

## Second Record of *Pyura comma* (Hartmeyer, 1906) from Sagami Bay and Adjacent Waters, Japan (Urochordata: Ascidiacea)

By

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西川輝昭\* : 相模湾沖からの *Pyura comma* (Hartmeyer, 1906) の再発見

**Abstract:** In the ascidian material collected during the project of “Study on Environmental Changes in the Sagami Sea and Adjacent Coastal Area with Time Serial Comparison of Fauna and Flora” in 2001–2003 by the National Science Museum, Tokyo, there are two small specimens referable to *Pyura comma* (Hartmeyer, 1906) of the family Pyuridae. This is only the second record in about a hundred years' blank since the holotype collected by Doflein in Sagami Bay. The specimens, dredged from slightly south of Sagami Bay at a depth between 133 m to 166 m, have a thick outer coat of sand entangled with crowded branches of tunic filaments, lined internally with a thin space traversed by basal portion of the filaments. The uninjured 16 mm long specimen has a ciliated groove as a longitudinal slit, the branchial sac composed of 8 (on the left) and 9 (on the right) folds, and one gonad on each side (the left being in the first intestinal loop), consisting of 9 (on the left) or 12 (on the right) capsules without any ligaments for their attaching to the mantle wall.

**Keywords:** Ascidiacea, Sagami Bay, *Pyura comma*, *Cynthia snaboja*, *Pyura molguloides*

### Introduction

Sagami Bay, located on the Pacific coast of central Japan, has its local ascidian fauna studied more intensively than other Japanese waters, as is usually the case with marine animal groups. Many ascidians were named after the bay itself or the localities therein, among others, Misaki on the coast of Miura Peninsula, the eastern limit of the bay. The first such case for the ascidians was the binomen *Didemnum misakiense* (Oka & Willey, 1892). One of its authors, Dr. Asajiro Oka is the first Japanese taxonomist of ascidians, starting his taxonomic and biological studies on ascidians at the Misaki Marine Biological Laboratory, Imperial University of Tokyo (see, e.g., Oka, 1892a, b).

Hartmeyer (1906) and Oka (1906) produced the first monographic works on the Japanese ascidian fauna, in spite of the earlier sporadic studies by Herdman (1880 etc.), Drasche (1884),

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Traustedt (1885), Oka and Willey (1892), and so on. Among others, Hartmeyer's (1906) material came largely from Sagami Bay, collected by Döderlein in 1880-1881, Haberer in 1903, and Doflein in 1904. Thus, Hartmeyer may be regarded as the pioneer to reveal the ascidian fauna of the bay; most (not all) of the material is still housed in the Museum für Naturkunde der Humboldt-Universität zu Berlin and the Zoologische Staatssammlung München. Later, a large work was completed by Tokioka (1953) as the first monograph to treat the ascidians exclusively from the bay on the basis of the materials collected from its eastern part by Hirohito, the Showa Emperor, from 1922 to 1951, with a list of ca. 110 species (including 81 species described therein). Subsequently he continued to collect a large number of ascidians, most of which remain yet unstudied. Almost all his specimens are now kept in the Tsukuba Research Center of the National Science Museum, Tokyo. Since Tokioka's (1953) summation, the ascidian fauna of Sagami Bay has been supplemented or referred to by many papers including Nishikawa (2005).

Recently, I had a chance to examine the newly collected material from the Sagami Sea mainly dredged from deeper bottoms during the project of "Study on Environmental Changes in the Sagami Sea and Adjacent Coastal Area with Time Serial Comparison of Fauna and Flora" in 2001-2003 by the National Science Museum, Tokyo. My examination has revealed that the material consists of 27 species, probably including several new to Japan and even to science. Unfortunately, however, most of the specimens were immature, which makes detailed taxonomic studies difficult. Here, I give a taxonomic description of the two specimens of *Pyura comma* (Hartmeyer, 1906) dredged from the bottom slightly south of Sagami Bay, the first of this species to be recorded since the holotype obtained by Doflein in Sagami Bay about 100 years ago.

### Taxonomic Description

#### *Pyura comma* (Hartmeyer, 1906)

(Figs. 1-3)

*Halocynthia comma* Hartmeyer, 1906, pp. 5-6, fig. 3.

*Pyura comma*: Hartmeyer, 1909-1911, p. 1339; Tokioka, 1963, p. 140. (no new records)

*Material Examined.* NSMT-Pc S031, 22 Feb. 2001, Stn 6, dredged from 35°07.678' N and 139°33.273' E, 133 m deep to 35°07.438' N and 139°33.391' E, 166 m deep, 2 individuals.

*Description.* Two individuals in the material, 16 and 17 mm long; mantle body in larger one too injured to describe. Body elliptical, elongated longitudinally, with whole surface completely covered with foreign materials such as sand grains, shell fragments, and foraminiferan tests (Fig. 1A-B). Both apertures (without marked siphons in appearance) situated nearly on opposite sides. Body composed of thick (up to 4 mm) outer coat of foreign materials entangled with crowded branches of tunic filaments, tunic proper (only 0.2 mm thick, having mantle body within), and thin (up to 1 mm high) space in between, traversed by basal portion of tunic filaments (Fig. 1C). Branches of tunic filaments found very densely and often reticulately in deeper layers of outer coat but only sparse in superficial layer. Tunic proper opaque and white, coated (though not impregnated) densely with sand granules. Each siphon of tunic elongated to ca. 7 mm, without any filaments; the branchial located terminal, while the atrial nearly in middle of body proper and directed anteriorly. No siphonal spinules detected even with SEM (Fig. 2).

Mantle musculature composed of longitudinal and transverse bundles radiating from branchial

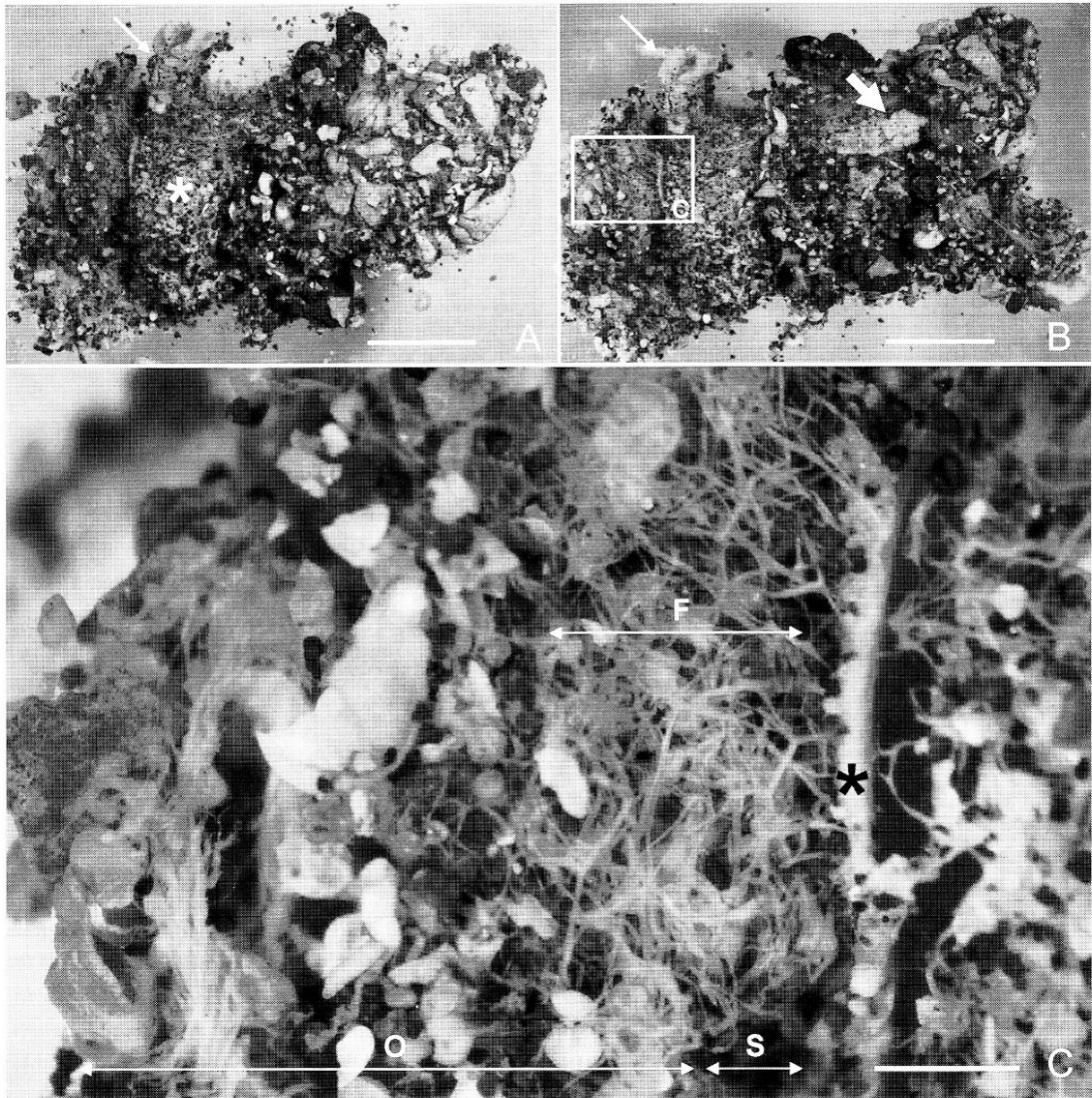


Fig. 1. *Pyura comma* (Hartmeyer, 1906) from near Sagami Bay (NSMT-Pc S031), 16mm long individual. A, Right side of the whole body, with the outer coat of sand and other foreign materials opened and partly removed in the posterior (left-hand) one-third of body to show the atrial siphon (thin arrow) and posterior part (white asterisk) of tunic proper; B, Right side of the body to show the branchial siphon (thick arrow) of tunic proper emerging from the outer coat, as well as the atrial siphon (thin arrow); C, Part of body surface, enlarged to show the cut surface of tunic proper (black asterisk), the outer coat (O), entangled with crowded branches of tunic filaments (F), and a thin space (S) in between. Scales for A and B indicating 5 mm, for C 1mm.

and atrial siphons, respectively. Two adjoining pockets formed each by a U-shaped ridge of mantle underlain by thin tunic on inner base of each siphon, followed proximally by branchial tentacles or by two extensive atrial lobes. Branchial tentacles 20 in number, with larger and finer ones alternating almost regularly, less developed, and branched in 2 orders. Ciliated groove as a longitudinal slit (Fig. 3A). Branchial folds well-marked; 8 on each, and an additional rudimentary (ventral-most) one only

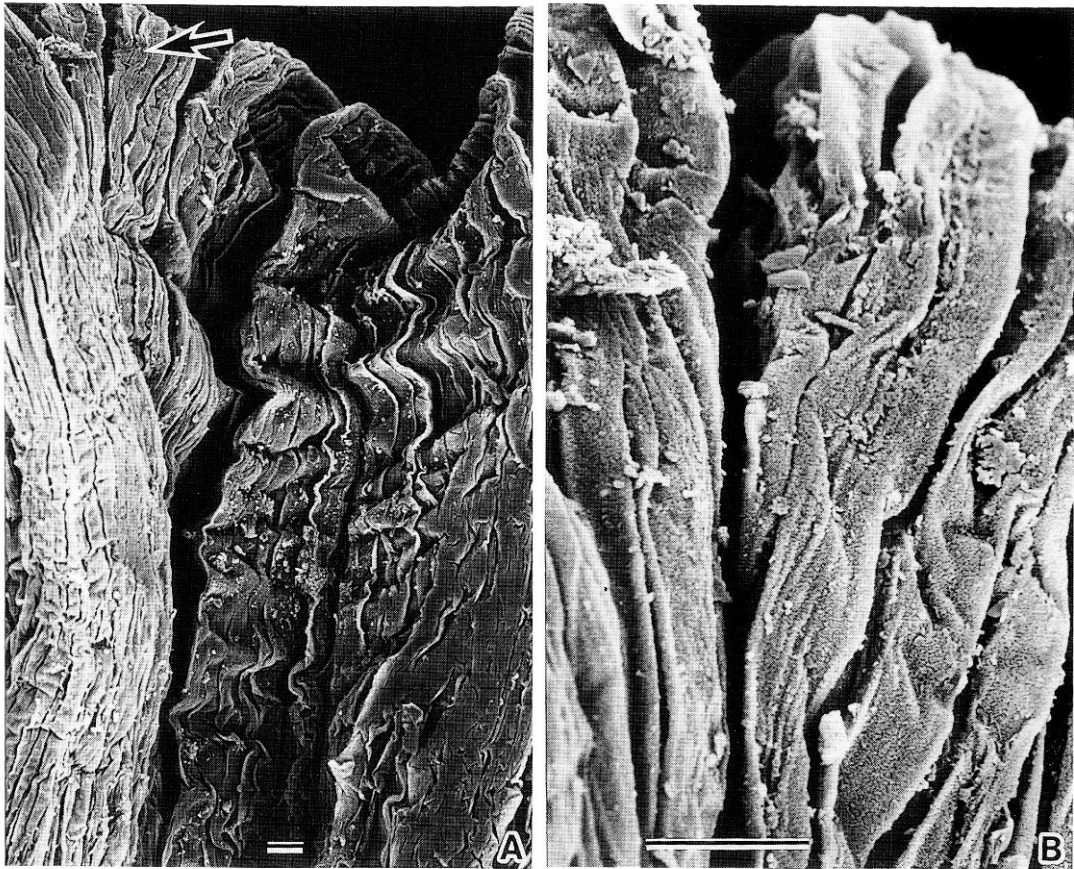


Fig. 2. SEM images of inner surface of siphon from a 16 mm long individual of *Pyura comma* (Hartmeyer, 1906) from near Sagami Bay (NSMT-Pc S031) to show the complete absence of siphonal spinules over the surface. A, Part of the surface; B, Enlarged area roughly indicated by an arrow in A. Scales indicating 10  $\mu$ m.

on right. Each fold provided with up to ca. 20 longitudinal vessels; ca. 5 ones between two folds. Stigmata on top of folds often curved slightly to constitute distinct summits. Dorsal languets fine and numerous. No endocarps. Visceral mass occupying posterior one-third of body; hepatic lobes inconspicuous; first loop deep and narrow, while second very shallow; anus bi-lobed, fringed faintly with minute papillae (Fig. 3B).

Left gonad in first intestinal loop, composed of 9 capsules, each often containing a few ovarian eggs, while right consisting of 12 emptied ones: each capsule attached to mantle wall only by its very short branch of central common genital duct embedded therein; no ligaments. Aperture of ovarian duct located terminal, accompanied with that of sperm duct opening on top of minute papilla.

*Remarks.* The present specimens are similar to the original and so far only description of *Halocynthia comma* for a single specimen (=the holotype) collected near Misaki, Sagami Bay, 180 m deep by Doflein, in the small size of body (shown only as "kleine Form" in the original description), the sand-covered tunic, the ciliated groove as a longitudinal slit, the number of branchial folds (8 on the left and 9 on the right, including a rudimentary one on each in the description), the occurrence of

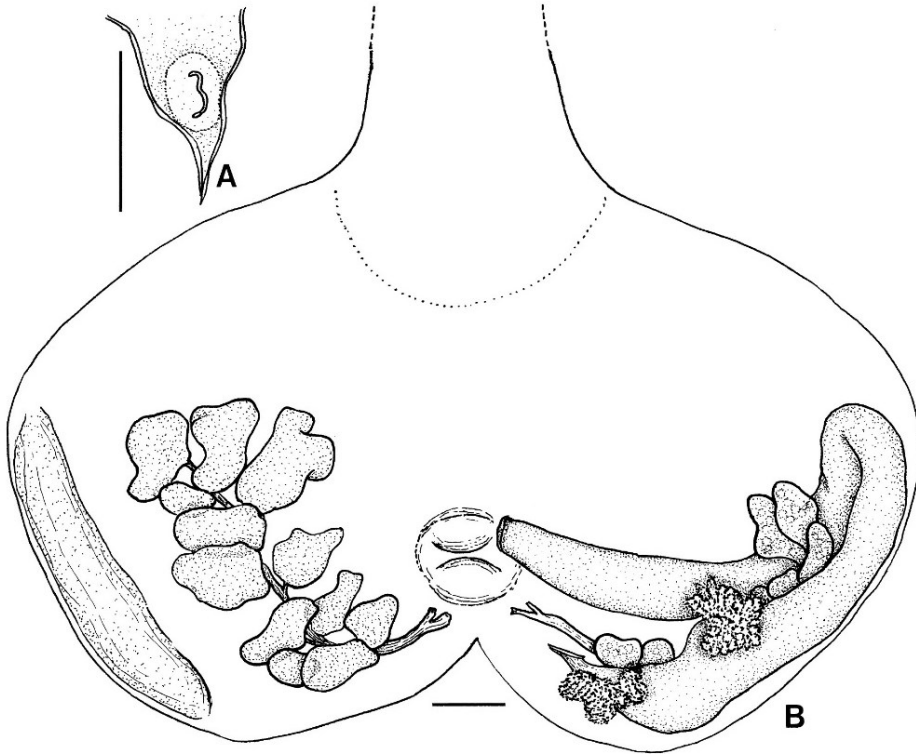


Fig. 3. Inner structure in a 16 mm long individual of *Pyura comma* (Hartmeyer, 1906) from near Sagami Bay (NSMT-Pc S031). A, Dorsal tubercle; B, Inside of mantle body, opened mid-ventrally. Scales indicating 1 mm.

curved stigmata on the top of folds, the number and location of gonads (one on each side, with the left in the intestinal loop), and the moderate number of gonadal capsules (12 on the left and 14 on the right in the description). Although I have failed to find the holotype for reexamination, a combination of the mentioned similarities well supports the present identification.

The present specimens are peculiar among the Japanese species of the genus *Pyura* in the thick outer coat of foreign materials entangled with tunic filaments, lined internally with a space traversed by the basal portions of the filaments. This feature is highly reminiscent of an uncertain species, *Cynthia snaboja* Oka from Goto Islands, west off Kyushu, known only by the brief original description given by Oka (1926, p.424), and later listed as *Pyura snaboja* by Tokioka (1963, p.140) without new record. I have tried to examine the name-bearing type, but so far in vain. The original description lacks completely the information about the inner structure. Making a brief reference to *Cynthia lanka* Herdman, 1906 as a closely allied species, Oka only noted some comparison in the tunic. Therefore, it is impossible to reconstruct how *C. snaboja* was considered "closely allied" to *C. lanka* by Oka (1926) in the inner structure enough to fully discuss *C. snaboja*'s identity with *Pyura comma*.

In the above-mentioned feature in the external character of body (with outer coat of sand entangled with tunic filaments, lined internally by a space), the present specimens are similar to an Australian species, *Pyura molguloides* (Herdman, 1899) in the sense of Kott (1985, pp. 312–314).

Further, these two resemble each other in the number of branchial folds (8–9 on the left and 7–8 on the right in *P. molguloides*) and the number, arrangement and structure of gonads (one on each, with the left in the loop, and each gonad composed of 7–8 capsules). However, the present specimens are markedly different from the Australian species mainly in the siphonal spinules (completely absent in the former, while represented by the “small (0.01 mm), overlapping scales with rounded border -- in the outer part of the siphonal lining” in the latter), and further in the body size (16–17 mm long, instead of up to 120 mm), the ciliated groove (as a longitudinal slit, while U-shaped), and the attachment mode of gonadal capsules to mantle wall (with no ligament, instead of “by fine ligaments”). Thus, *P. comma* can be regarded as distinct from *P. molguloides*.

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### 要 約

国立科学博物館によるプロジェクト、「相模灘およびその沿岸地域における動植物相の経時的比較に基づく環境変遷の解明」によって、2001年から2003年にかけて相模湾と相模灘から40点のホヤ類が採集された。採集深度は20 mから570 mの範囲であった。生殖腺の未発達や標本の不完全のため属が決定できなかったものも少なくないが、9科にわたる27種が含まれていた。小文ではそのうち、*Pyura comma* (Hartmeyer, 1906)を詳細に記載した。ドフラインが相模湾で採集した1個体に対して本種が創設されて以来、約100年ぶりの再発見である。

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