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A new species of *Scyllarus* (Crustacea Decapoda Palinuridea) from the Pacific Ocean

by L. B. Holthuis

Résumé. — Description de *Scyllarus aurora*, nouvelle espèce de Scyllare à large distribution indo-ouest-pacifique (Japon, Hawaii, îles de la Société).

Abstract. — Description of *Scyllarus aurora*, new species of Scyllaridae with a wide range n the northern and southern Pacific (Japan, Hawaii, Society Islands).

L. B. Holthuis, *Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.*

Collections recently received from Japan and the Pacific Ocean (Hawaii and the Society Islands) contained a species of *Scyllarus*, which, although mentioned and figured in the literature, proved to be unnamed, being usually confused with another species. The new species has a rather extensive geographical distribution.

I should like to express my gratitude to M. B. Richer de Forges, Muséum national d'Histoire naturelle, Paris, for his permission to study and report on the specimen from Tubuai, of which he also kindly placed colour slides at my disposal. Mr. Thomas A. Clarke, Hawaii Institute of Marine Biology, donated two series of the new species, collected by him near Oahu, to the Leiden Museum, for which I am most thankful, as it enabled me to study the variation of various characters. During a visit to Wagu, Japan, Mr. Nobuo Yamashita of that town presented me with a specimen of the new lobster, as well as with other interesting material ; I am greatly indebted to him as well as to Drs. Tune Sakai and Toshimitsu Odawara, who made it possible for me to visit Mie Prefecture.

The abbreviation cl. is used here for carapace length.

Scyllarus aurora new species

Scyllarus timidus — Tinker, 1965 : 42, pl. 9 ; Johnson, 1971 : 83, figs. 22, 23 ; Michel, 1971 : 472 ; Clarke, 1972 : 313, 314, 315. Not *Scyllarus timidus* Holthuis, 1960.

Material examined

Off Wagu, Kii Peninsula, Mie Prefecture, Honshu, Japan, 34º15′ N 136º48′ E ; received from fishermen ; don. N. Yamashita ; 7 May 1979. — 1 ♀, cl. 29 mm.

Off Haleiwa, Oahu, Hawaiian Islands, 21º36′ N 158º06′ W ; depth 146 m (= 80 fathoms) ; in fish trap left overnight ; 18 November 1970 ; R. V. « Valiant Maid » ; T. Clarke leg. et don. — 3 ♂, cl. 15-30 mm ; 2 ♀, cl. 20 and 21 mm.

Off Barbers Point, Oahu, Hawaiian Islands, 21°18′ N 158°07′ W ; depth 117-128 m (= 64-70 fathoms) ; gill nets, left overnight ; 19-20 April 1971 ; R.V. « Teritu » ; T. Clarke leg et don. — 2 ♂, cl. 30 and 31 mm ; 1 ovigerous ♀, cl. 38 mm.

Tubuai Island, Society Islands, 23°18′ S 149°30′ W ; depth 200 m ; leg. B. Richer de Forges ; no. 7913403 ; 14 May 1979. — 1 ♂, cl. 30 mm.

Fig. 1. — *Scyllarus aurora* new species, ♂ paratype, Tubuai Islands, MNHN Pa 566 (× 1,3). (*Phot. J. Forest.*)

Description

The rostrum is blunt and slightly or strongly constricted behind the top (in the largest female it is almost T-shaped). It bears a sharp rostral tooth. There is no trace of a pre-

gastric tooth, but the gastric tooth is large, high and sharp, and laterally compressed. On the posterior margin of the gastric tooth there are about 6 squamae, several of which form part of a transverse row of 3 or 4 squamae. The cardiac tooth is represented by two low, but distinct, bluntly or sharply pointed submedian teeth placed side by side behind the cervical groove. The cardiac teeth are followed by 5 or 6 transverse rows of squamae. The anterior submedian ridge carries about 3 or 4 squamae in a longitudinal row ; the posterior two of these squamae are largest, sometimes all are more or less fused. There are no tubercles between the anterior submedian and anterior branchial ridges. The posterior submedian ridge shows as an almost circular agglomeration of about 10 to 14 squamae in about 3 or 4 irregular transverse rows ; these squamae are in contact with those of the postcromedian ridge. A longitudinal row of about 6 small well spaced squamae is found between the posterior submedian ridge and the posterior branchial ridge ; the posterior of these squamae are largest. The anterior and posterior branchial carinae are separated by a deep incision in which there is no tubercle. The anterior ridge ends anteriorly in two large sharp teeth, that are placed over the orbit ; it shows only slight indications of squamae, but two squamiferous ridges branch off it laterally near the posterior end ; of these two ridges the anterior is the most distinct. The posterior branchial carina ends anteriorly in a sharp strong tooth, behind which there are about 10 to 15, often not too well defined, squamae, some of which form part of a transverse row of 2 or 3. An oval squamiform tubercle is visible mediad of the middle of the posterior branchial carina, a group of 6 to 12 smaller squamiform tubercles are placed near the anterior end of the ridge. The lateral margin of the carapace is distinctly divided into three parts. The anterior part ends in the strong and sharp anterolateral tooth of the carapace ; behind this tooth about 6 rather distinct squamae are visible. The mediolateral part of the margin likewise ends in a strong anterior tooth ; it bears 3 to 5 squamae behind this tooth. The posterolateral part consists of 10 to 13 squamiform teeth, the anterior of which is strongly pointed, the others are blunt. The orbit is smoothly rimmed, it bears the above mentioned two teeth on the inner margin, and a small tooth at the anterior end of the outer margin. Apart from the two squamiferous ridges that branch off from the anterior branchial ridge, no tubercles are present immediately behind the orbit, or a few very small ones may be seen near the lateral margin. The intercervical ridge shows a group of about 5 to 12 blunt, often fused squamae. The posterior groove of the carapace is very deep and distinct ; before it there are two rows of irregular tubercles ; behind it there is a single transverse groove. The middle of the posterior margin of the carapace is slightly and widely V-shapedly incised.

The first abdominal somite shows a transverse groove, which traverses the entire tergum ; from this groove about 24 or 25 longitudinal grooves extend posteriorly, these grooves are slightly curved, but not branched. The anterior half of the first somite is entirely smooth. The pleura of the somite are rounded with a deep incision in the middle. The posterior margins of the first three abdominal somites show a small and narrow, but very distinct V-shaped incision ; in the fourth somite the incision is very small, in the fifth it is absent. None of the abdominal somites has a median carina, although the median area may be slightly elevated. The median figure on somites II to V is distinctly lobulated. Each half of the tergum of those somites shows a tranverse groove with side grooves, providing the usual arborescent markings. The pleura of somites II to IV end in a very sharp, posteriorly directed spine-like point. The transverse groove of the tergum continues on

to the pleura and is also branched there. On the pleura of the second somite, in addition to the groove that continues from the median tergal groove, there is a parallel groove in the anterior part ; the two grooves are connected in the middle of the pleuron by a quadrangular or rounded depressed area which, like the grooves themselves, is filled with short hairs. The pleura of the fifth abdominal somite end in a bluntly rounded angle of less than 90°. The sixth somite shows the usual grooves. The posterior margin at each end has a distinct tooth ; the median part of the margin, between the end of the posterior branches of the submedian grooves, shows 3 very faint teeth, one in the middle and one at either end.

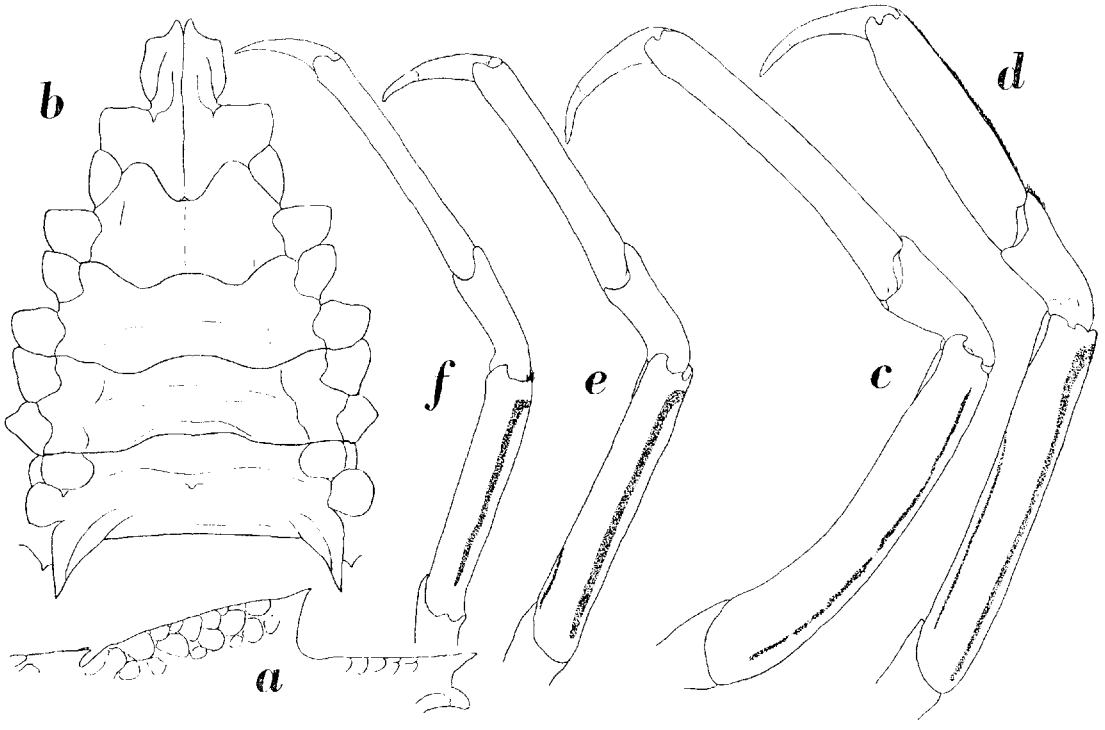

Fig. 2. — *Scyllarus aurora* new species, ♂ : a, rostral, gastric and cardiac teeth, in lateral view ; b, thoracic sternum ; c, second pereiopod ; d, third pereiopod ; e, fourth pereiopod ; f, fifth pereiopod. a-f, × 3.

The four teeth at the end of the calcified portion of the telson are sharply pointed ; they are of about equal size and placed in a single straight transverse row.

The anterior margin of the antennular somite is incised in the middle and bears a blunt tooth in each half.

The sixth (= last) segment of the antenna ends in 5 wide teeth, which distally suddenly end in a narrow sharp tip. On the inner margin of the segment is a sixth tooth, which is sharp, triangular and rather narrow. The upper anterior margin of the fifth segment ends into 2 strong pointed teeth, the inner of which shows a blunt carina ; the lower margin

of the segment shows one tooth. The upper surface of the fourth segment bears a single smooth oblique carina, which in its basal part shows a tooth, that rubs against a knob on the anterior margin of the orbit. There are no additional carinae or rows of tubercles. The outer margin of the segment presents two large sharp teeth in the distal part ; the inner margin is provided with a single large sharp tooth, which, on its inner margin, carries a small tooth, which is blunt and sometimes inconspicuous or altogether absent. The third segment shows two strong triangular teeth in the inner part of the anterior margin ; the outer of these teeth is the larger.

The anterior margin of the epistome is convex with a small median incision.

The first pereiopod is heavy and much more robust than the following legs. The dactylus is 2/3 as long as the propodus and much narrower. The propodus widens distinctly basally ; no grooves are present on either propodus or dactylus. The carpus is short and cup-shaped. The basal dorsal part shows a short longitudinal groove flanked by a blunt ridge. The merus is the longest and highest of the segments, it shows a deep groove in the lower part of the posterior surface and a faint one in the upper part. The second leg is very slender, it is the longest leg ; its dactylus is about half as long as the propodus and as long as the carpus ; the merus is about as long as propodus and carpus combined. A rather indistinct groove, filled with hairs, is present in the upper half of the merus. The third leg is slightly more robust than the second ; it and the fourth leg have the dactylus more than half as long as the propodus, but shorter than the carpus. The propodus of the third leg is distinctly shorter and slightly higher than that of the second leg, it is slightly compressed, but shows no hairy grooves at all ; its dorsal margin shows a fringe of very short hairs, which extends onto the dorsal margin of the carpus. None of the other segments of this or the other legs shows hairy fringes. Like in the second leg, the merus has a longitudinal groove in the upper part of the posterior margin and a less distinct one ventrally ; these grooves are filled with short hairs. The merus of the third leg is as long as propodus and carpus combined. The fourth leg is shorter and slenderer than the third. The fifth leg has the dactylus less than half as long as the propodus ; the propodus is more slender than in the fourth leg ; like in the other legs the merus shows a longitudinal pubescent groove in the upper half of the posterior surface, but a ventral groove is hardly visible posteriorly ; the merus of the fifth leg is about as long as the propodus.

The anterior margin of the thoracic sternum is produced forward beyond the anterolateral angles ; each half of the margin ends near the median line of the body in a narrow bluntly or more acutely topped tooth ; the left and right tooth are separated by a narrow triangular incision, which continues back as a closed groove. The anterolateral angles form a blunt angle with a widely rounded top. The sternites belonging to the third to fifth pereiopods show a transverse carina in the anterior half ; before the carina the surface is rather pubescent. The posterior of these carinae carries a blunt and small median tubercle, no such tubercles are seen on any of the other carinae, and sometimes, in large specimens, it is not very distinct even on the last sternite. In both sexes the sternum shows a strong and sharply pointed, posteriorly directed tooth at either side of the posterior margin near the bases of the fifth pereiopods ; this tooth is less distinct in the females than in the males, but is always present. The surface of the sternum is smooth and pitted.

The second pleopods of the male have the two blades of about equal length. That of the exopod ends in a slender very sharp and slightly curved tip without hairs ; the endopod

tapers more regularly to a narrow point which ends in a hair. In the third to fifth pleopods of the male the exopod is distinct and lamellate, the endopod is reduced to a small short worm-like appendage.

Size. — The carapace length of the examined males varies from 15 to 31 mm, that of the examined females from 20 to 38 mm ; the largest female is ovigerous. The eggs are very numerous and small, they have a diameter of about 0.5 mm. TINKER (1965 : 42) reported upon a specimen of " about two inches [= 50 mm] in length " ; this evidently is the total length corresponding with a carapace length of about 20 mm. CLARKE (1972 : 313) gave the carapace length of his material as 25-39 mm.

Colour. — The following colour description is based almost exclusively on colour slides made of the specimen from Tubuai when just captured ; they were placed at my disposal by Mr. B. Richer de Forges. The preserved specimens show very few traces of the original colouration ; the bands on the legs remaining longest. The general colour of the animal is pink. The carapace is slightly darker and more greyish brown than the rest. The squamae and teeth of the carapace are more reddish, especially those behind the cervical groove. On the abdomen the grooves are paler than the rest, while the articulating points between the somites show as whitish spots. The margins of the antennal segments as well as the oblique ridge on the fourth are pinkish purple, contrasting with the rest of the segments which is covered by a pale yellowish brown pubescence. The eyes have the cornea deep black, the stalk is pink with a narrow white line between the two. The second to fifth pereiopods have a dark purple transverse band over the middle of the merus and propodus, and one over the basal part of the carpus and of the dactylus. A faint band is visible on the merus and propodus of the first pereiopod. The lower surface of the body is whitish to pale pink.

HABITAT. — The examined material was obtained from depths between 117 and 200 m. TINKER's (1965 : 42) specimen came from " a depth below one hundred feet " [= 30 m]. CLARKE (1972 : 313) reported his material from between 110 and 185 m. The same author (CLARKE, 1972 : 315) mentioned that several specimens were caught in gill nets over rocky areas, but also in a trap on a smooth and sediment-covered bottom. Larvae were obtained in the plankton (JOHNSON, 1971 ; MICHEL, 1971).

DISTRIBUTION. — As shown by the present material, the species has a wide range in the northern and southern Pacific, being known from Japan, Hawaii and the Society Islands. The records in the literature are all from the Hawaii area, at least as far as the adults are concerned : off Oahu (TINKER, 1965), off Barber's Point, off Haleiwa, and off Kaneohe, Oahu (CLARKE, 1972). JOHNSON (1971 : 78) reported larvae also from the Hawaiian Islands : off Oahu (21°43′ N 158°26′ W, 21°26′ N 158°12′ W, 21°24′ N 158°23′ W, and 21°14′ N 158°05′ W) and off Hawaii (18°50′ N 155°58′ W, and off Kaohole Point ; I cannot find the last named locality on any map or in any gazetteer, it might be a misprint for Kauhola Point 20°15′ N 155°46′ W, or for Keahole Point 19°44′ N 156°04′ W). MICHEL (1971 : 467, 472) reported *Scyllarus* sp. III, which he thought identical with the species named *S. timidus* by JOHNSON, from the region of New Caledonia and the New Hebrides.

TYPES. — The ovigerous female from off Barber's Point, Oahu, is the holotype (RMNH no. Crust. D 33522). The other specimens all are paratypes. The paratype from Tubuai is preserved

in the collection of the Muséum national d'Histoire naturelle, Paris (MNHN no. Pa 566) ; the holotype and the other paratypes form part of the collection of the Rijksmuseum van Natuurlijke Historie, Leiden.

Affinities

Scyllarus aurora belongs to the group of the genus *Scyllarus* to which also belong *Scyllarus cultrifer* (Ortmann, 1897), *S. aureus* Holthuis, 1963, *S. timidus* Holthuis, 1960, *S. kitanoviriosus* Harada, 1962, and *S. umbilicatus* Holthuis, 1977. This group is characterized by (1) the absence of distinct median carinae on the dorsal surface of the abdominal somites, which show the normal arborescent markings, (2) the sharply pointed, posteriorly directed tips of the pleura of the second to fourth abdominal somites, (3) the anterior margin of the thoracic sternum, which is not V- or U- shapedly incised, but is produced anteriorly in the middle, (4) the propodus of the third pereiopod which is more or less flattened and broadened, being broader than that of the second, (5) the dactyli of the pereiopods which have no hairy fringes.

From *S. cultrifer* and *S. aureus* the new species may at once be distinguished by that the propodus of the third pereiopod does not show the anteroventral sharp tooth-like process, which gave *S. cultrifer* its specific name. In *S. kitanoviriosus* the gastric tooth is remarkably low and not or hardly larger than the rostral tooth ; in the present species, like in *S. timidus* and *S. umbilicatus*, the gastric tooth is very high and compressed, being much larger than the rostral tooth. *S. aurora* differs from both *S. timidus* and *S. umbilicatus* in having the propodus of the third leg only very slightly flattened, hardly broader than that of the second (but shorter) and without hairy grooves. In *S. timidus* and *S. umbilicatus* the anterior margin of the thoracic sternum has each half obliquely truncate and not produced in a narrow point near the median line of the body. The two strong posteriorly directed teeth on the posterior margin of the sternum are present in both sexes in *S. aurora*, but they do not show in the females of *S. timidus*, *S. umbilicatus* or *S. kitanoviriosus*.

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Enoplometopus debelius new species, lateral view.