

Two new species of medusae (Cnidaria) from the coastal waters of the northern Beibu Gulf

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Abstract

Medusae in 116 samples collected from the coastal waters of the northern Beibu Gulf during four seasonal oceanographic cruises from October 2017 to August 2018 were analyzed. In total, 34 species were identified. Two of the species are new to science, *Proboscoidactyla pentacanalisis* Xu, Chen & Yang sp. nov. and *Helgicirrho apapillata* Xu, Chen & Wang sp. nov., and three species are newly recorded in the Beibu Gulf, i.e., *Hydractinia vacuolata* Xu & Huang, 2006, *Proboscoidactyla flavicirrata* Brandt, 1834 and *Phialella macrogona* Xu, Huang & Wang, 1985. Collections of the species were deposited at the Third Institute of Oceanography, Ministry of Natural Resources.

Key words: medusae, Cnidaria, new species, coastal waters, northern Beibu Gulf

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1 Introduction

The Beibu Gulf is a semienclosed shallow bay in the northwestern part of the South China Sea that is connected to the South China Sea by its southern mouth and the Qiongzhou Strait on the eastern side. The spatial variation in water temperature and salinity in the Beibu Gulf is affected by the balance of seawater, freshwater inputs and water with a high salt content from the South China Sea and circulation in the gulf (Chen et al., 2008). Therefore, the Beibu Gulf is an important marine breeding area and high-quality fishery in China. Furthermore, the Beibu Gulf, which includes mangrove forests, coral reefs, seagrass beds and other typical marine ecosystems, is one of the most biodiverse marine areas in China (Chen et al., 2016).

A study on medusae in the Beibu Gulf was conducted by Xu (1965) along the Hainan Island and in the adjacent sea. In total, 52 species were identified, including 16 newly recorded species. Huang (1987) reported 64 species along the southern coast of Guangxi Zhuang Autonomous Region during six seasonal oceanographic cruises.

In the last two decades, the taxonomy and ecology of medusae in the Beibu Gulf have been well studied. Guo et al. (2008a) analyzed a total of 99 species of medusae, including six species of Anthomedusae that were new to science and three species newly recorded in China (Xu et al., 2008). Guo et al. (2008b) also studied the composition and distribution of planktonic medusae in summer and winter, identifying a total of 187 species. Later, Huang et al. (2010a) and Li et al. (2010) described two new species in the genera *Eucheilota* and *Hydractinia* along the Guangxi

Zhuang Autonomous Region coast, and Lin et al. (2010) and Du et al. (2012) updated the number of medusae with five new species and three newly recorded species.

Based on previous studies (Xu, 1965; Huang, 1987; Guo et al., 2008a, b; Xu et al., 2008; Huang, 2010a, b; Li et al., 2010; Lin et al., 2010; Du et al., 2012) and recent records from the authors, there are 159 species of medusae in the Beibu Gulf. In this work, the species composition and seasonal variation of planktonic medusae in the coastal waters of the northern Beibu Gulf are listed. Two species, *Helgicirrho apapillata* Xu, Chen & Wang sp. nov. and *Proboscoidactyla pentacanalisis* Xu, Chen & Yang sp. nov., are reported as being new to science. Three species are newly recorded: *Hydractinia vacuolata* Xu & Huang, 2006, *Proboscoidactyla flavicirrata* Brandt, 1834 and *Phialella macrogona* Xu, Huang & Wang, 1985. All new species are described, photographed and illustrated in this paper.

2 Materials and methods

We analyzed planktonic medusae in samples collected from 29 stations in the coastal waters of the northern Beibu Gulf (21°16'00"–21°49'52"N, 108°13'23"–108°52'41"E) during four seasonal oceanographic cruises from October 2017 to August 2018 (Fig. 1). All planktonic samples were collected using a large-type zooplankton net (80 cm net mouth diameter, 0.505 mm mesh size) by vertical towing from the near bottom to the surface. The samples were preserved in seawater with 5% buffered formalin. The samples were then examined using stereoscopic and light microscopy, and taxonomic identification was performed using

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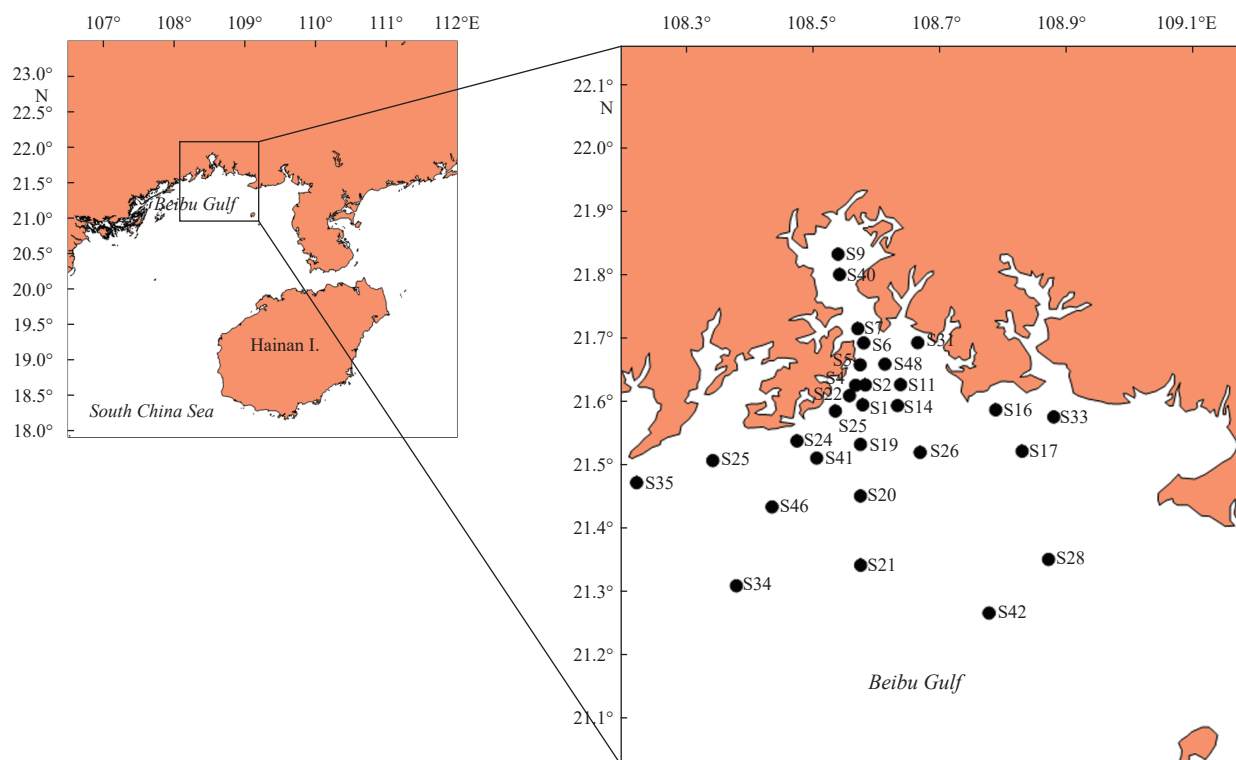


Fig. 1. Map of the study area showing the locations of the sampling stations.

the literature specified in the reference section.

All drawings were made from preserved specimens using a camera lucida and a drawing apparatus and further processed with Adobe Photoshop CS6. Microphotographs were taken using either an Axiocam MRe5 (Zeiss) dissecting microscope or a Micaren DC200 camera mounted on an Olympus microscope. The specimens were deposited at the Third Institute of Oceanography, Ministry of Natural Resources.

3 Taxonomy

In total, 34 medusae species were identified, two of which are new to science. Three species are reported from the Beibu Gulf for the first time (Table 1).

Subclass Anthomedusae Haeckel, 1879

Order Filifera Kühn, 1913

Family Proboscoidactylidae Hand & Hendrickson, 1950

Genes *Proboscoidactyla* Brandt, 1835

Proboscoidactyla pentacanalis Xu, Chen & Yang sp. nov.

(Fig. 2)

Material examined: Holotype (TIO-GFT18017), one species collected from the coastal waters of the northern Beibu Gulf. 2017. Station: GFT24 (21°32'14"N, 108°28'30"E). Depth: 11 m. Collector: Lin Chang.

Diagnosis: Umbrella nearly hemispherical, jelly moderately thick, manubrium pentangular shaped, with 5 radial gastric lobes, mouth with 5 lips, often poorly marked; 5 primary radial canals, each branching into 2–3 canals, very long, approximately 12 terminal branch canals and as many tentacles, gonads on the manubrium and lateral wall of radial gastric lobes, with medusa buds arising from the forking of radial canals.

Description: Umbrella nearly hemispherical, 2.0 mm in height, 1.8 mm in width, jelly moderately thick, slightly thicker at apex, manubrium pentangular shaped, short with large base,

with 5 radial gastric lobes, extending along proximal portions of radial canals, mouth with 5 lips, often poorly marked, gonads encircling the manubrium and extending onto the gastric lobes, with medusa buds arising from the forking of radial canals, 5 primary radial canals, each branching into 2–3 canals, very long, and finally all canals joining the solid endodermal marginal exumbrella core; 12 marginal tentacles, one at the foot of each terminal branch of the radial canals, tentacular bulbs large and hollow, nearly globular, their endoderm with dense pigmentation, marginal tentacles short and thick, covered with ring-like cnidocysts; alternating with the tentacles is exumbrella bear clusters of cnidocysts that are connected with the umbrella margin by a line; ocelli absent.

Distribution: The coastal waters of the northern Beibu Gulf.

Etymology: From the Latin *pentacanalis*, meaning pentacanal, the species name refers to an umbrella with 5 primary radial canals.

Remarks: This species has a manubrium presenting radial gastric lobes with branched radial canals, with clusters of cnidocysts on its exumbrella margin by a line. Usually without a circular canal, the marginal tentacles are hollow. These features place this medusa in the family Proboscoidactylidae Hand & Hendrickson, 1950 and genus *Proboscoidactyla* Brandt, 1835.

According to Schuchert (2020), the genus *Proboscoidactyla* current consists of 10 valid species, i.e., *Proboscoidactyla abyssicola* Uchida, 1948, *P. circumsabella* Hand, 1954, *P. flavicirrata* Brandt, 1835, *P. menoni* Pages, Bouillon & Gili, 1991, *P. mutabilis* (Browne, 1902), *P. occidentalis* (Fewkes, 1889), *P. ornata* (McCrary, 1859), *P. stellata* (Forbes, 1846), *P. trifurcata* Xu, Huang & Guo, 2019, *P. tropica* Browne, 1905; whereas five species are doubtful: *P. brooksi* (Mayer, 1910), *P. furcata* (Haeckel, 1879), *P. pacifica* (Maas, 1909), *P. brevicirrata* Haeckel, 1879, and *P. conica* Menon, 1932 (Bouillon et al., 2006).

Table 1. List of medusae species in the coastal waters of the northern Beibu Gulf during four seasons

| Species | Autumn | Winter | Spring | Summer |
|--|--------|--------|--------|--------|
| Phylum Cnidaria | | | | |
| Class Automedusa Lameare, 1920 | | | | |
| Subclass Narcomedusae Hackel, 1879 | | | | |
| Family Aeginidae Gegenbaur, 1857 | | | | |
| <i>Solmundella bitentaculata</i> (Quoy & Gaimard, 1833) | | + | | |
| Subclass Trachymedusae Hackel, 1866 | | | | |
| Family Geryoniidae Eschscholtz, 1829 | | | | |
| <i>Liriope tetraphylla</i> (Chamisso & Eysenhardt, 1821) | +++ | +++ | + | |
| Family Petasidae Haeckel, 1879 | | | | |
| <i>Petasiella asymmetrica</i> Uchida, 1947 | +++ | | | |
| Class Hydroidomedus Claus, 1877 | | | | |
| Subclass Anthomedusae Haeckel, 1879 | | | | |
| Family Bougainvilliidae Lütken, 1850 | | | | |
| <i>Bougainvillia muscus</i> (Allman, 1863) | + | | | |
| <i>Nubiella alvarinoae</i> (Segura, 1980) | | | + | |
| Family Clavidae McCrady, 1859 | | | | |
| <i>Turritopsis nutricula</i> McCrady, 1857 | ++ | | | + |
| Family Hydractiniidae L. Agassiz, 1862 | | | | |
| <i>Hydractinia apicata</i> (Kramp, 1959) | +++ | + | | |
| <i>Hydractinia carnea</i> (M. Sars, 1846) | | | | + |
| <i>Hydractinia vacuolata</i> Xu & Huang, 2006* | | | | + |
| Family Probosciditylidae Hand & Hendrickson, 1950 | | | | |
| <i>Proboscidityla flavicirrata</i> Brandt, 1834* | + | + | +++ | |
| <i>Proboscidityla gemmifera</i> (Fewkes, 1882) | ++++ | | | |
| <i>Proboscidityla pentacanal</i> Xu, Chen & Yang sp. nov.** | | | | |
| Family Corymorphidae Allman, 1872 | | | | |
| <i>Euphysora apiciloculifera</i> Xu & Huang, 2003 | | + | | |
| <i>Euphysora brunnescentis</i> Huang, 1999 | + | | | |
| <i>Euphysora verrucosa</i> Bouillon, 1978 | | + | | |
| Family Zancleidae Russell, 1953 | | | | |
| <i>Zanclea costata</i> Gegenbaur, 1857 | | | | + |
| Subclass Leptomedusae Haeckel, 1866 | | | | |
| Family Eirenidae Haeckel, 1879 | | | | |
| <i>Eirene brevigona</i> Kramp, 1959 | | | + | |
| <i>Eirene menoni</i> Kramp, 1953 | + | | | |
| <i>Helgicirrho apapillata</i> Xu, Chen & Wang sp. nov.** | | | | ++ |
| <i>Helgicirrho malayensis</i> (Stiasny, 1928) | | + | | |
| Family Lovenellidae Russell, 1953 | | | | |
| <i>Euheilota macrogona</i> Zhang & Lin, 1984* | + | | | |
| <i>Euheilota menoni</i> Kramp, 1959 | | | | + |
| <i>Euheilota tropica</i> Kramp, 1959 | + | | | |
| <i>Euheilota xiamenensis</i> Xu, Huang & Guo, 2014 | | | | + |
| Family Phialellidae Russell, 1953 | | | | |
| <i>Phialella macrogona</i> Xu, Huang & Wang, 1985 | | | + | |
| Family Campanulariidae Johnston, 1836 | | | | |
| <i>Clytia folleata</i> (McCrady, 1859) | | + | | +++ |
| <i>Clytia hemisphaerica</i> (Linnaeus, 1767) | | | ++ | |
| Subclass Siphonophorae Eschscholtz, 1829 | | | | |
| Family Agalmatidae Brandt, 1834 | | | | |
| <i>Nanomia bijuga</i> (Delle Chiaje, 1841) | | + | | |
| Family Diphyidae Quoy & Gaimard, 1827 | | | | |
| <i>Diphyes chamissonis</i> Huxley, 1859 | | | +++ | |
| <i>Lensia subtilis</i> (Chun, 1886) | | | | ++++ |
| <i>Lensia subtiloides</i> (Lens & Van Riemsdijk, 1908) | ++++ | + | + | |
| Phylum Ctenophora | | | | |
| Class Tentaculata | | | | |

to be continued

Continued from Table 1

| Species | Autumn | Winter | Spring | Summer |
|---|--------|--------|--------|--------|
| Family Pleurobrachidae | | | | |
| <i>Pleurobrachia globosa</i> Moser, 1903 | + | +++ | ++ | ++++ |
| Family Ocyropsidae | | | | |
| <i>Ocyropsis crystalline</i> (Rand, 1828) | ++++ | ++++ | ++++ | |
| Class Nuda | | | | |
| Family Beroida | | | | |
| <i>Beroe cucumis</i> Fabricium, 1780 | + | ++ | + | ++ |

Note: * represents new record for the Beibu Gulf, ** new species, + abundance (>0–5 ind./m³), ++ abundance (> 5–10 ind./m³), +++ abundance (>10–50 ind./m³), and ++++ abundance (>50–100 ind./m³).

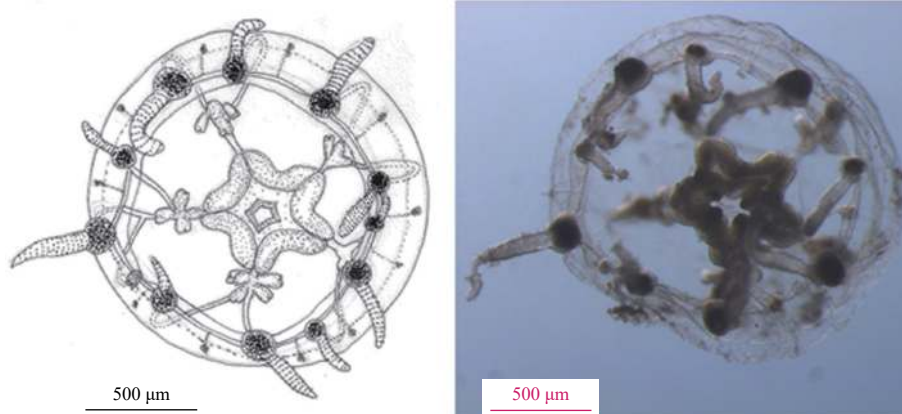


Fig. 2. Oral view of *Proboscidactyla pentacanalisis* Xu, Chen & Yang sp. nov.

This new species can be easily distinguished from the other species of *Proboscidactyla* by its 5 primary radial canals and medusa buds arising from the forking of the radial canals. It is similar to *P. tropica* Browne, 1905 and *P. ornata* (McCrary, 1859), which also have medusa buds. In addition, there are three other *Proboscidactyla* species that have been described with medusa buds: *P. gemmifera* (Fewkes, 1882), *P. stolonifera* (Maas, 1905), and *P. varians* Browne, 1905, all of which were synonymised with *P. ornata* (McCrary, 1859) by Hartlaub (1917).

However, Gershwin et al. (2010) suggests that the true *P. ornata* does not possess medusa buds and mistakes have probably been made in synonymizing other species that do possess buds with it. Mayer (1910) comments that the common *P. ornata* does not have medusa buds. In the life cycle of *P. ornata* in Naples described by Brinckmann and Vannucci (1965) and the life cycle of *P. ornata* described by Calder (1970), neither description mentioned medusa buds at any stage. Thus, the feature of the true *P. ornata* should be without medusa buds and gonads on the inter-radial side of the manubrium (Fig. 3a). The *P. ornata* recorded in the China seas should be referred to as *P. gemmifera* (Fewkes, 1882) (included the species in Table 1), of which each radial canal has a trifurcation and a single stolon arises from each corner of the manubrium, bearing several medusa buds (Fig. 3c). Until 2019, true *P. ornata* has not been found in the China seas, and this finding awaits further investigation.

Based on the above discussion, we consider *P. gemmifera* (Fewkes, 1882), *P. stolonifera* (Maas, 1905), and *P. varians* Browne, 1905a to be distinct from *P. ornata* (McCrary, 1859), and this updates the genus *Proboscidactyla* into 13 valid species from previous reports (Mayer, 1910; Kramp, 1961; Hand and Hendrickson, 1950; Uchida and Sugiura, 1975; Bouillon et al., 2006; Gershwin et al., 2010; Xu et al., 2014; Wang et al., 2019).

Among all the *Proboscidactyla* species with medusa buds, *P. tropica* Browne, 1905 (Fig. 4), *P. gemmifera* (Fewkes, 1882) and *P. stolonifera* (Maas, 1905) (Fig. 3d) all have only 4 primary radial canals, while *P. varians* Browne, 1905 (Fig. 3b) has 6 primary radial canals. Therefore, the Beibu Gulf specimens with medusa buds bears one major structural difference from them, namely, 5 primary radial canals, and their branching pattern of the radial canals are different (more details are shown in the key).

On the other hand, the immature medusae described by many authors can be distinguished from other species of *Proboscidactyla* with little or no certainty. The young medusae of *P. stellata* are predominantly hexamerous, although on occasion, a pentamerous type is found, while those of *P. flavicirrata* vary from tetramerous to hexamerous (Uchida and Okuda, 1941). *Proboscidactyla mutabilis* is also highly variable, and in the Californian form, mostly tetramerous medusa have been found and occasional pentamerous forms (Hand and Hendrickson, 1950). The medusae of *P. ornata* captured in Misaki over five years (1970–1975) were mostly young. Approximately 60% of the medusae presented 4 primary radial canals, while approximately 20% presented 5–7 canals and approximately 20% presented 8 canals (Uchida and Sugiura, 1975). However, the prevalence of 5 primary radial canals is not as extreme as formerly supposed. In no cases was branching of the radial canals or medusa buds that was found in immature medusae, which is in contrast to the characters of the Beibu Gulf specimens. Although the presently described medusa is approximately 2.0 mm and 1.8 mm wide and presents bifurcation of each primary radial canal, and medusa buds arising from the forking of radial canals, with five primary radial canals having five tentacles. These features differ from those of similar species in the genus *Proboscidactyla*. There-

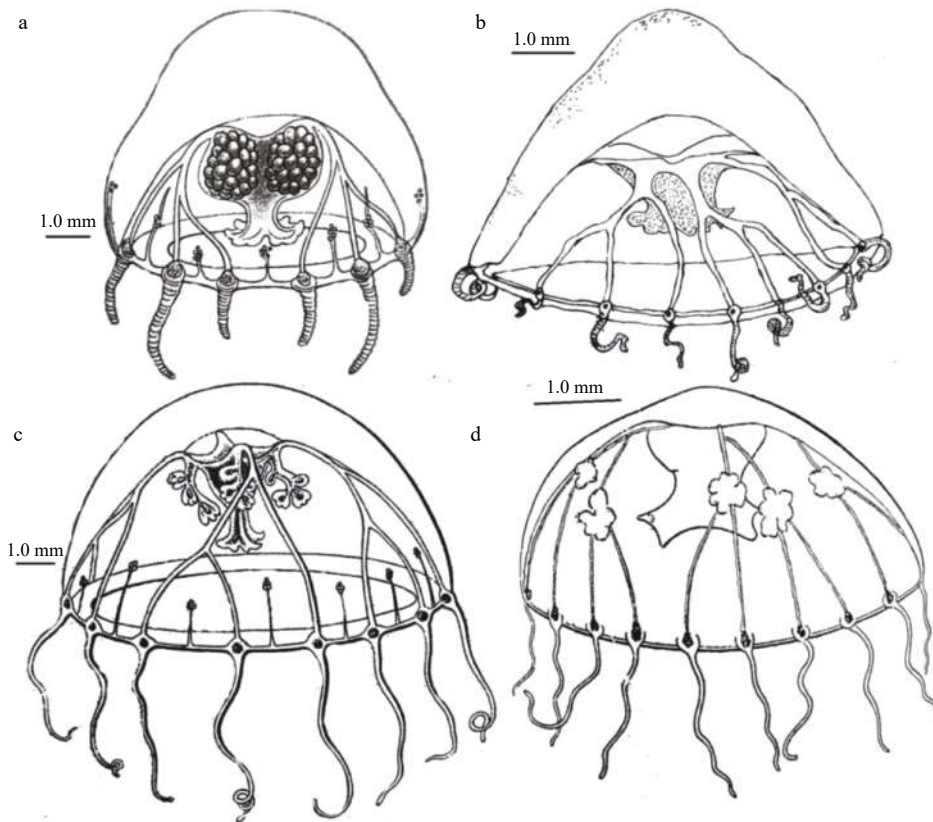


Fig. 3. Comparison of four *Proboscidactyla* species. a. *P. ornata* (McCrary, 1859), mature specimens in which the radial canals have 12 terminal branches (redrawn after Mayer (1910)); b. *P. varians* Brownne, 1905 (redrawn after Brownne (1905)); c. *P. gemmifera* (Fewkes, 1882), showing unusually dark pigment in the tentacle bulbs (redrawn after Mayer (1910)); d. *P. stolonifera* (Maas, 1905) (redrawn after Mayer (1910)).

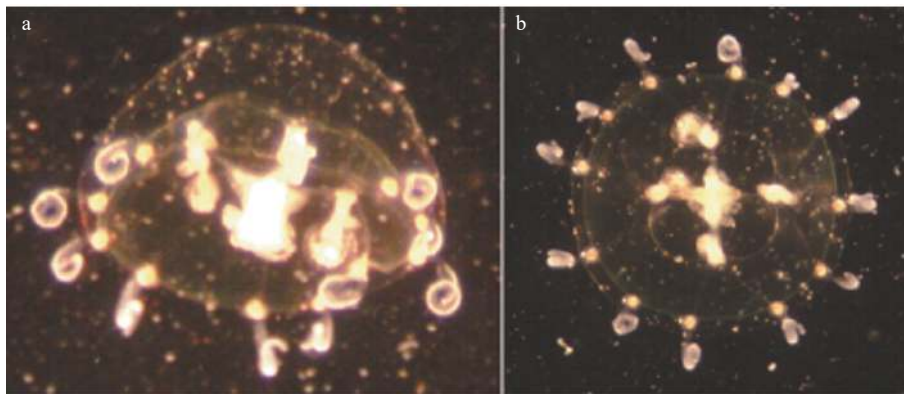


Fig. 4. *Proboscidactyla tropica* Brownne, 1905 (Gershwin et al., 2010). a. Lateral view; b. oral view; both images taken while specimen was alive.

fore, we regarded this medusa of the Beibu Gulf as a new species (Figs 2a, b).

Key to the medusae of all known species in the genus *Proboscidactyla*

- | | |
|---|--|
| <p>1. With 20 radial canals, some bifurcated; gonad extending along the proximal half of all radial canals; no tentacles<i>P. abyssicola</i> Uchida, 1948</p> <p>- With 4–8 primary radial canals.....2</p> <p>2. With medusa buds.....3</p> <p>- Without medusa buds.....7</p> | <p>3. With only 4 primary radial canals.....4</p> <p>- With 5–6 primary radial canals.....6</p> <p>4. With a trifurcation per primary canal and the primary stem canal leading to a tentacle bulb; gonad just proximal to each trifurcation, each bearing about 3 medusa buds on the stolons; with 12 terminal branches, in correspondence with tentacles<i>P. tropica</i> Brownne, 1905</p> <p>- With 3–5 branches per primary canal and the primary stem canal not leading to a tentacle bulb.....5</p> <p>5. With 2 side branches per primary canal, such that 3 terminal</p> |
|---|--|

- canals lead to a tentacle bulb and a single stolon arises from each corner of the manubrium, bearing several medusa buds.....*P. gemmifera* (Fewkes, 1882)
- With twice bifurcated per primary canal, such that 4 terminal canals lead to a tentacle bulb and medusa buds arise from the second branch points..... *P. stolonifera* (Maas, 1905)
6. With 5 primary radial canals, each branching into 2–3 canals, very long, approximately 12 terminal branch canals and as many tentacles, medusa buds arising from the forking of radial canals.....*P. pentacanalis* Xu, Chen & Yang sp. nov.
- With 6 primary radial canals, each with 1 to 3 lateral branches, approximately 12–18 terminal branch canals and as many tentacles; medusa buds arising from near the stomach..... *P. varians* (Browne, 1902)
7. With more than 5 primary radial canals.....8
- With only 4 primary radial canals.....9
8. Normally with 6 primary radial canals, 24 terminal branches and as many tentacles, with adaxial basal cnidocyst cushions.....*P. strelata* (Forbes, 1846)
- Normally with 8 primary radial canals, 24–54 terminal branches and some number of tentacles, without adaxial basal cnidocyst cushions.....*P. mutabilis* (Browne, 1902)
9. Gonads at base of manubrium wall, extending along lateral wall of gastric lobes..... 10
- Gonads restricted to manubrium wall.....11
10. Manubrium with 8–16 radial gastric lobes; 4 primary radial canals, 60 terminal branches and as many tentacles, each with an adaxial cnidocyst cushion; gonads extending to secondary branches of radial canals.....*P. menoni* Pages, Bouillon & Gili, 1991
- Manubrium with 4 radial gastric lobes; 4 primary radial canals, 24 terminal branches and as many tentacles, each without an adaxial cnidocyst cushion; gonads extending slightly onto the proximal part of primary radial canals.....*P. trifurcata* Xu, Huang & Guo, 2019
11. Mouth lips simple, with crenate edges; 4 large masses of gonads on the interradial side of the manubrium; 12–16 terminal branches and some number of tentacles.....*P. ornata* (McCrary, 1859)
- Mouth lips highly folded and hanging.....12
12. With 11–13 terminal branches per primary radial canal and some number of tentacles; 4 gonadal masses occupying internal positions, with each mass developed as a pair of thickened lobes upon the adradial sides of the quadratic manubrium with a thin sheet of gonadal tissue connecting the two lobes and covering the manubrium wall.....*P. flavicirrata* Brandt, 1835
- With 8 terminal branches per primary radial canal and some number of tentacles.....13
13. With 24–32 tentacles; primary canal seems to run directly to the margin; gonads occurring in the interradial position as four paired masses of simple swollen lobes on the adradial side of the manubrium.....*P. circumsabella* Hand, 1954
- With 40 tentacles; primary canal not running directly to the margin; gonads not fused across the radial margin of the manubrium and present as four interradial masses consisting of paired adradial lobes connected at the interradial by thin sheets of gonadal tissue....*P. occidentalis* (Fewkes, 1889)

Subclass Leptomedusae Haeckel, 1866

Order Conida Broch, 1910

Family Eirenidae Haeckel, 1879

Helgicirrha apapillata Xu, Chen & Wang. sp. nov. (Fig. 5)

Material examined: Holotype (TIO-GFT 18109), one specimen collected from the Beibu Gulf, northwestern part of the South China Sea. 2018. Station: GFT33 (21°35'10"N, 108°47'13"E).

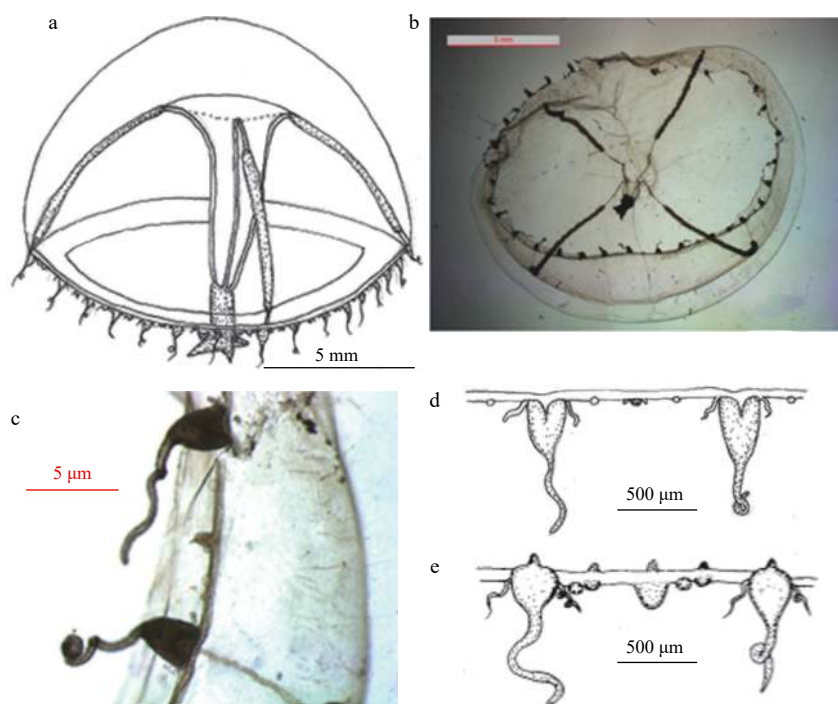


Fig. 5. *Helgicirrha apapillata* Xu, Chen & Wang. sp. nov. a–d. *H. apapillata* Xu, Chen & Wang, sp. nov. a. Lateral view; b. oral view; c–d. partial enlargement of the umbrella margin, showing the lateral cirri and all bulbs without adaxial excretory papillae; e. *H. malayensis* (Stiasny, 1928), showing all bulbs with adaxial excretory papillae (redrawn after Xu et al, 2014).

Depth: 14 m. Collector: Lin Chang.

Diagnosis: Umbrella nearly hemispherical, with thicker jelly at the apex; gastric peduncle very long, slightly extending beyond the velar opening; manubrium small, short, somewhat square in transverse section; mouth with 4 simple, long lips with crenulated margin; 4 radial canals and a circular canal; 4 gonads are linear shaped, extending from the peduncle base to near the bell margin, without medusa buds; up to 28 marginal, large tentacles and 1 rudimentary bulb between tentacles, all tentacles and rudimentary bulbs with pairs of lateral cirri and without adaxial excretory papillae; 2 statocysts between tentacles.

Description: Umbrella nearly hemispherical, 9.0 mm in height, 13.0 mm in width. With thicker jelly at the apex, thinning towards the umbrella margin; gastric peduncle very long, pyramidal base, slightly extending beyond the velar opening; manubrium small, short, somewhat square in transverse section; mouth with 4 simple, long lips with crenulated margin; 4 narrow radial canals, extending from the circular canal to the peduncle and connected to the manubrium; 4 linear subumbrella gonads extending from the peduncle base to near the bell margin; without medusa buds; up to 28 tentacles with elongated conical marginal bulbs and rudimentary bulbs between tentacles, all tentacles and rudimentary bulbs with pairs of lateral cirri, and all bulbs without adaxial excretory papillae; 2 statocysts between tentacles, each with a concretion; velum broad.

Distribution: The coastal waters of the northern Beibu Gulf.

Etymology: From the Latin *apapillata*, meaning without papilla. The species name refers to all tentacles and rudimentary bulbs without adaxial excretory papillae.

Remarks: The new species has a distinct gastric peduncle, with 1 pair of lateral cirri at the base of all tentacles, rudimentary bulbs and numerous closed statocysts. These features place this medusa in the family Eirenidae Haeckel, 1879 and the genus *Helgicirrho* Hartlaub, 1909.

The genus currently comprises 11 valid species, i.e., *Helgicirrho brevistyla* Xu & Huang, 1983, *H. cari* (Haeckel, 1864), *H. cornelii* Bouillon, 1984, *H. danduensis* (Bigelow, 1904), *H. gemmifera* Bouillon, 1984, *H. irregularis* Bouillon, Boero & Seghers, 1988, *H. malayensis* (Stiasny, 1928), *H. medusifera* (Bigelow, 1909), *H. ovalis* Huang, Xu, Lin & Guo, 2010, *H. sinuatus* Xu, Huang & Du, 2012, and *H. weaveri* Allwein, 1967 (Kramp, 1961, 1968; Xu and Huang, 1983; Bouillon, 1984; Bouillon et al., 1988, 2006; Huang et al., 2010b; Du et al., 2012; Xu et al., 2014), and one species in doubt: *H. schulzii* Hartlaub, 1909, accepted as *H. cari* (Haeckel, 1864).

Schuchert (2017) concluded that *H. schulzii* Hartlaub, 1909 must be regarded as a synonym of *H. cari* (Haeckel, 1864) by comparing the COI (Cytochrome Oxidase I) sequence of a Mediterranean specimen of *H. cari* to the COI sequence of *H. schulzii* collected in the North Sea; the two sequences differed in only one nucleotide, indicating only intraspecific variation.

This new species is distinguished from other species of *Helgicirrho* by the following aspects: the gonads are linear, extending from the base of the peduncle to near the bell margin, without medusa buds; the gastric peduncle is long, slightly extending beyond the velar opening; and more than 25 marginal tentacles. Similar to *H. malayensis* (Stiasny, 1928), this species also has linear gonads, a very long gastric peduncle and more than 25 tentacles, but this new species differs from similar species as follows: (1) mouth lips shorter than manubrium; (2) up to 28 marginal tentacles, with rudimentary bulbs between tentacles; (3) all marginal tentacles and rudimentary bulbs without adaxial ex-

cretory papillae (Fig. 5d); and (4) all bulbs with 1 pair of lateral cirri.

Key to the medusae of all known species in the genus *Helgicirrho*

1. Gonads with medusa buds 2
 - Gonads without medusa buds 3
2. Gonads in distal 1/3 of radial canals; with 16–21 marginal tentacles; all with 1 or 2 pairs of lateral cirri
 -*H. medusifera* (Bigelow, 1909)
 - Gonads in middle portion of radial canals; with 4 marginal tentacles, each tentacle with 4 pairs of lateral cirri.....
 -*H. gemmifera* Bouillon, 1984
3. Gonads linear, extending from the base of the peduncle to near the bell margin.....4
 - Gonads short, along middle or distal end of radial canals.....9
4. With fewer than 25 tentacles.....5
 - With more than 25 tentacles 6
5. Gonads undulate-shaped, with 16–18 tentacles without lateral cirri, and 80 rudimentary bulbs with 1 pair of lateral cirri
 -*H. irregularis* Bouillon, Boero & Seghers, 1988
 - Gonads simple, with 14 tentacles and 56–84 rudimentary bulbs, all bulbs with lateral cirri.....
 - *H. weaveri* Allwein, 1967
6. Peduncle short, never extending beyond the velar opening... 7
 - Peduncle long, extending beyond the velar opening.....8
7. Mouth lips longer than the manubrium; 50–60 tentacles without lateral cirri; approximately 100 smaller tentacles, each with 1 pair of lateral cirri.....
 - *H. cari* (Haeckel, 1864)
 - Mouth lips shorter than the manubrium; 28–54 tentacles with 2 pairs of lateral cirri; without smaller tentacles.....
 -*H. brevistyla* Xu & Huang, 1983
8. Mouth lips longer than the manubrium; with 30–141 tentacles, each with 1 pair of lateral cirri; with 1–3 rudimentary bulbs between tentacles, without lateral cirri; all bulbs with abaxial excretory papillae.....
 -*H. malayensis* (Stiasny, 1928)
 - Mouth lips shorter than the manubrium; with 28 tentacles and a rudimentary bulb between tentacles; all bulbs with 1 pair of lateral cirri and without abaxial excretory papillae
 -*H. apapillata* Xu, Chen & Wang, sp. nov.
9. Peduncle short, never extending beyond the velar opening.....10
 - Peduncle long, extending beyond the velar opening.....11
10. Gonads oval-shaped in middle portion of radial canals; 8 tentacles with 3 pairs of lateral cirri; with 1–2 rudimentary bulbs between tentacles, each with 1 pair of lateral cirri and a black spot on its extreme tip.....
 -*H. ovalis* Huang, Xu, Lin & Guo, 2010
 - Gonads sausage-shaped, along the distal half of radial canals or slightly near the umbrella margin; 16–22 tentacles with 2–3 pairs of lateral cirri; with 3 rudimentary bulbs between tentacles, each with 1–3 pairs of lateral cirri and no black spot at the extreme tip.....
 -*H. cornelii* Bouillon, 1984
11. Gonads spindle-shaped, along distal 2/3 of radial canals; with 32 tentacles, the perradial is a little longer, each with 1 pair of lateral cirri; with 1–2 rudimentary bulbs between tentacles without lateral cirri; with 1 statocyst and each with 5 concretions.....
 -*H. danduensis* (Bigelow, 1904)
 - Gonads sinuous-shaped, along distal 1/3 to 1/2 of radial canals; with 16–24 tentacles, each with 2 pairs of lateral cirri, with 3–5 rudimentary bulbs between tentacles, each with 1 pair of lateral cirri; with 3–4 statocysts between tentacles and each with 2–3 concretions ...
 -*H. sinuatus* Xu, Huang & Du, 2012

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References

- Bouillon J. 1984. Hydroméduses de la mer de Bismarck (Papouasie Nouvelle-Guinée): Partie IV: Leptomedusae (Hydrozoa-Cnidaria). *Indo-Malayan Zoology*, 1: 25–112
- Bouillon J, Boero F, Seghers G. 1988. Notes additionnelles sur les Hydroméduses de la mer de Bismarck (Hydrozoa-Cnidaria): II. *Indo-Malayan Zoology*, 5(1): 87–100
- Bouillon J, Gravili C, Pagès F, et al. 2006. An introduction to Hydrozoa. *Mémoires du Muséum National d' Histoire Naturelle*, 194: 1–591
- Brinckmann A, Vannucci M. 1965. On the life-cycle of *Proboscidadactyla ornata* (Hydromedusae, Proboscidadactylidae). *Pubblicazioni della Stazione Zoologica di Napoli*, 34: 357–365
- Calder D R. 1970. North American record of the hydroid *Proboscidadactyla ornata* (Hydrozoa, Proboscidadactylidae). *Chesapeake Science*, 11(2): 130–140
- Chen Zhaozhang, Hu Jianyu, Sun Zhenyu, et al. 2008. Comparison of temperature and salinity distributions between summer and winter in Beibu Gulf. In: Hu Jianyu, Yang Shiengyun, eds. *Symposium on Oceanography of the Beibu Gulf I* (in Chinese). Beijing: China Ocean Press, 77–84
- Chen Lan, Jiang Qinghua, Shi Xiangyang, et al. 2016. Environmental quality condition, problems analysis and protection suggestion for the coastal waters of the Beibu Gulf. *Ocean Development and Management* (in Chinese), 33(6): 28–32
- Du Feiyan, Xu Zhenzu, Huang Jiaqi, et al. 2012. Studies on the medusae (Cnidaria) from the Beibu Gulf in the northern South China Sea, with description of three new species. *Acta Zootaxonomica Sinica* (in Chinese), 37(3): 506–519
- Gershwin L A, Zeidler W, Davie P J F. 2010. Medusae (Cnidaria) of Moreton Bay, Queensland, Australia. In: Davie P J F, Phillips J A, eds. *Proceedings of the Thirteenth International Marine Biological Workshop, the Marine Fauna and Flora of Moreton Bay, Queensland*. *Memoirs of the Queensland Museum*. Brisbane, Queensland: Queensland Museum, 54(3): 47–108
- Guo Donghui, Huang Jiaqi, Li Shaojing, et al. 2008a. Ecological studies on zooplankton in Beibu Gulf during summer and winter: I. Species composition and abundance distribution. In: Hu Jianyu, Yang Shiengyun, eds. *Symposium on Oceanography of the Beibu Gulf: I* (in Chinese). Beijing: China Ocean Press, 222–236
- Guo Donghui, Huang Jiaqi, Xu Zhenzu, et al. 2008b. Ecological studies on zooplankton in Beibu Gulf during summer and winter: II. Medusae. In: Hu Jianyu, Yang Shiengyun, eds. *Symposium on Oceanography of the Beibu Gulf: I* (in Chinese). Beijing: China Ocean Press, 237–242
- Hand C, Hendrickson J R. 1950. A two-tentacled, commensal hydroid from California (Limnomedusae, *Proboscidadactyla*). *The Biological Bulletin*, 99(1): 74–87
- Hartlaub C. 1917. Craspedote medusen. Teil. 1, Lief. 4, Williidae. *Nordisches Plankton*, 6: 365–479
- Huang Liping. 1987. Study on the Planktonic medusae in the northern part of Beibu Gulf (in Chinese). *Guangxi Ocean*, (1): 1–9
- Huang Jiaqi, Li Shangping, Zhong Qiuping, et al. 2010a. One new species of genus *Eucheilota* in Guangxi Coast, China. *Journal of Xiamen University: Natural Science* (in Chinese), 49(3): 428–430
- Huang Jiaqi, Xu Zhenzu, Guo Donghui, et al. 2010b. Two new species of Leptomedusae (Hebellidae and Malagazzidae) from the south of Taiwan Strait, China. *Journal of Xiamen University: Natural Science* (in Chinese), 49(6): 871–873
- Kramp P L. 1961. Synopsis of the medusae of the world. *Journal of the Marine Biological Association of the United Kingdom*, 40: 7–382
- Kramp P L. 1968. The Hydromedusae of the Pacific and Indian Oceans: sections II and III. *Dana-Report*, 72: 1–200
- Li Shangping, Zhong Qiuping, Zhang Chenxiao, et al. 2010. Two new species of the genus *Hydractinia* in Guangxi Coast, China (Cnidaria, Anthomedusae, Hydractiniidae). *Acta Zootaxonomica Sinica* (in Chinese), 35(4): 853–856
- Lin Mao, Xu Zhenzu, Huang Jiaqi, et al. 2010. Two new species of genus *Hydractinia* from China (Filifera, Hydractiniidae). *Journal of Fisheries of China* (in Chinese), 34(1): 67–71
- Mayer A G. 1910. *Medusae of the World*. Washington DC: Carnegie Institution of Washington D.C., 1–735
- Schuchert P. 2017. Systematic notes on some leptomedusa species with a description of *Neotima galeai* n. spec. (Hydrozoa, Cnidaria). *Revue suisse de Zoologie*, 124(2): 351–375
- Schuchert P. 2020. World Hydrozoa Database. *Proboscidadactyla* Brandt, 1835. Accessed through: World Register of Marine Species. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=117202> [2020-02-28]
- Uchida T, Okuda S. 1941. The hydroid Lar and the medusa *Proboscidadactyla*. *Journal of the Faculty of Science, Hokkaido Imperial University, Series VI: Zoology*, 7(4): 431–440
- Uchida T, Sugiura Y. 1975. On the formation of medusa buds in *Proboscidadactyla ornata*. *Publications of the Seto Marine Biological Laboratory*, 22(5): 347–354
- Wang Xuefeng, Lin Lun, Xu Zhenzu, et al. 2019. Some new Hydroid-medusa (Cnidaria) from the northern South China Sea. *Zoological Systematics*, 44(3): 191–205
- Xu Zhenzu. 1965. Studies on the zooplankton of Hainan Island and adjacent waters: I. Hydromedusae. *Journal of Xiamen University (Natural Science)* (in Chinese), 12(1): 90–110
- Xu Zhenzu, Huang Jiaqi. 1983. On the Hydromedusae, Siphonophora, Scyphomedusae and Ctenophora from the Jiulong River estuary of Fujian, China. *Journal of Oceanography in Taiwan Strait* (in Chinese), 2(2): 99–110
- Xu Zhenzu, Huang Jiaqi, Guo Donghui. 2008. Six new species of Anthomedusae (Hydrozoa, Hydroidomedusae) from Beibu Gulf, China. In: Hu Jianyu, Yang Shiengyun, eds. *Symposium on Oceanography of the Beibu Gulf I* (in Chinese). Beijing: China Ocean Press, 209–221
- Xu Zhenzu, Huang Jiaqi, Lin Mao, et al. 2014. The superclass Hydrozoa of the Phylum Cnidaria in China (in Chinese). Beijing: China Ocean Press, 334–338, 543–548