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The occurrence of freshwater crabs (Crustacea: Decapoda: Pseudothelphusidae, Trichodactylidae) in the Rio Xingu, Amazon Region, Brazil, with description of a new species of Pseudothelphusidae*

by

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Abstract

A new species of pseudothelphusid crab, genus *Kingsleya* ORTMANN, 1897, is described from Rio Xingu, a southern tributary of the Amazon River, in the state of Pará, Brazil. The new species, *Kingsleya junki*, is distinguished by the morphology of the first male gonopod's apical plate, which shows a rudimentary proximal lobe and an enlarged distal lobe with a partially indented mesial margin. The occurrences of *Kingsleya ytupora* MAGALHÃES, 1986 (Pseudothelphusidae), *Sylvioarcinus devillei* H. MILNE-EDWARDS, 1853, *Sylviocarcinus pictus* (H. MILNE-EDWARDS, 1853), and *Trichodactylus ehrhardti* BOTT, 1969 (Trichodactylidae) are also recorded from this river.

Keywords: **Freshwater crab, Amazon region, new species, Trichodactylidae, Pseudothelphusidae, Rio Xingu.**

Resumo

É descrita uma nova espécie de caranguejo Pseudothelphusidae, gênero *Kingsleya* ORTMANN, 1897, do rio Xingu, tributário da calha sul do rio Amazonas, no estado do Pará, Brasil. A nova espécie, *Kingsleya junki*, é caracterizada pela morfologia da lâmina apical do gonópodo, a qual exibe um lobo proximal rudimentar e um lobo distal alargado, com sua margem mesial parcialmente endentada. São também registradas as ocorrências de *Kingsleya ytupora* MAGALHÃES, 1986 (Pseudothelphusidae), *Sylvioarcinus devillei* H. MILNE-EDWARDS, 1853, *Sylviocarcinus pictus* (H. MILNE-EDWARDS, 1853) e *Trichodactylus ehrhardti* BOTT, 1969 (Trichodactylidae) para o mencionado rio.

Introduction

A thorough picture of the specific diversity and distributional limits of the Pseudothelphusidae and Trichodactylidae of the Amazon Basin seems to be far from being achieved, in spite of the recent contributions of RODRÍGUEZ (1982, 1992), MAGALHÃES

*Dedicated to Prof. Dr. Wolfgang J. Junk on the occasion of his 60th aniversary.

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(1986, 1990), MAGALHÃES & TÜRKAY (1986, 1996a, b), and MAGALHÃES & RODRÍGUEZ (2002). The available records are usually concentrated in the vicinities of the most populated areas or scattered along the Amazon River and the lower course of some of the main rivers, such as Rio Negro, Rio Madeira, Rio Tapajós and Rio Tocantins. Many large Amazonian river systems are still poorly surveyed for their crustacean fauna. In the Rio Xingu basin, which is 1,450 km long with an area of 531,250 km^2, nothing is known about the composition and distribution of its decapod crustacean fauna, except for a single record of *Sylviocarcinus pictus* from its mouth (see MAGALHÃES & TÜRKAY 1996a).

Recent ichthyological and entomological expeditions to the middle and lower Rio Xingu have produced some collections of freshwater crabs that can contribute to improve our knowledge about this group in the Amazon region. In this paper I will report on the taxonomic results of the examination of these collections.

The specimens are deposited at the Instituto Nacional de Pesquisas da Amazônia, Manaus (INPA) and Museu Paraense Emílio Goeldi, Belém (MPEG). The following abbreviations were used in the new species description: carapace breadth (cb), measured across the carapace at its widest point; carapace length (cl), measured along the midline, from the frontal to the posterior margin; carapace height (ch), the maximum height of the cephalotorax; frontal breadth (fb), the breadth of the front measured along the upper border. For the other species, only the carapace breadth and carapace length are given after the number and sex of the specimens examined. Measurements are in millimeters. Other abbreviations used are: ov. = ovigerous; P = pereiopods; s = thoracic sternite. The word gonopod, when used alone, refers to the first male gonopod. Terminology for describing the gonopod morphology followed the criteria established by SMALLEY (1964) and RODRÍGUEZ (1982).

Taxonomic part

Family Pseudothelphusidae RATHBUN, 1893

Tribe Kingsleyini BOTT, 1970

Genus *Kingsleya* ORTMANN, 1897

Kingsleya junki n.sp. (Fig. 1A-G)

Material. - Holotype, ♂ (MPEG 777), Brazil, Pará, Rio Xingu, Vitória do Xingu (02°53'S 52°01'W), left bank of Rio Xingu, pitfall in terra firme area, 3.xii.2000, leg. R. SANTOS, C. MACIEL & J.O. DIAS.

Diagnosis. - First male gonopod with a large apical plate; its proximal lobe poorly developed, rounded, partially overreaching the distal lobe in an oblique position, but much shorter than the distal lobe; distal lobe much enlarged, its lateral margin broad and uniformly rounded, apex narrow and rounded, mesial margin with two distinct projections in cephalic direction: the distal one slightly bilobed, the proximal one indented.

Description of the holotype. - Carapace outline ellipsoid, widest at the middle (cb/cl 1.58); dorsal surface smooth, regions ill defined. Pair of gastric pits very close to each other, barely visible on metagastric region. Cervical grooves distinct, narrow, almost straight; their extremities ending near anterolateral margin. Postfrontal lobules low, small; median groove wide and shallow between postfrontal lobules, absent near frontal margin. Surface of carapace between front and postfrontal lobules smooth and slightly inclined anteriorly and medianly. Upper border of front marked by faint papillae, slightly convex in dorsal view, but straight in the median part; median notch absent; lower border carinate, sinuous in both frontal and dorsal view, and a little more projected anteriorly than the upper one, except in the middle. Lower and upper orbital margins marked by a row of very faint papillae; exorbital angle low, lacking

tooth. Anterolateral margin of carapace with a very shallow depression just behind exorbital angle, fringed by small papillae before cervical groove, and followed by a set of very low tubercles ending by the middle of the lateral margin; posterolateral margin smooth and rounded. Epistome narrow; epistomial tooth triangular, deflexed, borders carinate and slightly granulated. Suborbital and subhepatic regions of carapace sidewall smooth; pterygostomial regions smooth, only with a few small setae close mainly to the outer border of the third maxilipeds.

Endopod of third maxiliped with outer margin of ischium slightly convex, inner margin straight. Exopod of third maxiliped short and narrow, approximately 0.3 times the lenght of endopodal ischium outer margin. Aperture of efferent branchial channel wide, subquadrate.

First pereiopods moderately heterochelous, right cheliped larger than left. Larger cheliped with merus subtriangular in cross section; superior margin rounded with faint granules; medial margin lined by a longitudinal row of rounded, low teeth, slightly increasing size distally; inferior lateral margin marked by a row of faint tubercles, smooth distally; distal margin arched and smooth laterally, straight and marked by a row of faint tubercles mesially. Carpus with inner margin granular proximally, with a prominent median spine, and smooth distally; outer margin rounded, smooth. Palm relatively narrow (lenght/breadth 1.56), smooth on both sides. Fingers not gaping, tips not crossing; both fingers with large triangular teeth, smaller distally; dactylus with smaller teeth sometimes interspersed with larger ones. Dactylus slightly arched, longer than palm (dactylus/palm 1.25, measured dorsally), upper and outer surface of dactylus with longitudinal rows of minute granules. Propodal finger with smooth surfaces. Pereiopods 2-5 slender, ratios dactylus/propodus and dactylus/merus, respectively, as follows: P2 = 1.74 and 1.97; P3 = 1.56 and 1.70; P4 = 1.55 and 1.66; P5 = 1.74 and 1.69. P2 to P5 with dactylus bearing five longitudinal rows of sharp, corneous spines, increasing in size distally.

Thoracic sternites of the third maxillipeds and first pereiopods completely fused, except for small notches at lateral edges of sternum; sternal sulci s4/s5, s5/s6 and s6/s7 distinct, failing to reach midline of thoracic sternum by a short distance; sternal sulcus s7/s8 reaching midline. Midline of thoracic sternum marked by a deep groove between sternites VII and VIII.

All abdominal segments free. Lateral margins of the male telson slightly concave, tip rounded.

First male gonopod with a slight constriction at middle, enlarged distally, bearing a well developed mesial process and an apical plate. Marginal suture situated on the mesial side, bearing several setae proximally. Mesial process large and rather long (ca. 25 % of gonopod lenght), roughly retangular, bearing a sharp spine distally, pointing in mesial direction. Marginal process short, broad, extending to the lateral side, but not projected distally over the spine field area. Mesial process clearly separated from the apical plate, both structures juxtaposed in an arrangement of ca. 90° angle. Apical plate large; proximal lobe poorly developed, rounded, partially overreaching the distal lobe in an oblique position, but much shorter than the distal lobe; distal lobe much enlarged, its lateral margin broad and uniformly rounded, apex narrow and rounded, mesial margin with two distinct projections in cephalic direction: the distal one slightly bilobed, the proximal one indented. Field of apical spines small, longitudinally narrow, situated caudolaterally at the base of the apical plate, not extending distally beyond the apex of the apical plate's proximal lobe, surrounded by the mesial and lateral borders of the apical plate, and distally opened by a deep notch at the apex of the apical plate's proximal lobe.

Second male gonopod shorter than the first one (ca. 0.8 times the lenght of the first gonopod), flagellum slender, tapering, tip compressed.

Size. - Holotype male: cb 33.4 mm, cl 21.2 mm, ch 13.9 mm, fb 9.9 mm.

Distribution. - Brazil, Rio Xingu. Up to now, the species is known only from the type locality.

Remarks. - The present new species was assigned to the genus *Kingsleya* ORTMANN, 1897, as the state of some of the gonopodal characters agree with those that are diagnostic for the genus. The gonopod of *K. junki* has the marginal process distally broadened and not overreaching the field of apical spines, the mesial process is clearly salient from the cephalic side of the gonopod and not continuous with the apical plate, the apical spines area is distally divided by a deep terminal notch, and the apical plate presents two lobes.

K. junki is distinguished from the other species of the genus by the very distinctive apical plate of the

gonopod. The apical plate has a rudimentary proximal lobe and is clearly shorter than the distal lobe. The distal lobe itself is very enlarged, with an irregular mesial margin bearing two distinct prominences, the proximal one being lined with indentations. This arrangement has no similarity with those of the other four species currently known to the genus. In *K. latifrons* (RANDALL, 1840), *K. siolli* BOTT, 1967 and *K. ytupora* MAGALHÃES, 1986, the proximal lobe of the apical plate is well developed and just a little shorter than the distal lobe; in addition, the distal lobe is narrow and subtriangular in the former two species, and somewhat broad and rounded in the latter one. In *K. besti* MAGALHÃES, 1990, the proximal lobe is also well developed, although it involves the lower part of the distal lobe, which has a narrow apex. In all these four species the apical plate is rather narrow and the mesial margin is uniform, bearing no prominences or indentations.

K. junki can also be distinguished from *K. besti* by the marginal and the mesial processes of the gonopod. In *K. junki*, the marginal process is not projected upwards as it is in *K. besti*, and the mesial process is large and subrectangular in the former species, while subtriangular in *K. besti*. Concerning these characters, the present new species is similar to *K. latifrons*, *K. siolli* and *K. ytupora*.

However, possible affinities between *K. junki* and *Brasiliothelphusa tapajoense* MAGALHÃES & TÜRKAY, 1986, can be inferred based on the morphology of the gonopod's apical plate. In *K. junki*, the distal lobe is quite enlarged, with an irregular, indentated mesial margin; in *B. tapajoense*, the apical plate is also expanded, though thicker distally and with a mesial margin smooth and bearing a single spine. In addition, the lateral border of the apical plate is slightly twisted in *K. junki*, while it became highly twisted in *B. tapajoense*, leading to the characteristic U-shaped outline of this border shown by the latter species (MAGALHÃES & TÜRKAY 1986: 374, fig. 2d).

Whether or not the present new species represents an intermediate form between *Kingsleya* and *Brasiliothelphusa* is still unclear. As the pseudothelphusids from southern Amazonia are poorly known, I would rather leave it as *Kingsleya* until a more comprehensive knowledge of the crab fauna from that region is acquired and a better understanding of the southern Amazonian Kingsleyini genera relationships is possible.

Etymology. - The species has been named for Dr. Wolfgang J. Junk, of the Max-Planck-Institute for Limnologie, Working Group in Tropical Ecology, Plön, Germany, for his outstanding contribution to Tropical Ecology, and as a personal recognition for his support and incentive during my first steps as a carcinologist in the Amazon region.

Kingsleya ytupora MAGALHÃES, 1986 (Fig. 2A-C)

Material. - Brazil, Pará, Rio Xingu: 1 ♂, 51.8:31.8 (MPEG 792), Monte Belo (03°03'S 51°45'W), 8.x.1992, leg. V. PY-DANIEL et al.; 1 ♂, 44.4:27.1, 1 ♀, 21.6:13.8 (INPA 1266), Altamira (03°12'S 52°12'W), praia do pedral, 7.x.1990, leg. J. ZUANON; 4 ♂♂, 21.2:14.1 - 27.6:17.5, 3 ♀♀, 15.1:9.9 - 20.7:13.3 (INPA 1267), Altamira (03°12'S 52°12'W), Costa Junior, acima de Babaquara, 13.x.1996. J. ZUANON; 1 ♂, 41.2:25.1 (INPA 1269), furo do Tucum Seco, near Arroz Cru (03°25'16"S 51°55'08"W), 1.x.1990, leg. L. RAPP PY-DANIEL & J. ZUANON; 1 ♂, 19.5:12.6, 2 ♀♀, 12.6:8.5; 27.7:17.5 (INPA 1268), cachoeira do Espelho, 11.x.1992, leg. V. PY-DANIEL et al.; 1 ♀, 51.0:31.0 (INPA), cachoeira do Escalaço, 15.x.1992, leg. V. PY-DANIEL et al.; 1 ♂, 54.4:32.4, 1 ♀, 55.3:33.5 (INPA 1263), cachoeira do Pocão, 14.x.1992, leg. V. PY-DANIEL et al.; 3 ♀♀ with eggs and youngs, 52.1:31.5 - 58.7:35.3 (INPA 1265), cachoeira do Camaleão, 15.x.1992, leg. V. PY-DANIEL et al.; 1 ♀ ov., 52.4:32.6 (INPA), cachoeira Itapaiuna, 15.x.1992, leg. V. PY-DANIEL et al.; 7 ♀♀ with eggs and youngs, 41.6:20.8 - 57.5:35.0 (INPA 1262), cachoeira do Curuaia, 17.x.1992, leg. V. PY-DANIEL et al.; 1 ♀, 59.8:36.2 (MPEG 791), cachoeira Buraco do Arara, 17.x.1992, leg. V. PY-DANIEL et al.; 5 ♀♀ with youngs, 46.1:27.9 - 56.5:34.0 (INPA 1264), cachoeira do Acadá, 20.x.1992, leg. V. PY-DANIEL et al.

Remarks. - The male first gonopods of specimens from Rio Xingu exhibit the broad, rounded apical plate characteristic to *K. ytupora*. In addition, all specimens of both sexes show a row of irregular, sharp teeth in the distal half of the inner border of the chelipedal merus. These two characters are diagnostic for this species and distinguish it from *K. latifrons*, which has a gonopod with a narrow, subtriangular apical plate and the inner border of the chelipedal merus devoid of teeth (MAGALHÃES 1986).

MAGALHÃES (1986) pointed out that *K. ytupora* is typically found in rapids and waterfalls. This is corroborated by the above collections, all of them made in this kind of habitat. The present records extend this species range to a more eastern region in the lower Amazon and suggest that it could have a wider distribution in those Amazonian rivers coming from the Guyana and the Central Brazilian Shield.

Family Trichodactylidae H. MILNE-EDWARDS, 1853
Subfamily Dilocarcininae PRETZMANN, 1978

Sylviocarcinus devillei H. MILNE-EDWARDS, 1853 (Fig. 2D)

Material. - Brazil, Pará: 3 dry carapaces, 37.6:33.6 - 44.8:39.5 (INPA 1271), Rio Xingu, cachoeira do Escalaço, 14.x.1992, leg. V. PY-DANIEL et al.; 2 dry carapaces, 38.7:34.6; 38.0:35.5 (INPA 1270), Rio Iriri, cachoeira do Rio Iriri, 14.x.1992, leg. V. PY-DANIEL et al.

Remarks. - Only remains of dead specimens (carapace, chelipeds and legs) were found, usually among the rocks at rapid and water fall zones. However, the specimens could be positively identified to this species by the typical spined frontal margin of the carapace.

Sylviocarcinus pictus (H. MILNE-EDWARDS, 1853)

Material. - Brazil, Pará, Rio Xingu: 1 ♂, 21.8:19.5, 3 ♀♀, 17.0:15.1 - 21.3:19.0 (INPA 1272), rio Xingu, 30.x.1990, leg. V. PY-DANIEL et al.; 1 ♂, 32.4:29.6 (MPEG 776), Vitória do Xingu (02°53'S 52°01'W), left bank of Rio Xingu, in terra firme area, 3.xii.2000, leg. R. SANTOS; 3 ♂♂, 24.5:21.7 - 25.2:28.8 (INPA 1274), Monte Belo (03°03'S 51°45'W), 8.x.1992, leg. V. PY-DANIEL et al.; 8 ♂♂, 15.6:13.9 - 30.2:26.1, 5 ♀♀, 16.4:14.8 - 34.2:31.1 (INPA 1273), cachoeira Kaituká, 03°33'47"S 51°53'20"W, 9.x.1990, leg. J. ZUANON.

Remarks. - In spite of the fact that only immature males are available, the gonopod clearly shows the typical morphology of this species.

Trichodactylus ehrhardti BOTT, 1969 (Fig. 2E)

Material. - Brazil, Pará, Rio Xingu: 3 ♀♀, 6.6:5.2 - 8.0:7.1 (INPA 1275), cachoeira Kaituká, 03°33'47"S 51°53'20"W, 9.x.1990, leg. J. ZUANON.

Remarks. - In spite of being females, the above specimens were identified as *T. erhrhardti* by the presence and situation of the carapace dentition. They have only two widely spaced, sharp teeth on the anteriorlateral margin of the carapace; in addition, an obsolecent tooth is barely visible on the posterolateral margin of the carapace. Such a disposition of the carapace teeth could be similar from that of *Trichodactylus faxoni* RATHBUN, 1905, with which they could be confounded if male specimens are not available. In the latter species, only the teeth of the anterolateral margin of the carapace are present, and they are usually very small, reduced, and sometimes even absent; the carapace outline tends to be more rounded in shape as well. In *T. ehrhardti*, the carapace outline tends to be more hexagonal, the first two anterolateral teeth of the carapace are distinct and sharp, and usually shows 1-2 minute, sometimes obsolecent teeth on the posterolateral margin of the carapace.

Zoogeography

The records presented in this paper are shown in figure 3. Both *Sylviocarcinus devillei* and *S. pictus* have extensive distributional range in the Amazon Basin and are among the most frequent and common species of trichodactylid crabs (RODRÍGUEZ, 1992; MAGALHÃES & TÜRKAY 1996a; MAGALHÃES 2002); *S. pictus* also occurs in the coastal river basins of the Atlantic Guianas and Northeastern Brazil (MAGALHÃES & TÜRKAY 1996a). However, the former species has not yet been recorded to the Rio Xingu, and the latter has a single record from its mouth (MAGALHÃES & TÜRKAY 1996a). *Trichodactylus ehrhardti* was only known to the Central Amazon region (BOTT 1969). The record above greatly extends the distributional range of the species,

indicating that it can encompass a larger portion of the Eastern Amazon region.

The genus *Kingsleya* currently has four species assigned to it. The widest distribution is shown by *K. latifrons*, which occurs along most of the Guyana Shield region, encompassing Atlantic Guianas river basins and northern tributaries of the Amazon River in the states of Roraima, Amazonas and Pará (RODRÍGUEZ 1982; MAGALHÃES 1986). *K. siolli* also exhibits a Guayana Shield distribution, although more restricted to upper course of rivers coming from the mountain ranges (Serra Acaraí and Serra Tumucumaque) along the border between Brazil (state of Pará) and Guyana and Suriname (RODRÍGUEZ 1982; MAGALHÃES 1986). *K. ytupora* occurs in Brazil, in the rapids and water fall zone of rivers running from both the Guayana and Central Brazilian Shields, in the states of Amazonas and Pará (MAGALHÃES 1986; this paper).

The presence of another *Kingsleya* species in right bank tributaries of the Amazon River indicates that this genus has a wider distribution towards southern Amazonia. The affinities of *K. junki* with *B. tapajoense* would also suggest that the pseudothelphusid crabs may have had a complex evolutionary history within the Amazonian portion of the Central Brazilian Shield. Similar to Rio Xingu, all other river basins draining the Central Brazilian Shield are poorly surveyed for decapod fauna, especially for the Pseudothelphusidae. A few and scattered records were offered by MAGALHÃES (1986), but they are all inconclusive concerning specific identification (MAGALHÃES & RODRÍGUEZ 2002).

As mentioned by MAGALHÃES & TÜRKAY (1986), the evolutionary history of the Kingsleyini in the Amazon basin is still dependent upon a better knowledge of the decapod fauna from the southern Amazonian region. However, the southern and eastern Amazonia are highly vunerable regions under strong pressure due to increasing human activity caused by invading agrobusiness frontier and infrastructural projects (KOHLHEPP 2001). Systematic and compreensive faunistic surveys in the tributaries draining the Central Brazilian Shield, particularly in their headwaters, are therefore urgent for gaining data to be used either for scientific or for conservation purposes.

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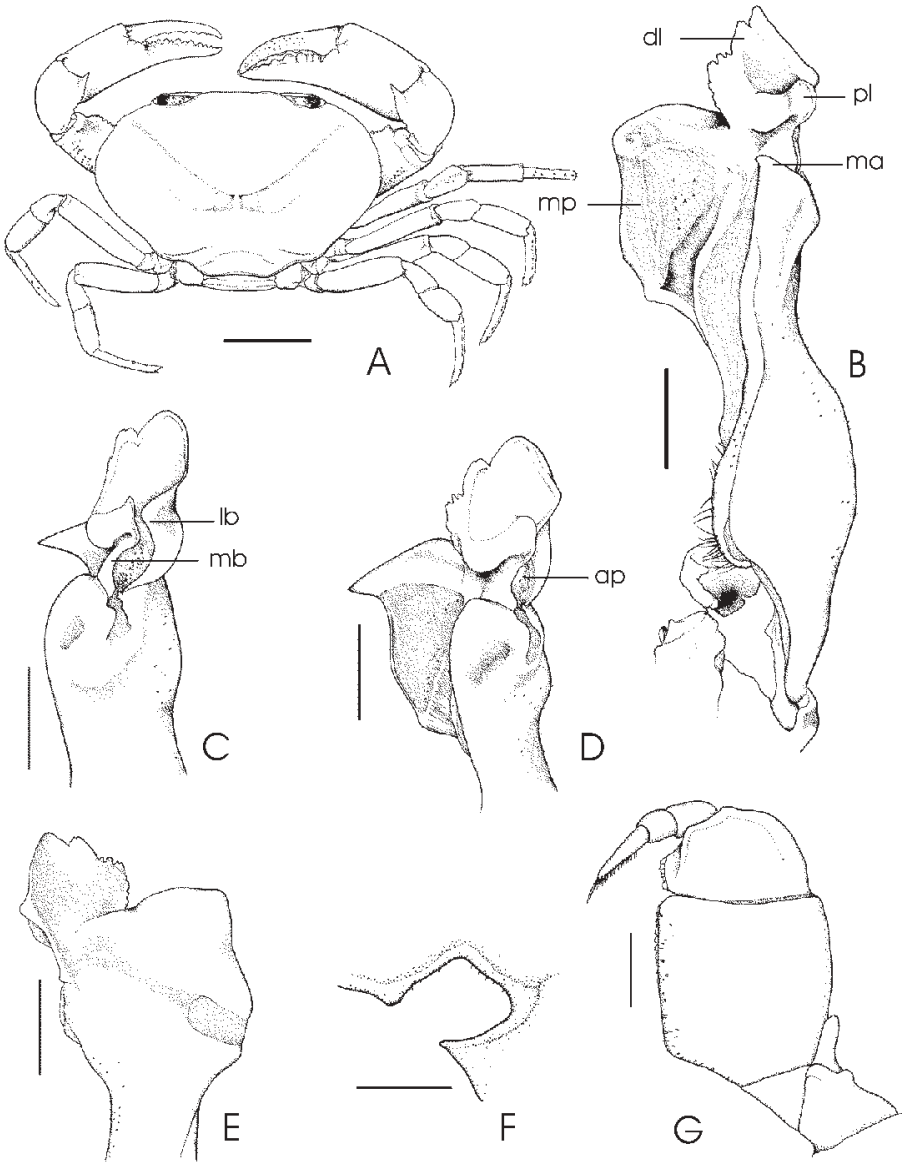

Fig. 1:
Kingsleya junki n. sp., holotype, MPEG 777: **A**: dorsal view; **B**: first left gonopod, caudal view; **C**: same, detail of distal part, caudolateral view; **D**: same, caudomesial view; **E**: same, cephalic view; **F**: opening of left efferent branchial chamber, external view; **G**: left third maxilliped, external view; ap, field of apical spines; dl, distal lobe of apical plate; lb, lateral border of apical plate; ma, marginal process; mb, mesial border of apical plate; mp, mesial process; pl, apical plate. Scale bars: **A** = 10 mm, **B-F** = 1 mm, **G** = 2 mm.

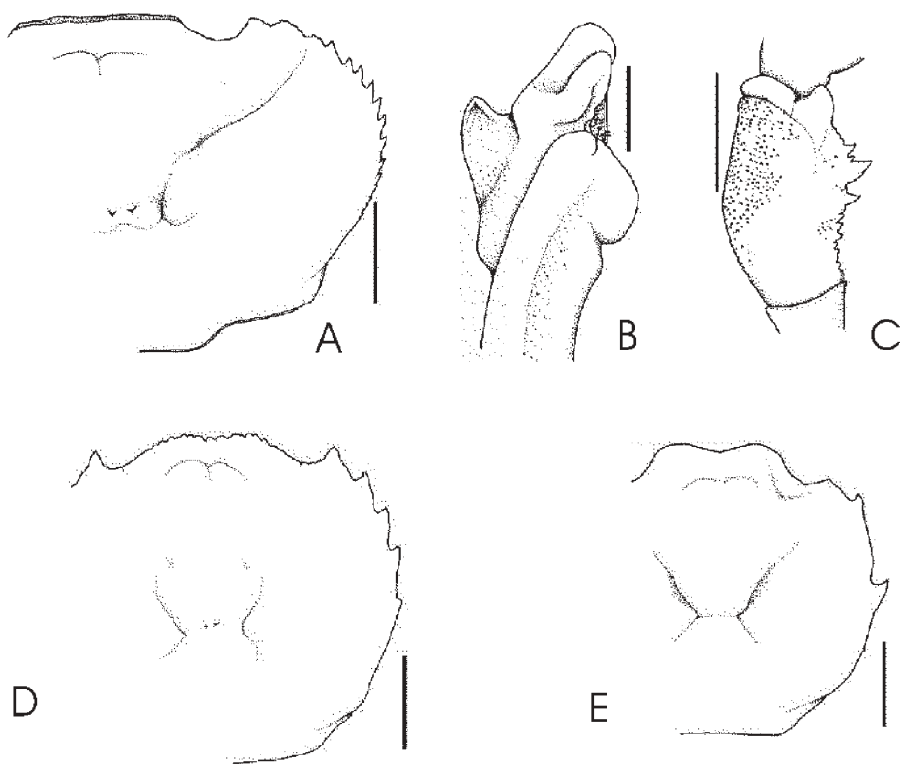

Fig. 2:
Kingsleya ytupora Magalhães, 1986: **A**: right side of carapace, dorsal view, male, MPEG 792; **B**: left gonopod, distal part, male, MPEG 792; **C**: merus of left cheliped, female, INPA 1263. *Sylviocarcinus devillei* H. MILNE-EDWARDS, 1853: **D**: right side of carapace, dorsal view, INPA 1270. *Trichodactylus ehrhardti* BOTT, 1969: **E**: right side of carapace, dorsal view, female, INPA 1275. Scale bars: **A**, **C**, **D** = 10 mm; **B** = 1 mm; **E** = 2 mm.

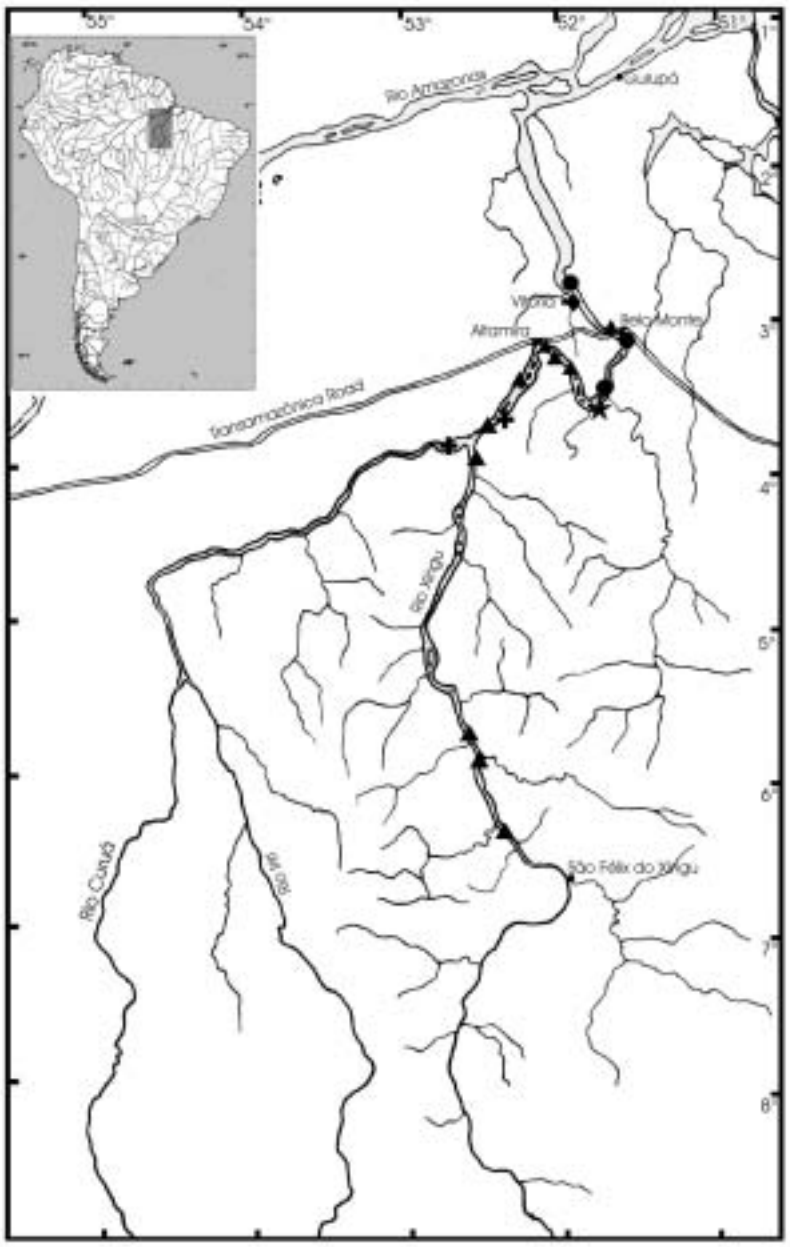

Fig. 3:
Distribution of the freshwater crabs in the middle and lower course of Rio Xingu, state of Pará, Brazil. Symbols: ◆ = *Kingsleya junki* n. sp.; ▲ = *Kingsleya ytupora*; ✚ = *Sylviocarcinus devillei*; ● = *Sylviocarcinus pictus*; ★ = *Trichodactylus ehrhardti*.