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The scorpions from the Mitaraka Massif in French Guiana (Scorpiones: Buthidae, Chactidae)

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Aerial view of the Massif of Mitaraka in French Guiana (photo: Xavier Desmier). In medallion: *Guyanochactas touroulti* n. sp., ♀ holotype habitus.

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The scorpions from the Mitaraka Massif in French Guiana (Scorpiones: Buthidae, Chactidae)

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KEY WORDS
Scorpiones,
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Inselberg,
endemism,
new species.

ABSTRACT

A synopsis is proposed for all scorpion species collected, up to present, in the Mitaraka Massif in French Guiana, a site located near to the borders of French Guiana, Brazil and Suriname. One new species, *Guyanochactas touroulti* n. sp. (Chactidae) is described. The description of the new species brings further evidence to the biogeographic pattern of distribution presented by some elements of the family Chactidae endemic to the Tepuys or the Inselberg formations of South America.

RÉSUMÉ

Les scorpions du massif du Mitaraka en Guyane (Scorpiones: Buthidae, Chactidae).

Un synopsis est proposé pour la totalité des espèces de scorpions collectés, jusqu'à présent, dans le massif du Mitaraka en Guyane, région située dans la zone frontalière entre la Guyane, le Brésil et le Suriname. Une nouvelle espèce, *Guyanochactas touroulti* n. sp. (Chactidae) est décrite. La description de la nouvelle espèce apporte un nouvel appui au modèle de distribution géographique présenté par certains éléments de la famille des Chactidae endémiques des régions des Tepuys ou des Inselbergs en Amérique du Sud.

MOTS CLÉS
Scorpiones,
Guyane,
Massif du Mitaraka,
Inselberg,
endémisme,
espèce nouvelle.

INTRODUCTION

As outlined in recent publications (Lourenço 2016a, b), until the early 1980s the scorpion fauna of French Guiana did not particularly call the attention of experts, and the few publications devoted to this fauna were limited to isolated description (Simon 1877) or to monographic compilations (Kraepelin 1899; Mello-Leitão 1945). The first framework dedicated to the scorpion fauna of French Guiana was done by Lourenço (1983), who treated all the species known at that date. Many subsequent publications followed on the scorpion fauna of French Guiana, including some dealing with soil species (Lourenço 2012); however, very few studies were dedicated to the French Guiana Massifs represented by Inselbergs. One exception was the description of a new species of *Ananteris* Thorell, 1891 from the Haut Ouarimapan in the extreme southwest of this department (Lourenço 2001a). Even if the studies on the French Guiana scorpion fauna are far from being complete, this region appears as one of the 'hot-spots' for biodiversity in South America. The degree of endemism for the scorpion species present in the region can overpass 70% (Lourenço 1991, 2001b).

Previously to the scorpions recently collected by the 'French Guiana Expedition, 2015' (in study since 2016), two other specimens were collected in the South Mitaraka Massif, located on the borders of French Guiana, Brazil and Surinam, and entrusted to me by the late J.-M. Betsch. These rather small specimens were obtained with the use of extraction methods. One proved to be *Ananteris sabineae* Lourenço, 2001 whereas the recent study of the second specimen led to the description of a new genus and species, *Spinochactas mitaraka* Lourenço, 2016 belonging to the family Chactidae Pocock, 1893. The description of this new genus and species brought further evidence about the biogeographic patterns of distribution of some chactid groups which are confirmed as an endemic element present only in Massif formations of South America such as the Tepuys and Inselberg. In the present paper, a synopsis is proposed for all scorpion species collected, up to now, in the Mitaraka Massif in French Guiana (Figs 1, 2). Since most biogeographic aspects related to the region of Guianas and to the Tepuys and Inselberg formations have already been treated in detail by Lourenço (2016a, b), these will be only briefly summarised here.

MATERIAL AND METHODS

Measurements and illustrations were made using a Wild M5 stereo-microscope with a drawing tube (camera lucida) and an ocular micrometer. Measurements (in mm) follow Stahnke (1970), trichobothrial notations Vachon (1974), and morphological terminology Hjelle (1990). The totality of the material collected in the present (and previous) missions to the Mitaraka Massif are now deposited in the Muséum national d'Histoire naturelle (MNHN), Paris, France. For detailed illustrations on the species treated previously to this paper, see the publications indicated in the references.



FIG. 1. — French Guiana with several Inselberg formations and in particular the site of the Mitaraka Massif (map by L. Wilmé).

TAXONOMIC RESULTS

Family BUTHIDAE C. L. Koch, 1837

Genus *Ananteris* Thorell, 1891

Ananteris sabineae Lourenço, 2001

Ananteris sabineae Lourenço, 2001a: 690-693.

NEW MATERIAL. — **French Guiana**. 1 ♀, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', MI15-0237-36, Layon D, in slope, Winkler (2.227554, -54.45371), 23.II-11. III.2015 (J. Orivel & F. PetitClerc).

REMARK

Species described based on one female collected in a previous MNHN field-trip to the Mitaraka region (Lourenço 2001a). This species remains extremely rare and endemic to the region of the Mitaraka massif.

Ananteris polleti Lourenço, 2016

Ananteris polleti Lourenço, 2016: 217-220.

MATERIAL EXAMINED. — **French Guiana**. Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)',



FIG. 2. — Aerial view of the Massif of Mitaraka in French Guiana (photo: Xavier Desmier).

♂ Holotype (02°13'59.1"N, 54°26'37.9"W), 433 m, tropical moist forest – in plateau, 2-8.III.2015 (M. Pollet). — ♂ paratype (02°14'17.8"N, 54°27'08.2"W), 352 m, tropical moist forest – in slope, 25.II-3.III.2015 (M. Pollet).

REMARK

This species is apparently extremely rare and most certainly endemic to the Mitaraka Massif.

Species described on the basis of two adult males (Lourenço 2016b).

Genus *Tityus* C. L. Koch, 1836
Subgenus *Archaeotityus* Lourenço, 2006

Tityus (Archaeotityus) silvestris Pocock, 1897

Tityus silvestris Pocock, 1897: 363, 364.

NEW MATERIAL. — **French Guiana**. 1 ♂, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', 02°13'59.1"N, 54°26'37.9"W, 433 m, tropical moist forest – in plateau, 2-8.III.2015 (M. Pollet). — 1 ♀, MTK-HC, Mitaraka (Hand Catch), 24-27.II.2015 (E. Poirier, P.-H. Dalens & J. Touroult).

REMARK

This species was described by Pocock (1897) from the region of Santarém in Brazilian Amazonia. Subsequently it proved to be largely distributed all over French Guiana and the Amazon region. It presents a very high polymorphism for some morphometric characters (Lourenço 1988). It was recorded for several sites in French Guiana by Lourenço (1983), but the record for the Mitaraka region is new.

Subgenus *Atreus* Gervais, 1843

Tityus (Atreus) obscurus (Gervais, 1843)

Scorpio (Atreus) obscurus Gervais, 1843: 130.

Tityus obscurus – Lourenço & Leguin 2008: 8.

NEW MATERIAL. — **French Guiana**. 1 ♂, 2 ♀, 1 ♀ juvenile, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', MTK-HC: Mitaraka (Hand Catch), 11-18.III.2015 (E. Poirier, P.-H. Dalens & J. Touroult). — 2 ♀, Mitaraka Camp, 26.II.2015 (E. Poirier, P.-H. Dalens & J. Touroult). — 1 ♂, Layon D, tropical moist forest – in plateau, Winkler (2.227554, -54.45371), 23.II-11.III.2015 (J. Orivel, F. PetitClerc).

REMARK

Tityus obscurus is one of the most common species of scorpion distributed in French Guiana but also in Brazil and Suriname. It was collected in French Guiana from quite different sites including zones around Cayenne largely impacted by human activities. *Tityus obscurus* is the only medically important species in French Guiana and can represent an important threat to humans, in particular to children (Lourenço 2016c). Mitaraka is a new record for the species.

Family CHACTIDAE Pocock, 1893
Genus *Auyantepuia* González-Sponga, 1978

Auyantepuia sp.

MATERIAL EXAMINED. — **French Guiana.** A very young ♀ juvenile. Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', MI15-136-29. Layon C, in plateau, pitfall (2.233158, -54.443805), 23.II-11.III.2015 (J. Orivel, F. PetitClerc), MNHN.

REMARK

This *Auyantepuia* specimen may represent a new species, however further material will be necessary for a final conclusion.

Genus *Broteochactas* Pocock, 1893

Broteochactas delicatus (Karsch, 1879)

Chactas delicatus Karsch, 1879: 134.

Broteochactas delicatus – Pocock 1893: 77.

NEW MATERIAL. — **French Guiana.** 1 ♂, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', MTK - HC: Mitaraka (Hand Catch), 12.III.2015 (E. Poirier, P.-H. Dalens & J. Touroult), MNHN.

REMARK

This species is moderately common in French Guiana and was reported from a small number of sites (Lourenço 1983). The Mitaraka Massif represents a new record for the species.

Genus *Broteas* C. L. Koch, 1837

Broteas gervaisii Pocock, 1893

Broteas gervaisii Pocock, 1893: 78.

NEW MATERIAL. — **French Guiana.** 1 ♀, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', Mitaraka Camp, 26.II.2015 (E. Poirier, P.-H. Dalens & J. Touroult).

REMARK

This species can be considered common in French Guiana and was previously reported from several sites in the department. The Mitaraka Massif represents, however, a new site for the *B. gervaisii*.

Genus *Guyanochactas* Lourenço, 1998

REMARK

Two species were previously described in the genus *Guyanochactas* from French Guiana: *G. gonzalezspingai* (Lourenço, 1983) and *G. flavus* Lourenço & Ythier, 2011 (Lourenço 1983; Lourenço & Ythier 2011). Species belonging to this genus remain, however, rather rare. A new species is now described from the Mitaraka Massif.

Guyanochactas touroulti n. sp.
(Figs 3-5)

[urn:lsid:zoobank.org:act:FA6C238C-9415-4A9E-A47D-02FA965451C9](https://doi.org/10.21203/rs.3.rs-1000000/v1)

MATERIAL EXAMINED. — **French Guiana.** ♀ holotype, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', MI15-0471. Layon C, parcel 9, hand collection, in litter during the night, 2.238334, -54.449117, 23.II-11.III.2015 (V. Vedel & J. Muriene), MNHN.

ETYMOLOGY. — Name honors Julien Touroult (MNHN) one of the organizers of the Field Expedition to the Mitaraka Massif.

DIAGNOSIS. — Scorpion of moderate size, as the other species of the genus, with 36.4 mm in total length. Coloration dark brown to almost blackish. Carapace slightly emarginated. Body and appendages weakly granulated, with minute punctations. Ventral internal carina of pedipalp femur with spinoid granules; internal face of pedipalp chela granulated and with 2-3 spinoid granules. Pectines with 9-10 teeth in female holotype. Dentate margin of chela fingers with six rows of granules. Metasomal segments I and II wider than long; III as long as wide. Spiracles oval. Tarsi with two rows of spinoid setae. Trichobothrial pattern of type C neobothriotaxic 'majorante'. *Guyanochactas touroulti* n. sp. can be distinguished from other species in the genus *Guyanochactas* and in particular from *Guyanochactas gonzalezspingai* (Lourenço, 1983) and *Guyanochactas flavus* Lourenço & Ythier, 2011, both also distributed in French Guiana, by the following features: 1) overall much darker coloration, almost totally blackish; 2) overall size smaller with only metasomal segments I-II wider than long; 3) smaller number of pectinal teeth; and 4) chela fingers with six rows of granules.

DESCRIPTION BASED ON FEMALE HOLOTYPE

Coloration

Basically dark brown to blackish. Prosoma: carapace dark brown to blackish with some slightly reddish zones on furrows; eyes blackish. Tergites dark brown to blackish, with confluent zones slightly reddish. Metasomal segments dark brown with blackish zones over carinae; telson reddish, darker ventrally; aculeus reddish at the base and blackish at the tip. Chelicerae yellowish with blackish variegated pigmentation; fingers and teeth blackish. Pedipalps dark brown to blackish; femur darker than patella and chela. Legs reddish-brown with darker spots. Venter: sternites, coxapophysis and sternum reddish-brown; pectines and genital operculum yellow to pale yellow.

Morphology

Carapace slightly emarginated, with minute granulations and punctations; furrows shallow. Median eyes largely anterior to the centre of the carapace, separated by a little more than one

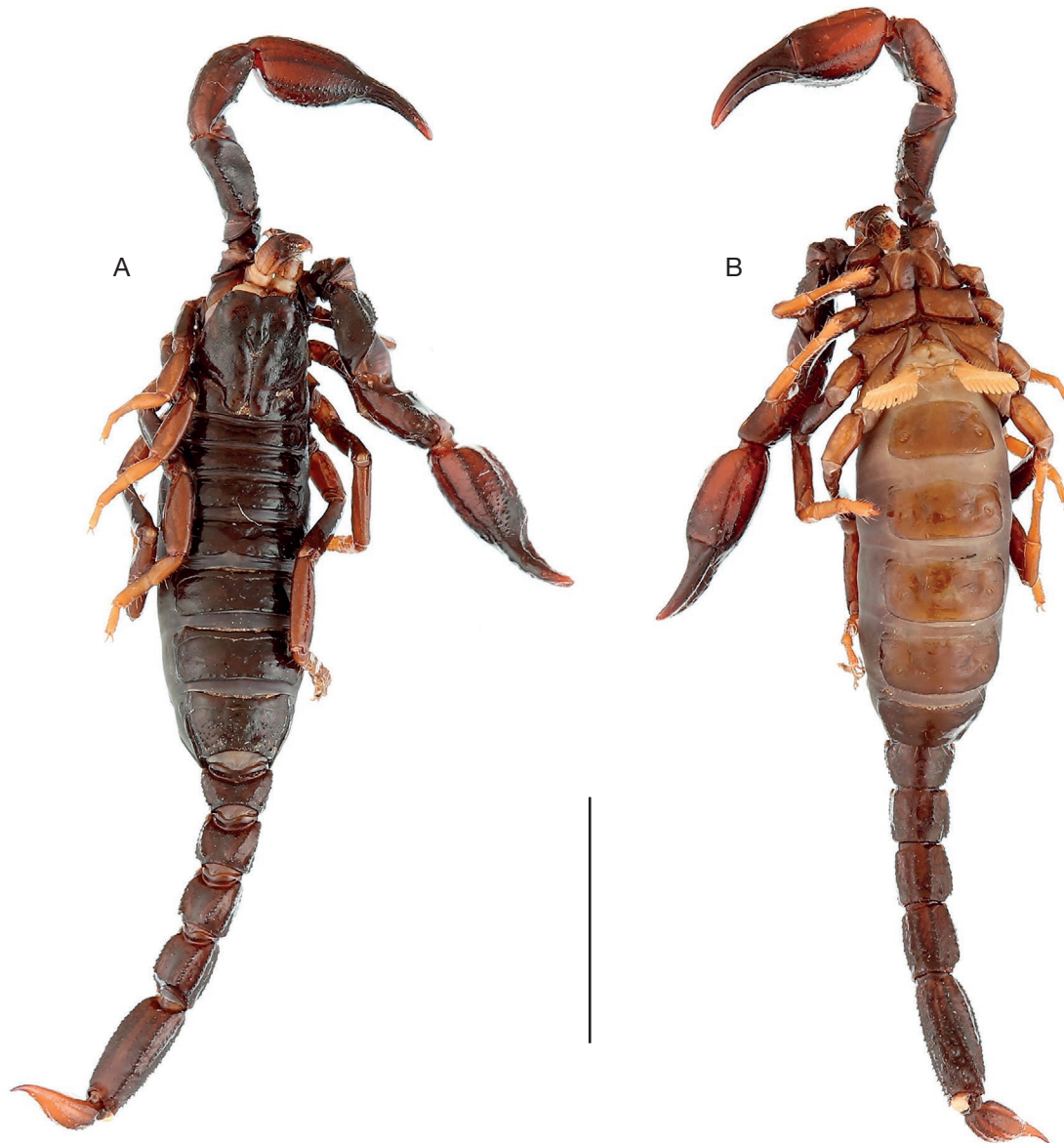


FIG. 3. — **A, B**, *Guyanochactas touroulti* n. sp., ♀ holotype habitus, dorsal (**A**) and ventral (**B**) views. Scale bar: 1 cm.

ocular diameter; two pairs of lateral eyes, moderate in size. Sternum pentagonal, wider than long. Tergites acarinate, with only minute granulations and punctations. Pectinal tooth count 9-10 for holotype; fulcra vestigial. Sternites smooth and punctuated; spiracles oval in shape. Metasomal segments I to II wider than long; metasomal tegument with moderately marked granulations and a few punctuations; dorsal carinae strongly marked on all segments with spinoid granules; other carinae strongly marked on segments III-V, weaker on segments I-II; segment V with spinoid granulations ventrally. Telson elongated and weakly globular with strongly marked granulation ventrally; aculeous moderately elongated. Pedipalps: femur with dorsal internal, dorsal external and ventral internal carinae strongly marked; ventral internal carina with spinoid granules; ventral external carina weakly to moderately marked; all faces with minute granulations. Patella with minute granulations and punctations; dorsal internal, ventral

internal, ventral external and external carinae weakly marked; other carinae vestigial. Chela with weakly marked carinae and a few granulations on internal aspect. Dentate margins on movable and fixed fingers with six rows of granules, separated by stronger accessory granules. Chelicerae moderately elongated with a dentition typical of the family Chactidae (Vachon 1963), and with dense setation ventrally and internally. Trichobothriotaxy of type C; neobothriotaxic 'majorante' (Vachon 1974). Tarsi with two rows of spinoid setae.

Morphometric values (in mm) of female holotype

Total length including telson, 36.4. Carapace: length, 5.1; anterior width, 3.2; posterior width, 5.2. Mesosoma length, 11.9. Metasomal segments. I: length, 2.0; width, 3.0; II: length, 2.3; width, 2.6; III: length, 2.4; width, 2.4; IV: length, 2.9; width, 2.3; V: length, 4.9; width, 2.1; depth, 1.7. Telson

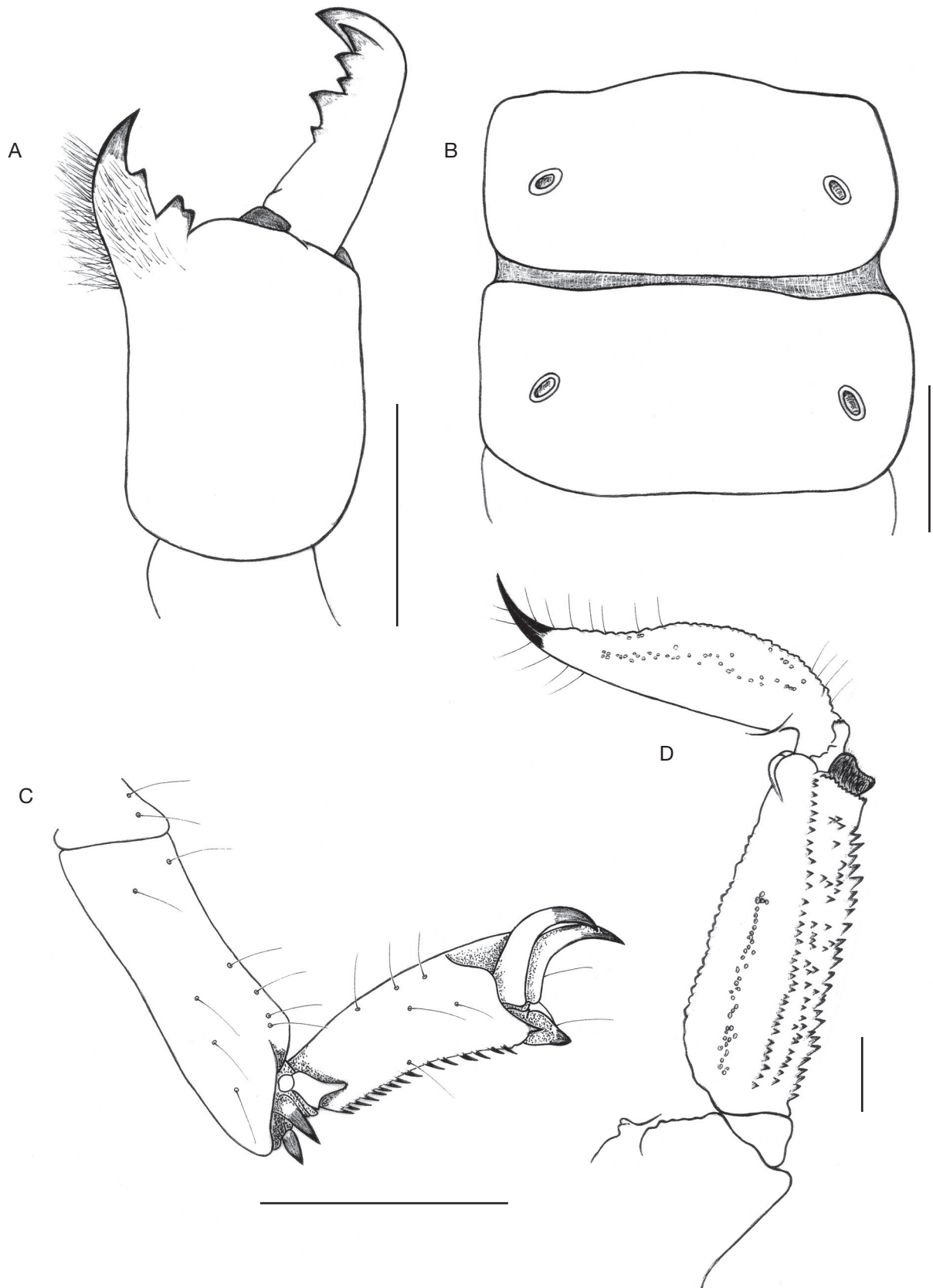


FIG. 4. — *Guyanochactas touroulti* n. sp., ♀ holotype: **A**, chelicera, dorsal view; **B**, sternites IV-V showing spiracles; **C**, tarsi of leg IV showing the series of spines; **D**, metasomal segment V and telson, lateral view. Scale bars: 1 mm.

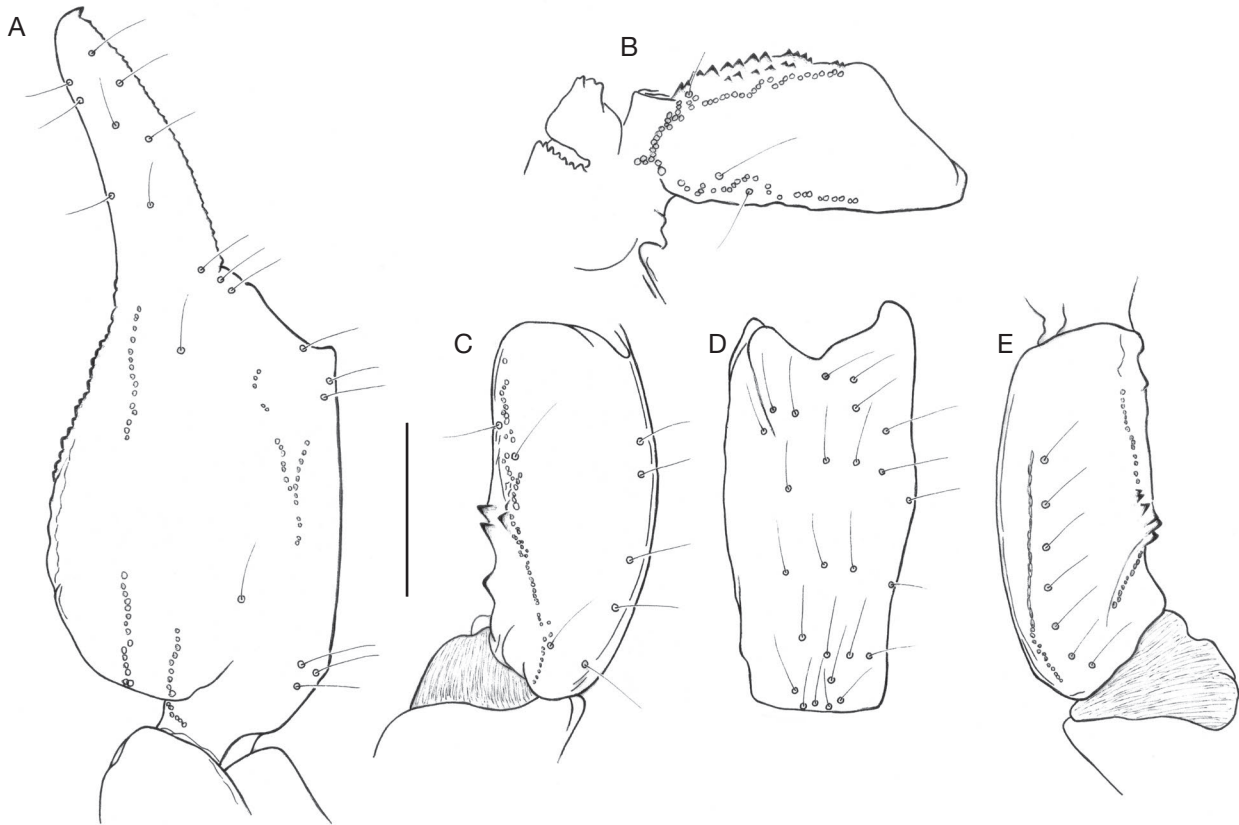


FIG. 5. — *Guyanochactas touroulti* n. sp., ♀ holotype, trichobothrial pattern: **A**, chela, dorso-external view; **B**, femur dorsal view; **C-E**, patella, dorsal, external and ventral views. Scale bar: 2 mm.

length, 4.9; width, 1.6; depth, 1.3. Pedipalp: femur length, 3.8, width, 1.7; patella length, 4.4, width, 1.8; chela length, 8.5, width, 2.8, depth, 2.9; movable finger length, 4.2.

Genus *Hadrurochactas* Pocock, 1893

Hadrurochactas sp.

MATERIAL EXAMINED. — **French Guiana**. A very young ♀ juvenile, Mitaraka, 'La Planète Revisitée – MNHN/PNI Guyane 2015 (APA 973-1)', MI15-0174-20. Layon D, in plateau, Winkler, 2.216359, -54.456976, 23.II-11.III.2015 (J. Orivel, F. PetitClerc), MNHN.

REMARK

This *Hadrurochactas* specimen may represent a new species, however further material will be necessary for a final conclusion.

Genus *Spinochactas* Lourenço, 2016

Spinochactas mitaraka Lourenço, 2016

Spinochactas mitaraka Lourenço, 2016: 144-146.

MATERIAL EXAMINED. — **French Guiana**. ♀ holotype. Mitaraka Sud (640 m), 15.III.2001 (J.-M. Betsch leg.); collected by extraction together with the ♂ holotype specimen of *Ananteris sabineae*.

REMARK

This genus and species were previously described from the material collected during a previous mission of the Muséum in the region of the Mitaraka Massif.

BIOGEOGRAPHICAL COMMENTS

As already outlined in previous publications (Lourenço 2016b, c), tepuys are table-top mountains (mesas) found only in the Guyana highlands of South America and are quite distinct from Inselbergs (from German 'insel = island' and 'berg = mountain'), which are isolated rocky outcrops consisting generally of Precambrian granite or gneiss. The Mitaraka massif precisely corresponds to a typical Inselberg. According to Sarthou *et al.* (2003, 2010) the geomorphology and the geology of Inselbergs have been studied worldwide, and a survey was provided for inselbergs in general (Bremer & Sander 2000).

Contrary to the tepuys formations which are exclusively of the Guyana region, shaped inselbergs are scattered throughout Guyana and Brazilian Shields (up to East Bolivia). These outcrops rise abruptly from the surrounding plain landscape and represent singular habitats in tropical rain forests (Sarthou *et al.* 2003, 2010). Consequently, these formations represent clear habitat fragmentation and constitute functional terrestrial islands (Prance 1996) which contain rare endemic species,

in most cases due to isolation and particular environmental conditions (MacArthur & Wilson 1967; Sarthou *et al.* 2003). For more detailed information see Lourenço (2016b, c)

The study of the scorpions collected during the ‘Our Planet Reviewed’ Guyane-2015 expedition in the Mitaraka Massif was achieved by some positive results (Lourenço 2016b, c, this study). However, one cannot consider this survey as complete. In fact most scorpions found in the Mitaraka Massif were collected by random and/or empirical methods. No specific methodology, normally used to the collections of these animals was used (e.g., research with ultra-violet light). Consequently, new discoveries may yet be expected if future expeditions may take place in the region.

Acknowledgements

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