

A New Hydromedusa of the Genus *Malagazzia* (Leptomedusae; Malagazzidae) from Japan

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Abstract. A new species of *Malagazzia* from Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan, is described with illustrations and photographs. *Malagazzia hirsutissima* n. sp. is the eighth species in the world, and the major characteristics are presence of numerous tentacles, liner gonads of which color is white, and adaxial excretory papillae.

Key words: hydromedusa, *Malagazzia*, new species, taxonomy, description, Kyushu, Japan

Introduction

The genus *Malagazzia* Bouillon, 1984 (Leptomedusae, Malagazzidae), which is characterized by normally four radial canals, manubrium with four lips, adaxial excretory papillae, closed statocysts, linear or ribbon-like gonads, no gastric peduncle, gonads completely surrounding radial canals, includes seven medusan nominal species (Mayer, 1900; Menon, 1932; Kramp, 1953; Chow & Huang, 1958; Xu & Zhang, 1978; He & Xu, 1982; Xu, Huang & Liu, 2006). *Malagazzia* medusae have been reported from shallow waters in the Pacific Ocean, the Indian Ocean and the Atlantic Ocean (Mayer, 1900, 1910; Menon, 1932; Uchida, 1947; Kramp, 1953; Chow & Huang, 1958; Xu & Zhang, 1978; He & Xu, 1982; Xu, Huang & Liu, 2006). Recently we collected *Malagazzia* species from shallow waters in Japan. After detailed examinations, all specimens were found to be new to science and here described as a new species. *Malagazzia* medusae have not been recorded in Japanese waters (Kubota & Gravili, 2007), and the full description of this genus from Japan is firstly described.

Materials and Methods

Five specimens were collected from Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan, by scoops up with a ladle on September 23, 2011. The medusae were swimming just below the sea surface among other aggregated medusae and ctenophores in the day time. These specimens were measured immediately after being narcotized with 5% MgCl₂ solution and were fixed in buffered 5% formalin-seawater within a day of sampling and preserved in the same solution. Drawings were made from photographs of the living specimens.

Taxonomy

Family MALAGAZZIIDAE Bouillon, 1984

Genus *Malagazzia* Bouillon, 1984

Malagazzia hirsutissima n. sp.

[Japanese name : Watage-kurage, new]

(Figs 1-4)

Material examined.

Holotype, Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan, 0 m deep, 33°6'2"N, 129°46'8"E, scoops up with a ladle, on 23 September 2011, collected by H. Akiyama and S. Horinouchi. The type-

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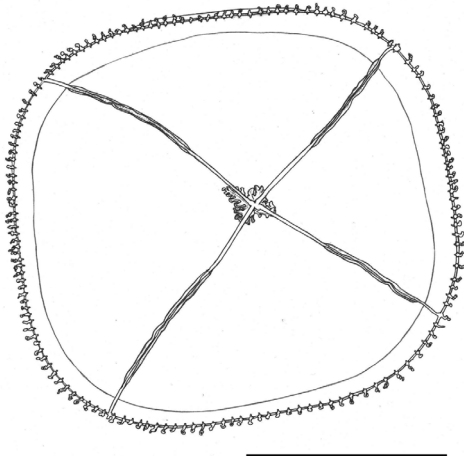


Fig. 1. Mature male medusa of *Malagazzia hirsutissima* n. sp. from Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan, aboral view. 11.2 mm in diameter. (Holotype). Scale bar = 5 mm.

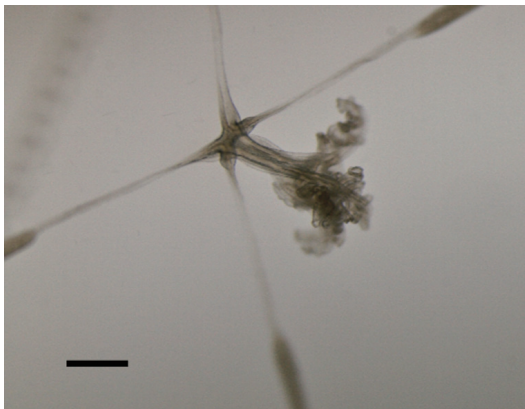


Fig. 3. Oral lips of *Malagazzia hirsutissima* n. sp. from Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan, oral view. 11.2 mm in diameter. (Holotype). Scale bar = 1 mm.

series was deposited in the Seto Marine Biological Laboratory, Field Science Education and Research Center, Kyoto University, Japan [Holotype: specimen number 2, SMBL Type 461] and in Saikai National Park Kujukushima Aquarium, Sasebo, Nagasaki Prefecture, Kyushu, Japan [Paratypes: specimen numbers 1, 3-5 SNPKA Type Nos. 04-304, 04-306-308].

Description of holotype.

Holotype is a mature male medusa. The umbrella is wider than high, measuring 11.2 mm in diameter



Fig. 2. *Malagazzia hirsutissima* n. sp. from Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan. 11.2 mm in diameter. (Holotype). Scale bar = 5 mm.

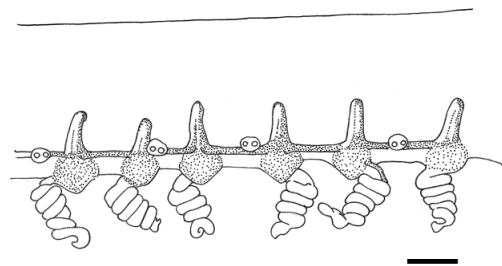


Fig. 4. Marginal tentacles and statocysts that includes statoliths of *Malagazzia hirsutissima* n. sp., oral view. (Holotype). Scale bar = 0.1 mm.

(Figs 1, 2). The manubrium is short and not protrude from the umbrella aperture, and provides with four well-developed oral lips which are crenulated and folded many times (Fig. 3). The stomach is small, being cruciform in section. The four gonads are liner, occupying the length of approximately 2/3 of the radial canals, situated middle of the radial canals but never reaching the ring canal and the stomach. Tentacles are present totally 158 in number (Fig. 1). The tentacular bulbs are swollen and well-demarcated from the tentacles. An excretory papilla exists on the adaxial side of every well-developed tentacular

bulb (Fig. 4). Small marginal warts are absent. Neither lateral nor marginal cirri are found. Statocysts are present totally 98 in number. One (rarely zero) statocyst is found between two successive marginal tentacles (Fig. 4). Most of the statocysts contain two statoliths (Fig. 4).

Parasites.

Trematoda attached to mesogloea of the holotype (n=5) and the paratype (n=9 in No.5).

Etymology.

The specific name means hairy in Latin, referring to its numerous tentacles.

Geographic distribution.

North-western region of Kyushu (Ōmura Bay and Tawaragaura coast of Nagasaki Prefecture), Japan.

Variation.

Four female mature medusae were examined other than the holotype (Table 1). They were from 8.35 to 14.20 mm in bell diameter. The maximum number of tentacles and statocysts per specimen was 218 and 174, respectively. A statocyst contains maximally four statoliths as a very rare case. No rudimentary bulbs were found between two adjacent tentacles, but one marginal wart was present in only a small

specimen as a very rare case (Table 1, No. 1).

Remarks.

The family Malagazziidae Bouillon, 1984, which is characterized by a short manubrium; no gastric peduncle; with normally 4-8, sometimes 12 radial canals; closed statocysts; no ocelli and no cirri, includes four genera such as *Octocanna*, *Octophialucium*, *Tetracanna* and *Malagazzia* (Bouillon *et al.*, 2006). Among them, *Octocanna* and *Octophialucium* have normally eight or more radial canals, while the others have normally four radial canals. One of the characters distinguishing between *Tetracanna* and *Malagazzia* is the presence or absence of excretory papillae. Species included in the *Tetracanna* have none of them, while those in the *Malagazzia* have. The present specimens have four radial canals and remarkable excretory papillae, thence relegating it to the genus *Malagazzia*.

The genus *Malagazzia* includes seven nominal medusan species such as *M. carolinae* Mayer, 1900; *M. multitentaculatum* Menon, 1932; *M. condensum* Kramp, 1953; *M. taeniogonia* Chow & Huang, 1958; *M. curviductum* Xu & Zhang, 1978; *M. cyphogonia* He & Xu, 1982; *M. monocanal* Xu, Huang & Liu, 2006. In order to discriminate them, the number of tentacles and both the shape and position of gonads are key characters. Morphological differences among

Table 1. Morphological variation of characters in *Malagazzia hirsutissima* n. sp. from Ōmura Bay, Nagasaki Prefecture, Kyushu, Japan.

Specimen number	Bell diameter (mm)	Sex (m: male; f: female)	Number of tentacles	Number of rudimentary bulbs between two adjacent tentacles	Number of statocysts between two adjacent tentacles (total no. of statocysts)	Number of statoliths per statocyst (range)
1	8.35	f	112	0, rarely 1	0-1(55)	usually 2(1-3)
2*	11.20	m	158	0	0-1(98)	usually 2(1-3)
3	11.20	f	187	0	0-1(113)	usually 2(1-3)
4	11.80	f	180	0	0-1(103)	usually 2(1-4)
5	14.20	f	218	0	0-1(174)	usually 2(1-3)

*: The holotype. (Nos. 1, 3-5 are paratypes)

Table 2. Comparisons among *Malagazzia* species including the present new species.

Species	Bell diameter (mm)	Shape of radial canals	Shape of gonads	Position of gonads	Number of tentacles	Number of rudimentary bulbs between two adjacent tentacles (total no. of rudimentary bulbs)	Number of statocysts between two adjacent tentacles (total no. of statocysts)	Number of statoliths per statocyst	Color	Geographical distribution	Major references
<i>M. caroliniae</i> (Mayer, 1900)	14	narrow and straight	linear	distal 1/4	16	- (48)	4 (64)	2	tentacle bulbs, proboscis, gonads bright yellow-green	Charleston Harbor, Carolina; Tortugas, Florida; Palao Islands; Great Barrier Reef, Australia; Chefoo, China	Mayer, 1900, 1910; Uchida, 1947; Kramp, 1953; Chow & Huang, 1958
<i>M. multitentaculatum</i> (Menon, 1932)	up to 14	narrow and straight	ribbon-like	almost 1/1	25-32	3-4	- (more than 150)	2-4 usually 2	tentacle bulbs brown, gonads light brownish yellow	Madras, India	Menon, 1932
<i>M. condensum</i> (Kramp, 1953)	5-7	very narrow	band-shaped	proximal 1/3-1/4	about 12	1-3	3-4	-	-	Great Barrier Reef	Kramp, 1953
<i>M. taeniogonia</i> (Chow & Huang, 1958)	up to 15.3	narrow and straight	slightly twisted wide ribbons	distal	8	5-8	4-8	-	manubrium, stomach and tentacle bulbs green, gonads light red-green	Chefoo, China	Chow & Huang, 1958
<i>M. curvicaudum</i> (Xu & Zhang, 1978)	4-10	S-shaped	S-shaped	almost 1/1	12-16	3	2-4	2	-	Guangdong and Fujian, China	Xu & Zhang, 1978
<i>M. cyphogonia</i> (He & Xu, 1982)	10-14	narrow and straight	band-shaped, twisted as curve	distal	14-19	2-4	1-4	-	gonads brownish red	Yantai, China	He & Xu, 1982
<i>M. monotocanal</i> (Xu, Huang & Liu, 2006)	10	two radial canal, straight	ovoid	distal	15	1-2	2-4 usually 3	2	-	Changjiang River Estuary, China	Xu, Huang & Liu, 2006
<i>M. hirsutissima</i> n. sp.	8.35-14.20	narrow and straight	linear	middle 2/3	112-218	0, rarely 1 (0 or 1)	0-1 (55-174)	usually 2 rarely 1, 3, 4	manubrium, stomach, tentacle bulbs and gonads white	North-western region of Kyusyu (Omura Bay and Tawaragaura coast of Nagasaki Prefecture), Japan	Present study

-: not described

Malagazzia species are summarized in Table 2. The present specimens resemble *M. multitentaculatum* in the presence of many tentacles and statocysts, but the present new species can be distinguished from it by numerous tentacles and white gonads that are band-shaped and located on the middle part of the radial canals. *M. multitentaculatum* is described to have only 25-32 tentacles, thence the number of tentacles of the present species is about 5 or 6 times than *M. multitentaculatum*. Furthermore, *M. multitentaculatum* is described to have light brownish yellow gonads and brown tentacle bulbs (Menon, 1932). However, *M. hirsutissima* has white gonads. Moreover, the other three known species have bright yellow-green, light red-green, brownish red gonads (Mayer, 1900; Chow & Huang, 1958; He & Xu, 1982). Thus, we consider the color of gonads seen in *M. hirsutissima* seems to be a specific feature. *M. multitentaculatum* is described to have ribbon-like gonads which occupy almost the entire lengths of the radial canals (Menon, 1932). However, *M. hirsutissima* has a linear gonad of which the length approximately 2/3 of the radial canal, and situated middle part of the radial canal. In the genus *Malagazzia* a species with numerous tentacles and white gonads have never been described in literature, therefore we propose here that it is a distinct species, as the eighth one in the world.

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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., Gravili, C., Pagès, F., Gili, J.-M. & Boero, F., 2006. An introduction to hydrozoa. Publications Scientifiques du Muséum, Paris, 1-591.
- Chow T. H. & Huang M. C., 1958. A study on hydromedusae of Chefoo. Acta Zoologica Sinica, **10** (2): 173-197.
- He Zhen-wu & Xu Ren-he, 1982. The hydromedusae from Yantai coast and a new species of hydromedusae. Journal of the Xinxiang Normal College, **4** (36): 38-44.
- Kubota, S. & Gravili, C., 2007. A list of hydromedusae (excluding siphonophora, milleporidae and actinulidae) in Japan. Nankiseibutu, **49**(2): 189-204.
- Kramp, P. L., 1953. Hydromedusae. Scientific Reports. Great Barrier Reef Expedition 1928-29, **6** (4): 259-322.
- Mayer, A. G., 1900. Some medusae from the Tortugas, Florida. Bulletin of the Museum of Comparative Zoology at Harvard College, **37** (2): 11-82.
- Mayer, A. G., 1910. Medusae of the world. Publications, Carnegie Institution of Washington, **109**: 1-735.
- Menon, M. G. K., 1932. The hydromedusae of Madras. Bulletin of the Madras Government Museum, New Series, Natural History Section, **3** (2): 1-32.
- Uchida, T., 1947. Some medusae from the central Pacific. Journal of the Faculty of Science, Hokkaido (Imperial) University, ser. VI, Zoology, **7** (3): 297-319.
- Xu Zhen-zu & Zhang Jin-biao, 1978. On the hydromedusae, siphonophores and scyphomedusae from the coast of the east Guangdong Province and South Fujian Province, China. Acta Scientiarum Naturalium Universitatis Amoiensis, **17** (4): 19-64.
- Xu Zhen-zu, Huang Jia-qi & Liu Guang-xing, 2006. On new species and records of hydroidomedusae from the Changjiang River Estuary and its adjacent waters. Acta Oceanologica Sinica, **28** (6): 112-118. (in Chinese)

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