

Addition of Three Stolidobranch Ascidian Fauna to Indian Waters from Andaman Group of Islands

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Abstract: Pyuridae family has 247 described species of the ascidian against 1025 species of ascidians under Stolidobranchia order reported so far. Three coral reef associated cryptic pyurid ascidians such as *Pyura curvigona* Tokioka, 1950, *Herdmania papietensis* (Herdman, 1882), *Halocynthia spinosa* Sluiter, 1905 were found from Andaman and Nicobar Islands as new record to Indian waters. The present paper deals with the taxonomical characteristics and distribution of these three newly recorded stolidobranch ascidians species from Andaman group of islands.

Key words: Ascidia • Pyuridae • Cryptic • Anadaman

INTRODUCTION

Knowledge on Ascidian fauna are very less from the biologically diversified Andaman and Nicobar Islands as only 21 species [1, 2] are reported from these region. Stolidobranchia is the second largest order of the Class Ascidiacea containing only 4 families [3]. All the members of this order having branchial folds, gonads paired to numerous, usually present both side of the body, gut, gonads and heart always alongside of the branchial sac

never posterior to it [3]. Most of the stolidobranch ascidians apart from the *Polycarpa pigmentata* (Herdman, 1906) are cryptic in nature as observed in Andaman and Nicobar Islands. *Halocynthia spinosa* Sluiter, 1905, *Pyura curvigona* Tokioka, 1950, *Herdmania papiteiensis* (Herdman, 1882) are the stolidobranch ascidians under Pyuridae family, reported from the Andaman and Nicobar Islands for the first time in Indian Waters. The present study deals with the taxonomical characters and distributional pattern of these three newly recorded stolidobranchs.

MATERIALS AND METHODS

Sampling of ascidians were made at Andaman group of islands (Fig. 1) by the undersea surveys conducted from November 2014 to December 2014 using Self Contained Underwater Breathing Apparatus (SCUBA) Diving. Collected samples were defecated and narcotized by magnesium sulfate ($MgSO_4 \cdot 7H_2O$) and menthol crystal ($C_{10}H_{20}O$) respectively and preserved in 4% formaldehyde-seawater solution (CH_2O) [3, 4]. Dissection was carried out under Labomed CZM4 microscope and anatomical details were digitized under Leica M205A DFC 500 stereo zoom microscope. Identification of the specimens was made in conjunction with Tokioka [5], Monniot *et al.* [6] and Monniot and

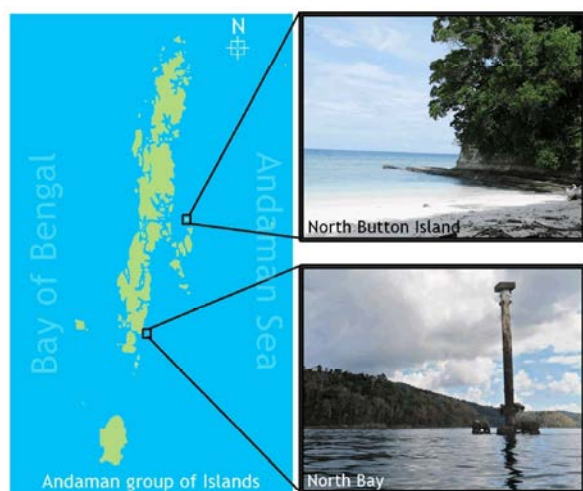


Fig. 1: Study areas in Andaman group of islands

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Debitus [7]. Specimens were registered as National Zoological Collections and deposited at Zoological Survey of India, Port Blair.

RESULTS

Class: ASCIDIACEA Nielsen, 1995
Order: STOLIDOBRANCHIA Lahille, 1887
Family: PYURIDAE Hartmeyer, 1908
Genus: *Pyura* Molina, 1782

1. *Pyura curvigona* Tokioka, 1950 (Fig. 2)

Material Examined: One specimen was sampled and examined during underwater survey in December, 2014 at North Bay (Lat: 11°43.006'N; Long: 92°45.465'E), Reg. No.: ZSI/ANRC – 11730.

External Appearance: Oval bodied 3.2 × 1.8 cm specimen (Fig. 2a) found in cryptic environment. Animal is attached by the large part of its left side of the body. Four lobed apertures are very indistinct from outside when it is closed. Bright red coloured siphons are easily noticeable in cryptic conditions also. Tough and leathery test is with a very few epibionts.

Internal Structures: Siphonal armature is present with sharply pointed opalescent spines (Fig. 2b). Bright red coloured branchial sac with strong musculature as in other *Pyura* species (Fig. 2c). About 14 long tentacles are present around the branchial siphons with the 3rd order branching (Fig. 2d); some minute tentacles are also present. Dorsal lamina is with slender languets. Dorsal tubercle is U shaped with the horns slightly bend inward (Fig. 2e). Six branchial folds are present each side of the body (Fig. 2b).

Gut loop on left side, enclosed the left gonad (Fig. 2f). Well-developed lobulated greenish-brown liver is present and a few rudimentary lobules of liver are found on the cardiac position as stated by Tokioka, 1950. Anal border is lobed. One gonad present on each side of the body. Gonads are characteristic “U” shaped with about 29 polycarps arranged in two rows in each gonad along the central gonoduct (Fig. 2g). On the left side endocarps are present outside the gut loop, mainly arranged along the alimentary canal (Fig. 2h).

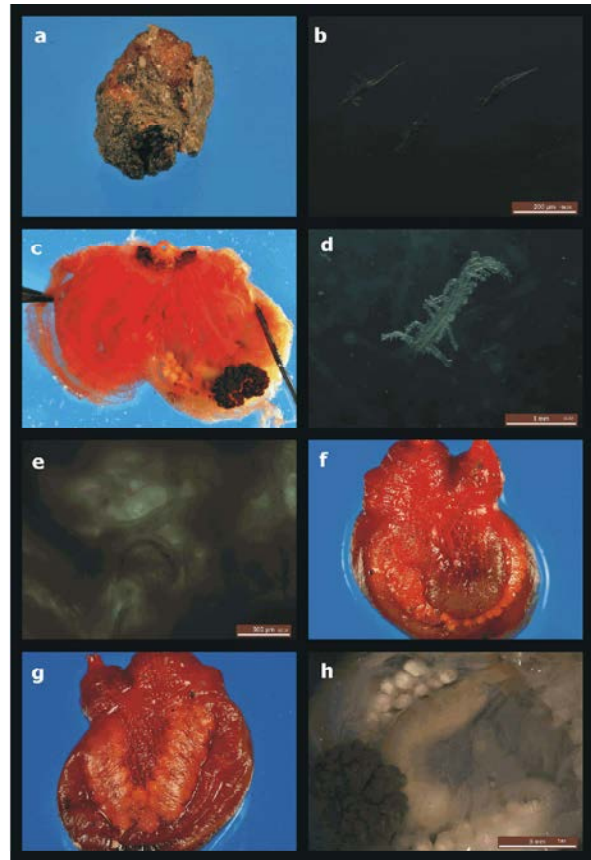


Fig. 2: *Pyura curvigona* Tokioka, 1950 a: preserved specimen; b: spines; c: branchial sac; d: tentacles; e: dorsal tubercle; f: gonad at the left side of the body enclosed by gut loop; g: gonad at the right side of the body; h: gut loop.

Remarks: The species is closely related to *Pyura vittata* as it is attached by its left side of the body but the characteristics “U” shaped gonads distinguished the species from the *P. vittata* found from the Andaman groups of islands.

Distribution: Palao Island [5], Hong Kong [8], Indonesia [9], Kii peninsula [10], Western Australia [3] and Vietnam [11].

Genus: *Herdmania* Lahille, 1888

2. *Herdmania papietensis* (Herdman, 1882) (Fig. 3)

Material Examined: one specimen was sampled and examined during underwater survey in November, 2014 at North Button Island (Lat: 12°18.880'N; Long:

93°04.010'E), Reg. No.: ZSI/ANRC –12101. Later on another one specimen has been collected from Little Andaman Island.

External Appearance: The specimen found in cryptic habitat (Fig. 3a) with oval shaped and 2 × 1.6 cm body size (fig 3b). Soft gelatinous, translucent tunic is epibiont free though some shell fragments are present on it. Thin body wall contains calcareous spicules (Fig. 3c). Orange colored pigments were found in siphons. Gonads and endostyle was not distinguishable from outside of the body.

Internal Structures: Tentacles surrounding the branchial siphon are of 3 different size, largest tentacles are 9 in number having 3 order branching (Fig. 3d). Dorsal tubercle is U shaped with out-bend horns but the horns are not rolled (Fig. 3e). Although as stated by Monniot and Debitus [7], no button like papillae in the body wall of the specimen is found. Dorsal lamina contains sharp languets. Seven branchial folds are found per side of the body.

On the left side of the body widely open gut loop is present with large hepatic gland divided into two unequal lobes made up of round papillae (Fig. 3f). Anal border is slightly indented in two lips (Fig. 3g). Gonads are Single, long and curved shaped on the each of the body. Oviduct aperture present below a large membrane which is thin and flat with the edge cut with several lobes. The sperm duct usually opens on the mesial side of the oviduct i.e. the base of the flap (Fig. 3h). Although only single papilla has been found near the male opening.

Remarks: As it is stated by Monniot and Debitus [7] species level identification of the Genus *Herdmania* is done based upon the structures of gonads and gonoducts. The specimen has close resembles with *Herdmania momus* as its external appearance is alike and *Herdmania pallida* as of the structure of gonads though more curved gonads are seen in *Hermania papiteiensis* and the structure of gonoducts clearly differs from the *Herdmania momus* found from the same location and *Herdmania pallida* from the surrounding region.

Distribution: Central Pacific Ocean between 17° to 27° S from 6 m to 70 m depth [7].

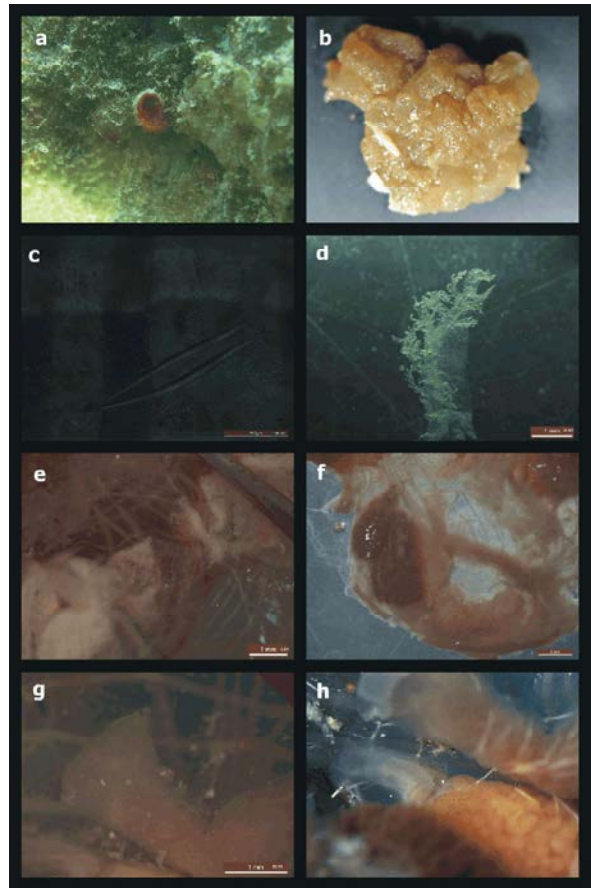


Fig. 3: *Herdmania papietensis* (Herdman, 1882) a: specimen in cryptic habitat; b: preserved specimen; c: spicules; d: tentacle; e: dorsal tubercle; f: gut loop enclosing the gonad; g: anal border; h: openings of gonads.

Genus: *Halocynthia* Verrill and Rutburn, 1879

3. *Halocynthia spinosa* Sluiter, 1905 (Fig. 4)

Material Examined: one specimen was sampled and examined during underwater survey in December, 2014 at North Bay (Lat: 11°43.006'N; Long: 92°45.465'E), Reg. No.: ZSI/ANRC – 11731. Later on several specimens were collected from Neil Island, Little Andaman Island and North Andaman.

External Appearance: Cryptic specimen has roundish body with cylindrical siphons (Fig. 4a). Living animal is little orangish and found in cryptic habitat, about 2.5 cm in size (Fig. 4b). Sometimes only siphons are seen from the outside of the crevices (Fig. 4a). Test is robust with some

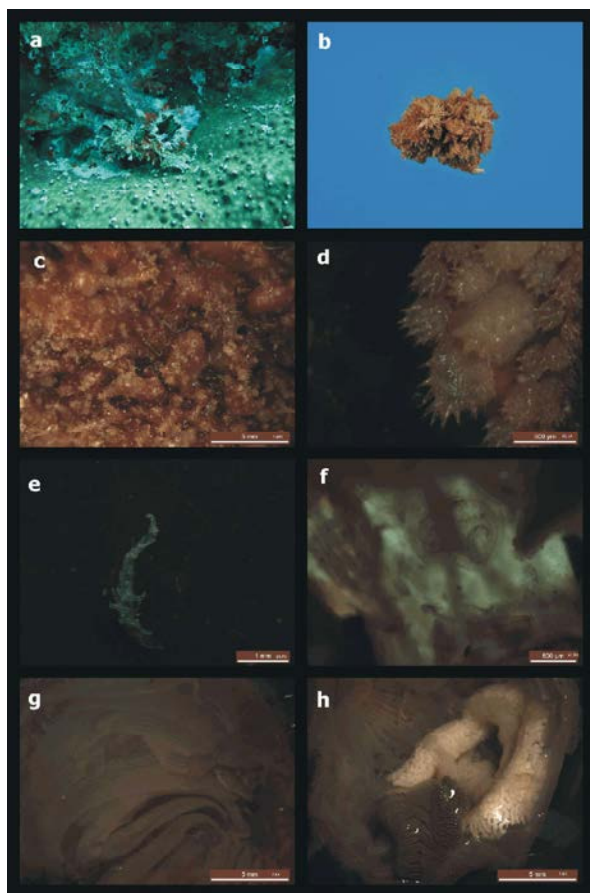


Fig. 4: *Halocynthia spinosa* Sluiter, 1905 a: specimen in cryptic habitat; b: preserved specimen; c: bristles on test; d: papillae with the spinules on internal siphonal lining; e: tentacle; f: dorsal tubercle; g: branchial folds; h: gut loop with gonad

sand grains. Siphonal apertures are surrounded by long, stiff, crowded bristles that project vertically from the test (Fig. 4c). Test surface has tubercles with groups of bristles of various sizes similar to the bristles surrounding the apertures. These bristles have 2nd order branch.

Internal Structures: Body wall is with well-developed musculature. Internally siphonal lining has scale-like swelling papillae with the spinules as on the surface of the test (Fig. 4d). Colour of the siphon is dark brownish red with yellowish stripes (Fig. 4a). About 15 tentacles are present surround the branchial apertures with the 2nd ordered branches (Fig. 4e). Dorsal tubercle U shaped with inrolled horns (Fig. 4f). Dorsal lamina has narrow and pointed languets. There are 9 branchial folds are present

on each side of the body, the last fold of each side is rudimentary (Fig. 4g). About 5-6 stigamata are found per mesh.

Gut loop is found enclosing two gonads on the left (Fig. 4h). Gonad on right side is not found. Large and well developed hepatic gland is present. Endocarps present on the both side of the body. Few endocarps found inside the gut loop on left. Rectum is attached with body wall. Anal border is bi-lobed but one lobe is further divided. Ovary situated centrally in the gut loop. Male follicles fill the intervening space.

Remarks: There are a few species which resembles with the present species having the spiny appearance as stated in Kott [3] and Monniot *et al.* [6]. But as the specimen having two gonads enclosed in the gut loop it classified as *Halocynthia spinosa*.

Distribution: False Bay, Ibo Island, Mozambique [6], Persian Gulf [9], Djibouti [12].

DISCUSSION

Ascidians are filter feeder often found in reefs, rocky shores and also found on sandy bottom of the sea. A total of about 400 species of ascidians were reported from India [2, 4] while only 43 species belong to stolidobranchia of which 13 species were described under Pyuridae family. The pyurids are often cryptic in habitat in Andaman and Nicobar Islands but their brightly coloured siphons are easily noticeable underwater. They are hard to remove from the crevices as the size of the crevice is almost same of their body size. The ascidians reported from India is based only the work along the peninsular coast of India except the publication of Anathan [2] who reported about 15 species from the Great Nicobar Biosphere reserve out of which only one is stolidobranch ascidians belongs to Stylidae family though it was not identified up to species level. There is no detailed report on anatomical characterization of pyurid ascidians of Andaman and Nicobar Islands before Anathan [2]. *Pyura curvigona* Tokioka, 1950 and *Halocynthia spinosa* Sluiter, 1905 have almost tropical distribution justifies the presence of these species in Andaman and Nicobar Islands. According to the previous distribution, it was recorded that *Herdmania papietensis* (Herdman, 1882) is only found in Southern hemisphere but the presence study reveals the distribution of this species

in Andaman group of islands. The occurrence of this species was recorded at the 12 m depth which support the preceding depth range as depicted by Monniot and Debitus [7]. The record of three ascidian fauna increases the database of Indian Ascidiaceans. Extensive studies are required to explore the ascidian fauna of Andaman and Nicobar Islands to know the distribution and diversity status of the species.

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