Zootaxa 5432 (2): 151–159
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5432.2.1
http://zoobank.org/urn:lsid:zoobank.org:pub:BC7C6D45-050F-4558-829D-3366FD93C16C

Actinopyga spinea Cherbonnier, 1980 (Holothuroidea: Holothuriida: Holothuriidae), new addition to the holothuroid fauna of Pakistan

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Abstract

We here in report on the first record of *Actinopyga spinea* from the intertidal zone from Balochistan, Pakistan in the northern Arabian Sea. Its taxonomic characters, habitat and distribution are described.

Key words: *Actinopyga*, sea cucumber, new record, Makran coast, Balochistan, Northern Arabian Sea

Introduction

The order Holothuriida (Miller *et al.* 2017) is the second largest order of sea cucumbers, comprising two families: Holothuriidae Burmeister, 1837 and Mesothuriidae Smirnov, 2012 (accessed WoRMS 2024). The family Holothuriidae is the largest and includes 5 genera: *Holothuria* Linnaeus, 1767, *Actinopyga* Bronn, 1860, *Bohadschia* Jaeger, 1833, *Labidodemas* Selenka, 1867 and *Pearsonothuria* Levin in Levin, Kalinin and Stonik, 1984. Pearson (1914) believed that *Actinopyga* and *Bohadschia* are closely related to the genus *Holothuria* and this was confirmed by Miller *et al.* (2017) by molecular examination. Species of *Actinopyga* are found in shallow-waters, depth range (0–100m), of a wide circum-tropical belt of the Indo-Pacific region but they also occur in the Caribbean region of the West Atlantic Ocean. They are usually found in association with coral reefs (Samyn *et al.* 2006) and without exception, display five well developed anal teeth which are sometimes concealed within the anus.

The first consolidated compilation of the holothuroid fauna of Pakistan and West India is that of Clark & Rowe (1971),who listed 12 species, but did not specify which came from Pakistan and which from W. India. Subsequently there were sporadic additions to the fauna by mostly Pakistani workers (see Table below). Thus only 25 species have been reported from Pakistan. This current record of *Actinopyga spinea* increases the number of known species to 26.

Only 11 species belonging to the family Holothuriidae have previously been recorded from Pakistan. Thus, of all the species of *Actinopyga* known to date only *Actinopyga mauritiana* was previously reported from Pakistan. To this we now add *A.spinea* Cherbonnier, 1980, here described from three specimens recently collected from the Makran coast, North Arabian Sea (Figure 1). This paper records the morphology, habitat and distribution of this rarely found species with some new information.

Materials and Methods

Three specimens of *A. spinea* were collected fromthe intertidal zone—two from Gariyan beach, and one from Bandari beach, Makran coast, Balochistan, Pakistan. The collected specimens were initially fixed in 5% formalin

Accepted by C. Mah: 21 Feb. 2024; published: 28 Mar. 2024

for 2 days and then transferred to 70% buffered alcohol for permanent storage (Figure 1 A). They were studied according to conventional methods outlined by Rowe & Doty (1977), amongst other workers. Ossicles were removed from dorsal and ventral body wall, tube feet and tentacles, in household bleach, washed in 3–7 changes of distilled water, allowed to dry, and then mounted on microscope slides, in Canada balsam for permanent storage. They were then illustrated with the camera lucida and photographed under a compound microscope using a digital camera (FujiFilim 16MP).

TABLE 1. List of species currently known from Pakistan

Order	Family	Species	Records	Habitat	Actual locality
DENDROCHIROTIDA Grube, 1840	Thyonidae Panning, 1949	*Hemithyone semperi* (Bell, 1884).	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned
		Stolus conjungens (Semper, 1867)	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned.
		Stolus buccalis (Stimpson, 1855)	Haque (1969)	attached to rock	Buleji, Karachi coast
		Thyone dura (Koehler &Vaney, 1908)	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned
		Thyonina rasidae Thandar, 2017	Thandar (2017)	unknown	Karachi coast
	Cladolabidae Heding & Panning, 1954	*Afrocucumis africana* (Semper, 1867)	Shaikh *et al.* (2023)	in rock crevices but hardly attached to rocks.	Gariyan Beach, Jiwani, Makran coast, Balochistan
		Cladolabes aciculus (Semper, 1867)	Clark and Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned.
		Ohshimella ehrenbergii (Selenka, 1868)	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned
	Cucumariidae Ludwig, 1894	*Aslia forbesi* (Bell, 1886)	Clark &Rowe (1971)	not mentioned	West coast of Pakistan
		Staurothyone rosacea (Semper, 1869)	Haque (1969)	attached to rocks	Buleji, Karachi coast

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TABLE 1. (Continued)

Order	Family	Species	Records	Habitat	Actual locality
HOLOTHURIIDA Miller, Kerr, Paulay, Reich, Wilson, (Carvajal & Rouse, 2017)	Holothuriidae Burmeister, 1837	*Holothuria (Mertensiothuria) leucospilota* (Brandt, 1835)	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned
		Holothuria (Lessonothuria) pardalis Selenka, 1867	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned
		Holothuria (Thymiosycia) arenicola Semper, 1868	Tahera & Tirmizi (1995)	buried in subtidal sandbeneath rock	Sunari Beach, Karachi coast
		Holothuria (Platyperona) difficilis Semper, 1868	Tahera, & Kazmi (1995)	attached to green seaweed, rocky shore	Buleji, Karachi coast.
		Holothuria (Halodeima) atra Jaeger, 1833	Tahera, & Kazmi (2005)	shallow water with sandy bottom	Buleji, Karachi coast
		Holothuria (Semperothuria) cinerascens (Brandt, 1835)	Ahmed, Q. *et al.* (2016)	in rock crevices in intertidal zone	Sunehri Beach, Karachi coast
		Holothuria (Lessonothuria) verrucosa Selenka, 1867	Ahmed, Q. *et al.* (2016)	in rock crevices in intertidal zone	Sunehri Beach, Karachi coast
		Holothuria(Lesso nothuria) insignis Ludwig, 1875	Ahmed, Q. *et al.* (2020)	under boulders or in sand in shallow waters.	Buleji, Karachi coast.
		Holothuria (Lessonothuria) lineata Ludwig, 1875	Ahmed, Q. *et al*. (2020)	attached to algae and sea-weeds and covered with fine sand.	Buleji, Karachi coast.
		Holothuria (Theelothuria) hamata	Moazzam & Moazzam (2020)	found on sandy or muddy bottoms.	not mentioned
		Actinopyga mauritiana (Quoy & Gaimard, 1833)	Clark & Rowe (1971)	not mentioned	West coast of Pakistan, specific location not mentioned
		Actinopyga spinea Cherbonnier, 1980	This study	Under rock at Gariyan Beach; covered with sand at Bandari Beach.	Gariyan Beach and Bandari Beach, Makran coast.

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TABLE 1. (Continued)

Order	Family	Species	Records	Habitat	Actual locality
SYNALLACTIDA Miller, Kerr, Paulay, Reich, Wilson, Carvajal & Rouse, 2017	Stichopodidae Haeckel, 1896	*Stichopus herrmanni* (Semper, 1868)	Moazzam & Moazzam (2020)	not mentioned.	Churna Island, near Balochistan coast
APODIDA Brandt, 1835	Synaptidae Burmeister, 1837	*Leptosynapta inhaerens* (O.F. Müller, 1776).	Haque (1969)	muddy sandy shore of Buleji.	Buleji, Karachi coast
		Synaptula recta (Semper, 1867)	Tahera (1997)	not mentioned	not mentioned

Taxonomy

Order Holothuriida Miller, Kerr, Paulay, Reich, Wilson, Carvajal & Rouse, 2017

Family Holothuriidae Burmeister, 1837

Genus *Actinopyga* Bronn, 186

Actinopyga spinea Cherbonnier, 1980

(Figures 2 & 3)

Actinopyga spinea Cherbonnier, 1980: 621–622, fig. 4a–j; Purcell *et al*. 2012: 24–25, text figs; 2023: 30–31, text figs; Di Simone, 2022: 111–112 text figs; Jontila, 2022: 63–67, fig. 2,3.

Diagnosis (from Purcell *et al*. 2012). Body uniformly coloured, ranging from rusty brown to dark brown, to brownish-black, occasionally camouflaged with a thin layer of fine sand. Form subcylindrical, with slight ventral flattening. Tentacles 20, dark brown. Dorsal papillae thin, moderately long, ventral podia short. Anus subdorsal, anal teeth pronounced, nodular, yellow. Cuvierian tubules absent. Ossicles scattered, only abundant around mouth (peristome), anus and in the tentacles. Body wall ossicles rare, comprise few, forked spiny, sometimes terminally perforated, rods (about 110 μm long) and spiny plates of various sizes. Tentacle ossicles as spiny curved rods, 80–130 μm long. Pedicel ossicles comprise few short, 120 μm rods, bifurcate at ends; papillae with similar rods but twice longer.

Material examined. All three specimens at hand originate from the Makran coast, Balochistan (Figure 1), Two specimens were collected from the intertidal zone at Gariyan Beach (25°00’57”N, 61°46’44”E), on December 02, 2021, during low tide (-0.05m; 2:40 p.m), by Qadeer Mohammad Ali, Iqra Shaikh, Ateeqa Baloch and Kashif Jameel, while the third specimen came from Bandari Beach (25°03’09”N, 61°44’36”E), Makran coast, also collected during low tide (-0.06m; 2:39 pm) by Quratulan Ahmed and Hafsa Qazi.

Description. Colour uniform dark brownish, sometimes camouflaged by adhering fine sand grains (Figure 2A &B). Tentacles light brown, tube feet creamy white in colour. Papillae long, slender; anus sub- terminal. The preserved length, breadth and weight of the three specimens are as follows:specimen1, 12 cm x 4.2 cm and weighed 54 g; specimen 2,13 cm x 4.5 cm and weighed 65 gm; specimen 3, 18 cm x 5.5 cm and weighed 209 gm. In specimen 3 the gonads is thick and mature. Body elongate, sub-cylindrical, bivium slightly arched, trivium slightly flattened. Bivium generally covered by fine sediment, camouflaging its dark brownish colouration; papillae of bivium long, slender, conical, approximately 120 μm long, pedicelson trivium cylindrical, thick, arranged irregularly on both radii and interradii. Mouth ventral, surrounded by 20 stout, peltate tentacles. Anus sub-dorsal, surrounded by 5 strong, yellow, conspicuous, triangular teeth with characteristic nodules. Calcareous ring 1 cm wide, 0.5 cm high and thick with wide radial plates that split anteriorly and thin interradial plates that are depressed posteriorly, all of the plates having notches (Figure 2H). Cuvierian tubules absent.

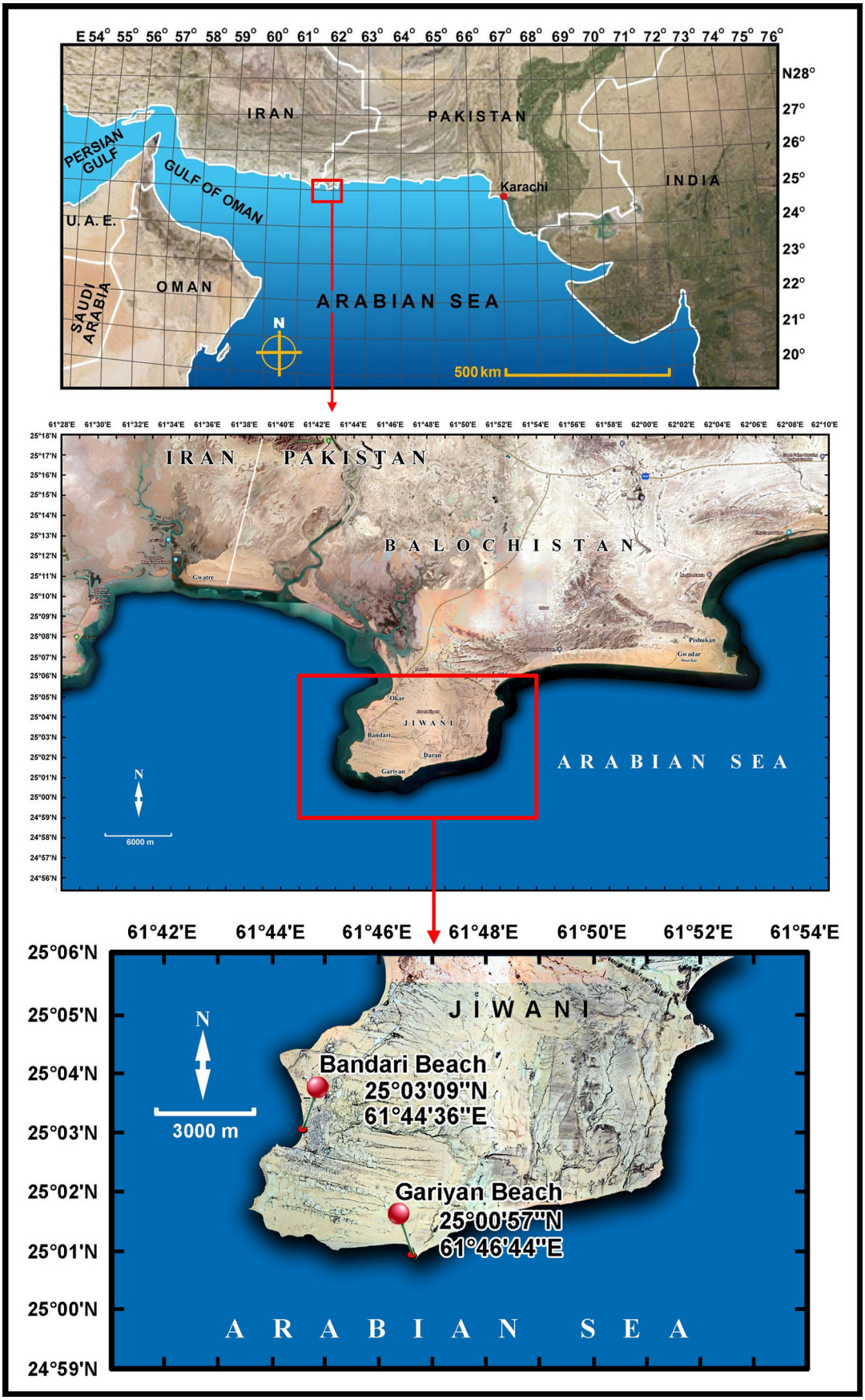

FIGURE 1. Map showing location of Gariyan (map developed by Abrar Ali, Marine Reference Collection and Resource Centre, University of Karachi)

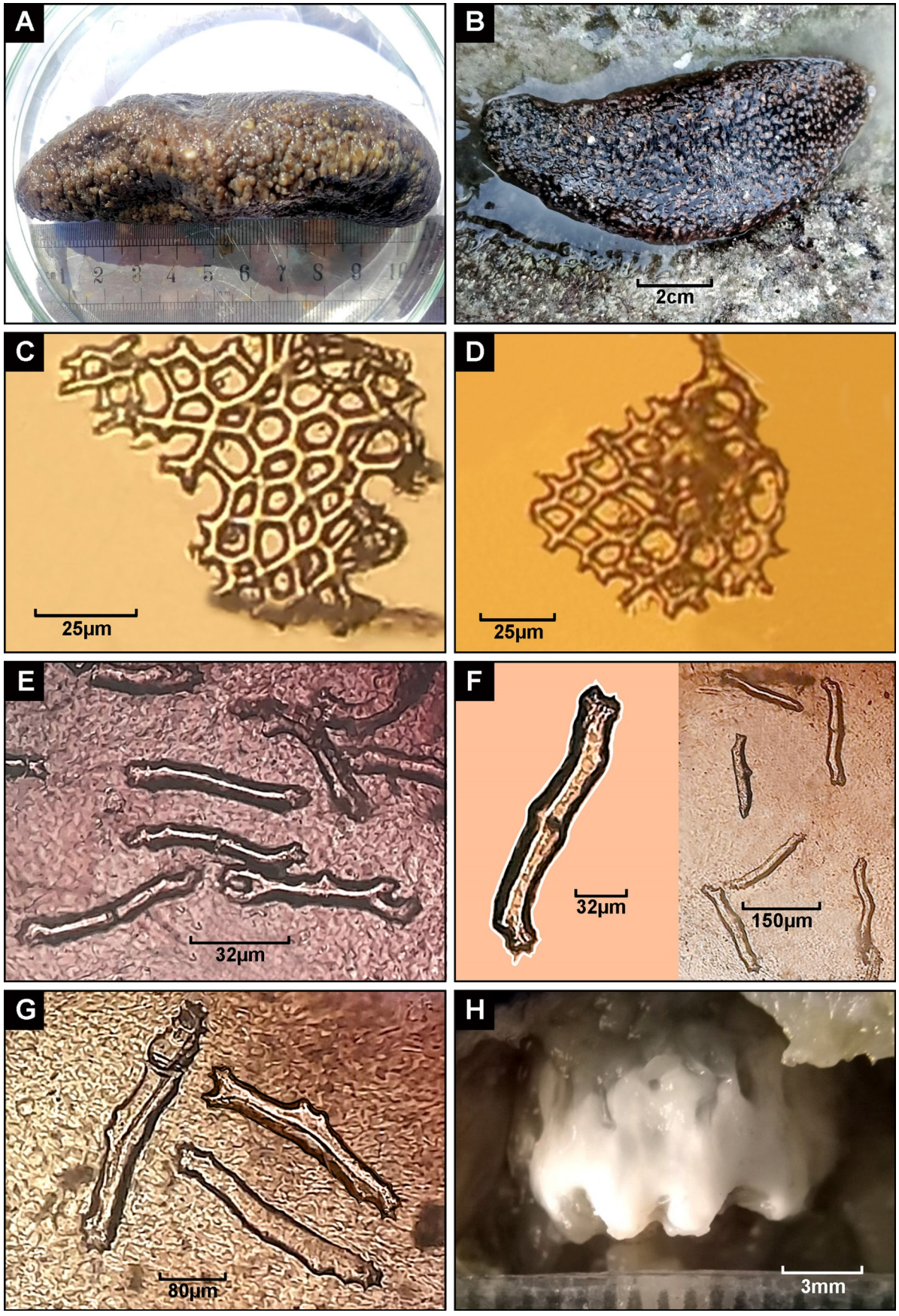

FIGURE 2. *Actinopyga spinea* (Cherbonnier, 1980). A. preserved specimen, B. live specimen, C and D. plates of dorsal body wall, E. rods of body wall, F. podia rods, G. tentacle rods H. calcareous ring (mid-dorsal radial and adjoining interradial plates).

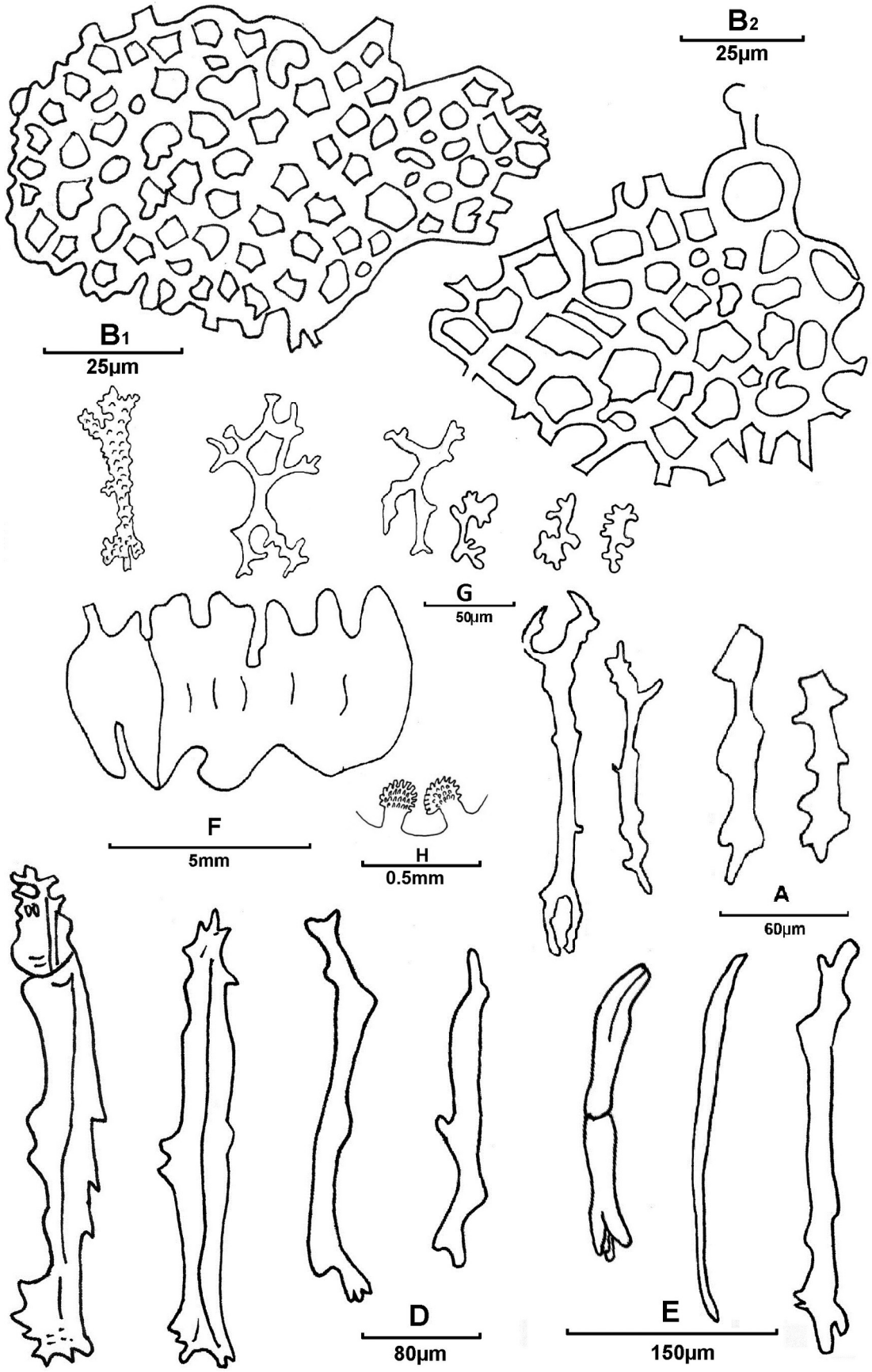

FIGURE.3. *Actinopyga spinea* (Cherbonnier, 1980). A. rods of body wall; B_1 and B_2. plates of dorsal body wall; C. podial rods; D. tentacle rods; E. anal teeth rods; F. anal teeth; G. rods and rosettes of anal region.

Ossicles. Ossicles scattered, both dorsally and ventrally, only abundant around mouth (peristome), anus and in the tentacles. They comprise rods only, with rosettes and plates restricted to the anal region. Rosettes appear as minute branching rods, whereas the plates are perforated and often provided with spines. Tentacle ossicles comprise elongated, straight or slightly arched rods, 280–400 μm long (Figure 2G, 3D), bearing small spines along their length and sometimes a terminal perforation, occasionally branching out to form cross-shaped deposits. Spiny plates measure 70–140 μm long (Figure 2C & D, $3B_1$ & B_2), forked spiny rods of dorsal body wall about 132 μm long (Figure 2E and 3A). Podial deposits comprise few, short, 130–150 μm, bifurcating rods (Figure 2F and 3C). Rods and rosettes of anal region range in size from 45 to 90 μm (Figure 3G). Anal teeth distinctly nodular, 0.25 mm long (Figure 3F).

Distribution. New Caledonia (Cherbonnier, 1980) Great Barrier Reef, Queensland (Leeworthy, 2007), Watson's Bay, Lizard Island (Purcell *et al.* 2012), Philippines (Jontila, 2017) and now from Pakistan. According to Purcell *et al.* (2023) the species may be more widely spread in the Melanasian region but is often mistaken for *A. miliaris* by fishermen.

Habitat. All three specimens were taken from the intertidal zone, under rock, buried in sand.

Remarks. We compared our specimen with the type described by Cherbonnier (1980) and those described by Purcell *et al.* (2012, 2023) and Jontila (2017). In colour, our specimens come very close to that described by Jontila (2017) as dark brownish; bivium blackish; trivium dark brown. Like Jontila's specimen the papillae are long and slender and the anal teeth bear distinct nodules. Our specimens also resemble those described by Purcell *et al.* (2012, 2023), except for variations in ossicle size. According to Purcell *et al.* (2012) the tentacle ossicles comprise spiny curved rods, 250–500 μm long; the forked spiny rods of the dorsal body wall are about 110 μm long, and spiny plates are of various size, 80–130 μm. The ventral body wall of their specimen was also devoid of ossicles and the ventral podia possessed few short, approximately 120 μm long, bifurcating rods, with the papillae bearing similar rods, twice as long. The calcareous ring illustrated by Purcell *et al.* (2023) varies slightly from our material, showing narrower interradial plates, perhaps indicating intraspecific or geographic variationas their materials came from New Caledonia and/or Australia.

Acknowledgements

We would like to acknowledge The Marine Reference Collection and Resource Centre University of Karachi for providing us the facilities for sample collection, laboratory work and analyses. We also acknowledge the field assistance rendered by Mr. Kashif Jameel and Mr. Danish for sample and data collection. Special thanks are due to Mr. Abrar Ali for assistance and guidance in illustrations and photography of the ossicles.

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