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Monocoryne colonialis sp. nov., a colonial candelabrid hydroid (Cnidaria: Hydrozoa: Candelabridae) from the North Pacific

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Monocoryne colonialis *sp. nov. is described from the Aleutian Islands, Alaska. The new species is unusual among candelabrid hydroids in having a colonial growth form, differing from its congeners in the shape and size of hydranths, in having stolons that anastomose, and by having tentacles not fused or only partly fused into bract-like structures.*

Keywords: Coloniality, Hydrozoa, Alaska

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INTRODUCTION

The genus *Monocoryne* Broch, 1910 comprises a small number of hydroid species known from a few localities in the North Atlantic, North Pacific, Antarctica, and South Africa (Table 1; see also Broch, 1910, 1916; Calder, 1972; Stepanjants *et al.*, 2002, 2003). These species have been described on the basis of solitary polyps, but Swenander (1904) and Johannesen (1924) reported that polyps of *Monocoryne gigantea* (Bonnevie, 1898) may also have small young polyps attached to their bases. More recently, Stepanjants *et al.* (2002, 2003) reported a small colony, identified as *Monocoryne bracteata* (Fraser, 1941), with about ten loosely connected polyps. Despite the small number of polyps, this finding indicates that some species of *Monocoryne* may be colonial.

In this study, we report the first observations of a large living colony of *Monocoryne*, collected using a manned submersible off the Aleutians Islands, Alaska, in 2002. We show that the polyps are connected to each other and that the species is distinct from *Monocoryne bracteata*, previously reported from the North Pacific, and *Monocoryne gigantea*, known from the North Atlantic. Since no additional specimens became available since its discovery, this new species is described herein based on the single specimen collected in 2002.

MATERIALS AND METHODS

A colony of *Monocoryne colonialis* sp. nov. was collected by Anne Simpson on board the submersible 'Delta' during a survey off the Aleutian Islands, Alaska, organized by the United States National Oceanic and Atmospheric Organization, Auke Bay Laboratory, in 2002 (Station 5626: 176°50.1605′W 51°57.6257′N, off Cape Moffet, Adak Island, Aleutian Islands, Alaska, USA, depth 200 m). After collection, the specimen was immediately transferred to clean seawater on board the RV 'Velero IV' and examined alive. The colony (holotype) was subsequently preserved in 4% formaldehyde solution for cnidome and additional morphological observations. A polyp (paratype) of this colony was also removed and preserved in ethanol 100%. The abbreviations used are: MHNG: Natural History Museum of Geneva, Switzerland; ROM: Royal Ontario Museum, Toronto, Ontario, Canada; and USNM: National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

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SYSTEMATICS

Class HYDROZOA
Order ANTHOMEDUSAE Haeckel, 1879
Family CANDELABRIDAE Kühn, 1913
Genus *Monocoryne* Broch, 1910
Monocoryne colonialis sp. nov.
(Figures 1 & 2D)

? *Monocoryne bracteata*: Stepanjants, Svoboda & Anokhin, 2002: 146, figure 3a,b; Stepanjants, Christiansen, Svoboda & Anokhin, 2003: 101–102 (part: specimens from Kurile Islands), figures 2B, 3A,B.

Not *Symplectanea bracteata* Fraser, 1941: 78–79, pl. 13, figure 1.

Type material

Holotype: male colony, originally preserved in 4% formaldehyde solution, subsequently transferred to 75% ethanol (176°50.1605′W 51°57.6257′N, off Cape Moffet, Adak Island, Aleutian Islands, Alaska, USA; water depth 200 m) [USNM 2027434]. Collected by Anne Simpson, 25 July 2002.

Table 1. Species of *Monocoryne* and their substrates and distribution. For details on substrates, distribution, and taxonomy, see Stepanjants *et al.* (2003).

Species	Substrate	Geographic and Bathymetric Distribution
Monocoryne colonialis, sp. nov.	Embedded in sponge of the genus *Myxilla* Schmidt, 1862	North Pacific (Aleutian and Kurile Islands), 200–300 metres
Monocoryne bracteata (Fraser, 1941)	Unknown	North-eastern Pacific (south-eastern Alaska), 240 metres
Monocoryne gigantea (Bonnevie, 1898)	On stones, bivalve shell, and on the hydroid *Tubularia* Linnaeus, 1758 and a polychaete tube attached to the bivalve *Lima excavata* (Fabricius, 1779)	North-eastern and north-western Atlantic, 16–460 metres
Monocoryne minor Millard, 1966	Unknown	South Africa (Agulhas Bank), 77 metres
Monocoryne sp. Stepanjants, 1979	On rocks	Antarctica (off Amery Glacier, Indian Ocean), 3–35 metres

Paratypes: male polyps (part of holotype), preserved in 4% formaldehyde solution and in 100% ethanol (176°50.1605′W 51°57.6257′N, off Cape Moffet, Adak Island, Aleutian Islands, Alaska, USA; water depth 200 m). [ROMIZ B3645 and MHNG INVE35467]. Collected by Anne Simpson, 25 July 2002.

Comparative material examined

Monocoryne bracteata (Fraser, 1941). Holotype (*Albatross* Station 4253; 133°40′46″W 57°40′19″N, Thistle Ledge, Stephens Pass, south-eastern Alaska, water depth 240–344 m) [USNM43450]. Collected 14 July 1903.

? *Monocoryne colonialis* (identified as *Monocoryne bracteata* in Stepanjants *et al.*, 2002, 2003, Urup Island, Kurile Islands, Russia; water depth 300 m) [ROMIZ B3646]. Collected in 1987 and illustrated by Stepanjants *et al.* (2002: 145; 2003: 100–101).

Etymology

The specific name *colonialis* refers to the large colonial growth form of the species.

Diagnosis

Monocoryne colonialis is distinguished from its congeners (Table 1) by having a colonial growth form with polyps connected to each other through a stolonal system (instead of solitary or growing from a basal plate), by having a large number of hydranths per colony, by lacking chitinized anchoring filaments, and by having tentacles only partly fused and not as broad bract-like structures as described for *M. bracteata* (Fraser, 1941; Rees, 1956, 1957; Stepanjants *et al.*, 2003).

Description

Colony stolonal, with anastomosing stolons embedded in a sponge of the genus *Myxilla* Schmidt, 1862 (class Demospongiae Sollas, 1885) growing on an unidentified clam shell (Figure 1). Stolons growing within and partly outside the sponge and not attached to a hard substrate. Stolons and stems (i.e. hydrocauli) similar in structure and about equal in diameter. Stems un-branched, upright or slightly bent in living specimens, each terminating in a large hydranth with up to 100 tentacles and 120 gonophores, creating a flower bunch effect of the whole colony (Figure 1). Stolons and stems enclosed by a thin, flexible perisarcal tube, which ends at a thin but marked constriction between hydrocaulus and hydranth (Figure 1). *In vivo*, stems and hydranths up to ~3 cm long each. After fixation, hydranths and stems 1.9–2.5 cm long each, and 2–3 mm wide, with stems slightly thicker in their proximal part. Hydranths clavate, narrowing distally but with thicker hypostome (Figure 1B,C). Tentacles capitate, either single (particularly around the mouth and on proximal part of hydranth) or in groups of up to three, distributed over whole hydranth body. Gonophores simple sporosacs of styloid type, either in upper axil of tentacles or independent of tentacle(s) (Figure 1G). Distal quarter of hydranths without gonophores (Figure 1B). Only male sporosacs seen, female or hermaphroditic gonophores (as in *Monocoryne gigantea*), not observed. Hydranths and stems bright pink in colour (live specimen), spadix of gonophores a darker pink and tentacles with white terminal cluster of nematocysts.

Cnidome (measurements based on un-discharged capsules in 4% formaldehyde solution preserved specimen): *stenoteles* 15–21 μm long and 11–15 μm wide (N = 10), *desmonemes* 10–12 μm long and 7–9 μm wide (N = 6), and *microbasic mastigophores* 22–31 μm long and 8–12 μm wide (N = 8; Figure 1H). Discharged microbasic mastigophores with clearly distinguished shaft, wider than tubule; shaft about twice the length of capsule; tubule 4–5 times as long as capsule. Microbasic euryteles not observed.

DISCUSSION

Although a number of hydrozoans are known solely as solitary hydroids, it has been suggested that at least some of these species may form small colonies (Stepanjants *et al.*, 2002). In the genus *Monocoryne*, for example, a small colony with about ten loosely connected polyps has recently been reported for the Kurile Islands (Stepanjants *et al.*, 2002, 2003). Our observations of *Monocoryne colonialis* sp. nov. not only confirm that species of *Monocoryne* may be colonial, but show that species assigned to this genus may form large colonies with more than 50 polyps and having anastomosing stolons covered by perisarc.

Our observations also show that the stolons of *Monocoryne colonialis* do not form a differentiated hydrorhiza attached to

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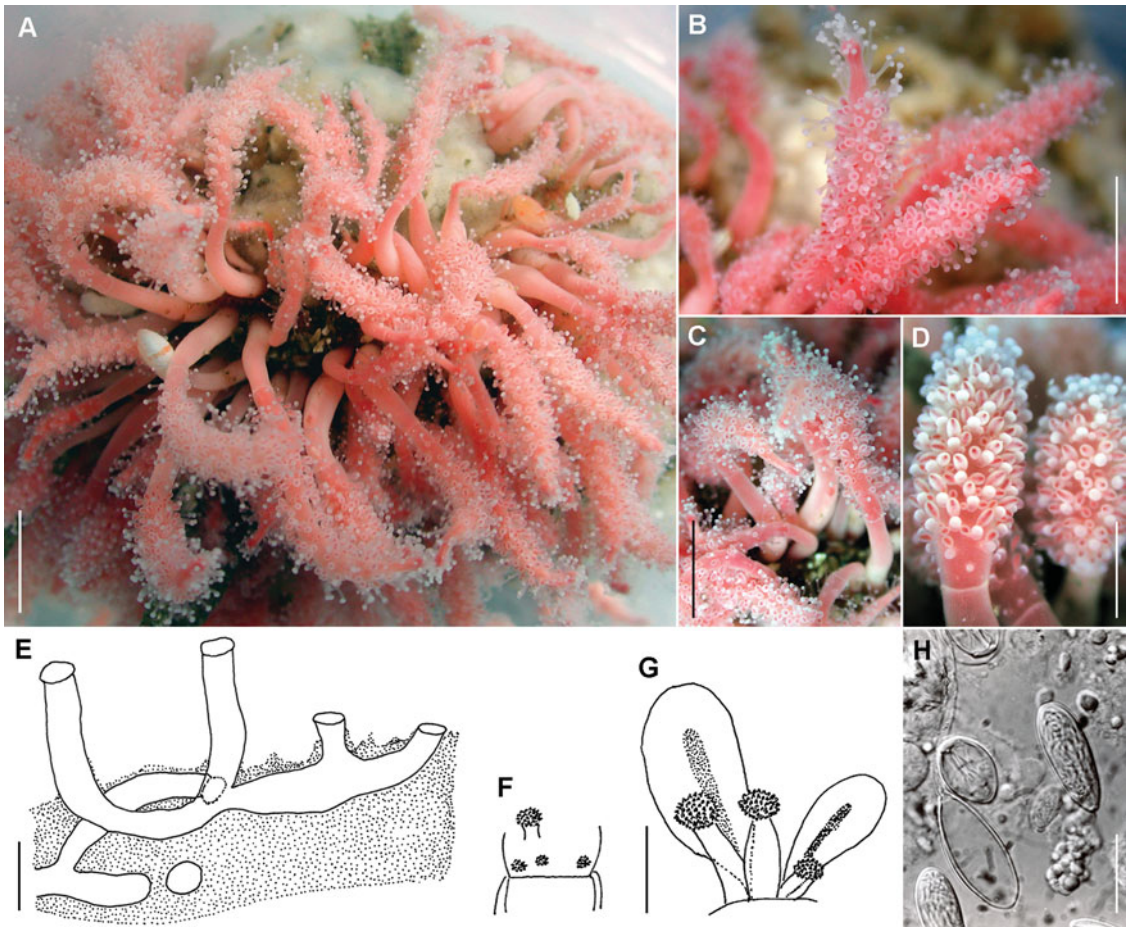

Fig. 1. *Monocoryne colonialis*, sp. nov.: (A) holotype colony; (B) hydranth with relaxed tentacles and gonad-free distal part with rounded hypostome; (C) hydranths, showing pedicel and hydranth body; (D) detail of hydranth; (E) stolon system embedded in sponge *Myxilla* sp. (dotted); (F) detail of terminal part of pedicel and basal portion of hydranth, showing constriction between hydranth and stem and three developing tentacles above perisarc constriction; (G) group of three tentacles and two adjacent male gonophores in axil between tentacles and outer wall of hydranth; (H) nematocysts, from left to right: discharged microbasic mastigophore, un-discharged stenotele, un-discharged microbasic mastigophore. (A–H: Holotype, USNM2027434). Scale bars: A–C, 1 cm; D, E, 0.5 cm; F, G, 0.2 cm; H, 20 μm.

a hard substratum. This indicates that the anastomosing stolons of *M. colonialis* may be the basal portions of the polyps (stems), which remain connected to each other after budding. This stolonal system is more complex than that reported for the candelabrid *Candelabrum fritchmanii* Hewitt & Goddard, 2001 (which may form groups of two or three connected polyps) and for the North Atlantic *Monocoryne gigantea* (Bonnevie, 1898), which may have two or three small polyps growing from a basal plate (Stepanjants *et al.*, 2003 and references therein). Although most records of *M. gigantea* refer to solitary hydroids (Stepanjants *et al.*, 2003), the species is similar to *M. colonialis* in having groups of tentacles on the hydranth body formed by only 2 or 3 tentacles that are not fused into bract-like structures. However, the species differ in that the hydranths of *M. gigantea* are only 0.2–1.5 cm long (Stepanjants *et al.*, 2003). These hydranths are much smaller than those of *M. colonialis* (up to 3.0 cm when living and 2.5 cm when preserved in formalin). In addition, polyps of *M. gigantea* bear anchoring filaments, a feature commonly observed in solitary candelabrids, but absent in *M. colonialis*.

Monocoryne colonialis is also similar to *M. bracteata* (Fraser, 1941), a species described for south-eastern Alaska and having large hydranths, the holotype being 3.3 cm long (Figure 2A,B; Fraser, 1941; Rees, 1957). The two species differ in that *M. bracteata* has groups of tentacles on the hydranth body formed by 3, 5, or 7 tentacles (Figure 2B; Fraser, 1941), instead of 2 or 3, as in *M. colonialis* (Figure 1G). Observation of the holotype (Figure 2A) shows that *M. bracteata* has mostly 6 or 7 tentacles per tentacle group. As previously reported, these tentacles are fused into bract-like structures diagnostic of *M. bracteata* (Figure 2B; Fraser, 1941; Rees, 1956, 1957; Stepanjants *et al.*, 2003). Hydranths of *M. bracteata* also have chitinized anchoring filaments characteristic of other solitary candelabrids, but not observed in *M. colonialis*. Additionally, the microbasic mastigophore nematocysts of *M. bracteata* are much smaller (16–20 μm long and 6–7 μm wide) than those of *M. colonialis* (22–31 μm long and 8–12 μm wide; all measurements in preserved material). Finally, there is no evidence for coloniality in the holotype of *M. bracteata*.

Although *M. colonialis* and *M. bracteata* differ in a number of characters, a specimen reported as *M. bracteata* from the Kurile Islands (Stepanjants *et al.*, 2002, 2003) is remarkably similar to *M. colonialis* (Figure 2C,D). Hydranths of the two specimens are large: up to 1.9–2.5 cm long (*M. colonialis*) and 2.5–3.6 cm long (Kurile specimen) (measurements in preserved material). Moreover, the bract-like tentacle groups

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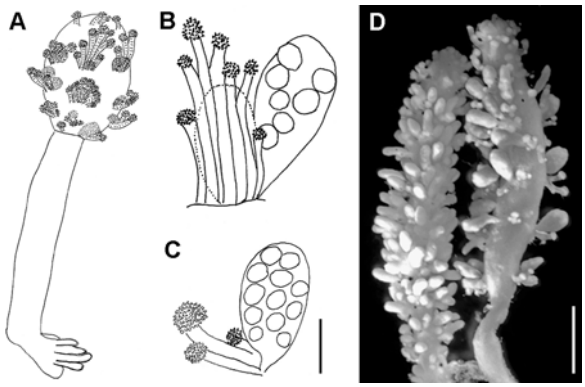

Fig. 2. (A) *Monocoryne bracteata* (Fraser, 1941), original drawing based on the three pieces of the holotype; (B) *Monocoryne bracteata* (Fraser, 1941), holotype, detail showing seven tentacles fused in a bract-like structure, and adjacent gonophore; (C) *Monocoryne colonialis*, identified as *M. bracteata* in Stepanjants *et al.* (2003), detail of colonial specimen from Kurile Islands, showing a group of three tentacles with adjacent gonophore; (D) *Monocoryne colonialis* (left) and *Monocoryne colonialis* (identified as *M. bracteata* by Stepanjants *et al.*, 2003) (right), showing similarity in size and shape of hydranth. (A, B: Holotype of *Monocoryne bracteata*, USNM43450; C, D (right): *Monocoryne colonialis*, identified as *M. bracteata* by Stepanjants *et al.*, 2003, from Kurile Islands, ROMIZ B3646; D (left): *Monocoryne colonialis*, paratype, ROMIZ B3645). Scale bars: B, C, 0.1 mm; D, 0.5 cm.

diagnostic of *Monocoryne bracteata* (and not seen in *M. colonialis*) were observed in only one fragment of the specimen from the Kurile Islands (Stepanjants *et al.*, 2003), further suggesting that this specimen is more similar to *M. colonialis* than *M. bracteata*. Specimens from the Kurile Islands also form small colonies with up to ten polyps, and the only major difference between *M. colonialis* and the Kurile specimens (referred to as *M. bracteata*), is that microbasic euryteles were observed in the latter species (Stepanjants *et al.*, 2003), but not in the former. Until additional specimens from the Kurile Islands become available for study, we consider the Kurile specimens reported as *M. bracteata* (Figure 2C,D; Stepanjants *et al.*, 2003) tentatively conspecific with *M. colonialis*.

The discovery of *M. colonialis* adds to a diverse marine fauna being uncovered off the Aleutian Islands, in Alaska. This fauna consists of sponges, cnidarians, and other organisms that may form diverse 'gardens' with high densities of fish and other associated fauna (Stone, 2006). Further studies on these habitats may result in the discovery of additional new species, that may shed further light on the diversity and abundance of the benthic marine fauna in the North Pacific.

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