

Description of a New Hinge-beak Shrimp, *Rhynchocinetes conspiciocellus*, from Southern Japan, with Designation of the Lectotype of *R. uritai* KUBO, 1942

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Abstract A new shrimp of the family Rhynchocinetidae is described under the name of *Rhynchocinetes conspiciocellus* based on the specimens from several localities along the coast of southern Japan. It is most closely related to *R. uritai* KUBO, but distinguished from the latter species and also from the other species by the combination of the features that the third abdominal segment is provided dorsally with a conspicuous ocellus, the first and second pereopods bear arthrobranches, and the outer margin of endopod of male first pleopod is entire, without lobe. To prevent the nomenclatural confusion a male is selected as the lectotype for *R. uritai* from the specimens studied by the late Prof. I. KUBO.

Introduction

In the early summer of 1990, the senior author captured three specimens of hinge-beak shrimp of the family Rhynchocinetidae in shallow water at Kita Harbor of Haha-jima Island in the Ogasawara Islands, about 1000 km south of Tokyo. The general color pattern with red lines and white spots is closely similar to that of *Rhynchocinetes uritai* KUBO which is commonly found in rocky shore along central Japan, but differs most remarkably in the presence of a conspicuous dark-colored ocellus on the dorsal median part of third abdominal segment. At the first glance, we regarded the ocellated specimens as falling within the color variation of *R. uritai*. In the next year, however, two additional specimens were collected from Hayama on the west coast of the Miura Peninsula faced to Sagami Bay and also from Hachijo-jima Island in the Izu Islands, together with the typical specimens referable to *R. uritai*. Furthermore, during the comparative study, we could examine two males and a female of ocellated shrimps through the kind arrangements of Dr. K.-I. HAYASHI of Shimonoseki University of Fisheries and Mr. Y. MAIHARA of the Marine Science Museum of Tokai University. The close examination of all the specimens revealed that there are some constant differences not only in the color pattern, but also in the morphological characters.

In the present paper, the ocellated shrimps are described as a new species under the name of *Rhynchocinetes conspiciocellus*. The type specimens of the new species are deposited in the Museum of Tokyo University of Fisheries (MTUF), the National Science Museum, Tokyo (NSMT) and Shimonoseki University of Fisheries (SUF). One of the paratypes (1 ovig. ♀, from NSMT-Cr 1476) was sent to the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM).

Measurements are as follows. The rostrum is measured from the tip to the basal articulation. The antennal scale is taken along the outer margin including a distal spine. The length of each propodus of first and second pereopods is taken at the inner margin, being equal to the length of palm and fixed finger combined. Other appendices are measured each along the longest upper margin excluding the distal spine. Length of carapace is abbreviated as cl.

Description of a new species

Family Rhynchocinetidae

Genus *Rhynchocinetes* H. MILNE EDWARDS, 1847

Rhynchocinetes conspiciocellus sp. nov.

[New Japanese name: Yaito-sarasaebi]

(Figs. 1–3, 4A–D; pl. 1, figs. A, B)

Type series: Holotype. Ovig. ♀ (NSMT-Cr 11102, cl 11.9 mm), Sokodo Beach, Hachijo-jima I., Izu Is., Japan (33°07'N, 139°49'E), 1 m depth, Sept. 5, 1991, J. OKUNO leg.

Paratypes. Eight specimens. 1 ♂, 1 ovig. ♀ and 1 ♀ (NSMT-Cr 1476, cl 4.8 mm, 6.2 mm and 4.0 mm), Kita Harbor, Haha-jima I., Ogasawara Is., Japan (24°42'N, 142°08'E), 0.5 m depth, June 15, 1990, J. OKUNO leg.; 1 ovig. ♀ (NSMT-Cr 11103, cl 11.0 mm), Hayama on west coast of Miura Penin., Sagami Bay, Honshu, Japan (35°15.8'N, 139°34.3'E), 3 m depth, Aug. 3, 1991, J. CHIBA leg.; 1 ♂ (SUF 530–2–1406, cl 14.5 mm), Kushimoto on southern tip of Kii Penin., Honshu, Japan (33°28.3'N, 135°47'E), Feb. 17, 1977; 1 ♂ (SUF 530–2–1407, cl 9.2 mm), Enashi on northwest coast of Izu Penin., Suruga Bay, Honshu, Japan (35°09'N, 138°43.3'E), Aug. 25, 1983, Y. MAIHARA leg.; 1 ♀ (SUF 530–2–1408, cl 7.8 mm), Enashi, Suruga Bay, 5–10 m depth, Nov. 18, 1983, Y. MAIHARA leg.; 1 ovig. ♀ (MTUF, cl 13.5 mm), one of the specimens studied by the late Prof. I. KUBO, Kominato on east coast of Boso Penin., Honshu, Japan (35°07.3'N, 140°11.6'E), Apr. 13, 1941, I. KUBO leg.

Description: Body subcylindrical (Fig. 1). Carapace (Fig. 2A) without any lateral ridge, having many fine transverse striae that are almost parallel to each other; depth of carapace 0.6–0.7 times as long as carapace (0.7 times in holotype). Two large sharp teeth on dorsal carina behind rostral articulation; supraorbital and antennal spines sharply pointed and directed forward, exceeding anterior margin of carapace; pterygostomial spine small, not as sharp as above two spines.

Rostrum (Fig. 2A) laterally compressed and curved obliquely upward along its

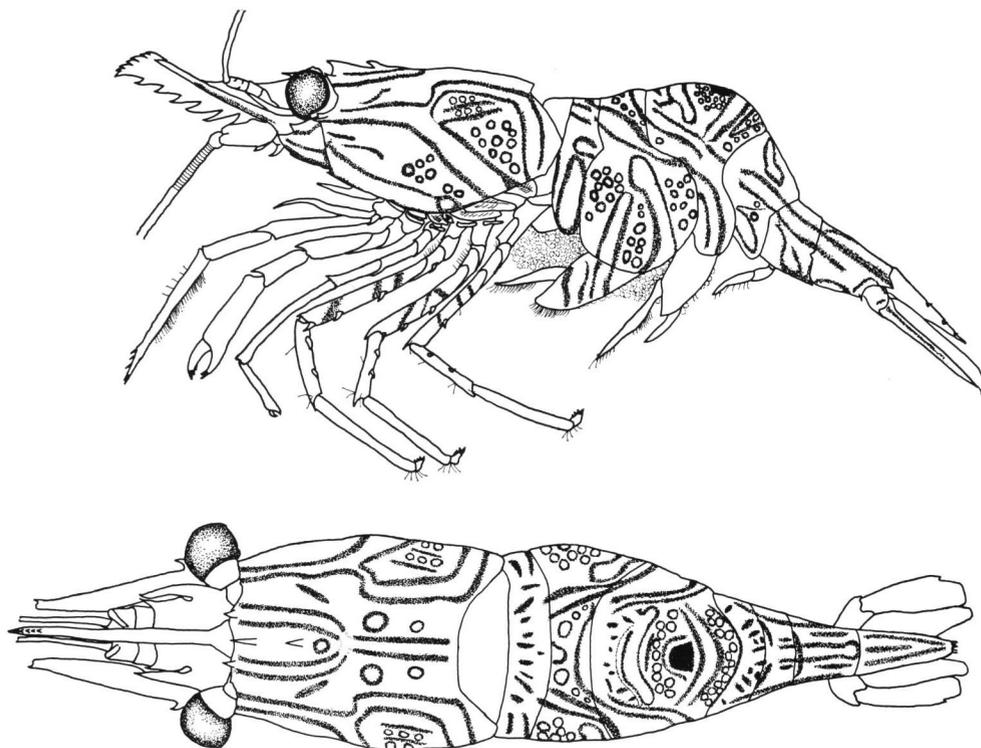


Fig. 1. *Rhynchocinetes conspiciocellus* sp. nov. Ovigerous female, holotype (11.9 mm cl, NSMT-Cr 11102).

distal half, being 1.1–1.4 times longer than carapace (1.1 times in holotype); upper margin armed with two large teeth on its proximal half and 4–6 (6 in holotype) small teeth at its distal extremity; lower margin with 12–15 (13 in holotype) large teeth decreasing in size distally.

Abdomen also covered with fine striae similar to those on carapace; third segment weakly humped posterodorsally; pleurae of first three segments rounded; fourth segment with its posteroventral angle rather backward produced; fifth segment with an acute small process at its posterolateral corner which is directed backward; sixth segment 0.4–0.7 times as long as carapace (0.5 in holotype), with a sharp small spine directed downward just in front of base of uropod. Telson (Fig. 2D) 0.5–0.6 times as long as carapace (0.6 in holotype), with three pairs of equidistant small spines on distal two thirds of dorsal surface; median dorsal part of posterior margin (Fig. 2E) with an acute small process, bearing three spines at each side, median one of which is longer than others.

Eye very large, nearly globular; cornea dark, much broader than eyestalk, greatest breadth being about one fourth as long as carapace.

External margin of antennular peduncle (Fig. 2B) strongly convex at proximal

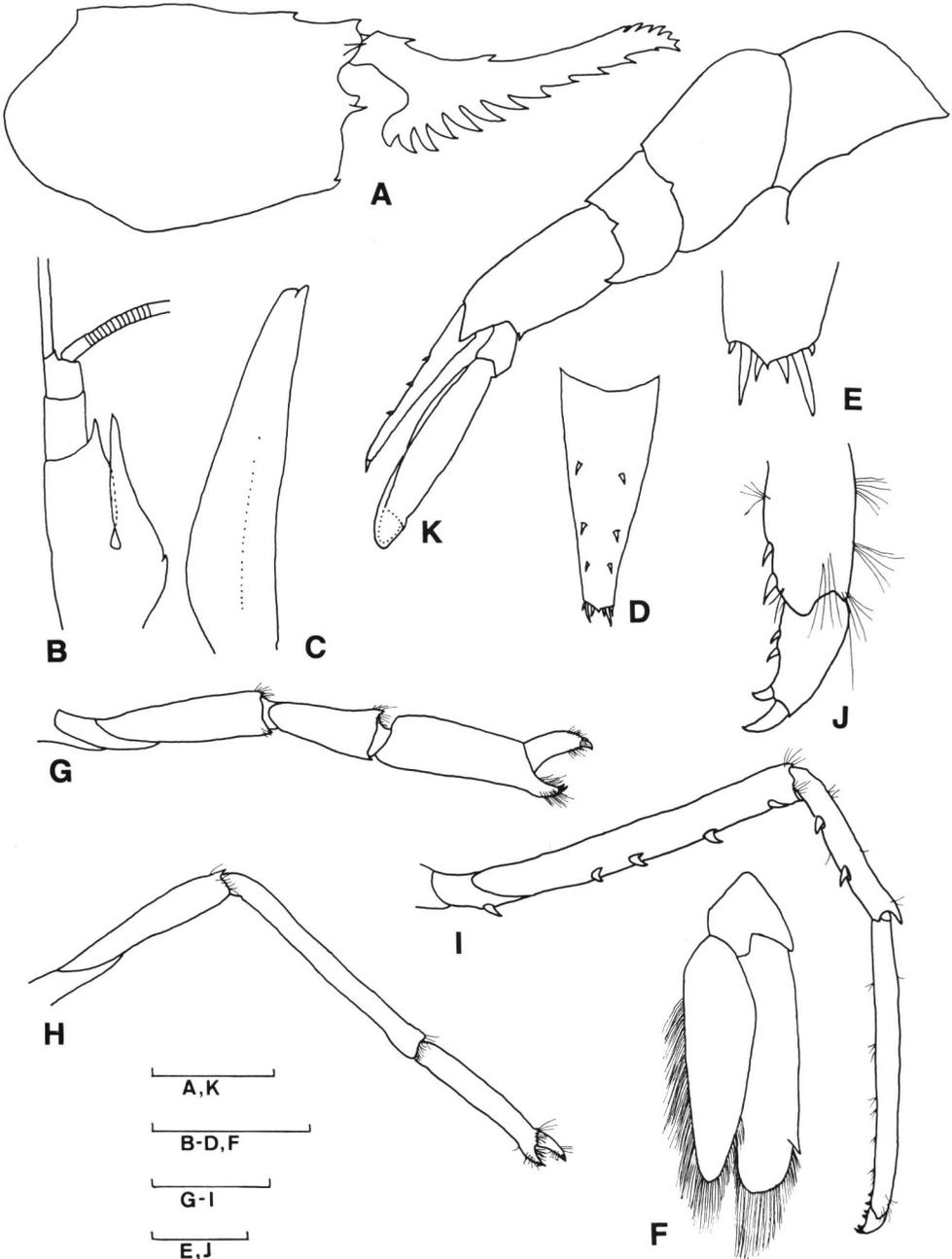


Fig. 2. *Rhynchocinetes conspiciocellus* sp. nov. Ovigerous female, paratype (11.0 mm cl, NSMT-Cr 11103) (A-J); male, paratype (9.2 mm cl, SUF 530-2-1407) (K). A, carapace with rostrum; B, antennular peduncle; C, antennal scale; D, telson; E, posterior margin of telson; F, uropod; G, first pereopod; H, second pereopod; I, third pereopod; J, dactylus of third pereopod; K, third to sixth abdominal segments. Scales for A-D, F, K=5 mm, E, K=5 mm, E, J=0.5 mm, and G-I=2.5 mm.

part; stylocerite sharply pointed at distal end, usually a little beyond proximal margin of next segment; in holotype, stylocerite a little beyond distal end of external spine of antennular proximal segment.

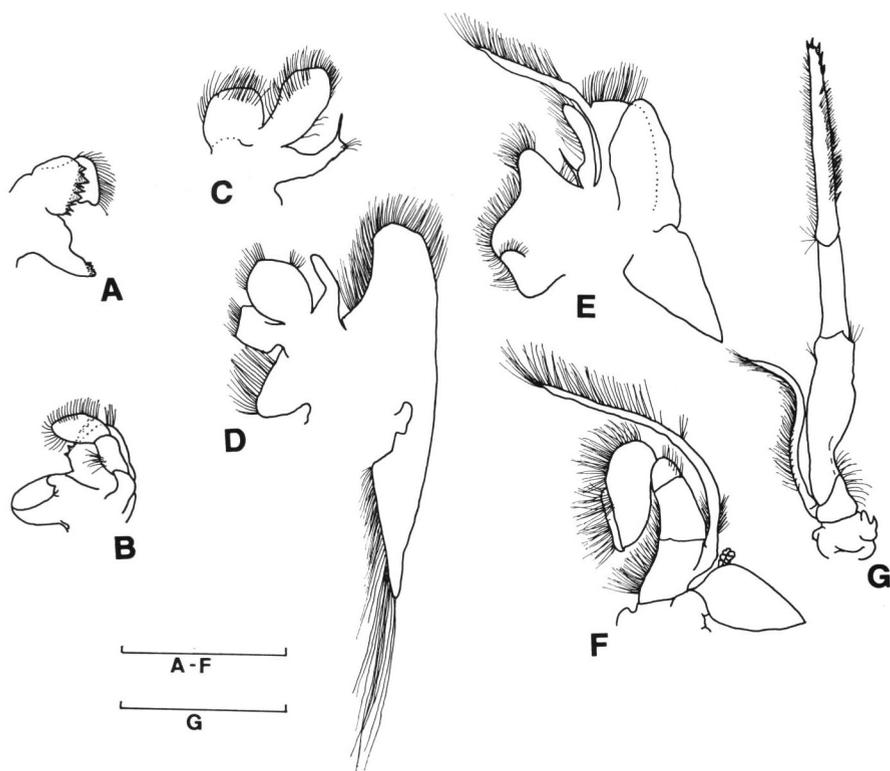


Fig. 3. *Rhynchocinetes conspicuocellus* sp. nov. Ovigerous female, paratype (11.0 mm cl, NSMT-Cr 11103). A, B, mandible in outer and inner views, respectively; C, first maxilla; D, second maxilla; E, first maxilliped; F, second maxilliped; G, third maxilliped. Scales for A-F=10 mm, and G=5 mm.

Antennal scale (Fig. 2C) broad at basal part, narrower distally, failing to reach rostral apex, being 0.8–1.0 times as long as carapace (0.8 in holotype), 0.7–0.9 times as long as rostrum (0.8 in holotype); external distal spine strong, beyond tip of lamella.

Mouthparts similar to those of congeners. Incisor process of mandible (Fig. 3A) with large dark cutting teeth at apex; three-jointed mandibular palp with many marginal setae at distal segment. Proximal endite of first maxilla (Fig. 3C) broader than distal endite, with distal end of this palp very sharply pointed. In second maxilla (Fig. 3D), scaphognathite well developed, conspicuously extended backward, with sharp distal end; distal endite of second maxilla with two lobes.

Maxillipeds with both of epipod and exopod. Epipod of first maxilliped (Fig. 3E) with two lobes. Exopod of third maxilliped reaches proximal one third of penultimate segment; third maxilliped (Fig. 3G) usually reaches beyond rostral tip, its

Table 1. Branchial formula of *Rhynchocinetes conspiciocellus* sp. nov.

| | I | II | III | I | II | III | IV | V |
|----------------|---|----|-----|---|----|-----|----|---|
| Pleurobranches | | | | 1 | 1 | 1 | 1 | 1 |
| Arthrobranches | | | 2 | 1 | 1 | | | |
| Podobranches | | 1 | | | | | | |
| Epipods | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Exopods | 1 | 1 | 1 | | | | | |

ultimate segment armed with 6 or 7 dark small spines near its apex (7 in holotype); in female and young male, ultimate segment 1.8–2.2 times as long as penultimate segment (1.8 in holotype); in large male, third maxilliped remarkably elongated, exceeding rostral tip by ultimate segment which is armed with only one small spine at distal end and 3.4 times as long as penultimate segment.

Branchial formula as shown in Table 1.

First pereopod (Fig. 2G) robust, elongated, usually reaching median part of antennal scale in female and young male; carpus with a strong acute spine at its upper distal end; propodus 1.4–1.9 times as long as carpus (1.7 in holotype); in large male, this pereopod extended beyond rostral tip, propodus about three times as long as carpus.

Second pereopod (Fig. 2H) slenderer than first pereopod, usually reaching distal two thirds of antennal scale; propodus 0.5–0.7 times as long as carpus (0.6 in holotype).

Last three pereopods similar in form and length to each other, robuster than second pereopod; each merus of all pereopods usually with three strong acute spines at outer margin, but in one ovigerous female paratype, merus of third pereopod armed with four spines; each carpus of all pereopods with two strong sharp spines at outer surface; each dactylus of all pereopods with a sharp dark claw at distal end, and three smaller spines on inner margin. Third pereopod (Fig. 2I) usually reaches tip of antennal scale; ischium armed usually with a strong sharp spine at lower part of outer surface, but rarely unarmed; merus 0.7–0.9 times as long as carapace (0.9 in holotype); carpus 0.3–0.4 times as long as carapace (0.4 in holotype), 0.3–0.5 times as long as merus (0.3 in holotype), 0.4–0.6 times as long as propodus (0.6 in holotype); propodus 0.6–0.7 times as long as carapace (0.6 in holotype), 0.8–0.9 times as long as merus (0.8 in holotype). Fourth pereopod exceeds distal two thirds of antennal scale; ischium unarmed or armed with one spine at lower part of outer surface (unarmed in holotype); merus subequal to, or slightly shorter than, that of third pereopod in length, being 0.7–0.8 times as long as carapace (0.7 in holotype); carpus 0.3–0.4 times as long as carapace (0.3 in holotype), 0.4–0.5 times as long as merus (0.5 in holotype), 0.5–0.6 times as long as propodus (0.6 in holotype); propodus as long as that of third pereopod, 0.8–1.0 times as long as merus (0.9 in holotype). Fifth pereopod reaches median part of antennal scale; ischium unarmed or armed with one spine at lower part of outer margin (unarmed in holotype); merus only slightly shorter than that of third pereopod, being 0.6–0.7 times as long as carapace (0.6 in holotype); carpus as long as those of two

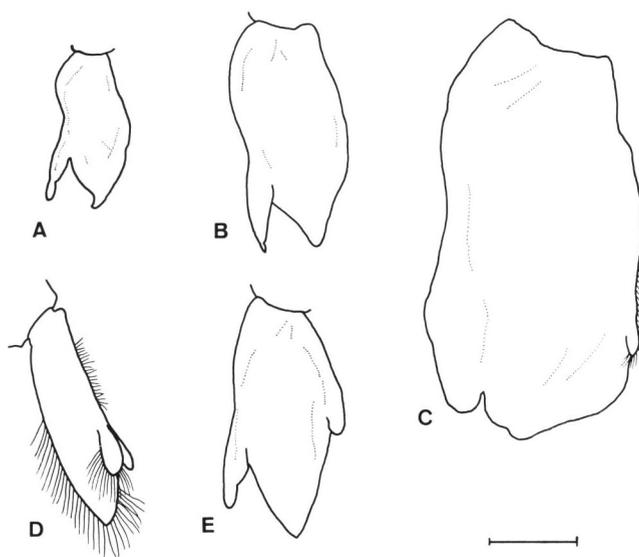


Fig. 4. *Rhynchocinetes conspiciocellus* sp. nov. Endopods of first (A–C) and second (D) pleopods. Male, paratype (4.8 mm cl, NSMT-Cr 1476) (A); male, paratype (9.2 mm cl, SUF 530–2–1407) (B, D); male, paratype (14.5 mm cl, SUF 530–2–1406) (C).

Rhynchocinetes uritai KUBO. Endopod of first pleopod of male (6.4 mm cl, NSMT-Cr 10961) (E). Scale represents 5 mm.

preceding pereopods, 0.5–0.6 times as long as merus (0.6 in holotype); propodus 0.6–0.7 times as long as carapace (0.6 in holotype), 0.9–1.0 times as long as merus (1.0 in holotype).

In young males with carapace length 4.8 mm and 9.2 mm, endopod of each first pleopod rather broader than that of female; apex of endopod bluntly pointed, differing from sharply pointed one in female; outer margin of endopod usually entire, without lobe, in both sexes; in a large male of cl 14.5 mm, endopod greatly enlarged and pear-shaped, with a very small lobe at outer margin.

Endopod of male second pleopod (Fig. 4D) with appendices interna and masculina. Appendix masculina fringed with dense setae at its apex and outer margin, its length being subequal to that of appendix interna.

Color in life (Pl. 1A, B): Ground color rather hyaline and pale, with labyrinth of red lines, being interspaced by white lines and ocelli. Rostral tip yellowish. Dorsal median surface of carapace with Y-shaped white lines. A crowd of white ocelli on dorsal median surface of third abdominal segment, forming white and red meshwork; a prominent dark-colored, more or less quadrate ocellus at median part of meshwork. Meri of third to fifth pereopods with oblique white and red bands.

Distribution: The present species ranges from Kominato on the east coast of the Boso Peninsula, to Kushimoto on the southern tip of the Kii Peninsula, and also

to Haha-jima Island in the Ogasawara Islands. The detailed localities are mentioned in the data of type specimens.

Etymology: *Rhynchocinetes conspiciocellus* was named after the distinct dark-colored ocellus on the dorsal median surface of third abdominal segment.

Remarks: The present new species is closely related to *Rhynchocinetes uritai* KUBO, 1942, in the morphological characters and the color in life. *R. uritai* was originally described on the basis of several specimens from some localities around Japan. The original author stated that an ocellus appears on the dorsal surface of third abdominal segment of large female as the sexual dimorphism. However, taking the present materials into consideration, the ocellus is present not only in the ovigerous female, but also in the males and small unovigerous females. Also, the occurrence of the ocellus is not referred to the geographic variation, because some ocellated shrimps were found together with unocellated shrimps. Therefore, the presence of the ocellus should be regarded as one of the distinguishing characters of the species distinct from the unocellated species, *R. uritai*.

Apart from the detailed color pattern and the presence or absence of the dorsal ocellus, *R. uritai* and the new species also differ from each other in the shape of endopod of male first pleopod and the comparative length of rostrum and antennal scale. 1) In three males (cl 4.8, 9.2 and 14.5 mm) of the new species, the outer margin of endopod of first pleopod is entire in the smaller two males and provided with a very small lobe at its subdistal part in the largest male, but provided always with a prominent lobe at its subdistal part in *R. uritai* (Fig. 4). The subdistal lobe of *R. uritai* remarkably developed in the smaller males and may diminish the size according to the developmental stage. 2) The relationship between the length of rostrum and antennal scale is shown in Fig. 5. It is apparent that the new species has the longer antennal scale, being 0.7–0.9 times as long as rostrum (N=9), while in *R. uritai* it is 0.6–0.7 times as long as rostrum (N=27).

The new species is also similar to *R. australis* HALE, 1941 from southwestern Australia and *R. kuitteri* TIEFENBACHER, 1983 from southern Australia, in the general morphological characters, although the color pattern is apparently different from them. Through the kind courtesy of Dr. A. J. BRUCE of the Northern Territory Museum, Darwin, Australia, the direct comparison of the specimens of *R. australis* and the new species were made possible, as noted below. 1) In *R. australis* the rostrum is armed with three or four teeth at the apex of its upper margin, but five or six (very rarely four) in the new species. 2) The number of spines on the outer surface of meri of third to fifth pereopods also differs from each other; five or six spines in *R. australis*, and three or four spines in the new species. 3) The rostrum is comparatively shorter in *R. australis*, with 0.9–1.1 times of carapace length (N=9), than in the new species, with 1.1–1.4 times of carapace length.

We have no chance to examine the specimen of *R. kuitteri*. The color in life represented by the original author differs obviously from that of the new species, but it is noted at present that the meristic characters are completely overlapped with those

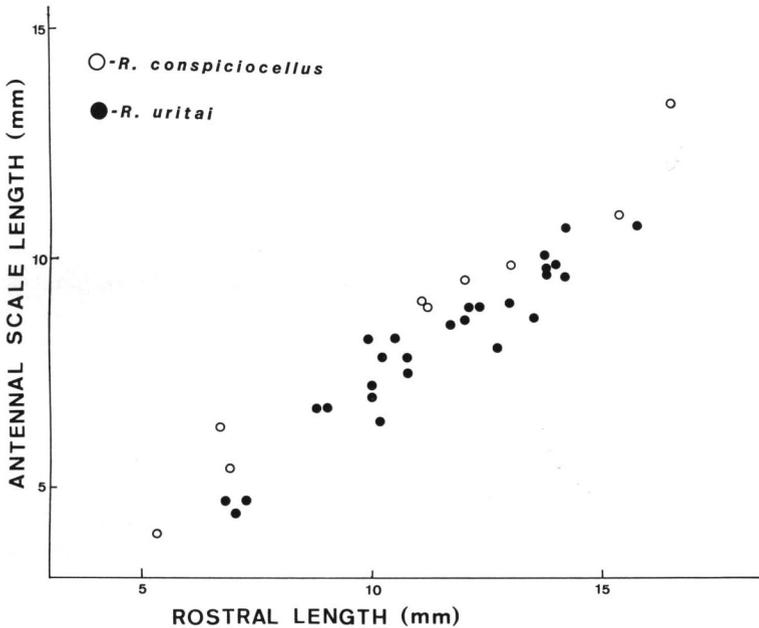


Fig. 5. Relationship between the length of rostrum and antennal scale in *Rhynchocinetes conspiciocellus* sp. nov. and *R. uritai* KUBO.

of the new species, so far as we refer to the original description (TIEFENBACHER, 1983). It is hoped that the morphological differences will be shown in detail by direct comparison.

Designation of the lectotype of *Rhynchocinetes uritai* KUBO, 1942

KUBO (1936) recorded *Rhynchocinetes rugulosus* STIMPSON as the first occurrence in Japanese waters from Kominato on the east coast of the Boso Peninsula, Misaki on the southern tip of the Miura Peninsula, and Mitaziri in the Inland Sea. In 1942, however, he corrected his identification and described the Japanese species under the name of *R. uritai*. The most important distinguishing character is that there is no arthrobranch on the third pereopod in the Japanese species.

The original description is based on two males and ten ovigerous females from four localities, viz. Okino-shima Island in the north of Kyushu in addition to three localities mentioned in 1936. The types had not been designated at all. As mentioned elsewhere, the original author remarked and figured that one of the specimens, the ovigerous female, is characteristic and different from the others in the presence of a prominent ocellus on the third abdominal segment as the second sexual character.

Through the courtesy of Prof. S. WATANABE of Tokyo University of Fisheries, we had a good chance to examine two males, five females and one ovigerous female in a bottle studied by the late Prof. I. KUBO, which accompanied with a label 'Kominato,

Apr. 13, 1941'. On close examination, all the specimens but the ovigerous female are referred to *R. uritai*, although the color is entirely faded out to light brown. The ovigerous female is without doubt the one remarked and figured by the original author to show the second sexual character.

We designated the ovigerous female as the paratype of the new species, *R. conspiciocellus*, described in this paper, and also selected the larger male, with cl 7.8 mm, as the lectotype. This male, which agrees well with the original description in its body length excluding the rostrum, is deprived of the endopod of left first pleopod, because its appendage was probably used for preparing the figure in the original description. We think that the other male and female specimens should not be selected as the paralectotypes based on the reasons mentioned below. 1) Although the number of upper rostral teeth corresponds to the original description, the male specimen has a peculiar feature that the proximal half of upper rostral margin is armed with three teeth instead of two teeth in the normal specimens. 2) Five females are unovigerous, contrary to the original description in which ten females were mentioned to be ovigerous.

Only the lectotype was designated and transferred from Tokyo University of Fisheries to the National Science Museum, Tokyo, being registered under the number of NSMT-Cr 1484.

Acknowledgments

Mr. Yasuhiko MAIHARA of the Marine Science Museum of Tokai University gave us the useful suggestions for the systematics of rhynchocinetid shrimps and the permission to reproduce his photographs in this paper. Dr. Ken-Ichi HAYASHI of Shimono-seki University of Fisheries and Dr. Alexander J. BRUCE of the Northern Territory Museum, Darwin, Australia, were kind enough to send us the valuable specimens for study. Through the courtesy of Dr. Seiichi WATANABE of Tokyo University of Fisheries we could examine specimens of *R. uritai* examined by the late Prof. Ituo KUBO. We wish to express our sincere gratitude to the colleagues recorded above.

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Explanation of Plate 1

- Figs. A-B. *Rhynchocinetes conspiciocellus* sp. nov. Female, paratype (7.8 mm cl, SUF 530-2-1408), from Suruga Bay, in lateral (A) and dorsal (B) views.
 Fig. C. *Rhynchocinetes uritai* KUBO, 1942. Female (8.6 mm cl, NSMT-Cr 11106), from Hachijojima I., in aquarium.

