

ORIGINAL ARTICLE

Taxonomic notes on Anthomedusae (Cnidaria) from the south-central South China Sea III: Family Pandeidae

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Abstract The present paper reviews all 14 genera and 46 species belonging to the family Pandeidae from the China seas. Two new species, *Leuckartiara ruberiverruca* Xu, Guo & Du, **sp. nov.** and *Merga longicosta* Xu, Huang & Wang, **sp. nov.**, from the south-central South China Sea, are described and illustrated. Keys to the known genera of family Pandeidae in the China seas and to all known species of the genus *Merga* are provided. Other data are briefly summarized to the list of species presented in the family Pandeidae in the China seas. The type species were deposited at the South China Sea Fisheries Research Institute, Chinese Academy of Fishery Science.

Key words Anthomedusae, Pandeidae, new species, South China Sea.

1 Introduction

The paper is the third publication in a series of taxonomic revisions of Anthomedusae from the south-central South China Sea (Wang *et al.*, 2017; Du *et al.*, 2018). The present study treats the family Pandeidae, and describes two new species, *Leuckartiara ruberiverruca* Xu, Guo & Du, **sp. nov.** and *Merga longicosta* Xu, Huang & Wang, **sp. nov.**.

Based on previous reports and present work (Hsu, 1965; Xu & Zhang, 1978, 1981; Kao *et al.*, 1958; Lin & Chen, 1991; Xu *et al.*, 1991, 2007, 2008, 2009; Xu & Huang, 2004, 2006; Huang *et al.*, 2008, 2019; present work), 46 medusa species and 14 genera of the family Pandeidae are presented in the China seas. In this paper, keys to the known genera of the family Pandeidae in the China seas and to all known species of the genus *Merga* are provided.

2 Materials and methods

Specimens of the new species were collected from the region (110°–118°E, 12°–18°N) in the south-central South China Sea during July 25th to August 17th 2014. All planktonic samples were collected using a large-type planktonic net (80 cm in diameter, 0.505 mm in mesh size) by vertical hauls from depth 200 m to surface. Species were fixed in 5% formalin buffered in seawater. Samples were examined using stereoscopy and light microscopy, and taxonomic identifications were undertaken using the literatures as specified in the references section. All drawings were made from preserved specimens using an Axiocam MRe5 (Zeiss) dissecting microscopy. The type species were deposited at the South China Sea Fisheries Research Institute, Chinese Academy of Fishery Science.

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3 Results

Based on previous reports (Xu *et al.*, 2014; Du *et al.*, 2018; Huang *et al.*, 2019) and recent data of the authors, a total of 46 medusa species of the family Pandeidae (14 genera) are recorded in the China seas (Table 1).

Table 1. List of species of the family Pandeidae in China seas, with its distribution*.

Family Pandeidae Haeckel, 1879	B	Y	Z	TS	TE	N	M	S
Genus <i>Amphinema</i> Haeckel, 1879								
<i>Am. australis</i> (Mayer, 1900)				+				+
<i>Am. dinema</i> (Péron & Lesueur, 1810)	+	+	+			+	+	+
<i>Am. globogonia</i> Xu, Huang & Guo, 2008								+
<i>Am. physophorum</i> (Uchida, 1927)				+				
<i>Am. rubrum</i> (Kramp, 1957)					+			
<i>Am. rugosum</i> (Mayer, 1900)	+	+	+			+	+	+
<i>Am. tsingtauensis</i> (Kao, Li F L, Chang & Li H L, 1958)	+							
<i>Am. turrida</i> (Mayer, 1900)	+			+				+
Genus <i>Annatiara</i> Russell, 1940								
<i>An. affinis</i> (Hartlaub, 1914)						+		+
Genus <i>Catablema</i> Haeckel, 1879								
<i>Ca. vescicarium</i> (A. Agassiz, 1862)				+				
Genus <i>Cirrhitiara</i> Hartlaub, 1913								
<i>Ci. simplex</i> Xu, Huang & Chen, 1991					+			
Genus <i>Codonorchis</i> Haeckel, 1879								
<i>Co. calcariformis</i> Xu, Huang & Guo, 2009					+			+
<i>Co. nanhaiensis</i> Xu, Huang & Guo, 2008								+
Genus <i>Halitholus</i> Hartlaub, 1913								
<i>H. pauper</i> Hartlaub, 1913								+
<i>H. triangulus</i> Xu, Huang & Guo, 2014								+
Genus <i>Leuckartiara</i> Hartlaub, 1914								
<i>L. fujianensis</i> Huang, Xu, Lin & Qiu, 2008					+			
<i>L. gardineri</i> Browne, 1916						+		
<i>L. hoeplii</i> Hsu, 1928	+	+	+	+				+
<i>L. jiangyinensis</i> Xu & Huang, 2004					+			
<i>L. nanhaiensis</i> Huang JQ, Xu & Guo, 2019								+
<i>L. neustona</i> Xu & Huang, 2004					+			
<i>L. octona</i> (Fleming, 1823)	+	+						+
<i>L. octonema</i> Xu, Huang & Guo, 2007					+			+
<i>L. orientalis</i> Xu, Huang & Chen, 1991					+			
<i>L. ruberiverruca</i> Xu, Guo & Du, sp. nov.								+
<i>L. zhangraotingae</i> Xu & Huang, 2006	+	+						
Genus <i>Merga</i> Hartlaub, 1914								
<i>M. apicirubellus</i> (Xu, Huang & Guo, 2009)					+			+
<i>M. apicispottis</i> (Xu, Huang & Lin, 2009)					+			+
<i>M. brevispura</i> (Xu, Huang & Guo, 2009)								+
<i>M. bulbosa</i> Bouillon, 1980								+
<i>M. crassocanalis</i> Huang JQ, Xu & Huang BB, 2019						+		
<i>M. longicosta</i> Xu, Huang & Wang, sp. nov.								+
<i>M. macrobulbosa</i> Xu, Huang & Chen, 1991					+			
<i>M. minuta</i> (Xu, Huang & Chen, 1991)					+			+

Table 1 (continued).

Family Pandeidae Haeckel, 1879	B	Y	Z	TS	TE	N	M	S
<i>M. nanhaiensis</i> Xu, Huang & Guo, 2018						+		
<i>M. nanshaensis</i> (Xu, Huang & Lin, 2009)				+				+
<i>M. tergestina</i> (Neppi & Stiasny, 1912)				+		+		+
<i>M. unguiformis</i> (Xu, Huang & Lin, 2009)				+				
Genus <i>Neoturris</i> Hartlaub, 1914								
<i>N. papua</i> (Lesson, 1843)						+		
<i>N. pelagica</i> (A. Agassiz & Mayer, 1902)						+	+	
Genus <i>Octotiara</i> Kramp, 1953								
<i>O. russelli</i> Kramp, 1953							+	
Genus <i>Pandea</i> Lesson, 1843								
<i>P. conica</i> (Quoy & Gaimard, 1827)	+				+	+	+	+
Genus <i>Pandeopsis</i> Kramp, 1959								
<i>P. ikarii</i> (Uchida, 1927)	+				+	+	+	+
Genus <i>Stomotoca</i> L. Agassiz, 1862								
<i>S. atra</i> A. Agassiz, 1862					+			
Genus <i>Timoides</i> Bigelow, 1904								
<i>T. agassizi</i> Bigelow, 1904							+	
<i>T. latistyla</i> Xu, Huang & Guo, 2007						+		

*Abbreviations: B—Bohai; Y—Yellow Sea; Z—Zhejiang coast of the East China Sea; TS—Taiwan Strait; TE—East of Taiwan; N—Northern of the South China Sea; M—Median of the South China Sea; S—Southern of the South China Sea.

Class Hydrodomedusa Claus, 1877

Subclass Anthomedusae Haeckel, 1879

Order Filifera Kühn, 1913

Suborder Pandeida Haeckel, 1879

Family Pandeidae Haeckel, 1879

Pandeidae Haeckel, 1879: 53.

Pandeidae Bouillon & Boero, 2000: 100–102; Bouillon *et al.*, 2006: 185; Schuchert, 2007: 298–299; Xu *et al.*, 2014: 297–298.

Diagnosis. Medusae with an apical projection or absent; manubrium large, mounted on a peduncle or not; mouth with four lips, simple, crenulate, or complexly folded; four (eight in *Octotiara*) radial canals usually broaden, band-like; centripetal canals rarely present; mesenteries present or absent; gonads with surface smooth or complexly folded, located on adradial or interradial position of manubrium, few extending to radial canals; tentacles originating from conical tentacular bulbs, hollow, without terminal nematocyst clusters (capitation); rudimentary tentacles (tentaculae) or marginal warts present or not; ocelli present or not.

Remarks. The Pandeidae comprises a large number of genera, of which some genera need a revision. Therefore, the key to medusa genera in China seas is provided (see Bouillon *et al.*, 2006 for a complete key of the Pandeidae genera).

Key to the known genera of Pandeidae medusae in China seas.

1. Up to 12 centripetal canals; with a very large peduncle *Timoides* Bigelow, 1904
Without centripetal canals 2
2. Eight radial canals *Octotiara* Kramp, 1953
Four radial canals 3
3. Two large perradial tentacles in adults 4
Four or more tentacles in adults 6
4. Without gastric peduncle 5
With gastric peduncle; simple mouth rim, simple gonads; rudimentary tentacles *Stomotoca* Agassiz, 1862
5. Gonads U-shaped *Codonorchis* Haeckel, 1879
Gonads not U-shaped *Amphinema* Haeckel, 1879

6. More than two marginal tentacles and marginal cirri	<i>Cirrhitaria</i> Hartlaub, 1914
More than two marginal tentacles and without marginal cirri, marginal tentacles hollow	7
7. Without mesenteries	8
With mesenteries	9
8. Four perradial manubrial lobes; gonads on manubrial lobes and interradial walls.....	<i>Annatiara</i> Russell, 1940
Without perradial manubrial lobes; gonads adradial, more or less U-shaped, folded.....	<i>Halitholus</i> Hartlaub, 1914
9. Gonads not reticulated or folded, smooth, sometimes corrugated; 4 fairly simple lips.....	10
Gonads reticulated or folded, or both; oral lips more or less folded or crenulated	11
10. Manubrium quadrangular, short and broad, with entire upper surface attached to subumbrella; gonads large, sheet-like, smooth, covering all interradial surface, with 3–4 dark red spots in living specimen.....	<i>Pandeopsis</i> Kramp, 1959
Manubrium cruciform, fairly long, flask-shaped; gonads smooth or exceptionally weakly corrugated, usually adradial or interradial	<i>Merga</i> Hartlaub, 1914
11. Gonads without isolated interradial pits, U-shaped, with diverging horizontal folds, connected by interradial transverse bridge.....	<i>Leuckartiara</i> Hartlaub, 1914
Gonads with isolated interradial pits, with or without additional folds, not U-shaped	12
12. Gonads altogether reticulated without surrounding folds.....	<i>Pandea</i> Lesson, 1843
Gonads with combined folds and not reticulated shaped	13
13. Gonads in 8 verticals, adradial series of transverse folds, interradial portion of manubrium wall with isolated pits; ocelli absent	<i>Neoturris</i> Hartlaub, 1914
Gonads adradial, reticular, with interradial connection, with irregular or parallel folds running either in vertical or perpendicular direction; with ocelli	<i>Catablema</i> Haeckel, 1879

Genus *Leuckartiara* Hartlaub, 1914

Leuckartiara Hartlaub, 1914: 282; Kramp, 1959: 120; Xu & Huang, 2004: 555–557; Bouillon *et al.*, 2006: 193; Schuchert, 2007: 321; Xu *et al.*, 2014: 311–312. Type species: *Geryonia octona* Fleming, 1823 by designation of Kramp, 1959.

Dinema van Beneden, 1867: 127–130. Type species: *Dinema slabberi* van Beneden, 1867 = *L. octona*.

Diagnosis. Medusae with various-shaped apical projection; manubrium large, connected to radial canals by mesenteries; mouth margin extensively folded or crenulated; gonads interradial, bipartite but connected interradially, U-shaped, with horizontal folds directed perradially; radial canals broad and ribbon-like, often with jagged edges; tentacles numerous, hollow, with elongated, laterally compressed basal bulbs; umbrella margin usually with rudimentary tentacles and ocelli.

Remarks. The immature medusa of *Leuckartiara* usually lack mesenteries, and hardly distinguish from *Halitholus* species. Only 12 species of *Leuckartiara* are known from China seas.

Pagès *et al.* (1992) provided a tabular review on all known *Leuckartiara* species. A key to all species was provided by Xu & Huang (2004).

Leuckartiara ruberiverruca Xu, Guo & Du, sp. nov. (Figs 1–2)

Material examined. Holotype (SFI 008), the southern South China Sea, station S16 (111°00'E, 14°30'N), depth 1230 m, sampling depth -200–0 m, August 14 2014, coll. Lianggen Wang.

Diagnosis. Umbrella nearly hemispherical, without apical projection, jelly of bell thin and uniform; exumbrella with only 4 perradial longitudinal canal-like bands; manubrium large and broad; mouth lip folded and crenulated; 4 U-shaped, interradial gonads present, with transverse bridge in down part of gonads; 4 large, perradial tentacles present; tentacular bulbs laterally compressed and elongated, conical-shaped, without abaxial spurs, ocelli absent; 3 marginal warts present between tentacles, each with a distinct red pigmented spot in apex.

Description. Umbrella nearly hemispherical, 1.9 mm in height, 2.0 mm in width, with dome round and apical projection absent, jelly of bell thin and uniform; exumbrella with 4 perradial long longitudinal canal-like bands, from abaxial side of tentacular bulbs to nearly apex of umbrella; manubrium large and broad, almost filling subumbrella cavity, but not extending beyond velar opening, 2/3 of manubrium connected to radial canals by mesenteries; mouth broad and large, quadrangular, with short, folded, crenulated lips; 4 U-shaped, interradial gonads present, each with 2 adradial series of 4–5 transversal folds, slightly obliquely downwards towards perradial; transverse bridge lies in down part of gonads; 4 broad radial canals present, without jagged margins, ring canal narrow; 4 well developed hollow marginal tentacles present, originating from conical tentacular bulbs tapering gradually into tentacles; tentacular bulbs laterally compressed, elongated conical-shaped, without abaxial spurs, ocelli absent; umbrella margin without minute tentaculae, but with 3 marginal warts between tentacles, each with a distinct red pigmented spot in apex; velum broad.

Distribution. The southern of South China Sea.

Etymology. The specific name is from the Latin *ruberiverruca*, meaning ruber-verruca, referring to the red pigmented spot on marginal warts.

Remarks. This new species has the manubrium connected to radial canals by mesenteries, the gonads interradial and typically U-shaped and the mouth with a crenulated margin. These characters belong to *Leuckartiara* Hartlaub, 1914.

At present, only 21 valid species are known in *Leuckartiara* (Brinckmann-Voss *et al.*, 2005; Bouillon *et al.*, 2006; Xu *et al.*, 2014; Schuchert, 2018; Huang *et al.*, 2019). The new species can be easily distinguished from other species of *Leuckartiara* by exumbrella with longitudinal canal-like bands or ribs, except *L. zacae* Bigelow, 1940 and *L. gardineri* Browne, 1916. The new species is similar to the latter two by exumbrella with longitudinal canal-like bands or ribs and 4 large perradial tentacles, but different by umbrella without apical projection, transverse bridge in down part of gonads and marginal warts with a red pigmented spot in apex.

Key to the new species and similar species in the genus *Leuckartiara*.

1. Exumbrella with many longitudinal canal-like ribs above the tentacles; with 4 large perradial and 8–12 smaller tentacles of varying size; apical projection absent; U-fold in uppermost part of gonads..... *L. zacae* Bigelow, 1940
Exumbrella with only 4 perradial, longitudinal canal-like bands; with 4 large perradial tentacles 2
2. With conical apical projection; transverse bridge in middle part of gonads; with some minute tentaculae, with ocelli *L. gardineri* Browne, 1916
Without apical projection; transverse bridge in down part of gonads; without minute tentaculae, but with 3 marginal warts between tentacles, each with a distinct red pigmented spot in apex *L. ruberiverruca* Xu, Huang & Du, sp. nov.

Genus *Merga* Hartlaub, 1914

Merga Hartlaub, 1914: 249; Kramp, 1961: 106; Bouillon *et al.*, 2006: 193; Schuchert, 2007: 347–348; Xu *et al.*, 2014: 318; Du *et al.*, 2018: 115–116. Type species: *Pandeia violacea* Agassiz & Mayer, 1899 by designation of Hartlaub, 1914.

Tiarula Hartlaub, 1914: 253. Type species: *Tiarula tergestina* Neppi & Stiasny, 1912.

Mergintha Hartlaub, 1914: 250. Type species: *Mergintha lobianci* Hartlaub, 1914.

Janiopsis Bouillon, 1980: 329.

Diagnosis. Medusae with apical projection or absent; exumbrella with longitudinal ridges and ribs or absent; manubrium with cross-shaped base, not twisted, with perradial edges connected with radial canals by long mesenteries; gonads smooth, slightly folded or weakly corrugated, adradial or interradial; with simple or faintly crenulated oral lips; four, eight, or more tentacles; with rudimentary bulbs or tentaculae or absent; with ocelli or absent (modified after Bouillon, 1980; Bouillon *et al.*, 2006; Schuchert, 2007; Xu *et al.*, 2014).

Remarks. Hartlaub (1914) established the genus *Merga* to accommodate pandeid medusae. Its taxonomic history sees Hartlaub (1914), Picard (1960), Kramp (1961), Bouillon *et al.* (2006), Schuchert (2007), Xu *et al.* (2014) and Du *et al.* (2018).

The genus *Janiopsis* Bouillon, 1980 is preoccupied by *Janiopsis* Rovereto, 1898 (Gastropoda: Buccinidae, fossils). According to Schuchert (2010), *Janiopsis* Bouillon, 1980 is congeneric with *Merga* Hartlaub, 1914 and there is no need to introduce a replacement name. In contradistinction to previous reports (Bouillon, 1980; Xu *et al.*, 2009), the genus *Janiopsis* Bouillon, 1980 comprises six species. These species are all combined to genus *Merga* Hartlaub, 1914 (Xu *et al.*, 2014): *M. apicirubellus* (Xu, Huang & Guo, 2009), *M. apicispottsii* (Xu, Huang & Lin, 2009), *M. brevispura* (Xu, Huang & Guo, 2009), *M. macrobulbosa* (Xu, Huang & Guo, 2009), *M. nanshaensis* (Xu, Huang & Lin, 2009), *M. unguiformis* (Xu, Huang & Lin, 2009) and *M. costata* (Bouillon, 1980).

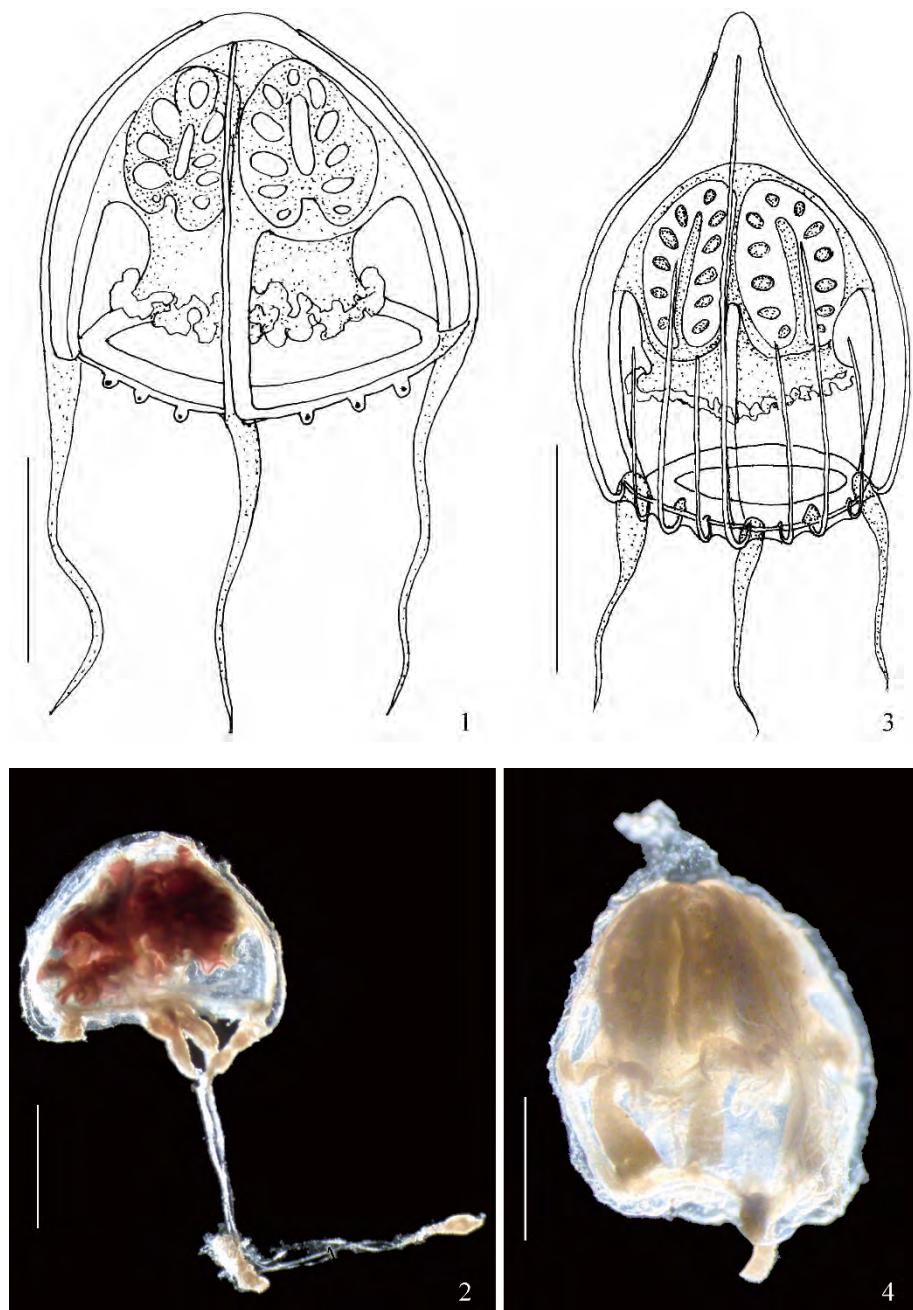
Presently, a total of 18 medusa species of *Merga* is known (Bouillon *et al.*, 2006; Xu *et al.*, 2014; Du *et al.*, 2018; Huang *et al.*, 2019), of which 12 species are reported from China seas.

Merga longicosta Xu, Huang & Wang, sp. nov. (Figs 3–4)

Material examined. Holotype (SFI 009), the South China Sea, station S23 (117°09' E, 13°29' N), depth 4100m, sampling depth -200–0m, August 9 2014, coll. Lianggen Wang. Paratype (SFI 010–012), three specimens, same data as holotype.

Diagnosis. Medusa with distinct apical projection, long conical-shaped; exumbrella with 16 longitudinal ridges and ribs, of which 4 perradial ridges and ribs long, extending to tip of umbrella; bell margin with 4 large, laterally compressed, elongated conical bulbs, bearing 4 filiform tentacles; tentacular bulbs without abaxial spurs; reduced bulbs present between tentacles, respectively; ocelli absent; tentaculae absent; mouth margin few folded; mesenteries long; gonads smooth, each adradial gonad long cylindrical, with 5 isolated pits.

Description. Bell 2.0–3.0 mm in height, 2.0–2.5 mm in width, apical projection 0.5–0.7 mm height, umbrella near conical-shaped, jelly of bell thick in apex, but uniform on side walls; medusa with a distinct apical projection, long conical-shaped, about 1/4 of height of umbrella, without pigmented spot at tip of pointed apex; exumbrella with 16 longitudinal ridges and ribs, of which 4 perradial ridges and ribs long, extending to tip of umbrella, 4 interradial ridges and ribs extending onto proximal part of apical projection, 8 adradial ridges and ribs shorter and slender than others, extending to half of bell; 4 radial canals narrow and smooth, attached to half of manubrium; bell margin with 4 large, laterally compressed and elongated conical bulbs, tapering gradually into filiform tentacles; tentacular bulbs without abaxial spurs; 3 reduced bulbs present between tentacles, respectively; ocelli absent; tentaculae absent; manubrium long and broad, about 2/3 length of subumbrella cavity, base broad; mouth broad and large, mouth with 4 simple lips, and few folded margin; gonads covering interradial apical part of manubrium, extending adradially along mesenteries and radial canals, forming a pair of long cylindrical gonads; gonads separated in downward, smooth, each with 5 longitudinal isolated pits.



Figures 1–4. Lateral view of Pandeidae spp. 1–2. *Leuckartiara ruberiverruca* Xu, Huang & Du, **sp. nov.** 3–4. *Merga longicosta* Xu, Huang & Wang, **sp. nov.** Scale bars = 1.0 mm.

Distribution. The South China Sea.

Etymology. The specific name is from the Latin *longicosta*, meaning long-costal, referring to the 4 perradial long longitudinal ridges and ribs extending to tip of umbrella.

Remarks. At present, only 18 valid species in *Merga* are known (Bouillon *et al.*, 2006; Xu *et al.*, 2014; Huang *et al.*, 2019). The new species can be distinguished from other species of *Merga* by: medusae with distinct apical projection, exumbrella with longitudinal ridges and ribs, with 4 perradial tentacles and tentacular bulbs without ocelli. It is similar to *M. apicispottis* (Xu, Huang & Lin, 2009) by having long apical projection and exumbrella with longitudinal ridges and ribs, but different from the latter by: exumbrella with 16 longitudinal ridges and ribs, of which 4 perradial ridges and ribs long, extending to tip of umbrella; tip of apical projection without pigmented spots, and rudimentary bulbs without ocelli, while *M. apicispottis* has exumbrella with 12 longitudinal ridges and ribs, of which 4 perradial ridges and ribs short, extending to proximal part of apical projection; tip of apical projection with a pigmented spot, and all rudimentary bulbs with ocelli.

Key to all known species (medusa) of genus *Merga*.

1. Without apical projection 2
With distinct apical projection 10
2. Gonads rough by warts and groove, red-brown manubrium; with tentaculae *M. reesi* Russell, 1956
Gonads smooth 3
3. Exumbrella with longitudinal ridges and ribs 4
Exumbrella without longitudinal ridges and ribs 5
4. Exumbrella with 20 longitudinal ridges and ribs, 20 marginal tentacles, all equal size; 4 radial canals narrow *M. nanshaensis* (Xu, Huang & Lin, 2009)*
Exumbrella with 16 longitudinal ridges and ribs, 16 marginal tentacles, all unequal size; 4 very broad radial canals *M. crassocanalis* Huang JQ, Xu & Huang BB, 2019*
5. With 4 perradial tentacles 6
With 8–16 tentacles 8
6. With 4 rudimentary bulbs, tentacular bulbs very large, ovaliform base *M. macrobulbosa* Xu, Huang & Chen, 1991*
Without rudimentary bulbs 7
7. With 20 tentaculae; with ocelli *M. minuta* (Xu, Huang & Chen, 1991)*
Without tentaculae and ocelli *M. tregoubovii* Picard, 1960
8. With small mouth and the triangular projections at the proximal end of the radial canals; 16 marginal tentacles, no rudimentary bulbs *M. treubeli* Schuchert, 1996
With large and broad mouth, without triangular projections at the proximal end of radial canals; with rudimentary bulbs 9
9. 8–12 tentacles, 24–36 rudimentary bulbs; all with ocelli *M. violacea* (Agassiz & Mayer, 1899)
8 tentacles, 8 rudimentary bulbs; ocelli absent *M. nanhaiensis* Xu, Huang & Guo, 2018*
10. Perradial tentacular bulbs with abaxial spurs 11
Perradial tentacular bulbs without abaxial spurs 13
11. Exumbrella with 4 longitudinal ridges and ribs; 4 tentacles and 4 rudimentary bulbs; mesenteries long *M. brevispura* (Xu, Huang & Guo, 2009)*
Exumbrella without longitudinal ridges and ribs 12
12. 4–8 tentacles, up to 8 rudimentary bulbs; mesenteries short *M. tergestina* (Neppi & Stiasny, 1912)*
8–16 tentacles, perradial bulbs with band-shaped ocelli; mesenteries long *M. galleri* Brinckmann, 1962
13. Exumbrella without longitudinal ridges and ribs, with 4 perradial tentacles, tentacular bulbs elongated cylindrical, with 8 tentaculae; ocelli absent *M. bulbosa* Bouillon, 1980*
Exumbrella with longitudinal ridges and ribs 14
14. With 16 marginal tentacles; exumbrella with 32–48 interradial longitudinal ridges and ribs; with abaxial ocelli *M. costata* (Bouillon, 1980)
With 4 marginal tentacles 15
15. Apical projection long conical, exumbrella with 12–16 longitudinal ridges and ribs 16
Apical projection short, exumbrella with 8 longitudinal ridges and ribs 17
16. Apical projection with a pigmented spot at tip; exumbrella with 12 longitudinal ridges and ribs, of which 4 perradial and 4 interradial longitudinal ribs extending to proximal part of apical projection *M. apicispottis* (Xu, Huang & Lin, 2009)*
Apical projection without pigmented spots at tip; exumbrella with 16 longitudinal ribs, of which 4 perradial longitudinal ribs extending to tip of umbrella *M. longicosta* Xu, Huang & Wang, sp. nov.*
17. 4–8 rudimentary bulbs with red ocelli at tip; gonads smooth, no folded *M. apicirubellus* (Xu, Huang & Guo, 2009)*
4 rudimentary bulbs without red ocelli at tip, but tentacular bulbs with abaxial ocelli; gonad ungulate-shaped *M. unguliformis* (Xu, Huang & Lin, 2009)*

*Recorded in China seas.

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