

New Records of the Hippolytid Shrimp, *Koror mysticius* CLARK, 1989, from Submarine Caves of the Ryukyu Islands

By

Thomas M. BRAND

Sakuradai, Nerima-ku, Tokyo

and

Masatsune TAKEDA

Department of Zoology, National Science Museum, Tokyo

Abstract The hippolytid shrimp, *Koror mysticius* CLARK, 1989, which has previously been known from five male specimens caught in a submarine cave off Koror Island, the Palau Islands, was found in several submarine caves of the Ryukyu Islands. The color in life is reproduced with photographs, and it is mentioned that *K. mysticius* may be widely distributed in the Indo-West Pacific, within interstitial habitats.

Dr. T. KASE, senior curator of the National Science Museum, Tokyo, and Prof. I. HAYAMI of the University of Tokyo made several extensive surveys of the so-called living fossils in submarine caves of the Ryukyu Islands. Their special interest is focused on cryptic mollusks like the *Pycnodonte* species described by them (HAYAMI & KASE, 1992), but many species collected during the surveys were described as new to science or recorded as new to the Japanese molluscan fauna (HAYAMI & KASE, 1993). They also collected samples of decapod crustaceans as possible predators on the cryptic mollusks to further their knowledge as a whole about the ecosystem in the completely or almost dark submarine caves.

As for these crustacean samples, only a paper describing a new swimming crab was recently published by TAKEDA (1993). This crab species is now considered to be the dominant predator on the mollusks in the caves.

The present paper is the second of the series dealing with the decapod crustaceans collected from submarine caves of the Ryukyu Islands, and will record the occurrence of the hippolytid shrimp, *Koror mysticius* CLARK, which has previously been described from five male specimens found in a submarine cave off Koror Island, the Palau Islands, as the monotypic representative of a new genus. This genus *Koror* is at present retained, with some comments, as one of the six monotypic genera in the family Hippolytidae, being distinguished from the closest genus *Parhippolyte* by the combination of some characters, as noted on the following pages.

More than 130 specimens examined, including 31 ovigerous females, represent the second record of *Koror mysticius*, the first record outside the Palau Islands, and

without doubt, the first in Japanese waters. However, examination of two specimens from the Seychelles in the collection of the National Science Museum, Tokyo, and a check of some photographs which have appeared in science books have revealed that *K. misticius* may be widely distributed in the Indo-West Pacific.

Family Hippolytidae

Genus *Koror* CLARK, 1989

Koror misticius CLARK, 1989

[New Japanese name: Ryûgû-moebi]

(Fig. 1)

Material examined. Ie-jima Is. — “Small Cave”, 18 m deep, 3 ♂ (cl 9.4, 8.1, 7.6 mm) (NSMT-Cr 1844), 2 ovig. ♀ (cl 15.3, 12.2 mm), 1 ♀ (cl 14.6 mm) (NSMT-Cr 1845), Oct. 12, 1990; 20 m deep, 12 ♂ (cl 5.0–11.9 mm), 16 ovig. ♀ (cl 10.4–16.0 mm), 4 ♀ (12.6–15.0 mm), 10 juv. (cl 3.6–4.5 mm) (NSMT-Cr 1846), Aug. 26, 1991; 18 m deep, 4 ♂ (cl 10.9, 11.5, 12.2, 12.3 mm), 7 ovig. ♀ (cl 11.4–16.8 mm), 1 ♀ (cl 13.0 mm) (NSMT-Cr 2186), 1 ovig. ♀ (cl 10.8 mm) (NSMT-Cr 2185), May 26, 1993; 18 m deep, 6 ♂ (cl 7.0–9.4 mm) (NSMT-Cr 2187), May 27, 1993; 18 m deep, 1 ♂ (cl 6.1 mm), 1 ovig. ♀ (cl 7.5 mm), 1 ♀ (cl 7.5 mm) (NSMT-Cr 2188), May 28, 1993.

Shimoji-shima Is. — “Devil’s Palace”, 25 m deep, 8 juv. (cl 4.4–7.4 mm) (NSMT-Cr 1849), Apr. 14, 1993. “Fool’s Palace”, 32–35 m deep, 1 ♂ (cl 10.1 mm) (NSMT-Cr 1847), 1 ♂ (cl 8.7 mm) (NSMT-Cr 1848), 41 ♂ (cl 7.6–11.6 mm), 2 ovig. ♀ (cl 12.8–14.7 mm, 1 juv. (cl 5.5 mm), 9 ♀ (cl 9.8–13.4 mm) (NSMT-Cr 1850), Apr. 14, 1993.

Irabu-jima Is. — “L-arch”, 25 m deep, 1 ovig. ♀ (cl 14.1 mm) (NSMT-Cr 1851), June 14, 1991. “Cross Hole”, 1 ovig. ♀ (cl 12.3 mm) (NSMT-Cr 1852), June 27, 1992.

Description. Rostrum extending almost to the distal end of basal segment of antennular peduncle, with 3 or 4 teeth on its dorsal margin (1 located postorbitally) and 1 or 2 on its ventral margin, rostrum being almost 5 times as long as high.

Antennal spine located posterodorsad to a distinct orbital angle and not extending beyond anterior margin of carapace. Branchiostegal spine extending beyond margin of carapace; both branchiostegal and antennal spines provided with horizontal carinae extending posteriorly.

Eye pigmented with cornea slightly broader than stalk.

Antennular peduncle with an acute stylocerite that does not extend beyond the end of distal segment. Second and third segments of antennular peduncle equal in length.

Antennal scale straight on outer margin with a distal tooth slightly overreaching rounded margin of blade. Antennal scale nearly twice as long as antennular peduncle.

Telson tapered to distal end with 2 pairs of dorsal spines; anterior pair located in posterior half of telson and posterior pair approximately halfway between first pair and tip of telson; its posterior margin armed with 3 pairs of movable spines.

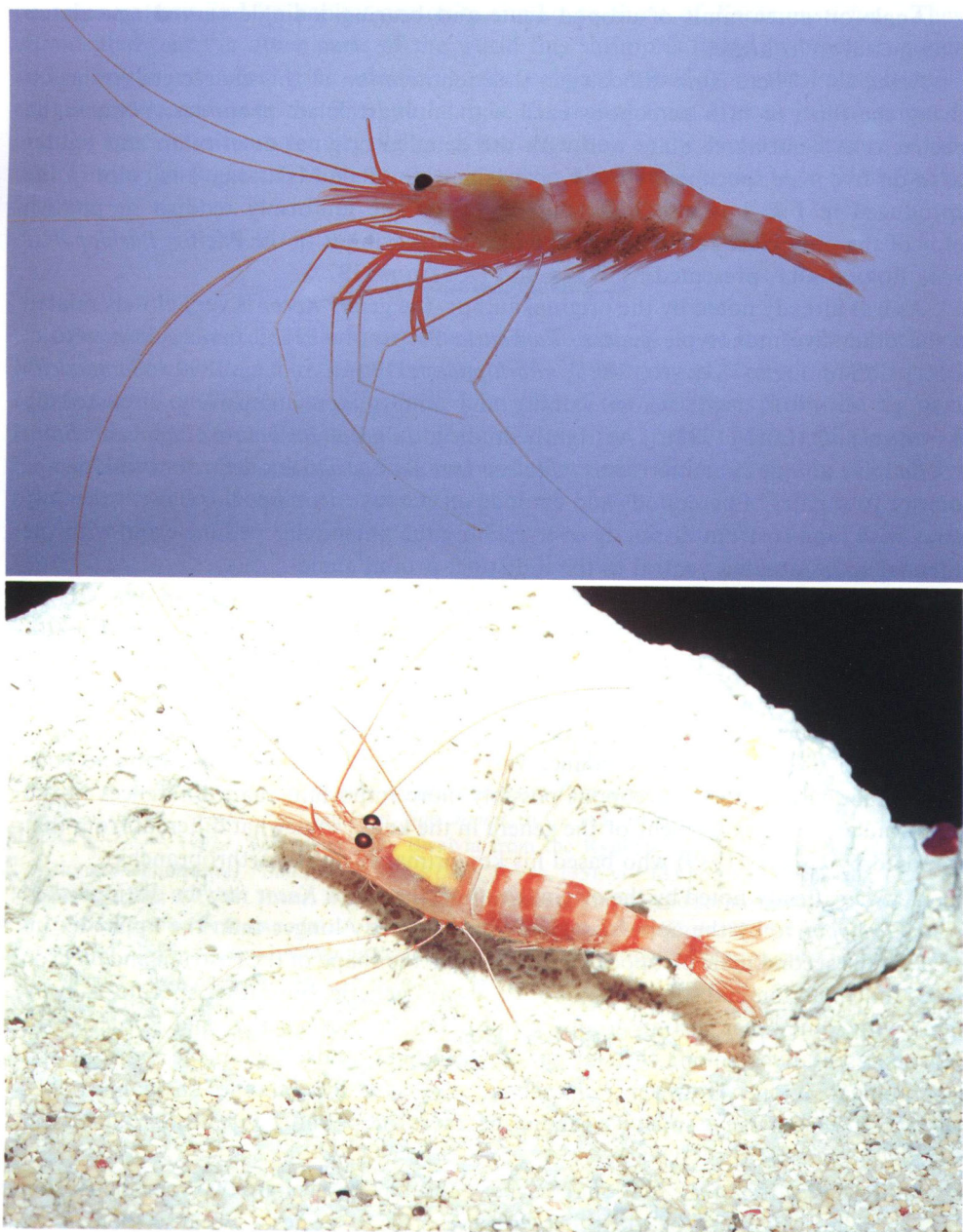


Fig. 1. *Koror misticus* CLARK, ovigerous female (NSMT-Cr 2185; cl 10.8 mm) from Shimojishima Island. Photographs taken in fresh condition (upper) and in life (lower).

Angle on outer ramis of uropod acute and bearing a single curved articulated spine mesial to its angle.

Remarks. There is no difficulty in the identification of this characteristic shrimp having the third to fifth pereopods each with multiarticulate propodus, because the specimens at hand agree quite well with the detailed original description and figures based on five male specimens from Koror Island, the Palau Islands. The color in life reproduced in Fig. 1 is also quite different from the uniformly reddish or pinkish color of the only close relative from the anchialine habitat in the Pacific, *Parhippolyte uveae* BORRADAILE, presented by WEAR and HOLTHUIS (1977).

As was already noted by the original author, the genus *Koror* is very closely related to the other five monotypic genera, *Barbouria* RATHBUN, 1912; *Janicea* MANNING et HART, 1984; *Ligur* SARATO, 1885; *Parhippolyte* BORRADAILE, 1899; *Somersiella* HART et MANNING 1981, whose validity and affinity were intensively discussed by MANNING and HART (1984). As rightly studied, *Janicea*, *Barbouria*, *Ligur* and *Somersiella* have unique characteristics. *Janicea* and *Barbouria* lack arthrobranchs on the anterior four pairs of pereopods and epipods on the first maxilliped. *Ligur* is the only genus with long rostrum distinctly overreaching the antennular peduncle and with the antennal spine situated ventral to the indistinct orbital angle.

Somersiella lacks podobranchs, but instead, has arthrobranch on the second maxilliped. The pereopods are not subdivided in *Barbouria* and *Ligur*, but multiarticulated for the carpi and propodi in *Janicea*, and for only the propodi in *Parhippolyte*, *Somersiella* and *Koror*. It is very difficult to decide which characters, subdivision of the pereopods or differences in the gill formulas, are most important at the generic level. However, in accordance with MANNING and HART (*op. cit.*) who considered subdivision of the pereopods possibly more important than differences in the gill formulas, the arrangement of the genera in the key is somewhat different from that proposed by CLARK (1989) who based his key primarily on the arthrobranchs.

As was already noted by the original author, the genus *Koror* may be distinguished from *Parhippolyte* by the appendix masculina distinctly longer than the appendix interna on the second male pleopod. Differences in the shape of the rostrum and pleuron of the fourth abdominal somite may not be always generic, but rather specific, as compared with some other shrimp groups. In the Pacific, *Parhippolyte* and *Koror* are the only representatives among the six monotypic genera, and occur in the same general geographical region. However, *Parhippolyte uveae* is an inhabitant of anchialine pools, whereas *Koror misticius* inhabits submarine caves or possibly interstitial habitats in rocks.

In the collection of the National Science Museum, Tokyo, are two specimens from the Seychelles which can be identified with the present species. Because there is no record of habit and habitat, it is reasonably considered that the specimens did not come from a specialized habitat such as submarine caves.

FIELDING and ROBINSON (1987) presented a fine color photograph of a shrimp found in deep lava caves in Hawaii. Though it was identified as *Parhippolyte uveae*,

its color pattern and its habitat are quite similar to those of *Koror misticius*. They commented that "in other parts of the world this shrimp is found in brackish ponds and is bright red color." In addition to the original record from the Palau Islands, the present record from the Ryukyu Islands, the record from Hawaii just mentioned, and the specimens from the Seychelles in the collection of the National Science Museum, Tokyo, all suggest that *K. misticius* is widely distributed in the Indo-West Pacific waters.

Acknowledgements

The authors' cordial thanks are due to Dr. Tomoki KASE of the National Science Museum, Tokyo, and Dr. Itaru HAYAMI of the University of Tokyo, and also Mr. Minoru ASAI of Tokyo Sea Life Park, who placed the specimens from the Ryukyu Islands and the Seychelles at the authors' disposal for study. Mr. Junji OKUNO of Nihon University School of Agricultural and Veterinary Sciences kindly offered the photographs reproduced in the present paper.

Literature

- CLARK, J., 1989. *Koror misticius*, new genus, new species (Decapoda: Hippolytidae), a cave shrimp from Palau. *J. crust. Biol.*, **9**: 445-452.
- FIELDING, A., & E. ROBINSON, 1987. An Underwater Guide to Hawai'i. 156 pp, University of Hawaii Press, Honolulu.
- GORDON, I., 1936. On hippolytid prawns of the genus *Ligur* SARATO. *Proc. Linn. Soc. London*, **1935-36**: 102-108.
- HAYAMI, I., & T. KASE, 1992. A new cryptic species of *Pycnodonte* from Ryukyu Islands: A living fossil oyster. *Trans. Proc. palaeont. Soc. Japan*, (n.s.), **165**: 1070-1089.
- & —— 1993. Submarine cave Bivalvia from the Ryukyu Islands: Systematics and evolutionary significance. *Bull., Univ. Mus., Univ. Tokyo*, (35), vi+133 pp., 1 frontispiece.
- MANNING, L. B., & C. W. HART, Jr., 1984. The status of the hippolytid shrimp genera *Barbouria* and *Ligur* (Crustacea: Decapoda): A reevaluation. *Proc. biol. Soc. Wash.*, **97**: 655-665.
- TAKEDA, M., 1993. A new swimming crab of the genus *Carupa* from submarine caves in the Ryukyu Islands. *Bull. natn. Sci. Mus., Tokyo*, (A), **19**: 145-150.
- WEAR, R. G., & L. B. HOLTHUIS, 1977. A new record for the anchialine shrimp *Ligur uveae* (BORRADAILE, 1899) (Decapoda, Hippolytidae) in the Philippines with notes on its morphology, behaviour and ecology. *Zool. Meded.*, **51**: 125-140, pls. 1-2.

