



A new species of *Aaptos* (Porifera, Hadromerida, Suberitidae) from Pribilof Canyon, Bering Sea, Alaska

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The Bering Sea is predominantly a shallow sea, with a massive shelf mostly shallower than 100 m. Pribilof Canyon and Zhemchug Canyon, two of the largest submarine canyons in the world, were explored in August 2007, by the Greenpeace vessel “Esperanza”, with manned submersibles and a remotely operated vehicle (ROV) to depths of 1000 m. Specimens were collected with hydraulic manipulators operated by the pilots of the submersibles or with the ROV. Once on deck the specimens were transferred to ethanol. Pribilof Canyon is 426 km long and 1800 m deep, while Zhemchug Canyon is even larger and reaches depths of more than 2600 m (Normark and Carlson 2003). Here we describe a new species of *Aaptos* and compare it with representative congeners. The genus *Aaptos* was erected by Gray (1867) for *Aaptos aaptos*, described by Schmidt (1864) as *Ancorina aaptos*. Today, *Aaptos* is placed in Suberitidae Schmidt, 1870 and contains 21 species (Van Soest *et al.* 2005). For a more detailed historical review of the family and genus we refer to the publications of Kelly-Borges & Bergquist (1994) and to Van Soest (2002). According to Van Soest (2002), *Aaptos* is separated from other Suberitidae by its spherical or lobate growth forms, and by the presence of a strictly radial skeleton that contains characteristic strongyloxeas. The type species was described from the Mediterranean Sea (Algeria) and was then reported from many other areas of the world. These subsequent records likely represent additional undescribed species of *Aaptos* (Van Soest, 2002).

Order Hadromerida Topsent, 1894

Family Suberitidae Schmidt, 1870

Genus *Aaptos* Gray, 1867

Aaptos kanuux sp. n.

Holotype: USNM 1117764; Figs. 1A–C, stored in ethanol after collection. Collected by Kenneth Lowyck in Pribilof Canyon at 219 m depth, 1 August 2007, 55°59.431N, 170°01.378W.

Description. The sponge is irregularly globular, somewhat wider than high, diameters range from 9 to 19 mm (Fig. 1B). At the base the sponge is firmly attached to two small black pebbles (Fig. 1B). The surface is almost smooth, microscopically slightly uneven and in places microhispid, due to protruding spicules. Live color is mustard yellow (Fig. 1A), in ethanol the sponge is greyish beige. In life, the black pebbles were buried in the silt with only the sponge protruding (Fig. 1A). No oscules are visible, neither on the collected specimen, nor on videos. The consistency is firm, only slightly elastic, and almost incompressible. The radial arrangement of the spicules in the interior of the sponge is evident with the unaided eye on sections perpendicular to the surface (Fig. 1C).

Spicules. Spicules are strictly arranged radially in all parts of the sponge (Fig. 1C); spicule density is very high throughout the sponge and thus the consistency is hard. There is no cortex. Single spicules are grouped in polyspicular tracts which are slender at start (as paucispicular tracts, 30µm in diameter) containing only few spicules per cross section. These polyspicular tracts widen towards the surface and reach diameters of 420µm with approximately 20 spicules per cross section. Small tylostyles form a dense palisade at the surface. Spicules at the ends of the polyspicular tracts can protrude through the palisade in some places and cause the microhispid surface there. Three types of spicules are proper

to the sponge (Figs. 1D-F) and represent the typical set of spicules of the genus: ectosomal tylostyles (Figs. 1E-F) measure 104 – 215 x 4-8 μ m; choanosomal spicules are strongyloxeas (Fig. 1D), 1795 – 2132 x 15-22 μ m and, fusiform subtylostyles (Fig. 1E), occasionally strongyloxeas (Fig. 1F), when the tyle is missing, 485 – 770 x 8-10 μ m.

Distribution: It is known only from the type locality. This is the northernmost record of the genus and the first from the Bering Sea. According to observations from videos the species is locally common on pebble patches in low-relief silt and sand habitat at depths between 203 and 219 m. The sponge was often in association with several unknown species of hydroids, zoanths, and the demosponge *Stylocordyla borealis* (Loven, 1868).

Etymology: The species name “kanuux” means heart in Unungan and the Bering Sea canyons are regarded as the heart of the Bering Sea by the Unungan people.

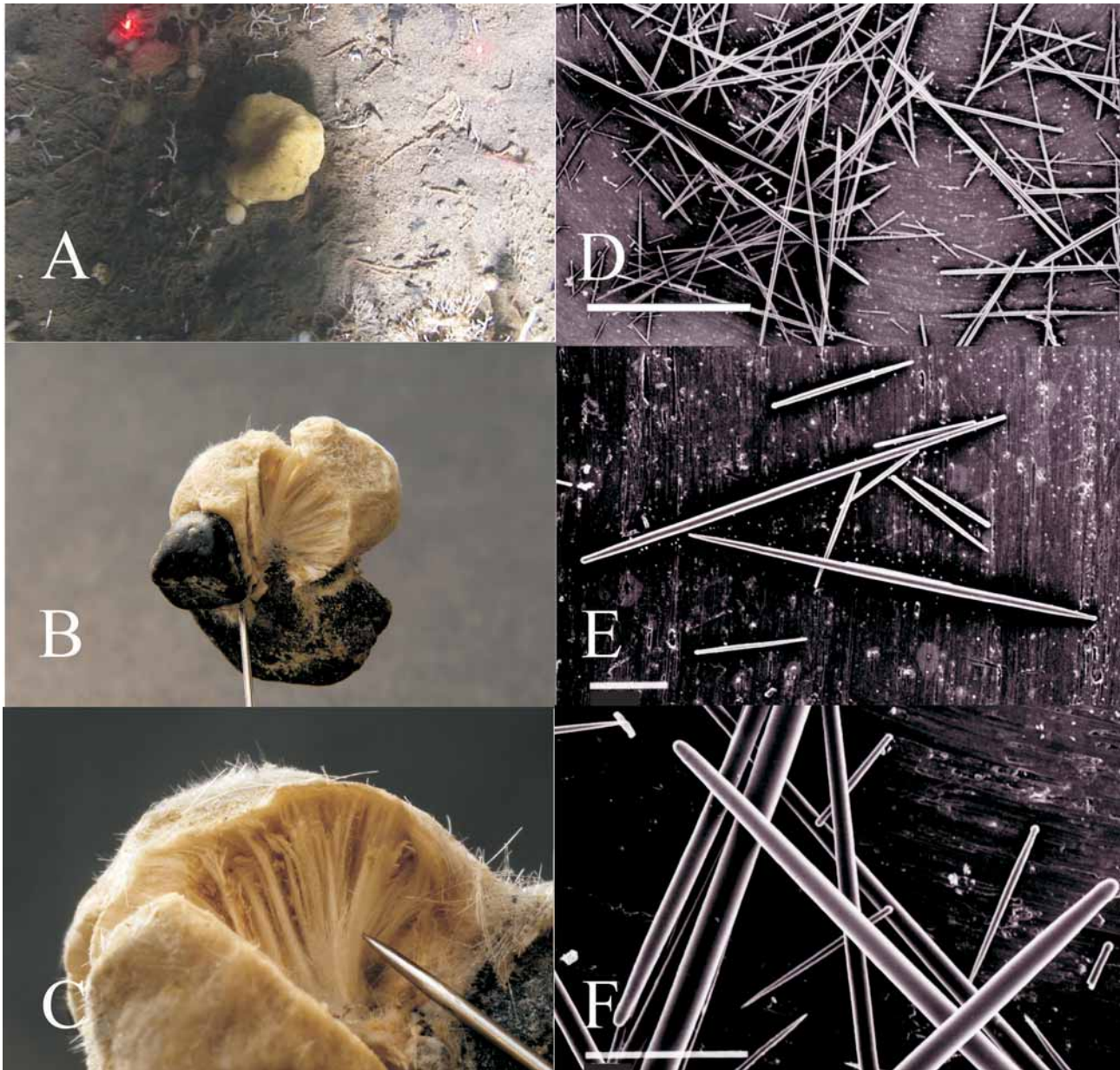


FIGURE 1. A: Holotype of *Aaptos kanuux* sp. n. in situ at 219 m depth in Pribilof Canyon. Black pebbles to which the sponge is attached are buried in the silt and not visible. Sponge diameter is approx. 3cm. B: Holotype, preserved in ethanol. Two fragments have already been cut out of the sponge. Note the radial arrangement in the interior. Sponge diameter is 1.9cm C: Radial arrangement of spicules and partly hispid surface visible. D: Overview of spicules occurring in *Aaptos kanuux* sp. n. Large strongyloxeas, medium sized subtylostyles and short, ectosomal tylostyles. Scale bar is 1 mm. E: Medium sized subtylostyles and ectosomal tylostyles. Scale bar *is* 100 μ m. F: Ectosomal tylostyles and ends of medium sized spicule category. Scale bar *is* 100 μ m.

TABLE 1. Characters and distribution of selected species of the genus *Aaptos*.

Aaptos	author, year	strongyloxeas	dermal spicules	additional spicules	records from	growth form
aaptos	Schmidt, 1864	two categories, 1053–1911 x 12–31µm and 490–955 x 10–23µm	styles to subtylostyles, 135–230 x 1–5 µm	none	Mediterranean, Atlantic (NW-Spain, Portugal, Azores, Madeira, Canary Islands)	Massively lobate, hard sponge, dark brown externally and yellow internally. No papillae.
papillatus	(Keller, 1880)	fusiform, 519–2989 x 12–59 µm	tylostyles, 110–952 x 3–26.5 µm	styles, 176–1478 x 2.5–14.5 µm	Mediterranean and W-Atlantic.	Reddish violet, hemispherical with small papillae, habitus similar to <i>A. kanuux</i> sp. n.
bergmanni	de Laubenfels, 1950	present, up to 950 x 15 µm	styles, 150 x 2.5 µm	none	Bermuda	Massive, often subspherical or aggregates of subspherical components, exterior dark brown, interior yellow, in ethanol exterior dark brown with purplish tinges, interior pale yellow, dried specimens turn black, ethanol becomes green. Cheeselike consistency, small and contractile oscules.
niger	Hoshino, 1981	540–1310 x 18–46 µm	styles, 170–270 x 5–10 µm	none	Japan, subtidal, 15m depth.	Irregular massive, black hard sponge.
vannamei	de Laubenfels, 1935	none	styles, 60–3600 (-6000) x to 120 µm	styles to subtylostyles, 500–600 x 5 µm	California	Base 2x7cm and 4.5cm height, "no distinctive color or consistency", moderately compressible and easily torn.
kanuux sp.nov.	present paper	1180–2135 x 15–22µm	fusiform tylostyles, 104–215 x 4–8 µm	subtylostyles, 480–770 x 8–10 µm	Bering Sea	Hemispherical sponge with small papillae, live color mustard yellow, greyish in preservative, growth form similar to papillatus but clearly differs in spicule geometry and size range of spicules.

Discussion: There are 21 nominal species in *Aaptos* (Van Soest *et al.*, 2005). We compare *A. kanuux* with congeners from the North Pacific and the N-Atlantic; other known species are unlikely to be conspecific for zoogeographic reasons and therefore are not considered further. Spicule measurements of *Aaptos* species compared with *A. kanuux* **sp. n.** are given in Tab. 1. *A. kanuux* **sp. n.** is the first record of the genus from the Bering Sea, which might be a valid argument for specific distinctness based on zoogeographic reasons. Zoogeographically the closest congener reported is *Aaptos niger* Hoshino, 1981 from Japan. *A. niger* differs ecologically as it was recorded from the subtidal at a depth of only 15 m. *Aaptos niger* has only two categories of spicules while the new species has three. The choanosomal strongyloxeas are roughly half the length but twice the thickness of those of *A. kanuux* **sp. n.** Ectosomal spicules differ in geometry and sizes between the two species; ectosomal styles in *A. niger* are much longer than ectosomal tylostyles in *A. kanuux* **sp. n.** The only other record of the genus in the North Pacific is *A. vannamei* de Laubenfels, 1935 reported from California. As *A. vannamei* completely lacks strongyloxeas, it does not fit in the definition of, and consequently is not a member of *Aaptos*. *A. vannamei* has styles of an extremely wide size-range and styles to subtylostyles. A confident assignment of de Laubenfels' species is not possible without a closer examination of the holotype. The type species *Aaptos aaptos* (Schmidt, 1864) was originally described from the Mediterranean Sea, but there are also N-Atlantic records. According to redescriptions of the type species, *A. aaptos* has two size categories of strongyloxeas (Kelly-Borges & Bergquist, 1994, Van Soest, 2002), in contrast with only one in *A. kanuux* **sp. n.**, with the maximum dimensions somewhat smaller. Both species have subtylostyles as intermediate spicules, but subtylostyles in the type species are somewhat longer and considerably thicker. The most striking difference is that of ectosomal spicules: these are curved and frequently flexuous styles or subtylostyles in the type species but straight tylostyles with well rounded tyles in *A. kanuux*, the latter being much shorter but thicker than ectosomal spicules in *A. aaptos*.

Aaptos papillatus (Keller, 1880) resembles our new species in growth form as it is hemispherical, but differs in hav-

ing surface papillae. Differences in spiculation are the strongyloxeas in a larger size-range in *A. papillatus*; notably, the width of spicules being over twice that observed in *A. kanuux* **sp. n.** The same is true for the dermal tylostyles, which may be up to 36 µm thick compared to only 8 µm in *A. kanuux* **sp. n.** The third category of spicules is composed of styles in *A. papillatus* and subtylostyles in *A. kanuux* **sp. n.**; the maximum length of these is 770 µm in the new species compared to 1478 µm in *A. papillatus*. *A. papillatus* is a Mediterranean species, with one record from the Atlantic coast of France. This record was first described as *Polymastia glenei* by Descatoire (1966) but was later synonymised with *A. papillatus*. Again, the distance between the European coasts, either Mediterranean or Atlantic, argue for specific distinctness. *A. bergmanni* de Laubenfels, 1950 is a shallow water species described from Bermuda. It is a rather large species, dark brown outside and yellow in the interior. It differs in having ectosomal styles which are much thinner than the tylostyles of *A. kanuux* **sp. n.** Furthermore, the strongyloxeas in *A. bergmanni* are shorter and the species lacks a third category of megascleres.

To summarize, *A. kanuux* **sp. n.** appears to be unique with its mustard yellow exterior, and it differs from all congeners in the assemblage of spicules occurring and/or in their dimensions. Most species of the genus occur in warm or temperate seas and in shallow water, *A. kanuux* **sp. n.** being an exception for it was found in rather deep water in a sub-polar region.

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