

Synopsis of the Neotropical mantid genus *Pseudacanthops* Saussure, 1870, with the description of three new species (Mantodea: Acanthopidae)

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Synopsis of the Neotropical mantid genus *Pseudacanthops* Saussure, 1870, with the description of three new species (Mantodea: Acanthopidae). - The constitutive members of the genus *Pseudacanthops* Saussure are re-examined. The genus now includes six species: *P. caelebs* (Saussure) (Mexico, Belize, Honduras, Guatemala), *P. spinulosus* (Saussure) (French Guyana, Guyana, Venezuela), *P. lobipes* La Greca & Lombardo (Peru, Bolivia, Brazil), *P. centralis* n. sp. (Nicaragua, Panama), *P. clorindae* n. sp. (Peru) and *P. huaoranianus* n. sp. (Ecuador). The species *Pseudacanthops angulata* (Lichtenstein) is considered an objective synonym of *Acanthops fuscifolia* (Olivier). A key to species of *Pseudacanthops* (males) is also provided.

Keywords: Acanthopidae - Acanthopinae - *Pseudacanthops* - new species - Neotropic area.

INTRODUCTION

The genus *Pseudacanthops* Saussure, 1870 is exclusively found in the Neotropical region and is distributed in warm and humid environments between the 18°N and 16°S parallels. *Pseudacanthops* has received little taxonomic treatment in the past; the number of species reported in the literature varies from three (Otte & Spearman 2005) to four (Ehrmann 2002) and despite of this reduced number of described species, they are very difficult to distinguish. Giglio-Tos (1927) recognized and keyed three valid species: *P. angulata* (Lichtenstein, 1802), *P. caelebs* (Saussure, 1869), *P. spinulosus* (Saussure, 1870). Travassos (1945) and Terra (1995) reduced the number of the species to two, because they considered *P. angulata* as a synonym for *Acanthops falcatoria* (Goeze, 1778). La Greca & Lombardo (1997) provided general remarks on the species included in this genus, considering *P. angulata* as a valid species; in the same article they described the new species *P. lobipes*. Agudelo Rondón *et al.* (2007) listed the following four species and their distribution: *P. angulata*

(Surinam); *P. caelebs* (Belize, Bolivia, Brazil, Costa Rica, French Guyana, Mexico, Nicaragua, Venezuela); *P. lobipes* (Bolivia); *P. spinulosus* (Bolivia, Brazil, Ecuador, French Guyana).

Among all the above species, *P. angulata* is the one with the most complicated taxonomic history and its taxonomic status has always been a matter of debate. Some authors often referred to *P. angulata* as a synonym of *Acanthops falcataria* (e.g. Charpentier, 1843; Kirby, 1904; Travassos, 1945; Terra, 1995; Lombardo & Ippolito, 2004) whereas some others recognized this species as valid (e.g. Saussure, 1871; Westwood, 1889; Kirby, 1904; Giglio-Tos, 1927; La Greca & Lombardo, 1997; Ehrmann, 2002; Agudelo Rondón *et al.*, 2007). This ambiguity originated because, in an initial publication, Stoll (1787) depicted and described (in both Dutch and French) 68 species in 18 colour plates without providing Latin names for any species. Later on, Olivier (1792) provided Latin names for some of these species, among them, “*La Mante Feuille*” (shown in figure 14), naming it as *Mantis fuscifolia*. Subsequently, Lichtenstein (1802) provided Latin names for the remaining figured species and, when referring to Stoll’s figure 14, he named it as *Mantis angulata*. In the meanwhile, Stoll had died (1795), leaving his unpublished papers to M. Houttuyn, who published them in 1813. This updated publication included 32 figures in 7 supplementary plates for the corresponding descriptions (pages 57 to 74), always in Dutch and French, with scientific names for all of these species (pages 75-79). Houttuyn provided the name *Mantis sinuata* for the mantid seen in figure 14, thus not conforming to the names previously given by Olivier and Lichtenstein. Consequently, Stoll’s figure 14 received three successive names that clearly represent objective synonyms: *Mantis fuscifolia* Olivier, 1792, *M. angulata* Lichtenstein, 1802, and *M. sinuata* Stoll, 1813. The oldest name is the valid one, which is *Acanthops fuscifolia* (Olivier, 1792) as established by Lombardo & Ippolito (2004). Thus, the valid species for the genus *Pseudacanthops* are: *P. caelebs*, *P. spinulosus* and *P. lobipes*.

In this paper, we review the species belonging to the genus *Pseudacanthops* and describe three new species: *P. centralis* n. sp., *P. clorindae* n. sp. and *P. huaoranius* n. sp.

MATERIAL AND METHODS

This study is based on the holotypes of *P. caelebs* deposited at the Muséum d’histoire naturelle de Genève (MHNG), *P. lobipes*, deposited at the Zoologische Staatssammlung München (ZSM) and additional specimens deposited in the following collections: Academy of Natural Sciences of Philadelphia (ANSP); Department of Biological, Geological and Environmental Sciences of Catania (MDAB); Instituto Nacional de Pesquisas da Amazônia (INPA-Manaus); Muséum National d’Histoire Naturelle, Paris (MNHN); Zoologische Staatssammlung München (ZSM); Museo de Entomologia Klaus Raven Büller, Universidad Nacional Agraria La Molina (UNALM).

The study of morphology was carried out using a stereoscopic microscope Leica MZ 12, with a micrometric ocular and a camera lucida attached. Images of the relevant structures were obtained via a stereoscopic microscope Leica MZ 205A (equipped with the software auto-montage pro, Syncroscopy).



FIG. 1

Mantis sinuata Stoll, 1813 (Stoll, 1787, fig. 14).

Anatomical terminology follows Snodgrass (1935), except for the copulatory apparatus that follows La Greca (1954). Spination formula of the fore femora follows Rivera (2010), where: **F**=Femur; **T**=Tibia; **ES**=External Spines; **IS**=Inner Spines; **DS**= Discoidal Spines, with values indicating the corresponding number of spines for each series (the genicular spines of the femora and the apical spur of the tibia are not included in the spination formula).

TAXONOMIC TREATMENT

Genus *Pseudacanthops* Saussure, 1870

Pseudacanthops Saussure, 1870: 243; type species: *Hymenopus caelebs* Saussure, 1869.

Paracanthops Saussure, 1870: 243.

Pseudocanthops Kirby, 1904: 283, Chopard, 1912: 335.

DIAGNOSIS: *Pseudacanthops* is related to *Acanthops* Serville, 1831 but can be separated from it by the presence of an elevated squarish process on the fastigium of vertex (Figs 2-7).

DESCRIPTION: Male and female morphologically show a marked sexual dimorphism as concerns the wings shape (Figs 46-47, 62-63).

Colouration: chestnut, dark to light brown or ochre, females can also be green when alive; abdomen exhibiting large, shiny black areas on tergites.

Body length: 35-50 mm.

Body texture: Males have a smooth body with very few scattered granulations. Females are completely covered by conspicuous tubercles and granulations of different sizes.

Head: Fastigium of vertex markedly concave and bearing an elevated, squarish process; eyes ovoid with a conical spine; frontal shield bidentate.

Thorax: Pronotum elongated, slender in males and stouter in females; metazone with two brown sub-circular spots on both sides. Fore coxae with one or two spine-like tubercles at their base (more developed in females); internal apical lobes contiguous. Fore femora with proximal lobe on their dorsal margin. Middle and hind legs rather short, markedly hairy in males; femora bearing a proximal lobe ventrally; tibiae thinner on their distal halves, each exhibiting a small swelling near its base and on its middle section, a small lobe is also present at the apex of each tibia; metatarsi shorter than all the other segments together. Male wings: mesothoracic wings with costal margin exhibiting a double sinuosity, costal area with proximal section dilated, tapering towards the tip of the wing until it disappears at about 2/3 of wing length; apical, rounded lobe present; metathoracic wings similar to mesothoracic wings. Female wings: mesothoracic wings reduced in size, opaque and with apex falcated; metathoracic wings small and non functional, yellow in color with brown pigment on cells.

Abdomen: Slightly flattened and exhibiting lateral lobes on 5th and 6th urotergites; last joint of cerci bilobed.

NOTE: Based on article 30.1.4.3 of the ICZN, a genus-group name ending in *-ops* is to be treated as masculine.

KEY TO SPECIES (MALES)

- 1a Pronotum with multiple granulations but without distinct tubercles 2
- 1b Pronotum exhibiting multiple granulations and with two more distinct conical tubercles on metazone below supracoxal sulcus (Nicaragua, Panama) *P. centralis* n. sp.
- 2a Mesothoracic wing mostly subhyaline, evenly pigmented from dark brown to yellowish brown, sometimes exhibiting scattered, dark spots 3
- 2b Mesothoracic wings colorless and hyaline; distal half and costal area darkly pigmented and opaque (Peru) *P. clorindae* n. sp.
- 3a Internal margin of eyes with one or more spine 4
- 3b Internal margin of eyes without spines (Mexico, Belize, Honduras, Guatemala) *P. caelebs*
- 4a Inner margin of eyes with one tubercle clearly more developed than the others 5
- 4b Inner margin of eyes with similarly-sized tubercles (Peru, Bolivia, Brazil) *P. lobipes*
- 5a Lateral process of the ventral fallomere exhibiting a sinuous outer margin (Ecuador) *P. huaoranianus* n. sp.
- 5b Lateral process of the ventral fallomere with uniformly curved outer margin (Guyana, French Guyana, Venezuela) *P. spinulosus*

Pseudacanthops caelebs (Saussure, 1869) Figs 2, 8-15, 23, 27-33, 95

Hymenopus caelebs Saussure, 1869: 73.
Paracanthops (Hymenopus) caelebs. – Saussure, 1870: 243.
Pseudacanthops caelebs. – Saussure, 1870: 243. – Saussure, 1871: 148. – Saussure, 1872: 279. – Saussure & Zehntner, 1894: 182. – Kirby, 1904: 283. – Chopard, 1913: 60. –



FIGS 2-7

Head in frontal view of males: (2) *Pseudacanthops caelebs*. (3) *P. centralis* (typus). (4) *P. huao-raniana*, typus. (5) *P. clorindae*, typus. (6) *P. lobies*. (7) *P. spinulosus*. Scale = 0.5 cm.

Giglio-Tos, 1927: 515. – Beier, 1934: 4. – Travassos, 1945: 217 (partim Mexico). – Cerdà, 1993: 135 (partim Mexico, Belize). – Terra, 1995: 30. – La Greca & Lombardo, 1997: 53. – Jantsch, 1999: 78 (partim Mexico). – Ehrmann, 2002: 291 (partim Mexico, Belize). – Battiston *et al.*, 2005: 213 (Mexico). – Agudelo Rondón *et al.*, 2007: 115 (Mexico).

Acanthops caelebs. – Stål, 1877.

TYPICAL MATERIAL EXAMINED: Holotype ♂ of *P. caelebs* from MEXICO; Orizaba (MHNG).

ADDITIONAL MATERIAL EXAMINED: BELIZE; Rio Grande 1935, 2 ♂ (ANSP). – GUATEMALA; Plan Grande (15°49'54.93 N; 88°48'08.70 W), 2 ♂ (ANSP). – HONDURAS; Atlandida, Massif Pico Bonito, El Pino 200 m, 5.04.1995, 1 ♂ (T. Porion & A. Grange leg.) (MNHN).

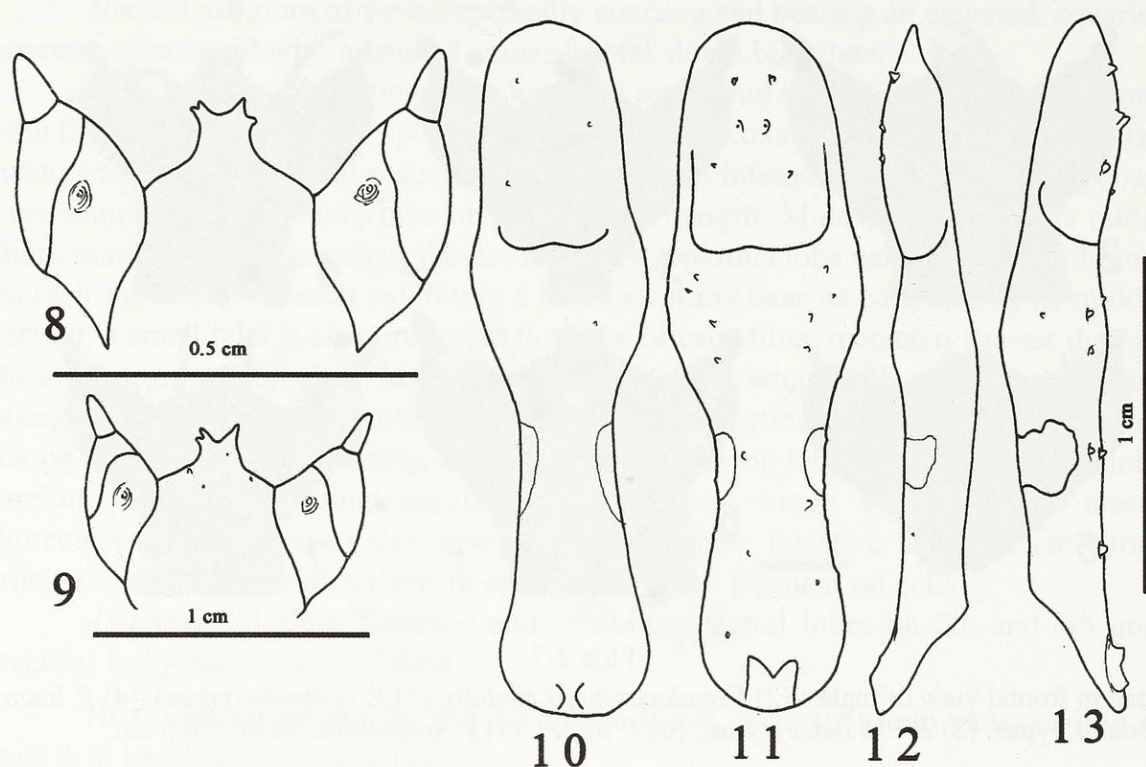
DIAGNOSIS: Body about 45-48 mm in size, eyes oblong with a well distinct apical ocular spine, postgene with two flattened tubercles; pronotum with or without small granulations on dorsal surface; middle and hind tibiae enlarged in their proximal half and with a poorly developed medial lobe.

Female unknown.

DESCRIPTION

Colouration: Body chestnut to ochre. Head ochraceous and exhibiting a dark strip between the compound eyes. Coxae ochraceous. Fore femora with two black bands on their inner side, medial surface with two black strips; bigger internal spines blackish. Mesothoracic wings ochraceous. Metathoracic wings with costal area ochraceous, anal veins with small ochraceous spots. Abdominal tergites ochraceous with black distal edges.

Head (Figs 2, 8-9): With some sparse small granules and about 1.42 times as wide as the pronotum supracoxal dilatation; vertex fastigium projecting upward in a squarish concave process at the apex where four small tubercles are present; frons near



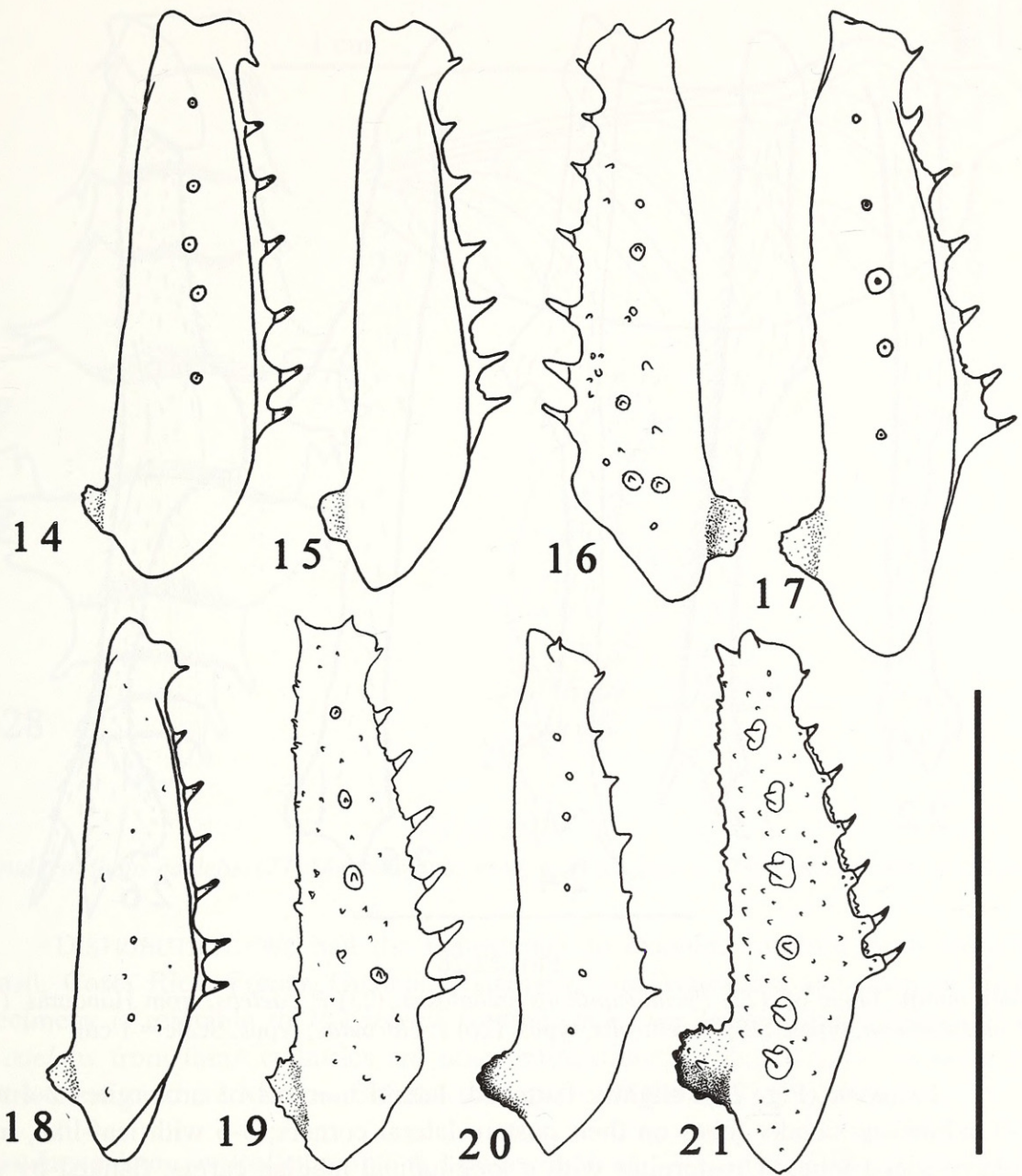
FIGS 8-13

Pseudacanthops caelebs male: (8-9) Head; 8 typus, 9 from Honduras. (10-13) Pronotum; 10-12 typus, 11-13 from Honduras.

ocular suture bearing 2-3 small spines, these are absent in the holotype; eyes oblong with a big ocular apical spine (approximately 1.3 as long as diameter of one ocellus); occiput with a flattened conical process on each side; post-frontal suture with two triangular spines opposite upper ocelli. Frontal shield transverse pentagonal, about twice as broad as high; vertex with two parallel contiguous small teeth.

Thorax (Figs 10-13): Pronotum 2.81 times as long as its maximum width; metazone slightly but notoriously constricted on its distal half; disc of pronotum exhibiting some scattered granulations in the holotype (Figs 10, 12), whereas these are more numerous and larger in specimens from Honduras (Figs 11, 13), two conical tubercles are present near to distal margin; lateral margins of metazone denticulated; ratio metazone/prozone 2.02; supracoxal dilatation distinct.

Legs: Fore coxae about 0.77 times as long as pronotum; anterior margin with minute spines; posterior margin smooth; posterior surface exhibiting numerous small, ivory calluses; inner apical lobes contiguous. Fore femora (Figs 14-15) 0.97 times as long as pronotum and 4.42 times as long as their maximum width; dorsal margin smooth, basal lobe distinct with crenulated margin; external surface smooth in the holotype and in the specimens from Guatemala, with 7-8 tubercles on its median line in the specimens from Honduras. Tibiae half as long as femora. Spination formula: F=6ES/13-14IS/4DS and T=19-20ES/15IS. Middle and hind femora shortened with long hairs; external surface with 3-4 ivory and robust tubercles; medial margin with a basal lobe; tibiae (Fig. 23) covered with minute hairs; basal half thicker than distal half

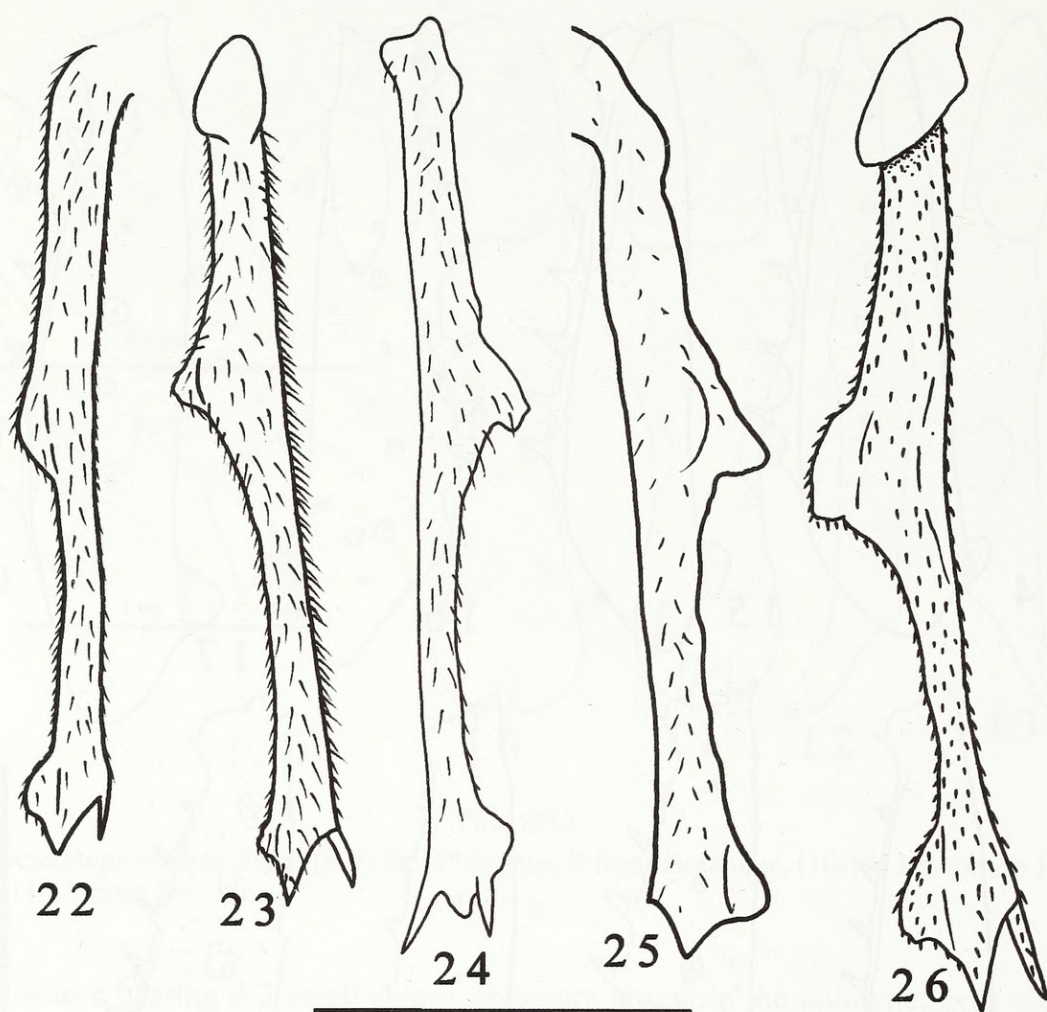


FIGS 14-21

Fore femora of: (14-15) *Pseudacanthops caelebs*; 14 from Honduras. 15 typus. (16) *P. centralis*. (17) *P. clorindae*, typus. (18-19) *P. spinulosus* (20-21) *P. huaorani*, typus and female paratype. Scale = 1 cm.

and with a medial lobated swelling; apex of tibiae with a distinct lobe. Metatarsus shorter than the remaining segments together.

Wings: extending well beyond the tip of the abdomen. Mesothoracic wing (Fig. 27) ratio total length/maximum width 4; anterior margin sinuous with a wide excavation and distinctly rounded apical lobe; anterior half and apex opaque chestnut, posterior half hyaline; costal area proximally wide about 1.5 times as length of prozona; stigma dark brown and rounded. Metathoracic wing with costal and subcostal area and entire apical area opaque with scattered darker spots.



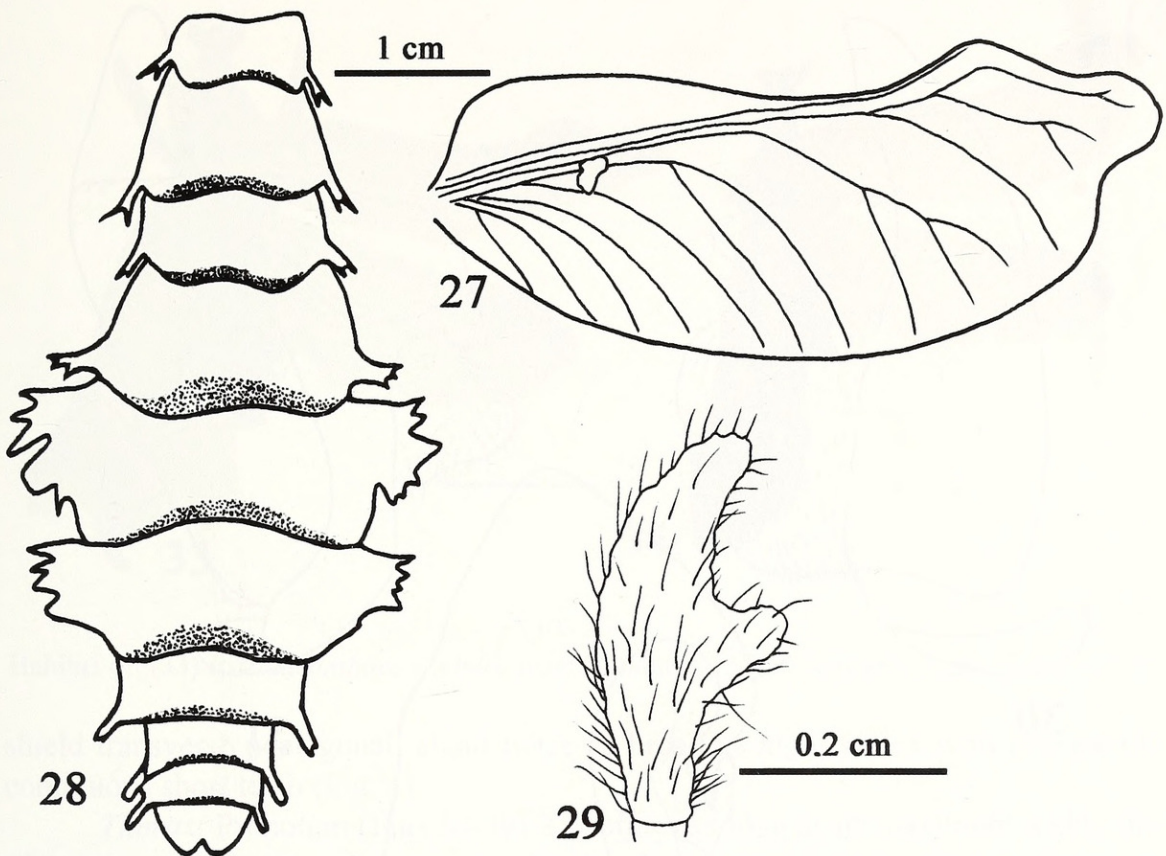
FIGS 22-26

Male middle tibiae of: (22) *Pseudacanthops spinulosus*. (23) *P. caelebs*, from Honduras. (24) *P. huaoraniana*, typus. (25) *P. centralis*, typus. (26) *P. clorindae*, typus. Scale = 1 cm.

Abdomen (Fig. 28): slightly flattened; lateral margins of urotergites 2-4 and 7-9 exhibiting slender lobes on their postero-lateral corners; 5-6 with leaf-like, irregularly-edged lobes. Urosternites with a longitudinal median carina, flanked by 2-3 short crests near the distal margin. Cerci (Fig. 29) extending beyond the subgenital plate and covered with sparse, long hairs; last segment enlarged and flattened, lateral margins irregularly sinuous and apex deeply incised, forming unequal terminal lobes. Subgenital plate longer than broad with incised apex, styles small; supranal plate short with rounded apex.

External male genitalia: Ventral phallomere (Fig. 32) about twice as long as its width; short, arcuated distal process; lateral process elongated, with its apical outer margin sinuous and denticulated. Left phallomere (Figs 30-31) well sclerotized; ventral lamina with elongated distal process; anterior process stocky; phalloid apophysis membranous with numerous small spines.

Measurements (millimeters): Head width 6.2-6.5; pronotum supracoxal dilatation width 4.4-4.5; prozone length 4.1-4.2; metazone length 8.3-8.5; anterior coxae length 9.4-9.8; anterior femora length 12-12.3; tegminae length 44-47.



FIGS 27-29

Pseudacanthops caelebs: (27) Mesothoracic wing. (28) Abdomen. (29) Last segment of cercus.

DISTRIBUTION: We had the opportunity to examine material from Bolivia, Brasil, Costa Rica, French Guyana, Nicaragua, and Venezuela and none of these specimens is referable to *P. caelebs*. Consequently, we believe that all records of *P. caelebs* from these countries are misidentifications, as this species seems to be restricted to southern Mexico, Belize, Honduras and Guatemala (Fig. 95).

***Pseudacanthops centralis* Ippolito & Lombardo n. sp.** Figs 3,16, 25, 34-45, 95

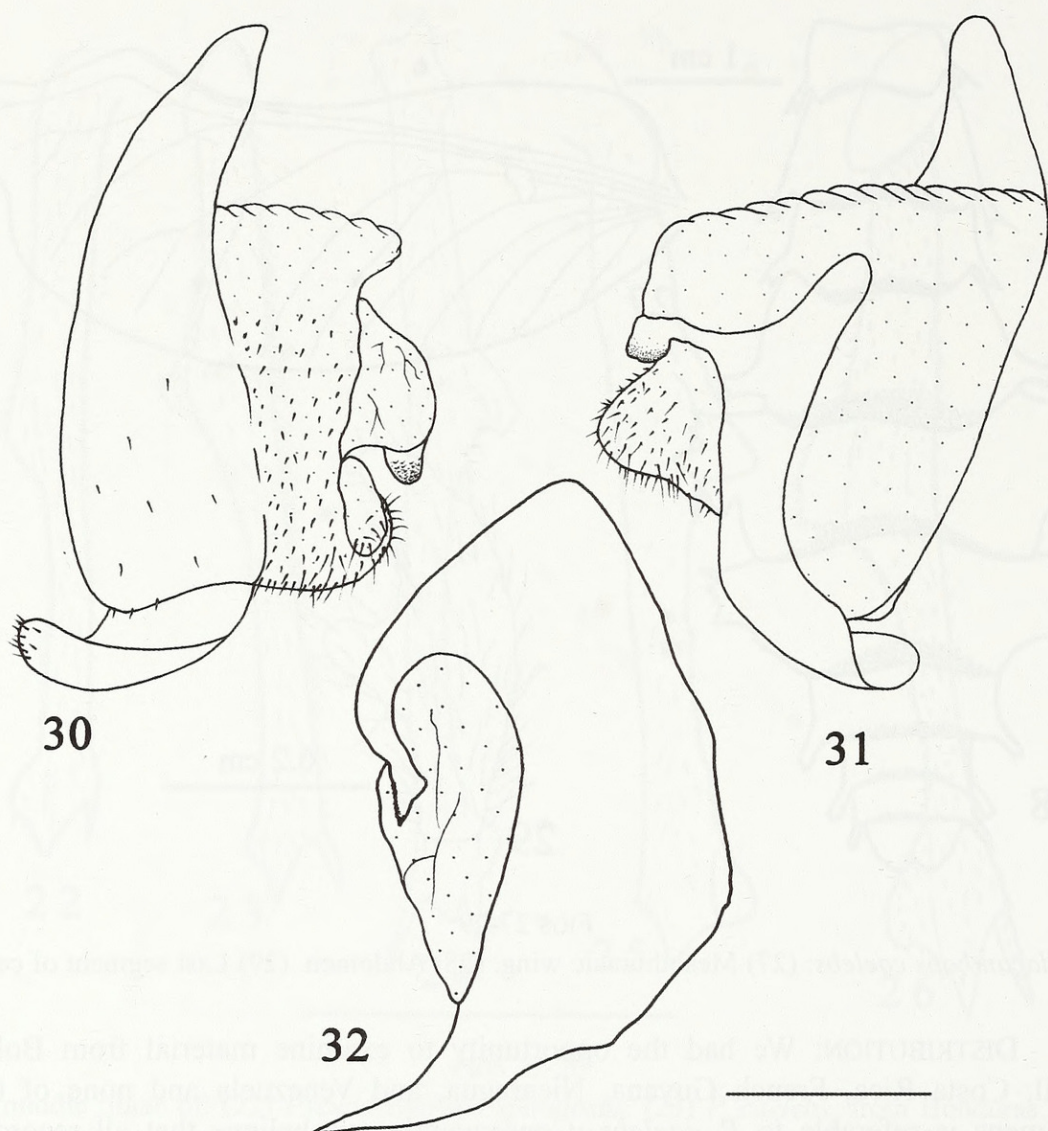
Pseudoacanthops caelebs. – Cerdá, 1993 (partim Nicaragua). – Ehrmann, 2002: 291 (partim Nicaragua). – Agudelo Rondón *et al.*, 2007: 115 (partim Nicaragua).

TYPE MATERIAL: Holotype: NICARAGUA; ♂, Great Falls, Pis Pis River, 10 miles NW of Eden 24.V.1922 (Wharton Huber leg.) (ANSP). – Paratypes: NICARAGUA; 1 ♂, same locality as holotype but 1.VIII.1922 (J.S. Mc Kenzie leg.) (ANSP), Eden, 2 ♂, 28.VIII.1922 (J.S. Mc Kenzie leg.) (ANSP). – PANAMA; (Veraguas), 1 ♂, Rte. de Santa Fé a Rio Luis 600 m, 26.IV.2003 (J. Barbut leg.) (MNHN).

ETYMOLOGY: The new species is named after the distribution in central America.

DIAGNOSIS: Body about 43-45 mm in size, eyes ochre with an apical ocular spine very developed; vertex with a bifide process; occiput with two conical processes with small sparse botchs. Pronotum with sparse tubercles. Anterior wings with a weakened excavation.

Female unknown.



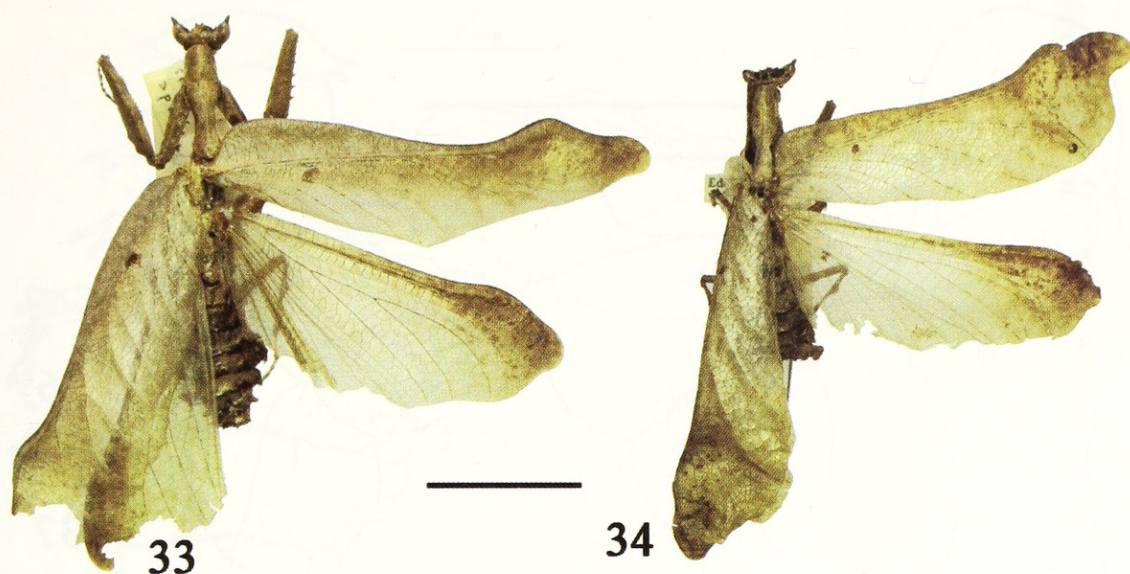
FIGS 30-32

External copulatory of *Pseudacanthops caelebs*: (30-31) Left phallomere, dorsal and ventral view. (32) ventral phallomere. Scale = 1 mm.

DESCRIPTION MALE

Colouration: General coloration ochre. Head ochraceous with frons and genes blackish. Coxae ochraceous with irregularly dotted ivory spots on external surface. Internal surface of femora with two black bands. Tegminae variegated brown-ochraceous. Metathoracic wings opaque ochraceous, anal veins with small ochraceous spots. Abdominal tergites with a black apical narrow strip.

Head (Fig 3, 35): About 1.61 times as wide as pronotum supracoxal dilatation, with numerous spines and small sparse tubercles; process of vertex (Figs 3, 36-37) similar to *P. caelebs* but shorter; eyes oblong with a big ocular apical spine (approximately 1.7 as long as diameter of one ocellus); ocular suture with two or three conical tubercles; frontal ridge similar to *P. caelebs*; occiput with a tuberculated conical processes on each side above the eyes and area near the eye suture with two tubercles, the posterior one clearly more developed and often bearing apical granulations; frontal



FIGS 33-34

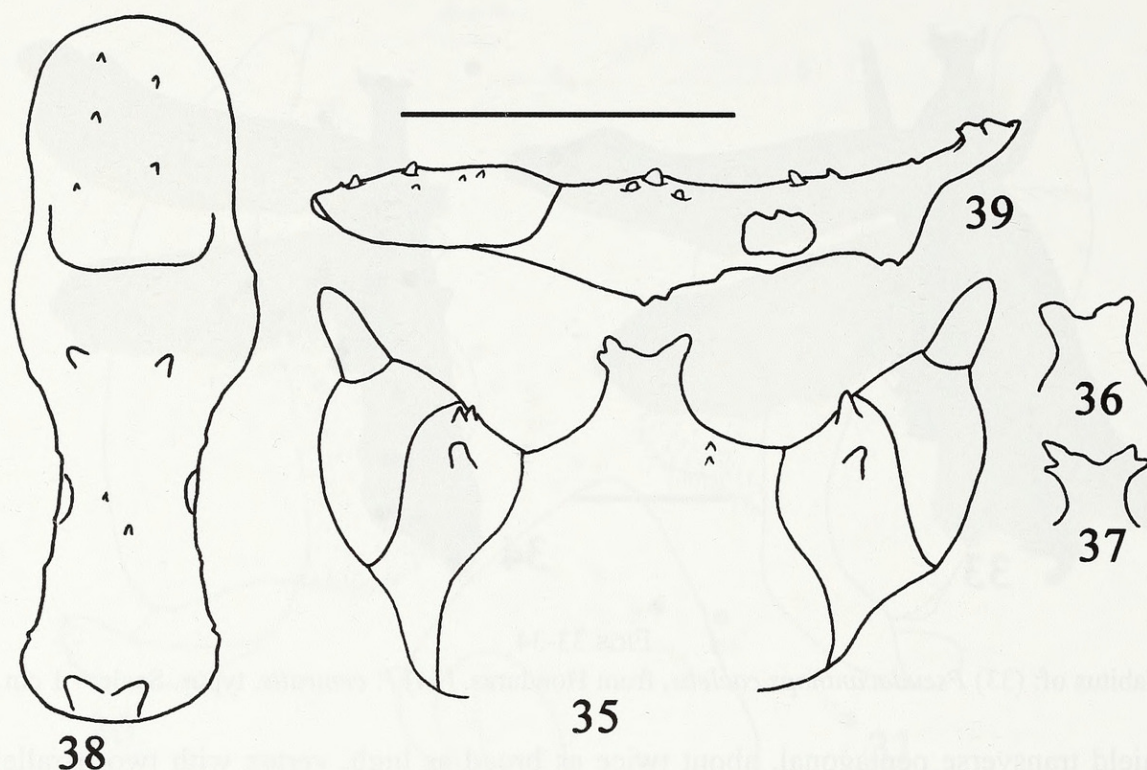
Habitus of: (33) *Pseudacanthops caelebs*, from Honduras. (34) *P. centralis*, typus. Scale = 1 cm.

shield transverse pentagonal, about twice as broad as high, vertex with two parallel contiguous short teeth (Fig. 3).

Thorax: Pronotum (Figs 38-39) 2.94 times as long as its maximum width, disc of prozone with numerous sparse small tubercles; disc of metazone below the supra-coxal sulcus with a stocky pair of tubercles, other two tubercles with an apical spine are present near posterior margin (Fig. 39); lateral margins denticulated only on the metazone; ratio metazone/prozone 1.91. Fore coxae about 0.77 times as long as pronotum; anterior and posterior margins spinulated; posterior surface with numerous ivory conical tubercles; internal surface with numerous sparse ivory calluses; internal distal lobes contiguous. Fore femora (Fig. 16) 0.98 times as long as pronotum and 4.44 times as long as their maximum width; upper margin smooth; basal lobe distinct with denticulated free margin (more developed than *P. caelebs*); external surface with 7-8 tubercles along median line. Tibiae half the length of femora. Formula spination $F=6ES/14-15IS/4DS$ and $T=20-22ES/14-16IS$. Middle and hind femora shortened with short hairs; external surface with 3-4 ivory and robust tubercles; medial margin with a basal lobe. Tibiae (Fig. 25) covered with minute hairs; basal half thicker than distal half and with a medial lobated swelling; apex of tibiae with a distinct lobe; apex with a small lobe. Metatarsus length less than the total length of all the other segments together.

Wings well developed, extending well beyond the abdomen apex. Mesothoracic wing (Fig. 41) ratio total length/maximum width 3.8; opaque only in its costal field and its apex; costal area not well dilated at base with an attenuate excavation; stigma small and rounded. Metathoracic wing with costal and subcostal area and entire apical area opaque.

Abdomen (Fig. 40): Slightly flattened; lateral margins of 2nd, 3rd, 4th, 7th and 8th urotergites with a small bilobate lobe; 5th and 6th with a leafy dentate lobe; 9th with elongated lobe. Urosternites similar to *P. caelebs*. Cerci (Fig. 42) extend beyond



FIGS 35-39

Pseudacanthops centralis: (35) Head, posterior view. (36-37) Process of vertex. (38-39) Pronotum. Scale = 0.5 cm.

the subgenital plate with sparse long hairs; last segment very large, flattened and dilated, lateral margins irregularly sinuous and deeply incised at apex, forming unequal terminal lobes. Subgenital plate longer than broad with incised apex, styles small; supranal plate short with incised apex.

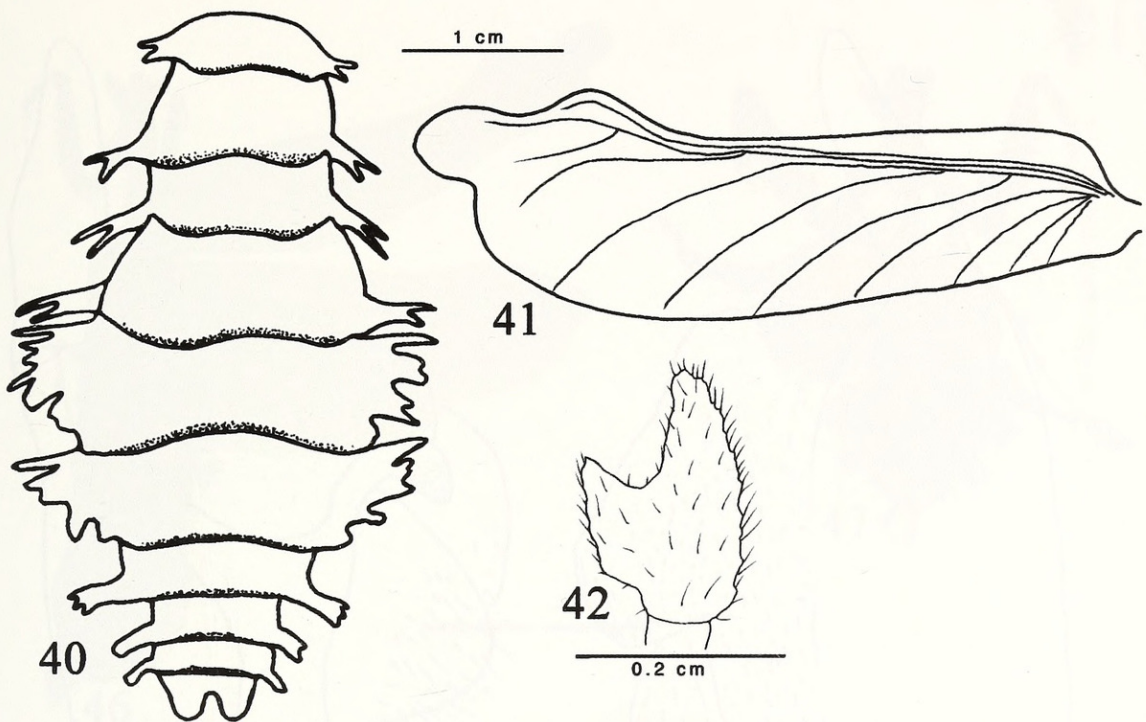
Male genitalia: Ventral phallomere (Fig. 45) about twice as long as its width; distal process elongated, arcuated; lateral process elongated with smooth external margin. Left phallomere (Figs 43-44) well sclerotized; ventral lamina with sinuous elongated distal process; anterior process acute; phalloid apophysis membranous with numerous small spines.

Measurements (millimeters): Head width 5.5-5.8; pronotum supracoxal dilatation width 3.3-3.7; prozone length 3.4-3.7; metazone length 6.5-6.9; anterior coxae length 7.8-8.2; anterior femora length 9.6-10.6; tegminae length 39-45.

COMMENTS: This new species is near to *P. caelebs*, but it has the following distinguishing features: head and pronotum more tuberculated; costal margin of mesothoracic wings with less accentuate excavation; supranal plate with incised apex; ventral phallomere much longer and more arcuated; apical process of left phallomere slender.

DISTRIBUTION: Known from Nicaragua and Panama (Fig. 95).

Pseudacanthops huaoranianus Lombardo & Ippolito **n. sp.** Figs 4, 20-21, 24, 46-61, 96
Pseudacanthops spinulosa. – Terra, 1995: 30 (partim Ecuador). – Jantsch, 1999: 78 (Ecuador).
 – Ehrmann 2002: 291 (partim Ecuador). – Agudelo Rondón *et al.*, 2007: 115 (partim Ecuador).



FIGS 40-42

Pseudacanthops centralis: (40) Abdomen. (41) Mesothoracic wing. (42) Last segment of cercus.

TYPE MATERIAL: Holotype, ECUADOR; Napo Prov.: ♂, Yasuni, E.C.Y. 250 m, 4. XII.1997, (leg. G. Onore) (MDAB). – Paratypes; ECUADOR; Napo Prov.: 1 ♀, Avila viejo, 500 m, 10.IV.1997 (leg. Ekohn) (MDAB). – ECUADOR; 1 ♂, Yasuni, 29.IX.1995 (leg. F. Lombardo) (MDAB).

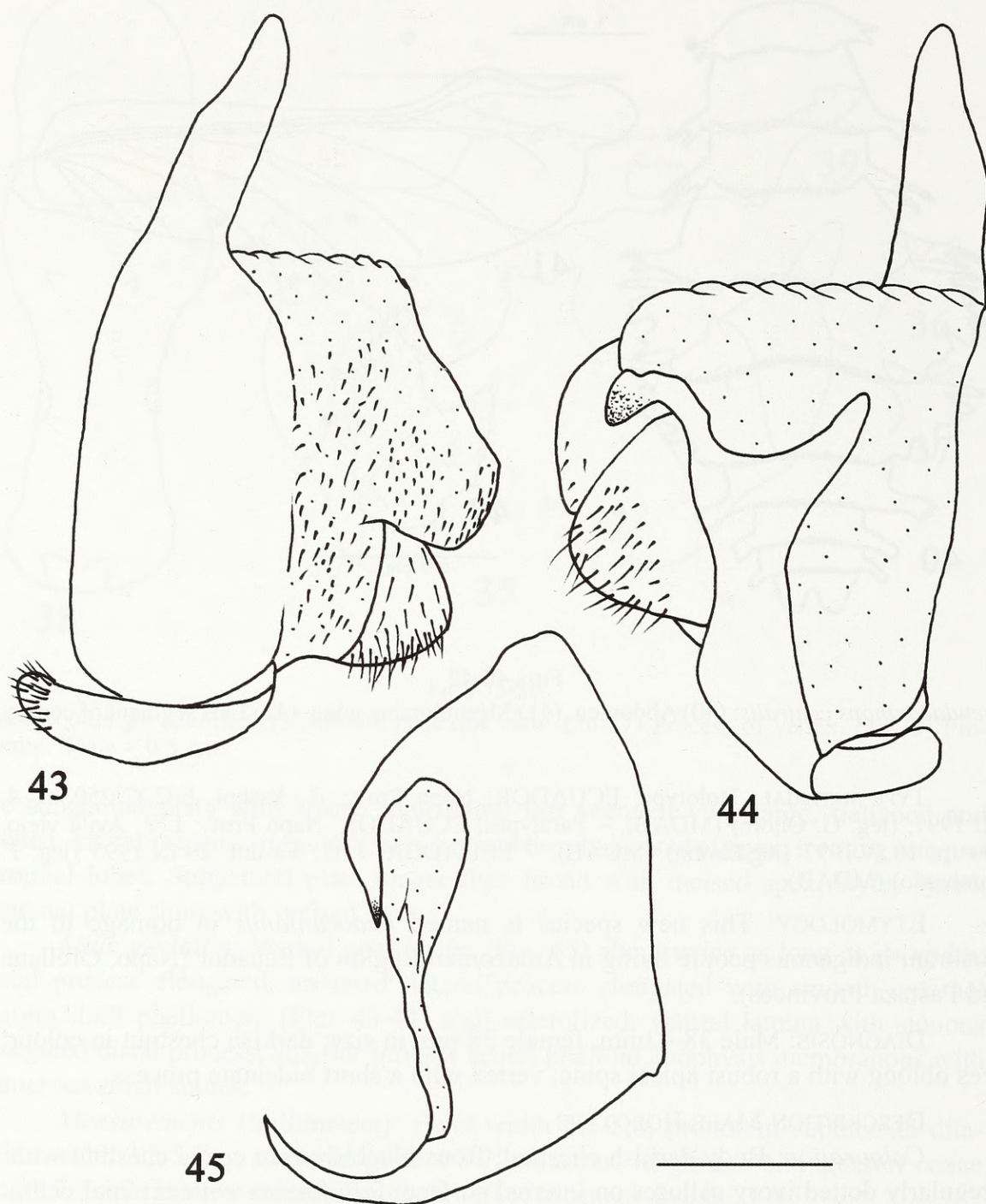
ETYMOLOGY: This new species is named *huaoranianus* in homage to the Huaorani indigenous people living in Amazonian Region of Ecuador (Napo, Orellana and Pastaza Provinces).

DIAGNOSIS: Male 38-43mm, female 38 mm in size; darkish chestnut in colour; eyes oblong with a robust apical spine; vertex with a short bidentate process.

DESCRIPTION MALE HOLOTYPE

Colouration: Body darkish chestnut; frons blackish; fore coxae chestnut with irregularly dotted ivory calluses on internal surface; fore femora with external ochraceous spines with black apex; discoidal spines and bigger internal spines black. Meso- and metathoracic wings chestnut. Male urotergites with a black apical band; female abdomen with a large shiny black spot comprises between the 2nd and 4th urotergites.

Head (Figs 4, 48-49): About 1.59 times as wide as pronotum supracoxal dilatation; process of vertex squarish with an apical small tubercle to four edges (Fig. 4); eyes oblong with a big ocular apical spine (approximately 1.5 as long as diameter of one ocellus); Frontal ridge with two small triangular processes behind the upper ocelli; occiput with one small acuminate tubercle on both sides. Frontal shield transverse, twice as broad as high, upper margin with two teeth separated by a deep incisure (Fig. 4).



FIGS 43-45

External copulatory of *Pseudacanthops centralis*: (43-44) Left phallomere, dorsal and ventral view. (45) Ventral phallomere. Scale = 1 mm.

Thorax: Pronotum (Figs 51, 53) elongated 3.09 times as long as its maximum width; slightly narrowed in the distal half metazone; lateral margins of metazone with small teeth; dorsal surface with few small granules, two flattened tubercles are present near posterior margin (Fig. 53); supracoxal dilatation well distinct with rounded lateral margins; ratio metazone/prozone 1.93. Fore coxae about 0.72 times as long as pronotum; anterior margin with minute spines; internal surface with ivory calluses;



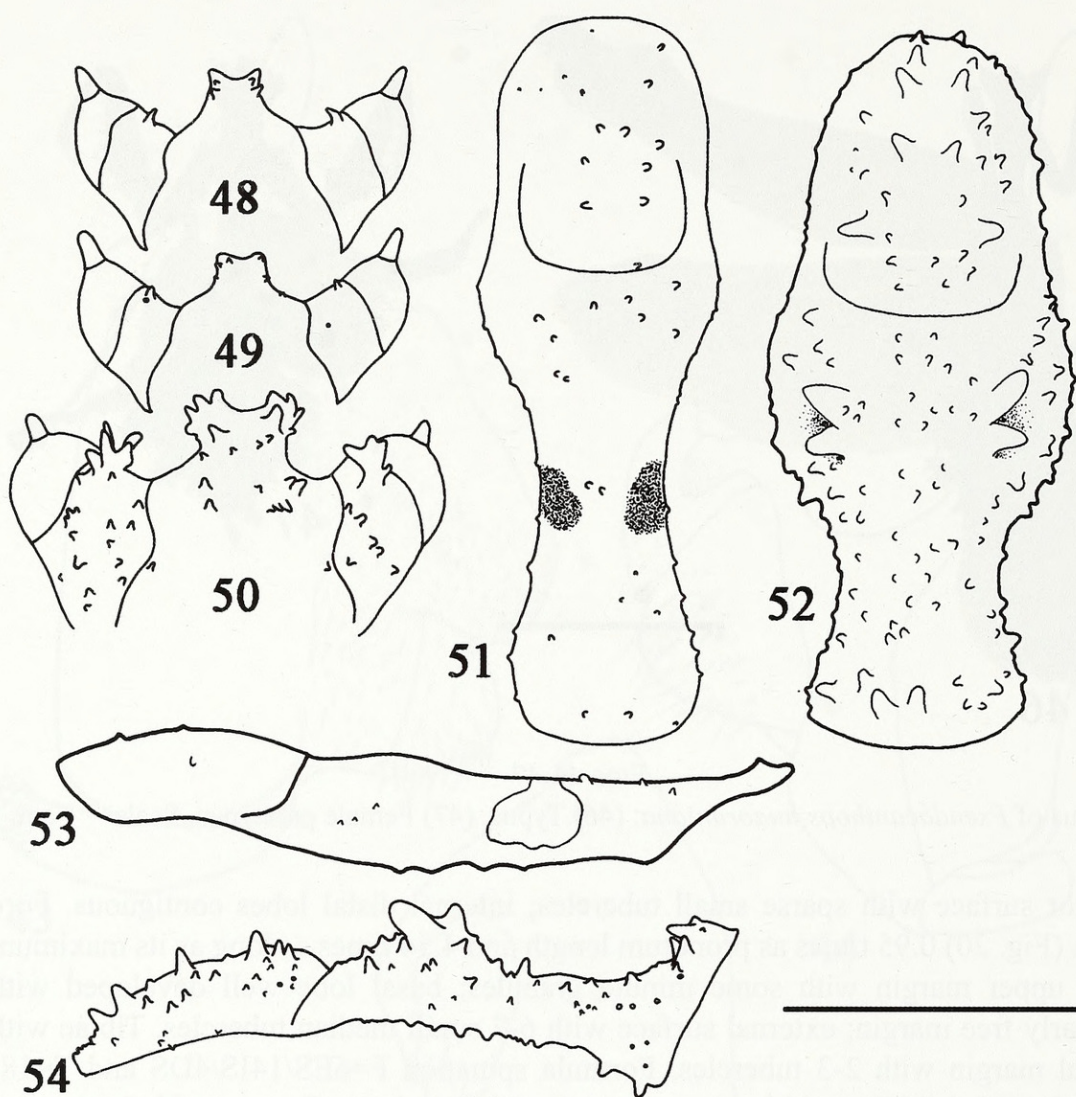
FIGS 46-47

Habitus of *Pseudacanthops huaoraniana*: (46) Typus. (47) Female paratype. Scale = 1 cm.

posterior surface with sparse small tubercles; internal distal lobes contiguous. Fore femora (Fig. 20) 0.95 times as pronotum length and 4.54 times as long as its maximum width; upper margin with some minute granules; basal lobe well developed with irregularly free margin; external surface with 6-7 small median tubercles. Tibiae with external margin with 2-3 tubercles. Formula spination $F=6ES/14IS/4DS$ and $T=18-19ES/15-16IS$. Middle and hind legs covered with long hairs. Femora with 5 tubercles on external surface and with a rounded basal lobe on the medial external margin. Tibiae (Fig. 24) basal half thicker than distal half and with a medial lobated swelling; apex with a small lobe. Metatarsi length less than the total length of all the other segments together. Wings well developed, extending well beyond the tip of abdomen. Mesothoracic wing (Fig. 57) ratio total length/maximum width 4; costal area opaque not well dilated at base with an attenuate excavation; discoidal field opaque in its anterior half and at the apex, hyaline in its posterior half. Metathoracic wing with costal area subopaque and discoidal area hyaline.

Abdomen (Fig. 55): Slightly flattened; lateral margins of 5th and 6th urotergites with a leafy dentate lobe, 7th similar to previous but with a smaller lobe; 1st-4th with a slender lobe with two tips; 8th-9th only with elongate lobe. Urosternites with a longitudinal median carina bilaterally flanked by two or three short crests near the distal margin.

Cerci extend beyond the subgenital plate with sparse long hairs; last segment very large and flattened, lateral margins irregularly sinuous and deeply incised at apex, forming unequal terminal lobes. Supranal plate short deeply incised at apex. Subgenital plate is longer than broad, incised at apex and with two small styles.



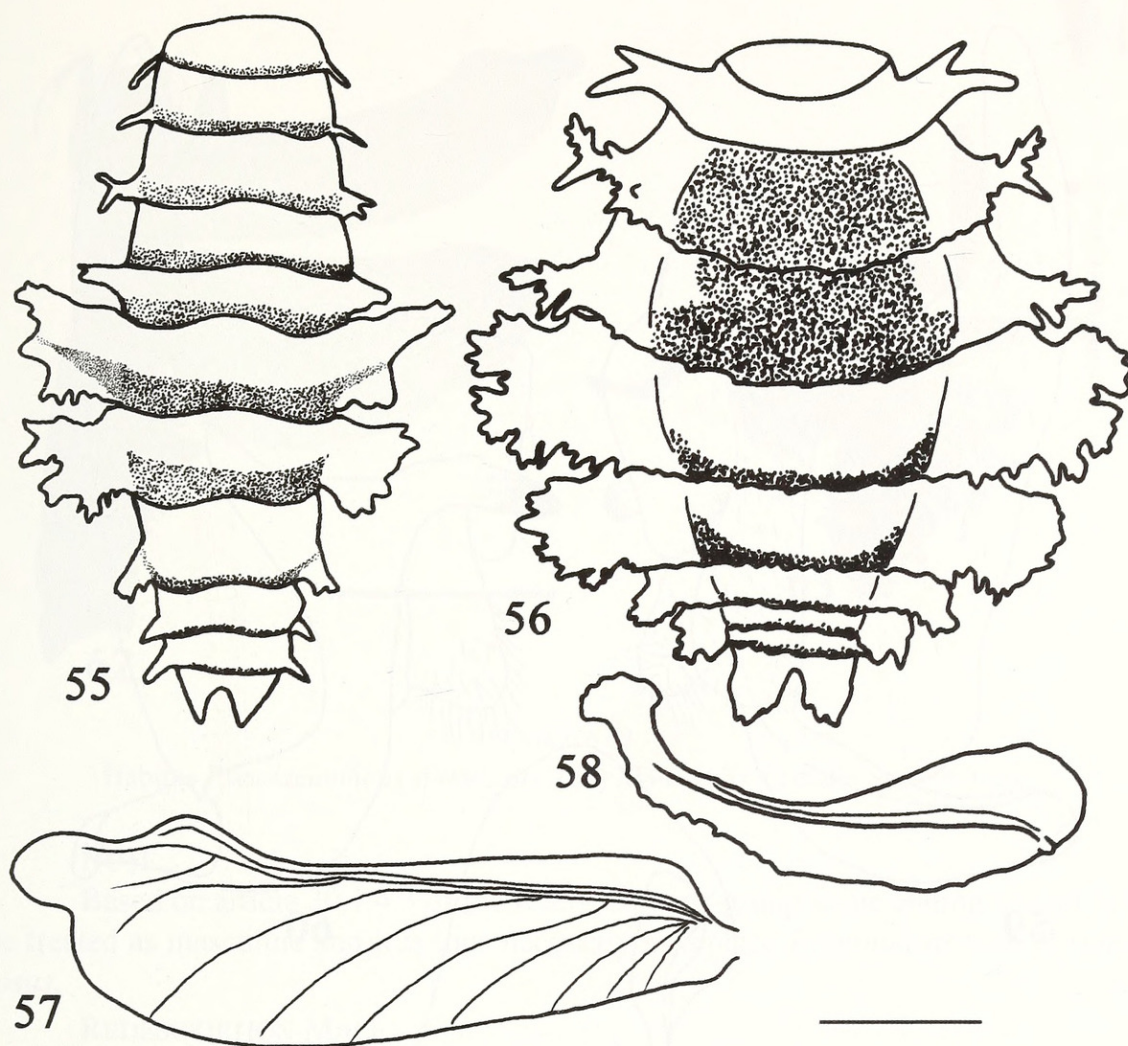
FIGS 48-54

Pseudacanthops huaoraniana: (48-49) Head, typus and male paratypus. (50) Head, female paratypus. (51, 53) Pronotum, typus. (52, 54) Pronotum, paratypus female. Scale = 0.5 cm.

External male genitalia: Ventral phallomere (Fig. 61) twice times as long as broad; distal process triangular ending in an acuminate tip; sinuous lateral process with acute apex. Left phallomere (Figs 59-60) with a long distal process; phalloid apophysis membranous; ventral lamina with apical right process.

Measurements (millimeters): Head width 5.5-5.85; pronotum supracoxal dilatation width 3.4-3.7; prozone length 3.5-4; metazone length 6.8-7.7; anterior coxae length 7.4-8.5; anterior femora length 9.9-11; tegminae length 37-43.

DESCRIPTION FEMALE: More robust than male; head (Fig. 50), pronotum (Figs 52, 54) and legs (Fig. 21) with numerous big tubercles. Wings not well developed, anterior margin sinuous, apical lobe well rounded, posterior margin crenulated; costal field and discoidal area opaque, chestnut. Metathoracic wing opaque with chestnut concentric spots. Abdomen (Fig. 56) enlarged with a big black spot comprises from 1st-3rd urotergites; 4th, 5th and 6th urotergites with a narrow black apical streep.



FIGS 55-58

Pseudacanthops huaoraniana: (55-56) Abdomen, typus and paratypus female. (57-58) Mesothoracic wing, typus and paratypus female. Scale = 1 cm.

Measurements (millimeters): Head width 6.7; pronotum supracoxal dilatation width 4.7; prozone length 4.5; metazone length 6.6; fore coxae length 9.8; fore femora length 12.9; tegminae length 25.

COMMENTS: This new species is related to *P. spinulosus* but the most substantial differences concern the genitalia: the apical process of the ventral plate of the left phallosome of *P. huaoranianus* is more prolonged and the distal process of the ventral phallosome is shorter.

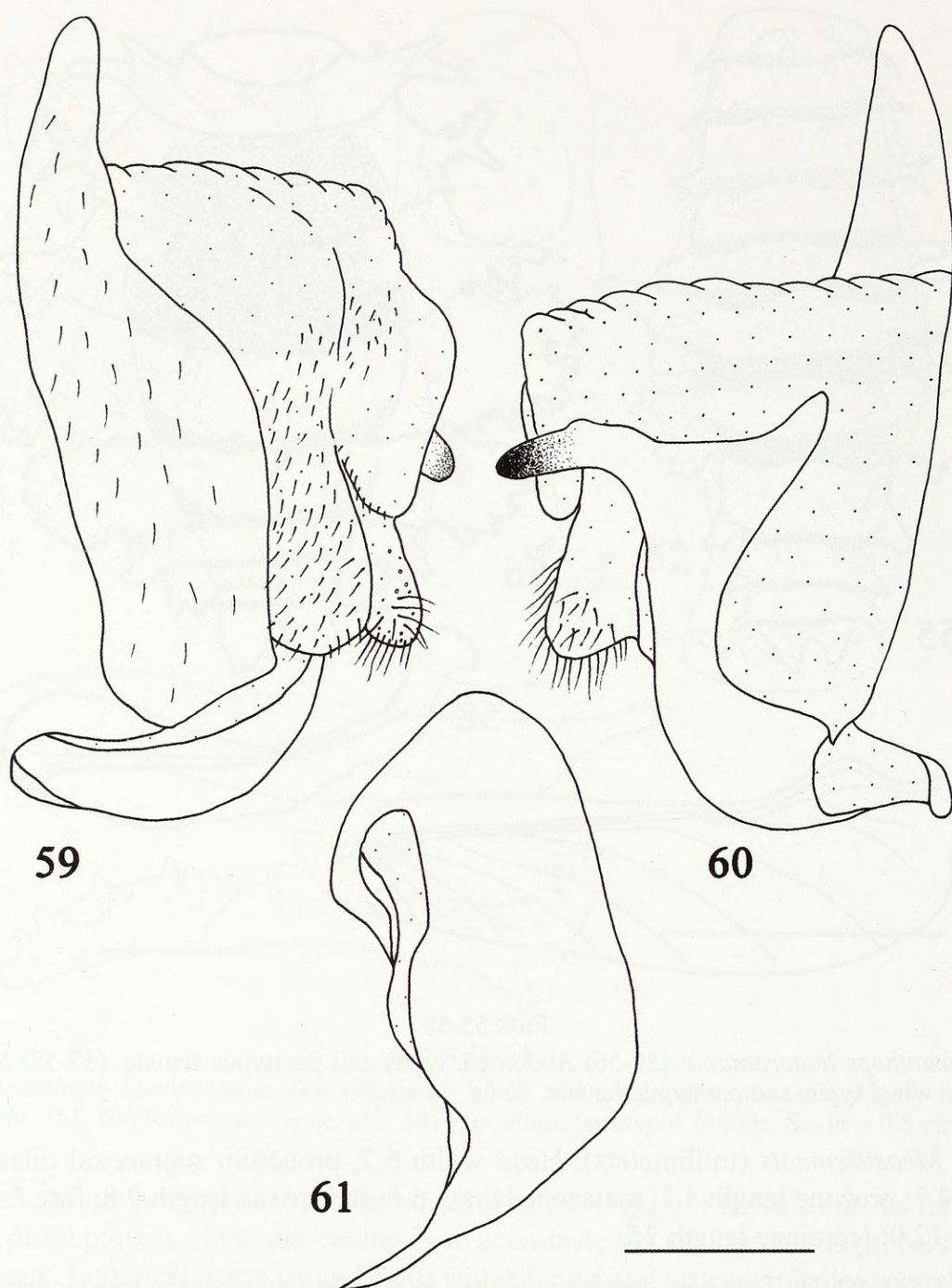
DISTRIBUTION: Known from Ecuador (Fig. 96).

Pseudacanthops spinulosus (Saussure, 1870)

Figs 7, 18-19, 22, 62-85, 96

Paracanthops spinulosa Saussure, 1870: 243-244.

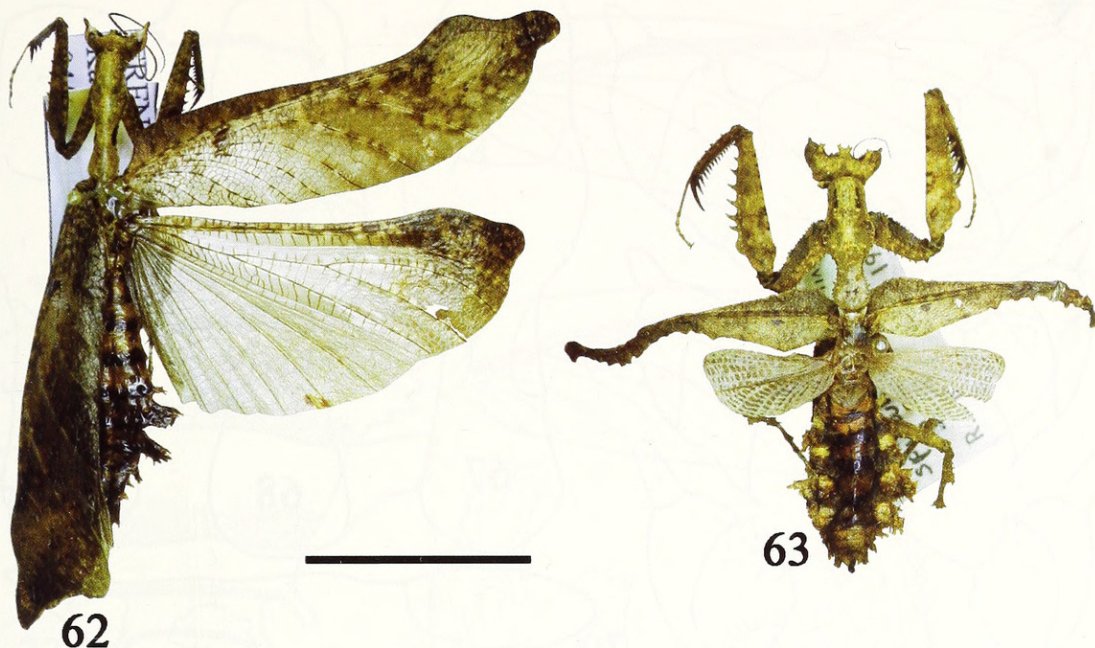
Pseudacanthops spinulosa. – Saussure, 1871: 150. – Kirby, 1904: 283. – Chopard, 1913: 335. – Chopard, 1916: 182. – Giglio-Tos, 1927: 515. – Beier, 1934: 4. – Terra, 1995: 30 (partim French Guyana). – Jantsch, 1999: 78 (partim French Guyana). – Ehrmann, 2002: 291 (partim French Guyana). – Agudelo Rondón *et al.*, 2007: 115.



FIGS 59-61

External copulatory of *Pseudacanthops huaoraniana*, typus: (59-60) Left phallomere, dorsal and ventral view. (61) Ventral phallomere. Scale = 1 mm.

MATERIAL EXAMINED: FRENCH GUYANA; 3 ♂, Belizon, V.2001 (MDAB). – 1 ♀, French Guyana 5.VII.1977 (Descampe leg.) (MNHN). – 2 ♂, Kaw, IV.2001 (MDAB). – 1 ♀, Piste de Kaw, 24.VII.1993 (Roubaud leg.) (MNHN). – 1 ♂, Saut Dalles, 11.V.1994 (P. Peters leg.) (MNHN). – 1 ♂, St. Jean du Maroni, Plateau des Mines 17.VII.1933 (L. Sénécaux leg.) (MNHN). – ENGLISH GUYANA; 1 ♀, Demerara (MDAB). – VENEZUELA; 1 ♂, Bolivar-Kanarakuni, 450 m, 3.II.1967 (F. Fernandez Y. A. D. Asco leg.) (ANSP).



FIGS 62-63

Habitus *Pseudacanthops spinulosus*: (62) Male. (63). Female. Scale = 1 cm.

NOTE

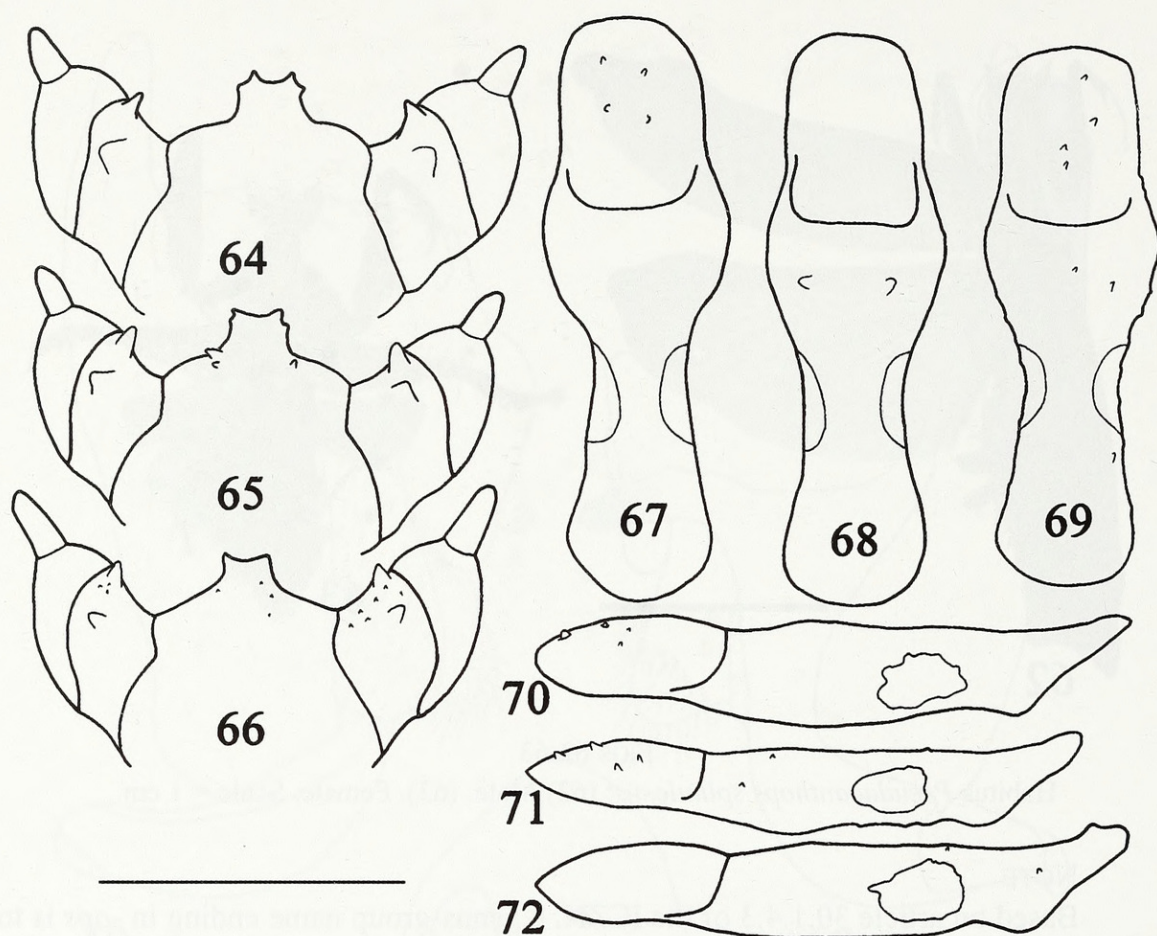
Based on article 30.1.4.3 of the ICZN, a genus-group name ending in *-ops* is to be treated as masculine and it is thus necessary to replace *P. spinulosa* with *P. spinulosus*.

REDESCRIPTION MALE

Colouration: General colouration brown. Head brown with frons blackish and ocelli black. Fore coxae brown with irregularly dotted ivory spots on internal surface. Internal surface of fore femora with two black bands. Tegminae variegated brown. Metathoracic wings hyaline and smoked with apex opaque and brown. Tergites ochraceous with apical shiny black band; sternites, mid and posterior legs blackish.

Head (Figs 7, 64-66): About 1.63 times as wide as a pronotal supracoxal dilatation; process of vertex squarish not well developed with two small spines in the apex; eyes oblong with a big ocular apical spine (approximately 1.5 as long as diameter of one ocellus). Frontal ridge behind the upper ocelli rises to form a small triangular process. Occiput with one conical process on both sides. Frontal shield transverse, about twice as broad as high, pentagonal with bidentate apex (Fig. 7).

Thorax: Pronotum (Figs 67-72) 3.13 times as long as its maximum width; it is narrowed in the distal half of metazone; lateral margins weakly subdentate; disc with some sparse granules, two flattened processes are present near posterior margin; pronotal supracoxal dilatation distinct and with rounded lateral margins. Fore coxae about 0.74 times as long as pronotum; lateral margins with small granules; internal surface with ivory calluses; posterior surface with sparse small tubercles; internal distal lobes contiguous. Fore femora (Fig. 18) 0.95 times as long as pronotum length and 4.59 times as long as its maximum width; upper margin with numerous small granules,

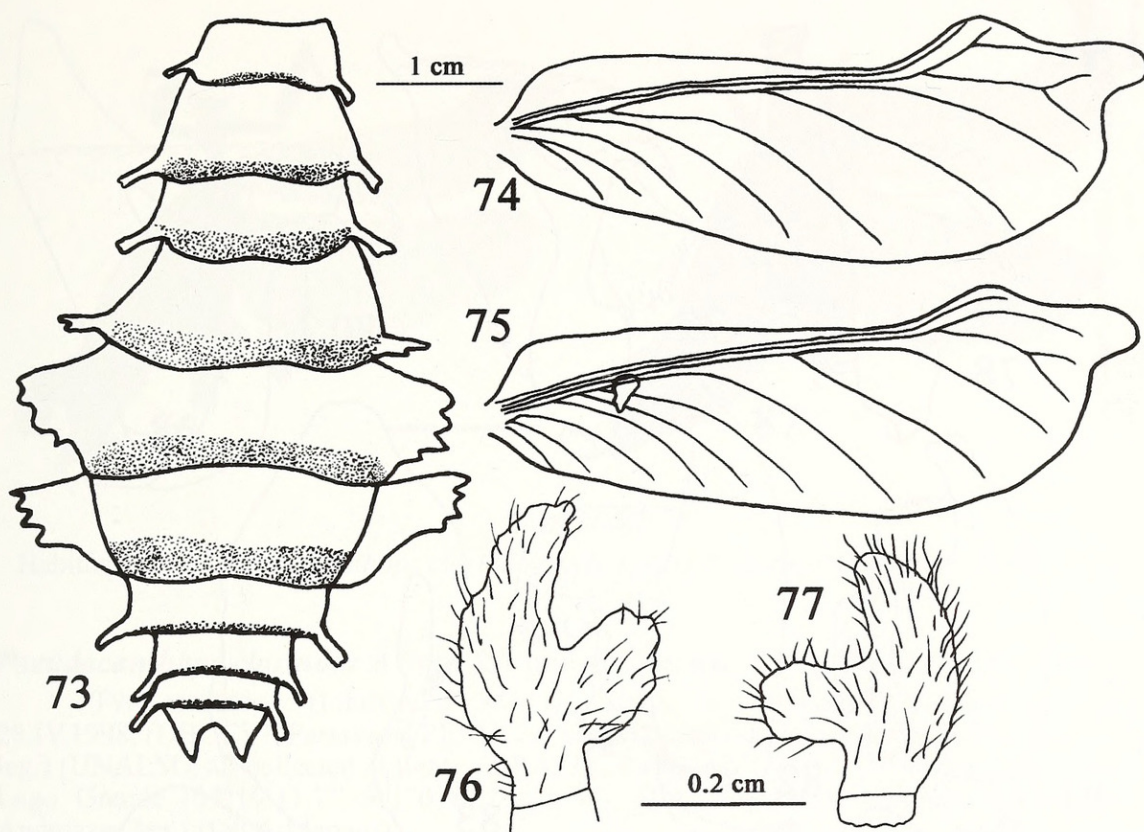


FIGS 64-72

Pseudacanthops spinulosus (male): (64-66) Head, 64 from Suriname, 65 from Venezuela, 66 from French Guyana. (67-72) Pronotum, 67 & 70 from Suriname, 68 & 71 from French Guyana, 69 & 72 from Venezuela. Scale = 0.5 cm.

basal lobe distinct with regular free margin; external surface with 5-6 small tubercles on the median line. Tibiae half the length of the femora. Formula spination $F=6ES/14IS/4DS$ and $T=18-21ES/16-17IS$. Middle and hind legs covered with long hairs. Femora with 2-3 tubercles on external surface and with a rounded basal lobe on the medial external margin. Tibiae (Fig. 22) basal half thicker than distal half and with a medial lobated swelling; apex with a small lobe. Metatarsi length less than the total length of all the other segments together. Wings well developed, extending well beyond the tip of abdomen. Mesothoracic wing (Figs 74-75) ratio total length/maximum width 4; costal area opaque not well dilated at base with an attenuate excavation; discoidal field opaque in its anterior half and at the apex, hyaline in its posterior half. Metathoracic wing with costal area subopaque and discoidal area hyaline.

Abdomen (Fig. 73): Cylindrical, slightly flattened, lateral margins of urotergites 5th and 6th with a leafy dentate lobe. Lobes of 2nd, 3rd, 4th and 7th similar to previous but smaller. 8th and 9th with a slender lobe. Urosternites with a longitudinal median carina bilaterally flanked by two or three shorts crests near the distal margin. Subgenital plate longer than broad with incised apex, styli small. Supranal plate short,



FIGS 73-77

Pseudacanthops spinulosus (male): (73) Abdomen. (74-75) Mesothoracic wing from Suriname and French Guyana. (76-77) Last segment of cercus from French Guyana and Suriname.

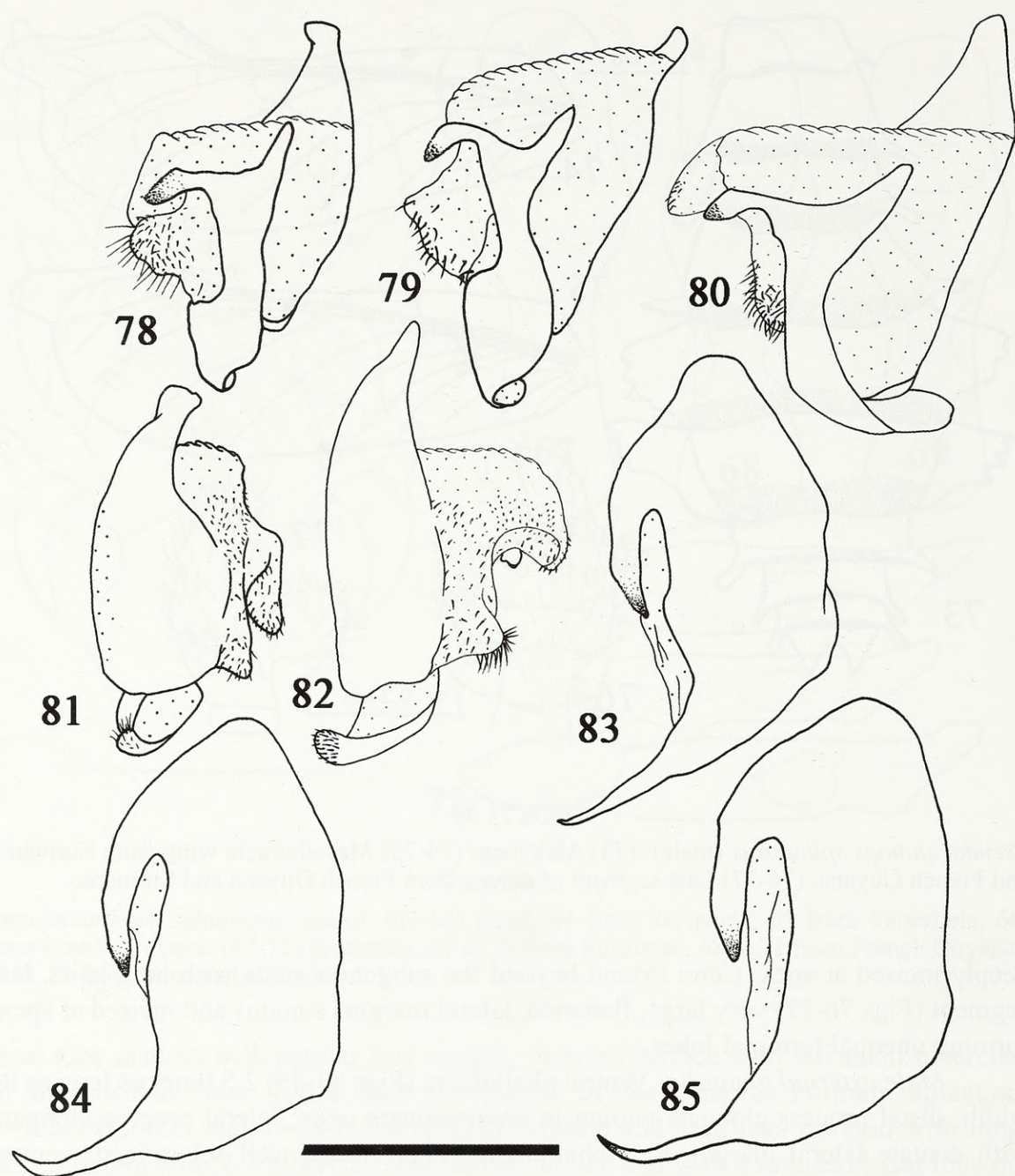
deeply incised at apex. Cerci extend beyond the subgenital plate with long hairs, last segment (Figs 76-77) very large, flattened, lateral margins sinuous and incised at apex, forming unequal terminal lobes.

Male external genitalia: Ventral phallomere (Figs 83-85) 2.5 times as long as its width, distal process elongate ending in an acuminate apex; lateral process elongate with dentate lateral margin. Left phallomere (Figs 78-82) well sclerotized; ventral lamina with distal process dilated; anterior process elongate and with small teeth on upper margin.

Measurements (millimeters): Head width 5.5-5.9; pronotum supracoxal dilatation width 3.4-3.6; prozone length 3.4-3.7; metazone length 6.8-7.6; fore coxae length 7.8-8.5; fore femora length 10.1-10.6; tegminae length 38-40.

FEMALE

Head about 1.53 times as wide as supracoxal pronotal dilatation, with numerous, various in size, tubercles. Pronotum more robust of male, narrower at centre of metazone with numerous tubercles more or less developed on the disc; lateral margins of metazone dentate. Posterior margin with two big processes. Legs more robust of the male and more tuberculated; Wings not well developed and opaque. Mesothoracic wing with a long narrow apical lobe originating about its half way.



FIGS 78-85

External copulatory of *Pseudacanthops spinulosus*: (78-82) Left phallomere, 78 & 81 from French Guyana (in ventral and dorsal view), 79 & 82 from Venezuela (in ventral and dorsal view), 80 from Suriname (in ventral view). (83-85) Ventral phallomere, 83 from French Guyana, 84 from Suriname, 85 from Venezuela. Scale = 1 mm.

Anterior margin sinuous; posterior margin crenulated. Metathoracic wing opaque with chestnut concentric spots.

Abdomen similar to those described in the male but lateral lobes more developed.

DISTRIBUTION: This species occurs from Venezuela to French Guyana (Fig. 96).



FIGS 86-87

Habitus of: (86) *Pseudacanthops clorindae*, typus. (87) *P. lobipes*, from Peru. Scale = 1 cm.

***Pseudacanthops clorindae* Rivera & Lombardo n. sp.** Figs 5, 17, 26, 86, 88-94, 96

TYPE MATERIAL: Holotype, PERU; ♂, Cuzco, La Convencion, Distrito de Echarate, 28.IV.1998, (DBUC). – Paratypes, PERU; 2♂ same data as holotype but 5.VIII.1998 (R. Acosta leg.) (UNALM), all collected at light. – BRAZIL. Amazonas prov.: 1♂, Ipixuna, Rio Gregorio, Lago Grande (07°10'11.7" S; 70°49'10.3" W), (J.A. Rafael, A. Agudelo Rondón & R. Andreazee leg.) (INPA-Manaus).

ETYMOLOGY: this new species is named after Prof. Clorinda Vergara, head curator of the Klaus Raven Büller Entomological Museum (UNALM) and former advisor of JR.

DIAGNOSIS: Small in size, head with ocular spines not very developed; vertex with a bifide process not well developed. Pronotum smooth. Wings hyaline with chestnut opaque spots on apical area.

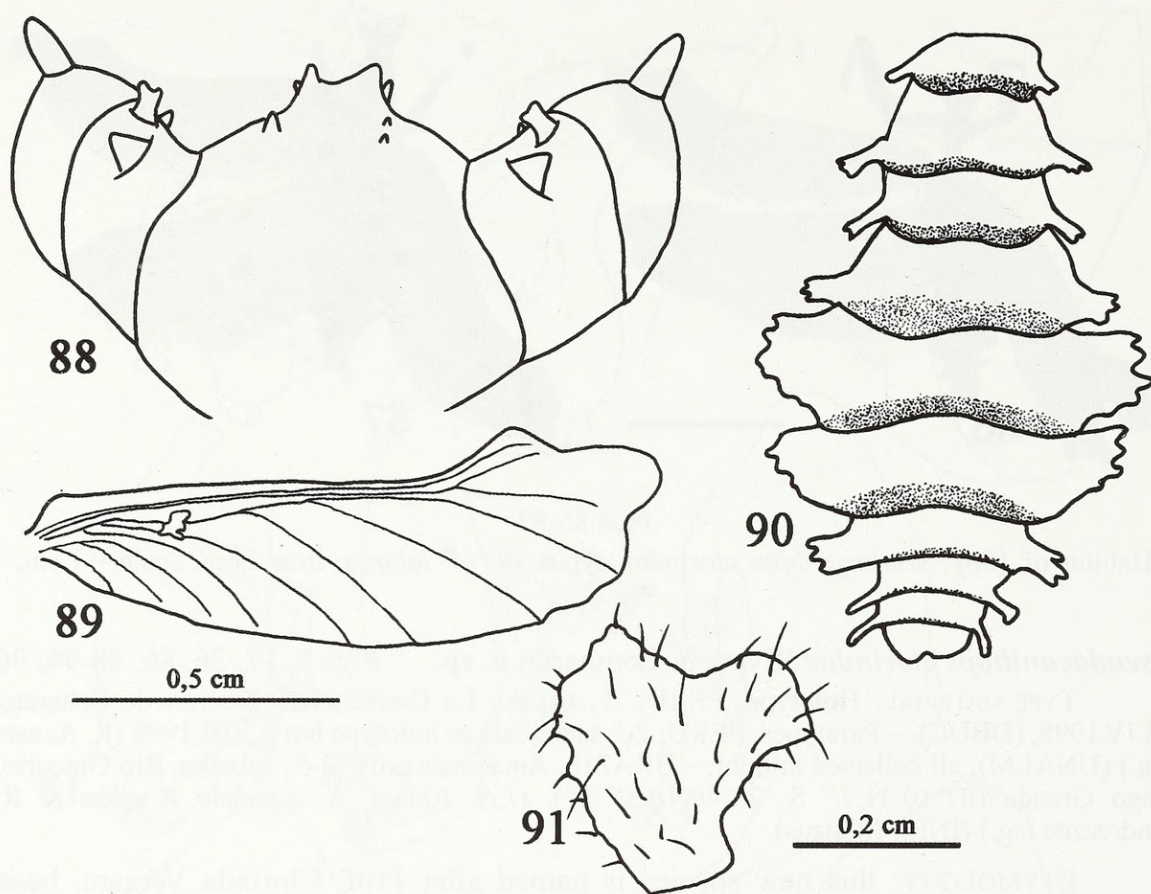
Female unknown.

DESCRIPTION MALE

Colouration: Dark to light brown. Head ochraceous with frons and ocelli blackish. Fore coxae ochraceous. Fore femora with two blackish bands on their inner and medial surfaces; larger internal spines blackish with a black, basal spot. Trochanter blackish. Wings hyaline exhibiting opaque, chestnut brown spots apically. Tergites and sternites abdominal with a black apical strip.

Head (Fig. 5, 88): About 1.61 times as wide as pronotum supracoxal dilatation, with sparse small tubercles; process of vertex not well developed, only slightly more elevated than ocelli and bearing 2-4 pointy tubercles apically; frontal ridge smooth; eyes oblong; ocular spine short (approximately as long as the diameter of one ocellus); occiput with a tuberculated conical processes on each side above the eyes and area near the eye suture with two tubercles, the posterior one clearly more developed and often bearing apical granulations; middle portion of vertex with four small tubercles describing a square; frontal shield transverse pentagonal, about twice as broad as high.

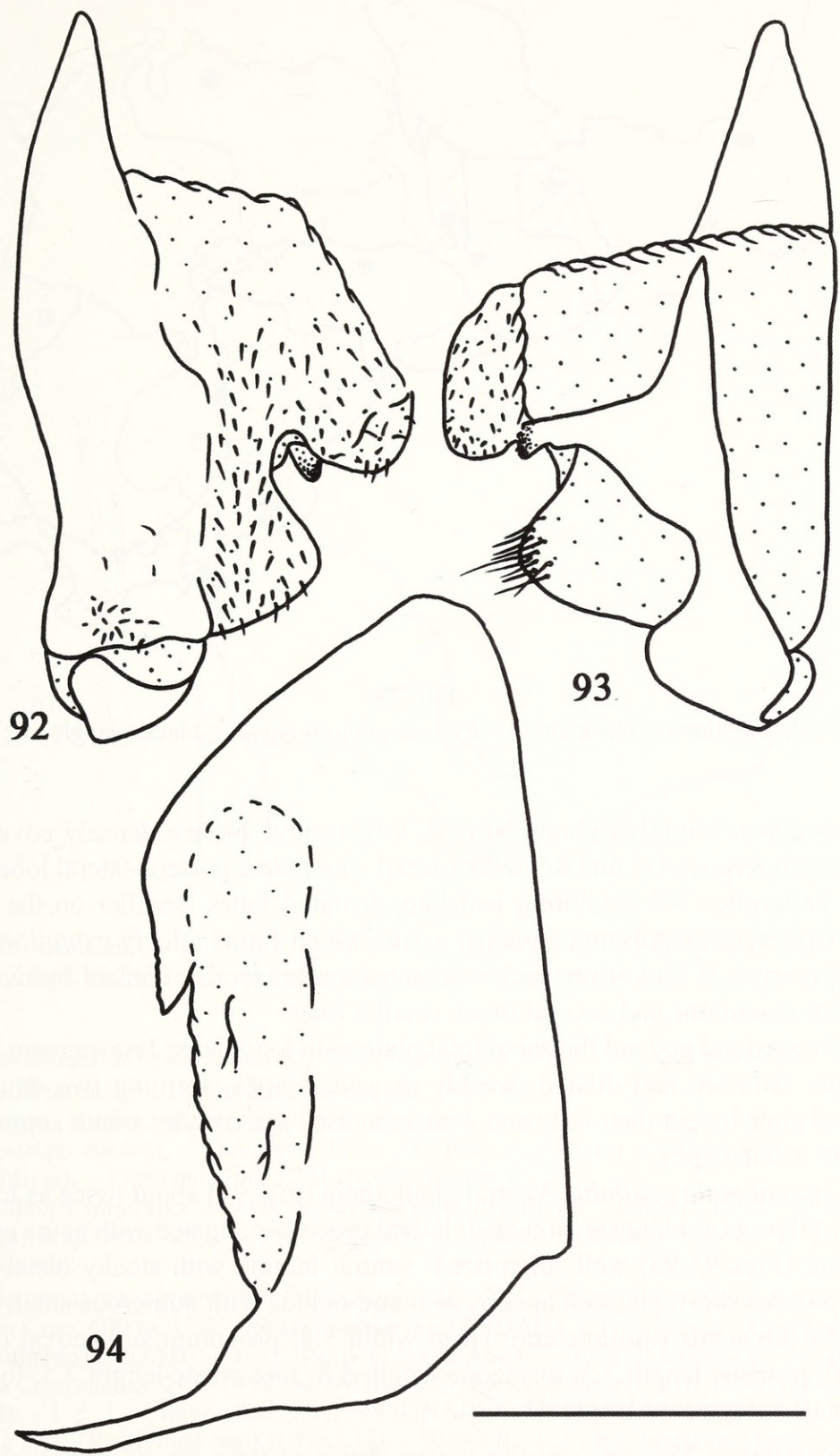
Thorax: Pronotum 2.58 times as long as its maximum width, disc of prozone smooth with some small tubercles distally; supracoxal dilatation widely rounded;



FIGS 88-91

Pseudacanthops clorindae, typus: (88) Head. (89) Mesothoracic wing. (90) Abdomen. (91) Last segment of cercus.

lateral margins exhibiting small, scattered denticles, those on the postero-lateral margins flattened and more developed; ratio metazone/prozone 1.65. Fore coxae about 0.80 times as long as pronotum, margins smooth; internal distal lobes contiguous. Fore femora (Fig. 17) 1.12 times as long as pronotum and 4.56 times as long as its maximum width; dorsal margin smooth, with rounded proximal lobe; external surface exhibiting several tubercles, specially on its medial axis, the one tubercle located at the level of the forth external spines is conical in shape and much more developed. Fore tibiae as long as half the length of the femora. Spination formula: $F=6ES/14IS/4DS$ and $T=16-20ES/14-15IS$. Middle and hind femora shortened, covered with long, conspicuous hairs and with a rounded basal lobe on medial external margin. Tibiae (Fig. 26) covered with minute hairs (4-5 times shorter than those on femora); basal half thicker than distal half and with a medial lobated swelling; apex of tibia with a distinct lobe. Metatarsus shorter than remaining segments together. Wings extending well beyond the tip of abdomen. Mesothoracic wing as in Fig. 89, ratio total length/maximum width 3.9; distal portion of mesothoracic wing (from one third to half) and whole costal area chestnut brown with hyaline spots, remaining of wing hyaline and largely unpigmented (small dark spots might occur along the longitudinal veins), stigma dark brown and conspicuous.



FIGS 92-94

External copulatory of *Pseudacanthops clorindae*, typus: (92-93) Left phallomere, dorsal and ventral view. (94) Ventral phallomere. Scale = 1 mm.



FIG. 95

Geographic distribution of: black circle = *Pseudacanthops caelebs*; black triangle = *P. centralis*.

Abdomen: Slightly cylindrical (Fig. 90); ventral surface densely covered with long hairs; urotergites 1-4 and 8-9 with a small, elongated, postero-lateral lobes; lateral margins urotergites 5-7 exhibiting leaf-like, dentated lobes (smaller on the 7th urotergite). Urotergites exhibiting a medial carina which forms a leafy extension towards the distal margin of each urite, such extensions are bilaterally flanked by two shorter and similar extensions and several much smaller ones.

Cerci extend beyond the subgenital plate with long hairs; last segment (Fig. 91) very large, flattened and dilated, weakly incised at apex, forming two equal lobes. Subgenital plate longer than wide and with an incised apex; styles small; supranal plate short with incised apex.

External male genitalia: Ventral phallomere (Fig. 94) about twice as long as its width; distal process elongate, arcuated; lateral process elongated with acute apex. Left phallomere (Figs 92-93) well sclerotized; ventral lamina with stocky distal process; anterior process short; phalloid apophysis membranous with numerous small spines.

Measurements (millimeters): Head width 5.8; pronotum supracoxal dilatation width 3.6; prozone length 3.5; metazone length 5.8; fore coxae length 7.5; fore femora length 10.5; tegminae length 43.

COMMENTS: This new species is very different from other known species; the more important differences regard the wings that in this species are hyaline, the costal margin little excavate and the shape of copulatory apparatus.

DISTRIBUTION: Known from southeastern Peru and Southwest Brazil (Fig. 96).



FIG. 96

Geographic distribution of: black square = *Pseudacanthops huaoraniana*; open circle = *P. lobipes*; black triangle = *P. clorindae*; black circle = *P. spinulosus*.

***Pseudacanthops lobipes* La Greca & Lombardo, 1997**

Figs 6, 87, 96, 97, 98

Pseudacanthops lobipes La Greca & Lombardo, 1997: 49.

Paracanthops caelebs. – Rehn, 1904: 571 (Bolivia).

Pseudacanthops caelebs. – Travassos, 1945: 217 (partim Bolivia). – Cerdà, 1993: 140 (partim Bolivia). – Ehrmann, 2002: 291 (partim Bolivia).

Pseudacanthops spinulosa. – Terra, 1995: 30 (partim Bolivia). – Jantsch, 1999: 78 (Bolivia). – Ehrmann, 2002: 291 (partim Bolivia). – Agudelo Rondón *et al.*, 2007: 115 (partim Bolivia).

MATERIAL EXAMINED: BOLIVIA; Sara Prov.: 1 ♂, 350 m (J. Steinbach leg.) (ANSP). – 1 ♂, Santa Cruz, 600 m, 17.XI.1960 (Zischka leg.) (MDAB). – 1 ♂, Guanay, Coroico, XI.1996 (Coll. Lombardo) (MDAB). – 1 ♂, “Bolivia, South Amer”. – PERU; Distrito de Echarate: 1 ♂, Cuzco, La Convencion, 21.V.1998 (MDAB). – 1 ♂, La Convencion, 2.III.1998 (R. Acosta leg.) (UNALM). – 1 ♂, La Convencion, 2.V.1998 (UNALM). – 1 ♂, Madre de Dios, Manu National Park, 1.XI.1991 (R. Medina leg.) (UNALM). – BRAZIL; 1 ♂, Rio Madeira-Mamore (Stanford expedition) (Mann & Baker leg.) (ANSP). – 1 ♂, Nova Olinda, Rio Purus, V.1922 (S.M. Klages leg.) (ANSP).

DESCRIPTION: A full description of this species is provided by La Greca & Lombardo (1997).



FIGS 97-98

Living specimens of *Pseudacanthops lobipes*. Males and females exhibit differences in habitat use, as both adult and immature females hang upside-down from clumps of moss (Fig. 97, specimen from Yanachaga-Chemillén National Park, Pasco; photo by André Baertschi), whereas adult males sit on branches (Fig. 98, specimen from Peruvian Amazon; photo by Robert Oelman). The preferred habitat of immature males is unknown, but they likely inhabit moss.

MEASUREMENTS (millimeters): Head width 5-6; pronotum supracoxal dilatation width 3.3-4; prozone length 3.4-4; metazone length 6.7-7.8; fore coxae length 7.8-8.8; fore femora length 9.8-10.8; tegminae length 42-45.

DISTRIBUTION: This species was originally described from Bolivia; we now expand its distribution to western Brazil and southeastern Peru (Fig. 96).

CONCLUSIONS

Pseudacanthops is morphologically very well defined by the presence of a median process on the frons and by the common shape of the male genitalia. It is distributed throughout the Neotropics from Mexico to north Bolivia, throughout Venezuela, the Amazon basin and the Guyanas and extends as far as central Brazil.

The analysis of the distribution patterns of its species shows that *P. caelebs* and *P. centralis* occur in Caribbean region, of which the first one is the most widespread species (Mexico, Belize, Honduras and Guatemala) the second one is known only from Nicaragua and Panama (Fig. 98). These two species are similar, sharing the same genitalia model, differing only in the shape of the distal process of the ventral phallosome (Figs 32, 45). The other four species live in Amazon Basin of which *P. huaoranianus* and *P. spinulosus* are morphologically very similar but with different shape of the male genitalia (Figs 59-61, 78-85). These two species are geographically distinguishable also because the first one lives only in Ecuador (Yasuni), while the second one occurs in east South America, (Fig. 96) (Venezuela, Guyana and French Guyana). This remarkable morphological likeness of both species clearly indicates a close phylogenetic relationship and their distribution pattern probably supports a common history of response to vicariant events. *Pseudacanthops lobipes* occurs in Peru, Bolivia and central Brazil (Fig. 96). It lives in parapatric distribution with *P. clorindae* in Peru (Fig. 96). This latter species occurs in Peru and central-west Brazil, it is the most diversified species of this genus, characterized by hyaline wings and by costal margin little excavate.

ACKNOWLEDGMENTS

We express our gratitude, for the loan of material, to the following persons: Peter Schwendinger (MHNG); Daniel Otte and Jason Weintraub (ANSP), Giovanni Onore (QCAZ), and Roger Roy (MNHN).

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