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The genus *Gymnogonos* (Anthoathecata: Capitata: Corymorphidae)—redescription of known species and description of a new species from the North Pacific

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Four valid species of the genus Gymnogonos *are known at this point of investigations:* G. crassicornis *(northern Atlantic and the Arctic Seas);* G. obvolutus *(northern Atlantic and the Arctic Seas);* G. ameriensis *(circumantarctic distribution) and the new species* G. pacificus *(northern Pacific). Other species, such as* Corymorpha antarctica *(Pfeffer, 1889) and* Tubularia cingulata *(Vanhöffen, 1910) from the southern hemisphere are recognized as 'species inquirendae'. New descriptions and taxonomic discussions of the known* Gymnogonos *species have been proposed. This genus has a typical bipolar distribution in the classical meaning of this term. This genus origin may rise from tropical Corymorphidae by neoteny in the period of glacial cooling.*

Keywords: genus *Gymnogonos*, new species, bipolar distribution, North Pacific

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INTRODUCTION

Gymnogonos was described by Bonnevie (1898, 1899) from the collection of the Norwegian North Sea Expedition. The type-species of this genus is *Gymnogonos crassicornis*, described by Bonnevie (1898) from a tiny, solitary polyp from the Trondheim Fjord (Norway), at 400 m deep (Figure 1A).

About this time and later new species from the southern hemisphere were described: *Corymorpha antarctica* (Pfeffer, 1889; Hartlaub, 1905) and *Tubularia cingulata* (Vanhöffen, 1910). Judging from the short descriptions and illustrations these species are similar to *Gymnogonos crassicornis*, but faulty illustrations (*T. cingulata*) or their absence (*G. antarctica*), and lack of description of the typical species characters and differential diagnosis allow us to consider these species as 'species inquirendae' (*International Code of Zoological Nomenclature*, 1999, Glossary). *Myriothela* sp. (Hickson & Gravely, 1907) was described based on the small juvenile specimen from the Ross Sea (see below). Finally a new Antarctic species *Corymorpha ameriensis* was described (Stepanjants, 1979). Later, the aforementioned species from the southern hemisphere were preliminarily classified as belonging to the genus *Gymnogonos* (Stepanjants & Svoboda, 1999).

Another species similar to *Gymnogonos crassicornis*, *Corymorpha obvoluta*, is known from the northern hemisphere (Kramp, 1933). In the context of the redescription of the Antarctic species *Corymorpha ameriensis*, this and the other species were added to *Gymnogonos* (Stepanjants & Svoboda, 2001).

In the collection of the Zoological Institute of the Russian Academy of Sciences additional material from the North Pacific (the Kurile Islands area) was found. It consists of an aggregate colony and solitary polyps, evidently from the same colony (see Materials and Methods section), belonging to the genus *Gymnogonos*. The morphological description suggests that the colony belongs to a new species which we name *Gymnogonos pacificus*. It is the first representative of *Gymnogonos* from the North Pacific.

MATERIALS AND METHODS

The material was collected by the Norwegian North Sea Expedition by dredging in the Norwegian Sea at the end of 19th Century, by the Russian expeditions to the Barents Sea with the vessels 'Andrey Pervosvanniyi' (1900), 'Romuald Mukhlevich' (2003), 'Ivan Petrov' (2003), from the East Siberian Sea with 'Sadko' (1937), and close to the Novosibirskiye Islands (1973) by diving. The collections of *Gymnogonos* of The Natural History Museum, London (one specimen of *Myriothela* sp.) and of the Museum für Naturkunde of the Humbold University Berlin (type-specimen of *Tubularia cingulata*) were investigated. Slides of *Gymnogonos ameriensis* from the collections of the Zoological Institute of the Russian Academy of Sciences (ZIN RAS) were considered too. Finally the type colony and separate polyps of a new species *G. pacificus* were investigated in detail and illustrations were prepared. Details of the dredging stations of the specimens are described in Table 1.

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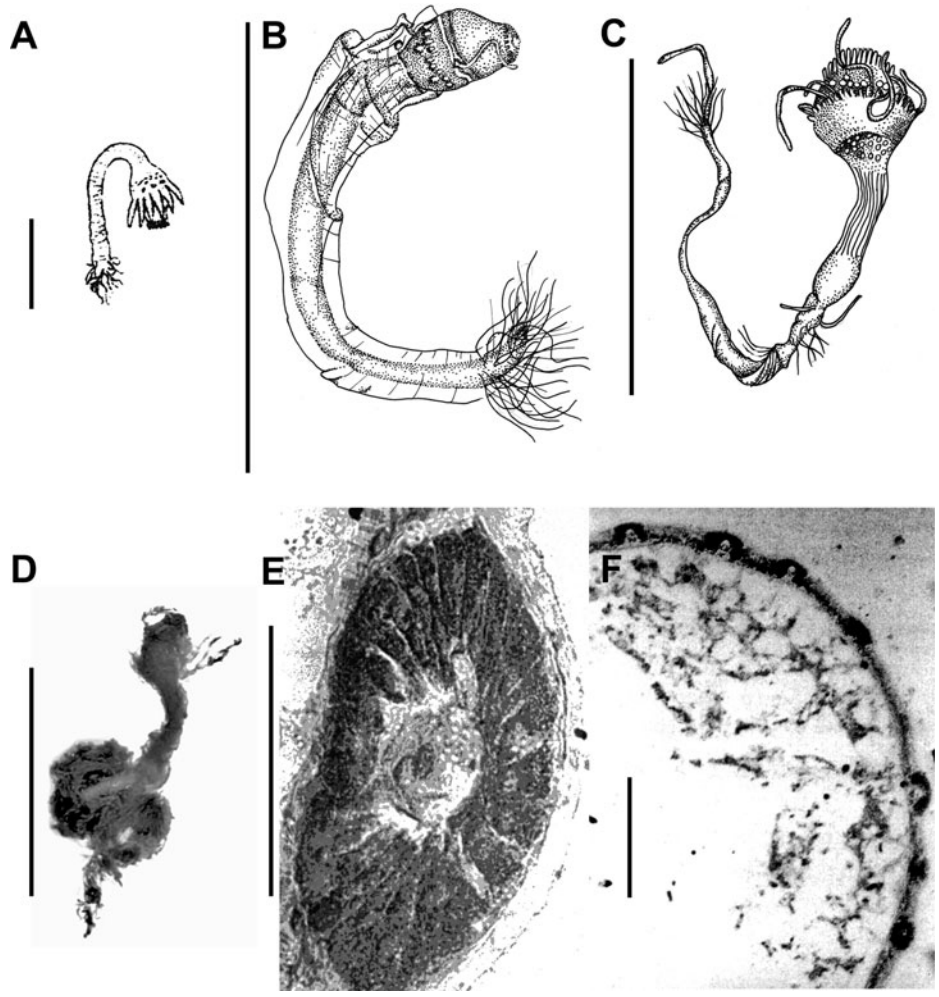

Fig. 1. *Gymnogonos crassicornis* Bonnevie, 1898. (A) holotype; Trondheim Fjord, 400 m; after Bonnevie, 1898; (B) juvenile specimen from the Barents Sea, collected by 'Romuald Mukhlevich', 15 August 2003 (material is in bad condition); (C) juvenile specimen from the Barents Sea, collected by 'Andrey Pervosvanniyi', 25 June 1900; (D) small polyp from the Barents Sea, collected by 'Romuald Mukhlevich', 17 August 2003; (E) transversal section of the papilla; (F) transversal section of head of polyp, on the level between gastral cavity of head of polyp and papillae level. Scale bars: A–D, 5.0 mm, E, 100 μm; F, 400 μm.

RESULTS AND DISCUSSION

Gymnogonos crassicornis Bonnevie, 1898 (Figures 1A–F, 5; Tables 1–3)

Gymnogonos crassicornis Bonnevie, 1898: 181, 182, Taf.XXV, figures 1–11; 1899: 16, 19;
Kramp, 1949: 11; 1949: 200, 202, figure 8; Petersen, 1990: 148; Schuchert, 2001: 41, figure 28 A–B; Stepanjants & Svoboda, 1999: 47–54, figures 1(1, 2);
Stepanjants & Svoboda, 2001: 249; Table; figures 1, 2, 8, 9;
Epifanova, 2007: 140; 2007: 16, 19, figure 2A, B.

Solitary polyps 5.0–17.0 mm length and diameter of head of polyp about 1–2 mm. Polyps covered by very thin, membranous, transparent perisarc. Constriction between head of polyp and caulus clear (Figure 1A–D). Head of polyp with two sets of hollow, cylindrical (oval in cross-section) filiform oral tentacles, up to 20 in number, distributed in 2–3 compact whorls around mouth; their length up to 1 mm. Up to 12 moniliform, hollow aboral tentacles, each 3–4 mm in length, distributed in one row. Gonophores styloids, distributed between oral and aboral tentacles, solitary, each attached to its own style. There are no branched blastostyles. Solid papillae below aboral tentacles, distributed in several rows (Figure 1A–C, E, F). Rooting filaments on basal part of caulus; no longitudinal gastral canals in caulus. No parenchymatous diaphragm between gastral cavity of head of polyp and caulus (Figure 1F).

Nematocysts (μm): stenoteles 14.0–16.0 × 10.0 (Stepanjants & Svoboda, 2001); 15.0–21.0 × 11.0–19.0 (new specimens); desmonemes 5.0–10.0 × 5.0–7.0; unidentified rhabdoids 16.0–20.0 × 5.0–6.0; euryteles were not found.

Gymnogonos crassicornis specimens were found in Norwegian Sea (400 m deep), near Iceland (about 209 m) and in the Barents Sea (17.5–9.0 m; 260 m; 136 m; 167 m). It is a typical high boreal west-Arctic species.

Gymnogonos obvolutus (Kramp, 1933). (Figures 2A–G, 5, Tables 1–3)

Corymorpha obvoluta Kramp, 1933: 4–14; figures 1–9; 1949: 193, 194, figure 5.
Heteractis obvoluta Broch, 1937: 19, 20.
Gymnogonos obvolutus: Petersen, 1990: 149, 150; figure 16A; Schuchert, 2001: 42; Stepanjants & Svoboda, 1999: 48–53;
Stepanjats & Svoboda, 2001: 249–251; Table; figures 3, 4.

Table 1. Investigated material of *Gymnogonos* species.

NN	Species	Hemisph	Coll. No.	Location, depth	Expedition	Polyp length (mm)	Material
1	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. of Zoological Museum of Oslo, Norway	Trondheim Fjord (Norway), 400 m	Norwegian North Sea Expedition, 1896	15.0	Slides by Bonnevie with transversal sections of type polyp
2	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS, N1/10753 part of slides of type-N1 material	Trondheim Fjord (Norway), 400 m	Norwegian North Sea Expedition, 1896		8 slides prepared by Bonnevie
3	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS, N2/10731	The Barents Sea; 17.5 – 9.0 m; Rayd, near beak Kharmakun	ENPIM – 'Andrey Pervosvanniyi' Station 250, hydrologogical survey 552; 25 June 1900.	12.0	One polyp and fragments
4	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS N3/10582	The Barents Sea 71°59769′N; 33°57666′E; 260 m	'Romuald.Mukhlevich'; Rip 1, Station 39, mud, sand with clay, grab 4; 15 June 2003; leg N. Epifanova	7.0 – 17.0	Two polyps
5	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS, N4/10732	The Barents Sea 69°00380′N; 40°02650′E; 136 m	'Romuald.Mukhlevich'; Rip 1, Station 61; sand with fine stones; 22 August 2003 leg N. Epifanova	5.0	One polyp
6	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS, N5/10733	The Barents Sea 68°58270′N; 37°58962′E; 167 m	'Romuald Mukhlevich'; Rip 1, Station 46; mud, sand and grab; 17 August 2003. leg N. Epifanova	5.0	One juvenile polyp
7	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS, N6/10734	The Barents Sea 76°5952′N; 50°4196′E, 350 m	BASICC – 2003 'Ivan Petrov' Norwegian Expedition, Station 38-3, 20 August 2003; leg S. Denisenko, A. Voronkov, S. Potin	12.0	One polyp
8	*Gymnogonos crassicornis* Bonnevie, 1898	N	Coll. ZIN RAS, N7/10735	The Barents Sea 76°4338 N; 32°4465′E; 193 m	BASICC - 2003 'Ivan Petrov' Norwegian Expedition, Station 11-5 13 August 2003 leg S. Denisenko, A. Voronkov, S. Potin	–	Fragments only
9	*Gymnogonos obvolutus* (Kramp, 1933)	N	Coll. ZIN RAS, N1/10728	The East Siberian Sea; south side of Jeanette Island; 76°478′N; 158°045′E, 20 m	'Sadko' Expedition; Station 37, 6 September 1937; stone fragments, pebble; leg Gorbunov	18.0	One juvenile polyp
10	*Gymnogonos obvolutus* (Kramp, 1933)	N	Coll. ZIN RAS, N2/10729	Novosibirskiye Islands, Makar Island; 10 m	Sample 11b; Rip 4; 18 August 1973; temperature –2.3° C; sand	6.0 – 32.0	6 polyps
11	*Gymnogonos obvolutus* (Kramp, 1933)	N	Coll. ZIN RAS, N3/10730	Novosybirskiye Islands Makar Island; 10 m	Sample 12b; Rip 2; 18 August 1973, temperature –2.3° C; sand	3.0 – 14.0	17 juvenile polyps
12	*Gymnogonos obvolutus* (Kramp, 1933)	N	Coll. ZIN RAS, 4/10740	Laptev Sea 79°293 N; 104°292′E; 106 m	'Polarstern'; 3 August 1995 Station 36/016 GKG; sand; temperature 1.46° C; salinity 34.32‰	12.0	One juvenile polyp

Continued

Table 1. Continued

NN	Species	Hemisph	Coll. No.	Location, depth	Expedition	Polyp length (mm)	Material
13	*Gymnogonos obvolutus* (Kramp, 1933)	N	Coll. ZIN RAS, N5/10741	Laptev Sea 79°293 N; 104°297′E 101 m	'Polarstern'; 13 August 1995 Station 36/010 GKG; sand; temperature 1.46° C; salinity 34.32‰	12.0	One juvenile polyp
14	*Gymnogonos ameriensis* (? *Corymorpha antarctica* Pfeffer, 1889)	S	Zoolological Museum of the University of Hamburg data from Pfeffer,1889 (specimens got lost in 1945), only description was investigated	South Georgia Island, 0 m		7.0	Several polyps
15	*Gymnogonos ameriensis* (?*Tubularia cingulata)* (Vanhöffen, 1910)	S	Museum für Naturkunde, Berlin: Zmb Cni 14856 holotype	Gaußberg, Twist 70 m	Deutsche Südpolar Expedition, November 1902	3.0	One type-polyp
16	*Gymnogonos ameriensis* (*Myriothela* sp)	S	BMNH coll. CR 05/55	Winter station, Ross Sea area	Antarctic Expedition 'Discovery' 13 November 1902	8.0	One polyp
17	*Gymnogonos ameriensis* (Stepanjants, 1979)	S	Coll. ZIN RAS, N1/9410 holotype-specimen	Sodruzestva Sea; Aimery Glacier; 30–35 m	16 SAE; Station 3531; 17 February 1972 Diving collectors Gruzov, Sheremetevskyi	34.0	One type-specimen
18	*Gymnogonos ameriensis* (Stepanjants, 1979)	S	Coll. ZIN RAS, N2/9411 Paratypes	Sodruzestva Sea; Aimery Glacier; 15 m,	16 CAE; Stations 3558 and 3567; 18 February 1972; rocks; Collected by diving Gruzov, Sheremetevskyi	–	Transversal sections were prepared
19	*Gymnogonos ameriensis* (Stepanjants, 1979)	S	Coll. ZIN RAS, N3/9412 slide sections	Sodruzestva Sea; Aimery Glacier; 25 m	16 CAE; Stations 3558 and 3567; 18 February 1972; rocks; Collected by diving Gruzov, Sheremetevskyi	–	Slides with longitudinal sections
20	*Gymnogonos* pacificus sp. nov., Stepanjants & Svoboda	N	Coll. ZIN RAS, N1/10850 holotype-specimen	48°02′17″N; 154°24′05″E Kurile Island, Lovushka Rocks; 580 m	'Odissey', 3 August 1984; Sand with gravel; drag; leg Sirenko, Kolesnikov	2.0–20.0	One colony and several solitary polyps belonging to the same colony

In Table 1: NN, column of ordinal number of investigated collection; Hemisph, column of N /northern/ and S /southern/ hemisphere; Coll. No, deposition of investigated collection and its number.

Table 2. Comparison of species-specific parameters of *Gymnogonos* species.

Gymnogonos species	Constrictions (1)	Hypostome size (2)	Aboral tentacle distribution (3)	Polyps solitary or colonial (4)
G. crassicornis	Clear	Short	One row	Solitary
G. obvolutus	Absent	Short	One row	Solitary
G. ameriensis	Clear	Short	Two rows	Solitary
G. pacificus	Not clear or absent	Elongated	Two rows	Colonial

Solitary polyps 3–18 mm in length and 1–3 mm in diameter (in our juvenile polyps) and up to 32 mm in length and about 6 mm in diameter of the caulus. Polyps covered by thick, transparent, membranous perisarc, extending to border of base of aboral tentacles. There is no constriction between head of polyp and caulus. Head of polyp with two sets of tentacles: oral set, up to 20 tentacles, distributed in one whorl around mouth. They are filiform, hollow, cylindrical (oval in cross-section), their length of up to 1 mm. The up to 28 aboral tentacles are distributed in one row. In our material, the oral and aboral tentacles are moniliform, i.e. tentacles have transversal nematocyst bands (Figure 2A, C, D). Below the aboral tentacles, there are small solid papillae, which are poorly recognizable in juvenile polyps. Gonophores are cryptomedusoids and have a large manubrium (spadix), rudiments of 4 marginal tentacles, a bell cavity and no radial canals. The gonophores distributed between oral and aboral tentacles. They are not located on branched blastostyles, but in clusters of 2–3 gonophores on a common style (Figure 2E). There are no typical rooting filaments at the base of caulus. Occasionally such structures can be seen in the middle of caulus, but they are occasionally located at the base of caulus. There are longitudinal gastral canals in type-polyp (Kramp, 1933: p.6; this paper Figure 2A). In our material, there are poorly distinguishable longitudinal gastral canals of caulus in one of the polyps. There is no parenchymatous diaphragm between gastral cavity of the head of polyp and caulus.

Nematocysts (μm): stenoteles: 25.0 × 20.0 (Stepanjants & Svoboda, 2001); 8.0 × 10.0 (new specimens); (?)rhabdoids: 7.0–8.0 × 4.0–4.5 (Stepanjants & Svoboda, 2001); 16.0–18.0 × 6.0–7.0; 11.0 × 4.0; (?)euryteles were not found.

Gymnogonos obvolutus was found near south-east Greenland (175 m; Kramp, 1933), in the Laptev and the East Siberian Seas (10–106 m). It is a west-boreal high Atlantic and Arctic species.

Gymnogonos ameriensis (Stepanjants, 1979). (Figure 3A–F, 5 Tables 1–3)

Corymorpha ameriensis Stepanjants, 1979: 23, Table II, figure 6; Table XXV, figure 1;
Gymnogonos *ameriensis* Stepanjants & Svoboda, 1999: 52, 53; Stepanjants & Svoboda, 2001: 247–252, figures 5, 10;
?*Corymorpha antarctica* Pfeffer, 1889: 17; Hartlaub, 1905: 543, 544;
?Tubularia cingulata Vanhöffen, 1910: 279, 280, figure 5;
Myriothela sp Hickson & Gravely, 1907 18, 19, Table III, figure 18;

Table 3. Nematocyst size of each *Gymnogonos* species.

Species of *Gymnogonos*	Stenoteles μm		Desmonemes μm	(?)Rhabdoids μm		(?)Euryteles μm
	Type	New	Type and new	Type	New	
G. crassicornis	14.0–16.0 × 10.0–11.0	15.0–21.0 × 11.0–19.0	5.0–10.0 × 5.0–7.0	16.0–20.0 × 5.0–6.0	16.0 × 5.0	?
G. obvolutus	19.0–25.0 × 13.0–20.0	19.0 × 12.0	7.0–8.0 × 4.0–4.5 8.0 × 10.0	16.0–18.0 × 6.0–7.0	11.0 × 4.0	?
G. ameriensis	12.0–19.0 × 9.0–12.0		6.0–10.0 × 6.0–7.0	16.0–18.0 × 6.0–7.0		28.0 × 25.0
G. pacificus	18.0–23.0 × 12.0–20.0		7.0 × 10.0	11.0–15.0 × 4.0–6.0		17.5–20.0 × 15.0–16.5

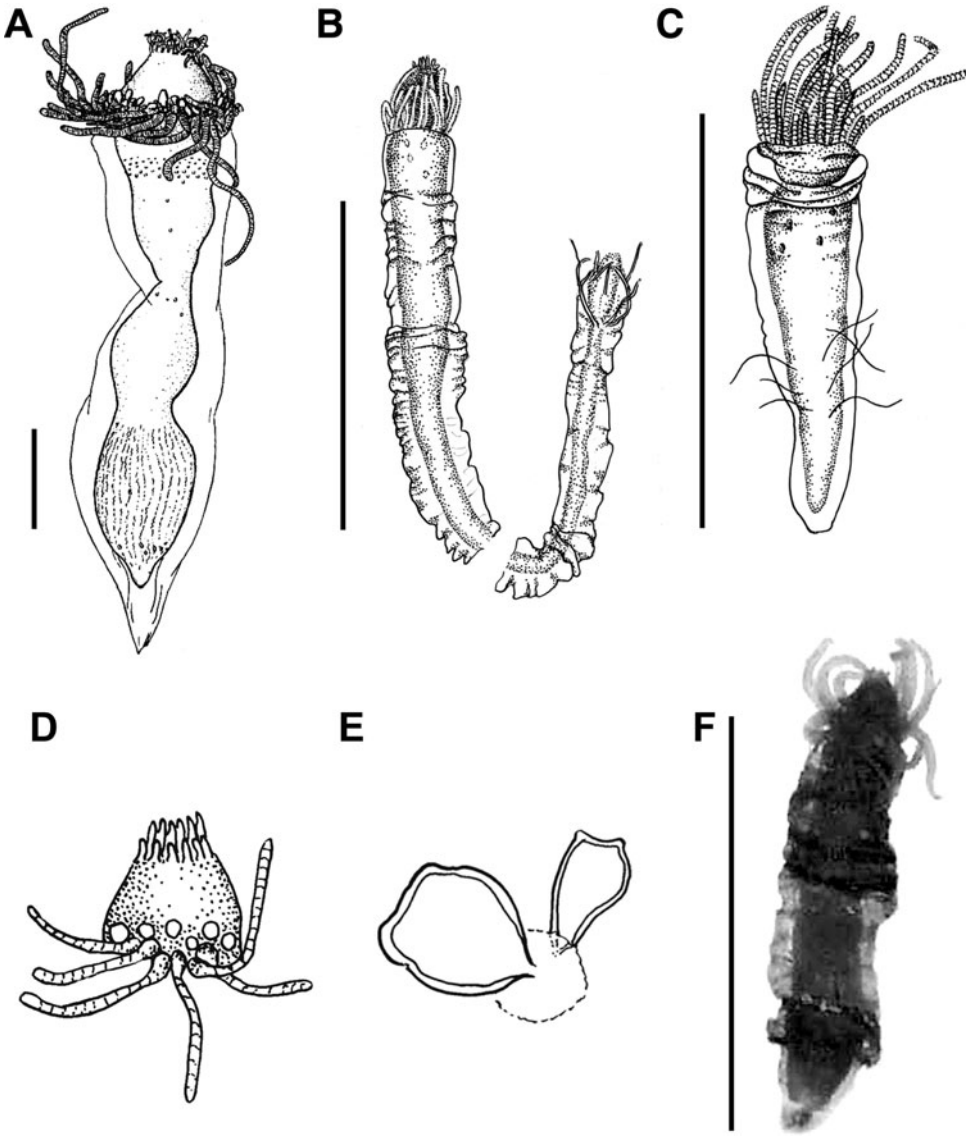

Fig. 2. *Gymnogonos obvolutus* (Kramp, 1933). (A) type-specimen from the Kangerdluggsuak Fjord (south-eastern Greenland, 175 m deep—after Kramp, 1933); (B) elongated specimen from the Novosibirskiye Islands area (the East Siberian Sea, 10 m deep); (C) short specimen from the same place; (D) oral tentacles distributed around the mouth; aboral tentacles distributed under gonophores; schematically; (E) cryptomedusoid gonophore group on common style, schematically; (F) short specimen collected at Makar Island, 18 August 1973, near Novosibirskije Islands. Scale bars: A–C, F, 5.0 mm.

Solitary polyps up to 34 mm in length, about 4–5 mm in diameter and light yellow in coloration. Constriction between the head of polyp and caulus visible. Polyp covered with thin, membranous, transparent perisarc, secreted below aboral tentacles. Head of polyp with two sets of tentacles. Up to 50 oral tentacles grouped in several compact whorls around hypostome; they are filiform, hollow, cylindrical (oval in cross-section), up to 1.5 mm in length with nematocyst rings and up to 40 aboral tentacles 2.5–4.5 mm in length, distributed in two rows and have markedly expanded basal parts. Below whorl of aboral tentacles there is a deep annular furrow, followed by closely packed solid papillae. Few papilla groups or solitary papillae are scattered along caulus. Basal part of caulus with many thin perisarcal rooting filaments. About 30 styloid gonophores (only male in our material) are situated in the upper part of head, between oral and aboral whorls of tentacles. Each gonophore attached to head of polyp with its own short leg. There are no branched blastostyles and no longitudinal gastral canals usually visible on caulus.

Nematocysts of type-specimen (μm): stenoteles: 12.0–19.0 × 9.0–12.0; desmonemes 6.0–10.0 × 6.0–7.0; rhabdoids(?) 16.0–18.0 × 6.0–7.0; euryteles(?) 28.0 × 25.0.

The older literature contains the descriptions of several species from the southern hemisphere which are comparable with *G. ameriensis*. The first one is *Corymorpha antarctica* from the South Georgia area (Pfeffer, 1889, Hartlaub, 1905). The description of this species suggests that it is a juvenile polyp (not fully developed gonophores and small size—only 7 mm in length). Both polyps have a yellow coloration, no evident constriction between the head of the polyp and caulus. They have hollow, filiform oral tentacles (about 20 in number) and a large number of aboral tentacles (40 in *G. ameriensis* and about 80 in *G. antarctica*). The gonophores are not fully developed (according to Pfeffer, 1889) but more or less mature, with radial canals, but without tentacles and ring

canal (Hartlaub, 1905). No branched blastostyles. There is no possibility to draw a final conclusion, because the type specimen of *Corymorpha antarctica* was lost after 1945 and there are no illustrations or species-specific details in previous publications. We suggest *C. antarctica* as 'species inquirenda' and consider *C. antarctica* with doubt as synonym with *G. ameriensis*.

Two juvenile specimens, probably belonging to *Gymnogonos*, were found later in the Antarctic region. We could obtain both related specimens from the British Museum of Natural History and from the Museum für Naturkunde, Berlin. One of them, collected near the Ross Sea area, was described as *Myriothela* sp. by Hickson & Gravely (1907: 18). This specimen (8 mm in length) lacks mature gonophores and has short tentacles, but bears papillae around the basal part of the head of polyp below deep annular furrow and rooting filaments at the base of caulus. The aboral tentacles of this polyp are distributed in two whorls, what may be concluded both in the illustration of *Myriothela* sp. (Hickson & Gravely, Table III, figure18) and after investigation of the type-polyp. These morphological details suggest that it is a juvenile specimen of *G. ameriensis* (Figure 3C). The second juvenile specimen was found by the Deutsche Süd-Polar-Expedition at Gauss-Berg and described as *Tubularia cingulata* by Vanhöffen (1910). The illustration shows only the head of the polyp, but the specimen (3 mm in length) shows more details than were described originally (Figure 3D). The polyp consists of a tiny head, the aboral tentacles (about 20) are distributed in 2 whorls. There is a deep annular furrow and papillae below the aboral tentacles and rooting filaments at the caulus. The incomplete description and unclear illustration allows us to classify this species as 'species inquirenda' and it is probably a juvenile polyp of *G. ameriensis*. New additional material is needed to decide this question ultimately.

Nematocysts of these juvenile polyps (μm). *Myriothela* sp: stenoteles 18.0 × 17.0; desmonemes 6.0–10.0 × 6.0–7.0; (?)rhabdoids 11.0–13.0 × 6.0–10.0; (?)euryteles19.0–20.0 × 17.0; *Tubularia cingulata:* only (?)rhabdoids 11.0 × 5.0.

In sum, we conclude that at the moment there is only one valid species of *Gymnogonos* in the Antarctic and Subantarctic —*G. ameriensis* with a circumantarctic distribution.

Gymnogonos pacificus Stepanjants et Svoboda, sp. nov
(Figures 4A–E, 5, Tables 1–3)

Material examined

Holotype specimen N 1/10850. Aggregate colony and its fragments—6 separated polyps of different age; 2 heads of polyps and, accordingly, 2 hydranths, possibly from the same colony. Type locality Kuril Islands; Rocks Lovushka Island 48°02′17″N, 154°24′05″E; 'Odissey' e/s; voyage 33; 3 August 1984; depth 580 m; sand with gravel; drag; leg. Sirenko, Kolesnikov (Table 1).

Diagnosis. The first distinctive character is presence of the aggregate colony which consists of several polyps of different ages: from juvenile to mature stages. Each polyp has either no or a poorly recognizable constriction between head and caulus of hydranth. The oral tentacles are short and distributed around the mouth at the end of remarkable elongated hypostome. Elongated hypostome is the second character of this species. The aboral tentacles are much longer and distributed in two rows. Between the oral and aboral tentacles there are whorls of gonophores: 2–3 gonophores in each group on joint style One gonophore of each group is significantly larger than the others (Figure 4E) (the third character of this species). They are cryptomedusoids (undifferentiated sex) and display several (~4) tentacles buds. Below the aboral tentacles, there is a poorly visible annular furrow. Below this furrow there are numerous papillae (typical for *Gymnogonos*). Another typical feature of this genus is the thin membranous, transparent perisarc covering the caulus up to the base of the polyp head.

Description. Aggregate colony (unstable colony, Stepanjants *et al.*, 2002), sometimes separated into solitary polyps after fixation, consists of several polyps in all stages of age (Figure 4A). Size of polyps ranges from 2.0–20.0 mm in length. Each mature polyp has two sets of tentacles on its head: oral tentacles (about 20 in number) are very short (about 0.5 mm in length) and distributed in one row around mouth on oral part of elongated hypostome (Figure 4B), The aboral tentacles (more than 20 in number) are filiform, hollow, about 8.0 mm in length and distributed into two rows. Each mature polyp has an inconspicuous annular furrow at the base of head (Figure 4D). Below this furrow there are numerous papillae (Figure 4C). The perisarc covers the caulus up to border of head. It is membranous, thin and transparent. The gonophores distributed between the oral and aboral tentacles. They are in groups (2–3–4 in each group), but only one of each group is fully matured, and probably male. Each gonophore group is attached to a common style. Gonophores are cryptomedusoids and display tentacle buds. It is impossible to recognize other gonophore structures (Figure 4E).

Nematocysts (μm): stenoteles 18.0–23.0 × 12.0–20.0; desmonemes 7.0 × 10.0; (?)rhabdoids 11.0–15.0 × 4.0–6.0; (?)euryteles 17.5–20.0 × 15.0–16.5.

Differential diagnosis. The species of *Gymnogonos* are very similar to each other. There are only few features of *Gymnogonos* that differ among species: presence or absence of clear constriction between the head of the polyp and caulus (1); size of the hypostome (2); the character of aboral tentacle distribution (3) and colonial or solitary polyp organization (4) (Table 2).

The new material extends the diagnosis of *Gymnogonos* compared with the original one from Bonnevie (1898): 'Der Hydrocaulus (ist) von einem membranartigen Perisark bedeckt, an dessen proximalem Ende Haftfädchen befestigt sind. Ein Kreis von Papillen am Übergang zwischen dem Hydrocaulus und Hydranthen. Styloide Gonophoren werden vom Hydranthen selbst entwickelt. Kommt einzeln vor'.

The new *Gymnogonos* diagnosis

Corymorphidae with solitary or colonial polyps covered with a more or less thin, transparent, membranous perisarc extending to base of the head of polyp. The hollow filiform tentacles are arranged in two—oral and aboral sets. The oral tentacles are arranged in one or several rows around the mouth; aboral tentacles longer than oral ones, arranged in one or two rows. The styloid or cryptomedusoid gonophores are solitary or in groups of 2–4 on a common style, distributed between oral and aboral tentacles of the head of polyp. No branched blastostyles.

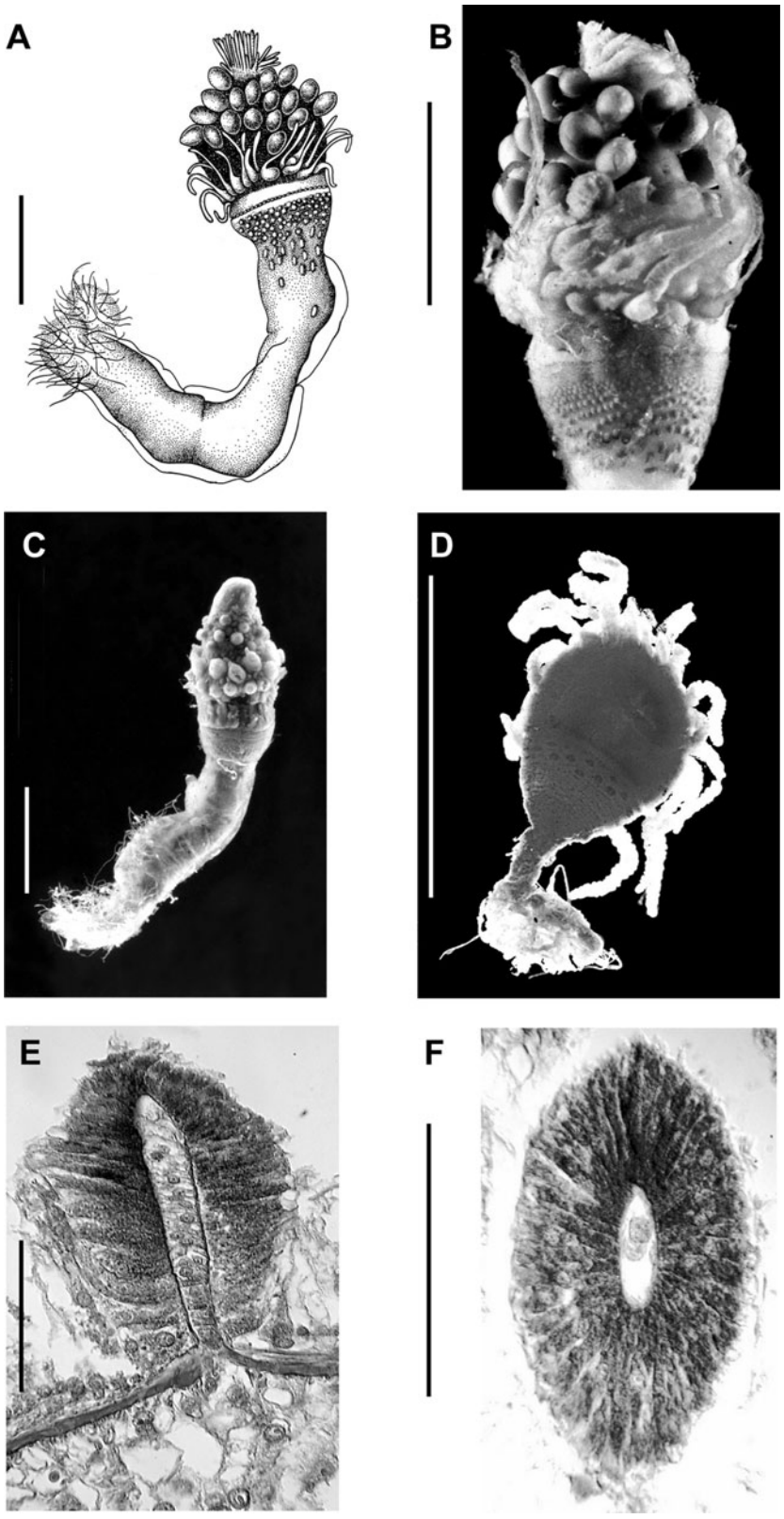

Fig. 3. *Gymnogonos ameriensis* (Stepanjants, 1979). (A) Holotype specimen (after Stepanjants, 1979); (B) head of holotype; (C) polyp of *Myriothela* sp., Hickson & Gravely, 1907; (D) type-specimen of *Tubularia cingulata* Vanhöffen, 1910; (E) papilla in longitudinal section, entodermal axis penetrating lamella, surrounded by ectodermal gland cells; (F) papilla in transversal section; Scale bars: A, B, 5.0 mm; C, D, 2.0 mm; E, F, 100 μm.

Below aboral tentacles there is an annular furrow often poorly visible. Under furrow many solid entodermal papillae with ectodermal cover of glandular cells, probably secreting perisarc. Rooting filaments at the base or middle of the caulus. *Gymnogono*s cnidom consists of stenoteles, desmonemes, unrecognizable rhabdoids and euryteles. Capsule types not a characteristic feature for this genus, but dimensions of nematocysts are more or less specific for each species (Table 3).

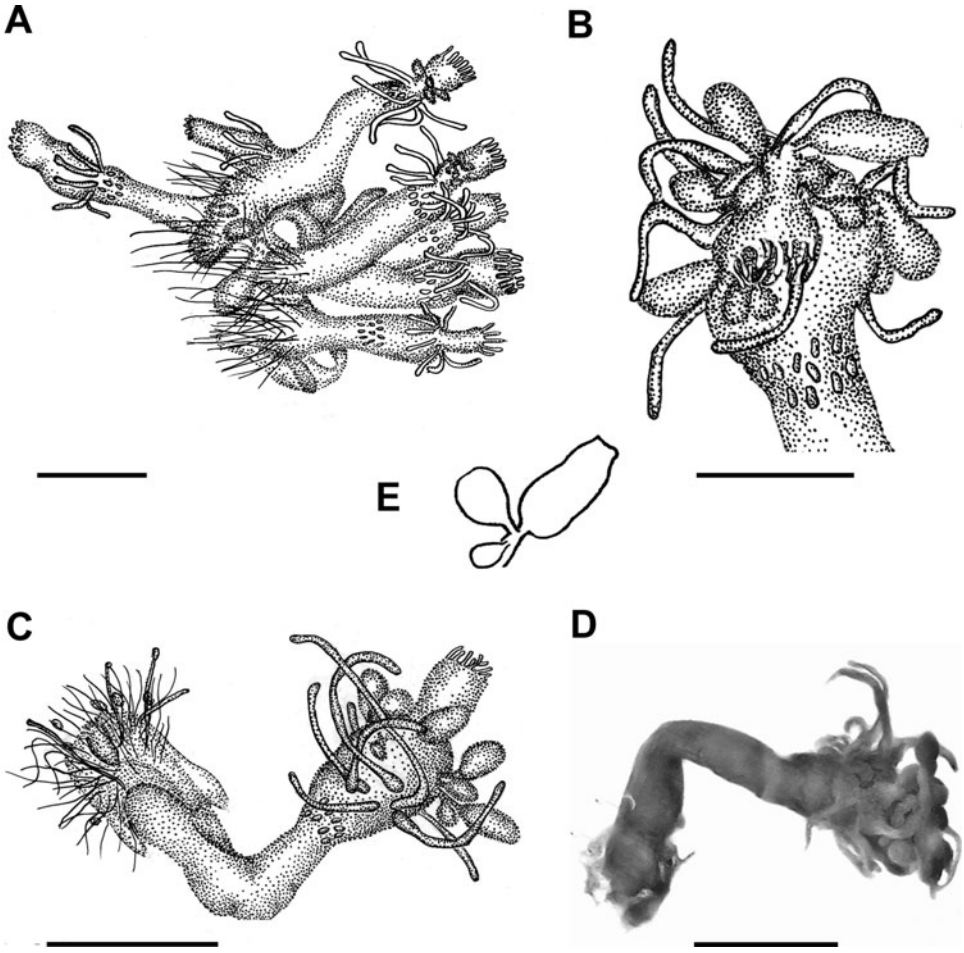

Fig. 4. *Gymnogonos pacificus* sp. nov. holotype: (A) aggregate colony; (B) head of a specimen with papillae, hypostome turned downwards; (C, D) separated, solitary specimens of the holotype colony; (E) gonophores, schematically; Scale bars: A, C, D, 5.0 mm; B, 2.0 mm.

As it was said, species-specific characters of *Gymnogonos* species are not so clearly marked. To have the possibility to identify species an identification key is required.

KEY FOR *GYMNOGONOS* SPECIES IDENTIFICATION

1(4). Aboral tentacles of polyp arranged in one row
2(3). Constriction between head of polyp and caulus is clear. . . . . *G. crassicornis*
3(2). Constriction between head of polyp and caulus is absent. . . . . .G. *obvolutus*
4(1). Aboral tentacles of polyp arranged in two rows
5(6). Hypostom of polyp is elongated . . . . . .*G. pacificus*
6(5). Hypostom of polyp is short . . . . . .*G. ameriensis*

The *Gymnogonos* species were found in the northern hemisphere, as indicated in the world map (Figure 5): *G. crassicornis* and *G. obvolutus* were discovered in the North Atlantic and Eurasian Arctic Seas; *G. pacificus* in the North Pacific and *G. ameriensis* in the Antarctic and subantarctic. The genus has a typical bipolar distribution in the classical meaning of this term (Stepanjants *et al.*, 2006).

In spite of missing fossils of Corymorphidae, the aforementioned material suggests that *Gymnogonos* is a relict genus which, possibly, originated from the warm water family Corymorphidae with the largest part of warm water species (~11; see Svoboda & Stepanjants, 2001; Stepanjants *et al.*, 2006) by neoteny. This idea is supported by the morphological similarity of the *Gymnogonos* juvenile polyp with the larvae of some species of Corymorphidae, for example, *Corymorpha forbesi* (see Brinckmann-Voss, 1970). It is possible to assume that the tropical zone is possibly the centre of origin of this family. During the Quaternary cooling of the tropics during the glacial period the larvae of several warm water *Corymorpha* species were forced to migrate northwards and southwards of both hemispheres and adapted to the new environments with cold water. We hypothesize that closely related cold water *Gymnogonos* species originated by this way in the northern and southern hemispheres (Stepanjants *et al.*, 2006).

CONCLUSIONS

1. The genus *Gymnogonos* is characterized by several specific morphological features and its representatives are easily distinguishable from other Corymorphidae by the presence of a transparent perisarcal membrane and papillae at the base of the head of polyp.

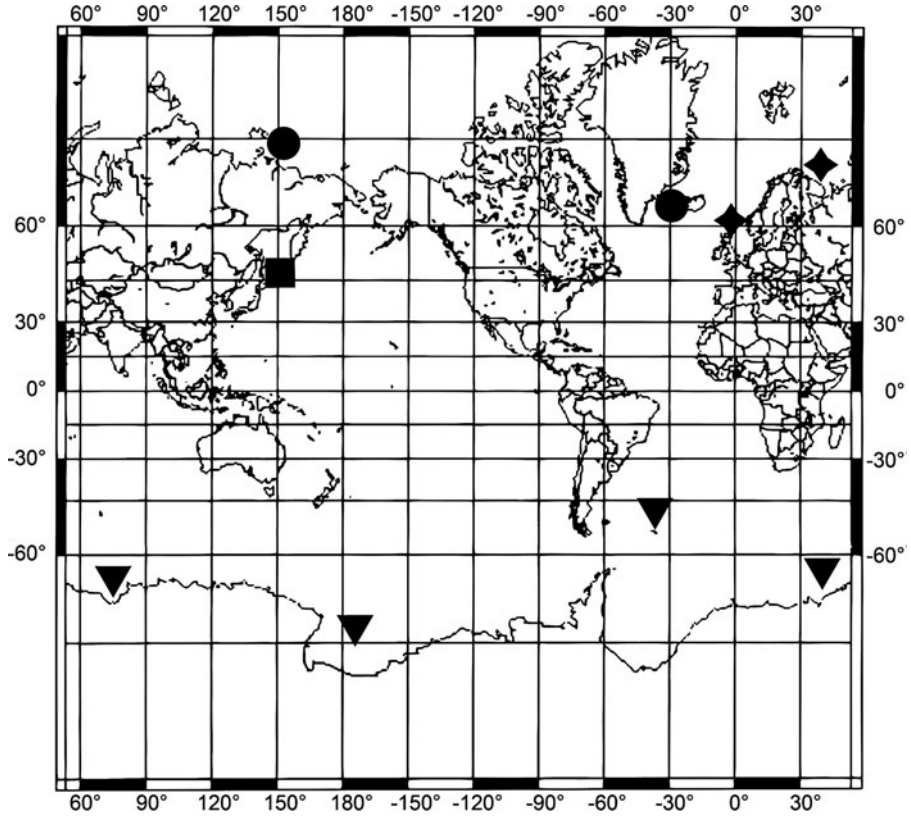

Fig. 5. Map of *Gymnogonos* distribution. ★, *G. crassicornis*; ●, *G. obvolutus*, ▼, *G. ameriensis*; ■, *G. pacificus*.

2. The cnidome of *Gymnogonos* (capsule types) is not a genus specific feature, since all four capsule types are known from most Corymorphidae. On the other hand, the size of capsules may be used as characteristic for each *Gymnogonos* species.
3. Today 4 valid species of *Gymnogonos* are known.
4. Several species described earlier from the southern hemisphere on juvenile polyps, such as *Corymorpha antarctica* and *Tubularia cingulata* we suppose to be 'species inquirendae' and as possible synonyms of *G. ameriensis*. The juvenile polyp described as *Myriothela* sp. we consider a synonym of *G. ameriensis* without doubt.
5. The distribution of *Gymnogonos* species suggests that they belong to bipolar genus.
6. It is possibly a relict genus. Its origin may rise from tropical Corymorphidae by neoteny in the period of glacial cooling.

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