

SHORT COMMUNICATION

Scorpions (Arachnida, Scorpiones) from the state of Acre, southwestern Brazilian Amazon

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ABSTRACT

Although Brazil has one of the highest scorpion diversities worldwide, the scorpion fauna of the Amazon region remains relatively poorly described. In this study, we updated the list of scorpion species from the state of Acre, in the southwestern Brazilian Amazon, based on a revision of records contained in Brazilian arachnid collections and a survey of the relevant literature. We recorded the occurrence of seven scorpion species belonging to two families (Buthidae and Chactidae) among which we report three new records (*Ananteris* sp., *Tityus* (*Tityus*) *gasci*, and *Chactopsis* cf. *insignis*) for Acre. The results presented herein make an important contribution to the knowledge on scorpion diversity in the Amazonian forests of Acre.

KEYWORDS: Buthidae, Chactidae, checklist, new record, Wallacean shortfall

Escorpiones (Aracnida, Scorpiones) del estado de Acre, suroeste de la Amazonía brasileña

RESUMEN

Aunque Brasil tiene una de las diversidades de escorpiones más altas del mundo, la fauna de escorpiones de la región amazónica sigue siendo relativamente poco descrita. En este estudio, actualizamos la lista de especies de escorpiones para el estado de Acre, en el suroeste de la Amazonía brasileña, en base a una revisión de los registros contenidos en colecciones de arácnidos brasileños y un estudio de la literatura relevante. Registramos la ocurrencia de siete especies de escorpiones pertenecientes a dos familias (Buthidae y Chactidae), entre las cuales informamos tres nuevos registros (*Ananteris* sp., *Tityus* (*Tityus*) *gasci* y *Chactopsis* cf. *insignis*) para Acre. Los resultados presentados aquí hacen una contribución importante al conocimiento acerca de la diversidad de escorpiones en los bosques amazónicos de Acre.

PALABRAS-CLAVE: Buthidae, Chactidae, lista de especies, nuevos registros, déficit de Wallace

The order Scorpiones constitutes a group of invertebrates that have successfully colonized a variety of environments. Worldwide, there are approximately 2,470 known species of scorpions, which, with the exception of Antarctica, are distributed across all continents (Polis 1990; Rein 2019). The Brazilian scorpion fauna comprises approximately 160 known species distributed among four families (Lourenço 2002; Coelho *et al.* 2016), of which the highest diversity (>50% of the species richness) is found in the Northern region, which covers 45% of the country and is mostly covered by Amazon forest (IBGE 2016; Brazil and Porto 2011). The scorpion fauna of the Brazilian Amazon is highly diverse, with representatives of all four scorpion families recorded in Brazil,

namely, Buthidae C.L. Koch, 1837; Bothriuridae Simon, 1880; Chactidae Pocock, 1893; and Hormuridae Laurie, 1896 (Lourenço 2002). However, numerous species are known from just a single locality (e.g., Lourenço 2005; Lourenço and Qi 2007) or have been described based exclusively on juvenile specimens (e.g., Lourenço *et al.* 2005a; Lourenço and Silva 2007), whereas for others certain important taxonomic characters (such as hemispermaphore morphology) have not been described (e.g., Lourenço 2005; Lourenço and Qi 2007), thereby making species identification and recognition more difficult. At state level, the highest scorpion diversities in Brazil are reported for the Amazonian states of Amazonas (approximately 40 species) and Pará (approximately 20). In

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Acre state, in the southwestern Brazilian Amazon, only four species have been reported (Lourenço 2002; Brazil and Porto 2011). Here, we present an updated species list for Acre, based on a revision of collection material accumulated over the past three decades and a literature review.

The state of Acre, covers an area of 164,221.36 km² and borders with Peru, Bolivia and the Brazilian states of Amazonas and Rondônia (Acre 2006; Figure 1). Compared with other Brazilian states, Acre has a relatively high number of plant, vertebrate, and invertebrate species (Oliveira *et al.* 2016). Between 1984 and 2015, students and staff from Universidade Federal do Acre (UFAC), and other members of the community, collected scorpions throughout the state (Table 1). The collected material was identified by means of relevant literature (Lourenço 2002; Lourenço *et al.* 2005b; Ochoa *et al.* 2013). All the specimens were deposited in the Arachnological Collection of Universidade Federal de Pernambuco (UFPE; curator L. Ianuzzi). We also had access to additional material from the zoological collection (Laboratório

Especial de Coleções Zoológicas) at Instituto Butantan (IBSP; curator A.D. Brescovit). We also consulted the database of the zoological collections of Centro de Coleções Taxonômicas at Universidade Federal de Minas Gerais (UFMG; curator A.J. Santos) and Instituto Nacional de Pesquisas da Amazônia (INPA; curator M.L. Oliveira), accessed through Species Link (CRIA 2020). We found the latter two databases to contain records for Acre of *Tityus (Atreus) obscurus* Gervais, 1843 and *Chactas brevicaudatus* (Karsch, 1879), both of which we suspect to be misidentifications, given that *T. (A.) obscurus* is known only from the eastern Amazon (Lourenço *et al.* 2000), whereas *C. brevicaudatus* is endemic from Colombia (Lourenço 1991). Accordingly, these two species were excluded from the species list.

A total of 31 scorpion specimens belonging to seven species have been recorded in Acre, (Table 1; Figure 2). The scorpions were collected from sites in eight municipalities, with the largest number of species being recorded in Rio Branco (4 species), Senador Guiomard (4), and Mâncio Lima (3) (Table

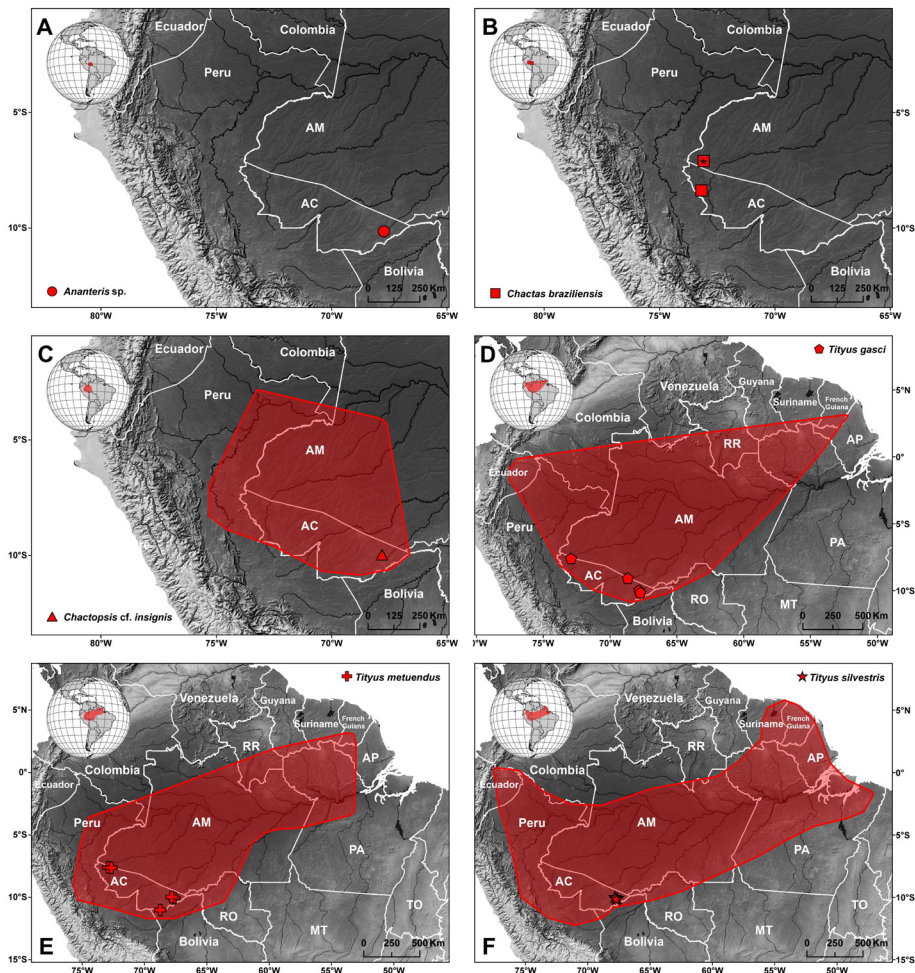


Figure 1. Overall distribution and collection localities in the state of Acre of the six native scorpion species recorded for Acre, southwestern Brazilian Amazon. Distribution data were obtained from literature. This figure is in color in the electronic version.

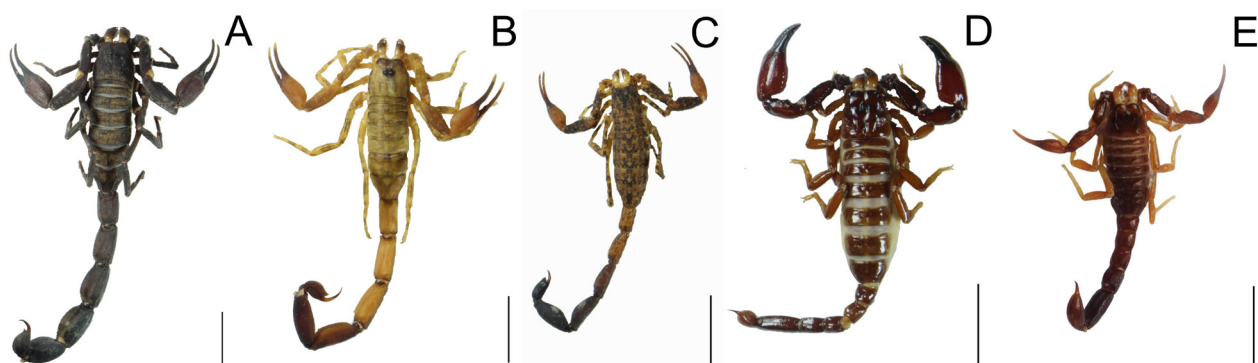


Figure 2. Representative specimens of five of the seven scorpion species recorded in the state of Acre, in the southwestern Brazilian Amazon. A – *Tityus (Atreus) metuendus* (CA-UFPE 1588); B – *Tityus (Tityus) gasci* (CA-UFPE 1492); C – *Tityus (Archaeotityus) silvestris* (CA-UFPE 1495); D – *Chactas braziliensis* (CA-UFPE 1583); E – *Chactas cf. insignis* (CA-UFPE 1602). Credit: João Regueira (A-D) and Edson Guilherme (E). Scale bar = 1 cm. This figure is in color in the electronic version.

Table 1. Scorpion species recorded in the state of Acre, southwestern Brazilian Amazon. *New record.

Family/Species	Locality	Collection voucher
Buthidae		
* <i>Ananteris</i> sp.	Senador Guiomard	IBSP-SC 4791
<i>Isometrus maculatus</i> (DeGeer, 1778)	Acre	IBSP-SC 5573
<i>Tityus (Archaeotityus) silvestris</i> Pocock, 1897	Rio Branco	CA-UFPE 1495, 1496, 1581, 1584; IBSP-SC 4798
	Senador Guiomard	CA-UFPE 1494; UFMG 10173
* <i>Tityus (Tityus) gasci</i> Lourenço, 1981	Mâncio Lima	CA-UFPE 1493
	Rio Branco	CA-UFPE 1499, 1585, 1586; IBSP-SC 5127
	Sena Madureira	CA-UFPE 1582
	Senador Guiomard	CA-UFPE 1492
<i>Tityus (Atreus) metuendus</i> Pocock, 1897	Brasiléia	CA-UFPE 1500
	Cruzeiro do Sul	CA-UFPE 1600; IBSP-SC 3586
	Mâncio Lima	CA-UFPE 1587, 1601
	Rio Branco	CA-UFPE 1588, 1589; IBSP-SC 3586, 5125
	Senador Guiomard	UFMG 6565; 11364
	Xapuri	CA-UFPE 1501
Chactidae		
<i>Chactas braziliensis</i> Lourenço, Aguiar & Franklin, 2005	Mâncio Lima	CA-UFPE 1542, 1583
* <i>Chactopsis cf. insignis</i> Kraepelin, 1912	Rio Branco	CA-UFPE 1602

1). *Tityus (Atreus) metuendus* and *T. (T.) gasci* were widespread species, being recorded in six and four localities, respectively. Of the remaining species, *T. (A.) silvestris* was represented by only two records, whereas all other species were recorded from just a single locality (Table 1).

We provide the first checklist of scorpions for Acre, and seven species have now been documented in the region. In Brazil, this species richness is surpassed only by the states of Amazonas and Pará, which are much larger in area (Figure 1) and have a comparatively longer history of taxonomic studies (e.g., Lourenço *et al.* 2005a; Pinto-da-Rocha *et al.* 2007; Lourenço and Duhem 2010). Although the records from Acre are far from complete, they are of particular importance, as they significantly reduce the large Wallacean shortfall in the Brazilian scorpion fauna. The scorpions recorded from Acre belong to either Buthidae (80%) or Chactidae (20%), the two most diverse scorpion families in the Brazilian Amazon (Lourenço 2002). The buthid *T. (A.) metuendus* is a widespread rainforest species that is mainly distributed in the western Amazon (Lourenço 2002; Acosta and Ochoa 2002), where

it is responsible for most scorpion-related accidents (Pucca *et al.* 2015). Other widespread species are *T. (T.) gasci*, which is found in French Guiana, Peru, Ecuador, Bolivia and Brazil (Lourenço 2002; Acosta and Ochoa 2002; Brito and Borges 2015), and *T. (A.) silvestris*, which is also a source of severe accidents in the Brazilian Amazon (Coelho *et al.* 2016). The latter species inhabits rainforests, where it is found under litter or on palm trees (Lourenço 2002; Brazil and Porto 2011). In addition to its wide distribution, *T. (A.) silvestris* is also characterized by a considerably high level of polymorphism (Lourenço 1988). This combination of factors could indicate the existence of cryptic species, as evidenced by a thorough revision of the subgenus *Archaeotityus* (Lourenço *et al.* 2006; Lourenço 2012) as it has previously been demonstrated for Colombian species (Moreno-González *et al.* 2019). The other four species were represented by single records. To date, nine *Ananteris* species have been reported from the Brazilian Amazon (Lourenço *et al.* 2013), and our findings confirm the occurrence of this genus in Acre. However, more specimens are required to make an identification at species level, given that

the only individual examined was a juvenile, and therefore, difficult to identify. *Isometrus maculatus* is an exotic species, introduced from the Indo-Malayan region to several tropical regions of the world, possibly being transported in ships (Kovářík 2003). The species was recorded in Acre in 1955 (Piza 1955), however, the specimen reported herein was recorded seven years prior to that reported in Acre by Piza (1955). This suggests that a breeding population exists in the state, or that multiple invasions have occurred in the region.

Finally, we also documented the chactid *Chactopsis cf. insignis*, which has previously been reported only from the state of Amazonas and from several localities in Peru. Our record therefore fills a gap in the distribution range of this species (Ochoa *et al.* 2013). The identification of this species was based on a female specimen (CA-UFPE #1602). Ideally, a male is required to confirm the species identity, based on hemispermaphore morphology (see Ochoa *et al.* 2013). We also confirmed the presence of the chactid *Chactas braziliensis* in Acre, a male specimen which was recently described (Lira *et al.* 2018). Our results contribute to increase the knowledge on the diversity of scorpions in the Amazonian forest and can serve as a reference for future studies.

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