zoosystema

2023 • 45 • 5

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Nicolas MOULIN &
Christian J. SCHWARZ

art. 45 (5) — Published on 10 March 2023
www.zoosystema.com

PUBLICATIONS SCIENTIFIQUES

MUSÉUM NAL HIST NATURELLE

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Royacanthops soukana (Roy, 2002), n. comb. female holotype MNHN-EP-EP-2424, dorsal view. Photo: M. Depraetere.

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Diffusion – Publications scientifiques Muséum national d'Histoire naturelle
CP 41 – 57 rue Cuvier F-75231 Paris cedex 05 (France)
Tél. : 33 (0)1 40 79 48 05 / Fax : 33 (0)1 40 79 38 40
diff.pub@mnhn.fr / https://sciencepress.mnhn.fr

ISSN (imprimé / *print*) : 1280-9551/ ISSN (électronique / *electronic*) : 1638-9387

Two new genera of Acanthopidae (Mantodea) from the Amazon region, with description of a new species

Nicolas MOULIN
Institut de Systématique, Évolution et Biodiversité (ISYEB),
Muséum national d'Histoire naturelle, CNRS UPMC EPHE UA,
case postale 50, 57 rue Cuvier, 75231 Paris Cedex 05 (France)
nicolas.moulin@mnhn.fr

Christian J. SCHWARZ
Faculty of Biology and Biotechnology, Conservation Biology Unit, Ruhr University Bochum,
ND 1/31, Universitätsstraße 150, 44780 Bochum (Germany)
christianschw@gmx.de

Submitted on 27 September 2022 | Accepted on 20 december 2022 | Published on 10 March 2023

urn:lsid:zoobank.org:pub:531E6108-5736-42D3-A6D6-F680CE3FA2A6

Moulin N. & Schwarz C. J. 2023. — Two new genera of Acanthopidae (Mantodea) from the Amazon region, with description of a new species. *Zoosystema* 45 (5): 137-161. https://doi.org/10.5252/zoosystema2023v45a5. http://zoosystema.com/45/5

ABSTRACT
Despite recent developments in the systematics of Acanthopinae Burmeister, 1838, the generic identity of two species, *Acanthops parva* Beier, 1942 and *A. soukana* Roy, 2002 remained ambiguous. The examination of the types and of previously unstudied specimens necessitated the creation of two new genera. *Royacanthop*s n. gen. is introduced to accommodate *Acanthops soukana* Roy, 2002, and a new species from Brazil. *Parvacanthop*s Schwarz & Moulin, n. gen. is proposed for *Acanthops parva* Beier, 1942. The resulting new combinations are *Royacanthops soukana* (Roy, 2002) n. comb. and *Parvacanthops parva* (Beier, 1942) n. comb. The male of *R. soukana* n. comb. is described for the first time. Three specimens from Brazil are described as *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp. The new genera are easily separated from other genera of Acanthopinae by morphological and genital characters. The geographic distribution of the two genera is briefly discussed.

KEY WORDS
Mantodea,
Acanthopinae,
Brazil,
French Guiana,
new combinations,
new species,
new genera.

RÉSUMÉ
Deux nouveaux genres d'Acanthopidae (Mantodea) d'Amazonie, avec la description d'une nouvelle espèce.
Malgré des travaux récents sur la systématique des Acanthopinae Burmeister, 1838, la situation de deux espèces, *Acanthops parva* Beier, 1942 et *A. soukana* Roy, 2002 est restée ambiguë. L'examen des types et des spécimens jusque-là non étudiés justifie la création de deux nouveaux genres. *Royacanthop*s n. gen. est introduit pour accueillir *Acanthops soukana* Roy, 2002 et une nouvelle espèce du Brésil, et *Parvacanthop*s Schwarz & Moulin, n. gen. est proposé pour *Acanthops parva* Beier, 1942, avec les nouvelles combinaisons *Royacanthops soukana* (Roy, 2002) n. comb. et *Parvacanthops parva* (Beier, 1942) n. comb. Le mâle *R. soukana* n. comb. est décrit pour la première fois. Trois spécimens du Brésil sont décrits comme *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp. Les nouveaux genres se distinguent nettement des autres genres d'Acanthopinae par des caractères morphologiques et génitaux. La répartition géographique des deux genres est brièvement discutée.

MOTS CLÉS
Mantodea,
Acanthopinae,
Brésil,
Guyane,
combinaisons nouvelles,
espèce nouvelle,
genres nouveaux.

INTRODUCTION

The praying mantises (Mantodea Latreille, 1802) present a striking morphological diversity. In South America, the family Acanthopidae Burmeister, 1838 contains some of the most cryptic and bizarre-looking mantodeans. According to our current knowledge, species from this family in their adult state look like dead or decomposing leaves, pieces of degraded plants, or are colorful "flower mantises", while the first instars frequently mimic ants (e.g. Grimaldi & Engel 2005; Agudelo *et al.* 2019; Rivera & Svenson 2020; Schwarz *et al.* 2020; Scherrer & Aguiar 2021). The ecological similarities to the Paleotropical family Hymenopodidae Giglio-Tos, 1915 are quite striking.

Rivera & Svenson (2016) produced the first exhaustive molecular phylogeny of Neotropical earless artimantodeans. This phylogenetic scheme has been adopted in Rivera & Svenson (2020: 130), who added updates on taxonomy and identification keys. These authors treat Stenophyllidae Saussure, 1869 and Acontistidae Giglio-Tos, 1915 as separate families, while they were considered subfamilies before, and point out that half of the species of Acanthopidae Burmeister, 1838 are known by only one sex. The most recent integrative systematic arrangement of this family, based on morphological and genital synapomorphies, is given by Schwarz & Roy (2019: 111) (see also comments in Schwarz *et al.* 2020: 37). They propose to divide the family Acanthopidae into two subfamilies, Acanthopinae Burmeister, 1838 and Stenophyllinae Saussure, 1869, with the Acontistini Giglio-Tos, 1915 as a tribe of the latter.

Acanthopinae is one of the best-studied lineages of Neotropical Mantodea (Travassos 1945; La Greca & Lombardo 1997; Ehrmann 2002; Roy 2002a, b, 2004; Rivera 2005; Ippolito 2007; González *et al.* 2011; Rivera & Svenson 2020; Otte *et al.* 2022). Many generic revisions have been produced in recent years, i.e., *Acanthops* Audinet-Serville, 1831 (Lombardo & Ippolito 2004), *Lagrecacanthops* Roy, 2004 (Roy 2004), *Pseudacanthops* Saussure, 1870 (Lombardo *et al.* 2013), *Decimiana* Uvarov, 1940 (Lombardo 2000; Menezes & Bravo 2012; Maldaner & Rafael 2017), *Plesiacanthops* Chopard, 1913 (Roy 2002b; Schwarz & Roy 2018), *Metacanthops* Agudelo & Maldaner, 2019 (Agudelo *et al.* 2019), and *Miracanthops* Roy, 2004 (Roy 2004; Rivera 2005; Schwarz *et al.* 2020). Even though this subfamily is well understood when compared to related groups, there are still some problems to solve, most notably the paraphyly of *Acanthops* with respect to the other genera (e.g. Lombardo & Ippolito 2004; Rivera & Svenson 2016).

In French Guiana, the diversity of Acanthopidae is high, with several genera and species known by only one specimen or one sex (Roy 2002a, 2004, 2015, 2019; Moulin & Roy 2020). *Acanthops soukana* Roy, 2002 was described after a single female. Roy (2002a: 300) classified this 'remarkable' species in the genus *Acanthops* while indicating that it is distinguished from other species by the shape of its forewings and its coloration. Later, Schwarz & Roy (2018: 453) and Rivera & Svenson (2020: 133) indicated that the female holotype of *A. soukana* as well as the male of the Amazonian *Acanthops parva* Beier, 1942 are aberrant members of *Acanthops* and that the discovery of their opposite sex would confirm the generic identity of these species.

Moulin & Roy (2020: 37) mentioned two individuals of *A. soukana* on the CardObs platform (https://inpn.mnhn.fr/espece/cd_nom/760691) of the "Inventaire national du Patrimoine naturel" (INPN, French natural heritage inventory), i.e., the female holotype and another specimen which sex was not specified. That individual is actually a male from the North-East of French Guiana, near Roura.

While working on the *Acanthops* preserved in the SMNK, the second author noticed two males from Brazil which fit the diagnosis of *A. parva* Beier, 1942 *sensu* Lombardo & Ippolito (2004). One of them had a corresponding female, while the other, smaller one, bore an identification label "*Acanthops erosula* Stål, 1877; det. R. Ehrmann". The two males and the female were later (2020) assigned to *A. parva* and *A. soukana*, respectively, by the second author, but uncertainties about a putative synonymy of the two species remained. Examination of the male holotype of *Acanthops parva* Beier, 1942 showed that this taxon is not identical with the SMNK specimens nor with the specimen identified as *A. parva* by Lombardo & Ippolito (2004). The finding of the Guianese male finally confirmed that the Brazilian specimens represent an undescribed taxon.

In this study, we describe two new genera of Acanthopinae related to *Plesiacanthops* and *Miracanthops* to accommodate *A. soukana* from French Guiana and a new species from Brazil described below on one hand, and *A. parva* on the other hand. *Royacanthop*s n. gen. is characterized by a prominent vertex with very large juxtaocular tubercles, a long and relatively slender pronotum, forewings with a strongly sinuate costal margin, abdominal tergites with remarkably large foliaceous lobes particularly in females, and the conformation of the male genitalia.

*Parvacanthop*s Schwarz & Moulin, n. gen. is characterized by a small body size, a very convex and strongly tuberculate vertex, a pronotum with weakly expressed lateral expansions, forewings with a wide, gradually tapering costal margin without subapical and apical lobes, and the conformation of male genitalia.

MATERIAL AND METHODS

Specimens examined are deposited in the Muséum national d'Histoire naturelle (MNHN, France), in the Muzeum i Instytut Zoologii, Polskiej Akademii Nauk (MIZ, Poland), in the Research Collection of Nicolas Moulin (Coll. NM, France), in the Staatliches Museum für Naturkunde (SMNK, Germany), and the Museu de Zoologia da Universidade de São Paulo (MZUSP, Brazil).

We used the national taxonomic backbone TAXREF (Version 16, Gargominy *et al.* 2022) as a reference to describe the pattern of descriptions of species of the French Guiana fauna, which lists all the cited species in French Guiana with their year of publication.

Morphological nomenclature and specimen preparation followed Brannoch *et al.* (2017), except for the following: head length includes the labrum, foretibia length includes the apical claw, and total length was measured from the vertex of the head to the tip of the abdomen. Genital dissection procedures and terminology follow Klass (1997) and Schwarz & Roy (2019). Specimens were studied using a Leica S8APO stereomicroscope connected to a Leica MC120 HD camera, or a Müller stereomicroscope.

All measurements were taken with a caliper and are expressed in millimetres. The measurement of the total body length produces a general assessment of body size rather than an exact species-specific character, since head position, abdominal expansion, and wing position are all variable. The total body length should then only be used as a rough measurement to initially discriminate between the small and large Mantodea species when performing identifications.

Habitus images were taken with a Konica-Minolta Dynax 5D or with a Canon EOS60. Images of *R. soukana* (Roy, 2002) n. comb. were taken over an 18% grey card background for white balance standards. Photographs of *R. confusa* Schwarz & Moulin, n. gen., n. sp. and *P. parva* (Beier, 1942) n. comb. were taken against a white background 20 cm away using a Nissin MF18 macro ring flash. Images were processed in GIMP 2 and Adobe Photoshop CS5, respectively, to adjust levels, contrast, exposure, sharpness, and to add scale bars. Minor adjustments were made using the stamp tool to correct background aberrations and to remove distracting debris. Plates were constructing using Publisher 2016 and Adobe Photoshop CS5.

Distributions

The distribution map was created in QGIS software 3.8 Zanzibar, with administrative areas from GDAM, the database of Global Administrative Areas website (https://gadm.org/) (ig. 21).

Measurements

Antenna length.
Anteroventral femoral spine count. All inner marginal ridge spines, except the distal genicular spur.
Anteroventral tibial spine count. All inner marginal ridge spines, except the distal terminal spur.
Body length. Length of body from vertex to posterior tip of abdomen (intraspecifically variable measurement, primarily for general size estimation).
Comparative wing length. Ratio tegmen to pronotum length.
Costal field width. Width at the widest point.
Forewing length. From proximal margin of axillary sclerites to distal tip of the discoidal region.
Forewing width. Width at the widest point.
Head length. Length of head from vertex to bottom margin of labrum.
Head width. From lateral margins of the eyes at the widest point.
Hindwing length. From proximal margin of axillary sclerites to distal tip of the discoidal region.
Mesothoracic femur length. From most proximal margin abutting the trochanter to the distal side of the terminal spine insertion site.
Mesothoracic tibia length. From most proximal groove near joint with the femur to the distal side of the terminal spine insertion site.
Metathoracic femur length. From most proximal margin abutting the trochanter to the distal side of the terminal spine insertion side.
Metathoracic tibia length. From most proximal groove near femoral joint to the distal side of the terminal spine insertion site.
Metazona length. Center of supra-coxal sulcus to posterior margin.
Pronotum length. From anterior margin to posterior margin.
Pronotum shape. Ratio metazona to prozona.
Pronotum width. From the lateral margins at the widest point, the supra-coxal bulge.
Posteroventral femoral spine count. All outer marginal ridge spines, except the distal genicular spur.
Posteroventral tibial spine count. All outer marginal ridge spines but except the distal terminal spur.
Prothoracic coxa length. From pronotal insertion to trochanter.
Prothoracic femur length. From proximal margin abutting trochanter to distal margin of genicular lobe.
Prothoracic femur width. From dorsal to ventral margin, at the widest point.
Prothoracic tibia length. From joint with femur to apex of apical claw.
Prozona length. Anterior margin of pronotum to center of supra-coxal sulcus.
Ratio forewings. Ratio between forewings length to width.
Ratio pronotum. Ratio between pronotum width and length.

Abbreviations

Institutions

MIZ	Muzeum i Instytut Zoologii, Polskiej Akademii Nauk, Warsaw;
MNHN	Muséum national d'Histoire naturelle, Paris;
MZUSP	Museu de Zoologia da Universidade de São Paulo, São Paulo;
SMNK	Staatliches Museum für Naturkunde, Karlsruhe.

Collection

coll. NM	collection of Nicolas Moulin, Montérolier.

Morphology

aan	anterior extension of sclerite R3 (anterior apodeme);
afa	phalloid apophysis;
AvS	anteroventral spines
bl	basal lobe of ventral phallomere;
bmfda	dextral extension and main posterior lobe (right phallomere);
fda	main posterior lobe (right phallomere);
L4A	sclerite extending over the ventral wall (left phallomere);
L4B	sclerite extending over the dorsal wall (left phallomere);
loa	membranous lobe;
paa	apical process of left phallomere, titillator;
pia	process posterolateral to pva (right phallomere);
pva	process anteromesal to pia (right phallomere);
R3	anteriorly extending sclerite (right phallomere);
sdp	secondary distal process of Schizomantodea.

RESULTS

Family Acanthopidae Burmeister, 1838
Subfamily Acanthopinae Burmeister, 1838

Genus *Royacanthops* n. gen.

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Type species. — *Acanthops soukana* Roy, 2002 by original designation.

Diagnosis. — Habitus typical for the subfamily, brown, resembling a dry leaf, with a slender pronotum as in *Plesiacanthops* and *Miracanthops*. Both sexes with convex vertex and prominent, tuberculate juxtaocular bulges; frontal shield with two projections on dorsal margin; pronotum long and relatively slender, with tuberculate prozona and two pairs of stronger tubercles anterior and posterior to supracoxal sulcus, respectively; dorsal margin of forefemora with a small but distinct basal lobe; spination formula of the foreleg F = 4DS/15-19AvS/6PvS; T = 17-22AvS/20-23PvS; forewings with costal margin strongly sinuate; alae shorter than tegmina; abdominal tergites with remarkably large foliaceous lobes; abdominal sternites with three posterior lobes; cerci short, the last segment flattened and indented, with the outer lobe just slightly larger than the inner lobe.
Male. Pronotum with lateral margins of the metazona slightly produced, forming a distinct expansion along its length; walking-leg femora with rounded genicular lobes; subapical margin of forewings with a small but distinct lobe; alae with a triangular apex; genitalia with acute bl, a sinistrally re-curved sdp, a simple, serrated afa, and a large loa consisting of two lobes.
Female. Pronotum with teeth along margin of the metazona; walking-leg femora with acute genicular lobes.

Etymology. — Taxon named after Roger Roy (MNHN), for his most valuable work on Mantodea systematics.

Distribution. — Brazil, French Guiana (Fig. 21).

Royacanthops soukana (Roy, 2002) n. comb.
(Figs 1-5; 19-21)

Acanthops soukana Roy, 2002a: 297.

Type material. — **Holotype** • ♀; French Guiana, Route de Kaw, pk36, IX.1999; F. Luquet leg.; battage; MNHN-EP-EP2424.

Other material. — **French Guiana** • 1 ♂; Roura; Montagne des Chevaux; 52°25'53"S, 4°44'31"E; alt. 45 m; 7.VII.2018; Société Entomologique Antilles-Guyane (SEAG) team; PVB (PolyVie Blue trap); genitalia preparation NM0217; BOLD GFMAN18-049; MNHN-EP-EP7504.

Type locality. — French Guiana.

Emended diagnosis. — Body coloration dark brown in males, pale brown in female.
Female. Pronotum with moderately marked supracoxal dilatation, metazona with small triangular teeth; costal margin on forewings strongly sinuate, with large triangular subapical and a markedly short apical lobe.
Male. Tegmina only slightly longer than alae. Male genitalia: sdp of ventral phallomere very elongate, re-curved to the left, and with several teeth at its base. Bl of ventral phallomere elongate, with acute apex curved to the left; afa, loa, and ventral lamina as in *R. confusa* Schwarz & Moulin, n. gen., n. sp.; paa curved, with a subapical process, rendering the whole structure hammerhead-like.

Description
Male (Figs 1-4)
Measurements (n = 1). Body length 40.7; antenna length 8-8.9; head length 3.7; head width 4.7; pronotum length 13.2; prozona length 3.6; metazona length 12.6; pronotum width 2.9; ratio pronotum width/length 0.22; ratio metazona/prozona 3.5; prothoracic coxa length 6.8; prothoracic femur length 10.3; prothoracic femur width 2.3; prothoracic tibia length 6.3; mesothoracic femur length 5.8; mesothoracic tibia length 5.8; metathoracic femur length 6.7; metathoracic tibia length 7.1; forewing length 30.3; forewing width 9.7; costal field width 4.8; ratio forewing length/width 3.1; ratio forewing/pronotum 2.3; hindwing length 29.6.

Coloration and habitus. Body and wings brown, resembling a dry leaf.

Head (Fig. 2A). Triangular in frontal view, spotted with dark, without projections. Antennae moniliform, shorter than body, bearing black setae; scape and pedicel ochraceous; flagellum black. Vertex convex, higher than compound eyes, with small tubercles. Juxtaocular bulges protruding, with several small tubercles. Eyes rounded, with a small dorsolateral process. Lower frons wider than high, with two small projections on upper margin.

Pronotum (Fig. 2C). Elongate, light brown with brown spots and a pair of darker spots at around two-thirds of the metazona. Prozona with smooth margins, and armed with four pairs of pointed tubercles, growing larger from front to back. Metazona with a fine and sparse denticulation along its lateral margins; armed at the posterior end of supracoxal dilatation with two paramedian conical tubercles with a blunt point.

Prothoracic legs (Fig. 2D, E). Same coloration as head and pronotum. Coxae rectangular, prism-shaped in cross-section, with two small black tubercles on posteroventral side; 13-14 small ochraceous dorsal spines. Trochanter slightly granular. Femora triangular in cross-section, spotted, with 6 posteroventral spines; margin between spines crenelated; 15 anteroventral spines, and 4 discoidal spines, all spines dark brown; claw-groove at basal fourth of femur, with an obtuse angulation towards the base of the external margin. Tibiae dark brown, spotted; 21-22 posteroventral spines, all dark brown at the tip, tightly arranged and decumbent; 19 dark brown, separated anteroventral spines; first tarsomere longer than remaining tarsomeres together.

Meso- and metathoracic legs. All segments setose. Coxae robust, relatively long. Femora slightly widened, with a deeply concave ventral margin, accommodating tibia when at rest; genicular lobes short and rounded. Tibiae darker, slightly arched, mesothoracic tibiae distinctly swollen in the basal half, metathoracic tibiae for almost two thirds of their length, with a very short apical lobe and two black terminal spines; tarsi with first tarsomere shorter than next four together.

FIG. 1. — *Royacanthops soukana* (Roy, 2002) n. comb. male MNHN-EP-EP7504: **A**, dorsal view; **B**, ventral view. Scale bars: 1 mm.

Wings (Figs 1; 2B). Forewings subopaque, brown, resembling dry leaves, with the postero-apical region more hyaline; costal area brown, slightly darker, opaque; costal area strongly sinuated, widest at about first quarter of wing, then convexly tapering towards Subcostal posterior at apical third of wing; subapical lobe weakly developed; stigma pale, almost hyaline. Hindwings with an ochraceous, spotted costal area; proximal part of discoidal and anal areas smoky; discoidal area with a well-developed apical lobe and two smaller lobes posteriad.

Abdomen (Fig. 3). Light brown, fusiform, shorter than wings; tergites 3 and 4 with thin lateral extensions; tergites 5 and 6 with large lateral, irregularly toothed lobes, more devel-

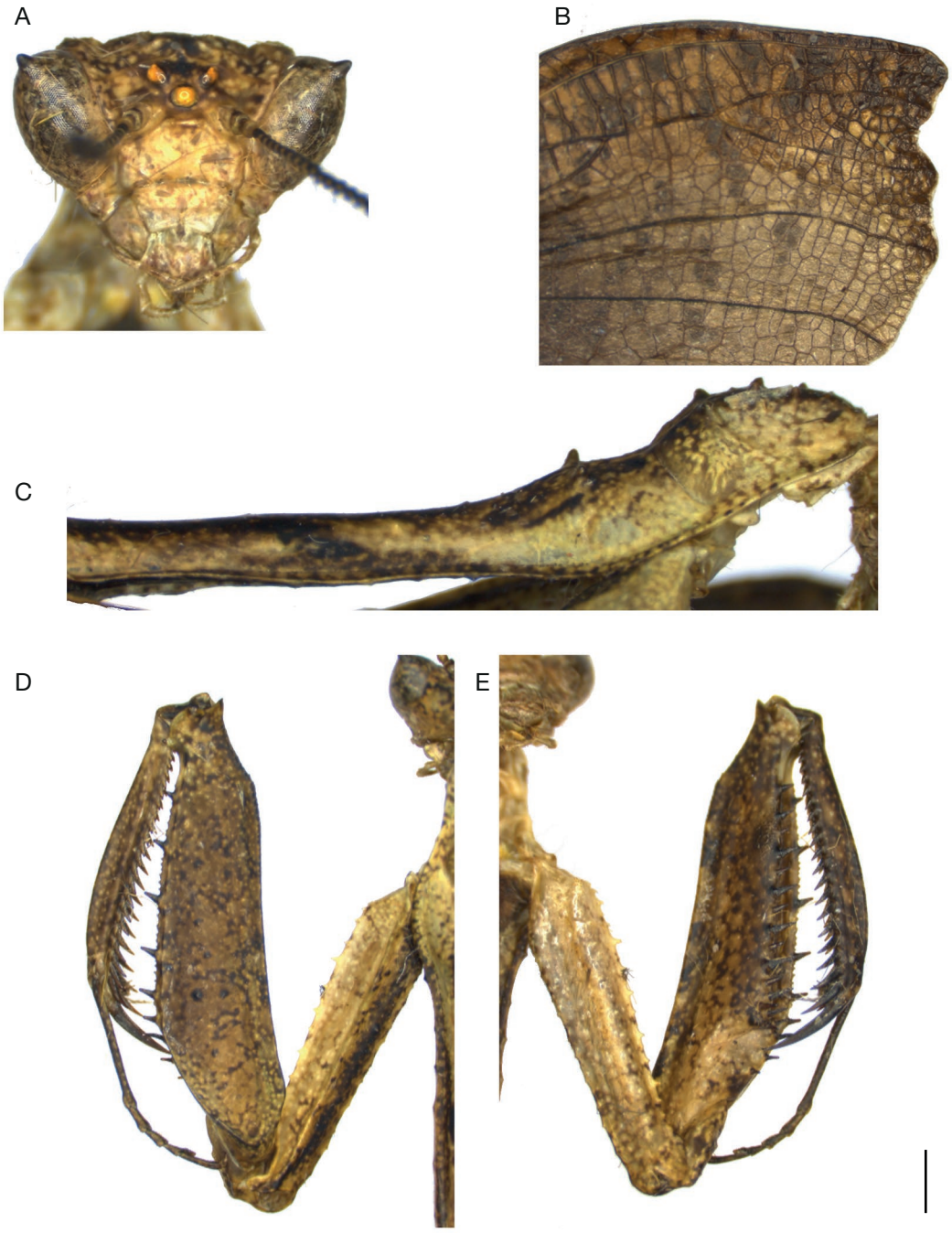

FIG. 2. — *Royacanthops soukana* (Roy, 2002) n. comb. male MNHN-EP-EP7504: **A**, face; **B**, apex of right hindwing; **C**, pronotum, lateral view; **D**, left prothoracic leg, dorsal view; **E**, left prothoracic leg, ventral view. Scale bar: 1 mm.

oped on tergite 5; tergites 7 and 8 with small lateral lobes. Supraanal plate deeply indented, bearing short cerci, the last segment flattened and indented, with the outer lobe larger than the inner lobe. Sternites each with a median and two paramedian lobes at posterior margin. Subgenital plate with two small styli.

Genitalia (**Fig. 4**). L4A longer than wide; sdp very elongate and re-curved, with acute apex and with several small denticles at the base; bl on right site of ventral phallomere well developed, elongate, thin, with truncate apex and a sclerotized acute process pointing to the left. L4B with afa sclerotized, distally more so, short, with several sclerotized spines; loa setose, anterior lobe with elongate setae, posterior lobe with roughly triangular apex, indented on the left side; paa curved at the end, with a subapical digitiform process rendering the apex hammerhead-shaped. Ventral lamina longer than wide, with a wide sclerotized area; R3 with digitiform pia bearing several sclerotized teeth, and a well sclerotized pva.

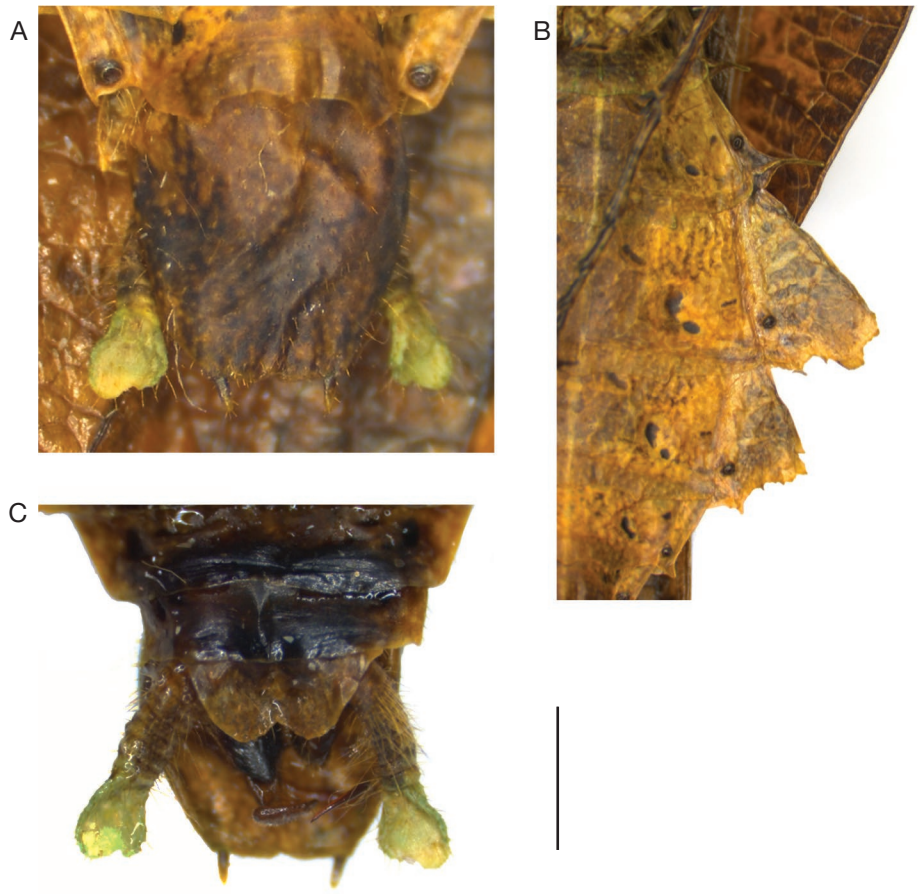

Fig. 3. — *Royacanthops soukana* (Roy, 2002) n. comb. male MNHN-EP-EP7504: **A**, subgenital plate, cerci, and styli; **B**, abdomen, left side, ventral view; **C**, supraanale plate and cerci. Scale bar: 1 mm.

Female
See Roy (2002a) (Fig. 5).

Royacanthops confusa Schwarz & Moulin, n. sp.
(Figs 6-13; 21)

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Acanthops parva Lombardo & Ippolito 2004: 1091, figs 19 B, D, F; 20 A; 21 A, B; 22 A, B, D, E (nec Beier 1942: 147).

Type material. — **Holotype**. **Brazil** • ♂; Reg. Roraima; Xixuau Reserve, Rio Jauaperi; 1°0'0"N, 61°0'0"W; 27.XII.1995; K. Joss leg.; genitalia preparation Schwarz No. 524; ex. SMNK, to be deposited in the MZUSP.
Allotype. **Brazil** • ♀; N Brazil; Reg. Roraima; Xixuau Reserve, Rio Jauaperi; 1°0'0"N, 61°0'0"W; 27.XII.1995; K. Joss leg.; SMNK-Mant 00006.
Paratype. **Brazil** • ♂; Reserva Ducke, Manaus; 3°4'48"S, 60°0'35"W; obtained by fogging; 15.VI.-30.VII.1992; W. Paarmann leg.; genitalia preparation Schwarz No. 595; SMNK-Mant 00003.

Type locality. — Xixuau Reserve, Roraima, Brazil.

Diagnosis. — Body coloration dark brown in males, pale brown in female.
Female. Pronotum with distinctly marked supracoxal dilatation, metazona with rounded, thick teeth. Costal margin on forewings strongly sinuate, with triangular subapical and digitiform apical lobe.
Male. Tegmina longer than alae. Genitalia with sdp of ventral phallomere very elongate, re-curved to the left, and with several teeth at the base; bl of ventral phallomere elongate, with blunt apex possessing a short spine pointing distally. Left phallomere with afa sclerotized, short, with acute apex and several sclerotized spines along its length; loa setose, anterior lobe with elongate setae, posterior lobe with roughly triangular apex, indented on the left side; paa curved distad, without subapical process, apex digitiform. Ventral lamina longer than wide, with a wide sclerotized area.

Etymology. — The specific epithet alludes to the fact that this taxon has been confused with three other acanthopine taxa by four different Mantodea scholars in the past, until it was finally recognized as new.

Description
Male (Figs 6; 7; 9A, B; 10A, B; 11A-D; 13)
Measurements (n = 2). Body length 36.1-41.6; antenna length 8.6-10.9; head length 3.5-3.9; head width 4.4-5.2; pronotum length 12.3-14.0; prozona length 3.1-3.5; metazona length 9.2-10.5; pronotum width 2.7-3.4; ratio pronotum width/length 0.22-0.24; ratio metazona/prozona 3.0; prothoracic coxa length 7.5-8.2; prothoracic femur length 9.7-10.7; prothoracic femur width 2.2-2.4; prothoracic tibia length 7.8-8.2; mesothoracic femur length 5.7-6.5; mesothoracic tibia length

FIG. 4. — *Royacanthops soukana* (Roy, 2002) n. comb., male MNHN-EP-EP7504: **A**, genitalia, ventral view; **B**, genitalia, dorsal view. Abbreviations: see Material and methods. Scale bar: 1 mm.

FIG. 5. — *Royacanthops soukana* (Roy, 2002) n. comb. female holotype MNHN-EP-EP2424, dorsal view. Scale bar: 1 cm. Photo: M. Depraetere.

6.2-7.2; metathoracic femur length 6.7-7.4; metathoracic tibia length 7.8-8.9; forewing length 27.6-35.4; forewing width 9.5-11.6; costal field width 4.2-5.3; ratio forewing length/width 2.9-3.0; ratio forewing/pronotum 2.2-2.5; hindwing length 26.2-33.3.

Coloration and habitus (Figs 6; 7). Body and wings brown, resembling a dry leaf.

Head (Fig. 9A, B). Triangular in frontal view, tuberculate, spotted with dark, without projections. Antennae moniliform, shorter than body, of general body color, segments darkened apically, flagellum bearing darkened setae. Vertex convex, higher than compound eyes, with small tubercles. Juxtaocular bulges protruding, with several small tubercles. Eyes ovoid, rounded anteriorly, with a small, conical, dorsolateral process. Lower frons wider than high, with two small projections on upper margin.

Pronotum (Fig. 10A, B). Elongate, light brown with brown spots and a pair of darker spots at around two-thirds of the metazona. Prozona with smooth margins, and armed with three pairs of pointed tubercles, growing larger from front to back, and 1-2 additional single tubercles. Metazona as in *R. soukana* (Roy, 2002) n. comb., with an indistinct, sparse denticulation on the lateral margins.

Prothoracic legs (Fig. 11A-D). Same coloration as head and pronotum. Coxae rectangular, prism-shaped in cross-section, with two little black tubercles on posteroventral side, and 16-17 small ochraceous dorsal spines of inequal size. Trochanter slightly granular. Femora triangular in cross-section, spotted, with 6 (rarely 7) posteroventral spines; margin between spines crenelated; dorsal margin almost smooth, with a small but distinct triangular lobe at base; 16 AvS, and 4 discoidal spines, all spines dark brown towards apex; claw-groove at basal fourth of femur. AvS configura-

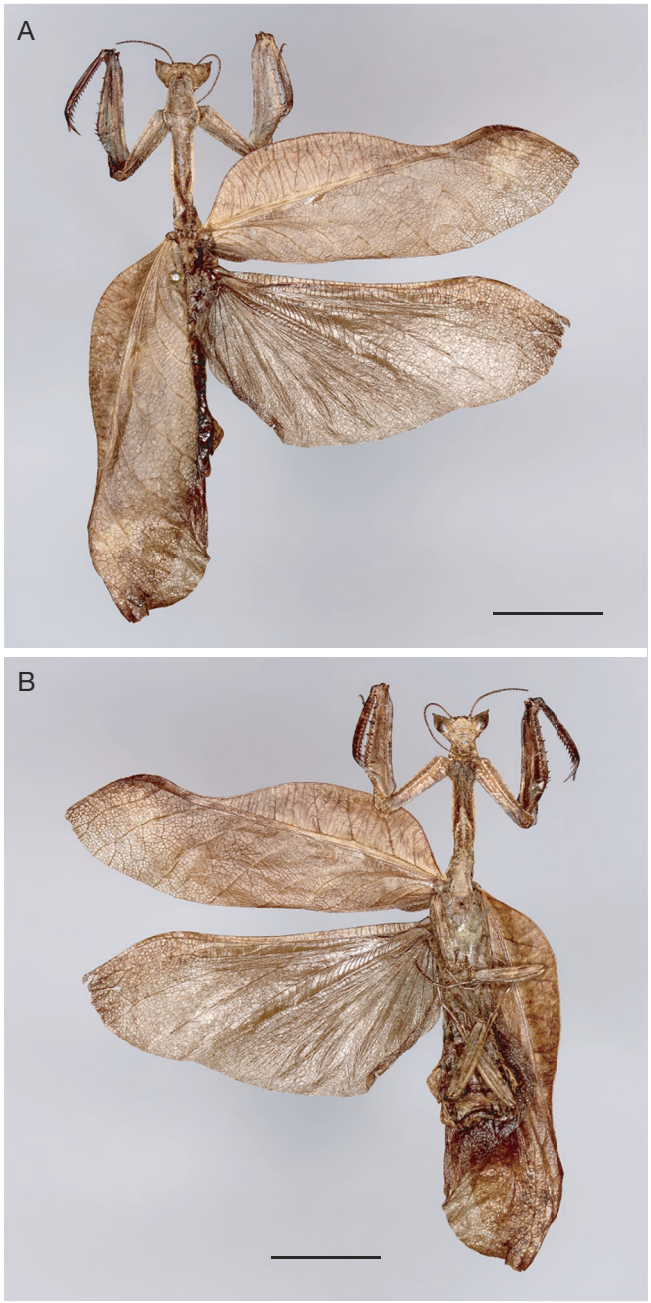

Fig. 6. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp., male holotype ex. SMNK-Mant 00005: **A**, dorsal view; **B**, ventral view. Scale bars: 10 mm.

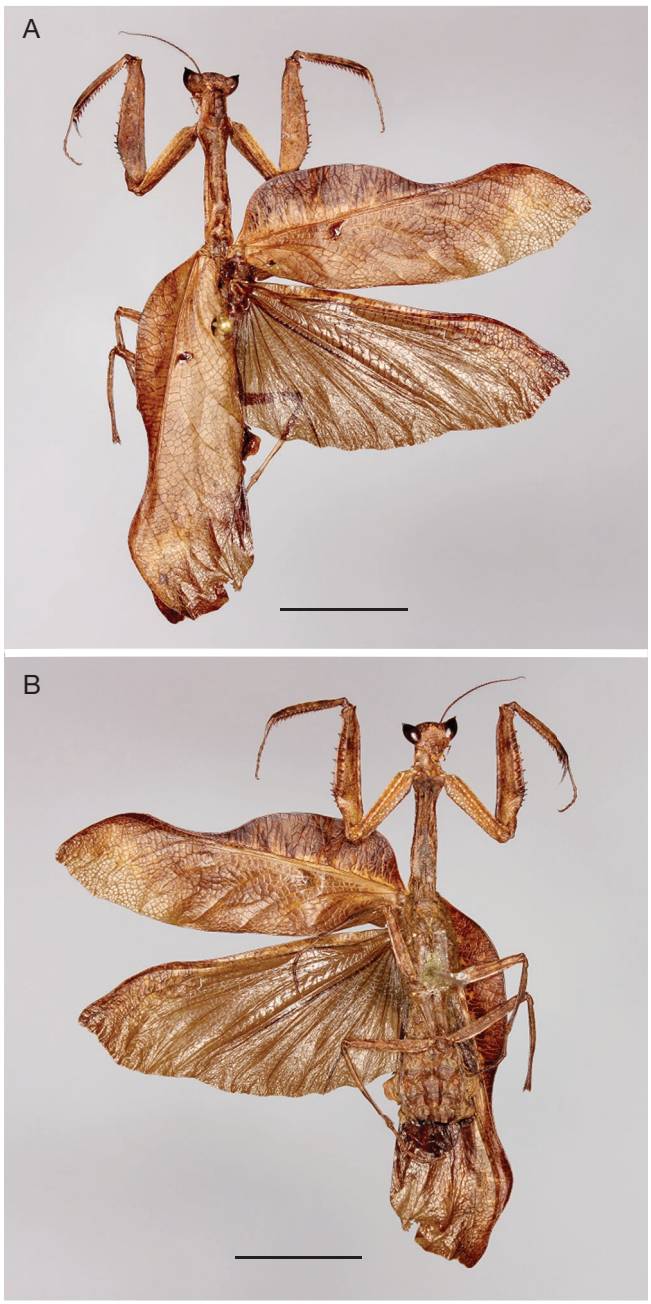

Fig. 7. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp., male paratype SMNK-Mant 00003: **A**, dorsal view; **B**, ventral view. Scale bars: 10 mm.

tion: holotype: IiIIiIiIiiiIiIiI (right) and IiIIiIiiIiIiiiIiI (left); paratype: IiIIiIiIiIiIiIiI. Tibiae dark brown, spotted; 20-22 posteroventral spines, all dark brown at the tip, decumbent; 17-18 anteroventral spines; first tarsomere longer than remaining tarsomeres together.

Meso- and metathoracic legs (Figs 6B; 7B). As in *R. soukana* n. comb. All segments setose. Coxae robust, relatively long. Femora slightly widened, with a deeply concave ventral margin, accommodating tibia when at rest; genicular lobes short and rounded. Tibiae darker, slightly arched, mesothoracic tibiae distinctly swollen in the basal half, metathoracic tibiae for almost two thirds of their length, with a very short apical lobe and two terminal spines with black base; tarsi with first tarsomere shorter than next four together.

Wings (Figs 6; 7). Forewings subopaque, brown, resembling dry leaves, with the postero-apical region more hyaline; costal area brown, slightly darker, opaque; costal area strongly sinuated, widest at about first quarter of wing, then convexly tapering towards Subcosta posterior at apical third of wing; subapical lobe weakly developed; stigma irregularly shaped, opaque, shiny. Hindwings with an ochraceous, spotted costal

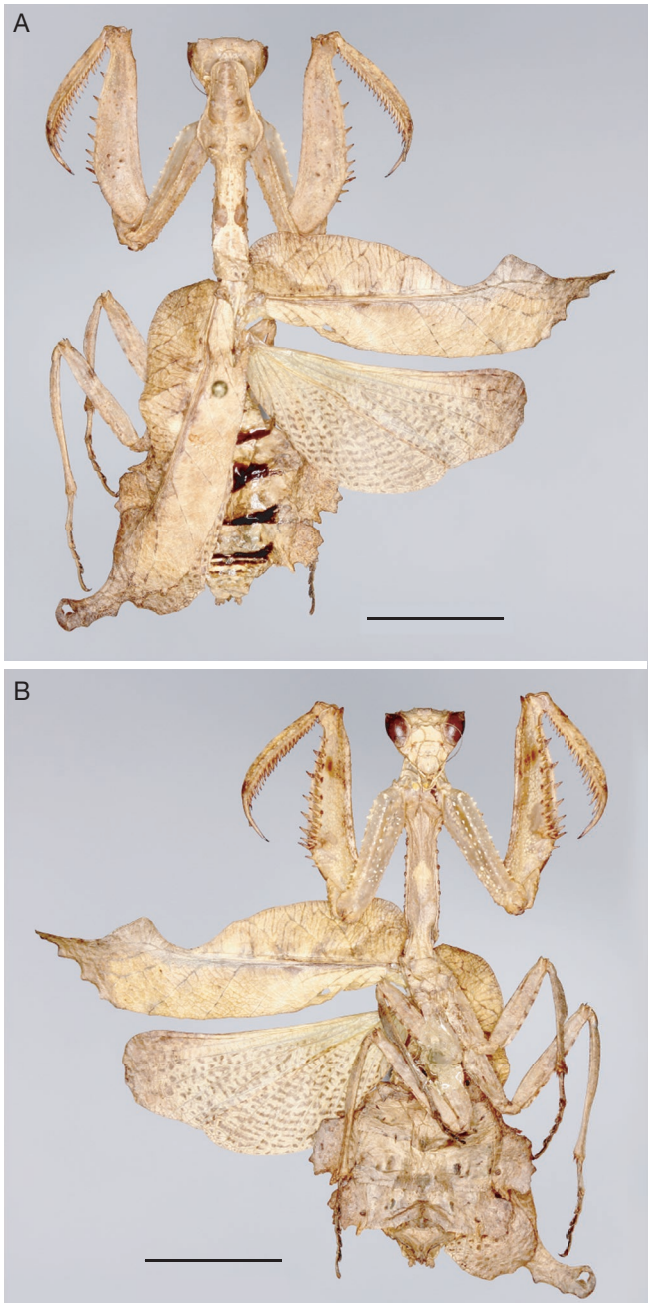

FIG. 8. — *Royacanthops confusa* Schwarz & Moulin, n. gen. n. sp., female allotype SMNK-Mant 00006: **A**, dorsal view; **B**, ventral view. Scale bars: 10 mm.

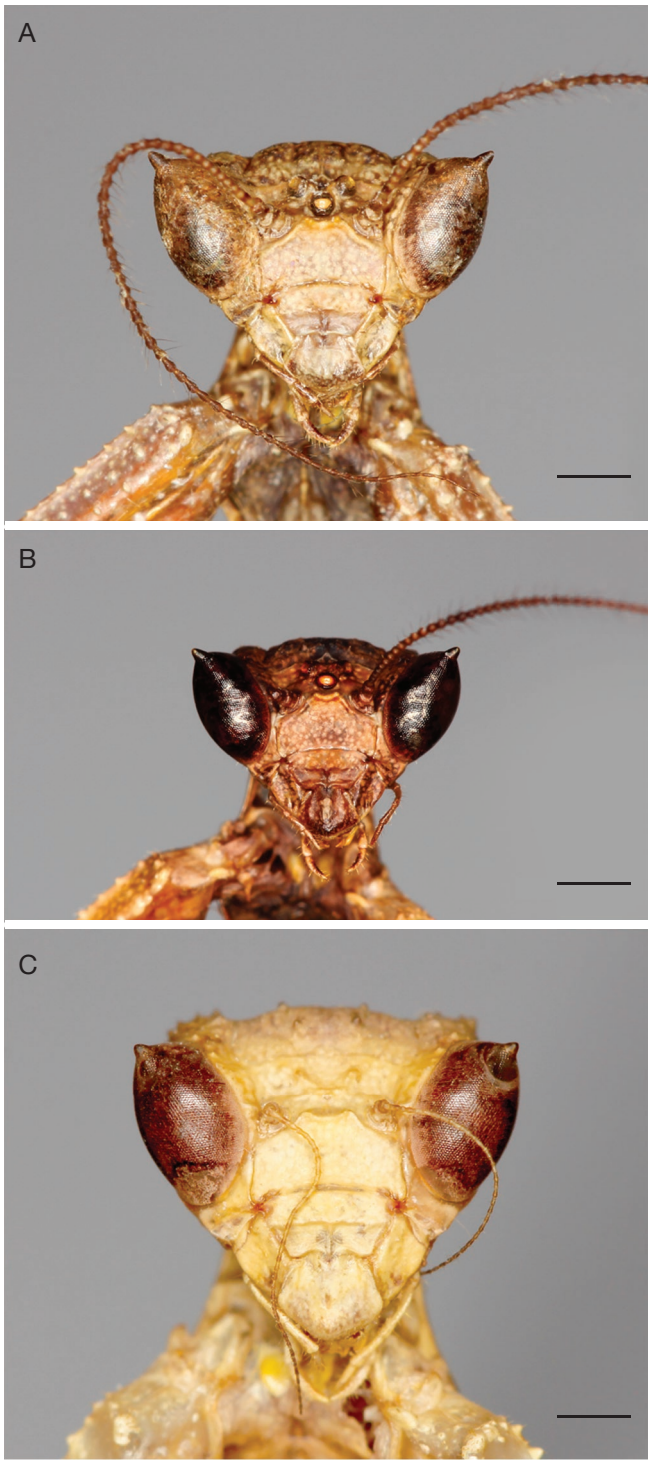

FIG. 9. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp., heads, anterior view: **A**, male holotype; **B**, male paratype; **C**, female allotype. Scale bars: 1 mm.

area; proximal part of discoidal and anal areas smoky; discoidal area with a well-developed apical lobe and two smaller lobes posteriad.

Abdomen. Dark brown, fusiform, shorter than wings; tergites 3 and 4 with acute, triangular extensions; tergites 5 and 6 with large lateral, irregularly toothed lobes, more developed on tergite 5; tergites 7 to 9 with small subacute lobes. Supraanal plate deeply indented, bearing short 11-segmented cerci, first and last segment consisting of 3 and 2 fused segments, respectively. Apex of last segment flattened and indented (Fig. 13A, B), with the outer lobe larger than the inner lobe. Sternites each with a median and two paramedian lobes at posterior margin. Subgenital plate with two small, conical styli.

Genitalia (Fig. 13C, D). Ventral phallomere (L4A) longer than wide; sdp very elongate and re-curved, with acute apex

Fig. 10. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp., anterior part of pronotum, dorsolateral view: **A**, male holotype; **B**, male paratype; **C**, female allotype. Scale bar: 1 mm.

and with several small denticles at the base; bl on right site of ventral phallomere well developed, digitiform, with a very short spine accompanied by a yet shorter spine on the right apical margin. L4B with afa sclerotized, distally more so, short, with several sclerotized spines. Membranous lobe setose, anterior lobe with elongate setae, posterior lobe with roughly triangular apex, indented on the left side. Apical process digitiform, curved at the end. Right phallomere with pia bearing several sclerotized ridges, and a well sclerotized, L-shaped pva.

Remarks

The two males from the SMNK correspond very well to the specimen from the ANSP investigated by Lombardo & Ippolito (2004). The holotype from Roraima is distinctly larger than the two other known males, but agrees well in all other characters with the specimens from the lower Amazon. The paratype from Manaus has an aberrant configuration of posteroventral spines on the left femur (Fig. 11C). While the total spine number is six, the fifth spine is distinctly smaller than the others, and there is a callus between this spine and

FIG. 11. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp., left forelegs: **A**, male holotype, posterior view; **B**, male holotype, anterior view; **C**, male paratype, posterior view; **arrows** point to the aberrant posteroventral spine configuration referred to in the text; **D**, male paratype, anterior view; **E**, female allotype, posterior view; **arrow** points to the aberrant posteroventral spine referred to in the text; **F**, female allotype, anterior view. Scale bar: 5 mm.

the sixth, where an additional spine was supposed to be. This spine seems to have been lost during postembryonic development. This specimen also has the right stylus shorter than the left one, a feature that is not apparent in the holotype (Fig. 13A, B).

An interesting feature in most Acanthopoidea is the irregular size of bendable anteroventral spines. In most artimantodeans, the anteroventral row consists of short, rigid spines alternating with long, bendable spines (except the apical ones) (pers. obs.). In Acanthopoidea (except Angelidae Beier, 1935) the proximal 4-6 spines are arranged in two rows, with the medial (= inner) row consisting of bendable spines. As seen in the configurations here, the bendable spines in this group may be shorter than neighboring rigid spines.

Female (Figs 8; 9C; 10C; 11E, F; 12)

Measurements (n = 1). Body length 38.9; antenna length 5.7; head length 5.3; head width 5.8; pronotum length 15.0; prozona length 4.4; metazona length 10.6; pronotum width 4.8; ratio pronotum width/length 0.32; ratio metazona/prozona 2.4; prothoracic coxa length 10.4; prothoracic femur length 13.6; prothoracic femur width 3.5; prothoracic tibia length 10.6; mesothoracic femur length 7.2; mesothoracic tibia length 8.7; metathoracic femur length 8.7; metathoracic tibia length 10.9; forewing length 27.0; forewing width 7.4; costal field width 5.3; ratio forewing length/width 3.6; ratio forewing/pronotum 1.8; hindwing length 21.0.

Coloration and habitus (Fig. 8). Body and wings light brown, resembling a dry, shriveled leaf.

Head (Fig. 9C). Triangular in frontal view, without projections but tuberculate. Antennae moniliform, slightly longer than head, ochraceous, along first half of flagellum darkened at every second segment apex, in the second half at each segment. Vertex convex, slightly arched, higher than compound eyes, with four tubercles in a trapezoid arrangement. Juxtaocular bulges very large, protruding, with several distinct tubercles. Ocelli small. Eyes ovoid, with a blunt, triangular, dorsolateral process. Lower frons distinctly wider than high, with two small projections on upper margin.

Pronotum (Fig. 10C). Elongate, tuberculate along its entire length, light brown with a pair of darker patches at around two-thirds of the metazona. Prozona with almost smooth margin, tuberculate, and with two pairs of robust paramedian projections, the posterior ones being larger. Supracoxal dilatation distinct, with subcircular margins. Metazona with parallel margins, 2.4 times as long as prozona, tuberculate, with a pair of robust paramedian projections at the posterior end of supracoxal dilatation and a pair of triangular projections at base; margins of metazona with thick, rounded teeth along their length.

Prothoracic legs (Fig. 11E, F). Same coloration as head and pronotum. Coxae trapezoid in cross-section; anterior sides tuberculate, with numerous whitish spots; posteroventral side with a few robust tubercles, some of them darkened; ventral margin with an irregular row of inclined small teeth; dorsal margin with 6 stronger, pale teeth interspersed with smaller teeth; apical lobes contiguous. Trochanter tuberculate. Femora triangular in cross-section; posterior side with several tubercles, some of them darkened, with 6 posteroventral spines; margin between spines heavily crenelated. Dorsal margin crenelated, with a small but distinct, darkened, triangular lobe at base; anterior side densely covered with light ochraceous spots, with two interrupted darker bands at middle and across femoral brush, respectively, and with dark spots at bases of the larger antero-ventral spines; clawgroove at basal fourth of femur; 18-19 anteroventral spines and 4 discoidal spines with brown tips; AvS configuration IiIIiIiIiIiIiIiiiI (right) and IiIIiIiIiIiIiIiiiI (left). Tibiae with convex dorsal margin, spotted with dark and with somewhat darker apex; 23 posteroventral, decumbent spines, plus an additional, vestigial, thin spine on left tibia located before the antepenultimate spine (Fig. 11E); all spines with dark tips; 20-22 anteroventral spines with dark tips, spines on right tibia showing some size anomalies towards apex. Tarsi broken off near base, remaining parts dark.

Meso- and metathoracic legs (Fig. 8B). With slight pubescence. Coxae relatively long, heavily keeled, dorsal side concave, accommodating femur when at rest. Femora rectangular in cross section, slightly widened, with a deeply concave ventral margin, accommodating tibia when at rest; genicular lobes acute. Tibiae keeled, somewhat darker dorsally, slightly arched, mesothoracic pair distinctly swollen in the basal half, metathoracic pair for almost two thirds of their length, with a triangular apical lobe and two terminal spines. Tarsi darkened, with first tarsomere much shorter than the remaining tarsomeres taken together.

Wings (Figs 8; 12). Forewings opaque, vein configuration resembling a dry leaf, spotted with brown, apical margin darkened; costal area strongly sinuated, widest near base, then convexly tapering towards Subcosta posterior at apical third of wing, then widening again into a triangular subapical lobe; Apex of forewing elongated into a digitiform lobe slightly widened at its end (apical half broken off on right tegmen); posterior margin of forewing subapically with three small lobes surrounding vein apices. Stigma triangular, shiny, light chestnut in color. Hindwings yellowish with dark apex; cells irregularly darkened in their middle, except those at base and along anterior margin of discoidal field; anal area relatively small; apex subtruncate, with slightly undulated margin.

Abdomen (Fig. 8B). Brown, ovoid but appearing roughly circular due to lateral tergal lobes, shorter than wings. Tergites shiny, tergites 3-8 with a black band at posterior end, widest on tergite 4; tergites 3 and 4 with slender, triangular lateral lobes; tergites 5 and 6 each with a large, irregularly toothed, lateral lobe, more developed on tergite 5; tergites 7, 8 and 9 with small lateral lobes. Supraanal plate wider than long, deeply indented at apex. Cerci short, 11-segmented, the last

Fig. 12. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp. , female forewing, reconstructed and mirrored. Scale bar: 5 mm.

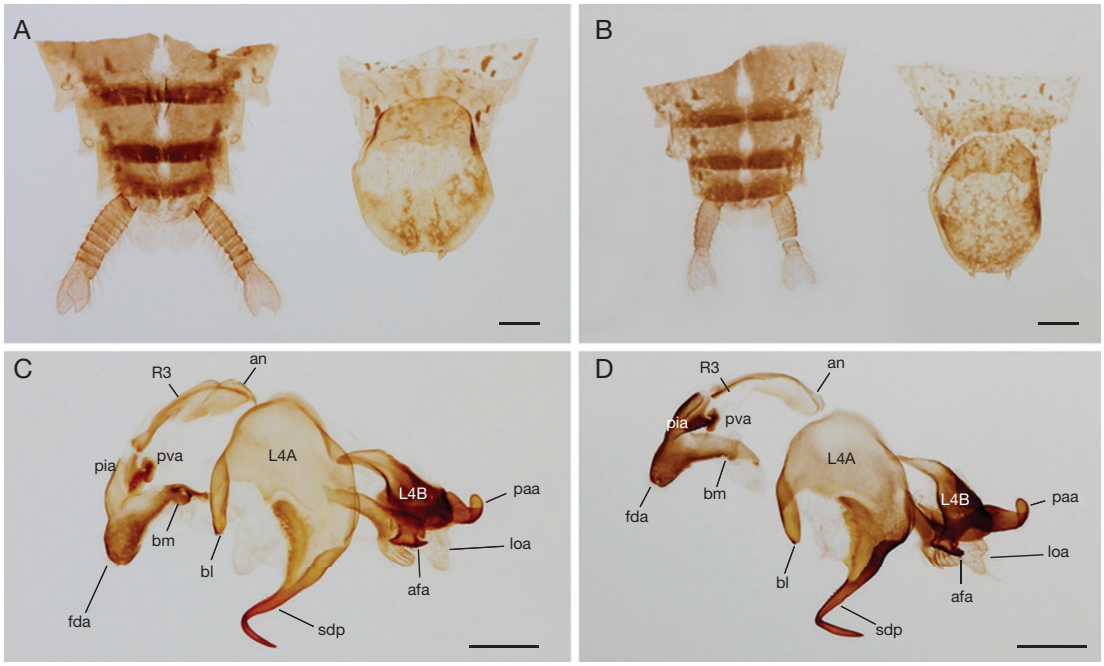

Fig. 13. — *Royacanthops confusa* Schwarz & Moulin, n. gen., n. sp., male abdomen apices: **A**, holotype terminalia; **B**, paratype terminalia; **C**, holotype genitalia, ventral view; **D**, paratype genitalia, ventral view. Scale bars: 1 mm.

segment flattened and indented, with the outer lobe only slightly larger than the inner lobe. Sternites each with a wide median and two acute paramedian lobes at posterior margin. Subgenital plate without peculiarities.

Differential diagnosis

Males of *R. confusa* Schwarz & Moulin, n. gen., n. sp. can be distinguished from those of *R. soukana* (Roy, 2002) n. comb. by their comparatively shorter alae, a much weaker apical spine on bl pointing distad instead of sinistrad, and paa lacking a subapical lobe. Females of *R. confusa* Schwarz & Moulin, n. gen., n. sp. can be distinguished from those of *R. soukana* (Roy, 2002) n. comb. by their more distinct and rounder supracoxal dilatation, the thick and rounded vs smaller triangular teeth on the metazonal margin, the flatter subapical lobe on the tegmen, and the long, digitiform (vs short triangular) apical lobe.

Genus *Parvacanthops* Schwarz & Moulin, n. gen.

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Type species. — *Acanthops parva* Beier, 1942.

Diagnosis. — Habitus similar to that of *Plesiacanthops* and *Miracanthops*, i.e., brown, resembling a dry leaf, with a slender pronotum

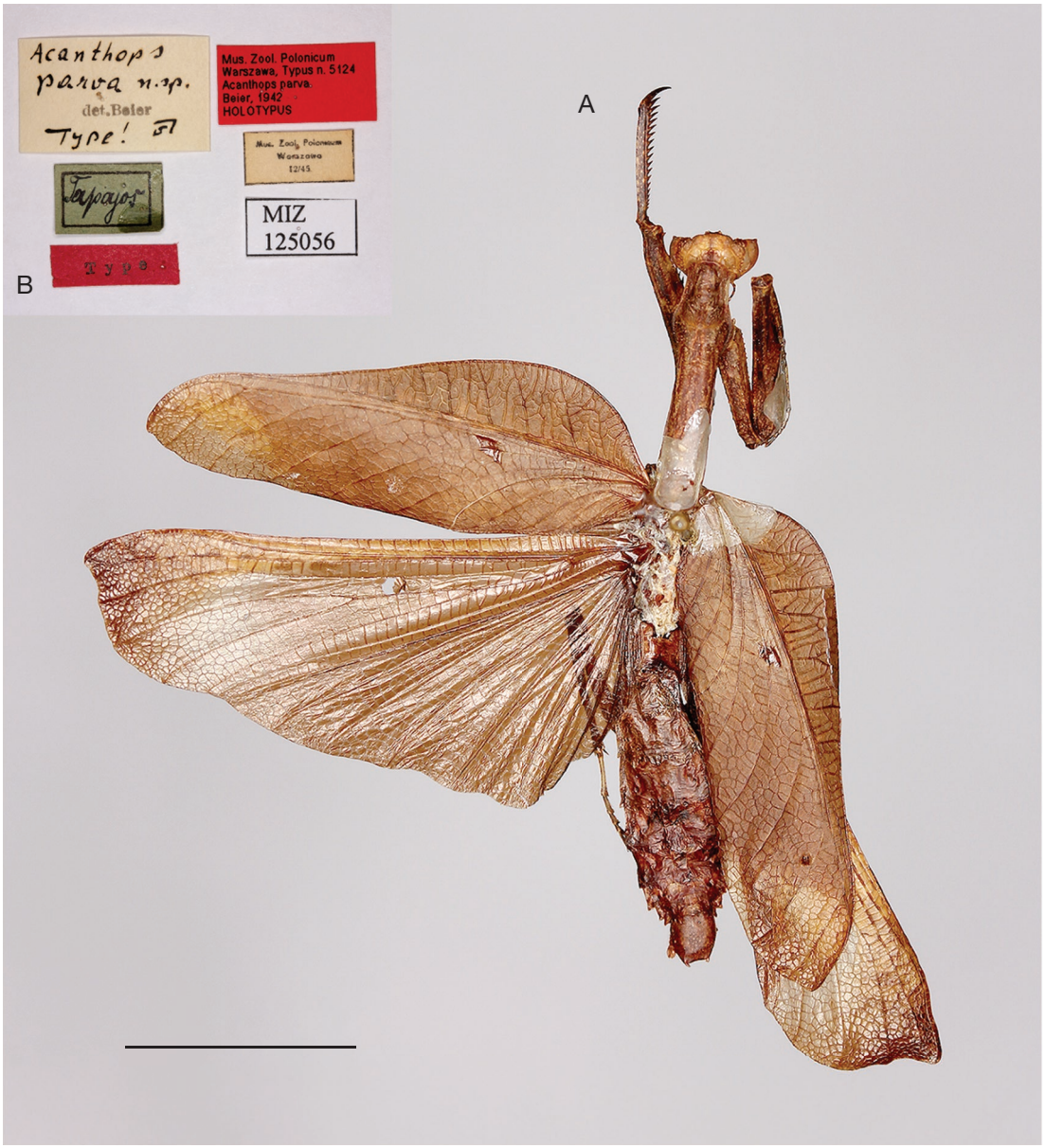

Fig. 14. — *Parvacanthops parva* (Beier, 1942) n. comb., male holotype MIZ 125056: **A**, dorsal view; **B**, labels. Scale bars: 10 mm.

and without subapical lobes on tegmina. Male with convex vertex armed by a paramedian pair of strong double tubercles; juxtaocular bulges moderately developed, tuberculate; frontal shield with two projections on dorsal margin; pronotum long and relatively slender, prozona with three pairs of tubercles, metazona without strong tubercles posterior of supracoxal sulcus; metazona of males with parallel margins, expansion along its length very indistinct in the anterior half, more developed in the posterior half; dorsal margin of forefemora with a very indistinct basal lobe; walking leg femora with subtriangular genicular lobes in males; forewings with very wide costal field gradually tapering towards apex; alae longer than tegmina in males, with a triangular apex; abdominal tergites with small triangular lobes; abdominal sternites with three posterior lobes; cerci short, the last segment flattened and indented, with the outer lobe just slightly larger than the inner lobe; genitalia with long bl curved to the left and with subacute apex, a long, dorso-dextrally curved sdp, a simple afa, and loa consisting of two rather small, setose lobes. Spination formula F=4DS/16AvS/6PvS; T=18AvS/24-25PvS.

Etymology. — Name consisting of the Latin prefix "parv-" (small) and "-acanthops", alluding to the small body size when compared to other members of the group.

Distribution. — Brazil (Fig. 21).

Parvacanthops parva (Beier, 1942) n. comb.
(Figs 14-18)

Acanthops parva Beier, 1942: 147.

Type material. — **Holotype. Brazil** • ♂; Tapajos, ; genitalia preparation Schwarz No. 596; MIZ 125056; type number 5124 (only specimen known).

Type locality. — Tapajos, Pará, Brazil (Fig. 14B).

Fig. 15. — *Parvacanthops parva* (Beier, 1942) n. comb., head, anterior view. Scale bar: 1 mm.

Redescription

Male (Figs 14-18)

Measurements (n = 1). Body length 32.0; head length 3.1; head width 3.8; pronotum length 10.7; prozona length 2.9; metazona length 7.8; pronotum width 2.7; ratio pronotum width/length 0.25; ratio metazona/prozona 2.7; prothoracic coxa length 6.5; prothoracic femur length 8.1; prothoracic femur width 1.7; prothoracic tibia length 6.3; mesothoracic femur length 5.1; mesothoracic tibia length 5.5; metathoracic femur length 5.9; metathoracic tibia length 6.8; forewing length 21.8; forewing width 7.8; costal field width 3.6; ratio forewing length/width 2.8; ratio forewing/pronotum 2.0; hindwing length 24.4.

Coloration and habitus. Body and wings dark brown, resembling a dry leaf (Fig. 14A).

Head (Fig. 15). Triangular in frontal view, with pale spots. Antennae missing. Vertex very convex, with two paramedian bicuspidate tubercles. Juxtaocular bulges moderately protruding, with several small tubercles. Eyes rounded, with a small dorsolateral tubercle located slightly mediad from lateral margin of eye. Lower frons wider than high, with two rather long conical projections on upper margin.

Pronotum (Fig. 14A). Elongate, brown, mottled with dark brown and pale, pair of darker spots at two-thirds of the metazona indistinct in the type. Prozona with smooth margins, and armed with six pairs of pointed tubercles, growing larger from front to back. Metazona indistinctly tuberculate, with almost smooth lateral margins; lateral expansion very indistinct in anterior half, becoming slightly wider in posterior half.

Prothoracic legs (Fig. 16). Same coloration as head and pronotum. Coxae rectangular, trapezoid in cross-section, with one or two stronger tubercles among scattered smaller tubercles on posteroventral side, and 15-18 very small dorsal spines of inequal size; anterior side with numerous pale spots. Trochanter slightly granular. Femora triangular in cross-section, spotted, with 6 posteroventral spines; margin between spines crenelated; dorsal margin almost smooth, with an indistinct lobe at base; 16 anteroventral spines, and 4 discoidal spines, large anteroventral spines with a dark spot around base. AvS configuration IiiIiIiIiIiIiIiI. Claw-groove at basal fourth of femur. Tibiae dark brown, spotted with pale; 24-25 decumbent, rather small posteroventral spines; 18 anteroventral spines; first tarsomere longer than remaining tarsomeres together.

Meso- and metathoracic legs. Typical for the group. All segments setose. Coxae robust, relatively long. Femora slightly widened, with a deeply concave ventral margin, accommodating tibia when at rest; genicular lobes triangular. Tibiae slightly arched, mesothoracic tibiae indistinctly swollen in the basal half, metathoracic tibiae for almost two thirds of their length, with a very short apical lobe and two proximally black terminal spines; tarsi with first tarsomere shorter than next four taken together.

Wings (Fig. 17). Forewings opaque, brown, resembling dry leaves, with the postero-apical region subopaque; costal field widest at about first quarter of wing, then tapering towards apex; forewing without subapical and apical lobes; stigma irregularly shaped, opaque, shiny. Hindwings with an ochraceous, spotted costal area; proximal two-thirds of discoidal and anal areas smoky; subapical part of hindwing subhyaline, apex subopaque; discoidal area with a distinct apical lobe.

Fig. 16. — *Parvacanthops parva* (Beier, 1942) n. comb., left foreleg, posterior view. Scale bar: 1 mm.

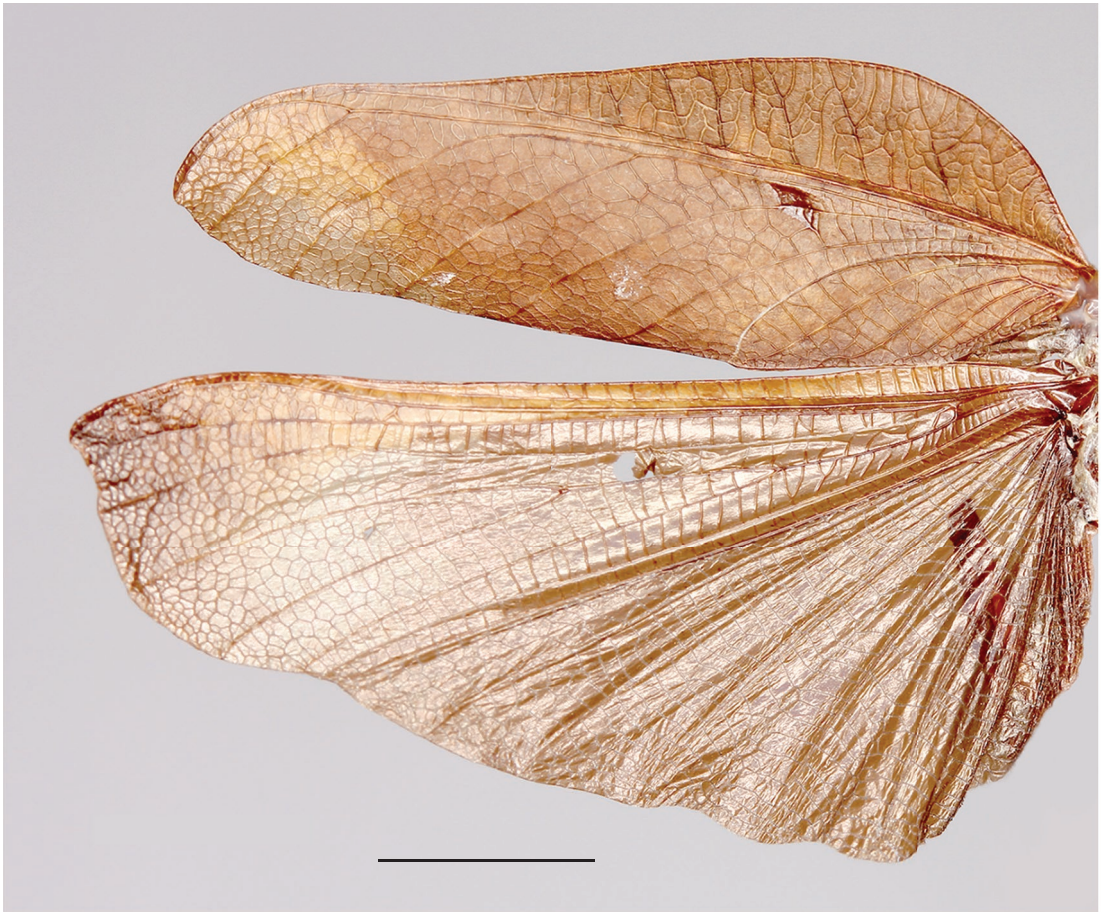

Fig. 17. — *Parvacanthops parva* (Beier, 1942) n. comb., wings. Scale bar: 5 mm.

Abdomen. Dark brown, fusiform, shorter than wings; tergites with small triangular extensions. Supraanal plate deeply indented, bearing short 9-segmented cerci, first and last segment consisting of 3 and 2 fused segments, respectively. Apex of last segment flattened and indented (Fig. 18A), with the two lobes of roughly the same size. Sternites each with a median and two paramedian lobes at posterior margin. Subgenital plate with two small, conical styli.

Genitalia (Fig. 18B). Ventral phallomere longer than wide; sdp very elongate, curved dorso-dextrad, with acute apex pointing antero-sinistrad; bl on right side of ventral phallomere well developed, digitiform, apical part curved sinistrad, with subacute apex. Left phallomere with a simple, sclerotized afa. Membranous lobe indistinctly setose, not well developed. Apical process digitiform, curved at the end. Right phallomere as in related species.

Remarks

The holotype male is in relatively good condition, given its age and history. Pronotum, right femur, right hind leg, and abdomen are glued to the specimen, the latter with the

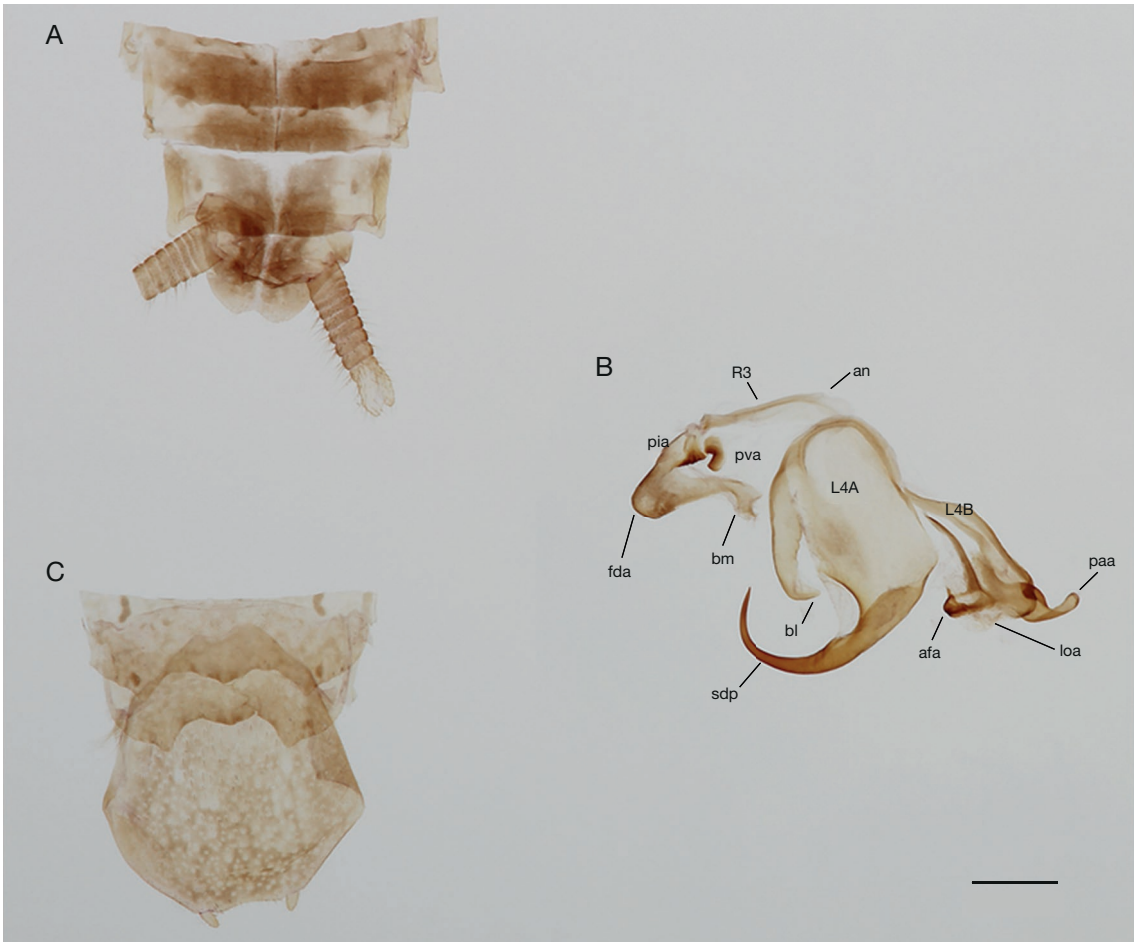

Fig. 18. — *Parvacanthops parva* (Beier, 1942) n. comb., male abdomen apex: **A**, holotype terminalia; **B**, holotype genitalia, ventral view. Scale bar: 1 mm.

ventral side up. The right forewing is also slightly damaged, and the antennae are missing. However, most taxonomically significant parts are still present.

Female
Unknown.

Differential diagnoses
Royacanthops n. gen., *Plesiacanthops*, *Miracanthops* and *Parvacanthops* Schwarz & Moulin, n. gen. are hypothesized here to represent a monophyletic unit. They are distinguished from other acanthopines by the following combination of characters: prominent juxtaocular bulges; metazona elongate, with parallel margins, in males with a distinct expansion along its length; weakly developed anterior lobe on forefemora; genicular lobes of walking leg femora short in males, more or less elongate in females; abdominal sternites with three posterior projections; and very long, sinuate sdp re-curved to the left (in *Parvacanthops* Schwarz & Moulin, n. gen. the sdp is ellipsoid and curved dorso-dextrad, but the tip is slightly sinuate; we argue in favor of this condition being secondarily derived from the sinuate condition by an antero-dorsal rotation of the sdp apex). The sinuate sdp, along with the lobate posterior margin of the female tegmen, is shared with *Acanthops erosula* Stål, 1877, which is closely related to this generic group (i.e., *Plesiacanthops*, *Miracanthops*, *Parvacanthops* Schwarz & Moulin, n. gen., and *Royacanthops* n. gen.). *Acanthops erosula* can be distinguished from other *Acanthops* by a more elongate metazona (though not as long as in *Plesiacanthops*, *Miracanthops*, *Parvacanthops* Schwarz & Moulin, n. gen., and *Royacanthops* n. gen.), and the posteriorly lobate tegmen apex in females. The latter character is also found in *Pseudacanthops* Saussure, 1870, but not in other *Acanthops*, *Decimiana*, *Metilia*, or *Metacanthops*. *Acanthops erosula* shares with *Royacanthops* n. gen. the subapical lobe on the male tegmina and the large, bilobed loa which curves dorsally around afa. Both characters are reduced in *Plesiacanthops*, *Miracanthops* (Schwarz & Roy 2018) and *Parvacanthops* Schwarz & Moulin, n. gen. The three genera are further distinguished from *Royacanthops* n. gen. in the male sex by their tegmina lacking a subapical lobe, and the alae being distinctly longer than the tegmina. In *Royacanthops* n. gen. the alae are shorter than the tegmina. Females of *Royacanthops* n. gen. share with those of *Plesiacanthops* the shape of the tegmina, while having a slightly wider costal field. They share with *Miracanthops* the very large juxtaocular bulges. They are distinguished from *Plesiacanthops* and *Miracanthops* by fewer but larger teeth along the metazona,

Key to the genera of Acanthopinae Burmeister, 1838 (adapted from Rivera & Svenson 2020)

Male

1. Post-ocellar area of vertex with a distinct rectangular projection bearing tubercles ..... *Pseudacanthops* Saussure, 1870
— Post-ocellar area with at most a short projection, smooth, or only with few, scattered granulations 2

2. Cerci with distal cercomere conical, not bilobed 3
— Cerci with distal cercomere flattened, normally with a well-defined central notch 5

3. Forewings with costal area broad, costal vein evenly curved 4
— Forewings with costal area relatively broad, costal vein bi-sinuous ..... *Lagrecacanthops* Roy, 2004

4. Compound eyes conical, vertex flat. Prothoracic femora usually with 7 posteroventral spines. Forewings greenish or yellowish with brown spots; if brown, then forelegs always with 7 posteroventral spines and hindwings smoky ..... *Metilia* Stal, 1877
— Compound eyes ovoid, vertex convex. Prothoracic femora usually with 6 posteroventral spines. Forewings entirely brownish, hindwings always hyaline except apex ..... *Metacanthops* Agudelo, Maldaner & Rafael, 2019

5. Costal area of forewings only slightly broadened proximally, costal vein describing a moderated undulation .... *Decimiana* Uvarov, 1940
— Costal area of forewings much wider proximally, costal vein describing a broad, proximal undulation, sometimes followed by secondary but smaller preapical one 6

6. Forewings without apical lobe. Proximal section of costal area broadly curved, but lacking a preapical sinuosity .. 7
— Forewings with apical, rounded lobe; proximal section of costal area broadly curved, followed by a small, preapical sinuosity 9

7. Costal field not distinctly sinuate, gradually tapering towards apex. Loa without elongate setae on anterior lobe. Anterior femora usually with 6 (rarely 7) posteroventral spines 8
— Costal field distinctly sinuate, reaching radial vein at apical fourth of wing. Loa with elongate setae on anterior lobe. Anterior femora with 7 posteroventral spines ..... *Plesiacanthops* Chopard, 1913

8. Vertex tuberculate but without process; ocular tubercle at dorsolateral margin of eye. Lateral expansion along metazona well developed. Hindwings elongate, distinctly surpassing forewings, with truncate apex. Last segment of cerci distinctly widened or elongate ..... *Miracanthops* Roy, 2004
— Vertex with a short quadricuspidate process; ocular tubercle medial of dorsolateral margin of eye. Lateral expansion along metazona indistinct. Hindwings only slightly surpassing forewings, with triangular apex. Last segment of cerci small, only slightly widened, indentation shallow ..... *Parvacanthops* Schwarz & Moulin, n. gen.

9. Pronotum short, metazona less than 3 times as long as prozona. Conspicuous apical lobes on both pairs of wings ..... *Acanthops* Serville, 1831
— Pronotum elongate, metazona at least 3 times as long as prozona. Forewings with very reduced apical lobe and hindwings with a well-developed lobe, followed by two small lobes on the discoidal area ... *Royacanthops* n. gen.

Females

(females of *Lagrecacanthops* Roy, 2004 and *Parvacanthops* Schwarz & Moulin, n. gen. unknown)

1. Post-ocellar area of vertex with a rectangular projection bearing tubercles ..... *Pseudacanthops* Saussure, 1870
— Post-ocellar area without projections, smooth, or only with few, scattered granulations 2

2. Cerci with distal cercomere conical, not bilobed 3
— Cerci with distal cercomere flattened, normally with a well-defined central notch 4

3. Compound eyes conical, vertex flat. Pronotum smooth ..... *Metilia* Stal, 1877
— Compound eyes ovoid, vertex convex. Pronotum tuberculate ..... *Metacanthops* Agudelo, Maldaner & Rafael, 2019

4. Pronotum elongate, metazona at least 2.7 times as long as prozona. Meso- and metathoracic femora each with both genicular lobes more or less elongated and triangular; prothoracic femora with 6-7 posteroventral spines 5
— Metazona less than 2.3 times as long as prozona. Meso- and metathoracic femora each with genicular lobes rounded or triangular, but not elongate; prothoracic femora with 6 posteroventral spines 7

5. Margin of metazona with spaced out, large teeth. Genicular lobes only slightly elongate. Subapical lobe on female forewing large, triangular. Abdomen ovoid, tergites with remarkably large foliaceous lobes ..... *Royacanthops* n. gen.
— Margin of metazona with numerous teeth. Genicular lobes distinctly elongate. Subapical lobe on female forewing narrow, flat-angled. Abdomen fusiform, tergites with smaller lobes 6

6. Juxtaocular bulges small, vertex distinctly convex. Female forewing not extremely elongate, only moderately surpassing hindwings ..... *Plesiacanthops* Chopard, 1913
— Juxtaocular bulges large, vertex less convex. Female forewing extremely elongate, more than twice as long as hindwing ..... *Miracanthops* Roy, 2004

7. Forewings with costal margin only slightly bisinuous. Apical lobe short and digitiform ..... *Decimiana* Uvarov, 1940
— Forewings with costal margin distinctly bisinuous. Apical lobe long and distinctly curved, if short, then with widened apex ..... *Acanthops* Serville, 1831

and by the very large abdominal lobes. Females of *Plesiacanthops* are distinguished from those of *Miracanthops* by smaller juxtaocular bulges and thus a more convex vertex, and by much less elongate female tegmina. Males of *Plesiacanthops* and *Parvacanthops* Schwarz & Moulin, n. gen. are distinguished from those of *Miracanthops* by less elongate male hindwings without a distinct apical truncation, and the smaller, only slightly widened last segment of the cerci. Males of *Plesiacanthops* are distinguished from those of *Miracanthops* and *Parvacanthops* Schwarz & Moulin, n. gen. by a more sinuate costal field and the presence of elongate setae at the basis of loa in the left phallomere. *Parvacanthops* Schwarz & Moulin, n. gen. shares with *Miracanthops* the small indistinct lobe on the prothoracic femur, the shape of the coastal field and of the ventral phallomere, and the simplified afa surrounded by a moderately developed loa. It is distinguished from *Miracanthops* by smaller body size, the convex vertex with its quadricuspidate process and the differently shaped eyes, the reduced lateral expansion along the metazona, smaller tergal lobes on the abdomen, the shape of the last cercal segment, and a differently shaped hindwing apex. Femoral PvS are six in *Parvacanthops* Schwarz & Moulin, n. gen. and *Royacanthops* n. gen. vs seven in *Plesiacanthops*, while *Miracanthops* exhibits both character states.

DISCUSSION

The descriptions of *Royacanthops* n. gen. and *Parvacanthops* Schwarz & Moulin, n. gen. are a continuation of the taxonomic revisions within Acanthopinae performed these recent years. However, as previously discussed (Moulin & Roy 2020), many males of common species are collected by standard methods, like ground light trapping. Very few other methods (vs light trapping) are used in the Neotropics to collect Mantodea (Brûlé & Touroult 2014; Touroult *et al.* 2021; but see Schwarz 2003). It is well-known that the diversity of collection methods would possibly increase the observed diversity (Moulin *et al.* 2017, 2021; Moulin 2018), as seen in the rather exhaustive list obtained by complementary methods at the Panguana station in Peru (Schwarz *et al.* 2020). Hand-catching by day and night (ground and canopy) would increase the chances of observing individuals, as well as behaviors like predation and mating, in their natural habitat. The *R. soukana* n. comb. female was obtained by beating the vegetation (Fig. 19) and the male by light trapping in a tree (Fig. 20). Interestingly, none of our *R. confusa* Schwarz & Moulin, n. gen., n. sp. specimens was obtained by light trapping. The male from Manaus was found in a fogging sample. The pair from Roraima has the same collection dates. Given the lack of flight ability in females and the notorious rarity of acanthopines in the wild, the respective pair had likely been found by manual searching while engaging in copulatory behavior.

For the reasons given above, it is often difficult to draw conclusions on the microhabitat of a given species. While their preference for forests seems to be well supported, whether they inhabit mainly the canopy or are spread out across vegetation layers remains a matter of debate. At least some species of Acanthopinae are considered canopy dwellers (Rivera & Svenson 2016). The rarity of females might better be related to a lack of sampling effort. It is worth noting that no females of these two genera have been observed in more than twenty years.

According to our current, admittedly incomplete, knowledge, the genus *Royacanthops* n. gen. seems to be restricted to the northern part of the lower Amazon east of the Rio Negro, including the Guyanas (Fig. 21). It does not seem to overlap with the distributional area of the more westerly *Miracanthops*. *Parvacanthops* Schwarz & Moulin, n. gen. is only known from the male holotype collected south of the Amazon along the Rio Tapajos in the Brazilian state of Pará. These three genera have distinctly allopatric ranges according to current data. In contrast, *Plesiacanthops*, initially only known from the Guyanas, has a representative in the Western Amazon (Schwarz unpubl.).

There are still some difficulties in species identification in Acanthopinae, mainly due to marked sexual dimorphism. Females of some taxa remain elusive to this day, the most notorious example being the genera *Lagrecacanthops* and *Parvacanthops* Schwarz & Moulin, n. gen. The use of DNA barcodes can be of great use in associating sexes or taxa with each other (Scherrer 2014; Moulin in press), or to high-

Fig. 19. — Humid forest of low altitude at the edge of the Kaw track, type locality of *Royacanthops soukana* (Roy, 2002) n. comb. Photo: Jérémie Lapèze.

Fig. 20. — Humid forest of low altitude at Montagne des Chevaux, locality of the male of *Royacanthops soukana* (Roy, 2002) n. comb. Photo: Stéphane Brûlé.

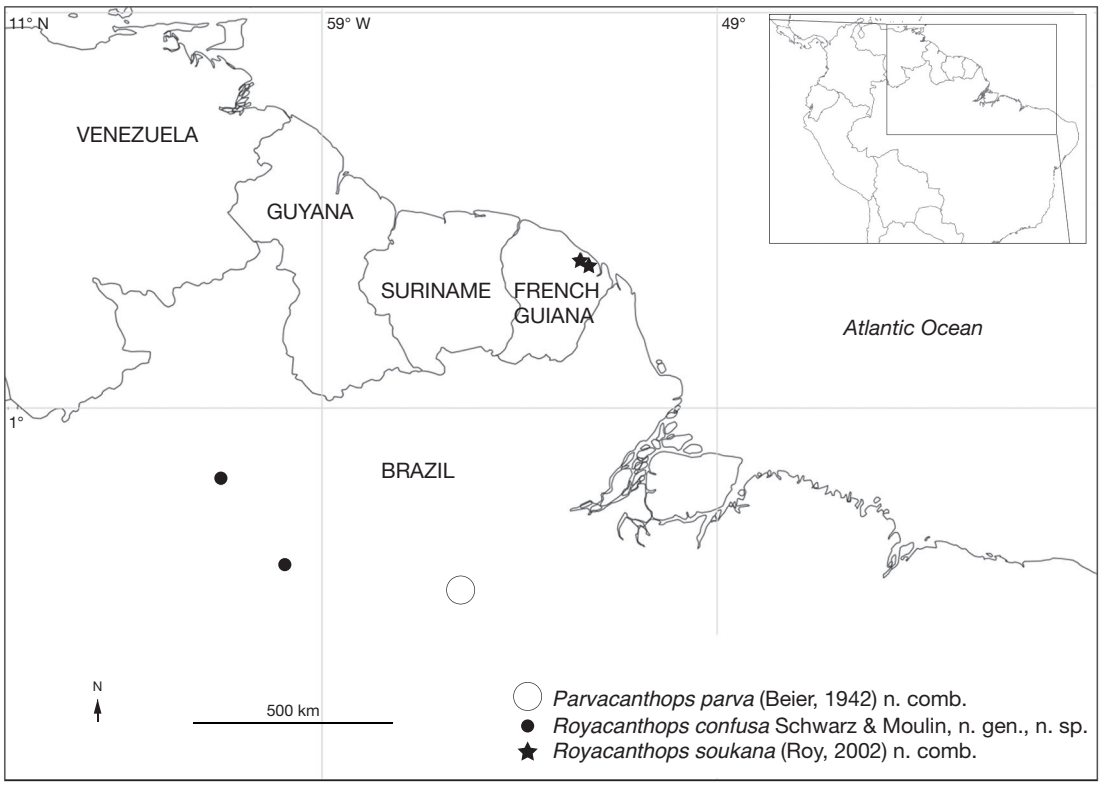

FIG. 21. — Distribution map of *Royacanthops soukana* (Roy, 2002) n. comb., *R. confusa* Schwarz & Moulin, n. gen., n. sp. and *Parvacanthops parva* (Beier, 1942) n. comb. Source: http://www.gadm.org GADM database of Global Administrative Areas.

light a cryptic species (Moulin 2020; Decaëns *et al.* 2021) when other criteria of integrative taxonomy have remained ineffective. More extensive molecular sampling within the well-diversified Acanthopinae is needed to test phylogenetic hypotheses (Rivera & Svenson 2016). As described in other groups of organisms (Guarnizo *et al.* 2015), we can also expect that the use of DNA barcoding, given exhaustive taxonomic and geographic coverage, will continue to modify our current perception of diversity distributed among biogeographical areas.

Acknowledgements
NM thanks Roger Roy, Frédéric Legendre and the Muséum national d'Histoire naturelle for giving him access to the Muséum's specimens. He is most grateful to the Société entomologique Antilles-Guyane (SEAG) for the time spent sorting the samples and forwarding the specimens for study. To Jérémie Lapèze and Stéphane Brûlé for respectively the use of the Kaw and Montagne des Chevaux photos. CJS would like to thank Alexander Riedel (SMNK) for providing access to the three *R. confusa* Schwarz & Moulin, n. gen., n. sp. specimens, as well as Arkadiusz Cegliński and Dariusz Iwan (MIZ) for facilitating the loan of the *Acanthops parva* type. DNA barcoding was supported by the International Barcode of Life project led by Paul Hebert at the Biodiversity Institute of Ontario (Guelph, Canada) and by funds dedicated to the research of the author's company. Finally, we thank the three reviewers of the manuscript for their useful comments and suggestions, which helped improve the quality of this work.

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Submitted on 27 September 2022;
accepted on 20 December 2022;
published on 10 March 2023.