



ORIGINAL ARTICLE

***Ptychodactis aleutiensis*, a new species of ptychodactiarian sea anemone (Cnidaria: Anthozoa: Actiniaria) from the Aleutian Islands, Alaska**

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Abstract

We describe a new species of ptychodactiarian sea anemone, *Ptychodactis aleutiensis*, and redefine the family Ptychodactiidae and the previously monotypic genus *Ptychodactis* to accommodate *P. aleutiensis* sp. nov. Individuals of the new species were photographed and collected at depths of less than 20 m off the Aleutian Islands, Alaska. Many were found detached, adrift in the water. The species differs from the only other member in its genus, *Ptychodactis patula*, in having more tentacles, tentacles only at the margin, frilled structures associated with only two siphonoglyphs, infertile primary mesenteries, oral stomata, holotrichous nematocysts of two size classes in the tentacles, actinopharynx, and mesenterial filaments, and by the morphology of the holotrichs and spirocysts. It is the fourth species of ptychodactiarian described; *Ptychodactis* is the only genus of suborder Ptychodacteae with more than one species.

Key words: Bering Sea, Hexacorallia, Ptychodacteae, sub-Arctic, taxonomy

Introduction

Ptychodactis aleutiensis (Figure 1) is a new species of ptychodactiarian sea anemone from the Aleutian Islands, Alaska. This anemone has been observed by diving ecologists in the Aleutian Islands since the early 1990s (SCJ personal observation; Brenda Konar, University of Alaska Fairbanks, personal communication to SCJ 2009). It can inflate and detach from the substrate, drift (Figure 1A), then reattach. Clearly a member of the suborder Ptychodacteae (its mesenteries are fused at the proximal end), *P. aleutiensis* sp. nov. resembles *Ptychodactis patula* Appellöf, 1893, but differs in details that typically separate related species of sea anemones, such as the arrangement and number of tentacles, and sizes of nematocysts.

Suborder Ptychodacteae was established as a taxon of order Actiniaria (true sea anemones) by Stephenson (1921); Carlgren (1949) raised it to

ordinal rank, but Cappola & Fautin (2000) determined that much of the anatomy used by Carlgren (1949) to justify order Ptychodactiaria had been misinterpreted or was insignificant, and returned the ptychodactiarians to subordinal status. Phylogenetic analyses by Berntson et al. (1999) and Daly et al. (2002) that included the ptychodactiarian *Dactylanthus antarcticus* (Clubb, 1908) showed ptychodactiarians nested among members of order Actiniaria.

Ptychodacteae currently contains three monotypic genera in two families that are confined to high latitudes. Family Preactiidae, from southern latitudes, has two monotypic genera: *Preactis millardae* England in England & Robson, 1984, is known from the southern tip of Africa, and *Dactylanthus antarcticus* is known from the southern tip of South America as well as parts of Antarctica (from south-

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Figure 1. Specimens of *Ptychodactis aleutiensis* sp. nov. (A) Animal adrift; South East Adak Island, 10 m. (B) Living animal with body expanded and mesenterial insertions visible, Kagamil Pass, Kagamil Island, 8 m. (C) Preserved specimen (USNM 1125408) with column contracted; diameter of oral disc 38 mm, diameter of pedal disc 51 mm.

east of Seymour Island west to the entrance to McMurdo Sound) (summarized by Fautin 2008). The column of members of the family Preactiidae has tentaculate vesicles (Clubb 1908; England & Robson 1984), and the animals are highly mobile predators of soft corals (members of anthozoan subclass Octocorallia) (England & Robson 1984; Dayton et al. 1997). The only genus of family Ptychodactiidae, *Ptychodactis*, is confined to northern latitudes and lacks tentaculate vesicles (Appellöf 1893; Carlgren 1921; Cappola & Fautin 2000).

The new species belongs to family Ptychodactiidae because of its smooth column, and it belongs to genus *Ptychodactis* based on its numerous tentacles and frilled structures that extend from the siphonoglyphs. It is distinguished from the other member of the genus, *P. patula*, by its tentacles being confined to the margin, its infertile primary mesenteries, the possession of oral stomata, the frilled structures being associated with only two siphonoglyphs, and having holotrichous nematocysts of two size classes in the tentacles, actinopharynx, and mesenterial filaments. The morphology of its holotrichs and spirocysts is also distinctive. We redefine the family Ptychodactiidae and the previously monotypic genus *Ptychodactis* to include *P. aleutiensis* sp. nov.; thus *Ptychodactis* is the first ptychodactiarian genus in which more than one species has been described.

Materials and methods

Specimens of *Ptychodactis aleutiensis* sp. nov. were photographed in situ, and eight were collected by scuba divers at depths of 6–17 m during three research cruises off Alaska's Aleutian Islands during July 2006, June and July 2007 (Jewett et al. 2008), and June 2008 (Table I).

Two specimens of *Ptychodactis patula* from the Swedish Museum of Natural History, Stockholm, Sweden (SMNH) (catalogue numbers 20214 and 103622, collected in 1908 and 1923, respectively),

one from the US National Museum of Natural History, Washington, District of Columbia, USA (USNM) (catalogue number 55624, collected in 1924), and one from the University of Kansas Natural History Museum and Biodiversity Institute Division of Invertebrate Zoology, Lawrence, Kansas, USA (KUIZ) (catalogue number 002950, collected in 2004) were also studied. Specimens of *P. aleutiensis* sp. nov. have been deposited at KUIZ, USNM, and the California Academy of Sciences Division of Invertebrate Zoology, San Francisco, California, USA (CASIZ).

Paraffin sections 8 μm thick cut from two specimens of *P. aleutiensis* sp. nov. were stained with haematoxylin and eosin (Humason 1967).

Specimens of *P. aleutiensis* sp. nov. were collected, preserved, and sent to the University of Kansas for identification; because animals were already preserved at the time cnidae were measured, we were unable to study them discharged. Undischarged cnidae were measured at 1000 \times from squash preparations taken from tentacles, column, actinopharynx, mesenterial filaments, and frilled structures. Cnida identification was based on Carlgren (1940) and Dunn (1983).

In Table I, latitude and longitude are based on the North American Datum of 1983 (NAD83).

Taxonomy

Cappola & Fautin (2000) adapted the definition of family Ptychodactiidae and genus *Ptychodactis* from the original description by Appellöf (1893). We have further adapted the definition to accommodate *P. aleutiensis* sp. nov.; changes are indicated in italics.

Family Ptychodactiidae Appellöf, 1893

Column short, smooth (or wrinkled in contracted specimens) without outgrowths. Tentacles simple, numerous, not retractile. Gametes develop

Table I. Localities of specimens of *Ptychodactis aleutiensis* sp. nov. observed in the Aleutian Islands between July 2006 and June 2008.

Locality	Locality	Locality
Islands of Four Mountains		
Kagamil Is., Kagamil Pass*	52°57.124'N 169°42.804'W	
Chuginadak Is., Samalga Pass	52°48.289'N 169°42.526'W	
Chuginadak Is., Bering Side	52°52.777'N 169°49.381'W	
Chuginadak Is., Bering Side	52°52.881'N 169°49.806'W	
Chuginadak Is., Bering Side	52°52.922'N 169°50.427'W	
Andreanof Islands		
Umak Is., Umak Bight	51°53.425'N 175°58.282'W	
Adak Is., S. Kagalaska Strait	51°45.358'N 176°25.437'W	
Adak Is., SE	51°44.106'N 176°27.229'W	
Little Tanaga Is., Umak Pass	51°52.005'N 176°09.232'W	
Tanaga Is.	51°50.697'N 177°51.210'W	
Tanaga Is.	51°42.615'N 178°06.201'W	
Skagula Is.	51°36.303'N 178°36.230'W	
Ogliuga Is.	51°36.579'N 178°37.546'W	
Ogliuga Is.	51°36.982'N 178°39.313'W	
Ogliuga Is., N	51°36.594'N 178°40.040'W	
Near Islands		
Shemya Is., NE	52°43.713'N 174°08.668'E	
Nizki Is., N	52°45.043'N 173°57.164'E	
Agattu Is.	52°23.689'N 173°35.353'E	
Attu Is., Temnac Bay**	52°48.164'N 173°04.487'E	
Attu Is., Murder Point	52°47.348'N 173°10.065'E	
Fox Islands		
Unalaska Is./ Peacock Pt.		53°23.703'N 167°36.599'W
Rat Islands		
Amchitka Is., Constantine Harbor		51°23.986'N 179°19.002'E
Amchitka Is., Constantine Harbor		51°23.964'N 179°18.822'E
Amchitka Is., NW of Constantine Harbor**		51°25.055'N 179°17.167'E
Amchitka Is., NW of Constantine Harbor		51°24.710'N 179°16.405'E
Amchitka Is., NW of Constantine Harbor		51°24.641'N 179°16.149'E
Amchitka Is., Kirilof Bay		51°25.850'N 179°13.403'E
Amchitka Is., Crown Reefer		51°27.983'N 179°11.595'E
Amchitka Is., Crown Reefer		51°28.153'N 179°11.163'E
Amchitka Is.		51°38.560'N 178°44.928'E
Little Sitkin Is., near Finger Pt.**		51°58.201'N 178°27.184'E
Rat Is.		51°49.594'N 178°16.676'E
Rat Is., E		51°46.088'N 178°21.561'E
Rat Is., SW		51°49.832'N 178°11.985'E
Rat Is., NW		51°50.139'N 178°12.421'E
Kiska Is., Vega Bay		51°54.869'N 177°26.865'E
Little Kiska Is., E of Yug Pt.**		51°56.422'N 177°40.022'E
Kiska Is., Haycock Rock		52°04.640'N 177°40.253'E
Kiska Is., S		51°56.669'N 177°41.489'E

Notes: *Type locality. **Localities where paratypes were collected.

proximal to filaments, mesenteries of primary cycle may or may not be fertile, all others are fertile. As many as six cycles of mesenteries; those of first and possibly second cycles complete. One weak retractor muscle per mesentery. Marginal sphincter muscle absent. Actinopharynx short to almost absent, little differentiated from the oral disc; two or more siphonoglyphs present. Cnidom: spirocysts, holotrichs.

Genus *Ptychodactis* Appellöf, 1893

Tentacles to at least 360, smooth or longitudinally ridged, at least in preserved specimens. Frilled structures attach to all siphonoglyphs.

Ptychodactis aleutiensis sp. nov.

Type material

Holotype. KUIZ 002951; preserved in 10% formalin; collected by SCJ, 19 July 2007.

Paratypes. Five specimens from Aleutian Islands, Alaska: one specimen, KUIZ 003022, Temnac Bay, Attu Island, 11 m, on sand; one specimen, KUIZ 002952, E of Yug Pt., Little Kiska Island, 16 m, on bedrock; one specimen, USNM 1125408, near Finger Pt., Little Sitkin Island, 11 m, on boulder; two specimens, CASIZ 171745, NW of Constantine Harbor, Amchitka Island, 13 m, on bedrock and boulder.

Type locality

Kagamil Pass, Kagamil Island, Alaska, USA (52° 57.124'N 169° 42.804'W). On sand, 17 m.

Etymology

Ptychodactis aleutiensis sp. nov. is named for the place in which it occurs, the Aleutian Islands, Alaska. Gender: feminine.

Description

Body form and size. Animals white to pale tan, may be translucent in life; preserved specimens yellowish-tan, column circumferentially furrowed when contracted. Column flaccid, so size highly changeable with contraction; mesenterial insertions typically visible through column wall both in life (Figure 1B) and in expanded preserved specimens, but not in contracted preserved specimens. Column length in all except the smallest specimen 14–61 mm (7 mm in smallest); narrower at pedal and oral ends than at mid-column (Figure 1C). In all except the smallest preserved specimen the narrowest column diameter is 29–45 mm (8 mm in smallest), pedal disc diameter 39–72 mm (16 mm in smallest), oral disc diameter 30–78 mm (10 mm in smallest); maximum tentacle-to-tentacle diameter across the oral disc in life 100–300 mm, 20–104 mm in preserved specimens.

Pedal disc. In live and preserved specimens the same colour as the column. Circular to ovoid, circumferentially furrowed, edge scalloped.

Tentacles and oral disc. In both preserved and live specimens the oral disc is circular to ovoid, radially furrowed; in live specimens white to pale tan, in preserved specimens yellowish-tan, slightly concave. Mouth typically raised and open in preservation, circular to ovoid; two symmetrical siphonoglyphs present but not obvious.

Tentacles smooth, white to pale tan in life, yellowish-tan in preservation, rare tentacles bifurcated; usually 200–380, minimum number 72 (in smallest specimen with pedal disc diameter 16 mm). Tentacles arranged along margin; each communicates with one intermesenterial space; endocoelic tentacles slightly nearer mouth than exocoelic. Typically 5–20 mm long (endocoelic slightly longer than exocoelic), 2–4 mm long in smallest specimen examined; taper from base diameter 1–2 mm to 0.5–1 mm at tip. Tentacles of one specimen short and spherical (Figure 2).

Internal anatomy. Up to six cycles of mesenteries in specimens studied, fewer in smaller specimens; develop from both ends, so those of youngest two orders only at extreme distal and proximal ends; two members of a pair of any cycle may be unequally developed. Retractor muscles weak, diffuse (Figure 3). Primary mesenteries complete with large oral stomata, sterile. All other mesenteries fertile; gametogenic tissue proximal to filaments; only males observed.

Two symmetrical siphonoglyphs, each attached to a pair of directive mesenteries. Attached to each edge of each siphonoglyph at its junction with the actinopharynx is a thin, layered sheet that forms a frilled structure (Figure 4A,B). Frills extend proximally to where column widens.

Marginal sphincter muscle absent.

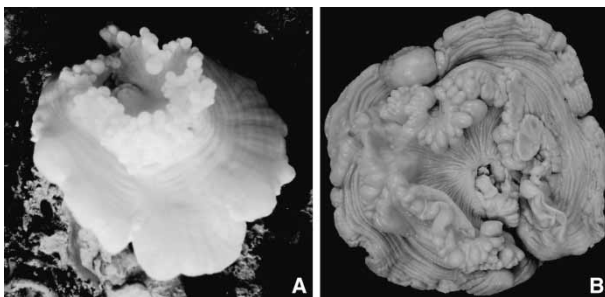


Figure 2. Specimen of *Ptychodactis aleutiensis* sp. nov. from Temnac Bay, Attu Island, 11 m (KUIZ 003022); bulbous tentacles are presumably regenerating. (A) *In situ* photograph taken by diver. (B) Preserved specimen; oral disc 38 mm, pedal disc 62 mm.

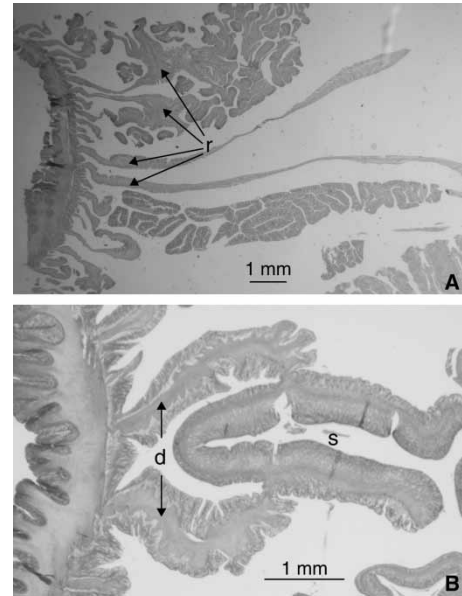


Figure 3. Cross sections of mesenteries of *Ptychodactis aleutiensis* sp. nov. (A) Note weak diffuse retractor muscles (r). (B) Directive mesenteries (d) and siphonoglyph (s).

Cnidom. Spirocysts and holotrichs. Small holotrichs of mesenterial filaments and holotrichs of frills rare. Sizes and distribution of cnidae shown in Table II, illustrated in Figure 5.

Habitat

Most specimens of *Ptychodactis aleutiensis* sp. nov. were found singly (occasionally one or two others were within a few meters), attached to or above bedrock, boulders, and cobbles; some were on or above coarse sand. An unattached animal was never more than 1 m above the substrate. Found in areas of moderate currents, they were associated with an invertebrate community dominated by suspension feeders, many on encrusting coralline algae (*Clathromorphum nereostratum* and *Lithothamnion* sp.). Bottom water temperatures during collections ranged from 5 to 10°C.

Distribution

Specimens were found in all five major Aleutian Island groups (Fox Islands, Islands of the Four Mountains, and the Andreanof, Rat, and Near Islands), across a distance of approximately 1000 km (Table I; Figure 6). Of the 102 sites sampled throughout the Aleutians in 2006–2008, specimens of *Ptychodactis aleutiensis* sp. nov. were found at 39. They may occur deeper than 17 m, but 20 m was the maximum depth sampled. Animals of this species have not been noted in NOAA benthic trawl surveys (30–500 m) in the Aleutian Islands (Roger Clark,

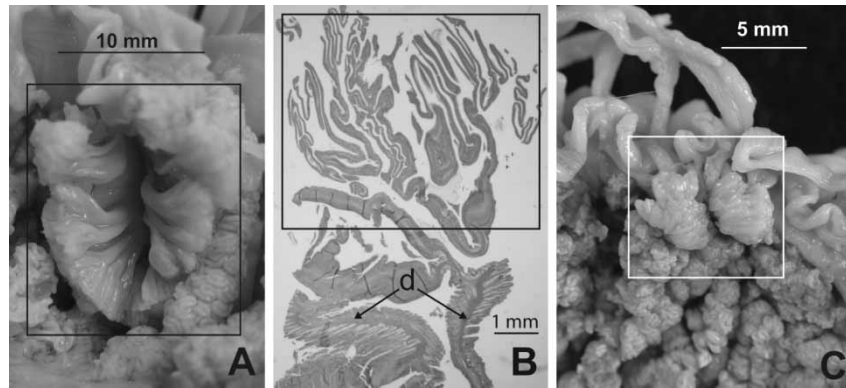


Figure 4. Frilled structures of *Ptychodactis* (indicated by boxes). (A) On a siphonoglyph of a preserved specimen of *P. aleutiensis* sp. nov. (KUIZ 002951); top of box is distal. (B) Tangential section from specimen of *P. aleutiensis* sp. nov.; directive mesenteries (d). (C) On a siphonoglyph of a preserved specimen of *P. patula* (SMNH 20214); top of box is distal.

Santa Barbara Museum of Natural History, personal communication to SCJ 2008).

Differential diagnosis

A specimen of *Ptychodactis aleutiensis* sp. nov. has smooth tentacles, typically numbering more than 200, restricted to the margin; in *Ptychodactis patula*, tentacles are longitudinally ridged, numbering to about 100, and are dispersed on the oral disc, those of the first cycle nearest the mouth and those of sequential cycles more marginal.

All mesenteries of only the first cycle in *P. aleutiensis* sp. nov. are complete; in *P. patula*, mesenteries of two cycles may be complete (in one specimen two cycles were complete, but mesenteries of other specimens were too poorly preserved to determine which were complete). In *P. aleutiensis* sp. nov., only the first cycle of mesenteries is sterile and is perforated by oral stomata. In *P. patula*, all cycles of mesenteries are fertile and lack stomata. A specimen of *P. aleutiensis* sp. nov. has only two siphonoglyphs; a specimen of *P. patula* has multiple siphonoglyphs (three or four in specimens we examined).

Ptychodactis aleutiensis sp. nov. has holotrichs of two size classes in its tentacles, actinopharynx, and mesenterial filaments by contrast with *P. patula*, which has holotrichs of only one size class. Spirocysts in tentacles of *P. aleutiensis* sp. nov. are larger than those in *P. patula* (Table II).

Discussion

Gross anatomy

The specimens of *Ptychodactis patula* that we examined agree with the original description of the species by Appellöf (1893) with the exception of tentacle number. The specimens of *P. patula* that we observed

with comparable pedal disc diameter (44–73 mm) to specimens of *P. aleutiensis* sp. nov. had between 66 and 89 tentacles; Appellöf's original description included one specimen with 122 tentacles.

Tentacles of *Ptychodactis aleutiensis* sp. nov. are typically tapered; however, in one specimen from Temnac Bay, Attu Island, they are spherical (Figure 2). The oral disc of the specimen appeared to be damaged. We infer that the specimen was in the process of regenerating.

There have been inconsistencies in characterizing suborder Ptychodacteae (Cappola & Fautin 2000). One concerns siphonoglyphs, which Carlgren (1949), Cappola & Fautin (2000), and Grebel'nyi (2007) stated are absent, but which are present in both *P. patula* and *P. aleutiensis* sp. nov. Although the original description of *P. patula* mentioned them, in *P. patula* they are very short and narrow, so are easily overlooked.

It is unclear whether a single frilled structure extends across the space at the oral portion of a siphonoglyph or if there is one at each junction of a siphonoglyph with the actinopharynx. Because the frills are so thin, it is possible that the single structure is torn by manipulations so it only appears to be two. If the frilled structures that attach to each edge of the siphonoglyph are separate from one another, there are four in *P. aleutiensis* sp. nov.

Cnidae

Carlgren (1949) defined the cnidom of *Ptychodactis patula* as spirocysts and atrichous nematocysts ('atrichs'). Cutress (1955) and Bigger (1976, 1982) concluded that what were once thought to be atrichs (nematocysts each having a tubule that lacks spination) are really holotrichous nematocysts ('holotrichs') with spines that may not be visible using light microscopy. For this reason we refer to what

Table II. Cnida size and distribution of *Ptychodactis*; 'n' indicates the number of capsules sampled and 'N' is the ratio of the number of specimens from which a particular type of cnida were found relative to the number of specimens sampled for cnidae. Letters in parentheses after cnida type refer to cnida images in Figure 5, the first letter to the cnida of *P. aleutiensis* sp. nov., the second letter to the cnida *P. patula*.

Tissue and cnida type	<i>Ptychodactis patula</i>										
	<i>Ptychodactis aleutiensis</i> sp. nov.			Alaska – USNM 55624			Bering Strait – KUIZ 002950		Norway – SMNH 20214; 103622		
	Length × Width (µm)	n	N	Length × Width (µm)	n	Length × Width (µm)	n	Length × Width (µm)	n	N	
Tentacles											
Spirocysts (A/J)	19.9–37.0 × 2.4–3.7	95	6/6	(12.1) 14.7–16.9 × 2.7–3.4	10	(13.1) 14.3–18.6 × 2.6–3.3	11	11.2–16.2 (19.1) × 2.9–3.9	20	2/2	
Holotrichs 1 (B/K)	16.0–27.6 × 2.8–4.3	106	6/6	14.9–24.4 (26.1) × 2.9–3.5	10	(12.1) 13.9–24.4 × 2.9–4.4 (4.9)	20	17.1–26.2 × 3.0–4.5	21	2/2	
Holotrichs 2 (C/None)	(30.2) 31.5–60.1 × (3.3) 3.9–6.6	105	6/6	None	–	None	–	None	–	–	
Actinopharynx											
Holotrichs 1 (D/L)	(18.2) 19.6–28.9 (32.4) × 3.3–4.4 (4.9)	54	3/3	16.0–17.3 × 2.9–3.1	2	14.9–19.1 (21.4) × (2.5) 2.8–3.8	11	(11.9) 15.0–20.9 × 2.6–3.9	21	2/2	
Holotrichs 2 (E/None)	36.1–49.8 × 4.7–5.9	30	3/3	None	–	None	–	None	–	–	
Mesenterial filaments											
Holotrichs 1 (F/M)	(11.3) 12.4–25.1 (27.1) × 1.8–4.9	40	3/3	(13.3) 15.9–16.2 (19.3) × 2.9–3.1 (3.5)	4	11.2–19.9 × 3.0–4.0	10	11.1–22.7 × 2.9–4.5	20	2/2	
Holotrichs 2 (G/None)	36.0–53.8 (55.7) × 4.8–6.6	44	3/3	None	–	None	–	None	–	–	
Column											
Holotrichs (H/N)	(12.9) 19.6–26.4 (27.6) × 3.1–4.7 (5.3)	53	3/3	13.9–16.4 × 3.0–4.1	10	15.2–21.0 × 3.0–4.1	10	(13.0) 14.2–20.0 (22.3) × 3.1–4.3	20	2/2	
Frills*											
Holotrichs (I/O)	(10.3) 11.0–21.5 (23.1) × (2.4) 2.8–3.5 (4.0)	22	5/6	11.6 × 2.9	1	17.2 × 3.0	1	11.2–15.6 (17.9) × 2.9–3.5 (3.9)	10	1/2	

*In the frills of two specimens of *P. aleutiensis* sp. nov. we found spirocysts within the size range of tentacle spirocysts that we inferred to be contaminants from the tentacles.

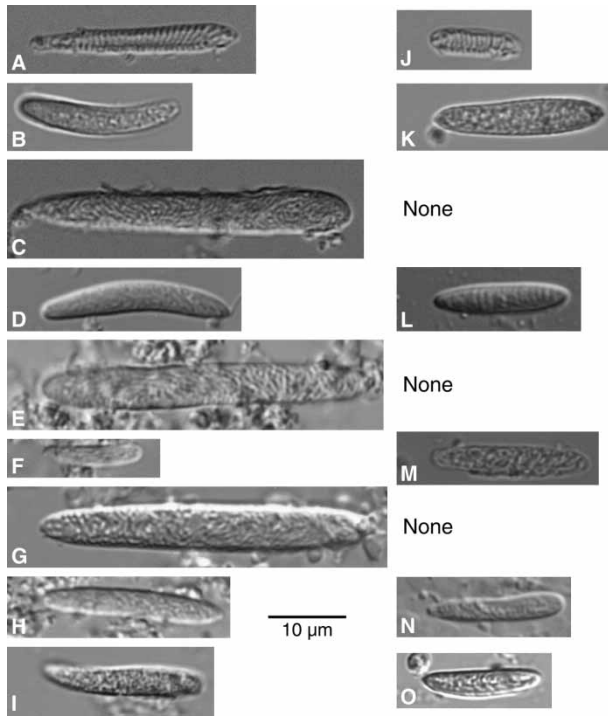


Figure 5. Ctenae of *Ptychodactis*. A–I from *P. aleutiensis* sp. nov., J–O from *P. patula*. See Table II for data on size and distribution.

were originally called atrichs as holotrichs, and have modified the taxon definition accordingly.

We measured ctenae from four specimens of *P. patula* which included two from Norway (SMNH 103622 and SMNH 20214), one from the Bering Strait (KUIZ 002950), and one from Alaska (USNM

55624). Their agreement on size (Table II) supports their belonging to a single species. Our measurements also agree with measurements made by Carlgren (1940) and Cappola & Fautin (2000).

In frills of two of four specimens of *P. patula* were kidney-shaped holotrichs about 10 µm long that resemble those of octocorals (called atrichs by Weill 1934, who illustrated them); similar holotrichs occurred in the mesenterial filaments of one of the two specimens. We infer these were from octocoral prey. Members of family Preactiidae feed on octocorals (England & Robson 1984; Dayton et al. 1997); no one has observed *P. patula* feeding, but specimens have been collected on gorgonians (Appellöf 1893; Grebel'nyi 1986).

We found microbasic *p*-mastigophores in the frills of five of six specimens of *P. aleutiensis* sp. nov., and microbasic *b*-mastigophores in frills of three that differed in size from specimen to specimen. For that reason, and because nematocysts of these types are characteristic of other sea anemones but not of ptychodactarians, we infer they also came from prey. Thus individuals of *P. aleutiensis* sp. nov. appear to prey on other sea anemones.

Detachment

Although uncommon, detachment of the pedal disc by sea anemones is not unknown. Specimens of *Phlyctenactis tuberculosa* (Quoy & Gaimard 1833) attach to rock and algae but are also commonly found unattached and drifting (Dakin et al. 1956; Gowlett-Holmes 2008). Some deep-sea anemones of the genera *Liponema*, *Bolocera*, *Segonzactis*, and *Actinoscyphia* live on or are loosely attached to the substrate and can drift along the sea floor (summarized by Riemann-Zürneck 1998). Perhaps the most widely known example of anemone detachment is by some members of genus *Stomphia*, which release their hold on the substrate in response to the presence of a predator, and flex the column rapidly, which allows them to escape (Robson 1966; Ross 1974).

Distribution

Ptychodactis patula is recorded from 80 m (44 fathoms) (Carlgren 1921) to at least 188 m (Carlgren 1939 gave a depth range of one specimen as 188–350 m). In addition to the first record of the species from Trondheimsfjord, Norway (Appellöf 1893), *P. patula* has been collected at the mouth of Skagafjörður, Iceland (Carlgren 1939). Members of the deep-water fauna often occur at atypically shallow depths in fjords (Brattegard 1980). We therefore

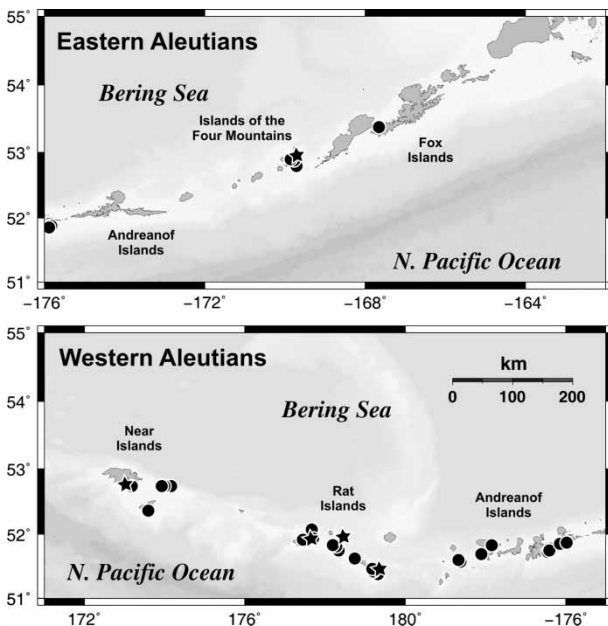


Figure 6. Localities of *Ptychodactis aleutiensis* sp. nov. in the Aleutian Islands, 2006–2008. Dots represent observed specimens; stars represent specimens that were collected. See Table I for specific locations.

consider it likely that members of *P. patula* typically occur deeper than has been recorded.

We have not found specimens of *P. patula* in the Aleutian Islands, but those we examined from the mouth of Kotzebue Sound, Alaska (USNM 55624) and the Bering Strait (65°40'35''N 168°17'57''W) (KUIZ 002950) resemble in all respects those from Norway. Grebel'nyi (2007) reported 28 specimens of *P. patula* from 19 localities in the Arctic Ocean, Bering Strait, Kuril Islands, and northern Sea of Okhotsk at depths of 47–323 m. The specimen from Shiashkotan Island, Kuril Islands illustrated in figure 1 of Grebel'nyi (2007) resembles specimens of *Ptychodactis aleutiensis* sp. nov. that we examined in having more than 200 smooth tentacles. We requested these specimens to study, but they were not sent. We are therefore unable to ascertain whether *P. aleutiensis* sp. nov. occurs beyond the Aleutian Islands and deeper than 17 m. The physical oceanography of the Bering Sea (which is bounded to the south by the Aleutian Islands) and the Sea of Okhotsk (which is bounded to the east by the Kuril Islands) are similar, as evidenced by their constituting the North Pacific Epicontinental Sea Province (BERS) of the Pacific Polar Biome (Longhurst 1998). It would therefore not be surprising to find *P. aleutiensis* sp. nov. also in the Kuril Islands. However, as far as we know, *P. patula* does not occur in the Aleutian Islands, and *P. aleutiensis* sp. nov. is endemic to shallow waters of the Aleutians.

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