

ORIGINAL ARTICLE

Taxonomic notes on Hydroidomedusae (Cnidaria) from South China Sea I: Family Eucodoniidae (Anthomedusae)

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Abstract A generic diagnosis of family Eucodoniidae is revised, with the monotype genus *Eucodonium*. Three new species, *Eucodonium bitentaculatum* Xu, Huang & Guo, **sp. nov.**, *E. brevistyle* Xu, Huang & Lin, **sp. nov.** and *E. longitentaculatum* Xu, Huang & Wang, **sp. nov.** from South China Sea are described and illustrated. A key to all species of *Eucodonium* is provided. The type specimens are deposited in the Third Institute of Oceanography, State Oceanic Administration.

Key words Eucodoniidae, *Eucodonium*, new species, South China Sea, new record.

1 Introduction

The family Eucodoniidae was established by Schuchert (1996) for the monotype species *Eucodonium brownei* Hartlaub, 1907. The species was first recorded as *Dipurena* sp. by Brown (1896). It had been associated with families Tubulariidae, Corymorphidae, or even Capitata *incertae sedis* (Kramp, 1961; Russell, 1953; Brinckmann-Voss, 1970; Petersen, 1990). Because of without stenoteles (Brinckmann-Voss, 1970; Picard, 1955; Schuchert, 1996), this species should not be placed among the above groups. For this reason, Schuchert (1996) erected the family Eucodoniidae in the order Filifera to accommodate *E. brownei*, which distributed at New Zealand, Northeastern Atlantic, Mediterranean and Brazil.

In this work, the family Eucodoniidae and the genus *Eucodonium* are first recorded in China Sea. Three species, *E. bitentaculatum* Xu, Huang & Guo, **sp. nov.**, *E. brevistyle* Xu, Huang & Lin, **sp. nov.** and *E. longitentaculatum* Xu, Huang & Wang, **sp. nov.** are reported as new to science. All new species are described, photoed and illustrated in this paper.

2 Materials and methods

Specimens of the new species were collected from stations (4°00'–18°30'N, 109°00'–119°00'E) in South China Sea during June to August, 2012. All planktonic samples were collected by vertical tows from the bottom to the surface with a maximum sampling depth of 200 m using a large-type zooplankton net (80 cm diameter, 0.505 mm mesh size) and WP2 zooplankton net (57 cm diameter, 0.202 mm mesh size). Specimens were fixed in 5% buffered formalin in seawater, and examined by stereoscopic and light microscopy. All drawings were made from preserved specimens using an attached camera lucida. Microphotographs were taken using an Axiocam MRe5 (Zeiss) dissecting microscope. The type specimens

are deposited in the Third Institute of Oceanography, State Oceanic Administration (SOA).

3 Taxonomy

Family Eucodoniidae Schuchert, 1996

Eucodoniidae Schuchert, 1996: 88–89; Bouillon *et al.*, 2006: 147.

Diagnosis (modified after Bouillon *et al.*, 2006). Hydroid. unknown.

Medusae. Umbrella bell-shaped, without apical projection; no exumbrellar cnidocyst tracks; and manubrium quadrangular, on conical gastric peduncle; mouth quadrangular, with 4 inconspicuous cnidocyst-armed lips; medusae budding from stomach; with 4 radial canals and circular canal; gonads encircling manubrium; four or two solid perradial marginal tentacles with terminal swelling; four or two tentacular bulbs and other two opposite bulbs very rudimentary; no ocelli.

Discussion. Schuchert (1996) and Bouillon *et al.* (2006) provided a generic diagnosis for monotypic family Eucodoniidae based on *Eucodonium brownei* Hartlaub, 1907 with four tentacles and four marginal bulbs. Contrary to *E. brownei*, 3 new species of *Eucodonium* are reported in the present paper with only two tentacles, two marginal bulbs, and other two opposite rudimentary bulbs. Therefore, the diagnosis of the family was modified with respect to these characters.

Genus *Eucodonium* Hartlaub, 1907

Eucodonium Hartlaub, 1907: 71; Mayer, 1910: 68; Schuchert, 1996: 89; Bouillon *et al.*, 2006: 147.

Type species: *Eucodonium brownei* Hartlaub, 1907.

Diagnosis. As in the family diagnosis.

Discussion. The genus *Eucodonium* is similar to *Cytaeis* Eschscholtz, 1829, *Hydractinia* van Beneden, 1841 and *Plotocnide* Wagner, 1885 by having four perradial nematocyst clusters embedded in the mouth margin. But it is distinguished from *Cytaeis* by oral tentacles simple, situated on/or very near mouth rim, from *Hydractinia* by mouth with four distinct lips elongated to form perradial mouth armed with one or many distinct cnidocyst clusters, from *Plotocnide* by the cnidome contains desmonemes and stenoteles (Hand & Kan, 1961) justifying assignment to the Capitata Tubulariidae *incertae sedis*.

Key to medusae of all known *Eucodonium* species.

- 1 Four perradial marginal bulbs and four tentacles present; tentacles with terminal swelling; mouth with 4 inconspicuous perradial lips, eaching containing a group of about 100 nematocysts *E. brownei* Hartlaub, 1907
- Two perradial marginal bulbs and two tentacles present; tentacles with terminal swelling..... 2
- 2 Two opposite perradial tentacles very long and thin, length up to 3 times bell height, with numerous prominent brown spots at irregular intervals *E. longitentaculatum* Xu, Huang & Wang sp. nov.
- Two opposite perradial tentacles short 3
- 3 Gastric peduncle broad conical, half as long as manubrium; oral tube long, about the same length as that of the stomach *E. bitentaculatum* Xu, Huang & Guo, sp. nov.
- Gastric peduncle short and broad, shorter than the length of manubrium; oral tube short, about shorter than the length of stomach.... *E. brevistyle* Xu, Huang & Lin, sp. nov.

3.1 *Eucodonium bitentaculatum* Xu, Huang & Guo, sp. nov. (Figs 1, 4–6)

Material examined. Holotype (TIO 006), coastal waters of southern Taiwan, Station 18 (21°56'N, 120°46'E), horizontal towing at depth 5 m to 10 m, 1 May 2008, coll. Meng-Hsien Chen. Paratype (TIO 007–008), same data as holotype.

Diagnosis. Umbrella bell-shaped, without apical projection; manubrium with conical peduncle; oral tube long about the same length of stomach; mouth with 4 inconspicuous perradial lips, each containing a row of nematocysts; medusa buds on interradial region of stomach; two equally developed tentacles with a terminal swelling, which terminates in a thin fibrous appendage, other two opposite perradial rudimentary bulbs no tentacles; without ocelli.

Description. Medusa with bell-shaped, up to 0.5–0.8 mm in height, slight higher or as high as broad; apical jelly slightly thickened; gastric peduncle broad conical, half as long as manubrium, oral tube long, about the same length as that

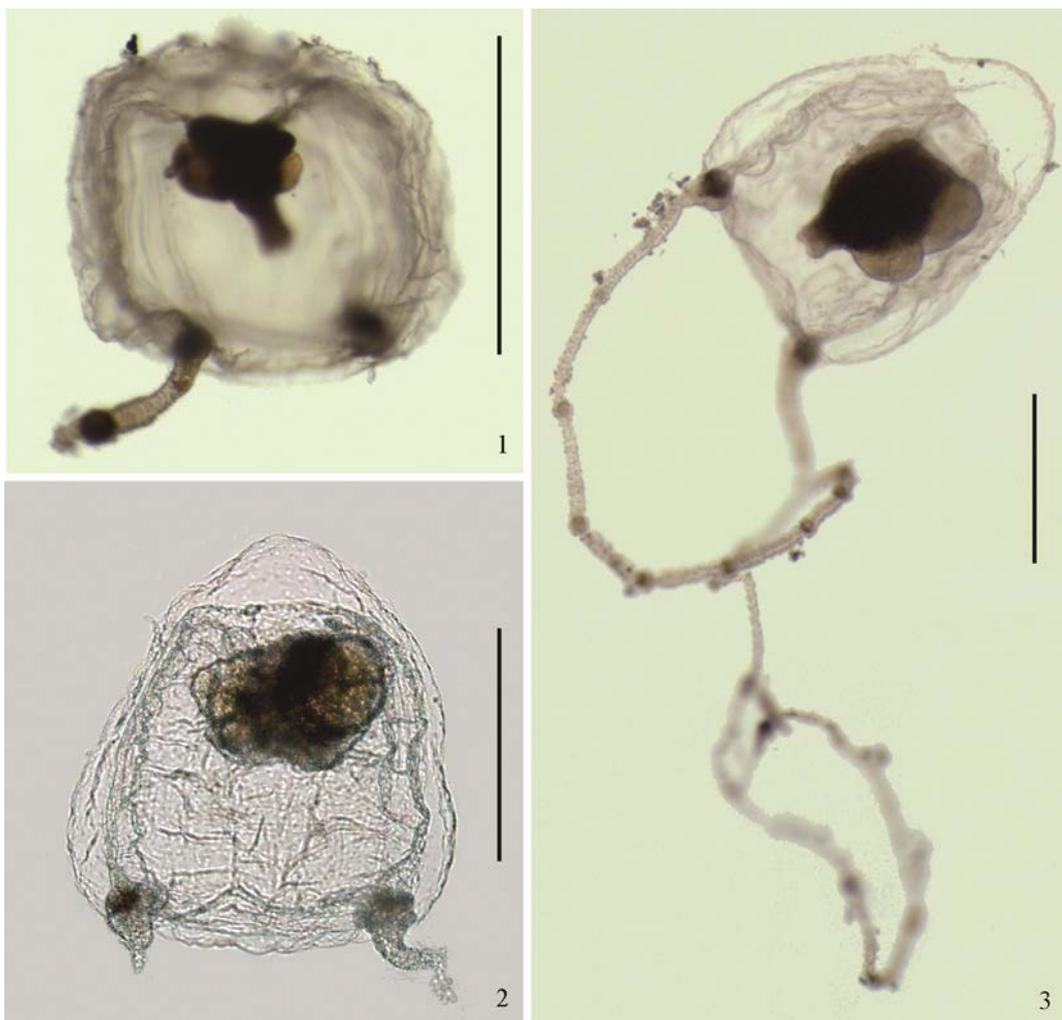
of stomach; manubrium length 2/3 of bell cavity, cylindrical; mouth quadrangular with 4 inconspicuous perradial lips, each containing a row of numerous nematocysts; medusa buds arise from interradial region of stomach; 4 narrow radial canals and circular canal present; 2 equally developed tentacles with a conspicuous terminal swelling terminated in a thin fibrous appendage, with large marginal bulbs containing brown pigment granules, and other 2 opposite rudimentary marginal bulbs without tentacles; no ocelli present; nematocyst not only present in terminal swelling but also along the whole tentacle covered with ring nematocysts; velum middle broad.

Distribution. Northern South China Sea (Southern Taiwan).

Etymology. The specific name is from the Latin *bitentaculatum*, meaning bi-tentacles, referring to the two opposite large marginal bulbs with solid equally developed tentacles.

Remarks. This new species has following characters which are in common with *Eucondonium* Hartlaub, 1907: quadrangular manubrium on conical gastric peduncle; mouth with 4 inconspicuous cnidocyst armed lips; medusa buds on stomach; no ocelli present.

The new species can be distinguished from the *Eucondonium browni* Hartlaub, 1907 by following: 1) the former has 2 opposite large marginal bulbs with solid equally developed tentacles with a conspicuous terminal swelling, which terminates in a thin fibrous appendage, and other 2 opposite marginal bulbs very rudimentary without tentacles, while the latter has 4 small marginal bulbs with 4 equally developed tentacles with a conspicuous terminal swelling, which terminal without fibrous appendage; 2) the former has 4 inconspicuous perradial lips, each containing a row of numerous nematocysts, while the latter has 4 inconspicuous perradial lips, each containing a group of about 100 nematocysts (see the key of *Eucondonium*).



Figures 1–3. *Eucondonium* spp., lateral view. 1. *E. bitentaculatum* Xu, Huang & Guo, **sp. nov.** 2. *E. brevistyle* Xu, Huang & Lin, **sp. nov.** 3. *E. longitentaculatum* Xu, Huang & Wang, **sp. nov.** Scale bars = 0.5 mm.

3.2 *Eucodonium brevistyle* Xu, Huang & Lin, sp. nov. (Figs 2, 7–8)

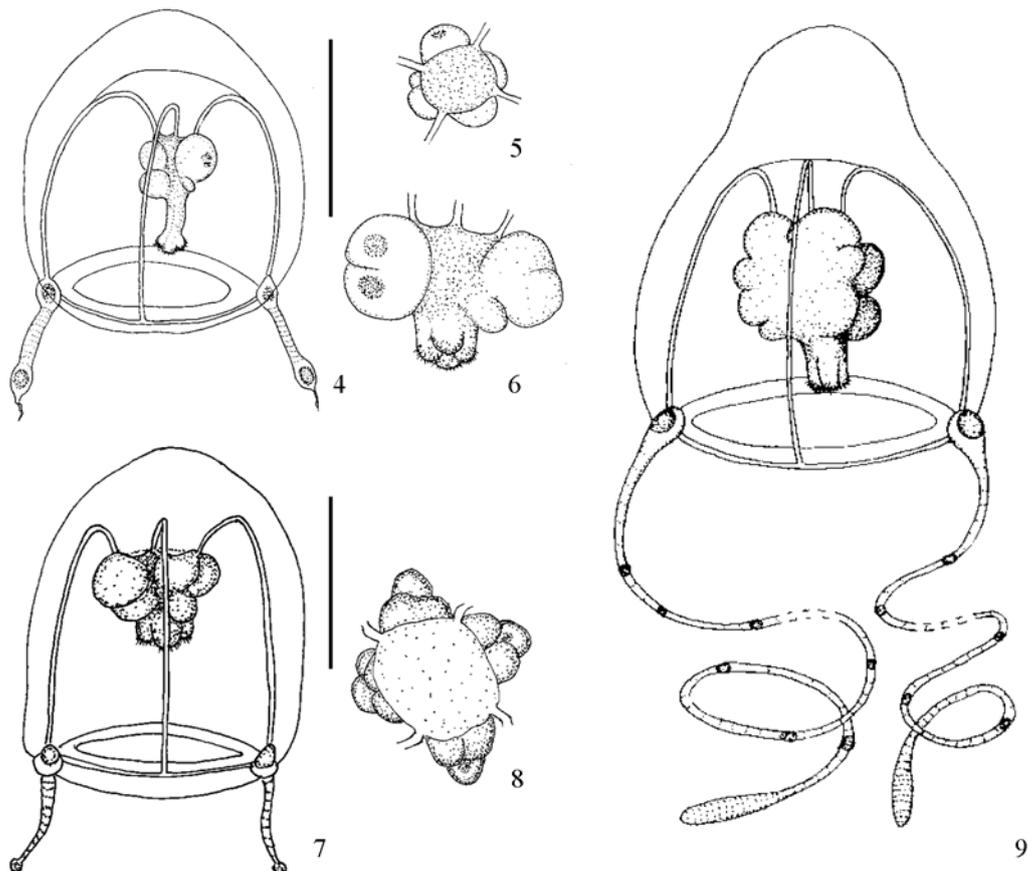
Material examined. Holotype (TIO 009), Beibu Bay of South China Sea, Station H11 (18°17'N, 109°06'E), depth 20 m, 6 August 2006, coll. Donghui Guo. Paratype. Three specimens (TIO 010–012), same data as holotype; two specimens (TIO 020–021), East China Sea, Station 332 and 338, August 2002.

Diagnosis. Umbrella nearly hemispherical, with slight rounded apical projection; gastric peduncle short and broad, shorter than the length of manubrium, manubrium cylindrical, oral tube short, about 1/2 length of manubrium, mouth quadrangular, with 4 inconspicuous perradial lips, each containing a row of numerous nematocysts; 2 opposite perradial marginal tentacles, short and thin, with ring nematocysts and a small terminal knob, marginal bulbs spherical-like, inside swelling, without ocelli, but containing red-brown pigment granules, and other 2 opposite marginal bulbs without tentacles.

Description. Umbrella nearly hemispherical, bell 0.9–1.0 mm in height, 0.4–0.8 mm in width, with slight rounded apical projection; jelly fairly thin; gastric peduncle very short and broad, shorter than the length of manubrium; manubrium large on broad gastric peduncle, oral tube short, about 1/2 of the length of manubrium; manubrium cylindrical, about 1/3 as long as bell cavity; mouth quadrangular, with 4 inconspicuous perradial lips, each containing a row of numerous nematocysts; medusa buds arise from interradial region of stomach; 4 very narrow radial canals and circular canal present; 2 opposite perradial marginal tentacles, short and thin, thread-like, extending to 1/3 the height of umbrella, with ring nematocysts and a small terminal knob containing nematocysts; marginal bulbs spherical-like, inside swelling, without ocelli, but containing red-brown pigment granules, and other 2 opposite perradial marginal bulbs without tentacles; velum narrow.

Distribution. Northern South China Sea (Beibu Bay), East China Sea.

Etymology. The specific name is from the Latin *brevistyle*, meaning brevi-style, referring to the short peduncle, which is shorter than the length of manubrium.



Figures 4–9. *Eucodonium* spp. 4–6. *E. bitentaculatum* Xu, Huang & Guo, sp. nov. 7–8. *E. brevistyle* Xu, Huang & Lin, sp. nov. 9. *E. longitentaculatum* Xu, Huang & Wang, sp. nov. 4, 7, 9. Lateral view. 5, 8. Gonads, dorsal view. 6. Gonads, lateral view. Scale bars = 0.5 mm.

Remarks. This new species is close to *E. bitentaculatum* Xu, Huang & Guo, **sp. nov.**, but differs from the latter by following: 1) a gastric peduncle shorter than the length of the manubrium; 2) two opposite perradial marginal tentacles short and thin, thread like, terminal knob without terminates in a thin fibrous appendage; 3) oral tube short, about 1/2 length of manubrium.

3.3 *Eucodonium longitentaculatum* Xu, Huang & Wang, **sp. nov.** (Figs 3, 9)

Material examined. Holotype (TIO 013), Beibu Bay of South China Sea, station J67 (18°21'N, 108°40'E), depth 32 m, 31 July 2006, coll. Donghui Guo.

Diagnosis. Umbrella with low, rounded apical process; gastric peduncle short and broad, shorter than the length of manubrium; oral tube short; mouth with 4 inconspicuous perradial lips, each containing a group of nematocysts; two opposite perradial tentacles, very long and thin, length up to 3 times bell height, with numerous prominent brown spots at irregular intervals.

Description. Medusa with bell-shaped umbrella, 1 mm in height, 0.8 mm in width, with low and rounded apical process, lateral walls thin; manubrium on well-formed peduncle, gastric peduncle short and broad, shorter than the length of manubrium, oral tube short, inconspicuous; manubrium length 3/4 of bell cavity, cylindrical, mouth quadrangular with 4 inconspicuous perradial lips, each containing a group of nematocysts; medusa buds arise from middle region of stomach; 4 narrow radial canals and circular canal present; two opposite perradial marginal bulbs containing blackish brown pigment granules, with two very long and thin tentacles, length up to 3 times bell height, with numerous prominent brown spots at irregular intervals and with a distinct terminal knob, two other opposite marginal bulbs no present; no ocelli present; velum narrow.

Distribution. Beibu Bay of South China Sea.

Etymology. The specific name is from the Latin *longitentaculatum*, meaning long-tentacles, referring to the morphology of the tentacles, which are very long and thin tentacles.

Remarks. The new species can be distinguished from the other species of *Eucodonium* by: 1) two very long and thin tentacles, length up to 3 times bell height, with numerous brown spots at irregular intervals; 2) gastric peduncle short and broad; 3) oral tube inconspicuous; 4) 4 inconspicuous perradial lips, each containing a group of nematocysts.

Funding This study was supported by Global Climate Change and Ocean Atmosphere Interaction Research (GASI-01-02-02-03, GASI-01-02-04, GASI-01-02-02-01), the Marine Biological Sample Museum of the Chinese Offshore Investigation and Assessment, and the National Basic Research Program of China (2011CB403604).

Acknowledgements Thanks extend to Taiwan Power Company, for providing long terms fundings to prof. MengHsien Chen, Sun Yat-sen University, Kaohsiung, Taiwan for the zooplankton survey in Nanwan Bay, and her research assistants for helping in field works.

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