

CTENOICHELES HOLTHUISI (DECAPODA, THALASSINIDEA), A NEW
REMARKABLE MUD SHRIMP FROM THE ATLANTIC OCEAN

BY

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In the course of prior research on mud shrimp of the genus *Callinassa* from the Brazilian coast, a previously undescribed species of the genus *Ctenocheles* was found among the specimens placed at my disposal.

The only specimen, an adult female, measuring 45.6 mm from the tip of the rostrum to the posterior margin of the telson, was collected off the mouth of Rio São Francisco (10°37'09"S 36°14'00"W) at a depth of 75 m, in a sand-mud bottom, on December 4, 1965, during the "Akaroa" expedition (sta. 180). The type is preserved in the Instituto Oceanográfico da Universidade Federal de Pernambuco.

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***Ctenocheles holthuisi* sp. nov.** (figs. 1-21)

Measurements (in millimeters). — Carapace and rostrum 14 long; abdomen (including telson) 31.6 long; telson 2.7 long, 3.2 wide. Large first leg: ischium 4.7 long; merus 5 long; carpus 1.7 long, 2 wide; propodus, upper border 3.8, lower border 14.8, greatest width 3.3; dactylus 10.3 long. Small first leg: ischium 4.5 long; merus 3.2 long; carpus 1.6 long, 2.5 wide; propodus, upper border 4.7, lower border 9.6, greatest width 3; dactylus 5.5 long.

Description. — The frontal margin of the carapace is trispinose. The rostral spine is triangular, pointed, slightly turned upwards and about as long as the eyestalks. A well marked ridge runs from the tip of the dorsal surface of the rostrum up to the posterior third of the carapace where it becomes much wider. On each side of the rostrum there is a wide triangular short spine placed near the outer basal angles of the eyes. The linea thalassinica is distinct and deep on the anterior two thirds of the carapace; it ends a little beyond the cervical groove where it almost joins a line placed lower which latter runs parallel to the linea thalassinica on the posterior half of the carapace. Towards the anterior half this lower line curves downwards and then upwards siding two small rounded elevations. The sternum is very narrow between the fourth legs. In the large space between the fourth and fifth legs the sternum widens considerably at its median portion and

narrows slightly posteriorly; its surface is divided into three plates: one on the upper half and two on the lower.

The first segment of the abdomen is the longest and about as long as the two following segments together. The fourth and fifth are the shortest, with about the same length. The second is as long as the sixth. The surface of the first segment has parallel lateral margins along the anterior two thirds; the posterior third has strongly divergent margins, the surface widening to twice its anterior width. The other segments have the same width throughout. In the third, fourth and fifth segments there is a comb of hairs along the posterior lateral angles. All the segments are smooth and unarmed. The telson is almost half as long as the sixth segment and slightly longer than wide. It narrows posteriorly. The lateral margins are slightly sinuous and form obtuse angles with the posterior margin. The edges are smooth; there are many hairs along the posterior margin and the lateral posterior angles. The dorsal surface is smooth, convex, with a slight transversal ridge placed proximally. The ventral face is also smooth, and concave.

The eyestalks reach the end of the basal segment of the antennular peduncle; they are oval-shaped, slightly oblique inwards, ending in a small tip which is placed medially and turned upwards; the corneas are extremely small, rounded, light-grey coloured and placed in the central part of the eyestalks.

The first and second segments of the antennular peduncle are of about the same size and slightly shorter than the third; the antennular flagellum is a trifle longer than its peduncle.

The general morphology of the antennal peduncle is more axiid-like than calianassid-like; the proximal segment, arising from a projection of the epistomial region, not covered by the carapace, is short, unarmed and with the antennal gland opening in a laterally protuberant papilla; the second segment has a moderately long spine dorsally on the distal margin; the antennal scale is represented by a pointed spine approximately as long as the spine of the second segment; the third segment, almost invisible in dorsal view, bears a distal ventral spine a little longer than the scale; the fourth segment is the longest of the peduncle, it is cylindrical and unarmed; the fifth segment is slightly shorter than the fourth and similarly shaped; the antennal flagellum is about three times as long as the peduncle.

The mandible ends in a strong but smooth lamina slightly curved inward; the molar process is slightly denticulate; a three-segmented palp is present; the outer face of the first segment has two rather long triangular spines. The maxillula has a very thin and almost transparent basis with thick short hairs at the mesial border; the palp is thin and tapers towards the apex ending in a very slender curved tip, bearing plumose hairs along its borders. In the maxilla the coxa and basis are bilobed, with many simple hairs at the tips; the inner lobe of the coxa is narrower on the distal half and has a row of hairs transversally placed on the inner face; the endopod is slender, curved at the tip, with long plumose hairs along its border; the exopod is expanded posteriorly and anteriorly, with plumose hairs along the inner border and simple hairs on the outer.

In the first maxilliped the basis is oval and flattened, with long plumose hairs along the borders; the coxa is irregularly shaped, with short and thick plumose hairs; there is a small oval palp with plumose hairs along the borders; the exopod is two-jointed, the distal joint is almost perpendicular to the shorter and wider proximal joint, on its upper border, apex, and part of the lower border, there are long and rather thick plumose hairs; the epipod is smooth, naked, widely concave on the inner face and bilobed, the lower lobe is posteriorly projected and the upper lobe projects towards the opposite direction.

The second maxilliped has a short dactylus with thick hairs at the apex, these hairs are pyramidal, and with a curved apex; along both lower borders there is a row of minute triangular spines; the outer face of the dactylus is convex, the inner is flat; the propodus is about twice as long as the dactylus, with long hairs on the upper border, both faces are flattened; the carpus is short, triangular, convex on both faces and without hairs; the merus is slightly longer than the previous segments together, the inner face is concave, the outer is broadly convex, on the upper margin there are long thin hairs; the ischium is short, with long hairs, similar to those of the merus, on its upper border.

In the third maxilliped the joints are longer than wide and about equally long with the exception of the dactylus, which is more than half as long as the propodus; in the dactylus both faces are convex and smooth, but there are long hairs, some of which plumose, along the margins; the joints have several rows of very long hairs along the upper border and fewer short hairs on the lower; on the inner faces there is a longitudinal ridge whereas the outer faces are smooth and convex; on the propodus the outer surface is slightly convex and smooth, the ridge along the inner surface is slight, with several close rows of short plumose hairs at the apex and longer simple hairs on the margins; in the carpus the ridge runs from the lower distal end upwards to the proximal extremity, thus giving to this joint a somewhat twisted shape; there are close rows of hairs along the ridge; in the merus the ridge is much higher on the distal half, where a row of short thick hairs and longer thinner hairs are placed; on the upper border there is a strong triangular pointed spine placed on the distal extremity; the ridge along the ischium is high and clearly marked, it goes from the upper half of the distal end towards the lower half of the proximal end, along its crest there are nine rather long triangular teeth.

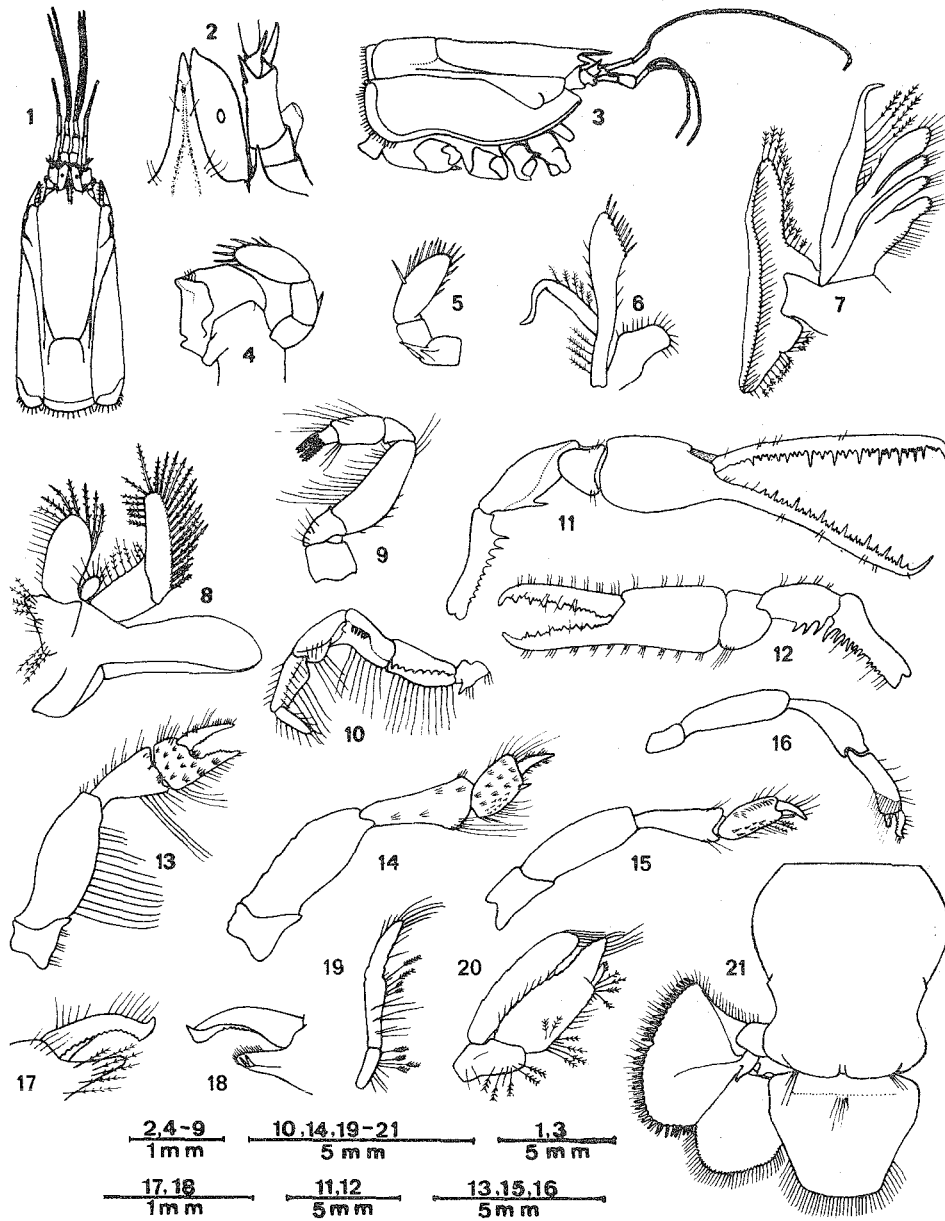
The branchial formula is as follows:

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	—	—	—	—	—	—
Arthrobranchs	—	—	2	2	2	2	2	—
Podobbranchs	—	—	—	—	—	—	—	—
Epipods	1	—	—	—	—	—	—	—
Exopods	1	—	—	—	—	—	—	—

The first pereiopods are very unequal in shape. The larger leg is on the right side and reaches with the ischium beyond the antennular peduncle; the fingers are slender and more than twice as long as the palm, they narrow at the apex ending

in long, curved, crossing tips; they are cylindrical except for a very short, depressed proximal part on the lower edge of the dactylus and on the upper edge of the fixed finger; they have a few tufts of very thin hairs; the cutting edges of both fingers are armed with seven long sharp teeth and several equally sharp teeth of two different sizes generally arranged as follows: large, small, medium, small and large; when the chela is closed the long sharp teeth of both fingers cross; the palm is swollen, smooth and equally convex on both sides, the upper and lower borders are curved; the carpus is swollen, convex on the outer face and more flattened on the inner; the inferior margin is broadly rounded, the superior is straight, extremely short, with the upper proximal extremity articulating with the merus; there are very few hairs on both borders. The merus narrows towards both extremities, it is less swollen than the palm and the carpus; the inner face is flattened, the outer is convex, with a ridge from the upper distal extremity to the lower proximal extremity; inferiorly to this ridge the outer face is flattened; the upper border is smooth; the lower is armed with a curved sharp spine (0.4 mm long) placed on the proximal half; the ischium is flattened on both faces and curved downward, the upper border is more curved than the lower; the lower border is armed with 10 spines; the distal spine is as long as the one of the merus, and the following spines are successively smaller, there are a few long thin hairs among the spines.

The smaller first leg reaches the antennular peduncle with the distal end of the ischium; the fingers are not much longer than the palm and less slender than those of the larger leg; the lower border of the dactylus, as well as the upper border of the fixed finger, is a flat surface in which the outer edge is armed with strong and short triangular teeth of two different sizes; in the dactylus this cutting edge has several small teeth placed among five larger teeth; at the proximal extremity there is a quadrangular tooth with a serrated edge; the cutting edge of the fixed finger has the same arrangement, with seven of the longer teeth; it is serrated on the proximal extremity; the tips of the fingers are curved and distinctly crossing; there are many tufts of very thin hair; the palm is smooth, somewhat swollen; both sides are convex; the upper and lower margins are straight and about parallel; there are tufts of thin hair; the carpus is swollen and convex on both faces; the inferior margin is rounded, the superior is straight and its proximal extremity articulates with the merus; there is only one tuft of thin hairs on the distal end of the lower edge; the merus is a trifle narrower posteriorly and anteriorly; the outer face is convex, with a median longitudinal ridge; the inner is more flattened; the superior edge is slightly curved and smooth; the inferior is curved and armed with three curved pointed spines placed on the proximal half; the proximal spine is the longest (0.5 mm), the ischium has almost the same width throughout; both faces are flattened; the upper margin is convex on the distal third, the lower is straight and armed with a curved pointed spine (0.8 mm long), six smaller less pointed spines and four small blunt spines; among these spines there are long and thin hairs.



Figs. 1-21. *Ctenocheles holthuisi* sp. n. 1, anterior part of body in dorsal view; 2, frontal margin of carapace, eyestalk and antennal peduncle; 3, carapace in lateral view; 4, mandible; 5, mandibular palp in outer view; 6, maxillula; 7, maxilla; 8, first maxilliped; 9, second maxilliped; 10, third maxilliped; 11, larger first leg; 12, smaller first leg; 13, second leg; 14, third leg; 15, fourth leg; 16, fifth leg; 17, fingers of fifth leg in outer view; 18, fingers of fifth leg in inner view; 19, first pleopod; 20, second pleopod; 21, telson and left uropod in dorsal view.

The second legs are equal; the fingers close over their entire length and the tips cross distinctly; the dactylus is more than twice as long as the palm and slightly longer than the fixed finger; it tapers regularly towards the end; the cutting edge is serrated; the fixed finger tapers more abruptly towards the apex, on its cutting edge there is a median row of about eight rounded or triangular teeth hidden by a row of short thick hairs placed on the upper, outer face; the palm is distinctly wider than long; the carpus is about three times as long as the palm, half as long as the merus and more than twice as long as the ischium; it narrows proximally.

The third legs have a narrow and pointed dactylus; the palm is slightly longer than the dactylus and flattened on both faces; the inner face is naked, the outer has three longitudinal rows of tufts of hairs and several short thick spine-like hairs placed near the lower margin; along the lower border there are thick short hairs plus long thinner hairs; near the distal end there is a short, thick and triangular blunt spine; the carpus narrows proximally; the merus and ischium have about the same width throughout and are slightly crenulated on the upper border.

In the fourth leg the dactylus is pointed, slender and curved downwards; the palm is longer than the dactylus and distinctly longer than wide; on the flatter outer face there is a superior longitudinal comb of hairs plus several soft and short spine-like hairs; the lower part of both faces is densely covered with hairs; some are plumose; on the distal end of the lower border there is one thick soft hair, shorter than the dactylus; the carpus is longer than the previous joints together; it narrows strongly proximally; the merus and ischium are much wider than the other segments, flatter on the inner face and without hairs.

The fifth legs have a very peculiarly shaped dactylus half as long as the propodus, curved downward, dorso-ventrally flattened, with the tip strongly turned inward and slightly upward; in the outer, lower border there are short triangular teeth, the inner border is smooth; the fixed finger has the outer face partially hidden by a dense cover of hairs; its upper surface is flat; on the upper, outer border and in the rounded distal end there is a row of spine-like hairs; the upper inner border is faintly marked, much lower than the outer and with two large spine-like hairs sub-distally placed; the propodus is almost as long as the carpus, much shorter than the merus and twice as long as the ischium; its outer face is half covered with hairs, the inner face is almost naked; the other segments are smooth and naked; the carpus, merus and ischium are flattened on the outer face, convex on the inner; the carpus tapers proximally; the merus and the ischium have about the same width throughout.

The pleopods of the first abdominal somite are flattened, slender and two-jointed; the proximal segment is the shortest; its margins are slightly serrated; there are long hairs with a plumose apex on both segments.

The second pleopods are biramous and about as long as the first; the endopod is as long as the exopod, but wider along the proximal two thirds; the distal third is much narrower, with an appendix interna at the lateral inner margin; there are short hooked hairs along the upper border of the appendix; the margins are faintly

serrated; the inner has long hairs with a plumose apex; the exopod is oval, with serrated margins; both segments are flattened, with convex inner faces; the protopod is proximally narrower, with long hairs plumose at the apex.

The pleopods of the third to fifth somites are well developed; the endopod is as long and also about as wide as the exopod, with long hairs along the outer margin and the apex, and with short hairs at the inner margins; on the exopod there are long hairs on the inner margin and apex; a well developed appendix interna, quite similar to that of the second pleopod, is present at the inner margin of the endopods.

The uropods have a broadly triangular exopod and an oval endopod; the exopod is broader than long, as long as the endopod and slightly shorter than the telson; along the posterior margin there is a row of short and thick spines, besides longer, thin hairs; the endopod is longer than wide, with smooth flat surfaces; the posterior margin is slightly crenulated.

REMARKS

Four species of the genus *Ctenocheles* Kishinouye, 1926, have been described up to now: *C. balssi* Kishinouye, 1926, *C. collini* Ward, 1945, *C. maorianus* Powell, 1949, all three from the Indo-West Pacific area, and *C. serrifrons* Loeuff & Intes, 1974, from the gulf of Guinea. Holthuis (1967) reported the first occurrence of the genus in the Atlantic region based on four larger chelipeds obtained during the R/V "Gerda" and R/V "Pillsbury" cruises to the Caribbean waters. As the material was insufficient for the description of new species, Holthuis just indicated *Ctenocheles* A and *Ctenocheles* B. Crosnier (1969) reported the presence of the genus in the East Atlantic (off Gabon) but also in this case the material (two larger chelipeds) was too incomplete to deserve a specific name.

The new species can be distinguished from *C. balssi* (Kishinouye, 1926: 65, fig. 1), *C. maorianus* (Powell, 1949, pl. 68 figs. 4, 5), *Ctenocheles* A (Holthuis, 1967: 378, 380, figs 1, 2a), *Ctenocheles* B (Holthuis, 1967: 380, fig. 2b) and *Ctenocheles* sp. from Gabon (Crosnier, 1969: 536, fig. 18), by the presence of spines on the ischium and merus of the larger cheliped. The description and figures of *C. collini* (Ward, 1945: 135, pl. 13) do not show if the ischium and merus of the larger cheliped are armed or unarmed and the larger cheliped of *C. serrifrons* (Loeuff & Intes, 1974: 26) is unknown. But, from the four named species, of which the body is described, *C. holthuisi* can be distinguished by the spiny aspect of the antennal peduncle, which is the most remarkable character of the new species because it is rather unusual for a callianassid.

The presence of a well marked movable spine (= scaphocerite, acicle or antennal scale) and a fixed spine (stylocerite) is even in disagreement with the definition of the family Callianassidae (cf. Borradaile, 1903: 541; Barnard, 1950: 504; Balss, 1957: 1581; De Saint Laurent, 1973: 513) and much more in accordance with the axiids. The only difference is the position of the stylocerite situated outside of the scale in the family Axiidae (cf. Borradaile, 1903: 536; Barnard, 1950: 498;

Balss, 1957: 1579) and inner-dorsally situated in *C. holtbuisi*, as it is in *Meticonaxius* De Man, 1905 (De Man, 1925: 56) a genus included among the axiids by Barnard (1950: 500) and Balss (1957: 1579) and provisionally placed among the callianassids by De Saint Laurent (1973: 515).

De Saint Laurent (1973: 516) points out that "Callianassidae et Axiidae forment d'ailleurs probablement un groupe d'origine commune". The present material seems to reinforce this statement.

RÉSUMÉ

Une nouvelle espèce du genre *Ctenocheles*, *C. holtbuisi* sp. nov., est décrite d'après un spécimen femelle adulte, recueilli sur la côte nord-est du Brésil, au large de l'estuaire du Rio São Francisco, à une profondeur de 75m. Il s'agit du premier spécimen complet récolté dans l'Atlantique. Son caractère le plus remarquable est la présence d'un scaphocerite et d'un stylocerite bien différenciés, ce qui est exceptionnel chez une Callianassidae.

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