

A New Swimming Crab (Crustacea, Decapoda, Brachyura, Portunidae) from a Submarine Cave in the Philippines

Masatsune Takeda

Faculty of Modern Life, Teikyo Heisei University,
2–51–4 Higashi-Ikebukuro, Toshima-ku, Tokyo, 170–8445 Japan
E-mail: takeda-m@thu.ac.jp

(Received 8 September 2010; accepted 7 October 2010)

Abstract A new species of the genus *Catoptrus* A. Milne-Edwards of the family Portunidae (Crustacea, Decapoda, Brachyura) is described based on two specimens from the Marigondon Cave in the Philippines. The new species is characteristic in having the flattened oval carapace armed with four lobes and a spiniform epibranchial tooth at each anterolateral margin, the third maxilliped merus produced anterolaterally, and the fifth pereopod having the natatory dactylus.

Key words: Swimming crab, Portunidae, *Catoptrus*, new species, submarine cave, Philippines.

Introduction

Under the financial support of the Japanese Government, the research team led by Dr. Tomoki Kase of the National Museum of Nature and Science, Tokyo, collected many invertebrate specimens in West and South Pacific submarine caves. Most specimens of crabs collected by the team have already been recorded (Takeda, 1993, 1998, 2003; Ng and Takeda, 2003; Takeda and Komatsu, 2010), but two specimens of a new species of the family Portunidae to be described have been left behind. The new species has some intricate characters of *Libystes* A. Milne-Edwards, 1867 and *Catoptrus* A. Milne-Edwards, 1870, which were considered to be synonymous with each other by Stephenson and Campbell (1960) and Crosnier (1962), but regarded to be distinct from each other by Serène (1966) and recent authors. Some characters considered to be important for generic distinction between them are the ovate or subquadrate contour of the carapace, the thin or thick anterolateral margins of the carapace, the third maxilliped merus produced or not at the antero-external angle, and the lancerolate or natatory dactylus of the fifth pereopod. The specimens of the new species at

the author's hand are apparently distinct from all the known species of both genera, seven species of *Libystes* and five species of *Catoptrus*, and are characteristic in having the ovate carapace with the thin anterolateral margins like in the species of *Catoptrus*, the strongly produced antero-external angle of the third maxilliped merus like in the species of *Libystes*, and the natatory leg similar to those of two species of *Libystes*. In this paper, both genera are retained as distinct, and the new species is rather tentatively referred to *Catoptrus* chiefly based on close similarity of the carapace.

Two male specimens examined and designated as the holotype and paratype are preserved in the collections of the National Museum of Nature and Science, Tokyo (NSMT). The abbreviations used in the description: cb and cl indicate the breadth and length of the carapace, respectively.

Description

Genus *Catoptrus* A. Milne-Edwards, 1870

Catoptrus marigondonensis sp. nov.

(Figs. 1–4)

Material examined. Marigondon Cave, Mactan I., Philippines, May 3–4, 1994, male

(paratype, NSMT-Cr 21378; cb 19.0 mm, cl 12.8 mm), T. Kase leg. Same locality, Nov. 25–27, 1998, male (holotype, NSMT-Cr 21377; cb 12.5 mm, cl 8.8 mm), M. Takeda leg.

Description of the holotype. Carapace (Fig. 1) ovate, ratio of breadth and length being 1.42; dorsal surface smooth, evenly convex in both directions, shining without granules and setae; areolae indistinct, only with hardly traceable gastro-cardiac separation. Frontal margin about one third of carapace breadth, separated into two lobes by a median small notch; margin of each lobe very weakly convex forward along its main part, shallowly concave along lateral one fourth of frontal margin, then directed obliquely forward toward external orbital angle.

Orbit small, its breadth about one third of frontal margin; inner angle subacute, triangle, directed obliquely forward in dorsal view with oblique lateral part of frontal margin and longitudinal inner part of supraorbital margin; median part of supraorbital margin transverse toward a small but distinct notch; supraorbital margin directed obliquely forward toward blunt external orbital angle.

Anterolateral margin of carapace weakly arched, thin, cut into four lobes by three small notches and followed by epibranchial sharp spine (Figs. 1A, B, 3A); first lobe formed as an extension of external orbital angle, subequal to, or only slightly shorter than second lobe; third lobe about as long as first and second lobes combined; fourth lobe subequal to second lobe; epibranchial spine sharp, directed forward, with its outer margin nearly longitudinal; carapace widest between posterior ends of epibranchial spines of both sides. Posterolateral margin of carapace not sharply separated from posterior end of epibranchial spine, weakly concave, convergent, slightly shorter than anterolateral margin. Posterior margin of carapace straight for its median half, concave for each lateral one fourth to receive basal segment of fifth pereopod; median half of posterior margin wider than frontal margin of carapace, but shorter than frontorbital margin.

Infraorbital margin thin, raised, interrupted just below external orbital angle; its inner half convex forward as a lobe, without inner angle at orbital hiatus; its outer half not distinctly separated from inner half, almost transverse toward lateral interruption. Antennal basal segment narrow, with long flagellum of three times of orbital breadth. Antennule slender, folded transversely into fossa under frontal lobe, with a transverse ridge on its basal segment.

Third maxilliped (Fig. 1C) smooth, with well developed exopod; ischium with an oblique depression running from basal part close to basis to mesial one third of distal margin; central part of merus weakly convex, surrounded by weak depression, anterolateral angle strongly developed as a thin lobe directed obliquely outward; exopod half as wide as ischium, long, attaining distal end of anterolateral angle of merus.

Both chelipeds (Fig. 1A) long, stout, smooth, slightly unequal in shape. Inner margin of merus armed with three short, strongly procurved spines, fringed with accessory spinules; median and distal spines equidistant, but basal spine slightly close to median spine; outer margin of merus regularly convex, smoothly continuous with lower surface; upper surface of merus not convex dorsally, cut into three surfaces by a median longitudinal, obtuse ridge divided into two branches at basal one third of upper surface running toward anterior and posterior proximal ends of merus; inner lower surface of merus truncated, with a submarginal ridge along articulation with carpus. Carpus smooth, shining, without granules and ridges, armed with a spine at inner upper part. Palm smooth and shining, inflated, with more or less thickened upper and lower margins. Fingers of both chelipeds about two thirds as long as palm, different in shape, edges armed with dark-colored teeth; in left (small) cheliped both fingers slender, with sharp cutting teeth of different sizes; in right (large) cheliped immovable finger convex downward, a small gape being left between both fingers, with molar-like prehensile teeth throughout edges of both fingers.

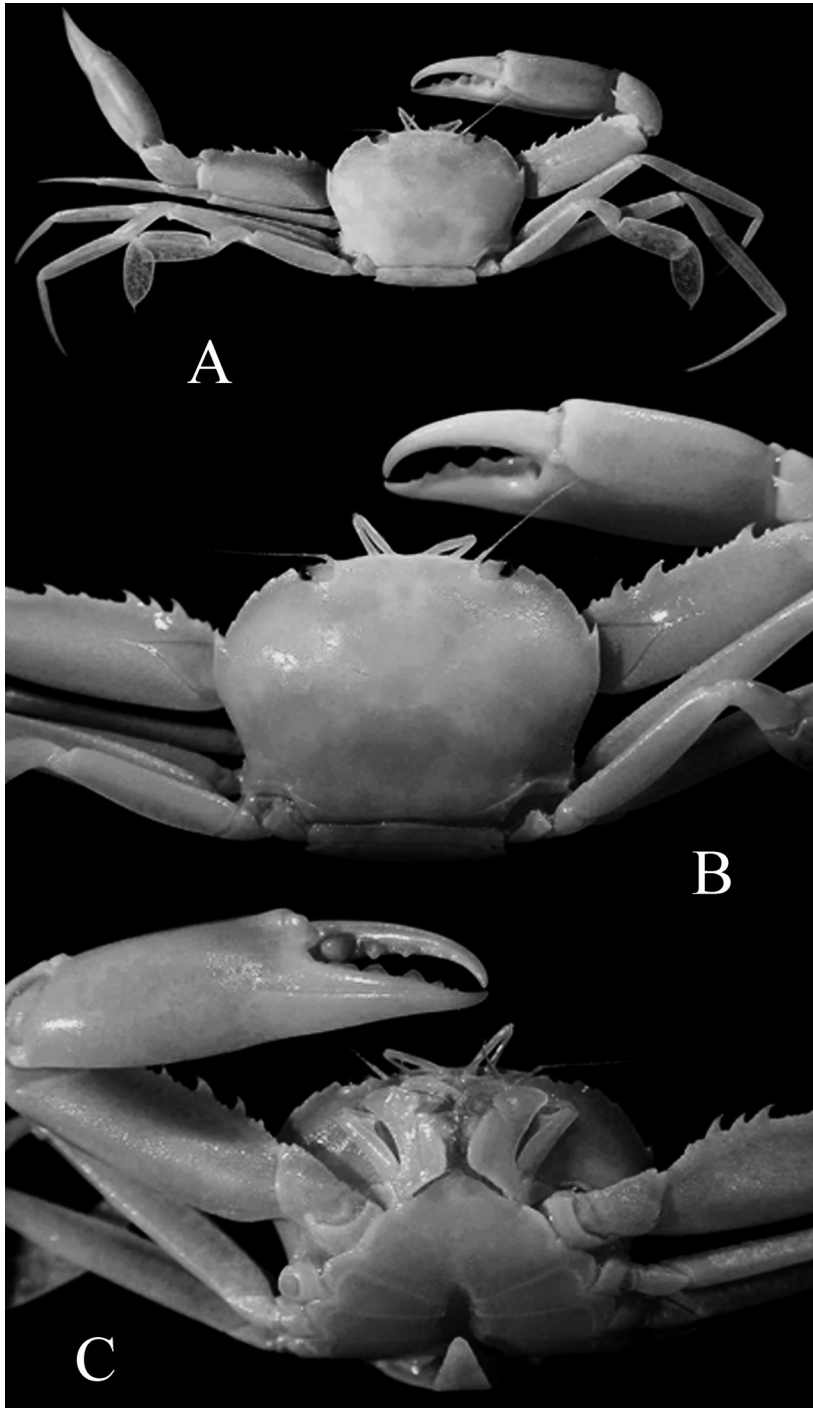


Fig. 1. *Catoptrus marigondonensis* sp. nov., holotype (NSMT-Cr 21377; cl 12.5 mm, cl 8.8 mm) in dorsal (A, B) and ventral (C) views.

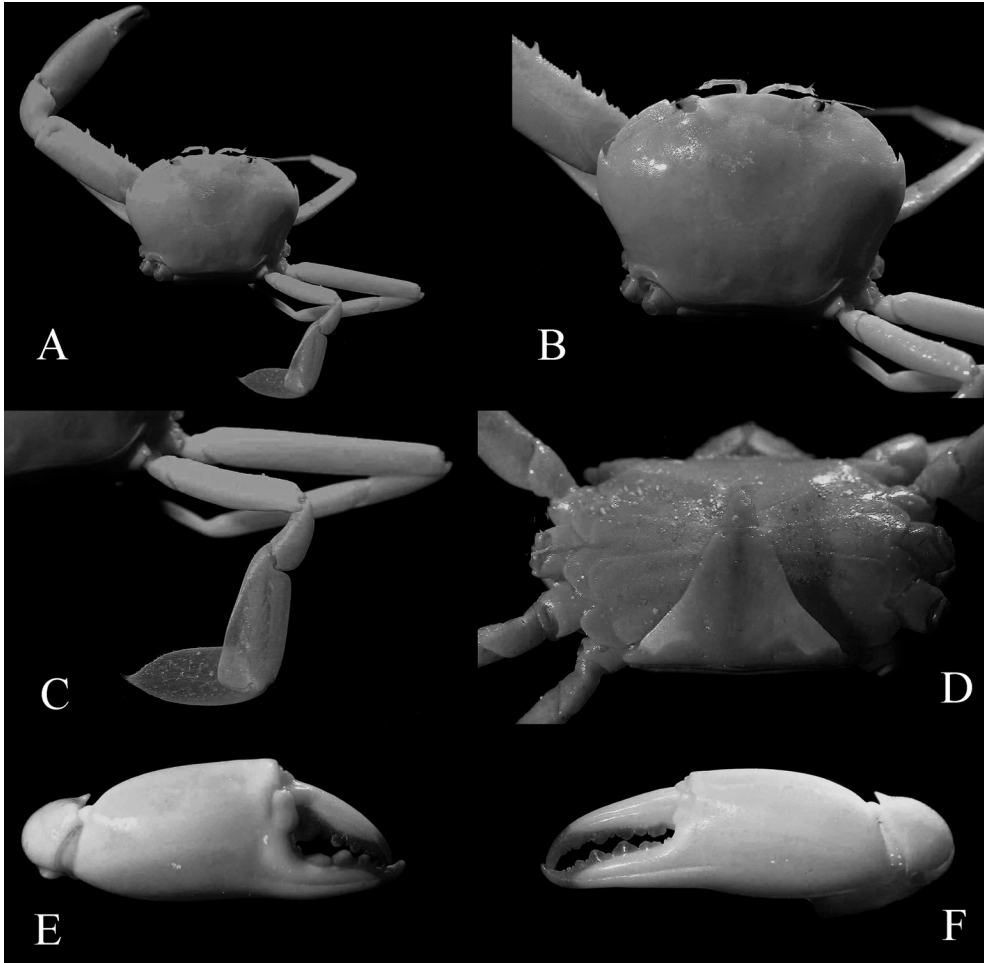


Fig. 2. *Catoptrus marigondonensis* sp. nov., paratype (NSMT-Cr 21378; cl 19.0 mm, cl. 12.8 mm). A, habitus in dorsal view; B, carapace, enlarged; C, third ambulatory leg and natatory leg of right side; D, abdomen, E, F, right (E) and left (F) chelae in outer view.

Ambulatory legs (Fig. 1A) remarkably slender, smooth, depressed. Fifth pereiopod well developed as natatory leg; merus and carpus weakly depressed like those of ambulatory legs, carpus curved strongly, about half as long as merus; propodus and dactylus thin, as long and high as to each other; propodus elongate quadrilateral, dactylus abruptly narrowed at distal one fourth, armed with microscopic corneous tubercles along distal two thirds of posterior margin and distal one third of anterior margin.

Abdomen wide, covering whole surface of eighth thoracic sternum between natatory legs of

both sides by second segment and basal part of fused third to fifth segments; first segment linear, shorter than second segment; third to fifth segments fused, without distinct traces of segmentation, narrowing abruptly toward median part of fused segment and then weakly toward sixth segment; sixth segment trapezoid, with distal margin half as wide as proximal margin; seventh segment as long as sixth segment, with sharp tip.

First pleopod as figured (Fig. 4C, D); proximal one third remarkably thickened, nearly horizontal *in situ*, distal two thirds slender, tapering distally, directed forward along thoracic trench, with lines

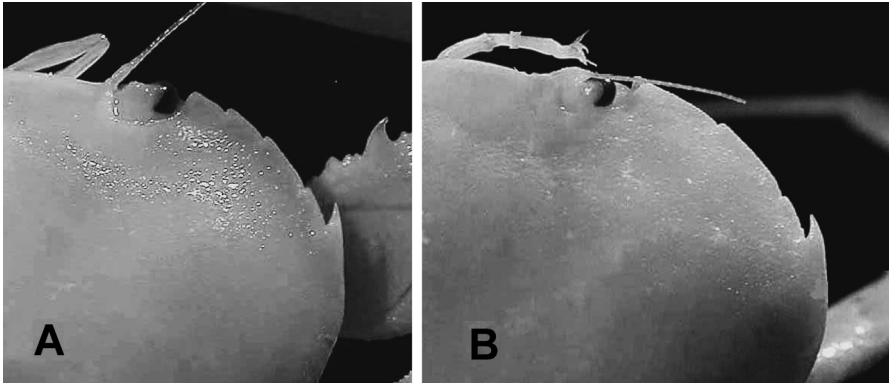


Fig. 3. *Catoptrus marigondonensis* sp. nov., holotype (A) and paratype (B), showing the four-lobed (A, holotype) and three-lobed (B, paratype) anterolateral margin of the carapace in front of the epibranchial spine.

of corneous small tubercles at subdistal part.

Notes on the paratype. The paratype male (Fig. 2) is larger than the holotype male; the carapace is proportionally wider, the ratio of the carapace breadth and length being 1.48, probably due to the developmental size difference. The carapace, chelipeds and ambulatory legs are in general very close to those of the holotype, but the anterolateral margin of the carapace in front of the epibranchial tooth is divided into three lobes different from four lobes in the holotype, with the first lobe undivided (Fig. 3B). The chelipeds (Fig. 2A, E, F) are more robust than in the holotype, with the right being the larger. Some ambulatory legs are missing. Both of the first pleopods are broken off at the subdistal parts, but the remaining part is very close to that of the holotype; the basal one third is thickened and horizontal *in situ*, and the main part is slender all along the length and directed forward near the basal part.

Color in life. The live color of the paratype is wholly brick red, without special tone. The color of the holotype is similar to that of the paratype, but paler and more or less pinkish.

Etymology. This species is named after the type locality, Marigondon Cave, Mactan Island, the Philippines.

Remarks. It is noted that the anterolateral margin of the carapace is cut into four lobes in the holotype (Fig. 3A) and three lobes in the

paratype (Fig. 3B). Although four lobes plus an epibranchial tooth are basic pattern in *Catoptrus* and *Libystes*, the number, size and shape of the anterolateral teeth are not always constant in some species, and therefore at present the different armature of the anterolateral margin in the paratype was considered to be not specific but variational.

Many decapod taxonomists have been worried and perplexed with validity of the genera *Libystes* and *Catoptrus* established by A. Milne-Edwards in 1867 and 1870, respectively. The type species of both genera, *Libystes nitidus* and *Capoptrus nitidus*, are distinctly different in the specific characters, but debatable in the generic distinction.

According to Ng *et al.*, (2008), the known species of *Libystes* are seven: *L. nitidus* A. Milne-Edwards, 1867, *L. alphonsi* Alcock, 1900, *L. edwardsi* Alcock, 1900, *L. villosus* Rathbun, 1924, *L. paucidentatus* Stephenson et Campbell, 1960, *L. vietnamensis* Tien, 1969, *L. lepidus* Miyake et Takeda, 1970, and the known species of *Catoptrus* are five: *C. nitidus* A. Milne-Edwards, 1870 (= *Goniocaphyra truncatifrons* de Man, 1888), *C. inaequalis* (Rathbun, 1906), *C. rathbunae* Serène, 1966, *C. quinquedentatus* Yang, Chen et Tang, 2006, and *C. undulatipes* Yang, Chen et Tang, 2006.

Stephenson and Campbell (1960) and Crosnier (1962) were of opinion that *Libystes* and *Catop-*

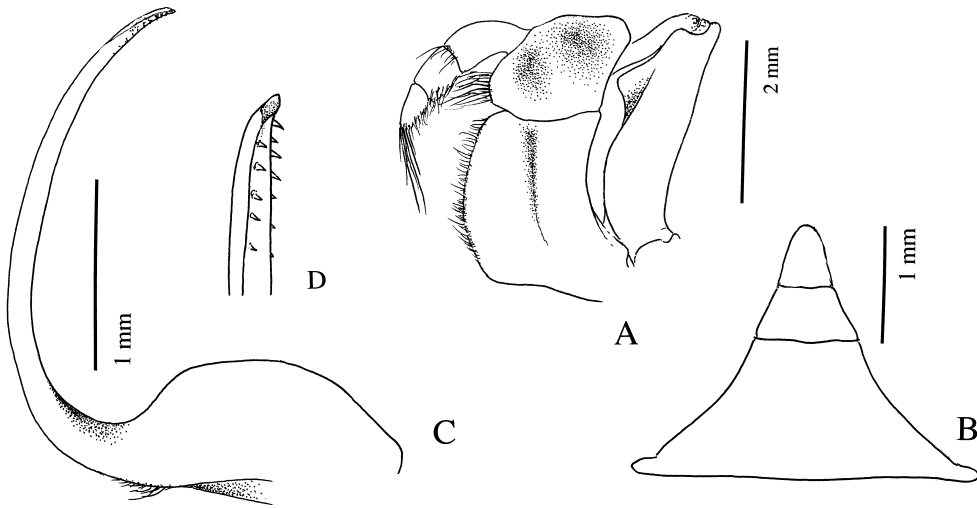


Fig. 4. *Catoptrus marigondonensis* sp. nov., paratype (A, B), holotype (C, D). A, third maxilliped of left side; B, abdomen; C, left first pleopod in sternal view; D, distal part of the same pleopod, enlarged.

trus are synonymous with each other, and thus suppressed *Catoptrus*, although they mentioned that the relative flattening of the fifth pereopod seems to have any quality of generic exclusiveness. On the other hand, Serène (1966) validated the two genera, and most of the subsequent researchers are generally of the same opinion. All the characters mentioned by Serène (1966) are not always generic, but it is true that the carapace is transversely quadrilateral with the thick anterolateral margins in *Libystes*, and transversely ovate with the thin anterolateral margins in *Catoptrus*, and also that the antero-external angle of the third maxilliped merus is strongly produced and auriculated in *Libystes*, but simply quadrate in *Catoptrus*. It is otherwise remarkable that in two species of *Libystes*, *L. edwardsi* and *L. paucidentatus*, the fifth pereopod is natatory with the widened dactylus, not lanceolate in the other species of both genera. Schweitzer *et al.* (2002) working on fossils summarized, without mention about the relation to *Catoptrus*, that the species of *Libystes* are diagnosed by 1) having the rectangular carapace, 2) that the front occupies one-third or less the maximum carapace width, being square and weakly sulcate axially, 3) having the shallow orbit with its upper margin

not interrupted, 4) having the entire or spinose anterolateral margin of the carapace, 5) that the carapace is much wider than long, smooth, relatively well-vaulted longitudinally and flattened transversely, and 6) having the slender ambulatory legs.

The new species is without doubt specifically distinct from all the known species of both genera in having the flattened oval carapace armed with four lobes and a spiniform epibranchial tooth at each anterolateral margin, the third maxilliped merus produced anterolaterally, and the fifth pereopod having the natatory dactylus, but the carapace is ovate in shape with the thin anterolateral margins as typical in *Catoptrus*, and the third maxilliped merus is developed as a lobe at its antero-external angle as in *Libystes*. In this paper, the new species was referred to the genus *Catoptrus* based on the close similarity of the carapace rather than the natatory leg of the fifth pereopod developed as in two species of *Libystes*, *L. edwardsi* and *L. paucidentatus*. Although the intervening form between the lanceolate and natatory forms is unknown to date, it is difficult at present to decide whether this character is generic or adaptive.

Acknowledgements

The author wishes to thank Dr. Tomoki Kase of the National Museum of Nature and Science, Tokyo, for offering the specimens from submarine caves not only in the West Pacific but also in the South Pacific and the eastern Indian Ocean, and to the staff of the National Museum of the Philippines for their kind assistance in the field work to collect the submarine crabs.

References

- Alcock, A. 1900. Material for a carcinological fauna of India. No. 6. The Brachyura Catometopa, or Grapsoidea. *Journal of the Asiatic Society of Bengal*, 69: 279–456.
- Crosnier, A. 1962. Crustacés Décapodes Portunidae. *Faune de Madagascar*, 16: 1–154, pls. 1–13.
- Man, J. G. de 1888. Bericht über die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv für Naturgeschichte*, 53: 215–600, pls. 7–22a.
- Milne-Edwards, A. 1867. Descriptions de quelques espèces nouvelles de Crustacés Brachyures. *Annales de la Société Entomologique de France*, 4: 263–288.
- Milne-Edwards, A. 1870. Notes sur le *Catoptrus*, nouveau genre appartenant à la division des Crustacés Brachyures Catamétopes. *Annales des Sciences Naturelles*, (5), 13: 82.
- Miyake, S. and M. Takeda 1970. A new portunid crab of the genus *Libystes* from the Ogasawara Islands, with note on *L. villosus* Rathbun from the Ryukyu Islands. *Ohmu*, 3: 29–36.
- Ng, P. K. L., D. Guinot and P. J. F. Davie 2008. *Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world*. *Raffles Bulletin of Zoology*, (Supplement), 17: 1–286.
- Ng, P. K. L. and M. Takeda 2003. *Atoportunus*, a remarkable new genus of cryptic swimming crab (Crustacea: Decapoda: Brachyura: Portunidae), with descriptions of two new species from the Indo-West Pacific. *Micronesica*, 35–36: 417–430.
- Rathbun, M. J. 1906. Brachyura and Macrura of the Hawaiian Islands. *Bulletin of the United States Fish Commission*, 23: 827–930, pls. 1–24.
- Rathbun, M. J. 1924. New species of crabs from Samoa. *Proceedings of the Biological Society of Washington*, 37: 127–128.
- Schweitzer, C. E., P. R. Scott-Smith and P. K. L. Ng 2002. New occurrences of fossil decapod crustaceans (Thalassinidea, Brachyura) from late Pleistocene deposits of Guam, United States Territory. *Bulletin of the Mizunami Fossil Museum*, 29: 25–49.
- Serène, R. 1966. Note sur les genres *Catoptrus* et *Libystes* et les *Catoptrinae* (Decapoda, Brachyura). *Bulletin du Muséum National d'Histoire Naturelle, Paris*, (2), 37: 989–1000, pl. 1.
- Stephenson, W. and B. Campbell 1960. The Australian portunids (Crustacea: Portunidae). IV. Remaining genera. *Australian Journal of Marine and Freshwater Research*, 11: 73–122.
- Takeda, M. 1993. A new swimming crab of the genus *Carupa* from submarine caves in the Ryukyu Islands. *Bulletin of the National Science Museum, Tokyo*, (A), 19: 145–150.
- Takeda, M. 1998. Crabs collected from submarine caves in the Palau Islands. *Natural Environmental Science*, 11: 43–47.
- Takeda, M. 2003. *Atoportunus doliochopus*, a new cavernicolous crab of the family Portunidae (Crustacea: Decapoda) from the Ryukyu Islands. *Bulletin of the National Science Museum, Tokyo*, (A), 29: 141–146.
- Takeda, M. and H. Komatsu 2010. A new xanthid crab (Decapoda, Brachyura) from a submarine cave in the Philippines. *Crustaceana Monographs*, 12: 677–683.
- Tien, D. D. 1969. New species and subspecies of swimming crabs (Portunidae) from the Tonkin Gulf and Hainan Island. *Zoologicheskii Zhurnal*, 48: 505–511. (In Russian with English summary.)
- Yang, S.-L., H.-L. Chen and B.-P. Tang 2006. On two new species of *Catoptrus*. A. Milne-Edwards, 1870 (Decapoda, Brachyura, Portunidae) from China. *Crustaceana*, 79: 835–842.