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INVERTEBRATE ZOOLOGY

New Records of the Sea Anemone *Ptychodactis patula* Appellöf, 1893 (Anthozoa: Actiniaria) in the Northern and Far Eastern Seas of Russia

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Abstract—Twenty-two samples of a rare sea anemone *Ptychodactis patula* having an unusual structure were found in the collection of the Zoological Institute (Russian Academy of Sciences, St. Petersburg). This species was previously referred to the small order Ptychodactiaria, which included only three species. *P. apatula* was known only from the coasts of Norway (the type locality), Iceland, and the Bering Strait. Our samples greatly exceed the materials thus far published, both in the number of specimens and their places of discovery.

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Key words: Spitsbergen, Barents Sea, Kara Sea, Laptev Sea, Chukchi Sea, Bering Sea, Sea of Okhotsk, Kuril Islands, *Ptychodactis patula*, Ptychodactiaria.

A small group of unusual actinians, the Ptychodactiaria, was for the first time registered in Russian waters in faunistic lists for the northern seas [1, 14]. Taking into account the weak development of the mesoglea and the structural peculiarities of mesenterial filaments and gonads, considered as primitive characteristics, these actinians were first isolated from the order Actiniaria as the tribe Ptychodactiidae [7] or suborder Ptychodactiaria [9]; later they were considered as the independent order Ptychodactiaria [10, 12, 13]. Supplementary investigations of polyp structure performed later have somewhat changed the initial assessment of these characteristics. Some structural peculiarities of the Ptychodactiaria appeared to also be characteristic of some other actinians with the simplest structure, while some of them have not been observed in all Ptychodactiaria or only in certain particular stages of ontogenesis (see [13] for details). Therefore, the Ptychodactyaria are again referred to as a suborder of the order Actiniaria [3].

The group comprises three described species belonging to three independent monotypic genera, which are clearly distinguished morphologically. The geographical ranges of the species are also isolated from each other; *Ptychodactis patula* Appellöf, 1893 inhabits only cold and temperate waters of the Northern Hemisphere; *Dactylanthus antarcticus* (Clubb, 1908) occurs in the Subantarctic and fjords of Chile [5, 11, 12, 15]; while *Preactis millardae* England in England et Robson, 1984 is known only at the southern extremity of the Africa. Comparatively recent observations on living polyps showed that both the southern species behave like mobile predators, i.e., they crawl over the substrate searching for prey as large worms or holothurians also do. The African form can swallow entire colonies of alcyonarians, [13] while the Chilean species is known to attack gorgonarians [11]. The food range of the northern ptychodactiarian is still unknown, although the weak development of mesoglea and great elasticity of tissues (see below) could show that the mode of life of the latter species is also unusual for actinians.

Order ACTINIARIA

Suborder Ptychodacteae Stephenson, 1922

Family Ptychodactiidae Appellöf, 1893

Ptychodactis patula Appellöf, 1893

(Figs. 1, 2)

Ptychodactis patula Appellöf, 1893, S.1–22, Taf. 1–3; Carlgren, 1921, p.11–13, pl. 3, fig. 6; Carlgren, 1934, p. 348; Carlgren, 1939, p. 2; Grebel'nyi, 1986, p. 91; Grebel'nyi, 2001, p. 37.[1]

MATERIAL

Spitsbergen: Storfjord, 78°03 N, 20°05 E, 77 m, silt and gravel, t—2.5°T, RV "Bakan," Stn. 14, 08.20.1901, Sigsby trawl, coll. A.I. Volkovich and M. Mikhailovskii, 2 specimens; *Barents Sea*: Western Murman, the area of Nordkap Cape or Pechenga Nomad Camp, about 70° N and 31° E (very incomplete

[1] The synonymy includes only papers comprising references for new findings of the species; papers discussing taxonomical relationships of materials reported elsewhere were not included. The available literature presents data on 14 specimens of *Ptychodactis patula*.

Fig. 1. *Ptychodactis patula*, found at the coast of the Kuril Islands (Shiashkotan Island), fixed with formalin. Specimen no. 10637 (according the Catalogue of the Department of Sponges and Coelenterates of Zoological Institute RAS, St.-Petersburg).

label), 1 specimen; 71°30′ N, 41°00′ E, 323 m, silt and stones, RV "Persey," Stn. 756, 07.17.1927, otter trawl, 2 specimens; 69°39′ N, 41°48′ E, 170–178 m, silt, RV "Andrei Pervozvannyi," Stn. 76, Sample 162, 08.04.1899, Petersen trawl, 1 specimen; 72°00′ N, 46°45′ E, 180 m, sand and silt, RV "Andrei Pervozvannyi," Stn. 619, Sample 1094, 08.24.1901, otter trawl, 2 specimens; 74°37′N, 47°07′E, 250 m, green–gray silt with stones, RV "Persei," Stn. 606, 09.14.1926, Sigsby trawl, 1 specimen; 70°21′ N, 53°50′ E, 105 m, clayey silt, RV "Andrei Pervozvannyi," Stn. 281, Sample 1303, 08.31.1903, Zoological trawl, 1 specimen; 70°21′ N, 53°50′ E, 105 m, clayey silt, RV "Andrei Pervozvannyi," Stn. 281, Sample 1302, 08.31.1903, Petersen trawl, 1 specimen; 76°28′ N, 59°10′ E, 118 m, silt and stones, RV "Andrei Pervozvannyi," Stn. 56, Sample 1167, 07.29.1902, Petersen trawl, 1 specimen; *Kara Sea*: to the east off Yugorskii Shar Strait, 69°57′N, 61°07′ E, 155 m, silt, RV "Taimyr," Stn. 8, 09.01.1921, coll. I.D. Strel'nikov, 1 specimen in poor condition; 76°55′N, 68°48′ E, 79 m, stones, t—0.38°C, S—34.52%, RV "Shtorm," Stn. 16/99, 25.08.1960, Sigsby trawl, coll. L.I. Shcherbakova, 1 specimen; *Laptev Sea*: 77°57′ N, 113°35′ E, 300 m, sand and clay, t—0.42°C, S—34.57%, RV "Polarstern," Cruise 36, Stn. 83a, 09.07.1995, Agassiz trawl, coll. V.V. Potin and N.A. Anisimova, 2 specimens; *Bering Strait*: 65°52′ N, 169°00′ W, 47 m, broken mollusk shells and pebble, RV "Dal'nevostochnik," Stn. 22, 08.09.1932, Beam-trawl, coll. A.V. Ivanov and V.V. Makarov, 1 specimen; 65°39′ N, 168°18′ W, 52 m, pebble, RV "Krasnoarmeets," Stn. 29, 08.06.1933, Petersen bottom sampler, coll. N.N. Kondakov and V.V. Makarov, 1 specimen; *Bering Sea*: 64°02′N, 172°13′W, 50 m, silted sand

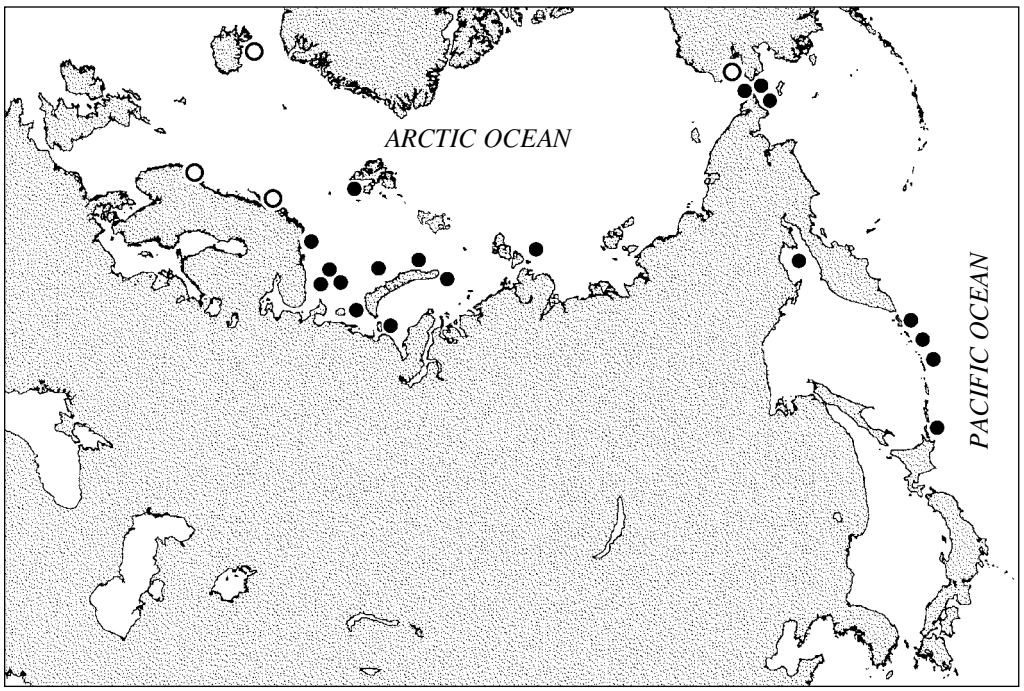

Fig. 2. Distribution of *Ptychodactis patula.* White and black circles indicate sampling locations known from available literature and from the data of the collections of Zoological Institute RAS, St. Petersburg, respectively.

and stones, RV "Akademik Korolev," Cruise 47, Stn. 41, 09.08.1988, Sigsby trawl, coll. B.I. Sirenko and V.M. Koltun, 1 specimen; *Sea of Okhotsk*: 59°25′ N, 158°51′ E, 149 m, t—0.64°C, RV "Okhotsk," Stn. 4, Sample 15, 07.03.1915, coll. G.R. Meder, 2 specimens; *Kuril Islands*: at southern Kamchatka, 50°40′N, 156°47′E, 70 m, unknown substrate, RV "Akademik Oparin," Cruise 14, Stn. 65, 09.03.1991, Sigsby trawl, coll. A.V. Smirnov, 1 specimen; Shumshu Island, 50°38′ N, 156°50′ E, 80 m, sand, RV "Akademik Oparin," Cruise 14, Stn. 61, 09.03.1991, Sigsby trawl, coll. A.V. Smirnov, 2 specimens; in the strait between Shiashkotan Island and Lovushki Rocks, 48°30′N, 153°55′ E, 200 m, stones, RV "Tikhookeanskii," Transect 61, Stn. 330, 08.22.1987, gredge, coll. S.D. Grebel'nyi, 1 specimen; 48°30′N, 153°55′ E, 100 m, stones, RV "Tikhookeanskii," Transect 61, Stn. 331, 08.22.1987, dredge, coll. S.D. Grebel'nyi, 1 specimen (ref. no. 10637 in the Catalogue of the Department of Sponges and Coelenterates of Zoological Institute RAS, see Fig. 1); Simushir Island, Diany Strait, approx. 47°15′ N and 152°20′W, 50 m, stones, boulders, gravel, and broken mollusk shells, t—2.45°C, RV "Tikhookeanskii," Transect 47, Stn. 286, Sample 835, 08.17.1987, dredge, coll. S.D. Grebel'nyi, 1 specimen; Kunashir Island, Pacific side, approx. 44°15′ N and 146°50′ E, 220 m, gravel and pebble, RV "Tikhookeanskii," Transect 9, Stn. 60, Sample 164, 08.19.1987, dredge, coll. V.I. Lukin, 1 specimen.

DESCRIPTION

These are large polyps with a rather smooth body (i.e., a column). The tentacles are numerous, up to 120 in number (Fig. 1). There is no sphincter. The pharynx is short, grading into peculiar folded lobes, appendages are located on large mesenteries. The pharynx has no pronounced longitudinal grooves, i.e., siphonoglyps. The number of mesenteries reaches four cycles, which often are irregular. The mesenteries of the first and, usually, the second cycle are perfect (as they are attached to the pharynx). In their lower parts, immediately above the base, they are either somewhat fused to each other or not fused at all.

When taken aboard, immediately after capture, the polyp of *Phychodactis patula* hardly resembles an actinian. The body is so soft that the animal spreads against the deck like a cloth. Being released from the trawl on deck boards, in a pile of stones, this organism mostly resembles fragments of the internal organs of some benthic animal crushed by the trawl or the everted stomach of a starfish. However, being placed into a vessel with cool seawater, the polyp rapidly takes the shape of a sea anemone.

A specimen of *P. patula* found in collected material never looks like a well-preserved non-broken specimen and only an experienced zoologist can identify it as an animal that needs careful treatment and warrants sampling. Possibly for this reason this species is still poorly represented in collections. On the other hand, at least in the Sea of Okhotsk and coastal zone around the Kuril Islands, this species does not belong to abundant and common actinians. Even particular attention was paid to suspicious objects occurring in trawl catches, it was still not possible to collect *P. patula* in quantity.

All tissues of this actinian are extremely thin and fragile. Only after several days in formalin do they become denser; allowing us to take the animal by hand and cut it with a blade, which is the common practice for dissection and identification of actinians. The softness of the body is not due to weak muscles, but rather to very thin mesoglea. After fixation the column and base show a characteristic rough rugosity, making it easy to distinguish *P. patula* in a museum collection.

Our findings did not provide any information about possible relationships between *P. patula* and gorgonian corals. However, the first specimens described by Appellöf [2] were found on colonies of *Paramuricea placomus* (Linnaeus, 1758) and *Primnoa resedae* (Ginnerus, 1763) (Anthozoa, Gorgonacea[2]).

Body coloration in living polyps is homogeneous, from yellowish- or grayish-white to bright pink. There are no pronounced patterns or spots. After long-term storage, fixed specimens take gray, ochreous, or brown (in alcohol) color. A. Appellöf has mentioned that, according to collectors' observations, in Norwegian fjords the polyps of *P. patula* living on *Primnoa* have a yellow body with pale pink-red mesenterial filaments, while specimens found on *Paramuricea* were blue in coloration.

Both the specimens shown in the full-size drawing provided in the first description by A. Appellöf were 6 × 8 cm in size. The smallest specimen, which was collected at the coast of Iceland, [4] had a diameter of 2 cm and had barely reached the stage of gonad formation. In our collection, the largest polyps, contracted after fixation, are 12 cm in diameter; when alive, they probably were much larger.

DISTRIBUTION

The species is distributed at depths of 47–350 m in Iceland (the northern coast), the fjords of Norway and Spitsbergen, the Barents Sea, Yugorskii Shar Strait, Kara Sea, Laptev Sea, Chukchi Sea and Bering Strait, Bering Sea and Sea of Okhotsk, and the coastal waters of the Kuril Islands. According to collectors' labels, the species was several times registered on silty, clayey, and sandy substrates, but more often occurred on stones, gravel, and broken mollusk shells.

[2] In the paper of Appellöf [2] these species were referred to as *Murucea placomus* and *Primnoa lepadifera*, respectively.

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