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ORIGINAL ARTICLE

Taxonomic notes on Hydroidomedusae (Cnidaria) from South China Sea III: Family Rathkeidae and Zancleopsidae

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Abstract This study reviews all South China Sea species belonging to the families Rathkeidae and Zancleopsidae. Morphological characters of *Lizzia blondina* Forbes, 1848 (formerly recorded as *Podocoryne*/*Hydractinia minuta*), *L. gracilis* (Mayer, 1900), *L. octostyla* (Haeckel, 1879) and *Podocorynoides minima* (Trinci, 1903) (formerly recorded as *Podocoryne*/*Hydractinia minima*) are redescribed. One new species, *Zancleopsis oblongus* Xu, Huang & Wang, **sp. nov.** from South China Sea, is described and illustrated. The keys to all medusa genera of Rathkeidae and Zancleopsidae and to all species of *Zancleopsis* are presented. The type specimen is deposited in the Third Institute of Oceanography, State Oceanic Administration, China.

Key words *Lizzia*, *Podocorynoides*, *Zancleopsis*, new species, South China Sea.

1 Introduction

This study is the third paper of the series of taxonomic reviews of Anthomedusae from South China Sea (Lin *et al*., 2016 (Eucodoniidae); Xu *et al*., 2016 (Bythotiaridae)).

An updated revision of all species of Rathkeidae and Zancleopsidae in South China Sea is presented. According to the view of Schuchert (2007), *Podocoryne*/*Hydractinia minuta* (Mayer, 1900), formerly included in the Hydractiniidae, is regarded as a synonym of *Lizzia blondina* (included in the Bougainvillidae), which is removed from the Bougainvilliidae and Hydractiniidae, and transferred to the Rathkeidae; *Podocoryne*/*Hydractinia minima* (Trinci, 1903), formerly included in the Hydractiniidae, is transferred to genus *Podocorynoides* Schuchert, 2007, and included in the Rathkeidae as *Podocorynoides minima* (Trinci, 1903). Therefore, 3 species of *Lizzia* and 1 species of *Podocorynoides* are redescribed and illustrated. One species, *Zancleopsis oblongus* Xu, Huang & Wang, **sp. nov.** is reported as new to science. The new species is described, photoed and illustrated in this paper. Keys to medusa genera of Rathkeidae and Zancleopsidae, and key to all known species of *Zancleopsis* are provided.

2 Materials and methods

The majority of the samples were collected from stations (04°00'–23°00' N, 109°00'–119°00' E) in the median and

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southern of South China Sea during June to August 2012, and October 2013. Partially samples were collected from Beibu Gulf, northern of South China Sea (17°04'–21°34'N, 107°24'–110°06'E) during July 2006 and Daya Bay during July 2006 and March 2008. Other samples were collected from Changjiang River Estuary on 14–16 June 2003 and Fujian coastal waters in April 2006. 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 plankton net (80 cm diameter, 0.505 mm mesh size) and WP2 plankton 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 a Leica M205C dissecting microscope with Leica DFC425 camera. The type specimens are deposited in the Third Institute of Oceanography (TIO), State Oceanic Administration (SOA).

3 Taxonomy

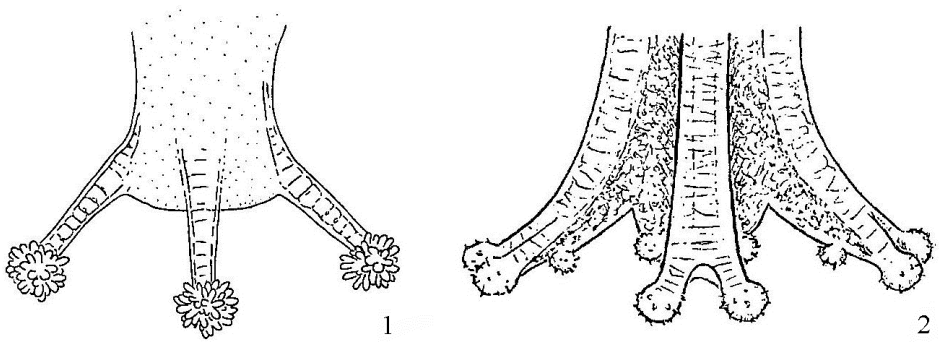
Order Filifera Kühn, 1913

Family Rathkeidae Russell, 1953 emend. Schuchert, 2007

Rathkeidae Russell, 1953b: 137; Kramp, 1961: 71; Bouillon *et al*., 2006: 155; Schuchert, 2007: 282–283.
Lizziinae Russell, 1953b: 144.
Type genus: *Rathkea* Brandt, 1838.

Diagnosis. Medusa bell-shaped, manubrium either with four elongated lips forming simple or branched oral arms with terminal knobs, or perradial unbranched oral tentacles inserted vertically or very oblique at level of mouth margin; immature ones with or without interradial medusa buds; with four or eight radial canals and a circular canal; usually eight marginal bulbs, interradial ones with more than one tentacle, rarely only four bulbs and four tentacles; ocelli absent; gonads encircle manubrium completely.

Remarks. Family Rathkeidae medusa includes two genera: *Allorathkea* Schmidt, 1972 and *Rathkea* Brandt, 1838 (Bouillon & Boero, 2000; Bouillon *et al*., 2006; Xu *et al*., 2014). Based on results of 16S sequence data, Schuchert (2007) suggested that the genus *Lizzia* Forbes, 1846 should be removed from the Bougainvilliidae Lutken, 1850 and transferred to the Rathkeidae Russell, 1953. Reexamination shows that the position and attachment of oral tentacles of *Lizzia blondina* Forbes, 1848 are distinct from those in Bougainvilliidae. The oral tentacles of *Lizzia* are free at the level of the lips and not above the mouth rim. They are also attached very obliquely and remain adnate to the manubrium for quite some distance, being continued as ridges along the manubrium accompanied by underlying vacuolated gastrodermal cells (Fig. 1). The same character is also found in *Rathkea* species (Fig. 2). Because its oral tentacles do not originate above the mouth just like in *Bougainvillia*, *Lizzia blondina* Forbes, 1848 is closer related to the Rathkeidae than the Bougainvilliidae (Schuchert, 2007). According to Schuchert's view, *Hydractinia minuta* (Mayer, 1900) and *H. minima* (Trinci, 1903) should be removed from the Hydractiniidae L. Agassiz, 1862. *Hydractinia minuta* is regarded as a conspecific with *Lizzia blondina* and the genus *Podocorynoides* was proposed by Schuchert (2007) to accommodate *Hydractinia minima* (Trinci, 1903) (=*Cytaeis minima* Trinci, 1903).



Figures 1–2. Comparison of oral tentacles, in lateral view. 1. *Lizzia blondina* (after Schuchert, 2007). 2. *Rathkea octopunctata* (after Russell, 1953b).

As mentioned above, the family Rathkeidae (medusa) thus comprises four genera: *Allorathkea* Schmidt, 1972, *Lizzia* Forbes, 1846, *Podocorynoides* Schuchert, 2007 and *Rathkea* Brandt, 1838.

Key to medusae of all Rathkeidae genera.

1. Four radial canals 2
   Eight radial canals ..... ***Allorathkea* Schmidt, 1972**
2. Obliquely or vertically inserted oral tentacles with a distinct, round pedicel 3
   Oral arms elongated corners of the mouth ..... ***Rathkea* Brandt, 1838**
3. Eight marginal bulbs, perradial ones sometimes with more than one tentacle ..... ***Lizzia* Forbes, 1846***
   Four bulbs, each with one tentacle only ..... ***Podocorynoides* Schuchert, 2007***

* Present in South China Sea.

Genus *Lizzia* Forbes, 1846

Lizzia Forbes, 1846: 286; Kramp, 1961: 87; Bouillon & Boero, 2000: 83; Bouillon *et al*., 2006: 134; Schuchert, 2007: 288; Xu *et al*., 2014: 229.

Type species: *Lizzia blondina* Forbes, 1848.

Diagnosis. Medusa with four or eight simple, unbranched perradial oral tentacles inserting at level of mouth rim; manubrial peduncle present; eight or exceptionally 16 marginal bulbs, each with one or more simple tentacles, usually with more tentacles on the perradial than the interradial bulbs; interradial medusa buds develop on manubrium; gonads encircling manubrium.

Remarks. Members of the genus are easily distinguished from all other genera by their unbranched perradial oral tentacles inserting at level of mouth rim and eight marginal bulbs. The genus comprises following species: *Lizzia blondina* Forbes, 1848, *L. elisabethae* Haeckel, 1879, *L. ferrarii* Segura, 1980, *L. gracilis* (Mayer, 1900) and *L. octostyla* (Haeckel, 1879) (Bouillon *et al*., 2006; Schuchert, 2007; Xu *et al*., 2014), of which only three species are known in China Sea.

Key to *Lizzia* species recorded in China Seas.

1. Eight oral tentacles 2
   Four solitary oral tentacles; marginal bulbs without ocelli, four interradial bulbs each with only one tentacle, four perradial bulbs each with one to three tentacles ..... ***L. blondina* Forbes, 1848**
2. Eight oral tentacles in four perradial pairs ..... ***L. octostyla* (Haeckel, 1879)**
   Eight oral tentacles in four perradial and four interradial position ..... ***L. gracilis* (Mayer, 1900)**

Lizzia blondina Forbes, 1848 (Figs 3–8)

Lizzia blondina Forbes, 1848: 67–69, pl. 12, fig. 4; Russell, 1953b: 145, text-figs 69–71, pl. 7, Figs 1–2, pl.34, Figs 5–6; Kramp, 1959: 105, fig. 78; Kramp, 1961: 87; Brinckmann-Voss, 1970: pl. 8, fig. 2; Bouillon *et al*., 2004: 47, fig. 28A–D; Schuchert, 2007: 289, figs 36A–G, 37–38.

Lizzia claparedei Chun, 1896: 36, Figs 2–4; Braem, 1908: 795, figs 4–5.

Lizzia fulgurans Brinckmann-Voss, 1970: pl. 8, fig. 1; Kramp, 1959: 105, fig. 80; Kramp, 1961: 88.

Podocoryne fulgurans Mayer, 1910: 139, pl. 12, figs 5–9, pl. 13, figs 3–5.

Podocoryne minuta Mayer, 1910: 140, pl. 14, fig. 1; Kramp, 1959: 102, fig. 68; Kramp, 1961: 69; Lin, 1989: 59, fig. 1.

Podocoryna minuta Schchert, 1996: 50, fig. 28a–b.

Dysmorphosa minuta Mayer, 1900: 41, pl. 18, fig. 42.

Hydractinia minuta Bouillon *et al*., 2004: 66, fig. 39F–G; Bouillon *et al*., 2006: 150; Xu *et al*., 2006: 117; Du *et al*., 2010: 74; Xu *et al*., 2014: 258–259, fig. 117.

Material examined. Daya Bay, 15 August 1989, about abundance 0–5 ind./m^3, initially identified as *Podocoryne minuta*; Changjiang River Estuary, 14 June 2003 and Beibu Gulf, 15 July 2006, about abundance 0–13.6 ind./m^3, identified initially as *Hydractinia minuta*.

Diagnosis. Four unbranched oral tentacles; eight marginal bulbs, four perradial each with one to three tentacles, four interradial each with only one simple tentacle, rarely two; medusa buds on manubrium, with manubrial peduncle; no ocelli.

Description. Umbrella spherical, sometimes a little higher than wide, usually with a shallow, rounded apical process, jelly moderately thick, especially in apical region; gastric peduncle present, slim, usually shorter than manubrium; four radial canals and a narrow ring canal, radial canals along manubrial peduncle with enlarged gastrodermal cells; eight marginal bubls, without ocelli, four perradial ones each with one to three tentacles, four interradial bulbs with a simple tentacle, rarely two; manubrium short, not reaching beyond umbrella margin in full extension, cone-shaped, either with

broad quadrangular base attached to peduncle or perradial corners somewhat extending along peduncle, gastrodermis thickened interradially; medusae budding from stomach wall in interradial position, medusa budding phase overlaps with gonad maturation phase; four unbranched oral tentacles, attached very obliquely and adnate for some distance, lower axils at level of mouth-margin, oral tentacles relatively long but contracted, each with one terminal nematocyst cluster; gonads completely surrounding stomach in a form of ring-shaped cushion.

Dimensions. Earliest stages of vegetatively produced medusa 0.5–0.7 mm high; sexually mature medusa height around 1 mm, maximally 2 mm (Schuchert, 2007; Xu *et al*., 2014).

Biology. *Lizzia blondina* is found in nearshore waters of summer. Owing to the rapid proliferation by asexual budding, this species may be sometimes exceedingly abundant, with a patchy distribution, but it may be often overlooked due to its small size. It occurs in the plankton around the northern South China Sea from April to August, but mostly abundant in July to August (Lin, 1989; Xu *et al*., 2006; Guo *et al*., 2008). In Changjiang River estuary, the medusae appear in June (Xu *et al*., 2006). In the Daya Bay, the species can be found at August (Lin, 1989). In Beibu Gulf, they are present from April to August (Guo *et al*., 2008).

Distribution. Under the name *Podocoryne minuta*, it has also been recorded from Daya Bay, northern South China Sea (Lin, 1989), Changjiang River estuary, East China Sea (Xu *et al*., 2006 as *Hydractinia minuta*), and Beibu Gulf, northern South China Sea (Guo *et al*., 2008). It is also recorded along the coast of the western Africa (Thiel, 1938 as *Podocoryne minuta*), Florida (Mayer, 1900 as *Dysmorphosa minuta*) and New Zealand (Schuchert, 1996 as *Podocoryna minuta*).

Lizzia blondina occurs from Norway to the Mediterranean as well as the northwestern Atlantic (Allwein, 1967; Russell, 1970).

Remarks. The synonymy and history of this species is treated by Russell (1953b). Kramp (1961) suspected that the Mediterranean records of *Podocoryne minuta* by Neppil & Stiasny (1913) were actually *L. blondina*. After reexaminating *Hydractinia minuta* material from Mediterranean, Schuchert (2007) found it is indistinguishable from eight-tentacled *Lizzia blondina* originating from Great Britian, and proposed that *H. minuta* should be considered as a synonym of *L. blondina*. This result was also confirmed by their 16S sequence data (Schuchert, 2007).

Since the medusae may be found mature at different stages of the tentacles development, the identity of the species was at first not certain, and three separate species were described previously. The first stage, medusa with one tentacle on each perradial marginal bulb, was recognizable as *Hydractinia minuta* (Figs 3, 6); the second stage, medusa with two tentacles on each perradial marginal bulb, was considered as *Lizzia claporedei* (Figs 4, 7); and the third stage, medusa with three tentacles on each perradial marginal bulb, was named *Lizzia blondina* (Figs 5, 8).

The materials from China Sea, previously identified by Lin (1989), Xu *et al*. (2006) and Guo *et al*. (2008) as *Podocoryne/Hydractinia minuta*, are also conformed with the eight-tentacle stage of *Lizzia blondina*. The name *Podocoryne/Hydractinia minuta* recorded from China Sea should be revised as *Lizzia blondina* Forbes, 1848.

***Lizzia gracilis* (Mayer, 1900)** (Figs 9–11)

Cytaeis gracilis Mayer, 1900: 39–40, pl. 36, figs 122–124.

Podocoryne gracilis Mayer, 1910: 141–142, pl. 16, figs 1–3.

Lizzia gracilis Kramp, 1928: 46–47; 1951: 105, 231, 272; 1961: 88; 1968: 31, 154; Li & Chen, 1991: 2, 15, fig. 19; Bouillon *et al*., 2006: 134; Xu *et al*., 2014: 229, fig. 84.

Material examined. Nansha Island, July–August, 1988, about abundance 0–0.4 ind./m^3, initially identified as *Lizzia gracilis*.

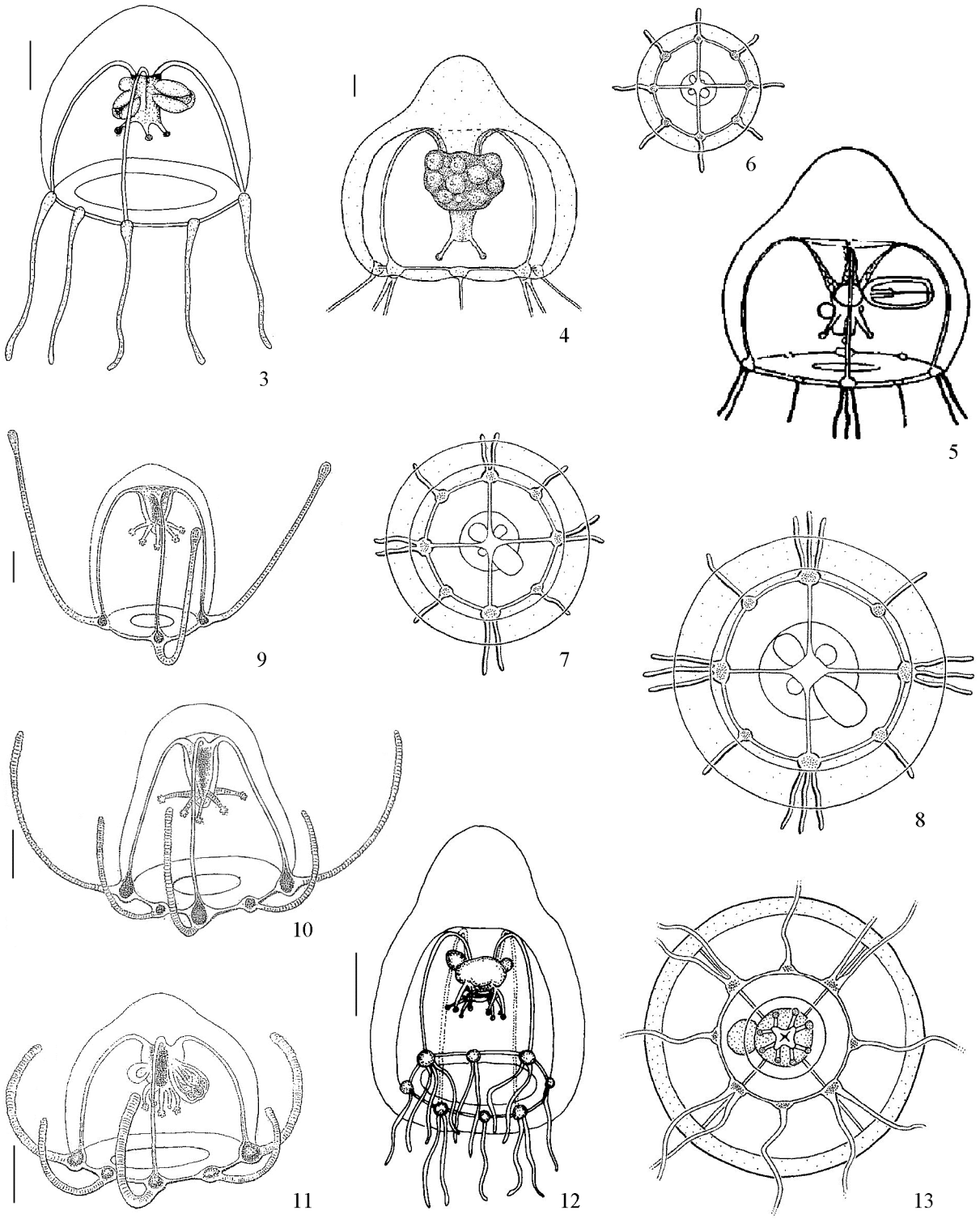
Diagnosis. Eight stiff marginal tentacles with large basal bulbs; mouth without prominent lips and surrounded by eight unbranched, oral tentacles, four perradial and four interradial in positation; manubrium small, on a slightly developed peduncle; medusa buds on manubrium; no ocelli.

Description. Medusa with domelike or pyriform with slight apical projection; manubrium small, mounted upon a short, wide and solid gastric peduncle; manubrium and mouth part together only about half as long as the depth of the bell cavity; mouth simple, round opening without prominent lips and surrounded by eight unbranched oral tentacles, each of which terminates in a knob of nematocysts, four of these oral tentacles inserting in the perradial and four interradial position of mouth margin; eight stiff marginal tentacles with large basal bulbs, these tentacles upward curled from the bell-margin, four perradial situated marginal tentacles longer than four interradial ones, the basal bulbs of all of the tentacles large, swollen and hollow, with their endoderm deeply pigmented; with four simple, straight radial canals and a ring canal; medusa buds develop upon the interradial sides of manubrium; velum broad.

Dimensions. Bell size about 3 mm in diameter (Mayer, 1910; Kramp, 1961).

Biology. It occurs only in the southern of South China Sea from July to August (Li & Chen, 1991). This medusa was

quite common on the surface at Tortugas, Florida, in June (Mayer, 1910).



Figures 3–13. *Lizzia* spp. 3–8. *L. blondina* (Forbes, 1848). 9–11. *L. gracilis* (Mayer, 1900), in lateral view (after Mayer, 1910). 12–13. *L. octostyla* (Haeckel, 1879). 3. Medusa before gonad maturation and with medusa buds, in lateral view (after Xu *et al*., 2014). 4. Mature medusa with two tentacles each perradial marginal bulb, in lateral view (after Schuchert, 2007). 5. Mature medusa with three tentacles each perradial bulbs, in lateral view (modified from Russell, 1953a). 6–8. Semi-diagrammatic illustration of three stages of development in aboral view (after Russell, 1953b). 9. Newly liberated medusa with four perradial tentacles. 10. Half-grown medusa with eight tentacles. 11. Asexually produced medusa buds. 12. Lateral view. 13. Oral view (after Schuchert, 2007). Scale bars: 3–4 = 0.1 mm; 9–11 = 0.5 mm; 12 = 0.2 mm.

Distribution. Globally occurs in tropical to subtropical seas, mostly neritic (Mayer, 1910; Kramp, 1959). In the west Atlantic, it occurs in the Tortugas, Florida on the east coast of North America (Mayer, 1910; Vanhöffen, 1913). In the Indo-west Pacific tropical region, it is present in the Malayan Archipelago, Philippines, Fiji Islands, Sunda Strait of Indonesia (Kramp, 1928, 1959, 1965, 1968). It is also present in the Nansha Islands on the southern of South China Sea (Li & Chen, 1991; Xu *et al*., 2014).

Remarks. This species and *Lizzia octostyla* (Haeckel, 1879) are the only form of *Lizzia* that have eight unbranched oral tentacles, but is distinguished from the latter by its eight oral tentacles lies in four perradial and four interradial position while eight oral tentacles lies in four perradial pairs in the latter.

***Lizzia octostyla* (Haeckel, 1879)** (Figs 12–14)

Desmorphosa octostyla Haeckel, 1879: 78, pl. 6, fig. 6.

Podocoryne octostyla Mayer, 1910: 140; Neppi & Stiasny, 1911: 399.

Lizzia octostyla Neppi & Stiasny, 1913: 32–34, pl. 2, fig. 22; Kramp, 1959: 106, fig. 81; 1961: 88–89; Bouillon *et al*., 2004: 47, fig. 28F; Boillon *et al*., 2006: 134; Xu & Huang, 2006: 235, fig. 3A–B; Schuchert, 2007: 295, fig. 40; Du *et al*., 2010: 74; Xu *et al*., 2014: 230, fig. 85.

Material examined. Fujian coastal waters from the Minnan and Mindong during April 2006, one medusa; NHW13021 (22°58'N, 118°46'E), depth 1194 m, 8 October 2013, one medusa; Daya Bay, March 2008, about abundance 50–100 ind./m^3.

Diagnosis. Medusa with low apical apex, with peduncle; eight oral tentacles in perradial pairs; eight marginal bulbs; 8–12 tentacles; medusa buds on manubrium.

Description. Umbrella 1 mm high, 0.7 m wide, with bulging side and low conical apex; manubrium mounted upon a conical peduncles; both together about half as long as the depth of the bell cavity; eight unbranched adradial oral tentacles inserting in pairs in the perradial corners of the level of mouth margin; radial canals narrow; eight small marginal bulbs, interradial ones slightly smaller; no ocelli; in younger specimens one tentacle per bulb, in older ones perradial bulbs with 2–3 tentacles; gonads as flat pads on manubrium wall, interradial medusa buds on middle of manubrium.

Biology. *Lizzia octostyla* is a warm water species found in nearshore waters. The medusa has the ability to the rapical proliferation by asexually budding, which may at times be exceedingly abundant. It occurs in the plankton around the Daya Bay in March (Du *et al*., 2010).

Distribution. This medusa is a neritic species. In China Sea, it occurs in the Fujian coastal water on the Taiwan Strait (Xu *et al*, 2006) and in the Daya Bay on the northern of South China Sea (Du *et al*., 2010). It is also present in the Mediterranean (Mayer, 1910 as *Podocoryne octostyla*; Neppi & Stiasny, 1911 as *Podocoryne octostyla*; 1913 as *Lizzia octostyla*).

Figures 14. *Lizzia octostyla* (Haeckel, 1879), mouth margin with oral tentacles.

Remarks. Previously, *Lizzia octostyla* was treated as an endemic species of Mediterranean Sea (Bouillon *et al*., 2004). It was widely distributed in Mediterranean such as Ligurian Sea (Kramp, 1957 as juvenile of *Koellikerina fasciculata*), Tyrrhenian Sea (Brinckmann-Voss, 1970), Adriatic Sea (Neppi & Stiasny, 1911; 1913), Ionian Sea (Haeckel, 1879). Our specimens mostly agree with the original description of *Lizzia octostyla* with an exception, that is, the marginal perradial bulb of our samples bears 2–3 tentacles, while samples of Mediterranean bears 1–2 tentacles. Schuchert (2007) speculated *Lizzia octostyla* may be a form of *Lizzia blondina*.

Genus *Podocorynoides* Schuchert, 2007

Podocorynoides Schuchert, 2007: 297.
Type species: *Cytaeis minima* Trinci, 1903.

Diagnosis. Medusae with four vertical unbranched oral tentacles inserting at level of mouth rim; with manubrial peduncle; four marginal bulbs, each with one simple tentacle; interradial medusa buds on manubrium; gonad encircling manubrium.

Remarks. According to the result of 16S sequence data (Schuchert, 2007), *Hydractinia minima* is closely related to *Lizzia* and *Rathkea*, so it does not belong to the Hydractiniidae. Schucher (2007) referred it to the Rathkeidae and established the new genus *Podocorynoides* to accommodate *Hydractinia minima* (Trinci, 1903).

***Podocorynoides minima* (Trinci, 1903)** (Fig 15)

Cytaeis minima Trinci, 1903: 26–28, pl. 1, figs 1–30.
Podocoryne simplex Kramp, 1928: 45, fig. 20; Russell, 1953b: 136; Kramp, 1961: 70; 1968: 28, fig. 70; Zhang & Liu, 1999: 25, 28, fig. 6.
Podocoryne minima Russell, 1953b: 134, Figs 63–64; Chow & Huang, 1958: 176, pl. 1, figs 10–11; Kramp, 1961: 69; 1968: 28, fig. 69; Brinckmann-Voss, 1970: pl. 7, fig. 1; Zhang, 1979: 129; Lin, 1989: 60; Lin & Zhang, 1990: 431; Huang *et al*., 1991: 465; Li & Chen, 1991: 2, 14, fig. 17; Jiang & Chen, 1994: 19; Lin, 1994: 169; Wang, 1996: 44; Ma & Gao, 2000: 535; Wang *et al*., 2005: 275.
Pododoryna minima Schuchert, 1996: 50, fig. 27.
Hydractinia minima Bouillon *et al*., 2004: 65–66, fig. 39D–E; Bouillon *et al*., 2006: 150; Xu *et al*., 2006: 117; Guo *et al*., 2008: 230; Du *et al*., 2010: 74; Xu *et al*., 2014: 258, fig. 116.

Material examined. Daya Bay, May and August 1989, about abundance 0–5 ind./m^3, initially identified as *Podocoryne minima*; Changjiang River estuary, 14 June 2003 and Beibu Gulf, 15 July 2006, about abundance 0–0.4 ind./m^3, initially identified as *Hydractinia minima*.

Diagnosis. See genus diagnosis.

Description. Medusae with dome shaped or globular bell; apical jelly slightly thickened in fully grown animals; relatively long gastric peduncle present (up to 1/3 of bell cavity); with four radial canals and a rather narrow ring canal; with four perradial marginal bulbs and tentacles, without ocelli; adaxial epidermis of bulbs thickened and pad-like, gastrodermis with or without brown pigment, tentacles very contractile; manubrium with cylindrical shape, length 2/3 of bell cavity, perradial lip margins elongated to short oral tentacles terminating in a spiny, spherical knob of nematocysts; interradial medusa buds on manubrium with ordered budding sequence; gonads surrounding manubrium completely.

Dimensions. Bell size 0.3–1.0 mm (Uchida & Sugiura, 1977; Chow & Huang, 1958; present work).

Biology. The medusa is a circumtropical species. In more subtropical (Taiwan Strait and northern of South China Sea) and tropical (middle-southern of South China Sea) waters of China Sea, they can be found all year round, but mostly abundant in May to October (Lin, 1989, 1994; Li & Chen, 1991; Xu *et al*., 2006). A quite rare medusa is recorded in the north temperate waters of China Sea (Bohai Sea and Yellow Sea) during July to August (Chow & Huang, 1958; Jiang & Chen, 1994). In the Mediterranean, the medusa is present at least during March to September (Trinci, 1903; Brinckmann-Voss, 1987).

Distribution. The medusa is widespread, it occurs in the China Sea from Bohai Sea, Yellow Sea (Chow & Huang, 1958; Jiang & Chen, 1994), East China Sea (Wang *et al*., 2005; Xu *et al*., 2006), Taiwan Strait (Lin, 1994), northern of South China Sea (Lin, 1989; Guo *et al*., 2008) to middle and southern of South China Sea (Li & Chen, 1991). An oceanic medusa recorded from Mediterranean (Trinci, 1903), English Channel (Russel, 1953b), Brazil (Vanucci, 1957), North Carolina (Allwein, 1967), Red Sea (Schmidt, 1973), New Zealand (Schuchert, 1996), Papua New Guinea (Bouillon, 1980), Northwestern Pacific (Kramp, 1928; Uchida & Sugiura, 1977).

Remarks. Although the oral tentacles of this species resemble much the *Podocoryna* type, it is closer related to the Rathkeidae than the Hydracitiniidae based on 16S sequence data and morphological characters of oral tentacles (Schuchert, 2007). The oral tentacles are mostly held in a nearly vertical position, thus somewhat unlike the oblique oral tentacles of

Lizzia blondina. Therefore, it is attributed to *Podocorynoides minima* by Schuchert (2007). The name, *Podocoryne/ Hydractinia minima*, previously recorded from China Sea was revised as *Podocorynoides minima* (Trinci, 1903).

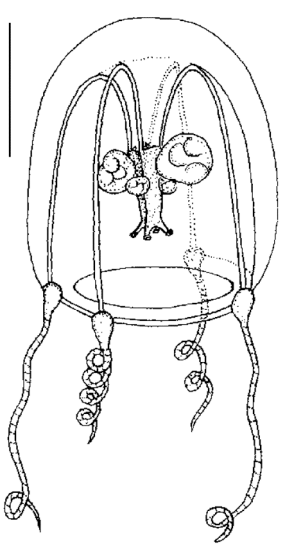


Figure 15. *Podocorynoides minima* (Trinci, 1905), in lateral view. Scale bar = 0.5 mm.

Order Capitata Kühn, 1913

Family Zancleopsidae Bouillon, 1978

Zancleopsidae Bouillon, 1978: 284–285; Bouillon & Boero, 2000: 125; Bouillon *et al*, 2006: 216; Xu *et al*., 2014: 362.
Type species: *Zancleopsis* Hartlaub, 1907.

Diagnosis. Umberlla conical or dome-shaped, without apical chamber; 2–4 capitate marginal tentacles, with or without lateral capitate branches; marginal bulbs clasping umbrella margin, with four or two adaxial hemispherical projection armed with cnidocysts; manubrium broadly flask-shaped, with quadratic or cruciform base; mouth square or circular, with or without fain lips; gonads 4, interradial with deep interradial grooves which may divided them into 8 adradial patches or gonads surrounding manubrium; with or without ocelli on marginal bulbs or on proximal part of tentacles. Hydroids unknown.

Remarks. Before the family was erected by Bouillon (1978), several families were proposed for the genus, such as Cladonematidae (Hartlaub, 1907; Mayer, 1910), Zancleidae (Kramp, 1959, 1961) and Pandeidae (Kramp, 1965, 1968). The systematic position of the *Zancleopsis* was outlined by Bouillon (1978), because of without exumbrellar cnidocyst pouches or tracks and tentacles capitate wand without branches, which are different with the latter three families. Thus, Bouillon (1978) erected a new family Zancleopsidae in the order Capitata for the genus *Zancleopsis* and another new genus *Dicnida*.

Key to medusa of all known Zancleopsidae genera.

1. With ocelli; gonads interradial, with deep interradial grooves ..... ***Zancleopsis* Hartlaub, 1907***
   Without ocelli; gonads surrounding manubrium in adults ..... ***Dicnida* Bouillon, 1978**

*Present in China Sea.

Genus *Zancleopsis* Hartlaub, 1907

Zancleopsis Hartlaub, 1907: 113–116; Mayer, 1910: 91; Kramp, 1961: 56; Bouillon, 1978: 284–285; 1985: 248; Bouillon *et al*., 2006: 217; Xu *et al*., 2014: 363.
Cnidotiara Uchida, 1927: 204.
Type species: *Zancleopsis dichotoma* (Mayer, 1900).

Diagnosis. Medusae with or without apical projection; either with two long opposed, capitate tentacles with capitate side branches and two opposed shorter or longer, simple capitate tentacles, or with four simple capitate tentacles; marginal tentacular bulbs clasping umbrella margin, with four or two large hemispherical adaxial expansion covered with cnidocysts;

manubrium flask-shaped; mouth more or less cruciform, with or without simple lips; gonads interradial, with deep interradial grooves which may divide them into 8 adradial masses; with ocelli. Hydroid unknown.

Remarks. The type species, *Zancleopsis dichotoma*, is originally described from Tortugas, Florida by Mayer (1900) under the genus *Gemmaria*.

This genus is distinguished from *Zanclea* by the absence of exumbrellar cnidocyst pouches or track, the capitate lateral branches upon the tentacles and ocelli present, which are unknown in *Zanclea*.

The genus comprises the following species: *Z. dichotoma* (Mayer, 1900), *Z. elegans* Bouillon, 1978, *Z. gotoi* (Uchida, 1927 as *Cnidotiara*), *Z. symmetrica* Bouillon, 1985, *Z. tentaculata* Kramp, 1928 and *Z. oblongus* **sp. nov.** In China Sea, only two species are known.

***Zancleopsis oblongus* Xu, Huang & Wang, sp. nov.** (Figs 16–21)

Material examined. Holotype (TIO 022), South China Sea, station NNXW12095 (11°58'N, 113°02'E), depth 4294 – 230 m, 1 September 2012, coll. Peng Xiang (TIO).

Description. Mesuda up to 3.5 mm high, with apical projection, reach one-third of the total height, umbrella almost conical-shaped, higher than width, jelly thick, forming pointed apex; manubrium flask-shaped, about half as long as the bell cavity, with large quadratic base, distal part of manubrium simple, conical, mouth opening quadrangular with faint lips, margin thick provided with cnidocysts; gonads interradial, with shallow groove which may divide them into 8 adradial masses, but separated perradially; 4 radial canals and a ring canal; 2 long, opposite capitate tentacles, each with 60–65 buttony-shaped cnidocysts knobs along the whole tentacle on the abaxial side, and 2 shorter, opposed capitate tentacles, simple, terminating in a slight swelling; 4 marginal tentacular bulbs clasping umbrella margin, of which 2 long tentacular bulbs oblong-shaped, without adaxial expansion at the base of the tentacles, and other 2 shorter tentacular bulbs very small, conical-shaped, with a large, spherical-shaped adaxial expansion at tentacular base covered with cnidocysts; with abaxial ocelli on marginal bulbs; velum narrow.

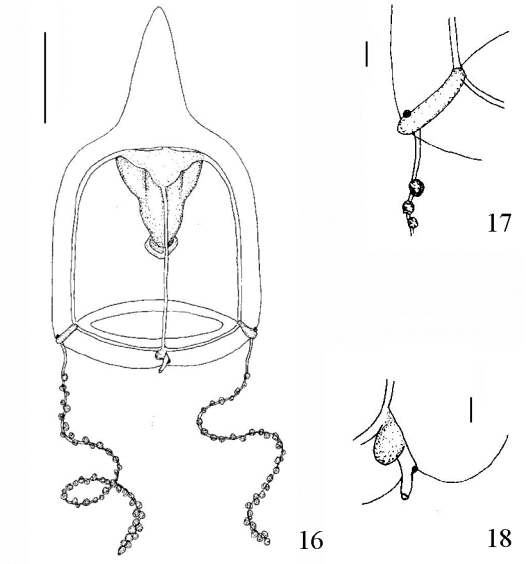
Biology. A deep-water species, occurring at depths of 4294–230 m.

Distribution. This species is rare in the southern of South China Sea, it is only known from one specimen caught in deep waters.

Etymology. The species name is from the Latin *oblongus*, meaning oblong, referring to the morphology of two opposite long tentacular bulbs.

Remarks. This new species has following characters which are in common with *Zancleopsis* Hartlaub, 1907: umbrella with apical projection; two long and short tentacles; marginal bulbs with two adaxial cnidocysts knobs; gonads on interradial regional of manubrium with interradial grooves; abaxial ocelli on the marginal bulbs.

The new species is similar to *Z. tentaculata* Kramp, 1928, but differs from the latter by following: 1) manubrium quadratic base and mouth square; 2) two long opposite tentacles with 60–65 buttony-shaped cnidocysts knobs along the



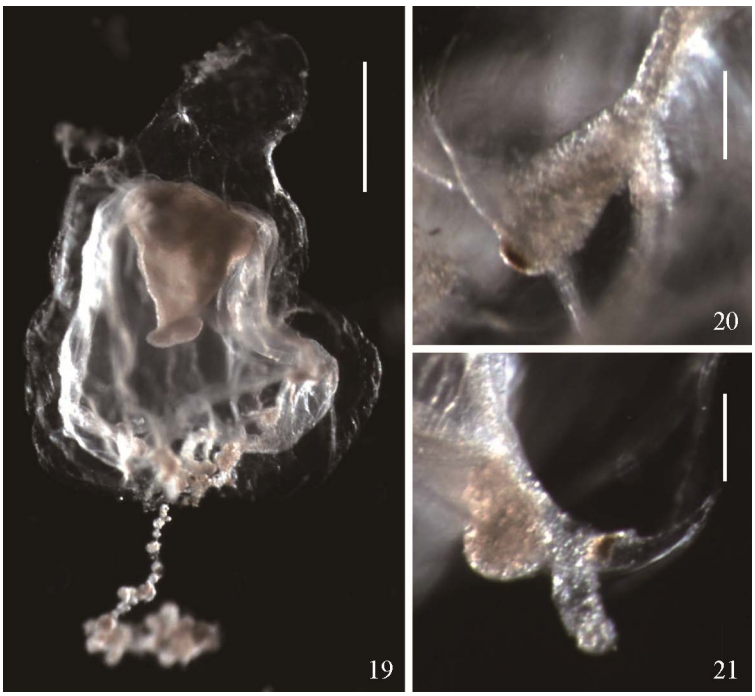
Figures 16–18. *Zancleopsis oblongus* Xu, Huang & Wang, **sp. nov.** 16. Lateral view. 17. Enlarged lateral view of long tentacular bulb. 18. Enlarged lateral view of short tentacular bulb. Scale bars: 16 = 1.0 mm; 17–18 = 0.1 mm.

whole tentacles; 3) two long tentacular bulbs oblong-like, without adaxial cnidocysts knobs; 4) gonads interradial with shallow grooves.

Key to medusa of all known *Zancleopsis* species.

1. Without apical projection; two long tentacles with 8–10 capitate side branches; four large hemispherical adacial cnidocysts knobs at tentacular base ..... ***Z. elegans* Bouillon, 1978**
   With apical projection 2
2. Four long capitate tentacles, each distal end with 7–15 knob-shaped cnidocysts ..... ***Z. symmetrica* Bouillon, 1985**
   Two long or four capitate tentacles 3
3. Four short capitate, club-shaped tentacles and four large cnidocysts knobs at tentacular base ..... ***Z. gotoi* (Uchida, 1927)**
   Two long capitate tentacles 4
4. Two long capitate tentacles with 2–4 capitate side branches and two opposed rudimentary bulbs ..... ***Z. dichotoma* (Mayer, 1900)***
   Two long and two short capitate tentacles 5
5. Each long tentacle with 6–15 capitate side branches at distal end of tentacles; four large, adaxial cnidocysts knobs at all tentacular base ..... ***Z. tentaculata* Kramp, 1928**
   Each long tentacle with 60–65 buttony-shpaed abaxial cnidocysts knobs along whole tentacles; only two large, adaxial cnidocysts knobs at short tentacular bulbs; long tentacular bulbs oblong-shaped, without adaxial cnidocysts knobs ..... ***Z. oblongus* Xu, Huang & Wang, sp. nov.***

* Presented in China Sea.



Figures 19–21. *Zancleopsis oblongus* Xu, Huang & Wang, **sp. nov.** 19. Lateral view. 20. Enlarged lateral view of long tentacular bulb. 21. Enlarged lateral view of short tentacular bulb. Scale bars: 19 = 1.0 mm; 20–21 = 0.1 mm.

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