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Chucho pintado, *Aetobatus narinari*. Foto: Gaby Carías Tucker

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# Six New Species of Freshwater Crabs from Pantepui, Venezuela (Crustacea: Decapoda: Pseudothelphusidae)

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## Abstract

Six new species of pseudothelphusid crabs (Crustacea: Decapoda: Brachyura) are described from several rivers of the Pantepui region of Venezuela, in the states of Amazonas and Bolívar: *Microthelphusa aracamuniensis,* **n. sp.**, *M. guaiquinimaensis,* **n. sp.**, *M. maigualidaensis,* **n. sp.**, *M. marahuacaensis,* **n. sp.**, *M. roraimaensis,* **n. sp.**, and *Fredius cuaoensis,* **n. sp.**

**Keywords:** Brachyura, Cerro Guaiquinima, Cerro Marahuaca, *Fredius*, *Microtelphusa*, Monte Aracamuni, Serranía de Maigualida, Río Cuao, Roraima.

# Seis nuevas especies de cangrejos de agua dulce del Pantepui, Venezuela (Crustacea: Decapoda: Pseudothelphusidae)

## Resumen

Se describen seis nuevas especies de cangrejos pseudotelfúsidos (Crustacea: Decapoda: Brachyura) procedentes de varios ríos de la región pantepuyana de Venezuela, en los estados Amazonas y Bolívar: *Microthelphusa aracamuniensis,* **n. sp.**, *M. guaiquinimaensis,* **n. sp.**,

*M. maigualidaensis,* **n. sp.** *M. marahuacaensis,* **n. sp.**, *M. roraimaensis,* **n. sp.**, y *Fredius cuaoensis,* **n. sp.**

**Palabras clave:** Brachyura, Cerro Guaiquinima, Cerro Marahuaca, *Fredius*, *Microtelphusa*, Monte Aracamuni, Serranía de Maigualida, Río Cuao, Roraima.

## INTRODUCTION

The mountains of the Guiana Shield are located between the Río Orinoco to the North and the Río Negro to the South, in Northern South America. Its highest prominence is the Pico da Neblina (3045 m). This group of mountain systems is developed essentially over two geological substrates: a basement of igneous-metamorphic rocks (acid granites) and a layer of sedimentary rocks (sandstones) deposited over that basement (Maguire 1979).

Sandstones, almost entirely belonging to the Roraima Formation, have suffered important and repeated tectonic and structural transformations, resulting in fragmented portions of tabular mountains, more or less isolated from each other. They have been called Tepuyes (Tepui, in singular) by local aboriginal people. Tepui summits usually reach 1500 to 2600 m, but there are a few exceptions where higher elevations are met (for example Roraima-Kukenán: 2800+ m, Serranía La Neblina: 3000+ m). Tepuyes emerge abruptly, like blocks, from lowland to medium elevation hilly areas of savanna and forest, giving the local landscape a unique and impressive aspect (Huber 1988).

Costa *et al.* (2014) recorded more than fifty tepuyes in the Guiana Shield; presenting, for the first time thus, their distribution in a map with indication of the mountain summits reaching at least 1500 m. This map is coupled with a table presenting, for each tepui, in numerical figures, the maximum elevation, the area of their summits and their batters (when known). It is noteworthy that this map shows only tepuyes above 1500 m, with the exception of Cerro Ichún (430 m), which was included due to its large extension and proximity to other elevated ranges.

In 1955, Mayr and Phelps, Jr. employed the term "Pantepui" to define "the sandstone table mountains located in the states of Ama-

zonas and Bolívar in Venezuela, and the neighboring areas of Guiana, Brazil and Colombia". This definition contains an explicit geographical criterion related to the magnitudes of altitude and surface area of the mountains, as well as an implicit biological criterion, referring to the condition of life in those regions (Costa *et al.* 2014).

Later on, several authors have offered different interpretations of the term Pantepui, which deviates from the original concept (Müller 1973, Hoogmoed 1979, Steyermark 1979, Brown 1987, Neild 1996). In an attempt to give a clearer meaning from the geographical and biological points of view, Huber (1987) stated that "the "Biogeographical province of Pantepui, which forms part of the Guyana region, is composed by the set of orographic ecosystems developed on the tabular mountains (tepuyes) of the Roraima Formation of the Guiana Shield, ranging from 1200-1500 m to 3045 m. It is a tropical oreobiome in the sense of Walter (1976). The tepuian oreobiome includes all ecosystems of the superior foothills and summits of the tepuyes, located in the tropical meso and sub-microthermic altitudinal levels".

Nine species of freshwater crabs have hitherto been described from the rivers of this biogegraphical region (*sensu* Huber, 1987 and Costa, [2014]). They belong to the genera *Fredius* Pretzmann (7 species), *Microthelphusa* Pretzmann (1 species) and *Prionothelphusa* Rodríguez (1 species) (Rodríguez 1980, Suárez 2006, Cumberlidge 2007). Five new species of *Microthelphusa* and one new species of *Fredius* are described in this work, all specimens known of these taxa were collected in the mountains of Pantepui, in Venezuela (Plate 1).

A group of *Microthelphusa* species is distributed from the foothills of the Andes, along the Cordillera de la Costa (Northern Venezuela) to the East, until Trinidad: *M. barinensis* (Rodríguez 1980, *M. forcarti* (Pretzmann 1968), *M. ginesi* Rodríguez and Estevez 1972, *M. odaelkae* (Bott 1970), *M. racenisi* (Rodríguez 1966), *M. sucreensis* Rodríguez and Campos 2000, *M. turumikiri* Rodríguez 1980 and *M. viloriai* Suárez 2006. Another group of species is exclusive of the Pantepui province: ***M. aracamuniensis*** Suárez, **n. sp.**; *M. bolivari* Rodríguez 1980; ***M. guaiquinimaensis*** Suárez, **n. sp.**; ***M. maigualidaensis*** Suárez, **n. sp.**; ***M. marahuacaensis*** Suárez, **n. sp.**; *M. meansi* Cumberlidge, 2007; *M. rodriguezi* (Pretzmann 1968); *M. roraimaensis* Suárez, **n. sp.**; *M. somanni* (Bott 1967); and *M. wymanni* (Rathbun 1905). Apart from

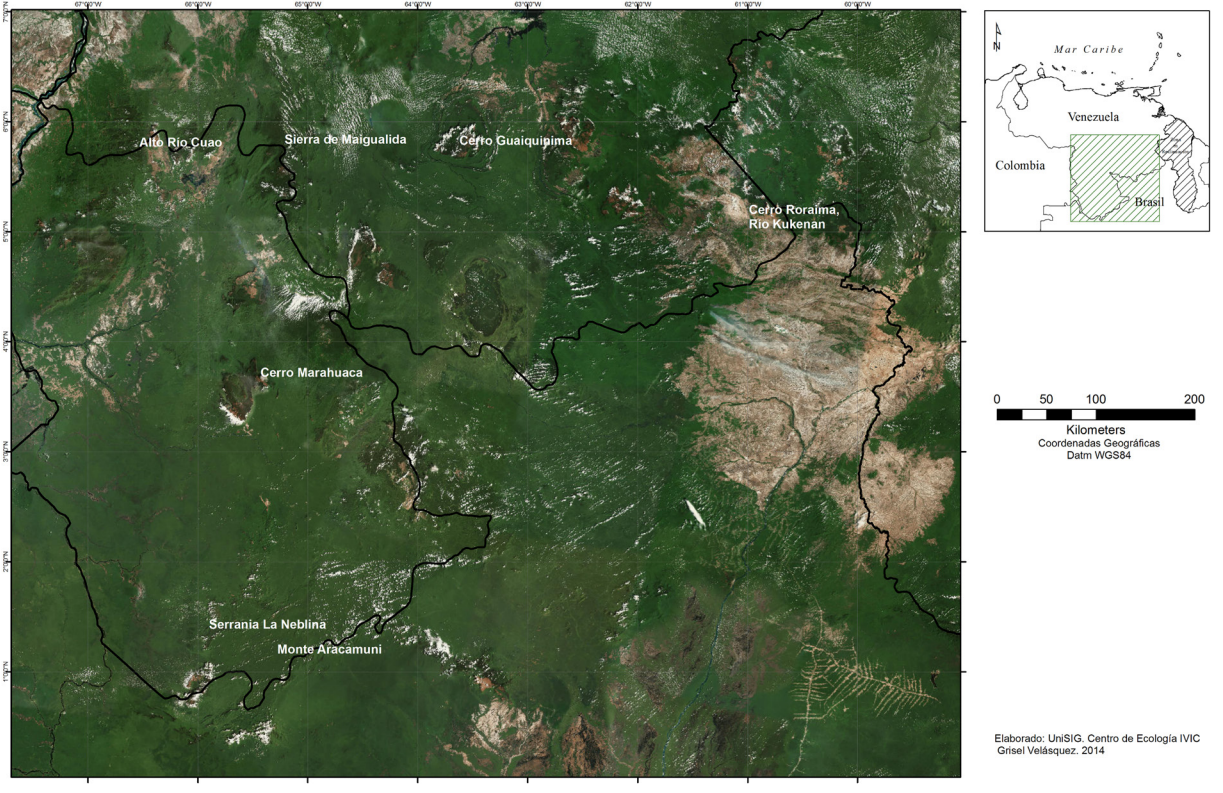


Plate 1. Map of the area of capture localities of the six new species of freshwater crabs described in this paper.

its insular geographical distribution, the genus *Microthelphusa* exhibits a clear altitudinal preference. Its species are only found above 500 m, and apparently, up to 2000 m (Table 1). The pattern of spatial disjunction is reflected in high levels of endemism. Diagnostic characters for the genus are summarized by Suárez (2006).

Table 1. Altitudinal distribution of *Microthelphusa* species.

| Species | Altitude (meters above sea level) |
|---|---|
| *M. rodriguezi* | – |
| *M. barinensis* | 530-570 |
| *M. odaelkae* | 600-800 |
| *M. wymani* | 880 |
| *M. roraimaensis* | 950 |
| *M. bolivari* | 1000 |
| *M. meansi* | 1135 |
| *M. guaiquinimaensis* | 1380-1400 |
| *M. aracamuniensis* | 1000-1500 |
| *M. ginesi* | 1400 |
| *M. turumikiri* | 1500 |
| *M. maigualidaensis* | 1500 |
| *M. marahuacaensis* | 1500 |
| *M. viloriai* | 1500 |
| *M. forcarti* | 1603-1800 |
| *M. racenisi* | 1400-2000 |

On the other hand, the genus *Fredius*, hitherto embraces twelve known species. ***Fredius cuaoensis*** Suárez, **n. sp.**, is certainly the smallest representative of the genus. It also represents the highest altitudinal distribution for the genus.

## METHODS

For the descriptions and comparisons, the author examined under magnification, samples of preserved biological material collected years ago by several explorers, which are deposited and catalogued in the Colección de Crustáceos Decápodos "Dr. Gilberto Ro-

dríguez" (CCDGR-IVIC), of the Instituto Venezolano de Investigaciones Científicas (IVIC), Caracas-Venezuela.

Description methods followed recommendations of the Fourth Edition of the *International Code of Zoological Nomenclature* (ICZN 1999).

Line drawings of morphological structures were produced with a camera lucida attached to a Stereomicroscope Wild M5. Tridimensional images of type specimens were produced by digitally adjusting superimposed photographs (Zerene Stacker® software ) taken with a camera Canon Eos Rebel T3 on a Leica Reprovit®, with ring flash lighting.

Abbreviations used are **cl**: cephalothorax length, **cb**: cephalothorax breadth, **m**: meters above sea level, *leg.*: legit, **fig**.: figure, **pl.**: plate.

## RESULTS

### Systematics
### Family Pseudothelphusidae Rathbun, 1893
### Tribe Kingsleyini Bott, 1970
### Genus *Microthelphusa* Pretzmann, 1968

***Microthelphusa aracamuniensis,* new species**
**Figs.1-2, Pl. 1 (distribution), Pl. 2A**
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**Material examined**: Cerro Aracamuni, Estado Amazonas, Venezuela, October 1987, *leg.* Terramar, 1 male holotype, cl. 17.3 mm, cb. 27.3mm, mature female paratypes, cl. 17.1 and 15.9 mm, cb. 30.2 and 24.5 mm (CCDGR-IVIC-1088); Cerro de La Neblina, Departamento Río Negro, Estado Amazonas, Venezuela, 1820-1880 m, *leg.* W. R. Buck, 7 February 1984, 1 male cl. 19.4 mm, cb. 33.2 mm, 1 mature female cl. 21.0 mm, cb. 36.6 mm (CCDGR-IVIC-1090); Cerro de La Neblina, 5°51'N, 65°58'W, Estado Amazonas, Venezuela, 1800 m, *leg.* P. Spangler and R. A. Faitoute, 3 juvenile male's cl. 12.5-6.5 mm, cb. 19.8-9.4 mm, 5 juvenile female's cl. 11.4-5.1mm, cb. 17.9-7.4mm (CCDGR-IVIC-1090).

**Diagnosis**: Male gonopods with marginal lobe simple, cup shaped, reaching middle of apical lobe; apical lobe triangular in caudal view with cephalic border extending farther than caudal one; field of apical spines very narrow, straight, developed along main axis of gonopod, with small apical notch; mesial process triangular,

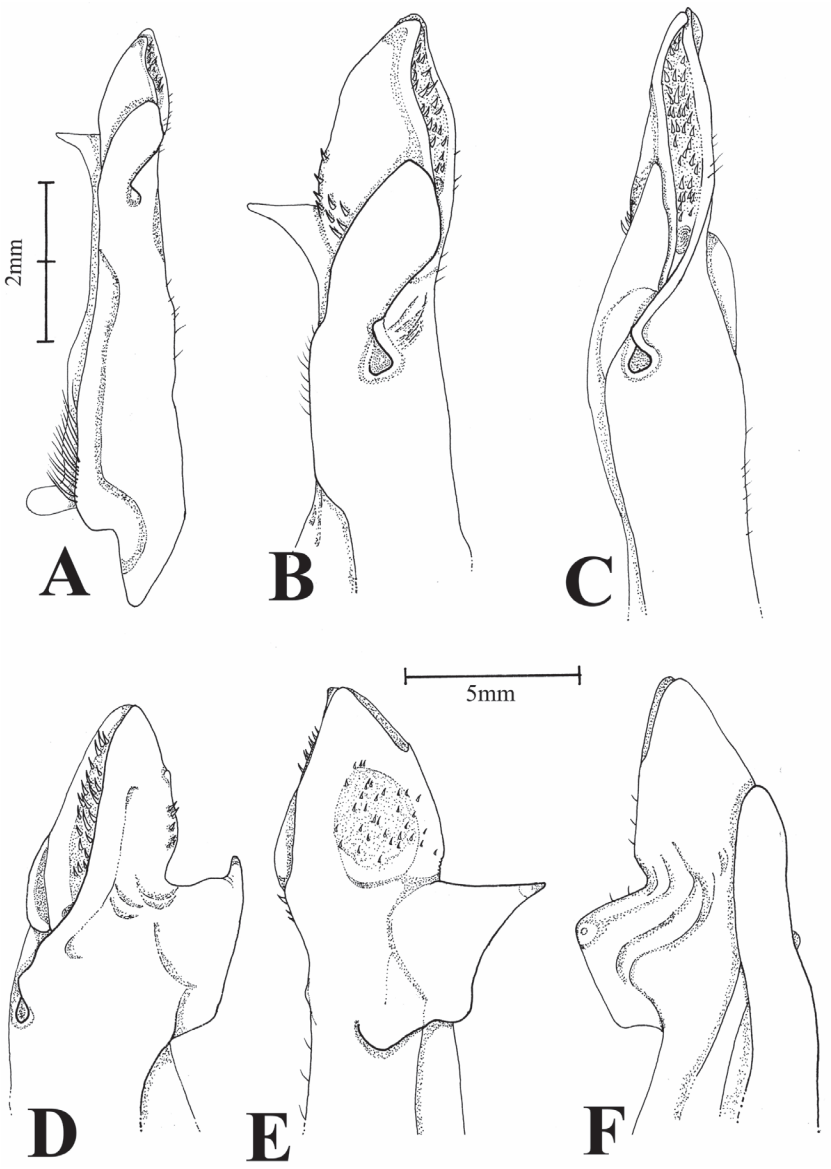


Figure 1. A.- Total caudal view of the first gonopod of the Holotype of *Microthelphusa aracamuniensis,* **n. sp.**; B-F.- Detail of the Holotype first gonopod in caudal view (B), caudo-lateral view (C), lateral view (D), cephalic view (E) and mesial view (F).

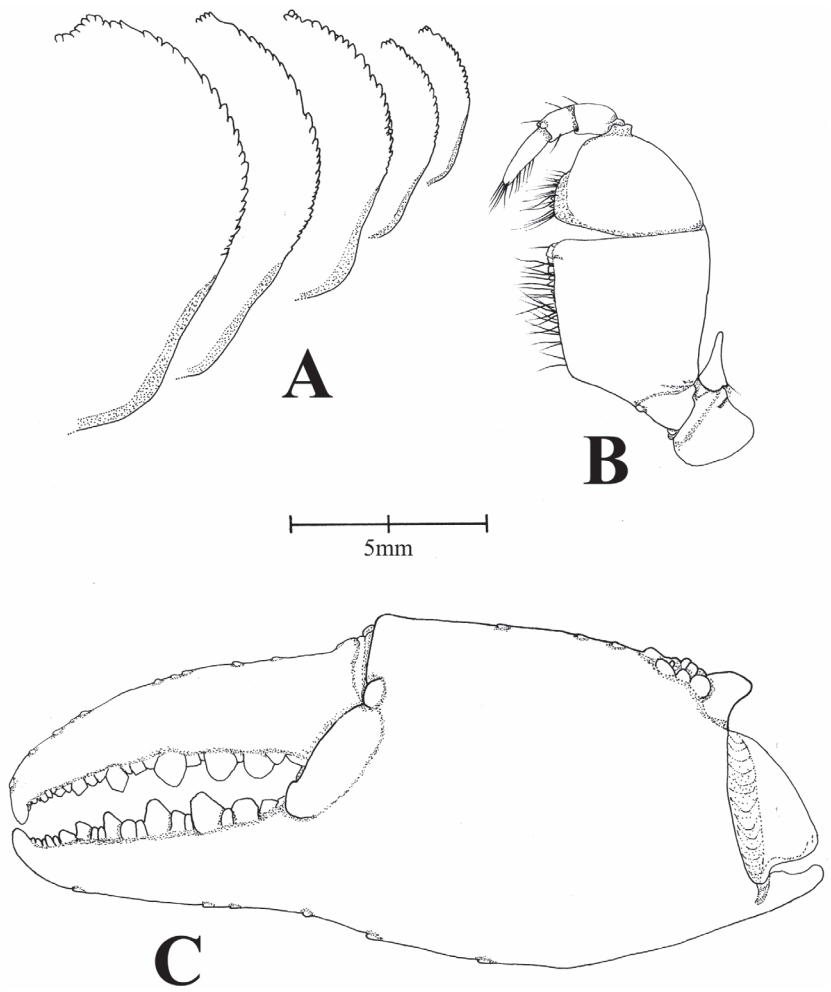


Figure 2. A.- Variation in the shape of the lateral border of cephalothorax of *Microthelphusa aracamuniensis,* **n. sp.**; B.- Third maxilliped of the Holotype; C.- Left major cheliped of the Holotype.

with proximal border angled, ending in acute spine directed backwards and slightly upwards.

**Description of holotype**: Cephalothorax 1.56 times as wide as long, dorsal surface smooth and polished; cervical grooves shallow and slightly arquate, not reaching margin of cephalothorax; antero-

lateral margins with shallow and long postorbital depression, rest of border smooth, except for 4-5 obsolescent squamiform papillae set far apart. Postfrontal lobes low, oblong, inconspicuous; median groove indistinct over frontal region, deep and wide between post-frontal lobes. Surface of cephalothorax between post-frontal lobes and front inclined anteriorly, slightly concave in frontal view. Upper margin of front slightly convex in dorsal view, without median notch, marked with row of minute coalescent papillae; lower margin thin, slightly sinuous in frontal view, advanced in front of upper margin; surface of front between upper and lower borders narrower at middle.

Palm of largest chela inflated, with lower margin strongly sinuous; fingers long, not gaping. Walking legs slender, but not unusually elongated, largest being those of third pair (total length 1.33 widths of cephalothorax); merus in this pair 3.8 times longer than wide. Exopod of third maxilliped 0.38 length of ischium of endognath.

Male gonopods straight in caudal and lateral views. Marginal lobe simple, cup shaped, reaching middle of apical lobe; apical lobe triangular in caudal view with cephalic border extending farther than caudal one; field of apical spines very narrow, straight, developed along main axis of gonopod, with small apical notch; mesial process triangular, with proximal border angled, ending in acute spine directed backwards and slightly upwards.

**Remarks**: This species displays considerable variability in the morphology of cephalothorax. In the female paratypes cervical grooves are deeper and straight, the postorbital notch is absent and the lateral border has 2-3 coalescent papillae before level of cervical groove, and approximately 10 papillae placed at considerable intervals from each other behind it; the postfrontal lobes are obsolescent and the median groove is absent. The specimens from Cerro de La Neblina have a distinct postorbital notch and 14-16 distinct triangular teeth, regularly spaced over the lateral border; the upper border of the front is well defined, with a row of small but distinct tubercles; in the largest specimens the median groove between the postfrontal lobes is distinct throughout, whereas in the juveniles it is absent. The cephalothorax is relatively narrow in the holotype, while in the female paratype and in the male and female from Cerro de La Neblina it is considerably wider (cb/cl=1.77, 1.71, 1.74, respectively); juveniles have a narrow cephalothorax (cb/cl=1.44-1.50).

**Distribution**: Only known from the type locality mounts Aracamuni and Cerro de La Neblina, Venezuela, near the Brazilian border (1800 – 1880 m) (Pl.1).

**Etymology**: The specific epithet *aracamuniensis* refers to the geographical procedence of the holotype of this new taxon, Cerro Aracamuni (1400 m) one of the most prominent summits of the Serranía La Neblina in the Brazilian-Venezuelan border.

***Microthelphusa marahuacaensis,* new species**
**Figs. 3-4, Pl. 1 (distribution), Pl. 2B**
urn:lsid:zoobank.org:act:2BE7B166-B538-4710-B5AD-B5161B54AEDB

**Material examined**: Cerro Marahuaca, Estado Amazonas, Venezuela, on the batter of the mountain at 1600 m, *leg.* E. Osuna, 1 male holotype, cl. 14.8 mm, cb. 24.5mm (CCDGR-IVIC-1109).

**Diagnosis**: Male gonopods with marginal lobe rounded, cup-shaped, ending distally in small acute spine; apical lobe with caudal lamella rounded, shorter than cephalic one, cephalic lamella with border turned over field of spines, forming elongated flap; field of apical spines narrow, slit-like, developed along main axis of gonopod; mesial process wide, triangular, with proximal border rounded, ending in acute tip directed backwards and slightly upwards.

**Description of holotype**: Cephalothorax 1.66 as wide as long, dorsal surface covered by minute papillae not visible to naked eye; cervical groove straight, deep proximally, and thin, slightly curved distally, ending near anterior margin of cephalothorax. Anterolateral margin with notch behind orbit, followed by few crenulations; rest of margin with approximately 15 sub-equal triangular papillae, except for last 2-3 that are smaller. Post-frontal lobes low, rounded. Median groove absents, but cephalothorax depressed in this area. Surface of cephalothorax in front of postfrontal lobes slightly excavated in frontal view and inclined anteriorly. Upper border of front slightly convex in dorsal view, with a row of papillae interrupted at middle, but without median notch. Lower margin almost straight in frontal view, advanced. Surface of front between upper and lower borders low.

Palm of largest chela moderately inflated, with lower margin sinuous; fingers long, not gaping. Walking legs long and slender, largest being those of third pair (total length 1.7 width of cephalothorax); merus in this pair 3.7 times longer than wide; spines of dactylus very

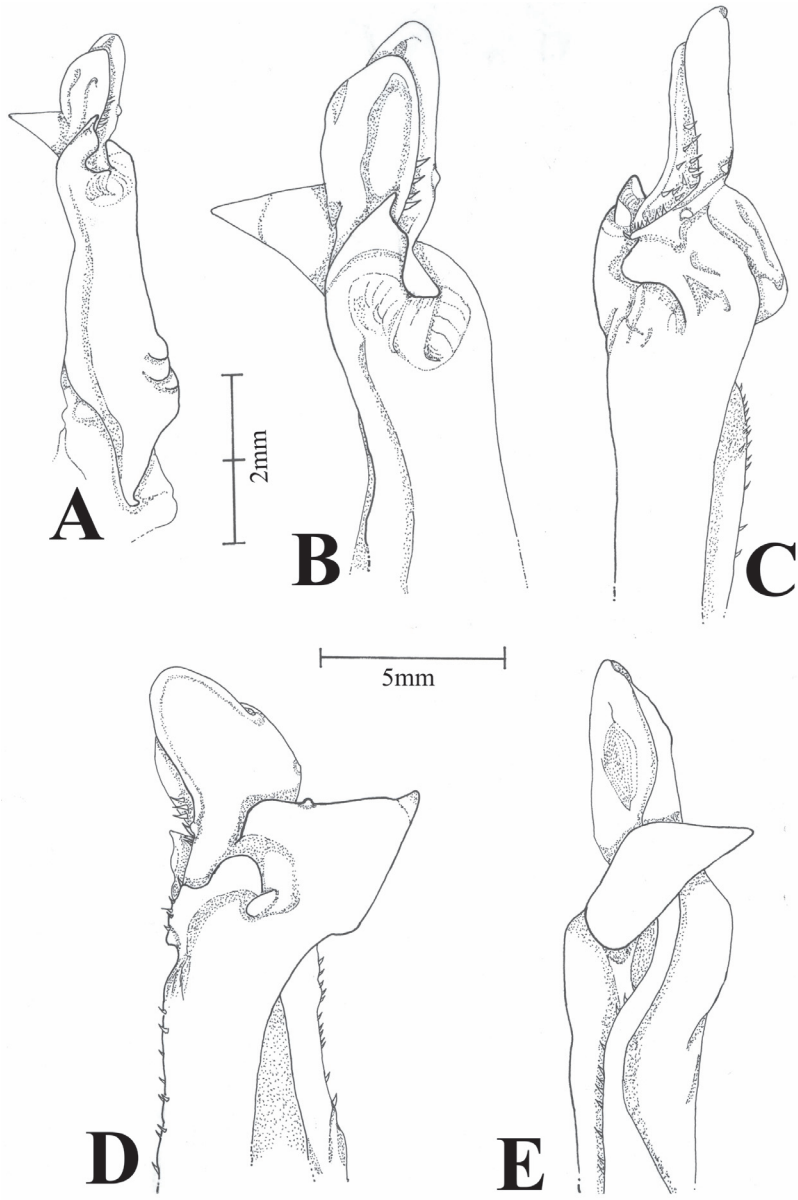


Figure 3. A.- Total caudal view of the first gonopod of the Holotype of *Microthelphusa marahuacaensis,* **n. sp.**; B, C, D, and E, detail of the first Holotype gonopod in caudal view, lateral view, cephalic view and mesial view respectively.

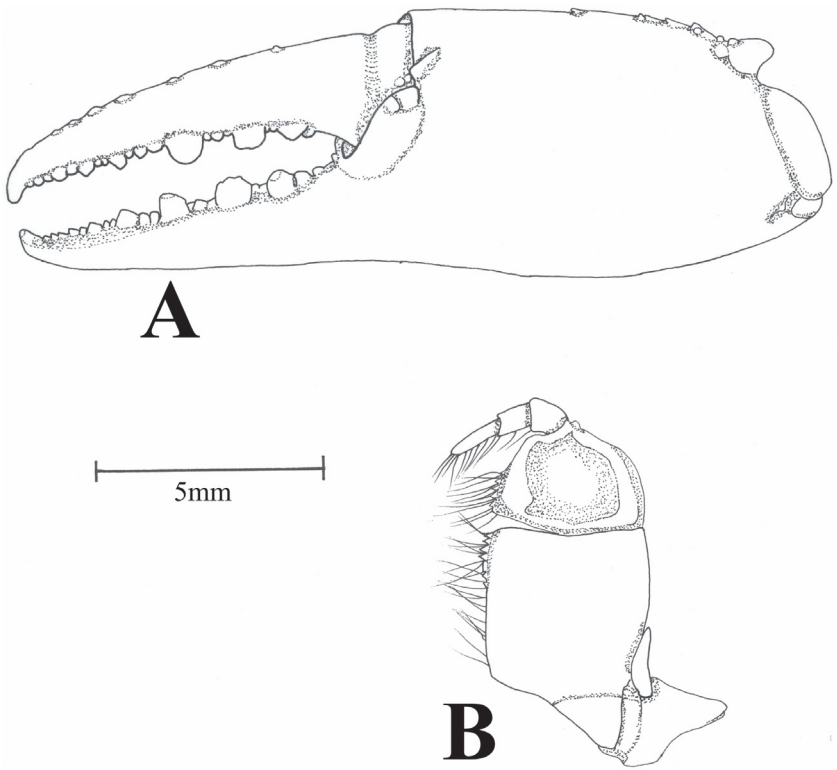


Figure 4. A.- Left major cheliped of the Holotype of *Microthelphusa marahuacaensis,* **n. sp.**; B.- Third maxilliped of the Holotype.

small. Exopod of third maxilliped 0.40 length of ischium of endognath.

Male gonopods short and stocky, with marginal, apical, and mesial lobes well developed. Marginal lobe rounded, cup-shaped, ending distally in small acute spine; apical lobe consisting of two distinct lamellae, caudal one shorter and rounded, cephalic one with border turned over field of spines, forming elongated flap; field of apical spines lodged between two lamellae, narrow, slit-like, developed along main axis of gonopod; mesial process wide, triangular, with proximal border rounded, ending in acute tip directed backwards and slightly upwards.

**Habitat**: The holotype was found within the leaves of the bromeliad *Brocchinia tatei* L.B. Smith, but we cannot ascertain whether this species lives habitually on this plant.

**Remarks**: This specie separates from *M. aracamuniensis*, and from the rest of the known species of *Microthelphusa*, because its caudal plate is pronouncedly shorter than its cephalic, and possesses a keel striking over its surface; the marginal lobe's apex ends up in a thorn in caudal sight. In this species the lateral border of the cephalic lamella is more broadened than the caudal lamella. This is the only species of the genus that shows thorns on the distal portion of the furrow of the gonopod. Its cephalic lamella is rounded off.

**Distribution**: Known exclusively from one individual found on the summit of Cerro Marahuaca (1600 m) one of the tepuyes of Amazonas State, Venezuela (Pl. 1).

**Etymology**: The specific name *marahuacaensis* alludes to the type locality of this species.

***Microthelphusa guaiquinimaensis,* new species**
**Figs. 5-6, Pl.1 (distribution), Pl. 2C**
urn:lsid:zoobank.org:act:4E7692E1-98DF-49E0-9665-9C9A35960C34

**Material examined**: Cerro Guaquinima, Estado Bolívar, Venezuela, 5°50'N, 63°50'W, 1400 m, 30 May 1987, *leg.* S. Gorzula; 1 male holotype, cl. 16.1 mm, cb. 25.9 mm (CCDGR-IVIC1113). Cerro Guaquinima, Estado Bolívar, Venezuela, 5°58'N, 63°27'W, 1380 m alt., 27 March 1985, *leg.* F. Barreto, 1 male paratype, cl. 14.2 mm, cb. 22.3 mm (CCDGR-IVIC1114).

**Diagnosis**: Male gonopods with marginal lobe elongated, cup-shaped, bent laterally at distal portion. Apical lobe consisting of two distinct lamellae fused to form rounded process, projected mesially into small triangular spine, cephalic lamella longer, with border thickened; field of apical spines narrow, slit-like, developed transversely to main axis of gonopod. Mesial process wide triangular, with proximal border rounded, ending in strangled tip directed backwards and slightly upwards.

**Description of holotype**: Cephalothorax 1.56 times as wide as long, dorsal surface covered by minute papillae not visible to naked eye; cervical groove proximally almost straight, deep, continuous with middle grooves of cephalothorax, becoming obsolescent distally. Anterolateral margin with depression behind orbit, followed by 4-5 indistinct papillae; rest of margin with approximately 15 very

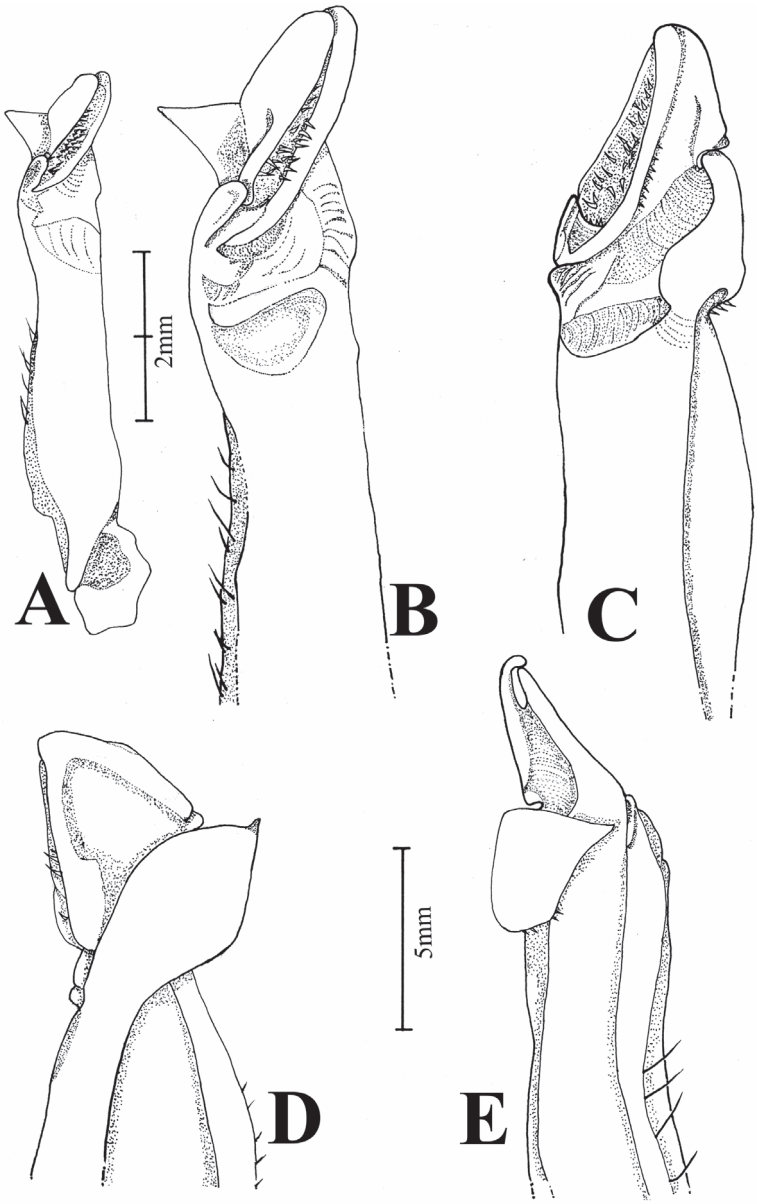


Figure 5. A.- Total caudal view of the first gonopod of the Holotype of *Microthelphusa guaiquinimaensis,* **n. sp.**; B-E.- Detail of the Holotype first gonopod in caudal view (B), lateral view (C), cephalic view (D), and mesial view (E).

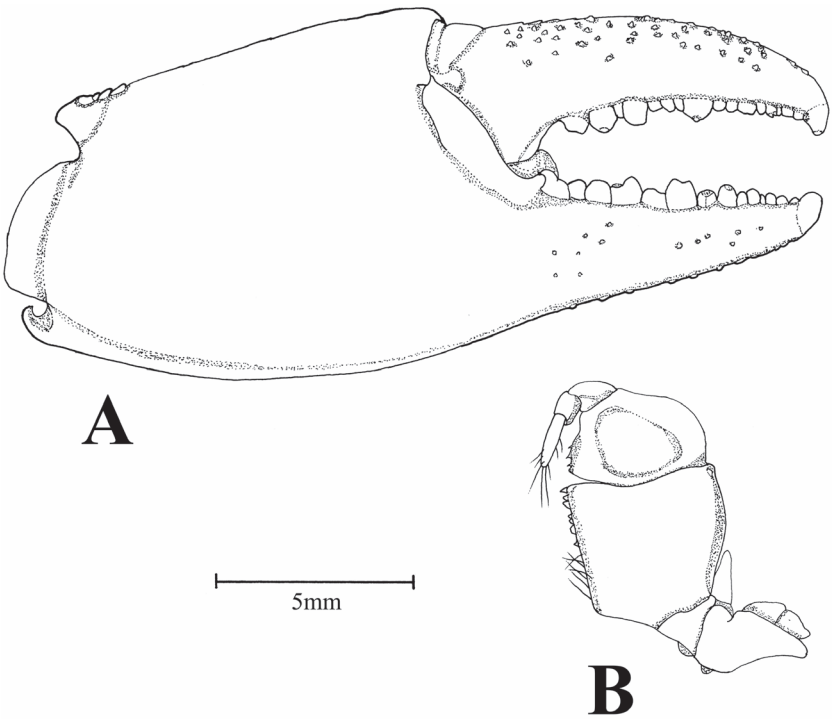


Figure 6. A.- Right major cheliped of the Holotype of *Microthelphusa guaiquinimaensis,* **n. sp.**; B.- Third maxilliped of the Holotype.

small denticles. Postfrontal lobes absent, with eroded depression in its place. Median groove undefined, but cephalothorax surface excavated in this area. Surface of cephalothorax in front of postfrontal lobes depressed at middle; upper margin of front sinuous in dorsal view, thin, with row of minute papillae, without median notch. Lower margin sinuous in frontal view, very advanced, surface of front completely visible in dorsal view of cephalothorax.

Palm of largest chela inflated; fingers short, slightly gaping, surface polished, with only minute non-colored papillae disposed in rows. Walking legs slender, but not conspicuously long, largest being those of third pair (total length 1.27 width of cephalothorax); merus in this pair 3.4 times longer than wide; spines of dactylus very small. Exopod of third maxilliped 0.37 length of ischium of endognath.

Male gonopods strangled at middle in caudal view, with marginal, apical, and mesial lobes well developed. Marginal lobe elongated, cup-shaped, bent laterally at distal portion; apical lobe consisting of two distinct lamellae fused to form rounded process, projected mesially into small triangular spine, cephalic lamella longer, with border thickened; field of apical spines narrow, slit-like, developed transversely to main axis of gonopod; mesial process wide triangular, with proximal border rounded, ending in strangled tip directed backwards and slightly upwards.

**Remarks**: This species can be separated from other *Microthelphusa* because its lateral border cephalic lamella contracts exposing the beginning of the fusion between the lateral lobe and the lateral border of the cephalic lamella. In lateral sight the lateral threshold is left over a projection shaped like a spine that separates the apical lobe from the mesial one.

**Distribution**: Known to be Cerro Guaiquinima (1400 m) in the Guiana Shield (Pl. 1).

**Etymology**: *guaiquinimaensis* means from Guaiquinima, the aboriginal local name of the mountain where this species came from.

***Microthelphusa maigualidaensis,* new species**
**Figs.7-8, Pl. 1 (distribution), Pl. 2D**
urn:lsid:zoobank.org:act:5A6AEB72-5B9D-4533-9A99-DCC0F48CE043

**Material examined**: Serranía de Maigualida, Estado Amazonas, 15 November 1988, *leg.* S. Gorzula and G. Medina, 1 male holotype, cl. 17.6 mm, cb. 28.6 mm, 1 male paratype, cl. 16.5 mm, cb. 27.1 mm, 1 mature female paratype, cl. 14.1 mm, cb. 22.0 mm (CCDGR-IVIC-1108).

**Diagnosis**: Male gonopods with marginal lobe strongly ribbed, spatulate, with terminal border rounded and scalloped (crenate), curved laterally, its base continued laterally by supplementary bulbous projection, with surface deeply wrinkled; apical lobe consisting of two distinct lamellae fused to form triangular process, with distal border with strong wrinkles, cephalic lamella longer, with border thickened and papillated on cephalic side; field of apical spines relatively wide, open, developed along main axis of gonopod, with incipient bulge at base; mesial process deep, auriculate, ending in acute tip directed caudally, with deep furrow (fold) on cephalic side.

**Description of holotype**: Cephalothorax 1.63 times as wide as long, dorsal surface smooth and polished, partially covered by

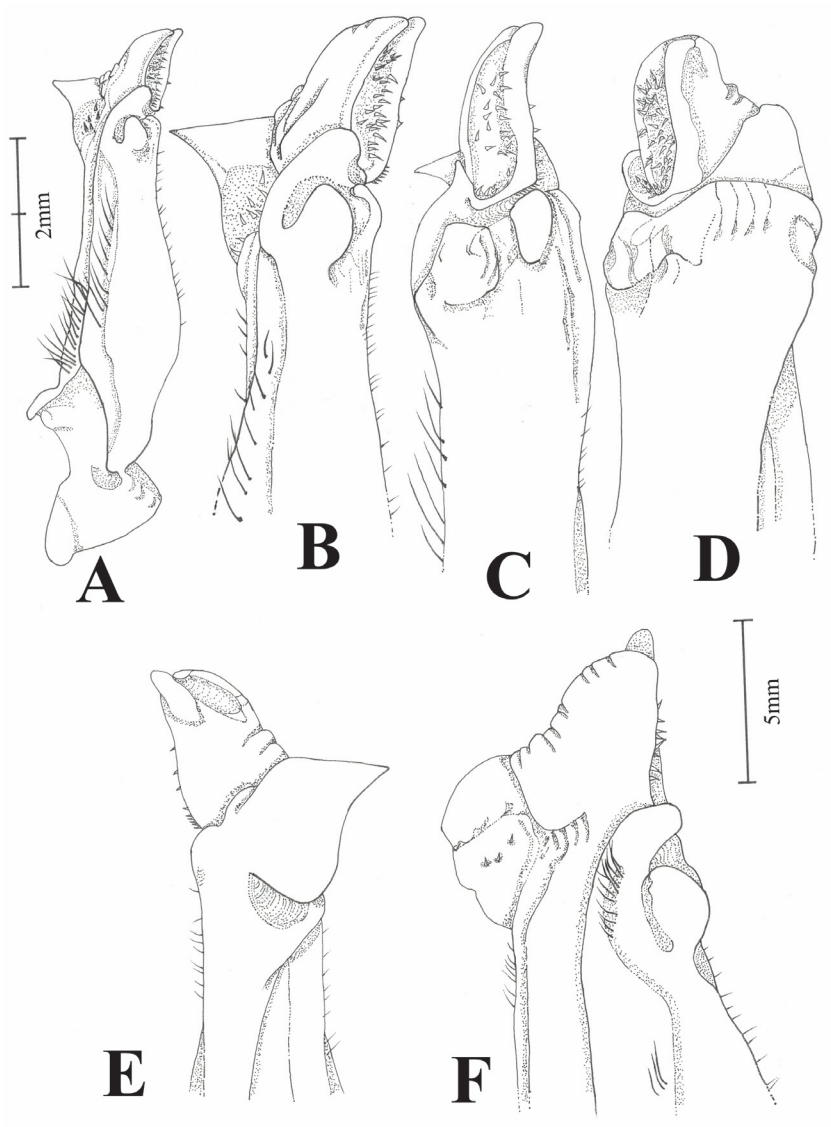


Figure 7. A.- Total caudal view of the first gonopod of the Holotype of *Microthelphusa maigualidaensis,* **n. sp.**; B-F.- Detail of the Holotype first gonopod in caudal view (B), caudolateral view (C), lateral view (D), cephalic view (E), and mesial view (F).

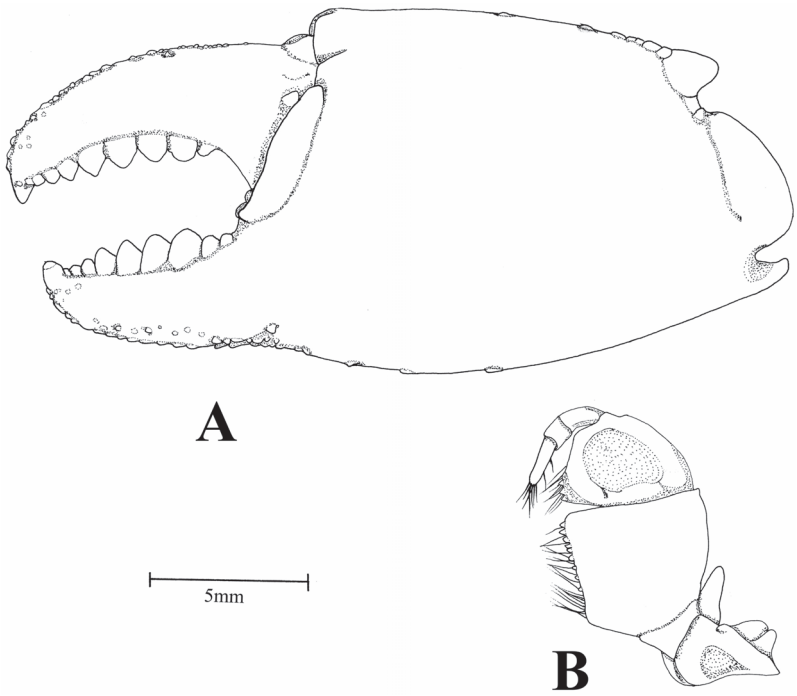


Figure 8. A.- Left major cheliped of the Holotype of *Microthelphusa maiguaalidaensis,* **n. sp.**; B.- Third maxilliped of the Holotype.

minute papillae only visible under magnification; cervical grooves straight, narrow deep, well defined proximally, becoming obsolescent distally. Anterolateral margin with conspicuous postorbital notch; 12 flat, rounded papillae behind level cervical grooves, first five papillae of this series indistinct and placed far apart, becoming more prominent and closer posteriorly. Postfrontal lobes absent, its place indicated by faint depressions. Median groove absent, and cephalothorax surface not excavated in this area. Surface of cephalothorax in front of postfrontal lobes regularly rounded, not inclined towards middle; upper margin of front absent, lower margin straight, partially visible in dorsal view of cephalothorax.

Palm of largest chela inflated; fingers short, thick, leaving small round gap at internal base when closed, surface of chela polished, with only minute non-colored papillae disposed in rows. Walking legs slender, but not conspicuously long, largest being those of third pair (total length 1.20 width of cephalothorax); merus in this pair 2.8

times longer than wide; spines of dactylus very small. Exopod of third maxilliped 0.46 length of ischium of endognath.

Male gonopods short and stocky, straight in caudal and lateral views, with marginal, apical, and mesial lobes well developed; marginal lobe strongly ribbed, spatulate, with terminal border rounded and scalloped (crenate), curved laterally, its base continued laterally by supplementary bulbous projection, with surface deeply wrinkled, apical lobe consisting of two distinct lamellae fused to form triangular process, with distal border with strong wrinkles, cephalic lamella longer, with border thickened and papillated on cephalic side; field of apical spines relatively wide, open, developed along main axis of gonopod, with incipient bulge at base; mesial process deep, auriculate, ending in acute tip directed caudally, with deep furrow (fold) on cephalic side.

**Remarks**: Of this new group of species, *M. maigualidaensis*, is the more physically derived, showing rudimentary reminiscences of the members of the genus *Fredius*, as the lateral massive lobe, which in this taxon appears to be partly product of the fusion of the marginal lobe with the basal lobe of the field of thorns, it closes the lower part of the apical lobe in this way, producing a much shorter and robust appearance. In this species the mesial border of the caudal lamella shows transverse keels conferring to it a wrinkled appearance. A reduction of the latter is appreciated in cephalic sight, giving it digitiform aspect.

**Distribution**: Individuals of this species have been found only in the mountains of the Serranía de Maigualida (Pl. 1).

**Etymology**: Maigualida is the local name of a remote mountain range in the border of the Bolivar and Amazonas States in Venezuela, which form part of the biogeographic Province of Pantepui. *M. maigualidaensis*, is named after this mountain range, which is its type locality.

### *Microthelphusa roraimaensis,* new species
### Figs. 9-10, Pl. 1 (distribution), Pl 2E

urn:lsid:zoobank.org:act:790EE8FF-C29C-4224-B6BB-D5BF14280A3B

**Material examined**: Creek affluent of Kukenan River, at base of Monte Roraima, Estado Bolívar, Venezuela, 950 m, 6 June 1989, *leg.* P. Lau, 1 male holotype, cl. 13.5, cb. 21.1 (CCDGR-IVIC-1111). Same data, 31 March 1989, *leg.* C. Lasso, 1 male cl. 10.3 mm, cb. 15.3 mm, 1 female, cl. 7.3 mm, cb. 10.4 mm (CCDGR-IVIC-1112).

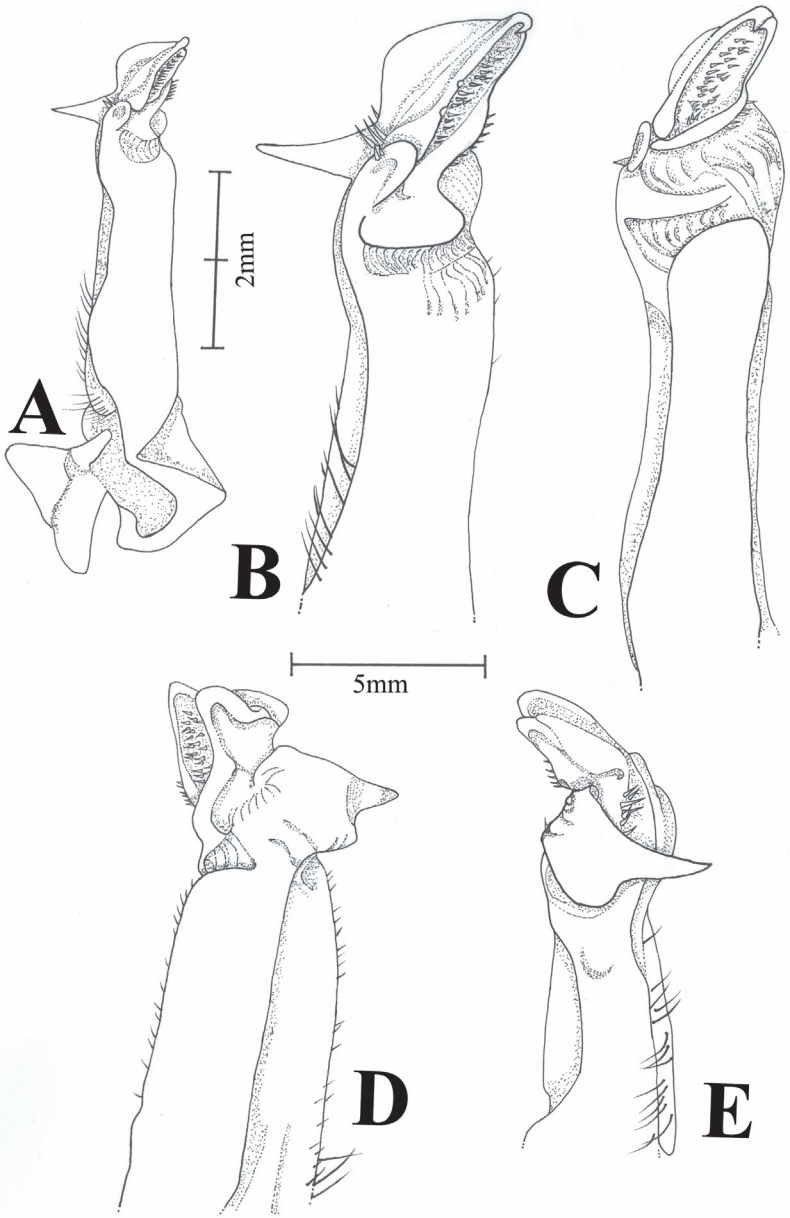


Figure 9. A. Total caudal view of the first gonopod of the Holotype of *Microthelphusa roraimaensis,* **n. sp.**; B-E.- Detail of the Holotype first gonopod in caudal view (B), lateral view (C), cephalic view (D), and mesial view (E).

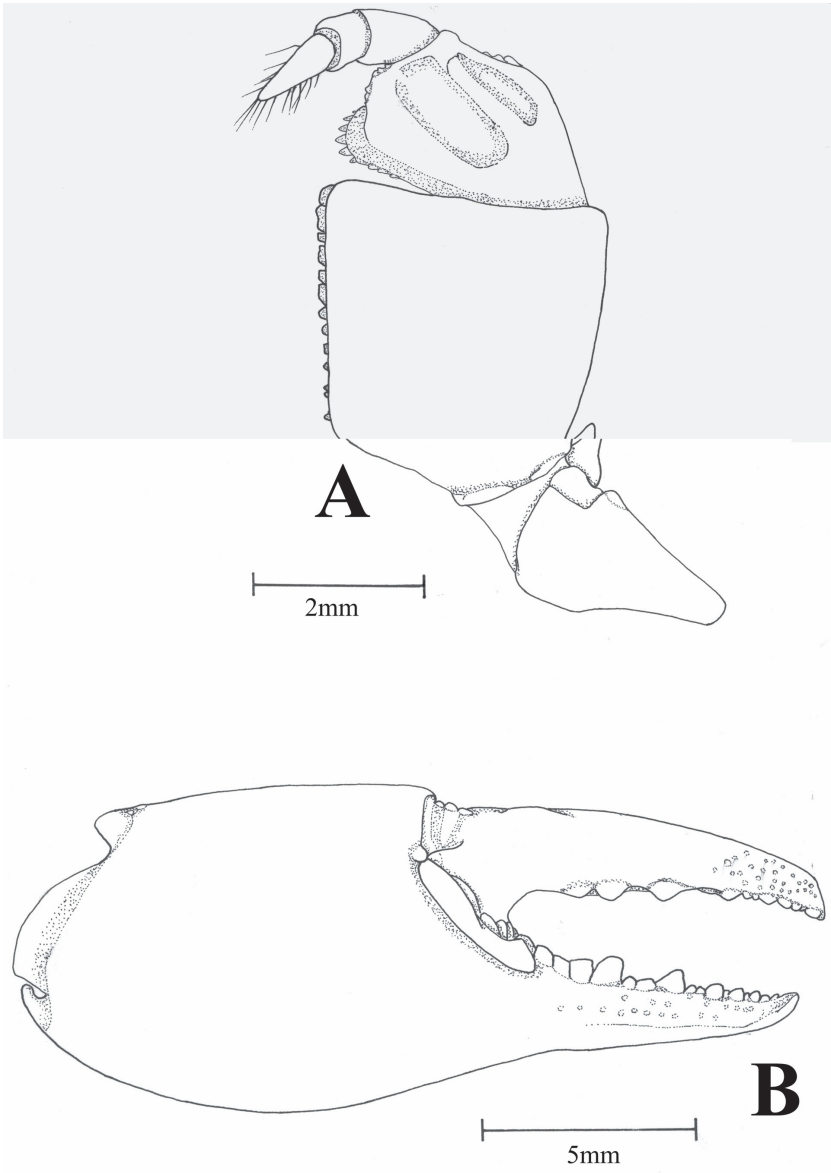


Figure 10. A.-Third maxilliped of the Holotype. B.- Right major cheliped of the Holotype of *Microthelphusa roraimaensis,* **n. sp.**

**Diagnosis**: Male gonopods with marginal lobe spoon-shaped, curved laterally, with terminal border rounded and fused to lateral surface; apical lobe consisting of two distinct lamellae fused to form hooded process, its mesial border folded, caudal lamella longer, ending in globose projection, cephalic lamella bent cephalically, field of apical spines relatively wide, open, developed along main axis of gonopod; mesial process forming bulbous projection on lateral and cephalic sides, ending mesially in long slender spine directed caudally.

**Description of holotype**: Cephalothorax 1.56 times as wide as long, dorsal surface covered by minute papillae only evident when magnified; cervical grooves straight, narrow deep, well defined proximally, becoming shallower distally, ending near margin of cephalothorax. Anterolateral margin with shallow post-orbital notch, series of small closely set papiliform teeth evenly distributed along margin. Post-frontal lobes low, defined anteriorly by wide depressions. Median groove absent and cephalothorax surface not excavated in this area. Surface of cephalothorax in front of postfrontal lobes regularly inclined anteriorly, but not towards middle; front in dorsal view strongly sinuous, upper margin of.front ill defined, with few papillae, lower margin sinuous, advanced, clearly visible in dorsal view of cephalothorax.

Palm of largest chela (right) moderately inflated; fingers long, slender, gaping, surface of chela polished, with rows of minute conical hairs implanted in pores. Walking legs slender, but not conspicuously long, largest being those of third pair (total length 1.01 width of cephalothorax); merus in this pair 2.9 times longer than wide; spines of dactylus relatively strong. Exopod of third maxilliped 0.20 length of ischium of endognath.

Male gonopods short and stocky, straight in caudal and lateral views, with marginal, apical, and mesial lobes well developed; marginal lobe spoon-shaped, curved laterally, with terminal border rounded and fused to lateral surface; apical lobe consisting of two distinct lamellae fused to form hooded process, its mesial border folded, caudal lamella longer, ending in globose projection, cephalic lamella bent cephalically, field of apical spines relatively wide, open, developed along main axis of gonopod; mesial process forming bul-

bous projection on lateral and cephalic sides, ending mesially in long slender spine directed caudally.

**Remarks**: As in *M. maigualidaensis*, a retraction of the lateral margin of the cephalic lamella and the basal lobe of the field of thorns has fused to close the field. The apex of the mesial process has turned into a thorn; in cephalic sight the apical border of the caudal lamella projects prominently over cephalic lamella. As viewed from the same angle, there is an enlargement of the lateral border of cephalic lamella. Rudiment of the lateral lobe similar to members of the genus *Fredius*.

**Distribution**: this species is so far known from the medium elevation (950 m) of the Roraima-Kukenan Massif in Venezuela close to the border with Brazil and Guiana (Pl. 1).

**Etymology**: The name *roraimaensis*, of this species of *Microthelphusa* refers to its type locality.

## DISCUSSION OF *MICROTHELPHUSA*

Campos (2001) and Campos and Magalhães (2004) have postulated that the genus *Rodriguezus* Campos y Magalhães, represents a sister-group to all other Kingsleyini. In this genus the orifice of the branchial efferent channel is partly closed by a spine of the jugal angle and by the production of the lateral lobe of the epistome, the merus of the third maxilliped has the endognath regularly curved, and its exognath is approximately 0.5 times the length of ischium. As shown by Rodríguez (1986), the adaptation of pseudothelphusids to air breathing led to a progressive opening of the orifice of the branchial efferent channel and to an indentation in the border of the merus; this process is accompanied by a reduction of the exognath in the third maxilliped. In the species of *Microthelphusa* dealt with above, the border of the merus is rounded, as it is in *Rodriguezus*, but its exognath is approximately 0.4 times or less the length of the ischium, and the orifice of the branchial efferent channels is open, thus pointing to a more derived condition. The first male gonopods, however, retain some of the primitive traits of *Rodriguezus*, as discussed below.

The type of gonopod more closely associated with *Rodriguezus* is that of *Microthelphusa aracamuniensis,* **n. sp.** Both taxa share simi-

larities, in the shape of the apex of the marginal lobe, the field of thorns, and in the shape of the prolongation of the keel of the lateral border of the cephalic lamella. The latter forms an angular lobe underneath the apex of the marginal lobe, which should be called basal lobe of the field of thorns. *Microthelphusa aracamuniensis* is apparently the more primitive species in its genus, however, it still shows some features of *Rodriguezus*.

## Genus *Fredius* Pretzmann, 1967

The genus *Fredius* Pretzmann, hitherto comprises five species of large freshwater crabs geographically restricted to the Guiana region and the Amazon Basin. Rodríguez and Pereira (1992) discussed in great detail the systematics and distribution of this genus. The new species described here is smaller than the others previously known.

### *Fredius cuaoensis,* new species
### Figs.11-13, Pl. 1 (distribution), Pl. 2F

urn:lsid:zoobank.org:act:D53A29E4-422F-4329-83CC-30AA051C9A61

**Material examined**: Alto Río Cuao, Estado Amazonas, Venezuela, 5 October 1957, *leg.* S. Zent, 1 male holotype, cl. 19.9 mm, cb. 30.6 mm (CCDGR-IVIC-1117).

**Diagnosis**: Marginal lobe with conspicuous knob-like projection, continued laterally by subapical bulge; apical lobe subquadrate, strongly marginated proximally, projected mesial into acute conical spine directed caudally and distally; field of apical spines narrow, developed along main axis of gonopod; mesial process with conical acute spine directed caudally and distally, with bifid tip; cephalic surface of this lobe thickened and connected to subapical bulge.

**Description of holotype**: Cephalothorax 1.54 times as wide as long, dorsal surface covered by minute papillae not visible unless magnified; cervical grooves shallow and thin, almost straight, ending near anterior margin of cephalothorax; anterolateral margins with shallow postorbital notch, remaining margin with approximately 15 large papillae, coalescent towards beginning of series. Post-frontal lobes low, small. Median groove absent. Surface of cephalothorax in front of postfrontal lobes slightly concave in frontal view and inclined anteriorly. Upper border of front slightly convex in dorsal view; well defined and provided with row of flat papillae, without

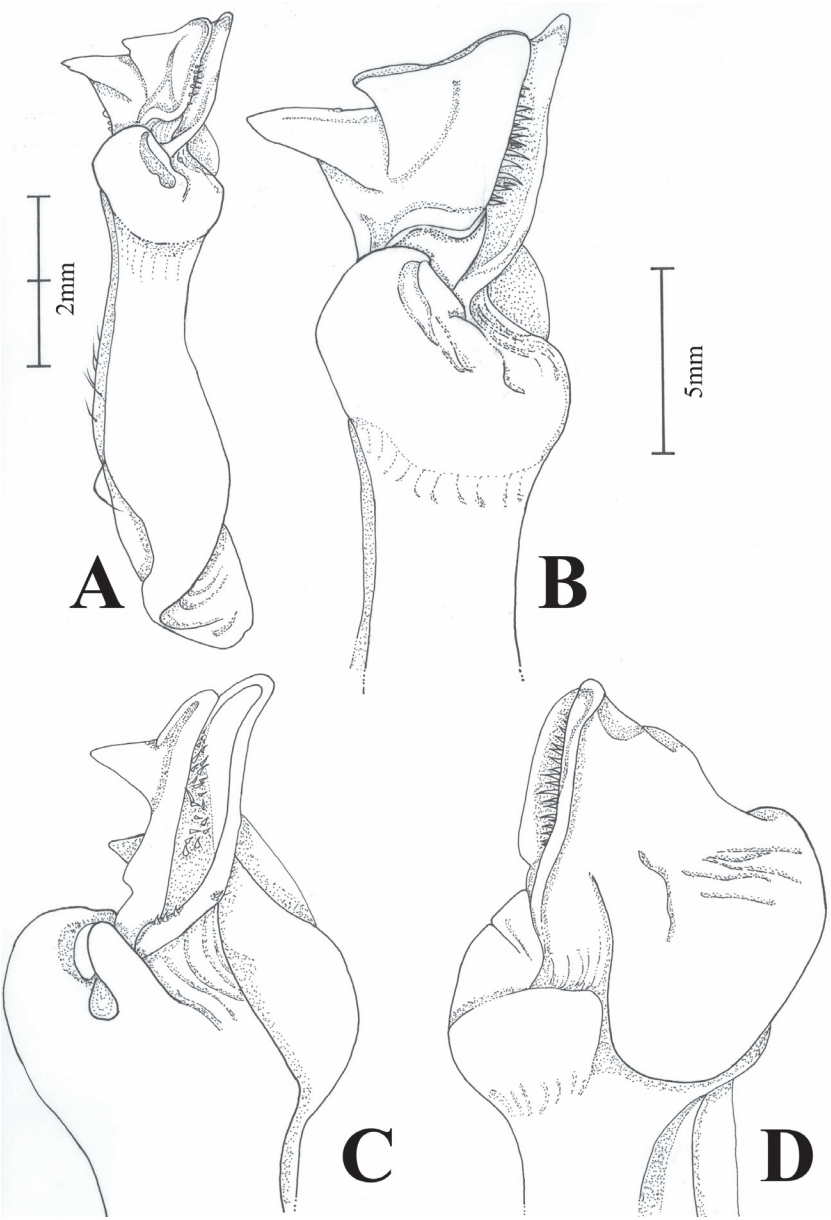


Figure 11. A.- Total caudal view of the first gonopod of the Holotype of *Fredius cuaoensis,* **n. sp.**; B-D.- Detail of the Holotype first gonopod in caudal view (B), lateral view (C), and cephalic view (D).

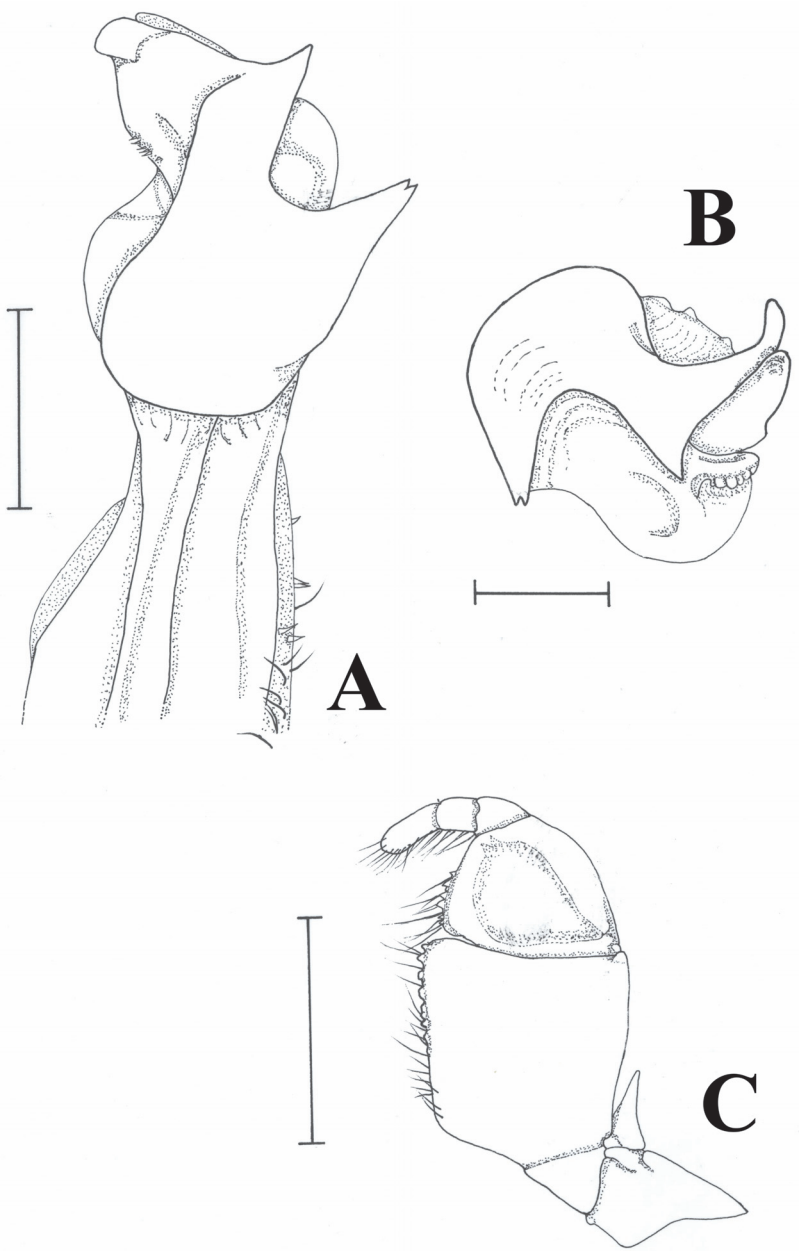


Figure 12. A.- *Fredius cuaoensis,* **n. sp.**, detail of the Holotype first gonopod in mesial view; B.- Apical view of the first gonopod; C.- Third maxilliped of the Holotype.

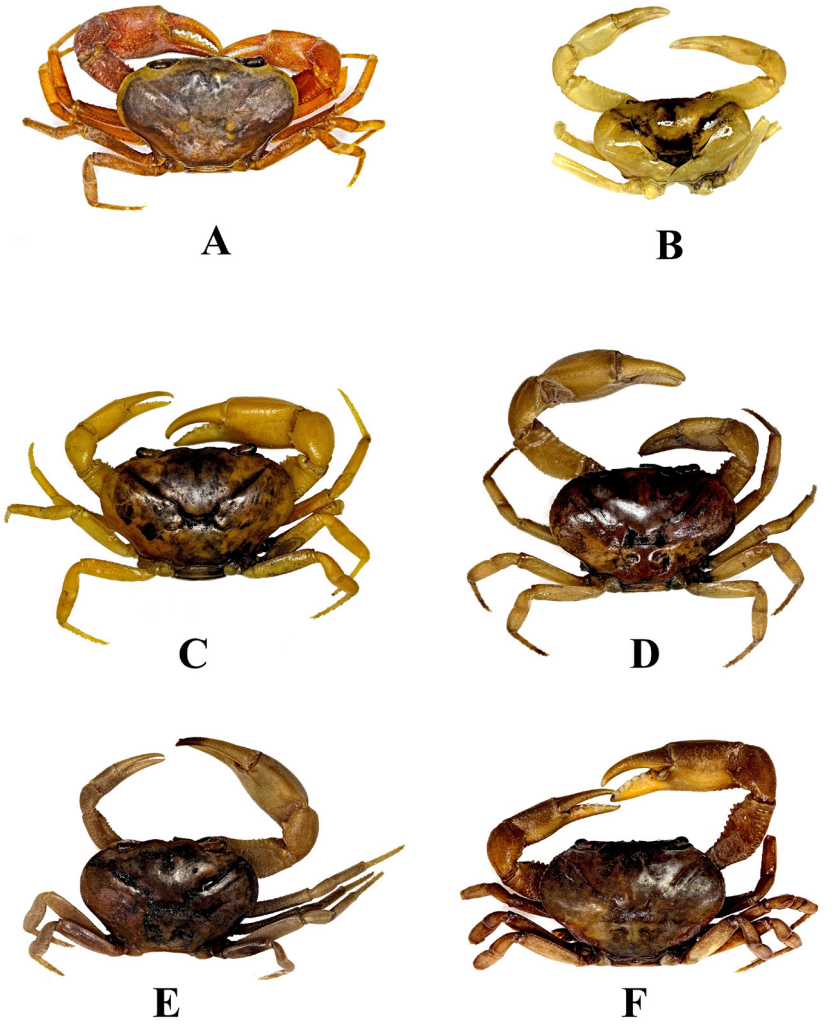


Plate 2. Dorsal view of the cephalothorax of six freshwater crab new species: A.- *Microthelphusa aracamuniensis,* **n. sp.**; B.- *M. marahuacaensis,* **n. sp.**; C.- *M. guaiquinimaensis,* **n. sp.**; D.- *M. maigualidaensis,* **n. sp.**; E.- *M. roraimaensis,* **n. sp.**; F.- *Fredius cuaoensis,* **n. sp.**

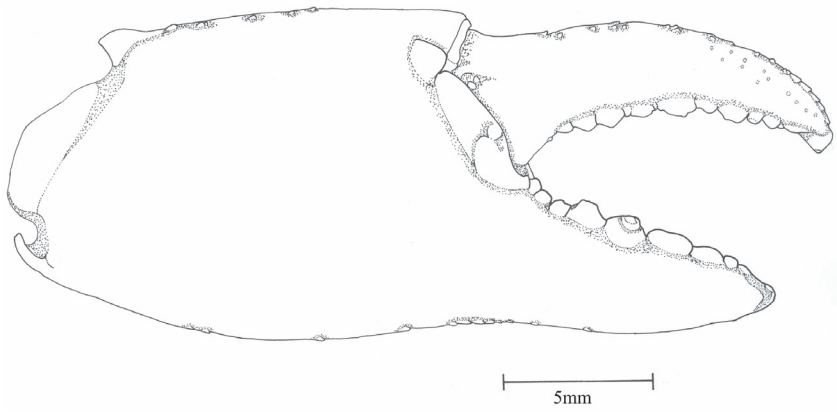


Figure 13. Righ major cheliped of *Fredius cuaoensis,* **n. sp.**

median notch; lower margin thin, slightly sinuous and depressed at middle in frontal view, advanced; surface of front between upper and lower borders high.

Palm of largest chela inflated, with lower margin sinuous; fingers short, moderately gaping, mobile finger with scattered black dots near tip. Exopod of third maxilliped 0.48 length of ischium of endognath.

Male gonopod short and stocky, straight in caudal and lateral views. Marginal lobe short, straight, with conspicuous knob-like projection, continued laterally by subapical bulge; apical lobe subquadrate, strongly marginated proximally, projected mesially into acute conical spine directed caudally and distally; field of apical spines narrow, developed along main axis of gonopod, lodged between two lamellae which constitute apical lobe; cephalic lamella prolonged distally and bent cephalically; mesial lobe with conical acute spine directed caudally and distally, with bifid tip; cephalic surface of this lobe thickened and connected to sub-apical bulge.

**Remarks**: The sub-apical bulge present in the first gonopod of this species is characteristic of the genus *Fredius*, but other characters, like the narrow field of spines and the spiniform mesial lobe appear more typically in *Microthelphusa*.

**Distribution**: So far known from the upper Río Cuao in the State of Amazonas, Venezuela. It might be an endemic to this region.

**Etymology**: *Fredius cuaoensis* owns its name to the Amazonian River Cuao, where the only specimen known was collected by Anthropologist Stanford Zent.

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## Contenido