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The genus *Brotheas* C. L. Koch, 1837 in Brazilian Amazonia, with a description of a new species from the State of Pará (Scorpiones: Chactidae)

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(with 10 figures)

Abstract

A geographical survey is presented of the species of the genus *Brotheas* C. L. Koch, distributed in Brazilian Amazonia. Since some of these species are yet poorly characterized, diagnoses are proposed and their geographical distribution is discussed. A new species is also described on the basis of one male specimen collected in the state of Pará, Brazil. The new species, *Brotheas tapajos*, is characterized by reddish-brown coloration, the carapace only slightly convex and body and appendages with punctations.

Key words: Scorpiones, Chactidae, *Brotheas*, new species, Amazonia, Brazil.

Introduction

The genus *Brotheas* C. L. Koch, 1837 is one of the chactid scorpion groups best represented in the Neotropical scorpion fauna. Most South American species of this genus are concentrated in the Amazonian and Guayanian floristic provinces (Mori 1991, Prance & Lovejoy 1985, Adis 2002). By the time when Mello-Leitão (1945) published his monograph on South American scorpions, only one species, *Brotheas paraensis* Simon, 1880 was clearly

known from Brazil, and a second species, *Brotheas gervaisii* Pocock, 1863, was suspected to be also present in Brazilian Amazonia. In fact, most species today known for Brazilian Amazonia have been described only in recent years (Lourenço 2002a,b, Lourenço & Machado 2004).

Since some of these species are yet poorly characterized, diagnoses are proposed for those distributed in Brazilian Amazonia, and their geographical distribution is also discussed. A new species is also described from the state of Pará.

Methods

Illustrations and measurements were made using a Wild M5 stereo-microscope with a drawing tube and an ocular micrometer. Measurements follow those of Stahnke (1970) and are given in mm. Trichobothrial notations are those developed by Vachon (1974) and the morphological terminology mostly follows that of Vachon (1952) and Hjelle (1990).

Taxonomic account

Family Chactidae Pocock, 1893
Genus *Brotheas* C. L. Koch, 1837

Brotheas amazonicus Lourenço, 1988

Scorpions of medium to large size, ranging from 60 to 70 mm in total length. General coloration brown to blackish-brown. Telson reddish-yellow. Legs yellowish-brown with dark spots. Carapace moderately granular; tergites I to VI punctuated; VII moderately granular. Metasomal segments with all carinae strong, except for segment I from which ventral carinae are absent. Ventral surface of metasomal segments IV and V with spinoid granules; intercarinal tegument moderately granular; telson stocky with four vestigial carinae, moderately granular. Pedipalps moderately to strongly granular; femur with five carinae, patella with four carinae and chela with only vestigial carinae. Fingers with 6 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear, elongated. Pectines with 8 to 11 teeth.

Geographical distribution: Known only from the type locality, the region around Manaus in the state of Amazonas (Lourenço 1988a). Other localities indicated by Lourenço & Pinto-da-Rocha (2000) for the states of Roraima and Rondonia, proved to be misidentifications.

Brotheas gervaisii Pocock, 1893

Scorpions of medium size, ranging from 50 to 55 mm in total length. General coloration brown to reddish-brown. Carapace reddish-brown; tergites paler than the carapace; metasomal segments reddish; telson reddish-yellow. Legs yellowish with some brown spots. Carapace with very weak granules, almost smooth; tergites the same as the carapace. Metasomal segments with dorsal, latero-dorsal and latero-ventral carinae strong; the other carinae

vestigial or absent. Ventral surface of metasomal segments V with spinoid granules; intercarinal tegument punctuated; telson stocky and moderately granular. Pedipalps moderately granular; femur with five carinae, patella with three carinae and chela with two carinae. Fingers with 6 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear, elongated. Pectines with 6 to 10 teeth.

Geographical distribution: The type locality of this species is uncertain, and *B. gervaisii* has been reported from many regions of South America (Mello-Leitão 1945). Many of these are fallacious, but the species certainly occurs in parts of the Guayana region, and its presence has been confirmed in French Guiana (Lourenço 1983). In Brazil this species can be found in the State of Amapá, near to the border with French Guiana.

Brotheas granulatus Simon, 1877

Scorpions of medium to large size, ranging from 58 to 65 mm in total length. General coloration brown to blackish-brown. Carapace dark-brown; tergites dark-brown, paler than the carapace; metasomal segments dark-brown, with blackish regions over the carinae; telson reddish-yellow. Legs yellowish-brown with dark spots. Carapace very strongly granular; tergites I to V as on the carapace; VI and VII with even stronger granulation. Metasomal segments with dorsal, latero-dorsal and latero-ventral carinae strong; the other carinae incomplete; ventral carinae absent from tergite I. Ventral surface of metasomal segments IV and V with spinoid granules; intercarinal tegument moderately to strongly granular; telson stocky and moderately granular with four vestigial ventral carinae. Pedipalps moderately to strongly granular; femur with five carinae, patella with four carinae and chela with vestigial carinae. Fingers with 6 slightly oblique rows of granules. Three pairs of lateral eyes, the third pair vestigial. Spiracles linear, elongated. Pectines with 7 to 11 teeth.

Geographical distribution: Probably occurs in parts of the Guayana region, and its presence has been confirmed in French Guiana (Lourenço 1983). In Brazil this species can be found in the State of Amapá, near the border with French Guiana.

Brotheas henriquesi Lourenço & Machado, 2004

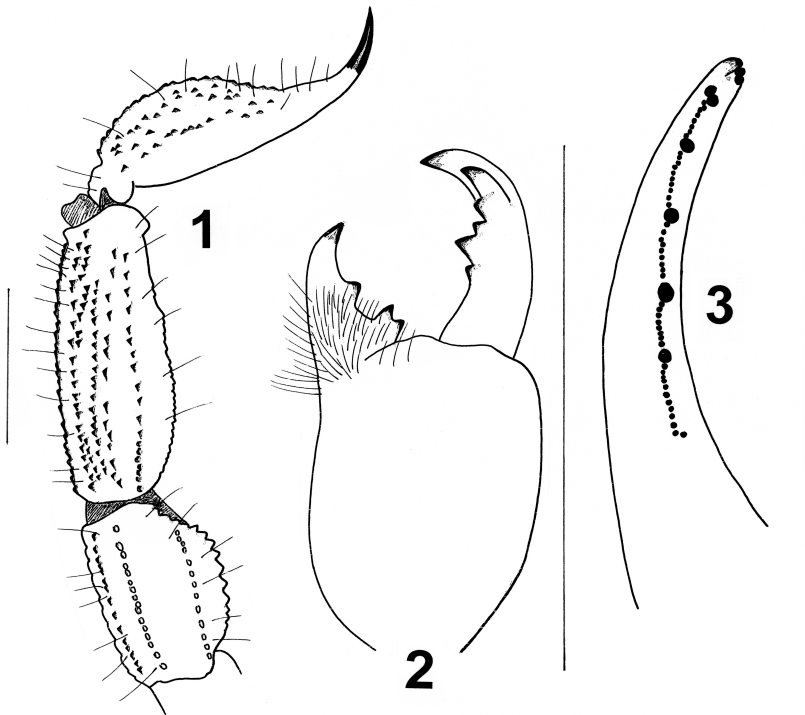
Scorpions of medium size, ranging from 55 to 60 mm in total length. General coloration blackish-brown, excepted for the chelicerae and telson which are reddish-yellow. Legs reddish-brown. Carapace lustrous and acarinate, with punctations; tergites acarinate, smooth with punctations. Metasomal segments with all carinae moderate, except for segment I from which ventral carinae are absent. Ventral surface of metasomal segment V with minute spinoid granules; intercarinal tegument lustrous and with punctations; telson stocky without carinae, not granular. Pedipalps weakly granular; femur with four carinae, patella with four carinae and chela with only vestigial carinae.

Fingers with 6 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear, elongated. Pectines with 10-11 teeth.

Geographical distribution: Known only from the type locality, the region around Novo Airão, Parque Nacional Jau in the state of Amazonas (Lourenço & Machado 2004).

Brotheas jordani Lourenço, 1997

Scorpions of medium to large size size, ranging from 55 to 60 mm in total length. General coloration reddish to dark reddish, with carapace, metasoma and pedipalps darker than the body. Telson reddish. The tegument of the entire body presents a punctuated aspect and is almost smooth. Metasomal segments with all carinae strong, with the exception of the ventral carinae of segment I which are absent. Ventral surface of metasomal segment V with spinoid granules; telson flattened and moderately granular. Pedipalps punctuated with vestigial carinae present on the femur, patella and chela. Fingers



Figs 1-3. *Brotheas tapajos* sp. n. Male holotype. 1. metasomal segments IV-V and telson, lateral aspect, 2. chelicera, dorsal aspect, 3. disposition of granulations on the dentate margins of the pedipalp chela movable finger. (Scale bars = 3 mm).

with 5 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear, elongated. Pectines with 8 teeth.

Geographical distribution: Known only from the type locality, in the region of Neblina-São Gabriel da Cachoeira, in the State of Amazonas (Lourenço 1997).

Brotheas overali Lourenço, 1988

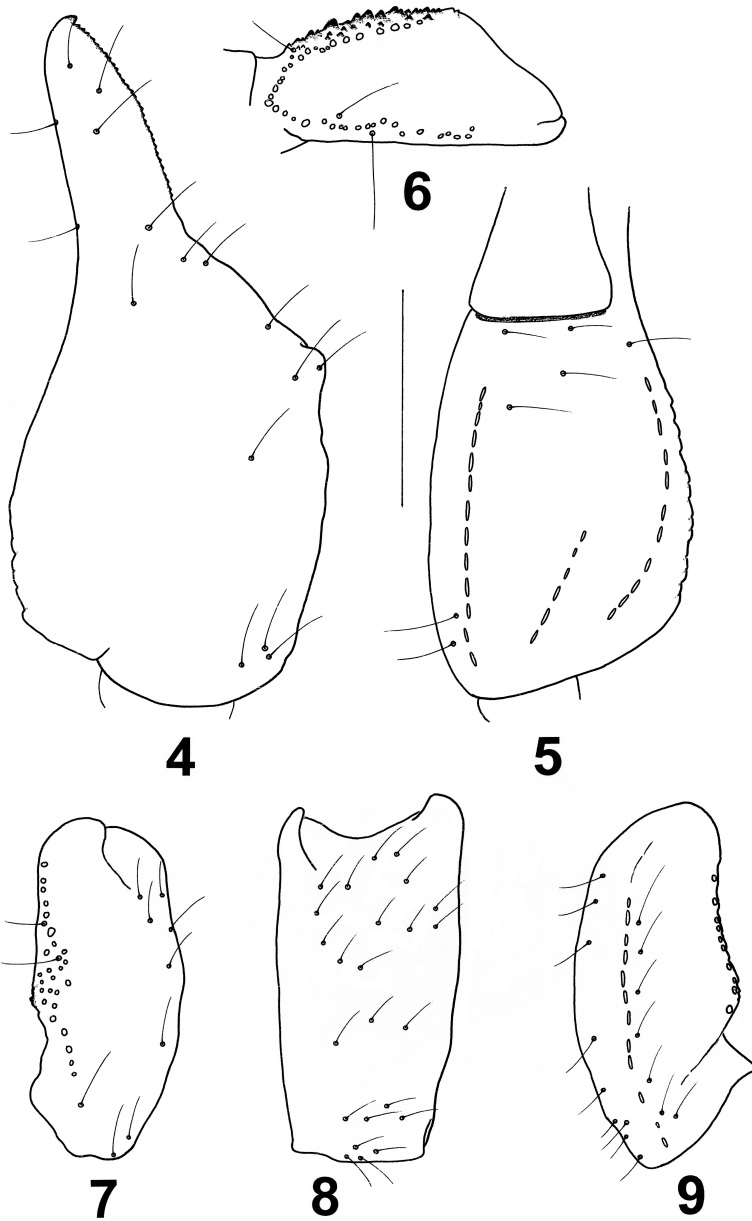
Scorpions of medium to large size, ranging from 58 to 65 mm in total length. General coloration brown to reddish-brown. Carapace reddish-brown; tergites paler than the carapace; metasomal segments reddish-brown; telson reddish-yellow. Legs yellowish with brown spots. Carapace with a weakly and diffuse granulation; tergites very weakly granular, almost smooth. Metasomal segments with dorsal, latero-dorsal and latero-ventral carinae strong; the other carinae present but incomplete; ventral carinae vestigial on segment I. Ventral surface of metasomal segment V with spinoid granules; intercarinal tegument weakly granular; telson slightly stocky and weakly granular. Pedipalps moderately to strongly granular; femur with five carinae, patella with four carinae and chela with vestigial carinae. Fingers with 6 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear. Pectines with 8 to 11 teeth.

Geographical distribution: This species is known only from its type locality, Anajas in the State of Pará (Lourenço 1988b).

Brotheas paraensis Simon, 1880

Scorpions of small to medium size, ranging from 40 to 50 mm in total length. General coloration brown to blackish-brown. Carapace blackish-brown; tergites slightly paler than the carapace; metasomal segments blackish; telson reddish-brown. Legs reddish with brown spots. Carapace without granulations, punctuated; tergites slightly punctuated, almost smooth. Metasomal segments with dorsal, latero-dorsal and latero-ventral carinae strong; the other carinae present but incomplete; ventral carinae absent from segment I and vestigial on segment II. Ventral surface of metasomal segments V with spinoid granules; intercarinal tegument weakly granular, punctuated; telson slightly stocky and weakly to moderately granular. Pedipalps with some granulations, punctuated; femur with five carinae, patella with three carinae and chela with vestigial carinae. Fingers with 6 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear, elongated. Pectines with 8 to 11 teeth.

Geographical distribution: This species was described from the State of Pará without further details. It is known only from this state (Lourenço & Pinto da Rocha 2000).



Figs 4-9. *Brotheas tapajos* sp. n. Male holotype. Trichobothrial pattern, **4-5.** chela, dorso-external and ventral aspects, **6.** femur, dorsal aspect, **7-9.** patella, dorsal, external and ventral aspects. (Scale bar = 3 mm).

Brotheas silvestris Lourenço, 1988

Scorpions of medium to large size, from 60 to 70 mm in total length. General coloration brown to reddish-brown. Carapace reddish-brown; tergites slightly paler than the carapace; metasomal segments reddish-brown; telson reddish-yellow. Legs yellowish with some brown spots. Carapace with a weak granulation; tergites weakly to moderately granular. Metasomal segments with dorsal, latero-dorsal and latero-ventral carinae strong; the other carinae are present but incomplete; ventral carinae absent from segment I and vestigial on segment II. Ventral surface of metasomal segment V with spinoid granules; intercarinal tegument weakly to moderately granular; telson slightly stocky and weakly granular. Pedipalps moderately granular; femur with five carinae, patella with four carinae and chela with vestigial carinae. Fingers with 6 slightly oblique rows of granules. Two pairs of lateral eyes. Spiracles linear. Pectines with 7 to 9 teeth.

Geographical distribution: This species is known only from its type locality, Rio Mapuera in the State of Pará (Lourenço 1988b).

Brotheas tapajos sp. n.
(Figs 1-10)

TYPE MATERIAL. Holotype (pre-adult male). Brazil, State of Pará, 70 km SW Jacareacanga, nearby the Tapajós River at the border with the State of Amazonas, November 1963 (collected by local mission team). Deposited in the Zoologisches Museum Hamburg (ZMH Acc. No. A19/12).

ETYMOLOGY. the specific name is placed in apposition to the generic name and refers to the Tapajós River, near the type locality.

DIAGNOSIS. Scorpions moderate in size, 42 mm in total length. Coloration reddish to reddish-brown. Carapace only slightly convex, almost straight and with minute punctations; tergites punctuated with only a few granules on VII. Pectines with 10-10 teeth in male. Dentate margins on movable and fixed fingers composed of 5-6 rows of granules. Trichobothrial pattern type C neobothriotaxic 'majorante'.

DESCRIPTION. Based on male holotype. Measurements follow the description.

COLORATION. Basically reddish to reddish-brown. Prosoma: carapace reddish-brown. Tergites reddish-brown, slightly paler than carapace. Metasomal segments reddish-brown, with darker zones over carinae; vesicle reddish-yellow; aculeus dark red. Chelicerae reddish with a darker variegated pigmentation; fingers dark brown with dark reddish denticles. Pedipalps reddish-brown with darker zones over the carinae. Legs reddish to reddish-yellow without spots. Venter reddish-yellow; sternites reddish-yellow; pectines and genital operculum with the same colour as sternites.

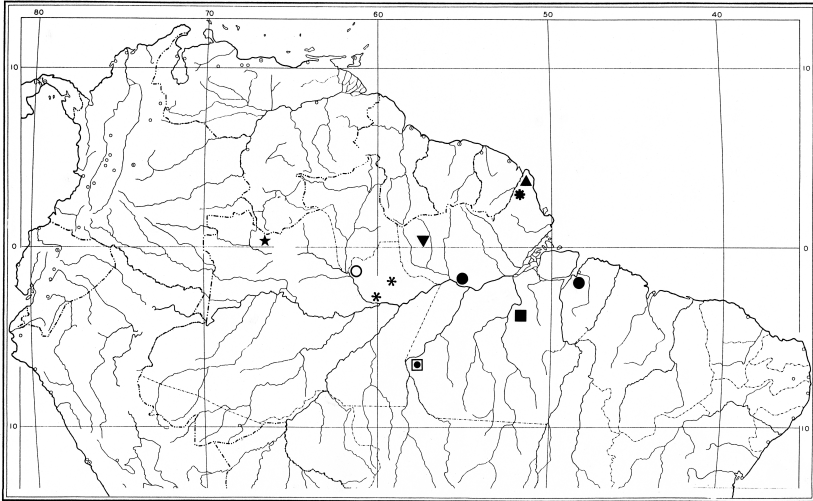


Fig. 10. Northern South America (Amazonian and Guayana regions), with records of the *Brotheas* species in Brazilian Amazonia. *B. amazonicus* (black flower), *B. gervaisii* (black asterisk), *B. granulatus* (black triangle), *B. henriquesi* (open circle), *B. jourdani* (black star), *B. overali* (black square), *B. paraensis* (black circle), *B. silvestris* (inverted black triangle), *Brotheas tapajos* sp. n. (open square with black circle).

MORPHOLOGY. *P r o s o m a*: Carapace only slightly convex with punctations; furrows moderately deep to shallow. Sternum pentagonal, wider than long. Tergites acarinate, with punctations and minute granulations on VII. Pectinal tooth count 10-10, fulcra reduced. Sternites smooth and shiny, with minute punctations; VII acarinate. *M e t a s o m a* l segments I to III wider than long; IV and V longer than wide; metasomal tegument with a few granulations and punctations; segments IV and V with spinoid granulations ventrally and laterally. Carinae on segments I-V strongly marked; ventral carina absent from segment I; vestigial on II; moderately marked on segment III. Vesicle not globular, elongated with moderate to strong spinoid granules on ventral and lateral surfaces. *P e d i p a l p s*: Femur with dorsal internal, dorsal external and ventral internal carinae moderately marked; ventral external carina vestigial; dorsal, ventral and internal faces not granular, punctated. Patella with some minute granulations but mostly punctated; dorsal internal and ventral internal carinae moderate to weak ventral external, external and ventral internal carinae vestigial. Chela with minute granulations on internal surface; all carinae weakly marked to vestigial. Dentate margins on movable and fixed fingers composed of 5-6 rows of granules. *C h e l i c e r a e* with the dentition typical of the family Chactidae (Vachon 1963), and with intense setation ventrally and dorso-internally. Trichobothriotaxy type C; neobothriotaxic 'majorante' (Vachon 1974).

Morphometric values (in mm) of the male holotype. Total length, 42.5 (including the telson). Carapace: length, 5.8; anterior width, 3.6; posterior width, 6.3. Metasomal segments. I: length, 2.0; width, 3.3; II: length, 2.3; width, 2.9; III: length, 2.7; width, 2.8; IV: length, 3.3; width, 2.7; V: length, 5.9; width, 2.4; depth, 2.2. Vesicle: width, 2.2; depth, 1.8. Pedipalp: femur length, 4.2, width, 2.9; patella length, 5.1, width, 2.0; chela length, 9.4, width, 2.9, depth, 3.0; movable finger length, 5.1.

RELATIONSHIPS. *Brotheas tapajos* sp. n. possess moderately to strongly developed carinae on the metasomal segments, and some spinoid granules on the ventral surface of segments IV and V. The new species can be distinguished from others in the genus *Brotheas* and in particular from *Brotheas paraensis* Simon, also distributed in the State of Pará, Brazil, by the following features: (i) carapace and tergites punctated; smooth in *B. paraensis*, (ii) vesicle and tergite VII with spinoid granules; smooth in *B. paraensis*, (iii), pedipalp fingers with 5-6 rows of granules; 6-6 in *B. paraensis* (iv) pectines with only 10 teeth in male; 12/13 in *B. paraensis*. For more details on *B. paraensis* refer to Lourenço (2002a,b) and Lourenço & Pinto-da-Rocha (2000).

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