

***Actinopyga caerulea* sp. nov.**

(Figures 1A–J, 2A–E, 3A–E, 4A–G, 5; plate 1A–C)

Actinopyga crassa; Cherbonnier & Féral 1984 : 664, fig. 3 A–K; Féral & Cherbonnier 1986 : 70–71; Erhardt & Moosleitner 1995: 1153 (non *A. crassa* Panning, 1944)

Actinopyga (?) *bannwarthi*; Erhardt & Baensch 1998: 1076 (non *A. bannwarthi* Panning 1944)

Name-bearing types

Holotype, RMCA 1803; Paratype 1, CNDRS 2004.09; Paratype 2, RBINS IG 30376; Paratype 3, MNHN EcHo 8081; Paratype 4, NHM 2005.2405.

Material examined

Union des Comores (Grande Comore, Ikoni), 22.XI.2003, 37 m depth, coll. Y. Samyn & D. VandenSpiegel, RMCA 1803 (holotype); Union des Comores (Grande Comore, H.L.M Langouste), 11.X.2004, 28 m depth, coll. Y. Samyn, D. VandenSpiegel & C. Massin, CNDRS 2004.09 (paratype 1); Union des Comores (Grande Comore, Itsandra), 20.XI.2003, 23 m depth, coll. Y. Samyn & D. VandenSpiegel, RBINS IG 30376 (paratype 2); Union des Comores (Grande Comore, Aérodrôme), 16.V.2005, 26 m depth, coll. Y. Samyn & D. VandenSpiegel, MNHN EcHo 8081 (paratype 3); Union des Comores (Grande Comore, Itsandra), 16.V.2005, 21 m depth, coll. Yves Samyn & D. VandenSpiegel, NHM 2005.2405 (paratype 4); Papua New Guinea (Madang Province, Madang's Reef, Wongat Island), 05.X.1996, 25 m depth, coll. C. Massin, RBINS, IG 28 455/22.

Type locality

Union des Comores, Grande Comore, Ikoni.

Type material (2 syntypes) of *Actinopyga serratidens* var. *bannwarthi* Panning, 1944: ZMH E5902 (Zoologisches Institut und Zoologisches Museum der Universität Hamburg); Egypt (Suez), 1913, depth unknown, coll. Dr E. Bannwarth.

Non type material (1 specimen) of *A. mauritiana* (Quoy & Gaimard, 1833) (misidentified as *A. bannwarthi* Panning, 1944 by Cherbonnier (1988)): Madagascar (Nosy Be, Andilana), 20.VIII.1959, coll. G. Cherbonnier, EcHh 5082 (Muséum National d'Histoire Naturelle, Paris, France).

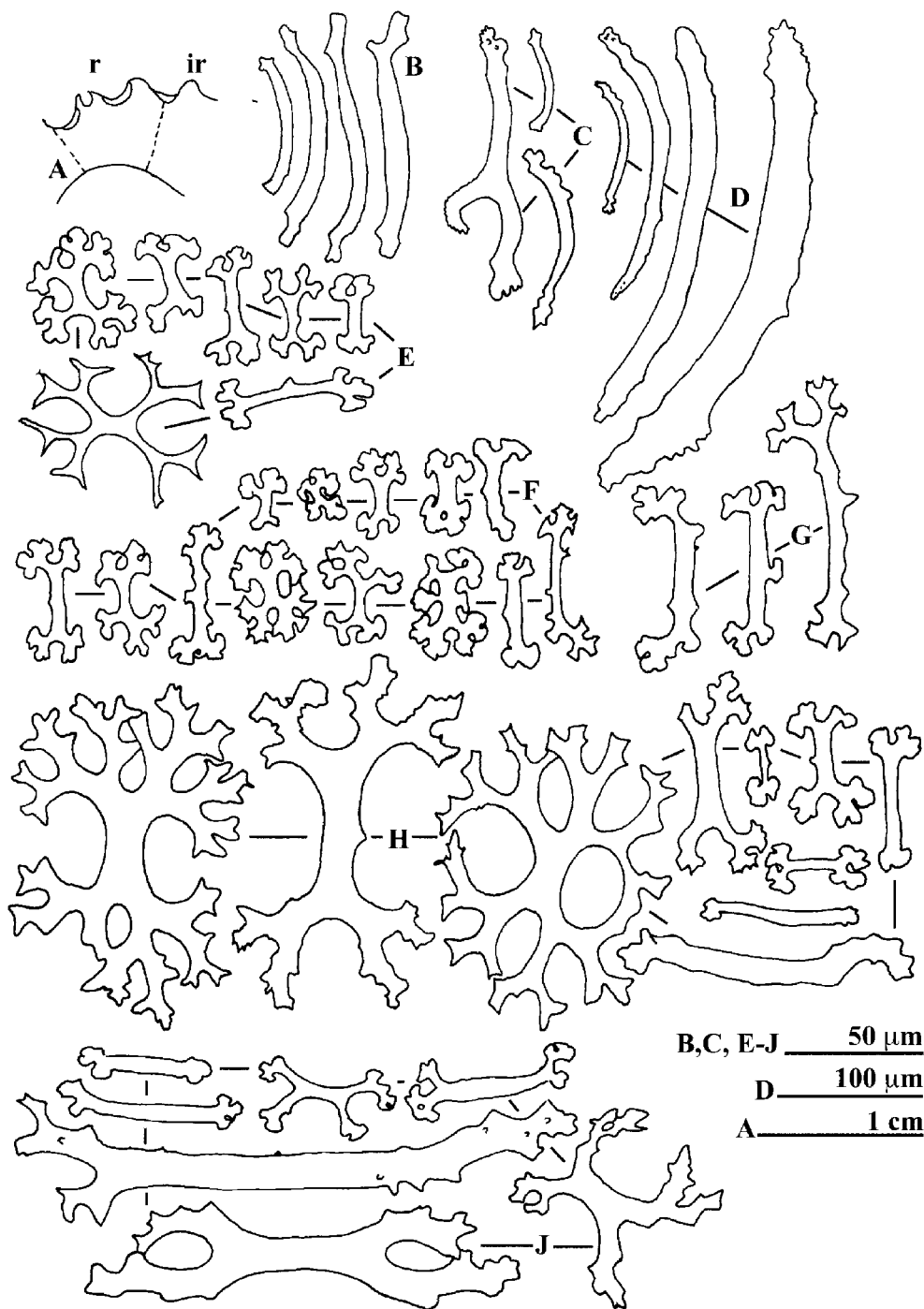


FIGURE 1. *Actinopyga caerulea* sp. nov. (Papua New Guinea). A, Calcareous ring.: r = radial piece, ir = interradial piece. B, Rods from base of tentacles. C, D Rods from tip of tentacle. E, Rosettes from ventral body wall. F, Rosettes from dorsal body wall. G, Elongated rod-like rosettes from dorsal body wall. H, Rosettes from tip of dorsal papillae. J, Rods from base of dorsal papillae.

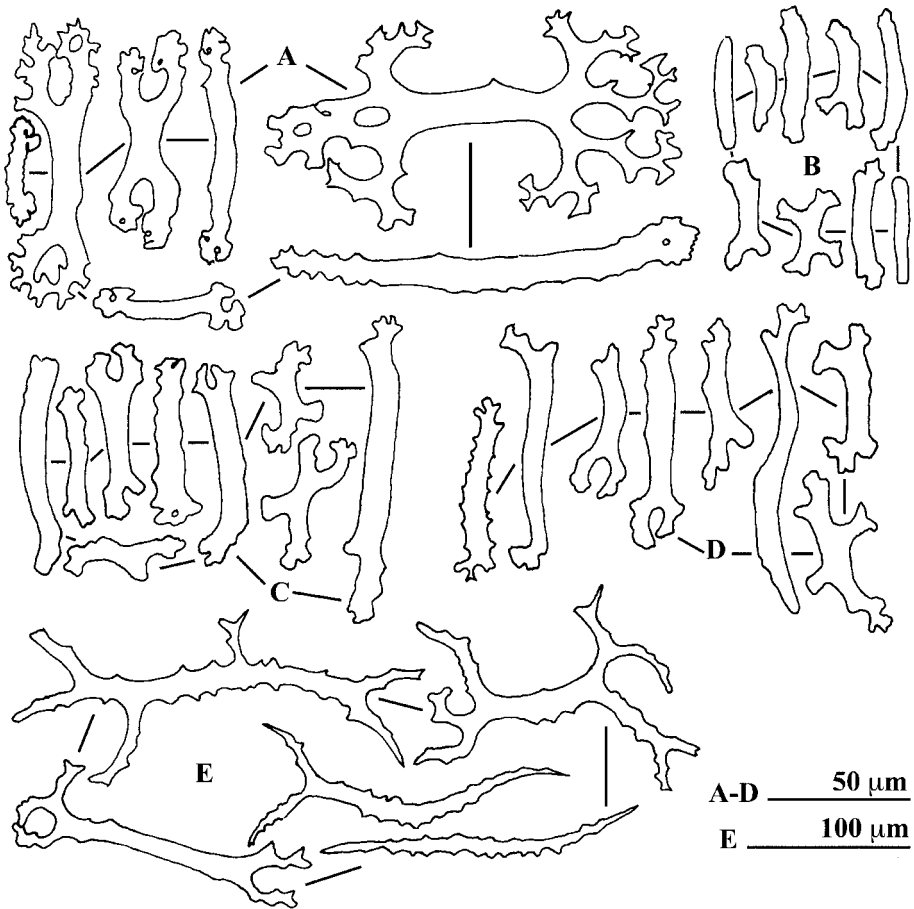


FIGURE 2. *Actinopyga caerulea* sp. nov. (Papua New Guinea) A, Rods from ventral tube feet. B, Rods from longitudinal muscle. C, Rods from cloacal retractor muscles. D, Rods from cloacal wall. E, Rods from gonad.

Non type material (2 specimens) of *A. crassa* Panning, 1944: Seychelles (Mahé), 07.IX.1969, coll. Mission zoologique MRAC-ULB, RMCA 1186.

Description

Very large species; living specimens up to 400 mm long and 140 mm wide mid-body; preserved specimens from 225 to 280 mm long and from 85 to 110 mm wide mid-body. Body loaf-shaped with slight ventral flattening (more or less cylindrical with some distal tapering). Colour in life bluish with patches of white devoid of tube feet at anterior and posterior ends and, discontinuously, along sides (Plate 1). Colour in type material in alcohol largely preserved, but faded to dull brown in specimen from Papua New Guinea. White patches remain clearly visible on all specimens. Body wall smooth, up to 14 mm thick. Mouth ventral, surrounded by 15–18 large, peltate, uniformly bluish-grey tentacles, in turn surrounded by a stout collar of bluish papillae, fused at their base. Anus terminal,

guarded by five prominent, calcareous, teeth, each bearing numerous tubercles. Ventral tube feet stout, distributed unevenly, *albeit* somewhat concentrated in ambulacral areas. Dorsal “papillae” large, conical at base, near cylindrical at top; bluish at base, slightly lighter at top; scattered over ambulacral and interambulacral areas, though absent in white zones. Cuvierian organ absent. Single, club-shaped Polian vesicle, about one seventh of length of preserved animals. Stone canal and associated madreporite not observed in all the specimens studied. Gonad observed only in the specimen from Papua New Guinea. Calcareous ring huge, radial pieces about twice as large as interradial pieces (Figure 1A). Details of surface of calcareous ring obscured by thick layer of tissue.

Ossicles: Tentacles with rods only; base of tentacles with few, straight to slightly curved, smooth rods, 50–90 μm long (Figure 1B); tip of tentacles with similar but larger rods, up to 500 μm long (Figure 1C, D), occasionally distally branching (Figures 1C, 3A). Ventral body wall with rosettes of various forms, some elongated with endings swollen, others wider and more spiny, 15–65 μm long (Figures 1E, 3B). Dorsal body wall with small rosettes that have their endings swollen, 20–60 μm long (Figures 1F, 3C) and elongated rod-like spiny rosettes, 255–100 μm long (Figures 1G, 3D). The proportion of rosettes with swollen endings versus spiny rod-like rosettes as well as the size of the rosettes are highly variable within a single specimen, depending on site of bivium sampled. The same phenomenon occurs in specimens coming from different geographic localities: holotype from Comoros Islands with more spiny ossicles in dorsal body wall than the specimen from Papua New Guinea. Base of dorsal papillae with rosettes and rod-like rosettes, 25–65 μm long, as well as dichotomously branched spiny rods, 100–160 μm long (Figures 1J, 3E). Tip of dorsal papillae with spiny rods of various form; from simple to complex branching, 50–200 μm long (Figures 1H, 4A). Ventral tube feet with smooth rods, 25–40 μm long, spiny rods, 40–150 μm long, and stout spiny rods, 100–140 μm long, with perforated extremities (Figures 2A, 4B); terminal disc, up to 1,000 μm across, composed of several pieces; centrally several perforated plates with large holes (Figure 4C) surrounded by 10–12 perforated plates with smallest holes at periphery (Figure 4D). Cloaca with spiky rods, similar in shape as those from dorsal papillae, 50–100 μm long (Figures 2D, 4E). Longitudinal and cloacal retractor muscles with simple, smooth, occasionally branched rods, 35–55 μm long (Figures 2B, C, 4F, G). Gonad with spiny, branched rods, 160–250 μm long (Figure 2E).

Etymology

The name *caerulea*, Latin, refers to the unique blue colour of the species.

Ecology

This species is characteristic of somewhat deeper tropical waters; it has been observed from 12 to 45 m. The species is predominantly a detritus/deposit feeder on coral patches on the outer slope of coral reefs; it forages actively during the day.

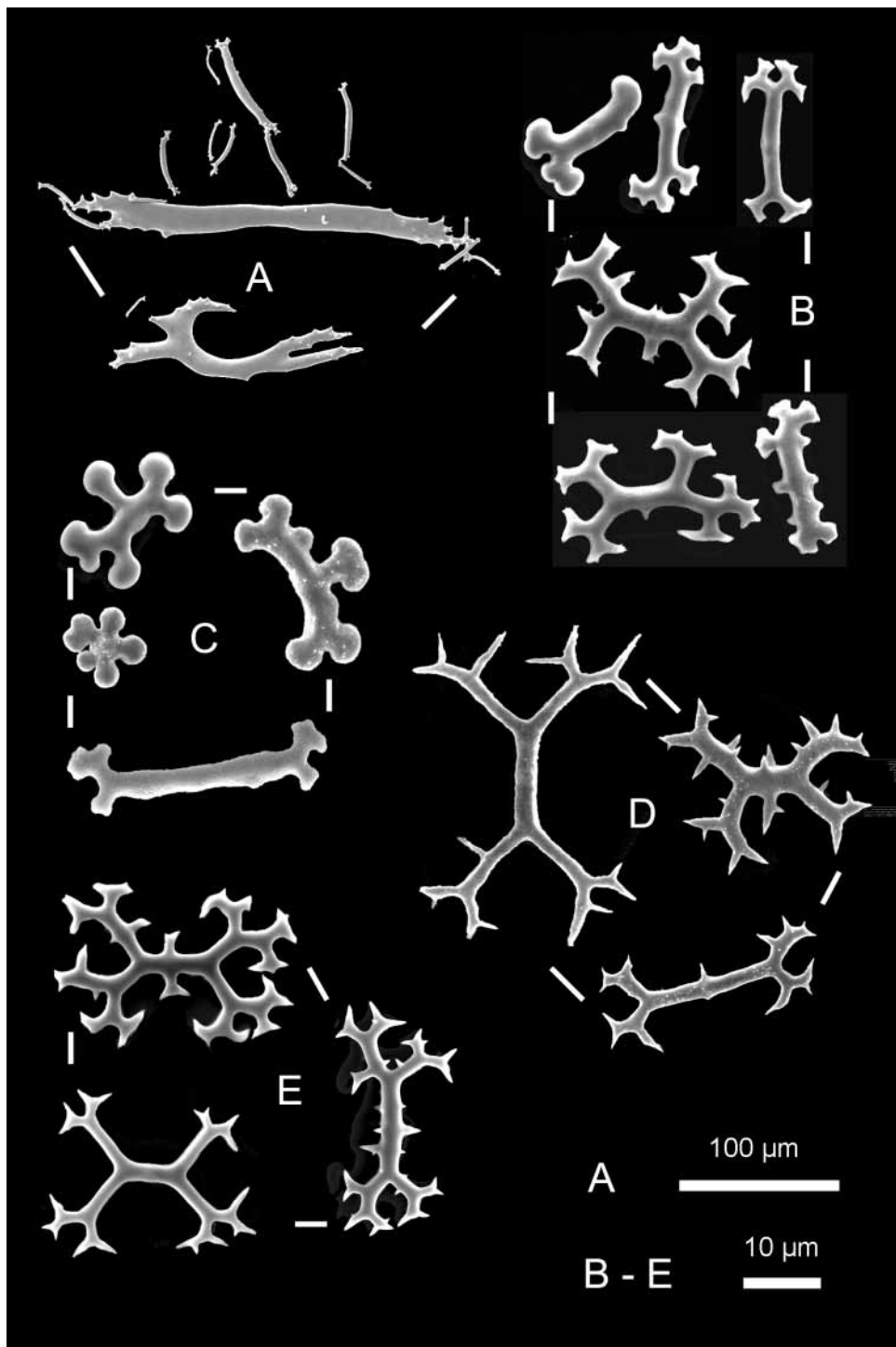


FIGURE 3. *Actinopyga caerulea* sp. nov. (Comoros, holotype) A, Rods from tentacle. B, Rosettes from ventral body wall. C, Rosettes from dorsal body wall. D, Spiny, rod-like rosettes from dorsal body wall. E, Rosettes from base of dorsal papillae.

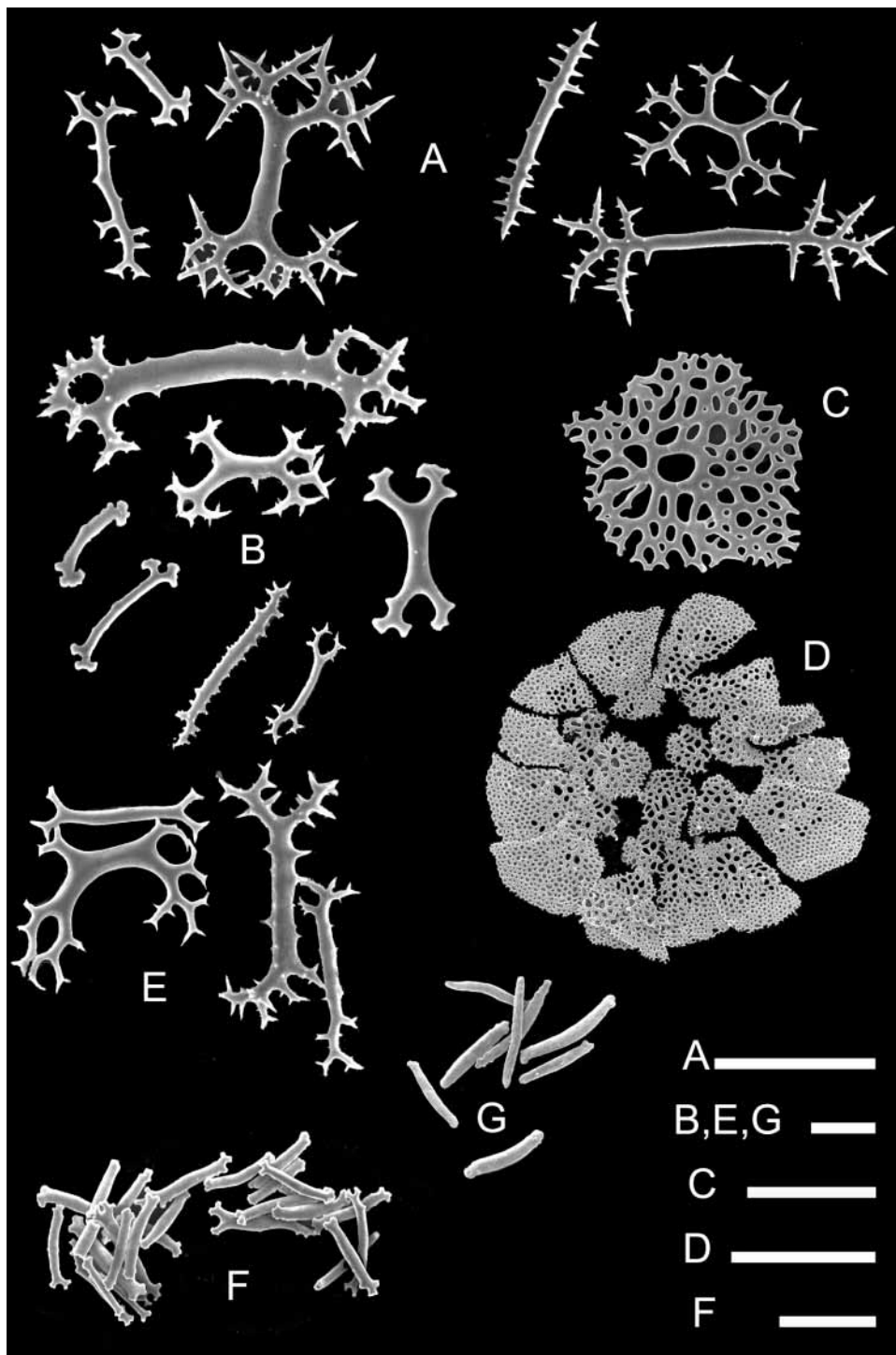


FIGURE 4. *Actinopyga caerulea* sp. nov. (Comoros, holotype) A, Rods from tip of dorsal papillae. B, Rods from ventral tube feet. C, Central plate from fragmented terminal disc. D, *In toto* view of fragmented terminal disc. E, Spiny rods from cloacal wall. F, Rods from cloacal retractor muscle. G, Rods from longitudinal muscle. Scale A& F = 50 μ m; Scale B,E,G = 10 μ m; Scale C = 100 μ m; Scale D = 200 μ m.

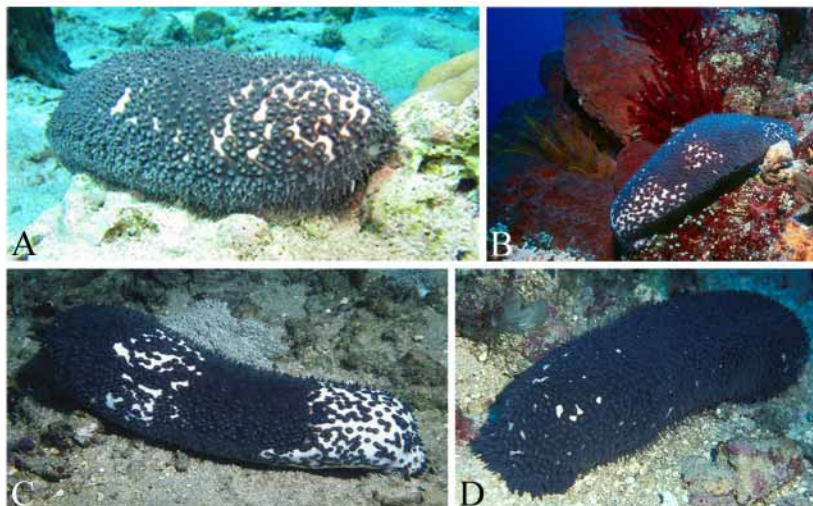


PLATE 1. *Actinopyga caerulea* sp. nov. as photographed *in situ* in Comoros (A), Sulawesi (B), Bali (C) and Papua New Guinea (D). (Picture A by D. VandenSpiegel; B by D. Lane; C by R. Myers and D by P. Colins).

Geographic distribution

Tropical Indo-Pacific; confirmed sightings have been made in Thailand (see Erhardt & Moosleitner 1995, as *A. crassa*), the Philippines (see Erhardt & Baensch 1998, as *A. (?) bannwarthi*), Indonesia [Bali (Myers pers. comm.) and Sulawesi (Lane pers. comm.)], Papua New Guinea [Kavieng (Colin pers. comm), Hansa Bay (Colin pers. comm.) and Madang (present paper)], New Caledonia (see Féral & Cherbonnier 1986, as *A. crassa*) and the Archipelago of the Comoros (type locality). Figure 5 shows the known distribution of this species, including locations requiring confirmation of identification.

Discussion

Actinopyga caerulea sp.nov belongs to what Panning (1944) has termed the ‘*echinites*’ group. It shares with *A. bannwarthi* the presence of spiny rosettes (cf. Panning 1944, Fig. 22, p. 54). However, rosettes from *A. bannwarthi* are less spiny and have many more lateral extensions than those from *A. caerulea*. Another striking difference between the two species lies in the colouration: the two syntypes of *A. bannwarthi* are uniform dark chocolate brown dorsally (Figure 6A) and light brown to yellow ventrally (Figure 6B), with no white patches devoid of tube feet on the lateral and dorsal surfaces of the body. The two species differ also in terms of distribution: *A. caerulea* has not yet been found in the Red Sea, whereas *A. bannwarthi* seems restricted to it. Sloan *et al.* (1979, as *A. sp. cf. A. bannwarthi*), Cherbonnier (1988) and Rowe & Gates’ (1995) records of *A. bannwarthi* need verification. Certainly one of the Malagasy specimens identified by Cherbonnier (1988) is *A. mauritiana* and not *A. bannwarthi*.

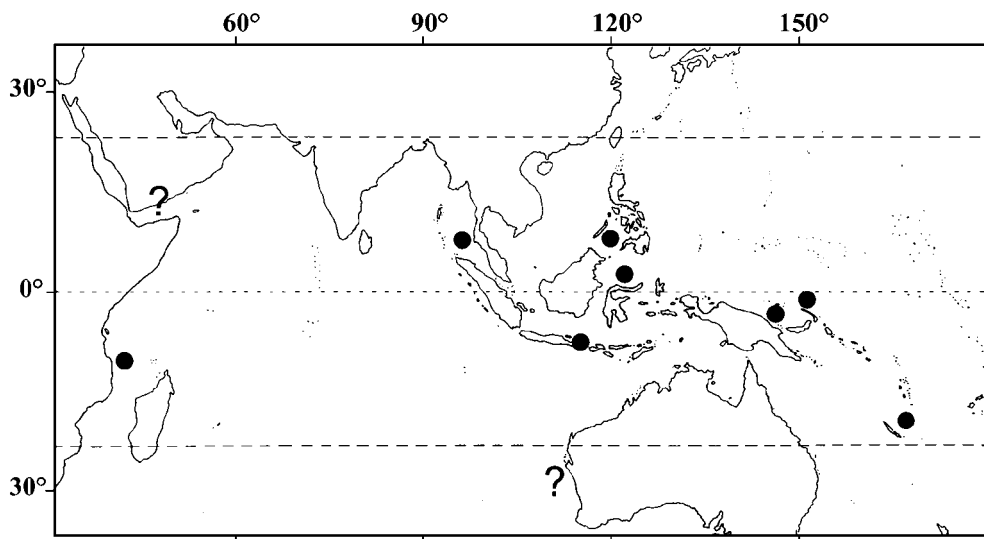


FIGURE 5. *Actinopyga caerulea* sp. nov. Known geographic distribution with uncertain records flagged with a question mark.

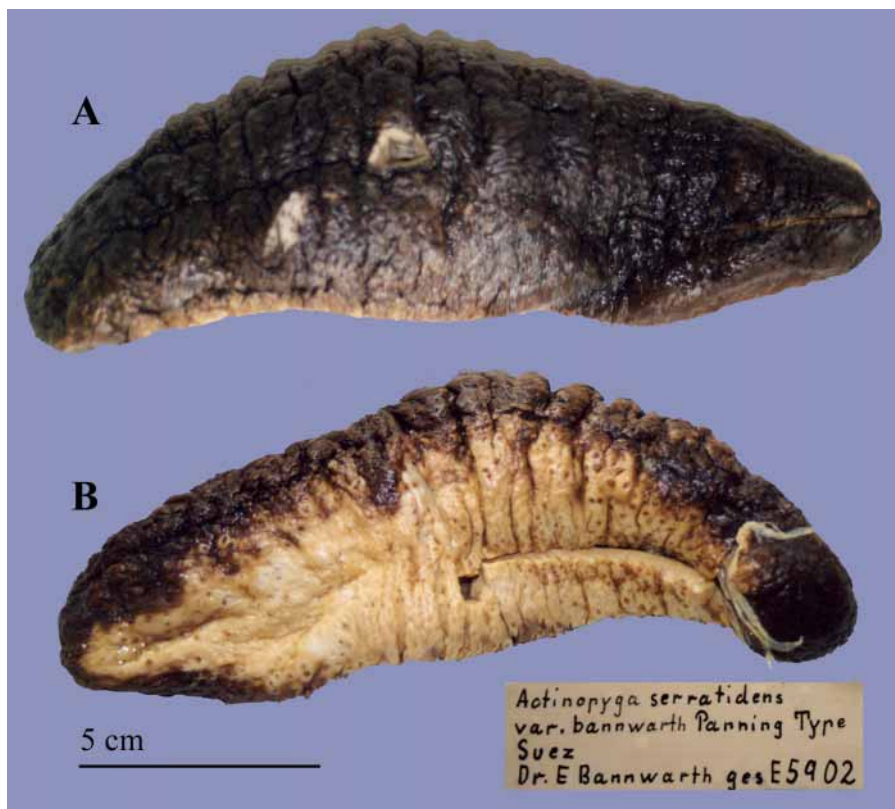


FIGURE 6. One of the two syntypes of *A. bannwarthi* Panning, 1944 as deposited in the ZMH (ZMH E. 5902) (A) dorsal view, (B) ventral view.

With comparative voucher material now at hand, we conclude that we are not dealing with *Actinopyga crassa* (see Erhardt & Moosleitner 1995). The latter species differs markedly from *A. caerulea* in the presence of stout, slightly curved rods in the ventral body wall and in the presence of elongated narrow rod-like rosettes with lateral extensions in the dorsal body wall (cf. Panning 1944, fig 19, p. 51).

The more recently described *A. flammea* also appears to belong to Panning's (1944) 'echinites group', an observation we share with Cherbonnier (1979). Nevertheless, *A. caerulea* can again be easily distinguished from *A. flammea*, in life, because *A. caerulea* has a conspicuous bluish and white colouration, and *A. flammea* has a uniformly brick red body wall and prominent, greyish, tubercular "papillae". Further, *A. caerulea* differs markedly from *A. flammea* in not having closed rosettes in the ventral body wall (see Cherbonnier 1979, fig. 2F,G, p. 5).

Our observation of a compound endplate in the ventral tube feet is not new. This character has already been noted for several species in *Actinopyga*, *Bohadschia*, *Pearsonothuria graeffei* (Semper, 1868), as well as in certain Stichopodidae (Massin 1996; 1999; unpublished data) and Synallactidae, notably species of *Synallactes* Ludwig, 1894 (Massin, 1992). More detailed systematic study of such "fragmentation" in all the genera of Aspidochirotida will help to determine whether this phenomenon is due to common descent or not. For now, we can note that an endplate of a large diameter (≥ 500 μm across) does not *ipso facto* imply that the endplate will be compound. Indeed, some aspidochirotid species have a simple, single endplate of over 500 μm across, while others possess a compound endplate that is 350 μm across.