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The genus *Monocoryne* (Hydrozoa, Capitata): peculiarities of morphology, species composition, biology and distribution

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SARSIA

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A revision of the genus *Monocoryne* was undertaken following analysis of peculiarities noted in earlier descriptions of the nominal species. Type specimens of *Monocoryne gigantea* from northern Norway and *Monocoryne minor* from South Africa were examined. In addition, non-type material from the Arctic Ocean, Antarctic Seas and the Kuril Islands was studied, and descriptions of species from Alaska and the Canadian Archipelago were investigated. A new diagnosis of the genus *Monocoryne*, provided here, was a necessary outcome of these studies. Most importantly, hydroids (in species of the genus) are colonial or solitary which differ from Bonnevie's original diagnosis. The collection of solitary polyps is a result of the tenuous nature of the colonies, which tend to fall to pieces. Species of *Monocoryne* are found in Arctic, Antarctic and temperate waters of the northern and southern hemispheres, and the genus may thus be regarded as bipolar. Although recognized species of *Monocoryne* are quite similar morphologically, four of them are recognized here to be valid based on current evidence. This conclusion is also supported by their distribution patterns.

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INTRODUCTION

In 1899 the Norwegian Hydrozoa taxonomist Kristine Bonnevie described a new species of athecate hydroid based on two specimens from Hammerfest in northern Norway. She gave a very short description of these solitary polyps, which were about 15 mm in length, partly covered with a thin transparent perisarc, and with capitate tentacles distributed in small groups over the surface of the hydranth (Bonnevie 1899a). The latter two characters led Bonnevie to assign this new species to the genus *Coryne*. Because of the size of the polyps in this new species, much larger than usual in *Coryne* (usually 1–3 mm) it was named *C. gigantea*. In the original description and in later papers, Bonnevie (1899a, b) stressed the differences between *C. gigantea* and taxa of Corynidae and she noted a relationship to the Myriothelidae (now Candelabridae). However, she was not convinced that it should be referred to the family Myriothelidae.

In 1902, Swenander found one specimen of *C. gigantea* at Røberg in Trondheimsfjorden (mid-Norway). He also found several specimens from Trondheimsfjorden in collections of the Museum of Natural History and Archaeology of the Norwegian University of Science and Technology in Trondheim, collected by the former curator of the museum, V. Storm (Swenander 1904). One of the specimens in the museum collection indicated that *C. gigantea* is probably a colonial form.

Broch (1910) erected a new genus, *Monocoryne*, for *C. gigantea,* retaining it in the family Corynidae. It was distinguished in his diagnosis by its supposedly solitary polyp, by the solitary tentacles in groups distributed over the whole hydranth, and by the gonophores at the base of the groups of tentacles. In a later paper, after careful study of material collected in Trondheimsfjorden, Broch (1916) described two types of nematocyst in the species: "globular or oviform capsules and also long narrowly oval ones". He concluded that the oviform nematocysts, when discharged, assumed a narrowly oval shape. Broch (1916) also stated that *M. gigantea* was hermaphroditic, with separate female and male cryptomedusoid gonophores on the same individual. Additionally, gonophores containing both large ova and spermatocytes of all stages were described.

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Johannesen (1924) published an accurate description of a specimen of *M. gigantea* collected in Trondheimsfjorden during 1921. Her conclusions confirmed the observations of Broch (1916).

The type material of *C. gigantea* (subsequently assigned to *Monocoryne*), was re-examined and illustrated by Rees (1956), and later by Stepanjants in 1991. In this material, a terminal mouth is surrounded by a circle of about six simple capitate tentacles. Most of the hydranth is covered with irregularly arranged groups of capitate tentacles: as a rule there are three tentacles in a group, with one large central and two lateral ones which are fused to the central one at their base (Rees 1956, fig. 2). Rees found that *Monocoryne* has many characters in common with *Myriothela* (now *Candelabrum*) and he assigned *M. gigantea* to the Myriothelidae. He erected a new subfamily (Monocoryninae), separate from the subfamily Myriothelinae (now Candelabrinae) (Rees 1956).

Studying hydroids from an "Albatross" expedition to the northeast Pacific, Fraser (1941) described a *Monocoryne*-like hydroid from Stephens Pass, southern Alaska. It consisted of several large solitary polyps which "grow from a broad base, with stubby processes projecting from the central portion". This perhaps indicates that these polyps were originally connected and formed a colony. The hydranth was similar to *M. gigantea,* with tentacles in groups and gonophores at the base of the groups of tentacles. There were three, five or seven tentacles in each group, and their bases were fused into "a bract-like" structure (similar to such structures in Siphonophora) (Fig. 2C). The median tentacle was the largest and others progressively shorter. Fraser also noted that there was no chitinous perisarc covering any part of the polyp. He named this hydroid *Symplectanea bracteata* and placed it in a new family Symplectaneidae.

Rees (1957b) re-examined the material of *Symplectanea bracteata* deposited in the United States National Museum, Washington DC (now National Museum of Natural History – Smithsonian Institution). Although the specimen was rather mutilated, Rees found the lower part of the polyp enclosed in a chitinous perisarc with a few anchoring filaments attached to the substratum. He concluded that the differences in the number of tentacles and the degree of their confluence into groups are not features which entitle them a separate generic rank. He considered *Symplectanea* and Symplectaneidae to be junior synonyms of *Monocoryne* and Monocorynidae. *Monocoryne gigantea* and *M. bracteata* were provisionally retained as separate species. Later, sterile representatives of *Monocoryne* were found in Arctic waters in the Hudson Strait, northeast Canada (Calder 1972) and Franz Josef Land (Antsulevitch 1988). In both publications, the hydroids of *Monocoryne* were regarded as solitary and conspecific with *M. gigantea,* and separate from *M. bracteata*.

Two species of *Monocoryne* have been described from temperate and Antarctic waters of the southern hemisphere. Millard (1966) described *M. minor* as a new species from Agulhas Bank off the Cape of Good Hope, South Africa, and Stepanjants (1979) described *Monocoryne* sp. from Sodruzestva Sea. Both were represented by solitary polyps having capitate tentacles in groups of two to five. In *M. minor* the gonophores are distributed at random over the polyp and not seated at the base of the tentacles.

MATERIAL

In addition to published data, the following specimens of *Monocoryne* have been studied:

(1) Syntypes (two polyps) of *M. gigantea* (reg. no. B855), Zoological Museum, University of Oslo, were re-examined and sketched.
(2) Holotype of *M. minor* (reg. no. SAMH.410), South African Museum of Cape Town, was re-examined.
(3) Specimens of *Monocoryne* sp. (reg. no. 1, 2), Zoological Institute RAS, St. Petersburg, were re-examined and sketched. Nematocysts were examined for the first time.
(4) Material (four polyps) of *M. gigantea* from Franz Josef Land, Arctic Ocean (reg. no. 1, 2), Zoological Institute RAS, St. Petersburg, was re-examined and sketched. The types of nematocyst were investigated for the first time.
(5) Material of *M. bracteata*: colony and solitary polyps collected during the Russian expedition of the Pacific Institute of Fishery and Oceanography and the Institute of Marine Biology, on NPS "Tichookeanskyi" at Urup Island in the Kuril Islands (reg. no. 1, 2), Zoological Institute RAS, St. Petersburg. This was examined for the first time, including nematocyst structure; sketched and photographed.
(6) For comparison, material of the type specimen of *Fabulosus kurilensis* (reg. no. 1/10076), Zoological Institute RAS, St. Petersburg, was included in this study.

RESULTS

Genus *Monocoryne* Broch, 1910

Type species

Coryne gigantea Bonnevie, 1899, by monotypy.

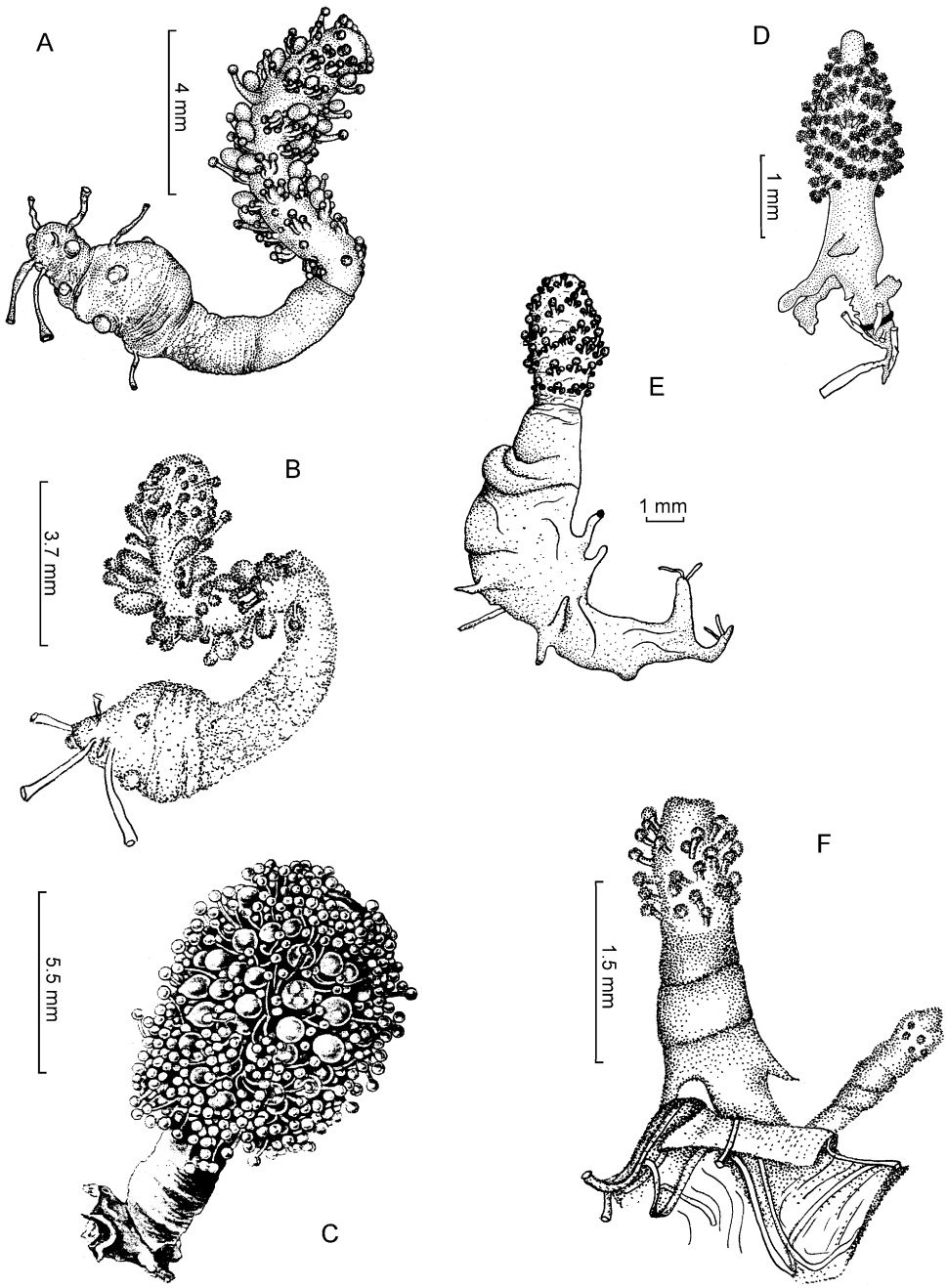

Fig. 1. *Monocoryne gigantea*. A. Type specimen from Hammerfest (after Rees 1956). B. Type specimen (redrawn by S. Stepanjants). C. Specimen from Trondheimsfjorden (after Johannesen 1924). D. Specimen from northern Canada (after Calder 1972). E. One specimen from Franz Josef Land (after Antsulevitch 1988). F. The second specimen from Franz Josef Land (drawing by S. Stepanjants).

Table 1. *Monocoryne gigantea*. Measurements (mm) of length and diameter.

	Bonnevie 1899a	Rees 1956*	Johannesen 1924	Calder 1972	Antsulevitch 1988*
Length of full polyp	11.8	14.7 & 12.1	11.0	2.0–3.3	3.0 & 7.5
Length of polyp head	5.9	6.3 & 6.3	7.0	4.0	
Diameter of polyp head	1.6	1.68 & 1.4		0.55–1.5	0.75 & 1.5
Length of gonophore	0.9	0.7 & 0.6	0.8?		
Diameter of gonophore	0.5	0.4 & 0.4	0.47		
Length of aboral tentacle	1.0	1.0 & 1.0	1.1?		

*Two specimens.

In light of observations presented below, a revised diagnosis of the genus *Monocoryne* is required.

Hydroids solitary or colonial. When colonial, polyps loosely aggregated through fusion of basal processes into a plate. Hydranths densely covered by scattered groups of capitate tentacles; hydrocaulus with root-like adhesive processes covered by thin, soft perisarc. Gonophores (sporosacs?) usually borne at bases of tentacle groups. Nematocysts of four types: stenoteles, microbasic mastigophores, desmonemes and microbasic euryteles.

Four species of *Monocoryne* are known: *M. gigantea* (Bonnevie, 1899), *M. bracteata* (Fraser, 1941), *M. minor* Millard, 1966 and *Monocoryne* sp. Additions to the known descriptions of each of these species are given below.

Monocoryne gigantea (Bonnevie, 1899)
(Figs 1A–F, 6.1; Table 1)

Coryne gigantea – Bonnevie 1899a:4–5, plate I, fig. 1, 1a; Bonnevie 1899b:13–15; Swenander 1904:4–5.
Monocoryne gigantea – Broch 1910:138–139; Broch 1916:12; Johannesen 1924:1–9, figs 1–7; plates I–II; Rees 1956:115–118, figs 1, 2; Rees 1957a:488, 509, 515–517, 523, figs 38, 56; Calder 1972:221–222, plate I, fig. 4; Antsulevitch 1988: 931–933, fig.

Type locality

Hammerfest, northern Norway (70°40′N 23°40′E) 50–100 fathoms (91–183 m).

Distribution

(1) Northern Norway, Hammerfest (no exact locality given), 50–100 fathoms (91–183 m) (Bonnevie 1899a). (2) Trondheimsfjorden, Røberg 1902, on *Tubularia* attached to *Lima excavata*, 460 m and Trondheims-

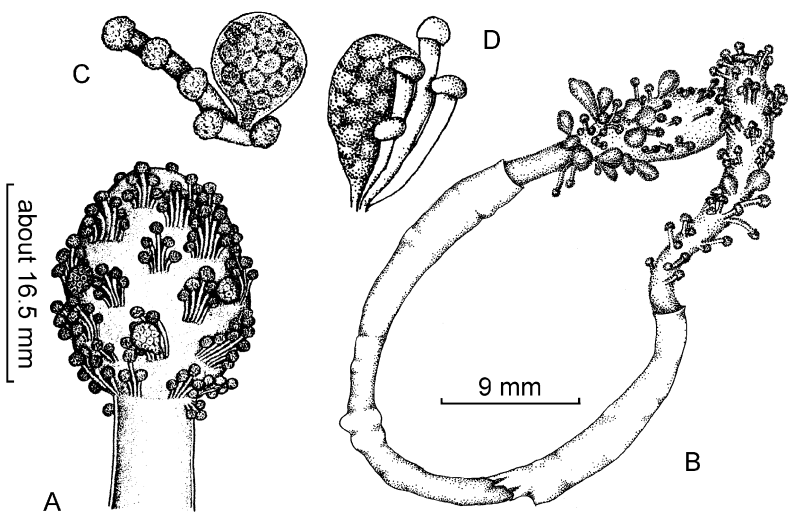

Fig. 2. *Monocoryne bracteata*. A. Holotype from Alaska, polyp head (after Fraser 1941). B. "Bipolar" colony from the Kuril Islands (Urup Island) (drawn by S. Stepanjants). C. "Bract"-like tentacle group (after Fraser 1941). D. A group of fused ("bract"-like) tentacles covering the gonophore.

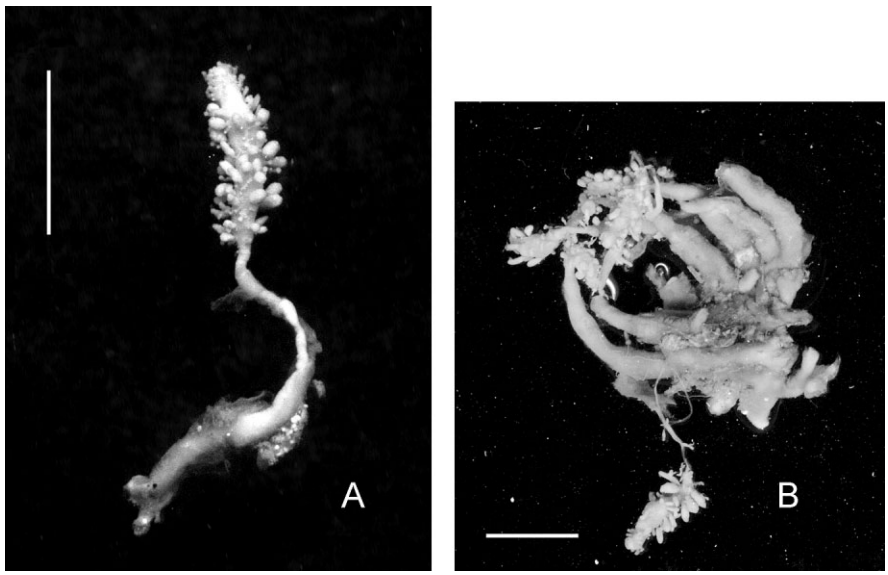

Fig. 3. *Monocoryne bracteata.* A. Specimen from the Kuril Islands (Urup Island). B. Colony from the Kuril Islands (natural size).

fjorden, a colony with a large number of polyps on a polychaete tube attached to *Lima excavata* (Swenander 1904). (3) Trondheimsfjorden, Hambåra, on a bivalve shell, 100–150 m (Johannesen 1924). (4) Northeastern Canada, Hudson Strait, 60°38′N 64°38.7′W, 90–100 m (Calder 1972). (5) Franz Josef Land, Heisa Island, 16–20 m, stones, attached to the alga *Halosaccion* sp. (Antsulevitch 1988).

Remarks

The syntype figured is a solitary polyp (Fig. 1A, B). Later Broch (1910, 1916), Calder (1972) and Antsulevitch (1988) also described *M. gigantea* as solitary, whereas Swenander (1904) and Johannesen (1924) observed that there were several young polyps at the base of several fully grown polyps. A re-examination of *M. gigantea* from Franz Josef Land showed that there are not two solitary polyps as reported by Antsulevitch (1988), but three young sterile polyps. Two of them originate from the hydrorhiza attachment disc (Fig. 1F). The third, figured by Antsulevitch (1988) (Fig. 1E), is solitary and was possibly broken off from the colony. Capitate tentacles on all *M. gigantea* hydranths observed are combined in groups of two to three tentacles, with one of them usually larger than the others. Rees (1956) considered each group as one trifid tentacle. Broch (1916) observed that in tentacle groups the ectoderm is coalesced at the base, but in the solitary tentacle the endoderm is continuous and completely surrounded by the ectoderm and the supporting lamella. Adult polyps have one gonophore attached near the base of nearly every tentacle group. According to Broch (1916) and Johannesen (1924), female and male gonophores are found on the same polyp, but some gonophores contain eggs as well as sperm, thus being truly hermaphroditic.

Nematocysts (in μm), in material from Franz Josef Land (Fig. 6.1): stenoteles 14.0–18.0 × 12.0–21.0; microbasic mastigophores 19.0–24.0 × 8.0–11.0; desmonemes 10.0 × 8.0; microbasic euryteles 22.5–25.0 × 12.0–12.5.

Table 2. *Monocoryne bracteata*. Measurements (mm) of length and diameter.

	Fraser 1941	Rees 1957b	Kuril Islands
Length of full polyp	33		25–36
Length of polyp head	11		12
Diameter of polyp head	2–4		4
Length of gonophore	0.8	0.8–1.5	2–3
Diameter of gonophore	0.3–0.4		1–2
Length of aboral tentacle	0.9–1.0		1

Monocoryne bracteata (Fraser, 1941)
(Figs 2, 3, 6.2; Table 2)

Symplectanea bracteata – Fraser 1941:78–79, plate 13, fig. 1
Monocoryne bracteata – Rees 1957b:17–19, fig. 1

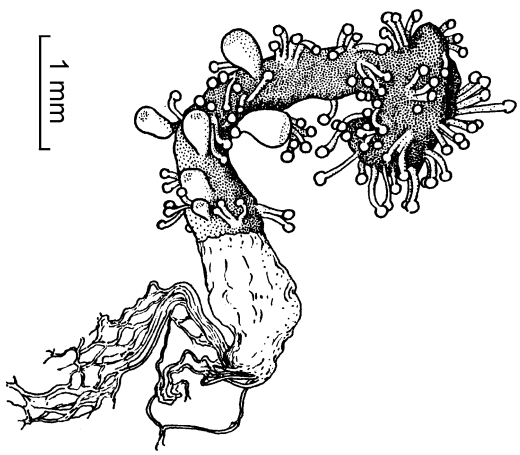

Fig. 4. *Monocoryne minor*. Type specimen from South Africa (after Millard 1975).

Distribution

(1) Holotype, US Fisheries Research, "Albatross" Station 4253, Thiste Ledge, Stephens Pass, South Alaska, 131 fathoms (240 m), 17 July 1903 (Fraser 1941). (2) Urup Island, Kuril Islands, Russia, 1987, 300 m depth.

Remarks

Fraser (1941) described the polyp as solitary and as lacking a perisarc, but a re-description of this specimen by Rees (1957b) showed that the basal part of the hydrocaulus is covered by a thin transparent perisarc, and that this basal perisarc is drawn out into a basal disc. On the hydranth, capitate tentacles are distributed into groups of three to seven. Fraser stated that the species differs from others of *Monocoryne* in that tentacles of each group are fused together into a basal part which looks like the "bract" seen in the Siphonophora. This basal part protects the gonophores which are present in nearly every group of tentacles. Female gonophores are large, oval and elongated, with a short pedicel. In mature gonophores, nearly ripe eggs could be seen. The eggs occupied only part of the gonophore. Rees supposed that the other part was filled with sperm, which means that the gonophores are possibly hermaphroditic as in *M. gigantea*.

In the material from the Kuril Islands there is a colony containing about 10 polyps connected to a common basal plate (Fig. 3B) in addition to solitary polyps, each more or less elongated, with the hydranth reaching about one third the total length and the hydrocaulus spanning the remaining two thirds. The basal part is covered by a perisarc (Fig. 2B). The hydranth bears groups of two to five capitate tentacles, with one tentacle always larger than the others. Only in the fragment with two fused polyps were "bract"-like tentacle groups seen, although they were considered by Fraser (1941) as characteristic for *Symplecteana bracteata*. Mature polyps have one or two gonophores per group of tentacles. The gonophores (sporosacs?) are pear-like, with numerous eggs, but it was not possible to see if these gonophores are hermaphroditic or not.

Table 3. *Monocoryne minor*. Measurements (mm) of length and diameter.

	Millard 1966	Re-description
Length of full polyp	5	5.2
Length of naked part of polyp	3.8	4.0
Diameter of naked part of polyp		1.3
Length of gonophore		0.8
Diameter of gonophore	0.3	0.4
Length of tentacle		0.8

Nematocysts (in μm), in material from the Kuril Islands (Fig. 6.2): stenoteles 15–25 × 12–21; microbasic mastigophores 21–37 × 7–14; desmonemes 11.5–12.5 × 8–9; microbasic euryteles 35.0–37.0 × 12.0–12.5.

Monocoryne minor Millard, 1966
(Figs 4, 6.4; Table 3)

Monocoryne minor – Millard 1966:435, fig. 1; Millard 1975:43–45, fig. 17a, b; Stepanjants 1979:26, fig. 3.

Distribution

Known only from the type locality, South Africa, Agulhas Bank, 77 m (Millard 1966).

Remarks

Millard's (1966) type specimen of this species was re-examined and a new diagnosis is given.

A solitary polyp, 5 mm in length. Hydranth length about two thirds and hydrocaulus making up the remaining one third. Hydrocaulus covered by a thin perisarcal tube, part of it sticking together and forming a plate, with new polyps presumably budding from this plate. Hydranth nearly the same diameter as basal part of polyp. Tentacles regularly distributed over entire hydranth, either solitary or combined into groups of two to five, with one of them larger (as a rule). Gonophores

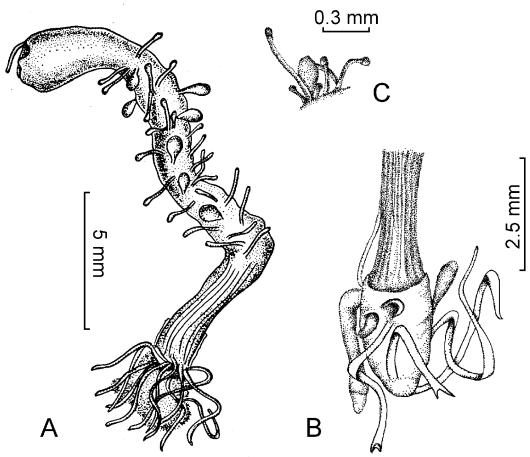

Fig. 5. *Monocoryne* sp. A. Specimen from Antarctic Sodruzestva Sea (after Stepanjants 1979). B. Base of same colony with young polyps. C. Tentacle group with gonophore from the same colony.

Table 4. *Monocoryne* sp. Measurements (mm) of length and diameter.

	Young polyp	Formed polyp
Length of full polyp	8	20
Length of polyp head	2	16
Diameter of polyp head	1	1.5
Length of gonophore		1
Diameter of gonophore		0.5
Length of tentacle	0.28	0.9

(sporosacs?) about 10 in number, small, pear-shaped, with no distinct pedicel, irregularly distributed on hydranth, not connected to tentacles.

Nematocysts (in μm) in holotype (Fig. 6.4): stenoteles 15.3–18.0 × 13.0–15.3; macrobasic mastigophores (?) 16.2–18.9 × 6.3–7.6; desmonemes 9.0–13.5 × 6.3–10.8.

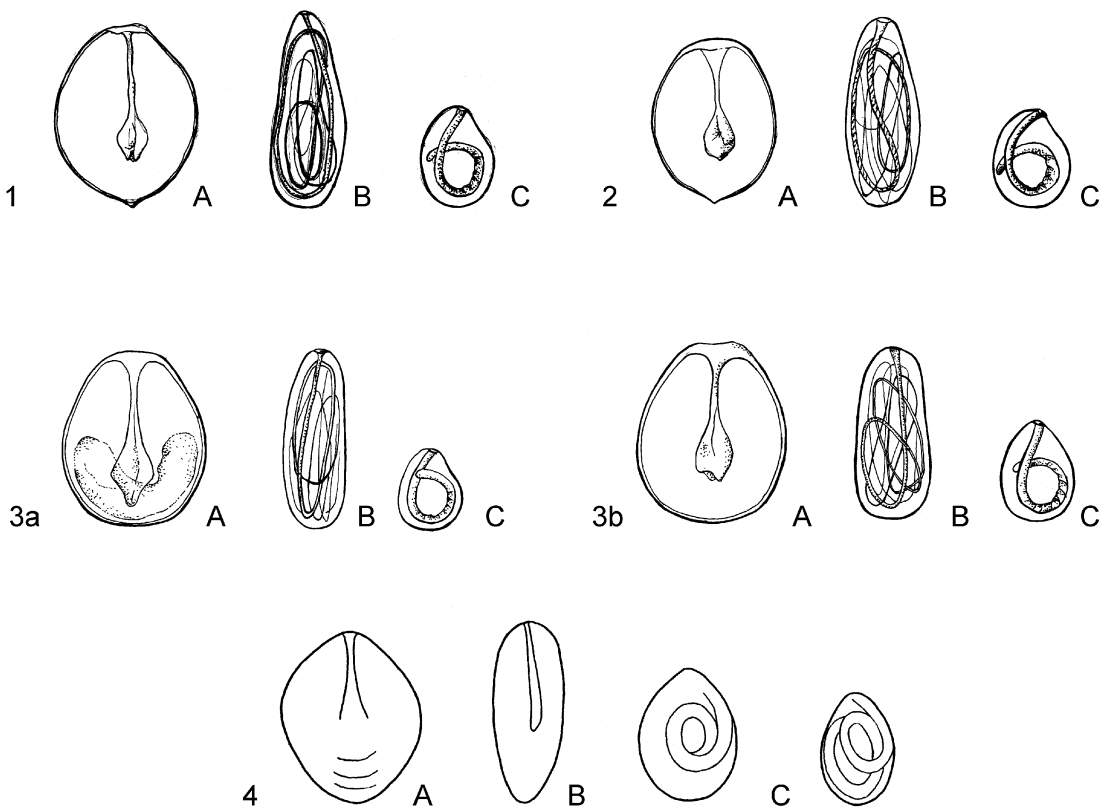

Fig. 6. Nematocysts of the different *Monocoryne* species (by Anokhin). 1. *Monocoryne gigantea*. 2. *Monocoryne bracteata*. 3a. *Monocoryne* sp., sterile specimen. 3b. *Monocoryne* sp., fertile specimen. 4. *Monocoryne minor* (after Millard 1966). Undischarged capsules of: A. Stenotele. B. Microbasic mastigophores. C. Desmonemes.

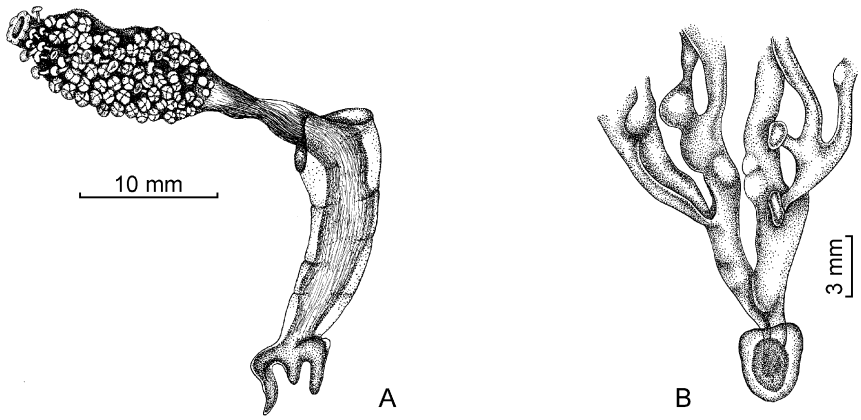

Fig. 7. *Fabulosus kurilensis.* A. Type specimen from the Kuril Islands (Shiashkotan Island). B. Base of same colony (after Stepanjants & al. 1990).

Monocoryne sp.
(Figs 5A–C, 6.3a, b; Table 4)

Monocoryne sp. – Stepanjants 1979:26, plate 16, figs 2, 3.

Distribution

The only record is from Sodruzestva Sea, off Amery Glacier (Indian sector of the Antarctic shore), 3–20 and 3–35 m depth, on rocks (Stepanjants 1979).

Fig. 8. *Fabulosus kurilensis.* Type specimen from the Kuril Islands.

Remarks

One of the polyps is young and sterile. The hydrocaulus is enclosed by a thin perisarc tube. The hydranth is naked and accounts for about one quarter the total length. The tentacles are capitate, irregularly distributed, and either solitary or arranged in groups with two tentacles having a common base and one being larger than the other. The second polyp is also young (Fig. 5A). The hydranth bears three to four capitate tentacles per group, and several young gonophores with distinct pedicels associated with the tentacle groups are present (Fig. 5C). The sex of the gonophores could not be determined. The basal part of the polyp is covered by a thin perisarc and filaments for attachment. Several polyp buds of different ages, from very young to more or less fully formed, arise from the base of the mother polyp (Fig. 5B). These buds were not mentioned in the first description (Stepanjants 1979).

Nematocysts (in µm) from two polyps from the Zoological Institute collection (Figs 6.3a, b): stenoteles (a) young polyp 10.0–17.0 × 7.0–14.0, (b) matured polyp 12.0–17.0 × 7.0–13.0; macrobasic mastigophores (?) (a) 15.0–16.0 × 5.0–6.0, (b) 17.0–18.0 × 6.0–8.0; desmonemes (a) 7.0 × 5.5, (b) 9.0–10.0 × 6.0–7.0.

DISCUSSION

In the type species, polyps were described as solitary by Bonnevie (1899a) and later by Broch (1910, 1916), Calder (1972) and Antsulevitch (1988). However, Swenander (1904) and Johannesen (1924) described

young polyps developing at the basal part of the hydrorhiza. Re-examination of materials of *M. gigantea* from Franz Josef Land and of *Monocoryne* sp. from the Antarctic confirmed this. Similar colonial aggregates are described by Rees (1957b) for *M. bracteata*. In the collection of *M. bracteata* from the Kuril Islands, the colonial nature of the hydroid was supported by the finding of a colony with 10 polyps connected to a common basal hydrorhizal plate (Fig. 3B). In the same collection there were also solitary polyps of *M. bracteata*. It means that *Monocoryne* representatives can form colonies, although they are merely loose aggregates that easily fall apart. We regard this as a primitive type of colony when new stolonal cell material from hydrorhiza may creep at the outer surface of polyps and give rise to a new polyp. A closely similar type of coloniality was described for the coronate polyps (Scyphozoa), such as *Stephanoscyphus komaii* (later *Linuche unguiculata*) (Chapman & Werner 1972; Werner 1973; Ortiz-Corp's & al. 1987). A similar situation was described for *Fabulosus kurilensis* Stepanjants, 1990 (Figs 7, 8) (Stepanjants & al. 1990). Colonial polyps (the same type of colony) were described for a new species, *Candelabrum fritchmanii* (Hewitt & Goddard, 2001). Additional studies will be necessary before a detailed comparison of coloniality in such primitive groups as Scyphozoa and some Hydrozoa can be made.

The differences between the described species of *Monocoryne* are small. The status of *Monocoryne* sp. is not fully settled, because only two young polyps are known. These specimens are much larger than hydroids of *M. minor*, although the two are otherwise similar morphologically. The gonophores of *M. minor* may be different in having no pedicels. *Monocoryne minor* and *Monocoryne* sp. differ from *M. gigantea* and *M. bracteata* mainly in the smaller size of their nematocysts. *Monocoryne bracteata* is larger than *M. gigantea,* and is the only species in which the tentacle groups are developed into "bracts".

Monocoryne species have been found in Arctic and high boreal regions (*M. gigantea, M. bracteata*), as well as in the Antarctic (*Monocoryne* sp.), and off Natal, South Africa (*M. minor*). *Monocoryne* can thus be classified as a bipolar genus (Stepanjants & al. 1997). The geographical distribution of the *Monocoryne* species in different oceans suggests that they are different species, with *M. gigantea* in the Atlantic, *M. bracteata* in the Pacific, *Monocoryne* sp. in the Antarctic and *M. minor* off South Africa.

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