

TWO SPECIES OF *CHIROSTYLUS* FROM THE INDIAN OCEAN WITH  
OBSERVATIONS ON THE GENERIC CHARACTERS  
(DECAPODA, CHIROSTYLIDAE)

BY

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Miyake & Baba (1968: 381) separated *Chirostylus* Ortmann and *Ptychogaster* A. Milne Edwards on "...the presence or absence of the antennal scale and rostrum". Accordingly, the genus then contained the type species, *C. dolichopus* Ortmann, and a new one *C. ortmanni* from Japanese waters.

Twenty two specimens, obtained by the International Indian Ocean Expedition, are available for study. The general shape of the body, the extraordinary length of the chelipeds, the armature of the antennule, and the anterior margin of the sternite place them very close to *C. dolichopus* and *C. ortmanni*; but in only one specimen the rostrum is totally wanting, in all the others, referable to two species, a small, spiniform rostrum is present. It seems necessary to revise all the known species belonging to *Chirostylus* and *Ptychogaster*. Unfortunately it is not possible for the present authors to take up this work because of the non-availability of reference material.

A specimen of *Chirostylus ortmanni* has very kindly been made available to us by Dr. Keiji Baba. It was interesting to note that a spiniform rostrum was present in the loaned specimen. Further communication with Dr. Baba has revealed that in one specimen, which was found living on Gorgonacea together with the specimen on loan with us, the rostral spine was totally wanting, whereas two other specimens presented to him and found with *Antipatharia* have a small spiniform rostrum. The presence or absence of the rostrum thus being of little or no generic importance. The shape and size of the rostrum are, however, characteristic. An antennal scale is found wanting in the known species.

The present specimens belong to two species: *C. dolichopus* and a new one *C. micheleae* named in honour of Madame Michèle de Saint Laurent of the Muséum National d'Histoire Naturelle, Paris.

The holotype of the new species will be deposited in the United States National Museum, Washington, D.C., U.S.A. From the paratypes of *C. micheleae* a few specimens will be retained in the Invertebrate Reference Museum, University of Karachi, Karachi, Pakistan. Four specimens of *C. dolichopus* will also be kept here with the permission of Dr. R. B. Manning of the Smithsonian Institution, Washington, U.S.A.

The term "sternal plastron" is used here for the ventral plate formed by the sternites of the third to seventh thoracic segments. The abbreviations used are c.l. = carapace length measured from the base of the rostrum to the posterior margin of the carapace; c.l. + r. = carapace length from the tip of the rostrum to the posterior margin of the carapace; c.b. = breadth of the carapace determined by measuring the widest part across the branchial regions; ch.l. = length of the cheliped.

### *Chirostylus micheleae* n. sp.

St. No. 403E, Cruise 8, 19°09'S 36°55'E, depth 88 m, 19 October 1964. — 3 ♂ c.l. + r. = 4.5-6.5 mm; 2 ovigerous ♀ c.l. + r. = 4.5-6 mm, ch.l. of large ♀ = 56 mm.

St. No. 420A, Cruise 8, 02°42'S 040°53'E, depth 140 m, 6 November 1964. — 3 ♀ c.l. + r. = 5-7 mm, ch.l. = 47-53 mm (ovigerous ♀ c.l. + r. = 6 mm, ch.l. = 47 mm); small specimen with bopyrid.

✓ St. No. 9-442, Cruise 9, 09°36'N 05°59'E-05°01'E, depth 75 m, 16 December 1964. — 1 ♂ holotype c.l. + r. = 7 mm, ch.l. = 65-70 mm (left ch.l. = 70 mm).

St. No. 444, Cruise 9, 09°36'N 051°01'E-051°03'E, depth 80 m, 16 December 1964. — 2 ♂ c.l. + r. = 6-7 mm, ch.l. = 47-55 mm respectively (large ♂ with bopyrid); 1 ovigerous ♀ c.l. + r. = 6.5 mm, ch.l. = 54 mm; 1 ♂, c.l. = 7 mm rostrum absent, ch.l. = 70.5 mm.

**Diagnosis.** — Rostrum short, spiniform; carapace and eye stalks spiny. Posterior margin of fourth abdominal segment with a large mid-dorsal projection. Chelipeds nearly eight to just over nine times length of carapace.

**Description of the holotype.** — The holotype selected is a male from St. 9-442, measuring 7 mm in carapace length including rostrum which is 0.5 mm long. The carapace is beset with numerous spinules, and in addition bears a pair of large submedian spines as illustrated in fig. 1 A. Each antero-lateral angle of the carapace is produced into a strong, sharp and medially curved spine, the outer orbital angle is also spiniform. The rostrum is short, acutely triangular, directed obliquely upwards and borne on the strongly convex anterior margin of the carapace.

The abdominal terga are smooth dorsally except the last one which is armed with several small spines (fig. 1 B). The posterior margin of the fourth is characteristically produced into a median projection, a much smaller tooth-like projection can also be seen on the posterior margin of the following somite (fig. 1 C, C'). The last two abdominal somites are of about equal length. The telson is nearly as long as its maximum breadth, smooth and unarmed.

The pterygostomian flap (fig. 1 D) is narrow, spinose and greatly produced posteriorly.

The anterior margin of the third thoracic sternite is slightly concave and armed with ten spinules, their arrangement and the general spinosity of the sternal plastron is shown in fig. 1 E.

The disto-lateral angle of the basal segment of the antennule (fig. 2 A) is greatly produced and bears unequal spines. The number and size of these spines is subject to variation; hence, on the right antennule five spines are present of which the middle one is longest and there are two well developed median spines and two rather small ones laterally. The disto-median angle is acute. The basal segment of

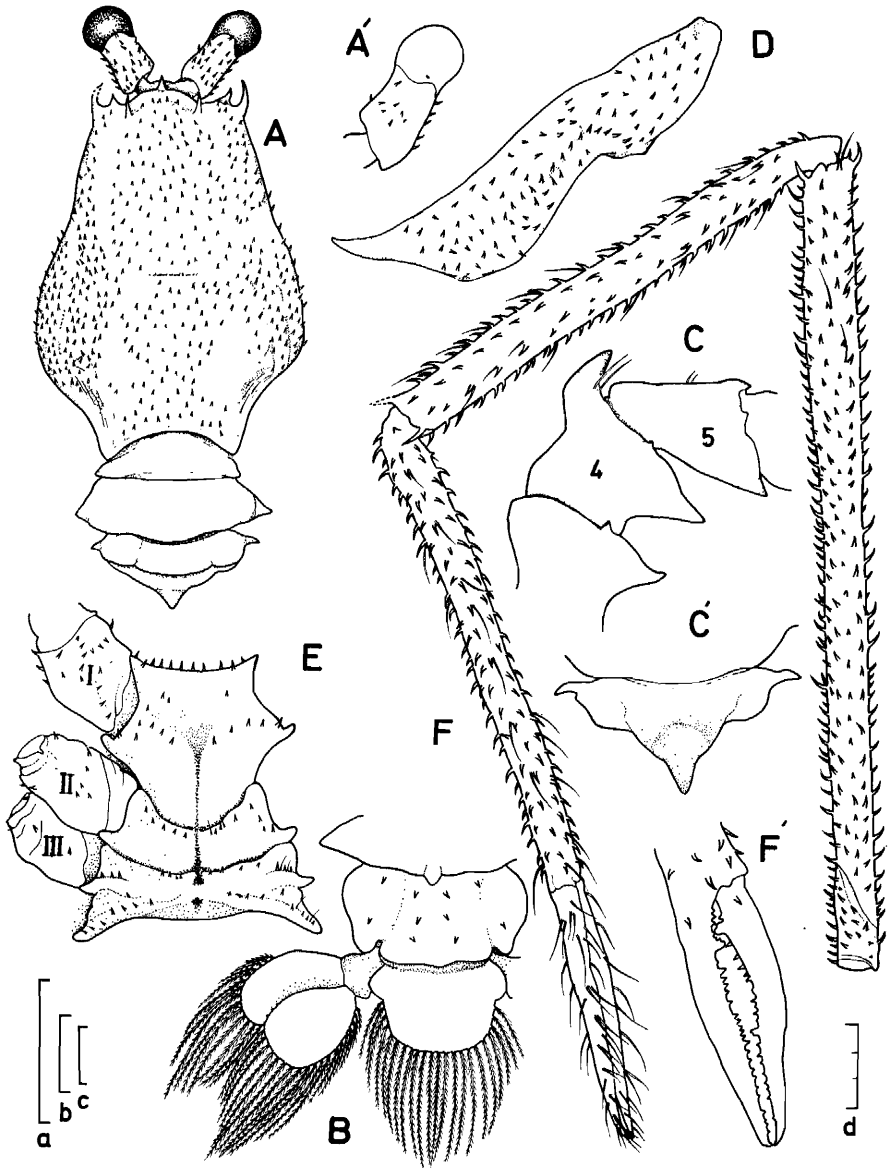


Fig. 1. *Chirostylus micheleae* n. sp., holotype. A, specimen in dorsal view; A', left eye in ventral view; B, last abdominal segment, telson and left uropod; C, fourth and fifth abdominal segments in lateral view; C', fourth abdominal segment showing dorsal projection, dorsal view; D, right pterygostomian flap; E, sternal plastron and coxae of pereopods I-III; F, right cheliped; F', chela of same. 4-5, fourth and fifth abdominal segments respectively; I-III, bases of pereopods I-III respectively. Figs. A, C at scale c = 1 mm; A', B, D at scale b = 1 mm; C' at scale a = 1 mm; F, F' at scale d = 3 mm.

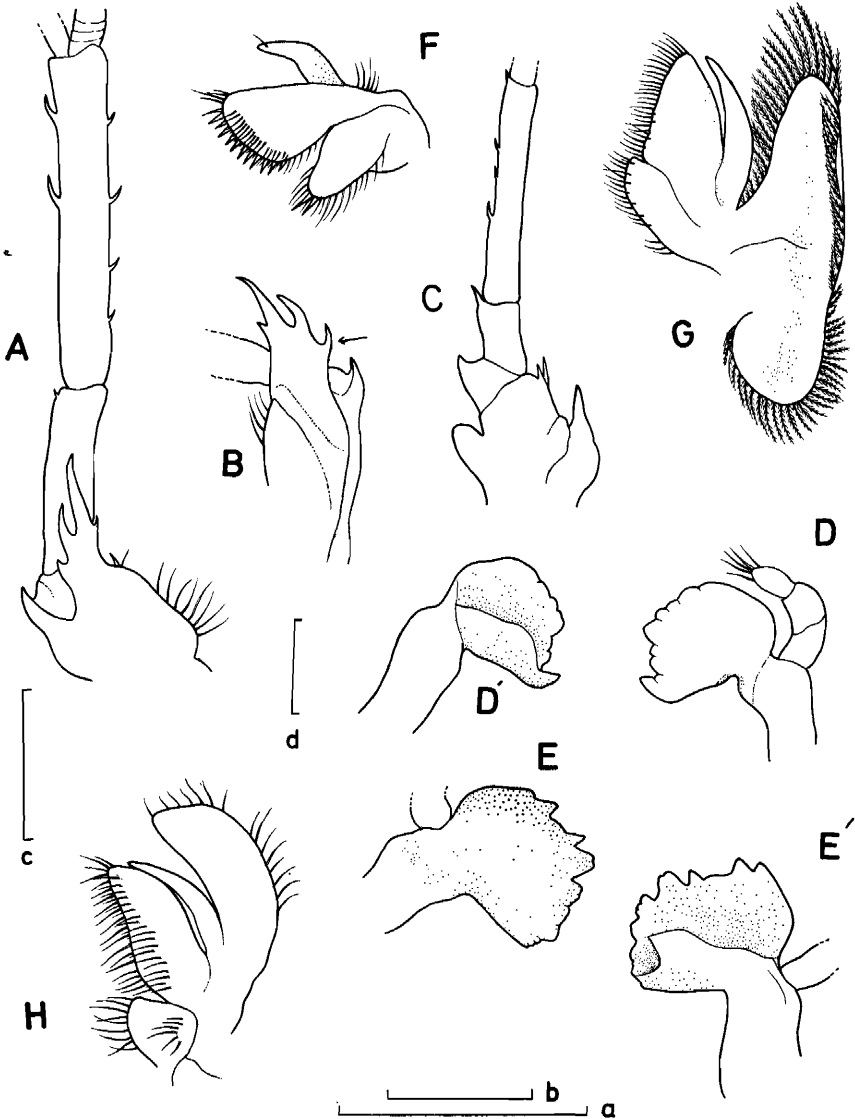


Fig. 2. *Chirostylus micheleae* n. sp. A, right antennule (without flagella), dorsal view; B, basal segment of left antennule; C, right antennal peduncle in dorsal view; D, right mandible in dorsal view; D', same in ventral view; E, left mandible in dorsal view; E', same in ventral view; F, right maxillula; G, right maxilla; H, first right maxilliped. Figs. A, B at scale b = 0.5 mm; C at scale d = 1 mm; E, E', D, D' at scale a = 1 mm; F-H at scale c = 4 mm.

the left antennular peduncle is illustrated in fig. 2 B; as can be seen, the proximal median spine is sharp and better developed (indicated in the figure by an arrow) whereas the distal spine alone is present on the lateral border. The peduncle is armed on the disto-median angle of the penultimate segment; there are two spines on the inner, four on the outer margin of the ultimate segment.

The disto-lateral angle of the basal segment of the antennal peduncle is prolonged and sharply pointed, that of the following segment bears two subequal spines (only one is developed in the antenna of the left side). The disto-median angle of the ante-penultimate segment (fig. 2 C) is acutely produced, the corresponding angles of the following segments each are armed with a spine. The ultimate segment is nearly as long as the combined length of all the other segments and its inner margin bears three spines.

The cutting edge of the right mandible (fig. 2 D, D') is beset with irregular and blunt teeth, that of the left side has sharp teeth (fig. 2 E, E') such as are also seen in some of the paratypes.

The maxillule and maxilla are represented in fig. 2 F and G respectively.

The first two maxillipeds are normal and without distinctive characters (figs.

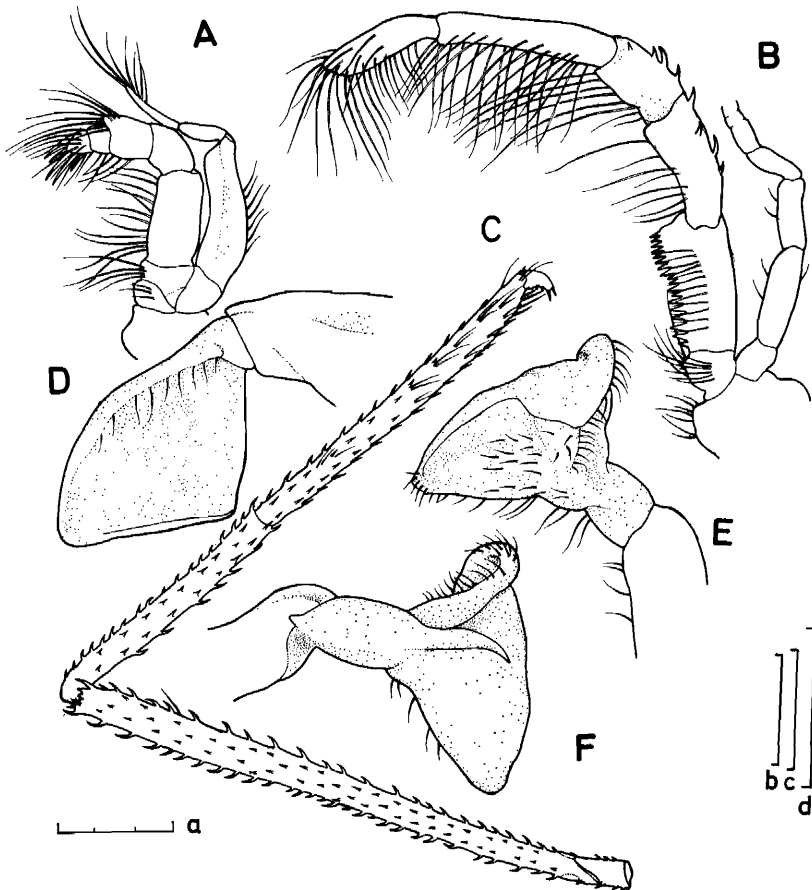


Fig. 3. *Chirostylus micheleae* n. sp. A, second right maxilliped; B, third right maxilliped; C, detached walking leg; D, distal part of first right pleopod; E, distal part of second right pleopod in dorsal view; F, same in ventral view. Figs. A, B at scale b = 1 mm; C at scale a = 3 mm; D at scale c = 0.25 mm; E, F at scale d = 0.5 mm.

2 H, 3 A). A row of spines is present on the outer margins of the merus and carpus of the third maxilliped (fig. 3 B).

The chelipeds are more than nine times as long as the carapace, being slender, cylindrical and densely covered with small spines (fig. 1 F); the fingers of the chela are nearly half as long as the palm, rather slender and slightly gaping in the middle (fig. 1 F').

The ambulatory legs are all alike, being long, slender, slightly flattened and spiny (fig. 3 C).

The first pleopod is elongated, concave and with a reflected anterior margin (fig. 3 D). The second pleopod is much expanded distally, giving the endopod a roughly triangular appearance (fig. 3 E). On the ventral surface is a keel-like structure terminating in a spiniform projection, whereas an anteriorly directed setose ridge is present on the dorsal surface, posterior to which the endopod is concave and prolonged (fig. 3 F).

Remarks on the paratypes. — A close study of the material at hand has shown that there is a considerable variation in the spinosity of the antennules and antennae, sternal plastron, last abdominal terga, and the coxae of pereopods, in the shape of the incisor teeth of the mandibles and in the size of the chelipeds. Only in one specimen (a male measuring 6 mm in carapace length taken at St. 420 A) the rostrum appeared to be absent but a careful examination revealed that it is broken off from its base.

The ocular peduncles appear to be more spiny in a male (c.l. = 6 mm) from St. 444 and the spines on the ventral side are also arranged in longitudinal rows.

The disto-lateral spinose process of the basal segment of the antennule has fewer spines than in a female (c.l. = 7 mm), where only the two terminal spines are developed (fig. 4 A). A bifurcated tip is seen in a male (c.l. = 7 mm) and an ovigerous female, the proximal spines are better developed (fig. 4 B) in the male than in the female (fig. 4 C), which is also the smallest available specimen (c.l. = 4.5 mm). In another and only slightly larger female the disto-lateral process appears trifurcate (fig. 4 D) and with a fairly well developed proximal spine on the median margin. The maximum number of spines are found in a male measuring 6.5 mm in carapace length including rostrum (fig. 4 E). This specimen also differs from all the others in having a spiniform disto-median angle of the antepenultimate segment of the antennal peduncle. Spines on the median margin of the last two segments of the antennal peduncle are exceedingly large in a smaller male (fig. 4 G).

In several specimens the cutting teeth of the mandible are sharp, they are best developed in an ovigerous female measuring 7 mm in carapace length (fig. 4 H), they are very irregular in another slightly smaller female (fig. 4 I), poorly developed in the youngest specimen (fig. 4 J). The spines on the merus and the carpus of the third maxilliped are also fewer in this specimen (fig. 4 K).

The last abdominal tergum of an ovigerous female, with well developed mandibles, shows numerous spinules arranged on the lateral surfaces. A few spinules can also be seen on the fifth tergum (fig. 4 L). It may be pointed out here that the

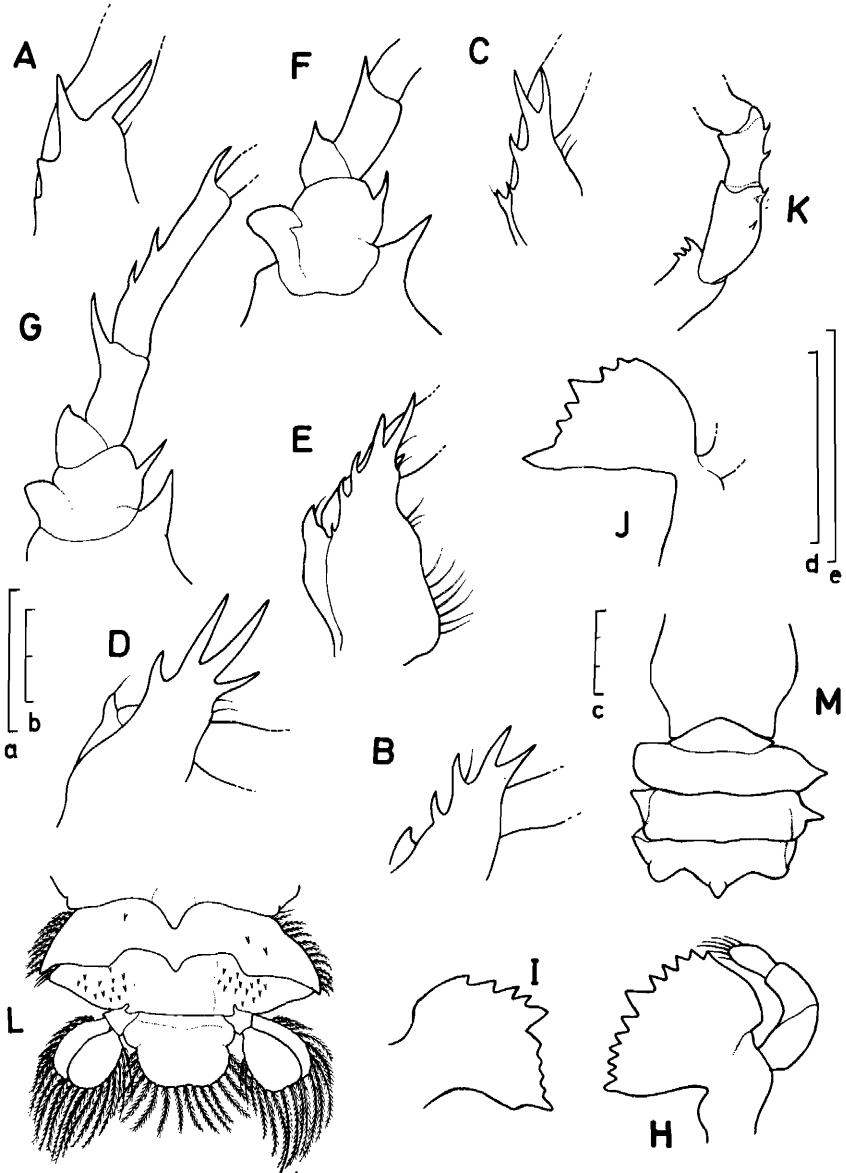


Fig. 4. *Chirostylus micheleae* n. sp. A-E, disto-lateral process of basal segment of antennule; F, G, antenna; H-J, mandible; K, part of third maxilliped (scale a = 1 mm); L, last two abdominal segments and telson (scale b = 2 mm); M, first three abdominal segments (scale c = 3 mm). A, H, L, ♀, c.l. 7 mm, from St. 420 A; B, ♂, c.l. 7 mm, from St. 444; C, J, K, ovigerous ♀, c.l. 4.5 mm, from St. 403 E; D, ♀, c.l. 5 mm, from St. 420 A; E, F, ♂, c.l. 6.5 mm, from St. 444; G, ♂, c.l. 6 mm, from St. 444; I, M, ovigerous ♀, c.l. 6.5 mm, from St. 444. Figs. A, D, E, H at scale d = 0.5 mm; B, C, F, G, J, I at scale e = 1 mm.

abdomen is very broad in females (fig. 4 M), the eggs present are few and of a large size.

The sternal plastron may have more spinules, than in the holotype, the coxae of one or more of the first four pereopods may be spiny.

Further, the chelipeds vary from just little less than eight times the carapace length to a maximum of more than nine times (as in the holotype); the relative length seems to be unrelated to sex or size.

A male specimen of c.l. = 7 mm, from St. 444, is in a poor condition, rather fragile and falling apart on handling. It exhibits several interesting variations as described below:

The carapace is without a rostrum or sub-median spines. The outer orbital angles are acute, the antero-laterals are well produced but are not spinose and curved as seen in the holotype. Further, the carapace is armed with several small spines which appear to be wanting on the anterior part (fig. 5 A).

The projection on the fourth abdominal tergum is quite similar to that seen in the holotype, whereas on the following somite, it is much reduced and a few lateral spines can be seen on the last one. It may also be pointed out here that the sixth segment is longer than the fifth, and the posterior margin of the telson is strongly convex (fig. 5 B).

The pterygostomian flap has a long and narrow anterior part, which widens posteriorly and terminates in a medially directed, beak-like portion. The spines on its surface are scattered and without any particular direction (fig. 5 C).

The sternal plastron differs in having irregular spines on the anterior margin and a definite row on each lateral margin of the fourth sternite (fig. 5 D).

The ocular peduncles are thinly armed on the dorsal surface, being smooth and unarmed ventrally.

The disto-lateral angle of the basal segment of the antennule is produced and armed with four spines which seem to be ill-developed, finer and rather spaced on the right (fig. 5 E), stout and clustered on the left antennule (fig. 5 F). Furthermore, both margins of the ultimate segment of the peduncle are armed with four spines each.

The antennae are fragmentary and can be best described as being similar to those of the holotype except that only one spine is present on the disto-lateral angle of the second segment and the ultimate segment has one spine on the outer and two on the inner margin.

The mandibles have well developed cutting edges and narrow molar processess (fig. 5 G, G').

Only the right cheliped is present, it is more than ten times the carapace length, thorny and the cutting edges of the fingers are well developed. The ambulatory legs are strongly depressed.

The first pleopod (fig. 5 H) appears to be rather elongated, in the second one (fig. 5 I, I') the setae are dense and confined on the ridge.

Relationship. — In the general shape of the body and the large size of the



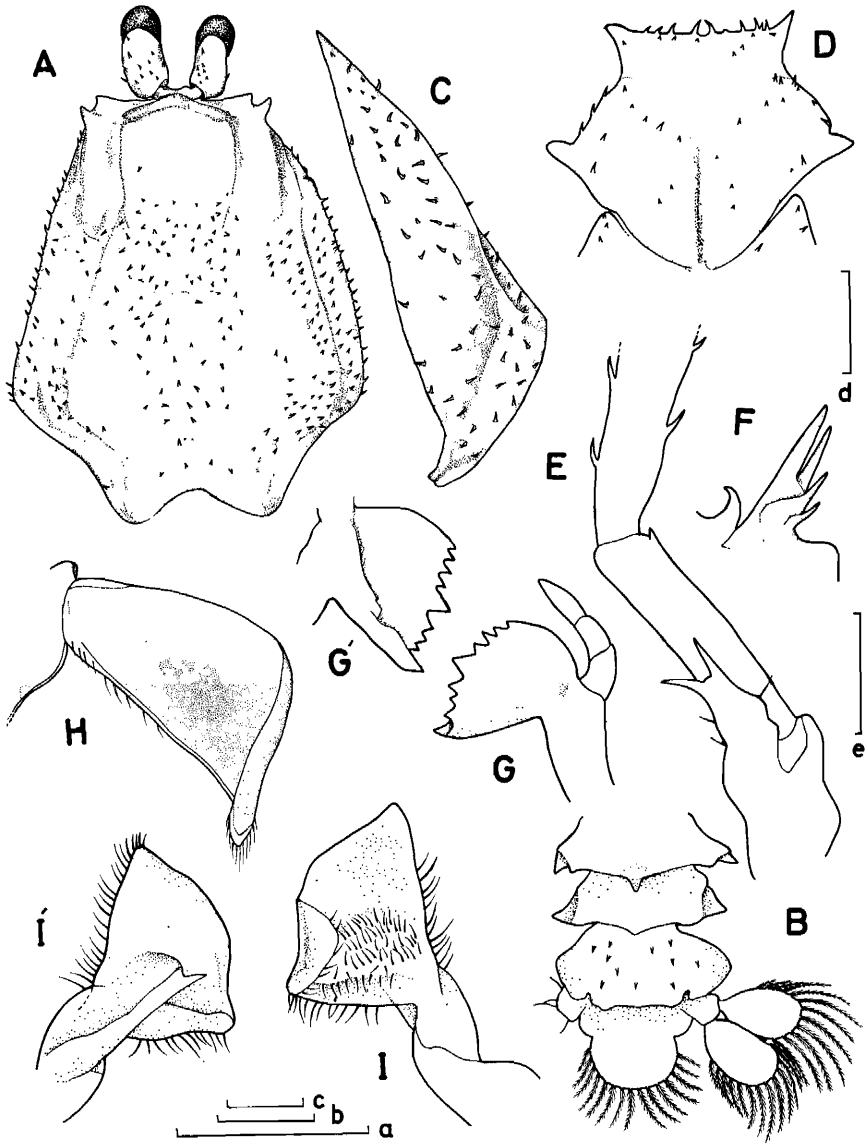


Fig. 5. *Chirostylus micheleae* n. sp., male c.l. = 7 mm, from St. 444. A, carapace in dorsal view; B, last three abdominal segments, telson and right uropod, dorsal view; C, right pterygostomial flap; D, anterior part of sternal plastron; E, left antennule (part); F, disto-lateral process of basal segment of right antennule; G, right mandible; G', same in ventral view; H, first pleopod; I, distal part of second left pleopod; I', same in ventral view. Figs. A, C, D at scale b = 1 mm; B at scale c = 1 mm; E, F at scale d = 1 mm; G, G' at scale e = 1 mm; H, I, I' at scale a = 0.5 mm.

chelipeds, *C. micheleae* appears to be related to the two Japanese species *C. dolichopus* and *C. ortmanni*, described by Miyake & Baba (1968), but it can be readily separated by the spinosity of the carapace, the ocular peduncles, and the appendages, and by the presence of a large projection on the fourth abdominal tergum.

**Chirostylus dolichopus** Ortmann, 1892

*Chirostylus dolichopus* Ortmann, 1892: 246, pl. 2 fig. 2, 2b, 2c, 2e, 2i, 2z; Miyake, 1960: 97, pl. 48 fig. 8; Miyake & Baba, 1968: 381, figs. 1b, 2.

St. No. 403E, Cruise No. 8, 19°09'S 36°55'E, depth 88 m. — 3 ♂ c.l. + r. = 5.5 mm, ch.l. = 62-65 mm (length of attached cheliped = 64 mm); 3 ♀ c.l. + r. = 5-6 mm, ch.l. of small specimen = 52 mm, of large = 62.5 mm (c.l. + r. of ovigerous ♀ = 6 mm).

St. No. 420A, Cruise 8, 02°42'S 40°53'E, depth 140 m. — 4 ♂ c.l. + r. = 4-7.5 mm, ch.l. = 67-68 mm.

The ten specimens were obtained from two different stations, off East Africa. These specimens seem to agree quite well with the detailed description given by Miyake & Baba (1968: 381, figs. 1b, 2). The differences noted are mentioned in the brief account given below.

Descriptive remarks. — The largest specimen is a male measuring 7.5 mm in c.l. + r. being larger than the Japanese specimens recorded by Miyake & Baba (1968: 383). The smallest specimen is also a male (c.l. = 4 mm) and of the three females only the largest (c.l. + r. = 6 mm) is ovigerous.

A distinct rostrum is present (fig. 6 A) in the specimens at hand and the spines are also more developed than illustrated for the Japanese specimen (Miyake & Baba, 1968, fig. 2a). Further, the branchial spines are placed more posteriorly in our specimens.

The abdominal segments are smooth and the posterior margin of the telson is broadly rounded (fig. 6 B). The last abdominal segment is nearly one and a half times as long as the fifth.

The anterior margin of the sternal plastron is armed with 4-6 spines and a pair of antero-lateral spines (not shown for the Japanese specimen) are invariably present (fig. 6 D).

The pterygostomial flap is armed with only a few spinules (fig. 6 C).

Spines on the disto-lateral projection of the basal segment of the antennule vary from 2 to 4 as illustrated in fig. 6E-I. Four spines are found on the antennules of both sides in one male (c.l. + r. = 7 mm) and only on the right side of a smaller male.

In addition to a disto-median spine on the ultimate segment of the antennal peduncle described by Miyake & Baba, a well formed spine is also present on the outer margin of the second segment (fig. 6 J).

Mandibles, maxillae, first and second maxillipeds are without any distinctive characters.

The merus and the carpus of the third maxilliped are armed with one distally placed spine each (fig. 6 K). At a first glance, however, the acute disto-lateral angle of the merus also gives a false impression of a spine.

The chelipeds vary from over nine times to twelve and a half times the length of the carapace. As would be expected, the number of spines on the cheliped varies considerably; in the cheliped illustrated the merus bears eleven spines on the outer margin, eighteen on the inner, eleven on the ventral surface, four or five spines

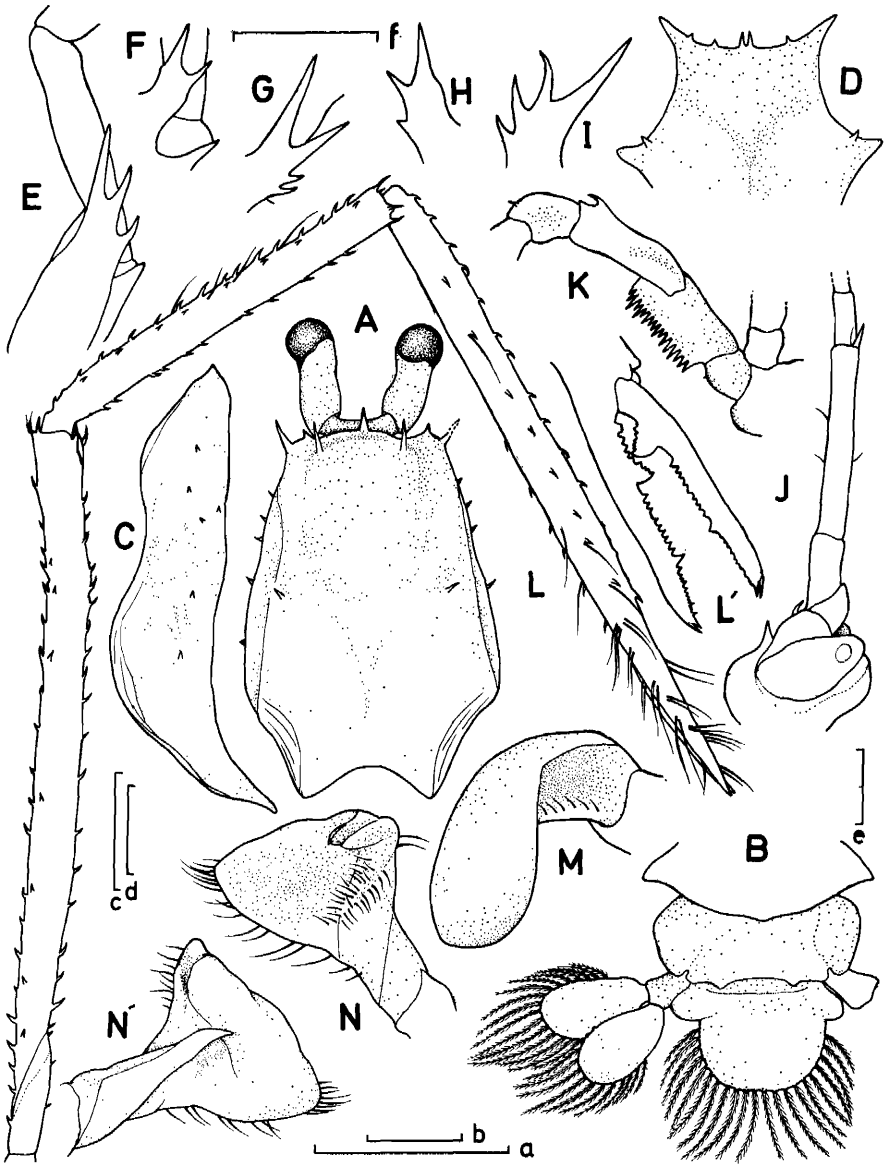


Fig. 6. *Chirostylus dolichopus* Ortmann. A, carapace of male (c.l. + r. = 5.5 mm) in dorsal view; B, last abdominal segment, telson and left uropod; C, left pterygostomian flap; D, anterior part of sternal plastron; E, left antennule of male (c.l. + r. = 6.5 mm) in dorsal view; F-I, disto-lateral process of basal segment of antennule; E, ♂, c.l. + r. = 5.5 mm, St. 403 E; F, ovigerous ♀, c.l. + r. = 6 mm, St. 403 E; G, ♂, c.l. + r. = 6 mm, St. 420 A; H, ♂, c.l. + r. = 5.5 mm, St. 403 E; I, ♂, c.l. + r. = 7 mm, St. 420 A; J, right antennal peduncle in dorsal view; K, ischium, merus, carpus and prododus of right third maxilliped in dorsal view; L, right cheliped; L', chela of same, further enlarged; M, distal part of right pleopod; N, distal part of second right pleopod in dorsal view; N', same in ventral view. Fig. A at scale b = 2 mm; B, D at scale d = 1 mm; C, K at scale c = 1 mm; E-I at scale f = 0.5 mm; J, L-N' at scale a = 0.5 mm; L' at scale e = 2 mm.

are situated dorsally, whereas the maximum spinosity of the cheliped is seen in the largest male (c.l. + r. = 7.5 mm) from St. 420A, where the spines in the same order are sixteen, twenty-three, six and eleven. The carpus and the palm are armed with a large number of spines on their inner margin and there is a double row of dorsal spines on the latter.

The ambulatory legs show some variation but on the whole agree well with the description given by Miyake & Baba (1968: 383).

The male pleopods are illustrated in fig. 6 M, N, N'. As can be seen, they are quite similar to those described for the previous species. At the most it can be said that the antero-distal reflected angle is narrow, prolonged and acutely rounded; there are also fewer setae on the ridge present ventrally.

Distribution. — Indo-Pacific: Previously known from Japanese waters only, now for the first time from the Indian Ocean.

#### ACKNOWLEDGEMENTS

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#### ZUSAMMENFASSUNG

*Chirostylus micheleae* n. sp. und *C. dolichopus* Ortmann werden vom Indischen Ozean beschrieben. Die neue Art zeichnet sich durch einen stacheligen Carapax, stachelige Augenstiele und einen grossen mitt dorsalen Fortsatz auf dem vierten Abdominalsegment aus. Es ist ein kurzes stachel förmiges Rostrum bei beiden Arten vorhanden. Das fehlen des Rostrums, ein mutmassliches Gattungsmerkmal, ist variabel.

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