinus. Marginal autozooids a little larger than the other ones (1.8-1.9 mm long).

One or two oral proximolateral adventitious avicularia with large prominent avicularian chamber. Avicularium with chitinous triangular mandible and transverse bar. In case that two avicularia present near orifice, sometimes they are arranged asymmetrically, e.g.: one smaller (0.15 mm long, 0.075 mm wide) and more lateral, and other one larger (0.25 mm long, 0.15 mm wide) and more proximal. In some autozooids avicularium absent. In one autozooid, vicarious rounded avicularium (0.225 × 0.225 mm) present instead of orifice.

In some autozooids, frontal not perforated shield transformed into domed conspicuous brooding chamber (0.6-0.7 mm in length, 0.4-0.45 mm in width) surrounded at its distal border by many additional areoles normally absent in autozooids (Fig. 2). These zooids longer (0.2-0.21 mm) and wider in the central part than normal autozooids.

Large inflated kenozooid present in points of dichotomous branching.

Lateral walls relatively high; inside autozooid the areoles continue in the shape of vertical canaliculi; each of them has two rounded septulae one near frontal, another one near basal wall. Basal wall with rounded septula inside.

No data available on ancestrula.

*Remarks.* Hydroids looking like kenozooids; rhizoids extend along the borders of the colony. The colony was broken near the area of branching in several places, but owing to stolons did not disintegrate into separate fragments. Probably, in this case, we can suggest symbiosis.

*Comparison.* *Aequilumina cavitis* sp. n. differ from *Metrarabdotosidae* in several features, and therefore, phylogenetic relationships of *Aequilumina* is a controversial issue.

The new species is similar to several species of *Metrarabdotos* and *Polirabdotos* in the vertical two-layer colony shape, autozooidal umbonulloid frontal with marginal areolae and proximally notched secondary orifice, and presence of adventitious avicularia.

*A. cavitis* differs from species of *Metrarabdotos* and *Polirabdotos* and from the similar species *Schizostomella crassa* Canu, 1908 in several important characters: (1) absence of peristome; (2) absence of gonoecia; (3) position and shape of

avicularia; (4) presence of pseudoovicells; (5) geographic distribution (except *Polirhabdotus* also occurring in the Antarctic waters).

In the presence of pseudoovicells, the new species is similar to representatives of the family Adeonidae, which have ascopora and gonoechia (Harmer, 1957), i.e. in this case the term "gonoechia" serves for denoting the modified autozooids used for brooding. In two genera of this family, *Bracebridgia* and *Laminopora*, "the median pore is wanting or apparently represented only in the young state" (Harmer, 1957). However, *Laminopora* has primary orifice and operculum of schizoporelliform type, and frontal surface with numerous pseudopores. *Bracebridgia* has zooecia, which are as a rule pear-shaped or vase-like (Levinson, 1909). In these characters, it is similar to *Aequilumina* and *Schizostomella*. In other characters, *Bracebridgia* differs from *Aequilumina*, namely: "a circle of widely separated pores somewhat distant from the frontal margin, show over almost the whole of the frontal surface a sharp, wavy, transverse striation appearing in a number of broad rounded ridges, somewhat curved. [...] Outside the primary aperture there is a low, but broad, somewhat trapeziform tooth. [...] The secondary aperture is of an elongate, oval form and surrounded by a collar-like ring. [...] Gonozooecia have not been found. [...] The avicularia appear on the margins of the colony in a more or less interrupted row" (Levinson, 1909: 289).

Since *Aequilumina cavitis* has umbonulloid frontal shield, we placed it in the family Metrarabdotosidae.

*Etymology.* From *cavitas*, Latin for chamber.

Superfamily SCHIZOPORELLOIDEA Jullien, 1883

Family HIPPOPORINIDAE Brown, 1952

Genus *Kymella* Canu & Bassler, 1917

***Kymella articulata* sp. n.**  
(Fig. 5)

*Holotype.* No. 1/49438. Branch 15 mm in height. The Weddell Sea, W of Cape Norwegia, 71°34'80"S – 12°25'90"W, depths 571–580 m, 26.II.1996. ANT XIII/3, "Polarstern" 39, station 9/D, gear DN 22, sample 22, collectors B.I. Sirenko, I.S. Smirnov.

*Paratypes.* No. 2/49439. 12 fragments of different size. Same data as in holotype.

*Description.* Colony erect, dichotomously branching, cellariiform with chitinous joints splitting internodes (Fig. 5). Each joint is located in distal parts of some adjacent autozooids in

such a way that proximal parts of autozooids are placed in "maternal" internode, while distal parts of autozooids are situated in the "daughter" internode. Joints often absent in points of dichotomous branching. In internode, autozooids are arranged in longitudinal rows and in quincunx order. The number of these rows within internode either constant (4 and more) or increasing with distance from the proximal end of internode owing to formation of two distal buds in autozoid and two daughter autozooids accordingly. Length of internodes from 6.75 to 9 mm.

Autozooids elongate (1.5–2.7 mm in length, rarely 1.2 mm, more frequently 1.5–1.7 mm), narrow (proximal width 0.2–0.3 mm; distal width 0.3–0.4 mm), slightly widened in the middle (0.4–0.5 mm), rectangular, rounded distally, gently convex, separated by distinct sutures (Fig. 5).

Primary orifice of autozoid situated at a short distance from its distal border. Height of orifice with sinus 0.25–0.3 mm, without sinus 0.2 mm, width of orifice 0.25 mm. Orifice semicircular with proximal edge deeply concave and arched frontally; condyles small and indistinct. Oral spines absent. Operculum yellowish, chitinous, slightly convex.

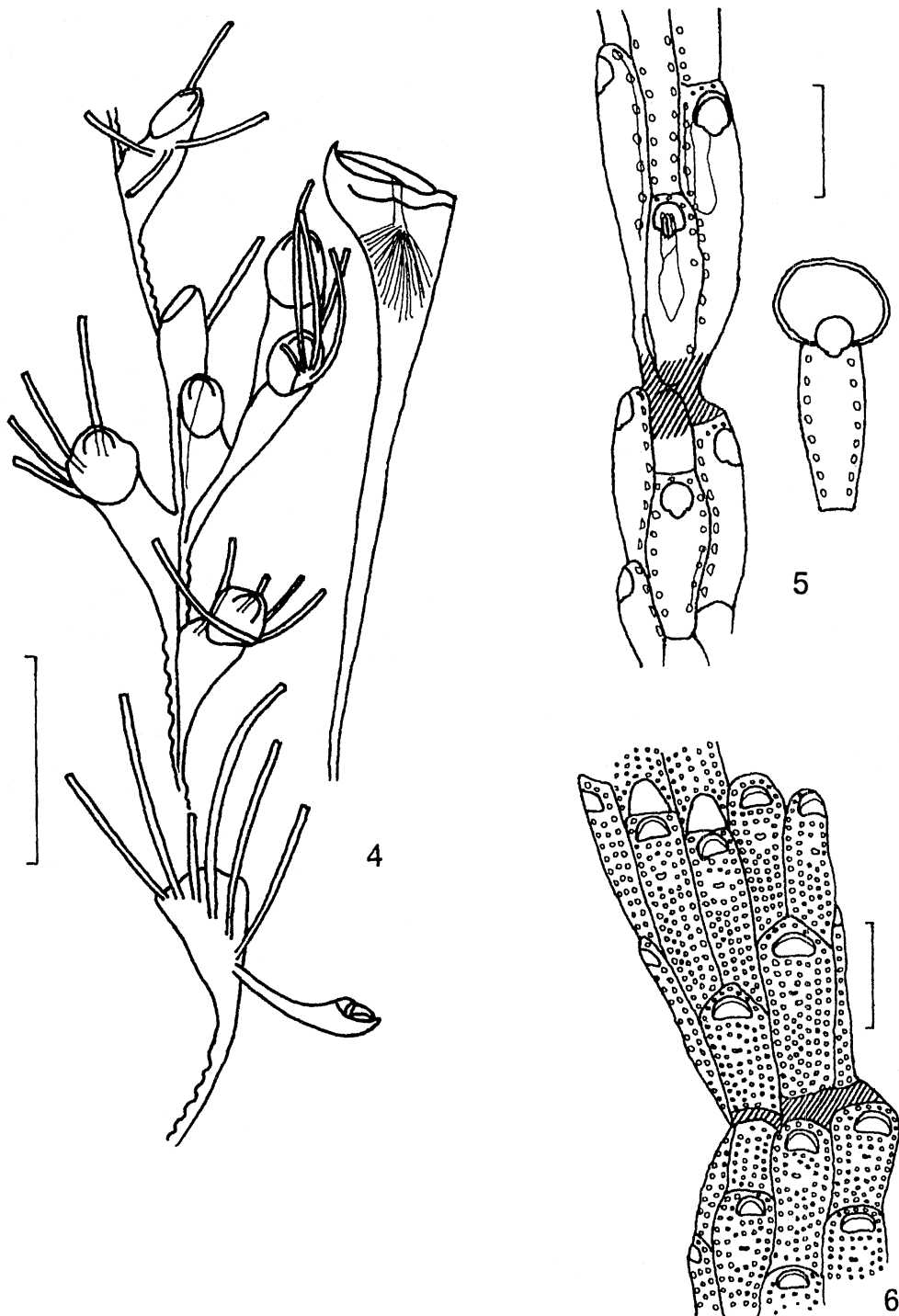
Frontal wall of autozoid cryptocystidean, thin, brittle, weakly convex, shining, transparent, vitreous in young autozooids so that pink-orange polypide visible beneath the wall. In more mature autozooids, frontal wall semitransparent and later even white owing to increasing calcification, though its degree still weak. Calcification begins from the borders of autozooids and spreads towards the centre. Lateral border of autozoid with distinct marginal rounded pores in a single, linear series.

Ovicell large, wider (0.65 mm) than high (0.55 mm), hyperstomial, globose, with weakly calcified frontal wall (ectooecium) and more calcified entoecium. Ovicell closed by autozooidal operculum. Lateral walls with two multiporous septulae. Rhizoids, if existed, not preserved. Avicularia not found. No data available on ancestrula.

*Remarks.* Unfortunately, an intact colony was not preserved, only fragments are available, therefore it is impossible to estimate the colony size. There are only 12-, 15-, and 30-mm branches and smaller fragments, some of them are in poor condition.

*Comparison.* The new species differs from *K. polaris* (Waters, 1904) in the shape of the colony, jointing branches, absence of avicularia, more elongated autozooids, and shape of ovicell.

*Etymology.* From *articulatus*, Latin for articulated.



Figs 4-6. 4, *Cornucopina flexuosa* sp. n.; 5, *Kymella articulata* sp. n.; 6, *Pseudoadelascopora weddellae* sp. n. Scale bar: 1 mm.

## Family MICROPORELLIDAE Hincks, 1880

Genus *Pseudodelascopora* gen. n.

Type species: *Pseudodelascopora weddellae* sp. n.

**Diagnosis.** Colony erect, freely growing, narrow leaf-shaped, bilaminate, dichotomously branching, with chitinous joints. Autozooids with cryptocystidean frontal shield perforated by numerous small pseudopores. Ascopora simple, bean-shaped, situated at some distance from proximal border of primary orifice. Primary orifice semicircular with straight proximal margin and rounded proximal angles. Operculum attached to proximal margin. Avicularia and spines absent. Ovicells endozoecial, completely embedded in daughter autozooid. Frontal surface of ovicell semioval, transparent, smooth, without pores, flat like frontal wall of daughter autozooid, with thin distal edge. Budding distal. Distal wall of autozooid with horizontal row of small irregularly arranged pores. Vertical lateral walls with two large septulae.

**Remarks.** The new genus differs from the closely related genus *Adelascopora* Hayward & Thorpe, 1988 in the shape of the colony, its internodes and joints, shape and position of ascopora and endozoecial ovicells.

***Pseudodelascopora weddellae* sp. n.**  
(Fig. 6)

**Holotype.** No. 1/49440. The Weddell Sea, SW of Cape Norvegia, 71°42'S – 12°29'W, depth 440-449 m, 20.II.1996. ANT XIII/3, "Polarstern" 39, station 4, AGT No. 5, sample 5, collectors B.I. Sirenko, I.S. Smirnov.

**Paratypes.** No. 2/49441. Two colonies and four fragments, same data as in holotype.

**Description.** Colonies erect (4-5.5 cm in height), yellowish white in alcohol, bilaminate, flexible, narrow leaf-shaped, dichotomously branching. Zoarium divided into internodes by chitinous joints (Fig. 6). These joints often weakly developed and formed in distal parts of several adjacent autozooids by means of their transversal division (reminiscent of branch fracture) and formation of chitinous intercalation. Thus, proximal parts of autozooids are located in "maternal" internode, whereas distal halves or larger parts of autozooids, in "daughter" internode. Edges of two internodes on either side of articulation not strictly parallel. Extent of exposed elastic joints (in direction from preceding internode to next one) varying around the circumference of joints.

At the base of colony in second internode (first one poorly preserved, partly destroyed) autozooids in regular longitudinal rows and in quincunx around the circumference of internode. This internode 1 mm at proximal end and 1.5 mm at distal end. In the next internode, number of longitudinal rows of autozooids sometimes increasing. An autozooid at distal edge had formed two buds, which developed into two autozooids. Thus, the internode acquired widened flat shape (height 10 mm; width 0.75-6 mm at proximal end, 1-10 mm at distal end). Such an internode consists of two layers of autozooids connected along the margin by one row of autozooids longer than typical ones. In case when two internodes formed from this internode, a kenozooid may appear in its centre, between two autozooids of two rows from opposite sides of internode (Fig. 3). Thus, U-shaped distal edge of internode is formed between two following internodes. Two newly formed internodes narrower at proximal end (0.75-1 mm), wider at distal end (1-1.25 mm), and transversally rounded. The newly formed two internodes equal or different in diameter, e.g. one internode consisting of three, another one, of five autozooid rows.

Autozooids elongate (1-2 mm, more often 1.25-1.5 mm), narrow (distal end 0.45-1 mm, more often 0.5-0.6 mm; proximal end 0.3-0.5 mm), slightly widened in distal part, rectangular or 5-angled (the latter variant occurring in case of formation of two buds and two rows simultaneously: Figs 3, 6), but normally with rounded distal edge. Orifices of autozooids spaced very closely, but at some distance from distal margin of autozooid. Orifice closed by operculum. Operculum attached by proximal margin, D-shaped with rounded corners (proximal margin of operculum 0.4-0.25 mm, height 0.15-0.2 mm). Distal margin of operculum with crescent structure on inner surface. This structure prominent perpendicular to inner surface of operculum and serving for attachment of muscles opening and closing operculum.

Frontal shield of autozooids slightly convex, vitreous, densely perforated by small pseudopores, each in a distinct pit, giving a speckled appearance under a low magnification, cryptocystidean, covered by a membrane. Pseudopores absent only around ascopora situated at a distance from distal end of autozooid at approximately one-third of autozooid length (0.3-0.4 mm). Ascopora situated at the centre of frontal shield, small (0.05 mm in width), bean-shaped, its size slightly exceeding the diameter of frontal pseudopores. Sometimes, non-porous area around asco-

pora more calcified and looking like white spot with irregular margins. White polypide visible through frontal shield.

Ovicells endozoecial, situated in proximal parts of daughter autozooids (Figs 3, 6). Their frontal surface absolutely flat, non-porous, transparent, semioval (proximal edge 0.35-0.5 mm, height 0.15-0.2 mm). Sometimes, a semioval part of frontal surface of ovicell transparent near proximal edge (Fig. 3). In case of origination of two daughter autozooids from one autozooid, ovicell embedded in one of daughter autozooids (Fig. 3).

In lateral wall of autozooid, two large septulae, oval or rounded. Distal wall of autozooid with a horizontal row of irregularly arranged small pores.

Avicularia absent, ancestrula not preserved. Rhizoids, if existed, not preserved.

*Remarks.* Among paratypes, one colony has cellariiiform internodes approximately cylindrical in shape (truncated, elongated, conical, with its smaller diameter at proximal end).

This species is a notable example of probable origination and evolutionary changes of chitinous joints. Different stages of formation of chitinous joints can be observed within one colony. At the first step, a transversal fissure appeared in the

distal parts of a group of autozooids, which is dissimilar to chitinous joint. At the second step, a very narrow chitinous intercalation is developed in the place of fissure. At the third step, further development takes place and wide chitinous intercalation is formed in the place of fissure, so that the proximal parts of autozooids belong to one internode, and their distal parts, to another internode. Probably, there are other ways of the origination of chitinous joints, but, in our opinion, the mode described above is one of the most evident and simple.

*Comparison.* The new species differs from the closely related species *A. secunda* Moyano, 1989, and *A. jeqolga* Hayward & Thorpe, 1988, in the shape of colony, its internodes and joints, position and shape of ascopora and endozoecial ovicells.

*Etymology.* From the Weddell Sea, where the species was found.

## References

- Harmer, S. 1957. The Polyzoa of the Siboga Expedition, pt. 4, Cheilostomata Ascophora II. *Siboga Exped. Reports*, 28d: 691-1145.
- Levinson, G.M.R. 1909. *Morphological and systematic studies on the Cheilostomatous Bryozoa*. 431 p. Nat. Forfatt. Forlag, Copenhagen.

Received 18 January 2001