



Title	New record of a callianassid ghost shrimp <i>Paratrypaea maldivensis</i> (Borradaile, 1904) (Crustacea: Decapoda: Axiidea) from subtidal flats in Okinawa-jima Island, Ryukyu Islands, Japan
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New record of a callianassid ghost shrimp *Paratrypaea maldivensis* (Borradaile, 1904) (Crustacea: Decapoda: Axiidea) from subtidal flats in Okinawa-jima Island, Ryukyu Islands, Japan

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Abstract. A small ghost shrimp, *Paratrypaea maldivensis* (Borradaile, 1904), is recorded from Japanese waters for the first time, on the basis of specimens collected from Okinawa-jima Island, Ryukyu Islands. The specimens were found to burrow on muddy sand substrata at subtidal depths down to 20 m. A brief diagnosis and illustrations of selected parts based on the present specimens are provided as evidence of the identification. The status of the genus *Paratrypaea* Komai & Tachikawa, 2008 is also briefly discussed.

Introduction

Paratrypaea maldivensis (Borradaile, 1904) (Decapoda: Axiidea: Callianassidae) was first described from the Male Atoll, Maldives, by Borradaile (1904) on the basis of a single male specimen [as *Callianassa (Trypaea)*]. Soon after the original description, Pearson (1905) recorded the species from Sri Lanka. De Man (1928) noted that it was closely related to *Callianassa bouvieri* Nobili, 1904 and discussed differentiating characters between the two species. However, Sakai (1999) synonymized Borradaile's (1904) taxon under *C. bouvieri*, together with *C. rectangularis* Ngoc-Ho, 1991, originally described from New Caledonia (Ngoc-Ho 1991). The synonymy has been followed by his subsequent publications (Sakai 2005, 2011). On the other hand, Komai & Tachikawa (2008) argued that *C. rectangularis* was a valid species, and transferred it to their new genus *Paratrypaea*, together with *C. bouvieri*. Finally, Dworschak (2012) clarified that *Callianassa maldivensis* is a senior synonym of *Paratrypaea rectangularis*, not a junior synonym of *Paratrypaea bouvieri* as Sakai (1999) proposed, and added the Red Sea and Taiwan to the geographical range of *P. maldivensis*.

During investigations of subtidal infaunal decapods in Okinawa-jima Island, Ryukyu Islands, a small collection of callianassid ghost shrimps was made, and amongst them specimens referable to

Paratrypaea maldivensis were found. This short article serves to report on the occurrence of the species from Japanese waters for the first time. The status of the genus *Paratrypaea* is also briefly discussed.

Specimens were collected from sandy mud bottom at subtidal depths down to 20 m by using a suction pump (yabby pump) or sieve during SCUBA diving. Material examined in this study is deposited in Muséum National d'Histoire Naturelle, Paris (MNHN); the Natural History Museum and Institute, Chiba (CBM); the Ryukyu University Museum, Fujukan (RUMF); and Zoological Collection of the University Museum, the University of Tokyo (UMUTZ). The measurements given in the text are carapace length (cl) measured from the tip of the rostrum to the mid-point of the posterior border of the carapace.

For comparative purpose, the following material was examined.

Gilvossius setimanus (DeKay, 1844): 1 male (cl 12.2 mm), New Haven, Connecticut, USA, donated by the Museum of Yale College, UMUTZ.

Paratrypaea bouvieri: See "Material examined" in Komai & Tachikawa (2008).

Taxonomic Account

Genus *Paratrypaea* Komai & Tachikawa, 2008

Paratrypaea maldivensis (Borradaile, 1904)

(Figs 1–3)

New Japanese Name: Chigo-Suna-Moguri

Restricted synonymy

Callianassa (Trypaea) maldivensis Borradaile, 1904: 753, pl. 58, fig. 3b; De Man 1928: 22.

Callianassa rectangularis Ngoc-Ho, 1991: 292, fig. 5.

Callianassa bouvieri. – Sakai 1999: 40 (part), fig. 6a, b; 2005: 78 (part).

Paratrypaea rectangularis. – Komai & Tachikawa 2008: 36.

Gilvossius bouvieri. – Sakai 2011: 374 (part).
Paratrypaea maldivensis. – Dworschak 2012: 50,
 figs 1F, 5J–T, 6K–U, 7C.
 For full synonymy, see Dworschak (2012).

ovigerous female (3.4 mm), Oura Bay, Nago,
 Okinawa-jima Island, subtidal, stn D2, about 8 m,
 19 June 2009, SCUBA diving with yabby pump,
 coll. Y. Fujita, RUMF-ZC-2609; 1 male (cl 3.7 mm),
 1 ovigerous female (cl 4.4 mm), same locality, 5 m,
 stn D5, 20 June 2009, SCUBA diving with yabby

Material examined. One male (cl 3.3 mm), 1

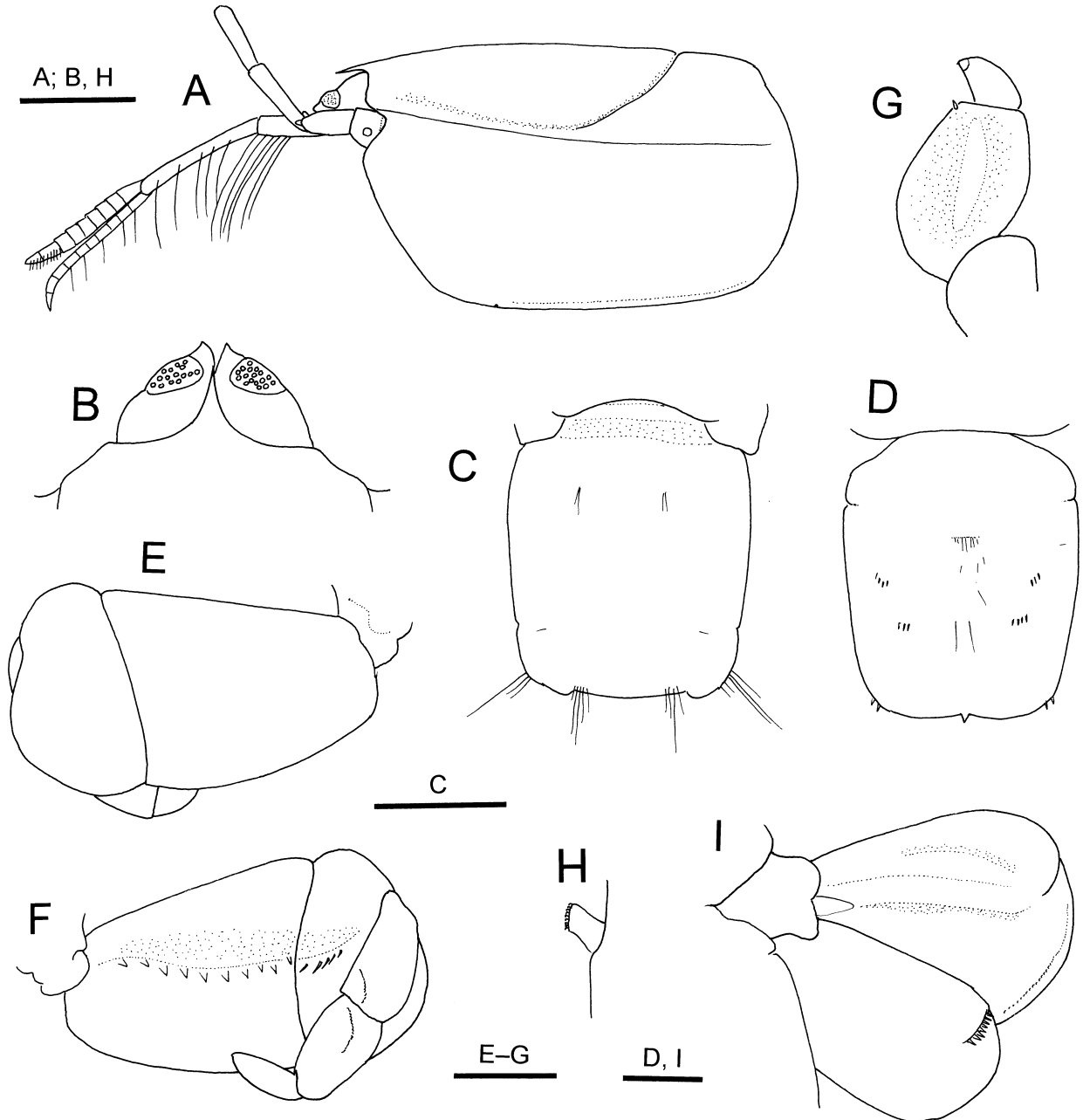


Fig. 1. *Paratrypaea maldivensis* (Borradaile, 1904), male (cl 3.6 mm), CBM-ZC 11808. A, carapace and cephalic appendages, lateral view; B, rostrum and eyes, dorsal view; C, sixth abdominal somite, dorsal view; D, telson, dorsal view; E, left third maxilliped, lateral view (setae omitted); F, same, mesial view; G, propodus and dactylus of left third pereopod, lateral view (setae omitted); H, appendix interna of left third pleopod, ventral view; I, right uropod, dorsal (perpendicular) view (setae omitted). Scale bars: 1 mm for A; 0.5 mm for B–I.

図1 *Paratrypaea maldivensis* (Borradaile, 1904) (新称: チゴスナモグリ), 雄 (頭胸甲長 3.6 mm), CBM-ZC 11808. A, 頭胸甲および頭部付属肢, 側面; B, 額角および眼, 背面; C, 第6腹節, 背面; D, 尾節, 背面; E, 左第3顎脚, 側面 (剛毛を省略); F, 同, 内面; G, 左第3胸脚前節および指節, 側面 (剛毛を省略); H, 左第3腹肢内肢突起, 腹側面; I, 右尾肢, 背面 (剛毛を省略). スケールバー: A, 1 mm; B–I, 0.5 mm.

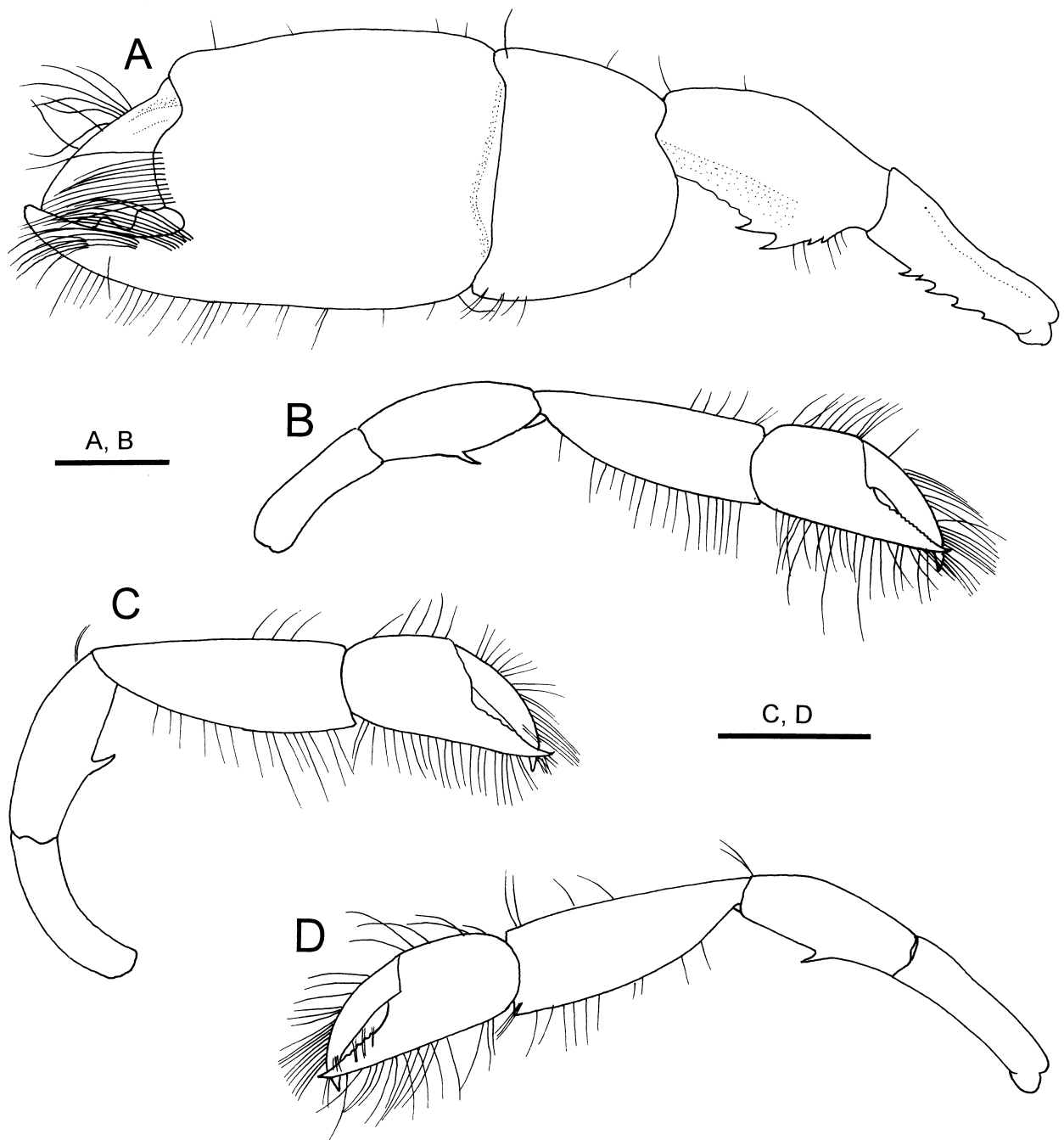


Fig. 2. *Paratrypaea maldivensis* (Borradaile, 1904). A, B, male (cl 3.6 mm), CBM-ZC 11808; C, D, ovigerous female (cl 3.2 mm), same lot. A, major (left cheliped), lateral view; B, minor (right) cheliped, lateral view; C, right cheliped, lateral view; D, left cheliped, lateral view. Scale bars: 1 mm.

図2 *Paratrypaea maldivensis* (Borradaile, 1904) (新称: チゴスナモグリ). A, B, 雄 (頭胸甲長3.6 mm), CBM-ZC 11808; C, D, 抱卵雌 (頭胸甲長3.2 mm), 同ロット. A, 大鉗脚 (左第1胸脚), 側面; B, 小鉗脚 (右第1胸脚), 側面; C, 右鉗脚, 側面; D, 左鉗脚, 側面. スケールバー: 1 mm.

pump, coll. Y. Fujita, RUMF-ZC-2610; 1 ovigerous female (cl 3.2 mm), same locality, 5-20 m, 20 October 2013, SCUBA diving with yabby pump, coll. Y. Fujita, RUMF-ZC-2629; 3 males (cl 3.1-3.6 mm), 2 ovigerous females (cl 3.1, 3.2 mm), Awa, Nago, Okinawa-jima Island, 13 m, 11 April

2010, SCUBA diving with sieve, coll. Yusuke Yamada, CBM-ZC 11808.

Additional material. Holotype of *Callianassa rectangularis*, male (cl 4.5 mm), Surprise Atoll, New Caledonia, 18°19'S, 163°04'E, 36 m, coll. B. Richer de Forges, MNHN-Th 1069.



Fig. 3. *Paratrypaea maldivensis* (Borradaile, 1904), entire animals in dorsal view. A, male (cl 3.3 mm), RUMF-ZC-2609 (major right cheliped detached; palm damaged); B, ovigerous female (cl 3.4 mm), same lot.
 図3. *Paratrypaea maldivensis* (Borradaile, 1904) (新称: チゴスナモグリ), 全体背面. A, 雄 (頭胸甲長 3.3 mm), RUMF-ZC-2609 (大鉗脚は外れ, 掌部が破損); B, 抱卵雌 (頭胸甲長 3.4 mm), 同ロット.

Diagnosis. Rostrum (Fig. 1A, B) spiniform, overreaching mid-length of eyestalks. Carapace (Figs. 1A, 3) with distinctly defined dorsal oval. Second abdominal somite subequal in length to sixth pleomere. Sixth pleomere (Fig. 1C) about 1.1 times longer than wide, with faint lateral notches

posterior to midlength. Telson (Fig. 1D) subrectangular, 1.1–1.2 times longer than wide; lateral margin unarmed, with faint notch proximally; posterior margin faintly concave medially, with small median spine and 2 pairs of minute movable spinules at each lateral angle.

Antennular peduncle (Fig. 1A) slightly longer than antennal peduncle; ultimate segment not particularly elongate. Third maxilliped (Fig. 1E, F) with ischium-merus operculiform, becoming wider distally; crista dentata consisting of about 10 small spines. Chelipeds distinctly unequal and dissimilar in males (Fig. 2A, B), subequal and similar in females (Fig. 2C, D). Male major cheliped (Fig. 2A) with ischium having row of spines on ventral margin; merus unarmed on dorsal margin, armed with row of 3–5 spines on proximal 0.5–0.6 of ventral margin; carpus wider than long; palm with dense long setae along distolateral margin, extending to fixed finger along cutting edge; dactylus with several to numerous long setae on dorsal surface. Male minor cheliped (Fig. 2B) slender; ischium unarmed; merus unarmed on dorsal margin, armed with 1 slender spine at midlength of ventral margin; carpus about 3 times length of distal width; chela distinctly shorter than carpus. Female chelipeds (Fig. 2C, D) subequal and similar, and similar to male minor cheliped. Propodus of third pereopod subovate, ventral margin smoothly convex, with movable spinule subterminally, proximal heel not defined. First and second pleopods absent in males. Appendices internae on the third to fifth pleopods (Fig. 1H) stout, slightly longer than broad, not tapering distally, distinctly projecting from mesial margin of endopod. Uropod (Fig. 1I) with endopod subovate, moderately broad, with distinct dorsal plate bearing distal row of minute movable spinules, lateral margin unarmed; exopod moderately broad, with slightly convex lateral margin, dorsal plate with distal row of minute spinules, lateral margin unarmed.

Coloration in life. See Fig. 3. Body generally translucent; patches of pale pink dots on abdomen. Cornea black. Chelipeds pale pink. Female gonad and eggs light yellowish brown. Dworschak (2012) published color photographs of this species.

Distribution. Heretofore known from the Red Sea (Dworschak 2012), Maldives (Borradaile 1904), Sri Lanka (Pearson 1905), Taiwan (Sakai 1999, as *Callianassa bouvieri*; Dworschak 2012), and New Caledonia (Ngoc-Ho 1991, as *Callianassa rectangularis*); shallow subtidal to 36 m. The present specimens represent the first record of this species from Japanese waters.

Remarks. The present specimens from Okinawa agree well with the redescription of *Paratrypaea maldivensis* by Dworschak (2012). As discussed by Dworschak (2012), *P. maldivensis* can be distinguished from *P. bouvieri* by the relatively

strong posteromedian spine of the telson, the subequal and similar female chelipeds, and the possession of a row of spines on the ventral margin of the male major cheliped merus. In *P. bouvieri*, the chelipeds are distinctly unequal and dissimilar even in females; the ventral margin of the male major cheliped merus is expanded into a marginally denticulate lobe, though the size and shape of this lobe is rather variable. Dworschak (2012) showed that habitats are also different between the two species. *Paratrypaea maldivensis* inhabits the subtidal zone, extending near coral reefs, whereas *P. bouvieri* occurs in intertidal flats, including areas near mangroves. Our field observations in Okinawa well supports the observations by Dworschak (2012).

The status of *Paratrypaea* has been subject to disagreement. Komai and Tachikawa (2008) established the genus for *Callianassa bouvieri* (type species) and *C. rectangularis*. The authors considered various characters to diagnose *Paratrypaea*, following the scheme of Manning & Felder (1991), Poore (1994), Tudge et al. (2000), and Ngoc-Ho (2003), and discussed that *Paratrypaea* appeared closest to *Pestarella* Ngoc-Ho, 2003. Felder & Robles (2009) performed phylogenetic analysis of Callianassidae using 16S and 12S rDNA mitochondrial genes, and their result found support for continued recognition of many separate genera, particularly in Callianassinae. Dworschak (2012) continued to recognize *Paratrypaea* as a valid genus. On the other hand, Sakai (2011) and Sakai & Türkay (2012) regarded *Paratrypaea* as a junior synonym of *Gilvossius* Manning & Felder, 1992, originally established to accommodate *Gonodactylus setimanus* DeKay, 1844 from the eastern coast of the United States. Sakai (2011) considered only limited characters to diagnose genera in Callianassinae (i.e., shape of third maxilliped and development of first and second pleopods in males), not fully reflecting morphological diversity within the subfamily. Unfortunately, the criticism by Sakai & Türkay (2012: 736) against the molecular phylogenetic analyses of callianassids made by Felder & Robles (2009) does not make sense, and thus we cannot accept it at all.

Actually, *Gilvossius setimanus*, the type species of the genus, differs from the two species of *Paratrypaea* in several key characters, such as the absence of an acute rostral spine, the antennular peduncle distinctly longer than the antennal peduncle, the appendices internae on the third to fifth pleopods embedded in mesial edges of endopods, the lack of a

dorsal plate on the uropodal endopod, and the broadly rounded posterior margin of the telson (Manning & Felder 1992; this study). Furthermore, in *G. setimanus*, the merus of the male major cheliped has a prominent hook-like process on the ventral margin, whereas in two species of *Paratrypaea*, such a prominent hook-like process is not differentiated. In *P. bouvieri*, the merus of the male major cheliped bears a marginally denticulated lobe on the ventral margin; in *P. maldivensis*, there is a row of spines on the ventral margin of the merus of the male major cheliped (Fig. 2A). Consequently we follow Komai & Tachikawa (2008) and Dworschak (2012) to maintain *Paratrypaea* as a valid genus.

Acknowledgements

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References

- Borradaile, L.A., 1904. Marine Crustaceans. XIII. The Hippidea, Thalassinidea and Scyllaridea. In: J. S. Gardiner (ed.), *The Fauna and Geography of the Maldive and Laccadive Archipelagoes*. Pp. 750–754, pl. LVIII, University Press, Cambridge.
- DeKay, J.E., 1844. Crustacea. In: *Zoology of New-York, or the New-York fauna; comprising detailed descriptions of all the animals hitherto observed within the state of New-York, with brief notices of those occasionally found near its borders, and accompanied by appropriate illustrations, Part 6*. Carroll and Cook, Albany. 70 pp, 13 pls.
- Dworschak, P., 2012. On the identities of *Callianassa bouvieri* Nobili, 1904, *C. maldivensis* Borradaile, 1904, and *C. gravieri* Nobili, 1905 (Crustacea: Decapoda: Callianassidae): a morphometric approach. *Zootaxa*, 3149: 39–56.
- Felder, D.L. & R. Robles, 2009. Molecular phylogeny of the family Callianassidae based on preliminary analyses of two mitochondrial genes. In: J. Martin, K. A. Crandall & D. L. Felder (eds.), *Decapod Crustacean Phylogenetics (Crustacean Issues 18)*. Pp. 327–342, CRC Press, Taylor & Francis Group, Boca Raton, London, New York.
- Komai, T. & H. Tachikawa, 2008. Thalassinidean shrimps (Crustacea: Decapoda) from the Ogasawara Islands, Japan. *Natural History Research*, 10: 19–52.
- Man, J.G. de, 1928. A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach. *Capita Zoologica*, 2: 1–56, pls 1–12.
- Manning, R.B. & D.L. Felder, 1991. Revision of the American Callianassidae (Crustacea: Decapoda: Thalassinidea). *Proceedings of the Biological Society of Washington*, 104: 764–792.
- Manning, R.B. & D.L. Felder, 1992. *Gilvossius*, a new genus of callianassid shrimp from the eastern United States (Crustacea: Decapoda: Thalassinidea). *Bulletin of Marine Science*, 49: 558–561.
- Ngoc-Ho, N., 1991. Sur quelques Callianassidae et Upogebiidae de Nouvelle-Calédonie (Crustacea, Thalassinidea). In: B. Richer de Forges (ed.), *Le Benthos des Fonds Meubles des Lagons de Nouvelle-Calédonie Vol. 1*: 281–311. ORSTOM Editions, Paris.
- Ngoc-Ho, N., 2003. European and Mediterranean Thalassinidea (Crustacea, Decapoda). *Zoosystema*, 25: 439–555.
- Pearson, J., 1905. Report on the Macrura collected by Professor Herdman at Ceylon in 1902. In: *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar by W. A. Herdman. With Supplemental Reports upon the Marine Biology of Ceylon by Other Naturalists, Vol. 4*. Pp. 65–92, pls. 1, 2. London.
- Poore, G.C.B., 1994. A phylogeny of the families of Thalassinidea (Crustacea: Decapoda) with keys to families and genera. *Memoirs of Museum Victoria*, 54: 79–120.
- Sakai, K., 1999. Synopsis of the family Callianassidae, with keys to subfamilies, genera and species, and the description of new taxa (Crustacea: Decapoda: Thalassinidea). *Zoologische Verhandelingen*, 326: 1–152.
- Sakai, K., 2005. Callianassoidea of the world (Decapoda, Thalassinidea). *Crustaceana Monographs*, 4: 1–285.

- Sakai, K., 2010. Callianassoidea from the Gulf of Tonkin and the Red Sea, in the Zoological Museum of Moscow University (Decapoda, Thalassinidea). *Crustaceana*, 84: 1431-1467.
- Sakai, K., 2011. Axioidea of the world and a reconsideration of the Callianassoidea (Decapoda, Thalassinidea, Callianassida). *Crustaceana Monographs*, 13: 1-616.
- Sakai, K. and M. Türkay, 2012. A collection of Thalassinidea Latreille, 1831 (Decapoda, Pleocyemata) from the Senckenberg Forschungsinstitut and Natural History Museum, Frankfurt am Main. *Crustaceana*, 85: 723-765.
- Tudge, C.C., G.C.G. Poore & R. Lemaitre, 2000. Preliminary phylogenetic analysis of generic relationships within the Callianassidae and Ctenochelidae (Decapoda: Thalassinidea: Callianassoidea). *Journal of Crustacean Biology*, 20: 129-149.

要旨. 沖縄島沿岸の潮下帯砂泥域から採集された *Paratrypaea maldivensis* (Borradaile, 1904) について、形態的特徴と近縁種である *P. bouvieri* (Nobili, 1904) (ブビエスナモグリ) との識別点について記述した。本種は、これまでに紅海、モルジブ、スリランカ、ニューカレドニア、台湾から記録されていたが、今回、日本沿岸における分布が初めて確認された。さらに、本種の所属する *Paratrypaea* (ブビエスナモグリ属) の有効性について論議した。なお、現在までに本種に対する和名は与えられていないため、本研究で検討した雄標本 (RUMF-ZC-2609) を基準標本とし、新標準和名としてチゴスナモグリを提唱する。

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**沖縄島沿岸の潮下帯砂泥域から得られた日本
初記録のチゴスナモグリ (新称) (甲殻亜門:
十脚目: アナエビ下目: スナモグリ科)**

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