

ORIGINAL ARTICLE

Two new hydrozoan species from the Taiwan Strait, China (Cnidaria: Hydrozoa: Leptothecata)

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Abstract Samples of leptomedusan were collected from the Taiwan Strait during July 2006. Two new species, *Gangliostoma abaxialispura* Xu, Huang & Guo, **sp. nov.** and *Eutima taiwanensis* Xu, Huang & Guo, **sp. nov.**, are described and illustrated. The keys to the species of *Gangliostoma* and *Eutima* are presented, respectively. The type specimens are deposited in the Third Institute of Oceanography, China.

Key words Leptomedusae, *Gangliostoma*, *Eutima*, new species, south of the Taiwan Strait.

1 Introduction

The Taiwan Strait is located at the southern East China Sea shelf, which is a longitudinal narrow strait, lying between the east coast of Fujian and the west coast of Taiwan. The Taiwan Strait extends from southwest to northeast between the South China Sea and the East China Sea, with complex hydrographic patterns driven by interactions among water masses of different origins (Guo *et al.*, 2011). Due to the variable hydrographic conditions in the Taiwan Strait, hydrozoan exhibited high diversity, 366 species had been recorded at the end of 2012, most of which are warm neritic species and oceanic species (Xu *et al.*, 2014).

Based on the precious reports (Xu *et al.*, 2012, 2014, 2019) and the recent collections of the authors, a total number of 142 species of leptomedusans is recorded in the Taiwan Strait. The purpose of this study is to describe two new species, *Gangliostoma abaxialispura* Xu, Huang & Guo, **sp. nov.** and *Eutima taiwanensis* Xu, Huang & Guo, **sp. nov.**, which aims to extend our knowledge of the diversity and distribution of these leptomedusans in China seas. And the keys to the species of *Gangliostoma* and *Eutima* are also provided in the present study.

2 Materials and methods

The samples were collected from the Taiwan Strait (20°51'–27°04'N, 114°55'–121°14'E) during July 2006. All planktonic samples were collected using a large-type zooplankton net (80 cm in diameter, 0.505 mm in mesh size) and a median-type zooplankton net (50 cm in diameter, 0.160 mm in mesh size) by vertical towing from the bottom to the surface.

Specimens were fixed and stored in 5% formaldehyde buffered in seawater. Samples were examined by the stereoscopic microscopy, and identified using the taxonomic literatures as specified in the references section. All drawings were made from preserved specimens using an attached camera lucida. Microphotographs were taken using Leica M205C dissecting

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microscopy. Type specimens are deposited in the Third Institute of Oceanography, State Oceanic Administration.

3 Results

Family Aequoreidae Eschscholtz, 1829

Genus *Gangliostoma* Xu, 1983

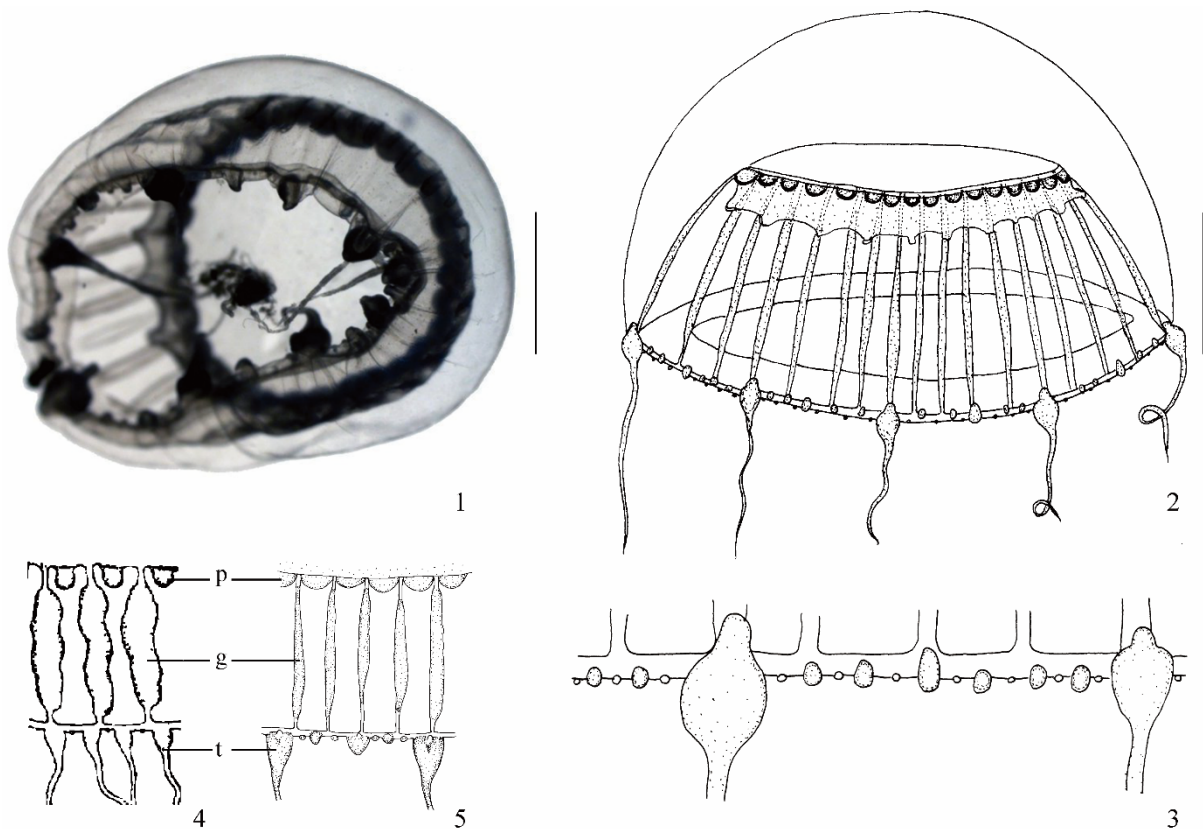
Type species: *Gangliostoma guangdongensis* Xu, 1983.

Diagnosis. The genus is diagnosed by following: medusa with many simple radial canals; subumbrella without radial rows of gelatinous papillae; manubrium with radial rows of gelatinous papillae.

Remarks. It comprises three species: *G. dayaensis* Xu, Huang & Du, 2010, *G. guangdongensis* Xu, 1983 and *G. abaxialispura* Xu, Huang & Guo, **sp. nov.**, which are known in China seas.

Key to the species of the genus *Gangliostoma*.

1. Oral lips longish, about same number as the radial canals; with 90–108 marginal tentacles, about 2–3 times as many as the number of radial canals; tentacular bulbs without excretory papillae and abaxial spurs; without rudimentary bulbs (Fig. 4)
 *G. guangdongensis* Xu, 1983
2. Oral lips short, less numerous than the radial canals; marginal tentacles much less than 1 time as many as radial canals 2
2. With 12–14 marginal tentacles, tentacular bulbs with distinct excretory papillae, no abaxial spurs; with 3 rudimentary bulbs between tentacles (Fig. 5).....
 *G. dayaensis* Xu, Huang & Du, 2010
- With 8 marginal tentacles, tentacular bulbs with a distinct abaxial spurs, no excretory papillae; with 6 rudimentary bulbs between tentacles (Fig. 3).....
 *G. abaxialispura* Xu, Huang & Guo, **sp. nov.**



Figures 1–5. *Gangliostoma* spp. 1–3. *G. abaxialispura* Xu, Huang & Guo, **sp. nov.** 1. Oral view. 2. Lateral view. 3. Part enlargement of marginal tentacles. 4. Part enlargement of the subumbrella of *G. dayaensis* Xu, Huang & Du, 2010 (after Du *et al.*, 2010). 5. Part enlargement of the subumbrella of *G. guangdongensis* Xu, 1983 (after Xu, 1983). Abbreviation: p—papilla; g—gonad; t—tentacle. Scale bars=2.0mm.

***Gangliostoma abaxialispura* Xu, Huang & Guo, sp. nov.** (Figs 1–3)

Type materials. Holotype (TIO 032), China, south of Taiwan Strait, Station ZD-MJK535 (26°09'N, 120°45'E), depth 67 m, sampling depth 67–0 m, 20 July 2006, coll. Peng Xiang.

Diagnosis. The species is diagnosed by following: umbrella nearly disk shaped, apex jelly very thick; manubrium very broad, with a basal circular row of as many papillae as radial canals; with 8 marginal tentacles, tentacular bulbs with a distinct abaxial spurs upwards over margin of bell; with 6 rudimentary bulbs and 6 statocysts between the tentacles.

Description. Umbrella 5.0 mm in height, 8.0 mm in width, nearly disk shaped, apex jelly very thick, thinning towards margin; with very broad manubrium which devoid of a peduncle, about half as wide as diameter of umbrella, with a basal circular row of as many as papillae as radial canals; without subumbrella gelatinous papillae; with 32 simple radial canals, oral lips short, less numerous than radial canals; gonads extending along whole length of radial canals, but not connected to ring canal; with 8 well-developed hollow marginal tentacles, about 1/4 as many as number of radial canals, tentacular bulbs large, nearly spherical-like with a distinct abaxial spurs upwards over margin of bell; no ocelli; with 6 rudimentary bulbs between tentacles, medium one larger than other two or three; with many statocysts of same number as rudimentary bulbs; velum broad.

Distribution. Taiwan Strait, China.

Etymology. The specific name derived from the Latin *abaxialispura*, meaning abaxial-spur, in reference to the morphology of tentacular bulbs with an abaxial spur.

Remarks. This new species has following characters which are in common with *Gangliostoma* Xu, 1983: medusa with a very broad manubrium, with a basal circular row of papillae of the same number as the radial canals.

Before the work, only two species of *Gangliostoma*, *G. dayaensis* and *G. guangdongensis*, are known (Xu, 1983; Bouillon *et al.*, 2006; Du *et al.*, 2010; Xu *et al.*, 2014). The new species can be distinguished from other two by following: 1) umbrella with 8 marginal tentacles, about 1/4 as many as the number of radial canals; 2) each tentacular bulbs with a distinct abaxial spurs, without excretory papillae; 3) with 6 rudimentary bulbs and 7 statocysts between the tentacles.

Family Eirenidae Haeckel, 1879**Genus *Eutima* McCrady, 1859**

Type species: *Eutima mira* McCrady, 1859.

Diagnosis. The genus is diagnosed by following: medusa with a distinct gastric peduncle; with lateral cirri and marginal warts; mouth with simple lips; 4 simple radial canals; gonads on radial canals, either beneath subumbrella or gastric peduncle or on both; with 8 (exceptionally 12) statocysts.

Remarks. Members of the genus are easily distinguished from all other genera by their medusa with 8 statocysts; with lateral cirri on marginal warts and marginal tentacles. The genus comprises 20 valid species (including the new species) (Mayer, 1910; Kramp, 1961; Bouillon, 1984; Bouillon *et al.*, 2006; Guo *et al.*, 2008; Xu *et al.*, 2014), of which only 13 species are known in China seas.

Key to the species of the genus *Eutima*.

1. With 8 gonads, 4 on subumbrella and 4 on peduncle 2
With 4 gonads, either on subumbrella or peduncle 9
2. Tentacle without lateral cirri 3
Tentacle with lateral cirri 4
3. With 32 marginal warts with lateral cirri; subumbrellar gonads linear-like, peduncular gonads in middle part of peduncle
..... *E. hartlaubi* Kramp, 1958
With 80–120 marginal warts with lateral cirri; subumbrellar gonads sinuous-like, peduncular gonads near proximal end of peduncle
..... *E. taiwanensis* Xu, Huang & Guo, sp. nov.*
4. With 4 tentacles 5
With 8–16 tentacles 6
5. Peduncle with a dome-like base, prismatic below; with 60–80 marginal warts *E. orientalis* (Browne, 1905)
Peduncle slender; with 100 marginal warts *E. mira* McCrady, 1859*
6. Tentacular bulbs and marginal warts with adaxial papillae *E. gegenbauri* (Haeckel, 1864)*
Tentacular bulbs and marginal warts without adaxial papillae 7
7. With 16 tentacles and 3 marginal warts between successive tentacles *E. variabilis* McCrady, 1859*
With 8 tentacles 8

8. Tentacular bulbs without abaxial spurs, marginal warts without black spot..... *E. levuka* (A. Agassiz & Mayer, 1899)*
Tentacular bulbs with abaxial spurs, marginal warts with black spot on extreme tip.....
..... *E. diademata* (Kramp, 1959) [=*E. krampi* Guo, Xu & Huang, 2008]*
9. Gonads on peduncle only 10
Gonads on subumbrella portion of radial canals 14
10. With 32 tentacles or 8 tentacles..... 11
With 4 tentacles or 2–4 tentacles..... 13
11. With 32 tentacles and 96 marginal warts with lateral cirri *E. coerulea* (L. Agassiz, 1862)*
With 8 tentacles..... 12
12. Umbrella higher than wide; tentacle with 2 pairs of lateral cirri, 16 marginal warts with lateral cirri *E. gentiana* (Haeckel, 1879)*
Umbrella broader than high; tentacle without lateral cirri, 64–80 marginal warts with a pair of lateral cirri.....
..... *E. longigonia* Bouillon, 1984
13. 4 tentacles with abaxial hook-like process *E. curva* (Browne, 1905)*
2–4 tentacles with abaxial hook-like process *E. gracilis* (Forbes & Goodsir, 1853)*
14. Tentacles without lateral cirri 15
Tentacles with lateral cirri..... 16
15. With 4 tentacles, with 28 marginal warts *E. sapinhua* Narchi & Hebling, 1975
With 8 tentacles, perradial tentacles longer than interradial; gonads with lateral swelling, not reaching to peduncle
..... *E. neucaledonia* Uchida, 1964*
16. With 16 tentacles with swollen bulbs, with lateral cirri, gonads in middle portion of radial canals.....*E. modesta* (Hartlaub, 1909)*
With 8 tentacles..... 17
17. Up to 32 marginal warts 18
With 50–80 marginal warts 19
18. Peduncle short, never exceeding beyond bell opening..... *E. japonica* Uchida, 1925*
Peduncle long, exceeding beyond bell opening..... *E. suzannae* Allwein, 1967
19. Bell flatter than hemisphere; peduncle long about 2/3 length exceeding beyond bell opening; gonads sinuous-like.....
..... *E. mucosa* Bouillon, 1984
Bell nearly hemisphere; peduncle short about 1/3 length exceeding beyond bell opening; gonads linear-like
..... *E. commensalis* Santhakumari, 1970

*Recorded in China seas.

Eutima taiwanensis Xu, Huang & Guo, sp. nov. (Figs 6–8)

Type materials. Holotype (TIO 033) and paratype (TIO 034–040), China, Taiwan Strait, Station ZD-MJK571 (24°59'N, 120°28'E), depth 80 m, sampling depth 79–0 m, 29 July 2006, coll. Peng Xiang.

Diagnosis. The species is diagnosed by following: umbrella almost hemispherical, apex jelly thick; with a distinct gastric peduncle; with 12 (rarely 16) tentacles without lateral cirri, with 80–120 marginal warts with lateral cirri; with 8 gonads, 4 subumbrellar gonads sinuous-like, 4 peduncular gonads near proximal end of peduncle.

Description. Umbrella 5.0–6.0 mm in height, 8.5–12.0 mm in width, almost hemispherical, apex jelly thick, thinning towards margin; with a distinct gastric peduncle, long, tapering manubrium small, about as long as bell diameter, about 2/3 exceeding bell opening; manubrium short and thick, cross-shaped in transversal section; mouth with 4 simple, long lips with crenulated margin; with 8 gonads on radial canals, 4 subumbrellar gonads, elongated sinuous-like extending from nearly bell margin to basal part of peduncle, other 4 peduncular gonads extending from middle part of peduncle to manubrium; usually 12 long hollow marginal tentacles, rarely 16, 4 perradial, 8 adradial, with elongated conical basal marginal bulbs, laterally compressed, without lateral cirri; with 80–120 marginal warts, each with 1 pair of lateral cirri; 4 simple radial canals running from circular canal across underside of bell along peduncle to manubrium; 8 adradial statocysts; velum broad.

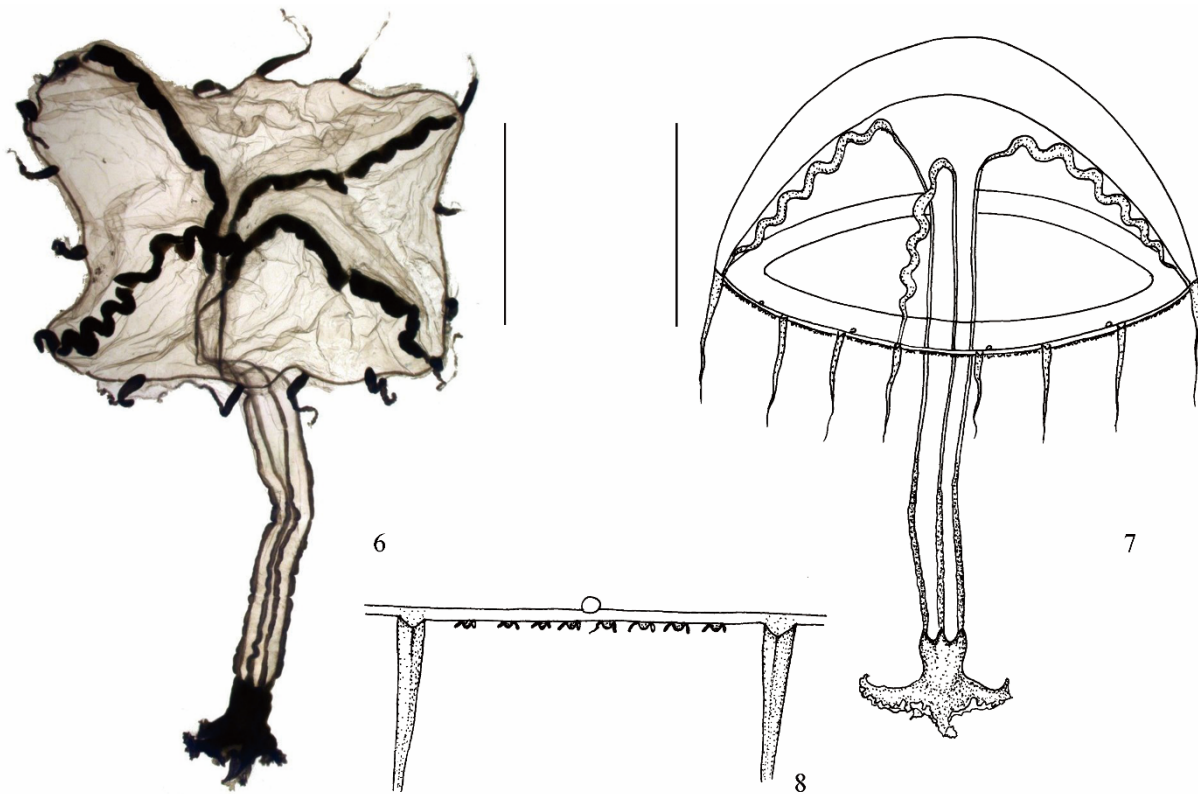
Distribution. Taiwan Strait, China.

Etymology. The specific name of the new species is referring to its type locality, the Taiwan Strait, China.

Remarks. The new species has following features: a distinct gastric peduncle; with 8 statocysts (rarely 12); marginal tentacles without lateral cirri; marginal warts with lateral cirri; without excretory papillae; gonads on radial canals, which in accordance with the genus *Eutima* of Eirenidae.

At present, 20 valid species in *Eutima* (including this new species) are known (Bouillon *et al.*, 2006; Xu *et al.*, 2014). This new species can be easily distinguished from the other species of *Eutima* by 8 gonads, 4 on subumbrella and 4 on peduncle; marginal tentacles without lateral cirri. It is similar to *E. hartlaubi* Kramp, 1958, but differs from the latter by following: 1) *E. taiwanensis* with 80–120 marginal warts with lateral cirri, and *E. hartlaubi* with 32 marginal warts with lateral cirri; 2) *E. taiwanensis* with 4 subumbrellar sinuous gonads, 4 peduncular gonads near proximal end of peduncle; and

E. hartlaubi with 4 subumbrellar linear gonads, 4 peduncular gonads in middle part of peduncle.



Figures 6–8. *Eutima taiwanensis* Xu, Huang & Guo, **sp. nov.** 6. Oval view. 7. Lateral view. 8. Enlargement of marginal umbrella. Scale bars = 5.0 mm.

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