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A new species of freshwater crab of the genus *Microthelphusa* (Brachyura: Pseudothelphusidae) from a remote isolated cloud forest on a tabletop mountain in western Guyana, South America

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Abstract

A new species of freshwater crab of the genus *Microthelphusa* Pretzmann, 1968, from Guyana, South America is described. *Microthelphusa meansi*, new species, was collected from a remote isolated cloud forest in the Wokomung Massif, a tabletop mountain (*tepui*) in western Guyana at over 1,000 m above sea level. The conspicuous horseshoe-like marginal lobe and the dome-like auxiliary cephalic lobe of the first gonopod clearly distinguish this species from all 12 congeners.

Key words: Crustacea, Brachyura, Pseudothelphusidae, *Microthelphusa*, freshwater crab, taxonomy, new species; *tepui*, Wokomung Massif, Guyana

Introduction

A recent biodiversity survey of the remote Wokomung Massif in Guyana, South America by Dr. D. Bruce Means of the Coastal Plains Institute and Conservancy, Tallahassee, Florida, USA, revealed the existence of a new species of freshwater crab belonging to the genus *Microthelphusa* Pretzmann, 1968, which is described. The discovery of a new species of freshwater crab is part of a wider exploration of the biodiversity of the Guyana Shield that is one of the most inaccessible and unknown areas in the world. This genus of freshwater crabs belongs to the family Pseudothelphusidae Ortmann, 1893, in the tribe Kingsleyini Bott, 1970, which includes nine genera from northeastern South America. The 12 species of *Microthelphusa* so far described are distributed in an area that includes the highlands of western and eastern Venezuela and western Guyana. The species of *Microthelphusa* are *M. barinensis* Rodríguez, 1980, *M. bolivari* Rodríguez, 1980, *M. forcarti* (Pretzmann, 1967), *M. ginesi* Rodríguez & Esteves, 1972, *M. odaelkae* (Bott, 1970), *M. racenisi* (Rodríguez, 1966), *M. rodriguezii* Pretzmann, 1968, *M. somanni* (Bott, 1967), *M. sucrensis* Rodríguez & Campos, 2000, *M. turumikiri* Rodríguez, 1980, *M. viloriai* Suárez, 2006, and *M. wymani* (Rathbun, 1905). All of these species, with the exception of *M. rodriguezii*, are found at high altitude localities, as is the species described here from the Wokomung Massif. The new species is compared with the other members of the genus and is distinguished by characters of the mesial, auxiliary cephalic, and marginal lobes of the first gonopod. The present study extends the distribution of *Microthelphusa* in Guyana to include the western Potaro-Siparuni highlands region. The material is deposited in the US National Museum of Natural History, Smithsonian Institute, Washington D.C. (USNM).

The following abbreviations are used:

cw = the distance across the carapace at the widest point; cl = carapace length measured along the median line, from the anterior to the posterior margin; ch = carapace height, the maximum height of the cephalothorax above the sternum; fw = front width, the width of the front measured along the anterior margin between the orbits; s = thoracic sternite; e = episternite; s4/s5, s4/s5, s5/s6, s6/s7, s7/s8 = sternal sutures between adjacent thoracic sternites; s4/e4, s5/e5, s6/e6, s7/e7 = episternal sutures between adjacent sternites and episternites; p1 to p5 = pereopods 1 to 5; asl = height in meters above sea level. The terminology used is that proposed by Cumberlidge (1999), except for gonopod terminology which is that proposed by Smalley (1964).

Taxonomy

Family Pseudothelphusidae Ortmann, 1893

Tribe Kingsleyini Bott, 1970

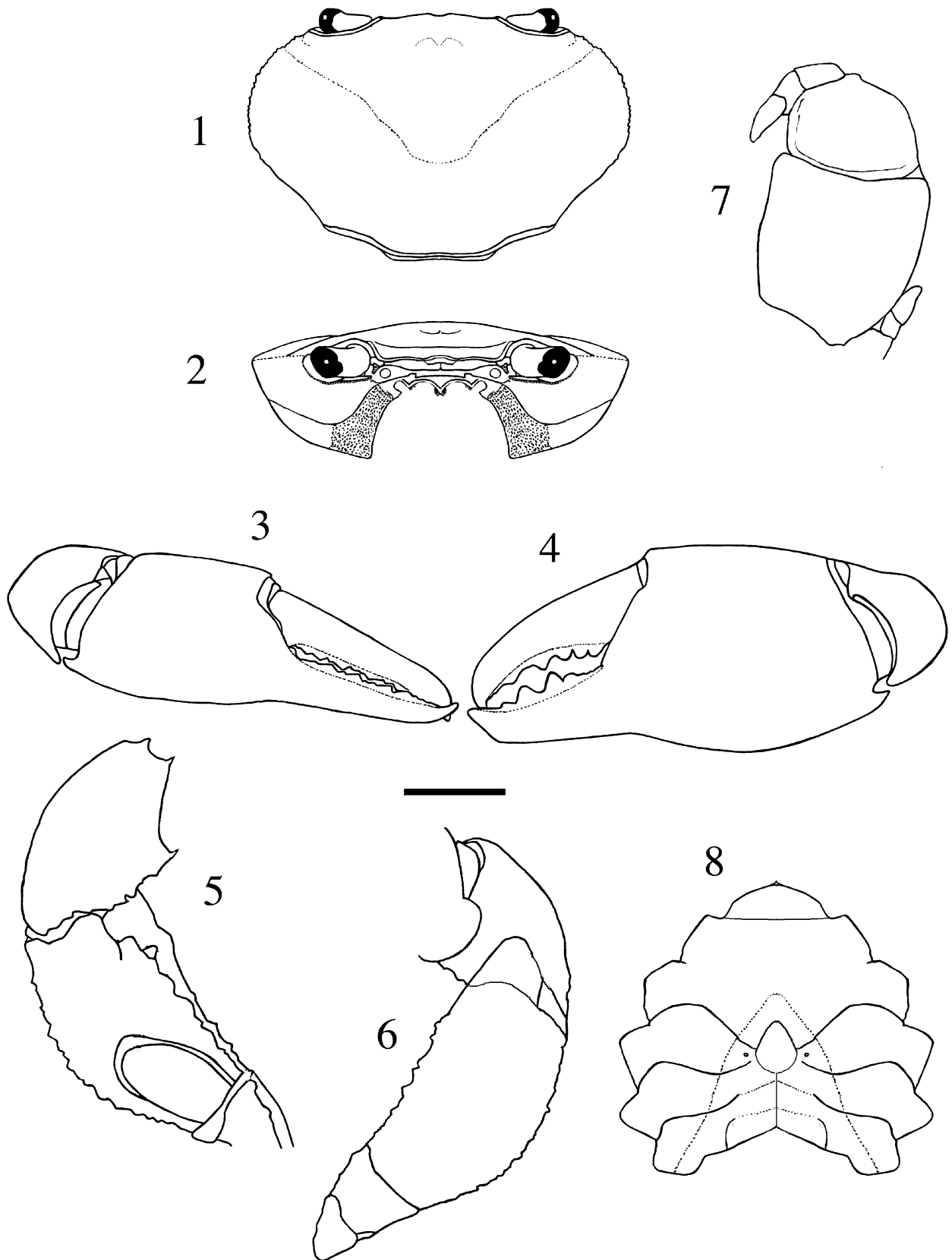
Genus *Microthelphusa* Pretzmann, 1968

Microthelphusa meansi, new species (Figs. 1–8, 9–11)

Type material: GUYANA: Male holotype (cw 22.5, cl 13.5, ch 7.5, fw 7.0 mm): collected near Middle Camp in deep humus on the floor of cloud forest on the Wokomung Massif, in Potaro-Siparuni Province, western Guyana (05°06'36.3" N, 59°49'14.1" W), altitude 1,135 m asl (according to altimeter) or about 1,219 m (according to the topographic map of the region), 18 July 2003, coll. D. Bruce Means, USNM 1098372; paratype, adult male (cw 18.5, cl 14.5, ch 6.3, fw 5.5 mm) same collection data as holotype, USNM 1098373.

Diagnosis. First gonopod with auxiliary cephalic lobe rounded, dome-shaped, conspicuously larger than mesial lobe; distal part of mesial lobe with enlarged triangular tooth-like process occupying half of this lobe; marginal lobe large, conspicuous, horseshoe-shaped (Figs. 9–11).

Description of Holotype. Carapace transversely oval, wide (cw/fw 3.2), medium height (ch/fw 1.1). Dorsal surface of frontal, antero-lateral regions smooth; cervical groove deep, long, straight, diagonal, reaching anterolateral margin; rest of carapace regions poorly defined by grooves. Anterolateral margin prominent, granulated. Postfrontal lobes low. Surface of cephalothorax between postfrontal lobes and front inclined anteriorly, concave in frontal view. Superior frontal ridge straight, relatively broad, about one third carapace width (fw/cw 0.3), frontal margin thin and sinuous in frontal view. Eyestalks normal. Upper, lower borders of orbit faintly granulated. Suborbital region of carapace sidewall completely smooth, subhepatic region with faint granules; sidewall with distinct longitudinal (epimeral) suture and very faint vertical (pleural) groove; pterygostomial region covered with dense setae. First thoracic sternal sulcus s1/s2 short, deep, horizontal; second sulcus (s2/s3) horizontal, crossing whole sternum, third sulcus (s3/s4) reduced to two faint notches on sides; episternal sulci s4/e4, s5/e5, s6/e6, s7/e7 absent. Third maxillipeds filling entire oral field, except for horseshoe-shaped anterior respiratory openings at superior lateral corners; exopod of third maxilliped reduced (0.3 x length of ischium); inner surface of merus of third maxilliped with field of short bristles; external surface of ischium of third maxilliped smooth. Epistome prominent, smooth, lower margin trilobed consisting of large triangular epistomial tooth in center, flanked by two smaller triangular teeth marking medial margins of anterior respiratory openings. Mandibular palp two-segmented; terminal segment bilobed, anterior lobe subequal to posterior lobe. Adult male abdomen triangular, segments a1–a6 four-sided, telson (a7) a broad triangle with rounded apex; segments a5–a6 broadest. Chelipeds asymmetrical, palm of right chela enlarged, lower and upper margins of propodus and moveable fingers smooth, fingers thickened, with large, rounded teeth on cutting edges, tips pointed and overlapping; dactylus of major cheliped slender, arched, enclosing oval interspace when fingers closed. Carpal tooth of cheliped with weak low triangular tooth on internal margin;



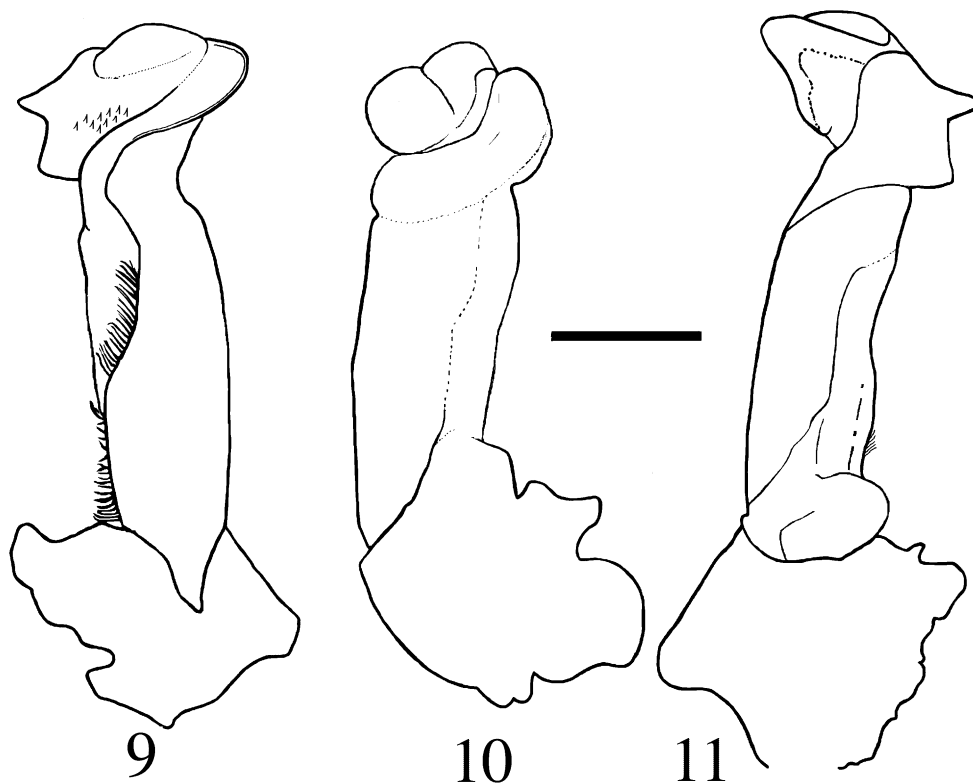
FIGURES 1–8. *Microthelphusa meansi* new species. Male holotype, cw 22.5 mm, from the Wokomung Massif, Guyana, USNM 1098372. 1, carapace, dorsal view; 2, cephalothorax, frontal view; 3, right cheliped, frontal view; 4, left cheliped, frontal view; 5, carpus and merus of right cheliped, dorsal view; 6, carpus and merus of right cheliped, inferior view; 7, left third maxilliped; 8, sternum. Scale = 3.2 mm (1, 2), 3.5 mm (3–8).

superior surface of merus smooth. Ambulatory legs (pereopods p2–p5) slender, p3 longest, p5 shortest, dactyli of p2–p5 tapering to point, each bearing four rows of downward-pointing short, sharp spines. In caudal view, first gonopod straight, robust, base broad, middle straight, distal end widened by three distinct processes - marginal, auxiliary cephalic, and mesial lobes. Apex broadened laterally by semicircular lateral/marginal processes, broadened medially by process with two points (cephalic and mesial lobes). Auxiliary cephalic lobe rounded, dome-shaped, conspicuously larger than mesial lobe; mesial lobe wide, flattened, distal part produced into enlarged triangular tooth-like process occupying half of lobe, inferior border produced into a broad lobe; marginal lobe large, conspicuous, horseshoe-shaped. Field of apical spines well developed, forming elongated curved patch along medial side running diagonally to longitudinal axis of gonopod, delimited by cephalic and caudal borders of apex; marginal suture sinuous, situated on caudal side. Second gonopod terminal article a long flagellum, with numerous spinules on distal portion; tip cup-shaped, with relatively strong spines directed distally.

Color. In life, dorsal surface of carapace, walking legs, chelipeds, red; ventral surfaces of cephalothorax pale red.

Size. The adult size range based on measurements of the specimens examined is between cw 18 and 22.5 mm, although a larger specimen (with an estimated cw 30 mm) was seen but not captured.

Type locality. Middle Camp, 1,135 m asl according to altimeter (but topographic map of the region indicates this locality is about 1,219 m), Wokomung Massif, Potaro-Siparuni Province, western Guyana (05°06'36.3" N, 59°49'14.1" W).



FIGURES 9–11. *Microthelphusa meansi* new species. Male holotype, cw 22.5 mm, from the Wokomung Massif, Guyana, USNM 1098373, left first gonopod. 9, caudal view; 10, lateral view; 11, cephalic view. Scale = 3.0 mm.

Distribution. This species is known only from the type locality. The Wokomung Massif (1,650 m) in Guyana is one of the easternmost peaks of the Guiana Shield that includes a series of steep-walled table mountains (*tepuis*) that each supports a unique flora and fauna, especially at elevations above 1,000 m.

Etymology. The species is named for the distinguished US natural historian Dr. D. Bruce Means, President and Executive Director of the Coastal Plains Institute and Land Conservancy, Tallahassee, Florida, USA, who collected the specimens used in this study. Dr. Means is also an Adjunct Professor in the Department of Biological Science at Florida State University in Tallahassee.

Remarks. This species is assigned to *Microthelphusa* based on the following generic definitions of characters provided by Pretzmann (1968), Rodríguez (1982), and Suárez (2006). The exopod of the third maxilliped is about 0.3 x the length of the ischium; the first gonopod is straight and robust with a field of apical spines running diagonally to the longitudinal axis; the mesial lobe is wide, flattened, and its distal part is produced into a triangular process while its inferior border is a broad lobe; the caudal lobe is separated from the mesial process, and there is a spine or lobe over the mesial border; the marginal lobe is prominent joins with the border of the cephalic lobe.

Microthelphusa meansi is morphologically similar to *M. wymani* from Surinam, *M. somanni* from the Upper Rio Negro in Brazil and Venezuela, and *M. rodriguezii* from Guyana. Although these four species are similar in many respects they differ in taxonomically important characters of the mesial, auxiliary cephalic, and marginal lobes of the first gonopod (Rodríguez 1982). *Microthelphusa meansi* can be distinguished from *M. wymani* by the following characters of the first gonopod (Rodríguez 1982, fig. 112). Although the cephalic lobe of both species is dome-shaped, that of *M. meansi* is conspicuously larger than the mesial lobe, whereas that of *M. wymani* is smaller than the mesial lobe; the base of the distal tooth of the mesial lobe of *M. meansi* is large and occupies half of this lobe, whereas that of *M. wymani* is much smaller and occupies only a quarter of the lobe; and the cephalic lobe of *M. meansi* is large, conspicuous, and horseshoe-shaped whereas that of *M. wymani* is low and inconspicuous.

Microthelphusa meansi can be distinguished from *M. sommani* as follows (Rodríguez 1982, fig. 111). The cephalic lobe of *M. meansi* is conspicuously larger than the mesial lobe, whereas that of *M. sommani* is smaller than the mesial lobe; the base of the distal tooth of the mesial lobe of *M. meansi* is large and occupies half of this lobe, whereas in *M. sommani* the margin of the mesial lobe is straight and lacks a distinct distal tooth; and the cephalic lobe of *M. meansi* is large, conspicuous, and horseshoe-shaped whereas that of *M. sommani* is low and inconspicuous. *Microthelphusa meansi* is similar to *M. rodriguezii* from Guyana in that the auxiliary cephalic lobe of the first gonopod is larger than the mesial lobe, and the mesial lobe has an enlarged tooth-like distal process (Suárez 2006, fig. 4). However, *M. meansi* can be distinguished from *M. rodriguezii* as follows. The auxiliary cephalic lobe of *M. meansi* is rounded and dome-like, whereas that of *M. rodriguezii* is broad and spearhead-shaped with a point that is directed upward laterally; and the marginal lobe of *M. meansi* is large, conspicuous, and horseshoe-shaped whereas that of *M. rodriguezii* is low and inconspicuous. *Microthelphusa rodriguezii* is the only other species of this genus that has been recorded from Guyana (Pretzmann 1968). The type locality of *M. rodriguezii* provided by Suárez (2006) is “the Rupununi River, Melville, British Guiana”, which is most likely Dadanawa (= Melvilles Ranch), in the Upper Takutu-Upper Essequibo Region of Guyana (2°49'60" N, 59°31'0" W). This locality is 156 m asl making it the only species in the genus that occurs at altitudes below 500 m (Suárez 2006).

Natural history. The following is based on the field notes provided by D. Bruce Means. The holotype was collected scuttling around on the deeply humic and leaf-littered floor of a large cloud forest (31 km by 11.5 km) on the remote unexplored Wokomung Massif (1,650 m) a tabletop mountain (*tepuí*) in the Pakaraima Mountain range of Guyana. Other larger specimens that were not collected were seen on the banks of a small blackwater stream, and specimens reported on here were collected from land, not water. The Pakaraima Mountains are part of the Precambrian quartzite and sandstone mesas known as the Guayana Highlands (Huber 1995), a series of *tepuis* found in Venezuela, northern Brazil, and Guyana. Nearby Mt. Roraima was made famous by the book ‘The Lost World’ by Sir Arthur Conan Doyle (1912). The Wokomung Massif is drained by tributaries of the Essequibo River that flows north into the Caribbean Sea and by the Ireng River that flows south into the Amazon River. The vegetation at the type locality on Wokomung is single-tiered

semi-open cloud forest with a canopy of medium height (about 15-18 m) and trees close together. The trees and plant stems are heavily draped with epiphytes (mostly aroids) that are also present on the ground together with spiny palms, and the tree trunks, branches, and lianas in the forest are all covered by a fuzzy, dark green moss. During July when the specimens were collected it rained constantly, with clear skies less than 5% of the time, indicating that this cloud forest is perennially wet. The soil is predominantly humic and is underlain at some depth by sand or indurated sandstone. The cloud forest on the top of this *tepui* is completely surrounded by seasonally dry lowland rainforest, and it is likely that this species will prove to be endemic to this very isolated location. Interestingly, the paratype of *M. meansi* was regurgitated from the stomach of a large tree frog (*Stefania* sp., Anura: Hylidae: Hemiphractinae) that was kept overnight in a collecting bag. Several other specimens of these small red crabs were seen (but not collected) crawling around in the litter of the forest floor at night, mostly near the banks of small streams, and it is estimated that *M. meansi* may reach carapace widths of about 30 mm or more.

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