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Phyllophorus (Phyllophorus) maculatus, a new species of sea cucumber from the Yellow Sea (Echinodermata: Holothuroidea: Dendrochirotida)

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Abstract

Phyllophorus (Phyllophorus) maculatus new species is described from a depth of 22–45 meters near the western edge of the Yellow Sea. The body is cylindrical, with body wall ossicles present only in the anal region. Ossicles are four-pillared tables with low spires and indented disc margin. A revised key to the eleven phyllophorine (Family Phyllophoridae, Subfamily Phyllophorinae) species now known from China is presented.

Key words: *Phyllophorus (Phyllophorus) maculatus*, Yellow Sea, Holothuroidea, Dendrochirotida

Introduction

Since the publication of Liao and Pawson (2001) on the dendrochirote and dactylochirote sea cucumbers of China, further investigations in the collections of the Institute of Oceanology, Chinese Academy of Sciences (IOCAS), have revealed ten specimens of a new phyllophorid species from the Yellow Sea. This new species brings to 36 the number of phyllophorids now known from China.

Order Dendrochirotida

Family Phyllophoridae Östergren, 1907

The family Phyllophoridae is well represented in China by 36 species.

Subfamily Phyllophorinae Heding & Panning, 1954

Including the new species described here, eleven species of phyllophorines are now known from China. Two new species were described by Liao and Pawson (2001).

The relevant section of the key to holothurians of China, provided by Liao (1997), is revised and presented below.

Key to members of the subfamily Phyllophorinae known from China

1. Tentacles 30 ..... *Anthochirus loui* Chang, 1948
- Tentacles 20 2
2. Ossicles four-pillared tables with high spires, the pillars connected by three or more transverse bridges 3
- Ossicles four-pillared tables with low spires, one transverse bridge present, or bridges absent 7
3. Tentacles 20 in a single ring ..... *Phyllophorus (Isophyllophorus) orientalis* Liao & Pawson, 2001
- Tentacles 20 in two rings. 4

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4. Spires of tables exceedingly high, with about ten transverse bridges ..... *Phyllophorus (Phyllothuria) hypsipyrga* (Marenzeller, 1881)
- Spire of table moderately high, with 3–6 transverse bridges 5
5. Spire of table topped with numerous closely crowded spines ..... *Phyllophorus (Phyllothuria) cebuensis* (Semper, 1868)
- Spire of table topped with few spines, not closely crowded 6
6. Ossicles in tube feet similar to those in body wall ..... *Phyllophorus (Phyllothuria) ordinatus* Chang, 1935
- Ossicles in tube feet irregular tables with discs divided into two to five lobes ..... *Phyllophorus (Phyllothuria) donghaiensis* Liao & Pawson, 2001
7. Ossicles absent from body wall except near posterior end; tables with nodulous periphery ..... *Phyllophorus (Phyllophorus) maculatus* new species
- Ossicles common in all parts of body wall; tables with or without nodulous periphery 8
8. Calcareous ring with long posterior projections, each composed of about 8–12 pieces 9
- Calcareous ring with relatively short posterior projections, each composed of five or fewer pieces 10
9. Discs of tables with peripheral knobs; body fusiform, up to 50 mm long ..... *Phyllophorus (Phyllophorella) dubius* (Cherbonnier, 1960).
- Discs of tables without peripheral knobs; body vermiform, up to 200 mm long ..... *Phyllophorus (Phyllophorella) liuwutiensis* Yang, 1937
10. Tables irregular, discs with marginal projections ..... *Phyllophorus (Phyllophorella) spiculata* Chang, 1935
- Tables regular, discs lacking marginal projections ..... *Phyllophorus (Phyllophorella) kohkutiensis* Heding & Panning, 1954

Genus *Phyllophorus* Grube, 1840

Subgenus *Phyllophorus (Phyllophorus)* Grube, 1840

The subgenus *Phyllophorus (Phyllophorus)* currently comprises three species – the type species *P. (P.) urna* Grube, 1840 (see Heding & Panning, 1954), from the Mediterranean; *P. (P.) pedinaequalis* Cherbonnier, 1969, from off NW Spain; and *P. (P.) roseus* Cherbonnier and Feral, 1976, from Indonesia.

Phyllophorus (Phyllophorus) maculatus, new species

Figures 1–2

Diagnosis: Medium-sized, up to 80 mm long and 20 mm in diameter. Body cylindrical, posterior end more or less tapering. Tube feet small, scattered on body wall, more numerous ventrally. Tentacles 20 in three circles, 10+5+5. Calcareous ring with medium-length posterior projections on radials, each composed of about 10 small pieces. Ossicles in form of four-pillared tables with low spires, scarce in body wall, present only in posterior region near anus.

FIGURE 1. *Phyllophorus (Phyllophorus) maculatus* new species. Left, lateral view of Holotype, total length 80mm. Right, calcareous ring of a Paratype, length of ring 20 mm.

Material Examined: HOLOTYPE, IOCAS E-1110, Yellow Sea, 36ºN, 120ºE, 16 September 2002, 32 m, muddy sand bottom. PARATYPES IOCAS E-1111, Yellow Sea, 36ºN, 120º30'E, 19 October 2000, 30 m, 2 specimens; IOCAS E-1112, Yellow Sea, 35º 30'N, 121º30'E, 19 May 2001, 32 m, 1 specimen; IOCAS E-1113, Yellow Sea, 35º30'N, 121º30'E, 15 June 2003, 33 m, 1 specimen; IOCAS E-1114, Yellow Sea, 36ºN, 121ºE, 15 June 2004, 32 m, 1 specimen; IOCAS E-1115, Yellow Sea, 35º 30'N, 121º E, 15 June 2003, 35 m, 1 specimen; IOCAS E-1116, Yellow Sea, 35º 30'N, 120º 30'E, 11 August 2001, 30 m, 1 specimen; IOCAS E-1117, Yellow Sea, 36ºN, 121ºE, 15 June 2003, 22 m, 1 specimen; IOCAS E-1118, Yellow Sea, 35º30'N, 121º30'E, 19 May 2001, 45 m, 1 specimen. All specimens collected with a Petersen grab.

Description: Holotype (Figure 1) 80 mm long, diameter at mid-body 20 mm. Body cylindrical, slightly curved, with anterior end rounded, posterior end more or less tapering. Tentacles retracted; anus terminal, surrounded by five minute papillae. Tentacles 20, apparently in three circles of 10+5+5. Tube feet small, numerous, scattered all over body, more numerous ventrally than dorsally. Body wall thick, soft. Color in alcohol whitish or cream, with numerous black bands or patches.

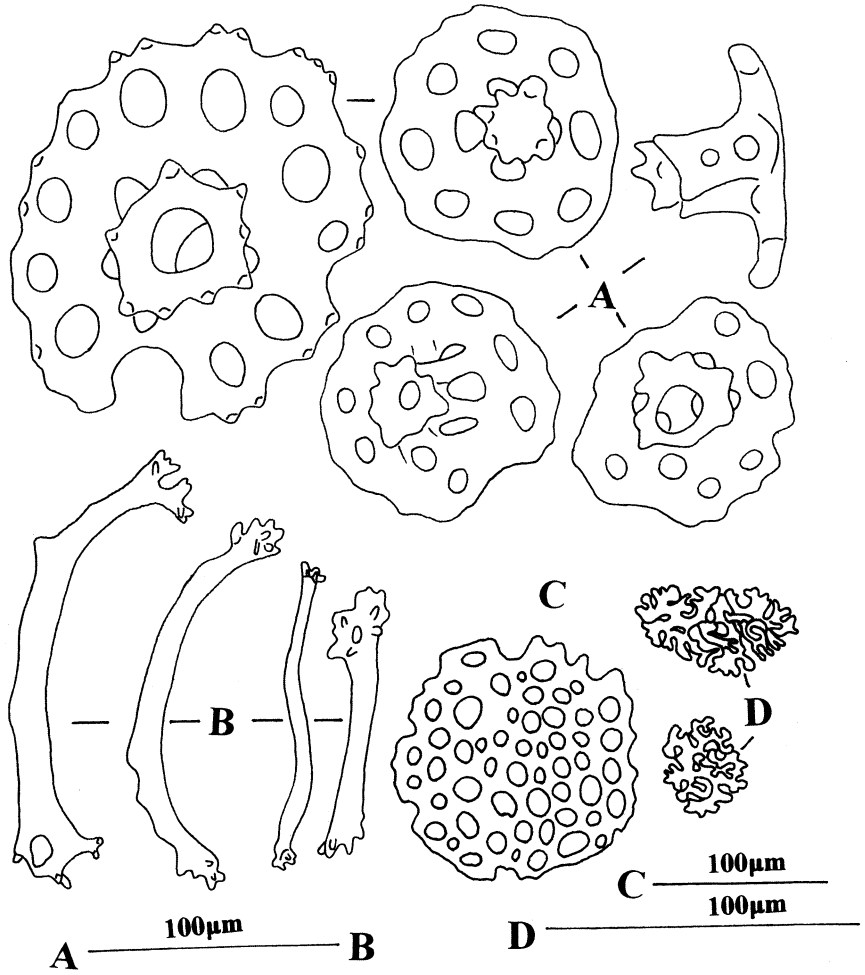

FIGURE 2. *Phyllophorus (Phyllophorus) maculatus* new species. A, tables from posterior end of body; B, rods from tentacles; C, endplate from tube foot; D, rosettes from introvert.

Ossicles in body wall scarce or absent. No ossicles in anterior and middle part of body, except for endplates in tube feet (Figure 1C). Ossicles present only in vicinity of anus, as tables (Figure 2A) with low four-pillared spires. Disk perforated by four large central holes and 8–12 small peripheral holes; edge of disc sinuous, with small peripheral knobs. Spire end in crown of eight spines. Disk diameter 74–179μm (average 120μm), spire height 51–63 μm. In tentacles, delicate supporting rods (Figure 2B) of length 68–310μm (average 180μm), often with one or two perforations at extremities. In introvert, rosettes only (Figure 2D).

Paratypes: Nine paratypes collected near or at same station as holotype. Two paratypes lack ossicles altogether; collectors noted that these two specimens had been placed in formalin for several days; presumably ossicles dissolved due to acidic conditions. In one paratype tube feet arranged in five double rows in radii, and apparently absent from interradii; other features identical with those of the holotype. Calcareous ring (Figure 1) large, about 20 mm in length, including posterior projections, ring composed of five compound radial and five single interradial plates. Radials divided anteriorly into two unequal halves by a deep notch; posterior projections each composed of 8–10 small pieces. Interradials lower, more or less triangular, anterior point attenuate, posterior base broad, rounded. Polian vesicle and stone canal single.

Etymology: The species name is derived from Latin *macula*, in reference to the blotches of color on the body wall of this species.

Remarks: It is assumed that this is a burrowing species, like most of its relatives. This new species differs from its consubgeners in possessing body wall tables with short spires, the tables present only in the vicinity of the anus; in the shape of the calcareous ring; and in the color of the body.

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