



# Revision of the genera *Eutrecha* and *Xenotrecha* (Solifugae: Ammotrechidae), taxonomic notes on Ammotrechinae, and description of a remarkable new *Eutrecha* from Colombia

Ricardo Botero-Trujillo<sup>1,2</sup>, Leonel Martínez<sup>2</sup>, Hernán Augusto Iuri<sup>2</sup>, Andrés Alejandro Ojanguren-Affilaastro<sup>2</sup>, Leonardo Sousa Carvalho<sup>3</sup>

1 Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79<sup>th</sup> Street, New York, NY 10024-5192, USA

2 División Aracnología, Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” – CONICET, Avenida Ángel Gallardo 470, CP: 1405DJR, C.A.B.A., Buenos Aires, Argentina

3 Universidade Federal do Piauí, Campus Amílcar Ferreira Sobral, BR 343, km 3.5, Bairro Meladão, s/no. CEP 64800-000, Floriano, PI, Brazil

<https://zoobank.org/BE57FF40-7147-40AC-8BEA-1706A95DA4ED>

Corresponding author: Leonardo Sousa Carvalho ([carvalho@ufpi.edu.br](mailto:carvalho@ufpi.edu.br))

**Received** 22 September 2022

**Accepted** 23 January 2023

**Published** 4 April 2023

**Academic Editors** Lorenzo Prendini, Klaus-Dieter Klass

**Citation:** Botero-Trujillo R, Martínez L, Iuri HA, Ojanguren-Affilaastro AA, Carvalho LS (2023) Revision of the genera *Eutrecha* and *Xenotrecha* (Solifugae: Ammotrechidae), taxonomic notes on Ammotrechinae, and description of a remarkable new *Eutrecha* from Colombia. Arthropod Systematics & Phylogeny 81: 317–344. <https://doi.org/10.3897/asp.81.e95181>

## Abstract

The solifuge genera *Eutrecha* Maury, 1982 and *Xenotrecha* Maury, 1982 are among the rarest and most elusive groups of camel spiders in the New World. Since their inception, both genera have remained unclassified within the subfamilial scheme of Ammotrechidae, where they belong, and their systematic position and affinities to other genera continue to be unexplored. This contribution addresses the affinities that *Eutrecha* and *Xenotrecha* have to the type genus of Ammotrechinae, *Ammotrecha* Banks, 1900. Based on the taxonomic distribution of characters shared by these genera, it is proposed that the three are closely related and classified into Ammotrechinae. Revised diagnoses are presented for Ammotrechinae s.str., *Eutrecha*, and *Xenotrecha*, and redescrptions are presented for species of these genera, when possible. A new species, *Eutrecha belenensis* **sp. nov.**, is described from Colombia, raising to three the number of species in the genus. New material of *Eutrecha florezi* Villareal-Blanco, Armas and Martínez, 2017 and *Xenotrecha huebneri* (Kraepelin, 1899) is referenced, thus extending the distribution range of these species in Colombia and Brazil, respectively. Ammotrechinae s.str. is here defined by the presence of a retroventral longitudinal carina on the movable finger of the chelicerae and a cleavage plane basally on the femur of pedipalps, among other characters. The cleavage plane allows the pedipalp to be autotomized, representing the first report of pedipalp autotomy in Solifugae. This work also presents a discussion on the taxonomy of Ammotrechidae and delves into some aspects that affect the current delimitation of some of its subfamilies.

## Keywords

Camel spiders, morphology, Neotropical region, Saronominae, taxonomy

## 1. Introduction

The family Ammotrechidae Roewer, 1934 occupies the third position in terms of generic diversity within Solifugae, only outrun by Daesiidae and Rhagodidae (Harvey 2003; Iuri et al. 2021). This family is currently divided into five subfamilies: Ammotrechinae Roewer, 1934, Mortolinae Mello-Leitão, 1938, Nothopuginae Maury, 1976, Oltacolinae Roewer, 1934, and Saronominae Roewer, 1934. Most of its generic diversity is contained in Ammotrechinae and Saronominae, respectively with ten and five genera (Harvey 2003). Mortolinae and Nothopuginae, as recently redefined (see Iuri et al. 2021), comprise three genera each, whereas Oltacolinae has remained monogeneric. Until recently, the internal classification of Ammotrechidae was devoid of any phylogenetic structure. Iuri et al. (2021) presented the first phylogenetic analysis of the family, wherein some changes to the traditional classification scheme were presented and some important characters were addressed. That work also presented, for the first time, evidence in support of the monophyly of Ammotrechidae and of three of its subfamilies (Mortolinae, Nothopuginae, Oltacolinae).

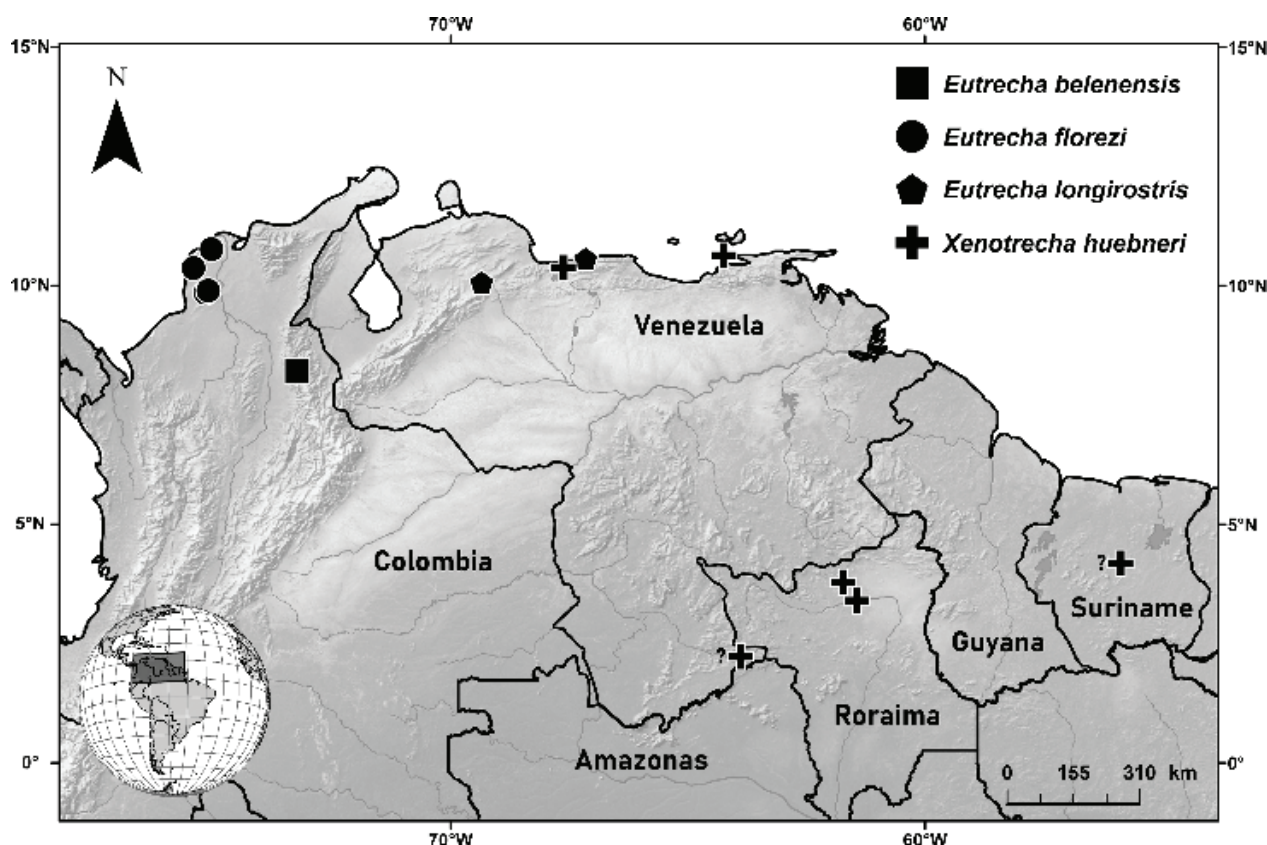
For several years, three genera, *Chileotreacha* Maury, 1987, *Eutreacha* Maury, 1982, and *Xenotreacha* Maury, 1982, have remained unclassified within Ammotrechidae (Harvey 2003) – not counting the extinct *Happlodontus* Poinar and Santiago-Blay, 1989 which will not be addressed here. Iuri et al. (2021) proposed that all three belong to a large clade consisting of Ammotrechinae + Saronominae, but they failed to assign them to either of the two subfamilies. *Xenotreacha* is a monotypic genus, consisting only of its type species, *Xenotreacha huebneri* (Kraepelin, 1899), and is known by a handful of specimens from Venezuela and Brazil (Maury 1982; Rocha and Cancellato 2002). The chelicera of the male of *X. huebneri* bears a plumose setiform organ arising from the prolateral surface of the flagellum (Maury 1982: fig. 27), an ornament that is so exclusive that suffices to distinguish this species from all other solifuge taxa. The oddity of this structure is such that some authors have even considered the possibility that the flagellum of the only male referenced in literature could be abnormal (Bird et al. 2015). *Eutreacha* currently consists of two known species, each from Venezuela and Colombia. Males of *Eutreacha longirostris* Maury, 1982 and *E. florezi* Villareal-Blanco, Armas and Martínez, 2017 have a highly specialized cheliceral morphology, if compared to the female, for example. This includes some modifications on the fixed finger, all addressed later in this study, which makes the identification of individual teeth challenging and the understanding of sex-related modifications difficult. This has led to misinterpretations of the dentition in the past (e.g., Blanco et al. 2017), for which rectification is proposed herein. *Chileotreacha* is composed of three known species and is distributed in Argentina and Chile (Iuri et al. 2014; Botero-Trujillo and Iuri 2015). Of the three mentioned genera, *Chileotreacha* is the only one that is not within the scope of this manuscript.

For their rarity and elusiveness, highly modified morphology, and unknown systematic relationships, *Eutreacha* and *Xenotreacha* are among the most enigmatic genera in the New World. In this contribution, the taxonomy and morphology of these genera are addressed, and both are classified into Ammotrechinae owing to the affinities that they have with *Ammotreacha* Banks, 1900, type genus of the subfamily. A delimitation is proposed for Ammotrechinae s.str., based on a series of characters that include some that are here introduced for the first time into the systematics of Solifugae. Revised diagnoses are presented for *Eutreacha* and *Xenotreacha*, as well as redescriptions for species in these genera, when possible. Additionally, *Eutreacha belenensis* **sp. nov.** is described from Playa de Belén in Norte de Santander Department, Colombia, raising the number of species of *Eutreacha* to three. A map plotting the known locality records of *Eutreacha* and *Xenotreacha* is presented (Fig. 1). Finally, some aspects that affect the subfamilial classification of Ammotrechidae are discussed.

Ammotrechinae, the nominotypical subfamily of Ammotrechidae, was proposed in the monumental work of Roewer (1934). It currently comprises ten extant genera, whereas eleven others and the extinct *Happlodontus* are sorted to other subfamilies or remain unclassified (Harvey 2003; Iuri et al. 2021). Up until the recent work of Iuri et al. (2021), no efforts had attempted to test the monophyly of Ammotrechinae or evaluated the phylogenetic position of its type genus, *Ammotreacha* Banks, 1900, into the broad arena of solifuge systematics.

The knowledge about *Ammotreacha* is rather fragmentary and tough to put together. As some authors have previously pointed out, it is not possible to recognize the type specimens of its type species, *Ammotreacha limbata* (Lucas, 1835), and these are presently mislaid (Muma 1970, 1976; Armas 1996; Harvey 2001). Additionally, the lack of a phylogenetic structure in Ammotrechinae (see Iuri et al. 2021) holds blurry the limits of some genera and makes it difficult to clearly delineate what exactly should be recognized as *Ammotreacha*.

The analysis of published information on the morphology of *Ammotreacha* (e.g., Roewer 1934; Mello-Leitão 1938; Armas and Teruel 2005), in addition to observations conducted during the present investigation on specimens of *Ammotreacha*, *Eutreacha*, and *Xenotreacha*, revealed the existence of some similarities between these three genera. The following aspects of *Ammotreacha* (confirmed in *Ammotreacha itzaana* Muma, 1986, *A. nigrescens* Roewer, 1934, and *A. stollii* (Pocock, 1895)), were determined to be common to males and females of *Eutreacha* and *Xenotreacha* as well: cheliceral movable finger with distinct prolateral (MPL) tooth (Fig. 6B), fixed finger without subdistal (FSD) tooth/teeth (Figs 2, 3), and legs II and III without retroventral spiniform setae on the distal segment of telotarsus. Additionally, other characters of the chelicerae and pedipalps were newly determined to be shared by *Ammotreacha*, *Eutreacha*, and *Xenotreacha*, and are here presumed to be synapomorphic to these genera. The combination of all those characters, presented in the revised diagnosis of Ammotrechinae (see section 3.1), does not



**Figure 1.** Known records of *Eutreacha* Maury, 1982 (squares, circles and pentagons) and *Xenotrecha* Maury, 1982 (crosses). Records with question mark correspond to unconfirmed record from Suriname and the unprecise type locality of *X. huebneri* in the headwaters of the Orinoco River, in Venezuela. See text for details.

occur in two of the other subfamilies, Nothopuginae and Oltacolinae. On the other hand, comparison to the other two subfamilies is more intricate and discussed below in some detail.

The subfamily Mortolinae will be addressed first. The primary type and only known specimen of *Mortola mortola* Mello-Leitão, 1938, a male from an unspecified locality in the Mendoza Province of Argentina, supposed to have been deposited at the Museu Nacional do Rio de Janeiro (MNRJ, Brazil), remained mislaid for several years (Kury and Nogueira 1999). The disastrous fire that in September 2018 burned down the MNRJ and destroyed the Arachnology collection (Kury et al. 2018), completely wiped out any opportunity to revisit that species based on the type material. In addressing this genus and species, Iuri et al. (2021) presented evidence to regard *Mortola* as a junior synonym of *Pseudocleobis* Pocock, 1900 and *P. mortola* as a nomen dubium. These authors also redefined Mortolinae by transferring into it, in addition to *Pseudocleobis*, the genera *Chinchippus* Chamberlin, 1920 (formerly in Saronominae) and *Dasycleobis* Mello-Leitão, 1940 (formerly in Ammotrechinae), respectively from Peru and Argentina. Of significance here, the study of Iuri et al. (2021) allowed to determine that Mortolinae, just as Nothopuginae and Oltacolinae, does not present the combination of features that are newly proposed as putative synapomorphies of Ammotrechinae.

The situation of Saronominae is rather different. This subfamily was proposed by Roewer (1934) for genera

with uni-segmented (undivided) leg telotarsi, a delimitation that was subsequently adopted by Mello-Leitão (1938). Oddly enough, the monotypic genus *Saronomus* Kraepelin, 1900, type of Saronominae, does not fit this delimitation as it has the telotarsi of the walking legs 2- (legs II and III) or 3-segmented (leg IV), as pointed out by Maury (1982). Contrariwise, during this investigation, *Saronomus* was found to have several similarities to *Ammotrecha*, to the extent that it features most of the aspects here set up for Ammotrechinae. This fact gives a sharp indication that *Saronomus* could be closely related to *Ammotrecha* and, in so doing, provokes the concern that Saronominae could require to be treated as a synonym of Ammotrechinae once a sound phylogenetic hypothesis exists for the family. This possibility is supported by the study of Iuri et al. (2021), which reached, in an independent manner, a similar conclusion. There is one single aspect by which *Saronomus capensis* (Kraepelin, 1899) does not completely fit into Ammotrechinae, as here redefined, which is the presence of a retroventral spiniform seta on the distal segment of the telotarsus of legs II and III, a seta that is absent in genera here ascribed to Ammotrechinae s.str., i.e., *Ammotrecha*, *Eutreacha*, and *Xenotrecha*. The absence of this retroventral spiniform seta could be synapomorphic for these three genera (and possibly others). Thus, this difference poses no obstacle to a possible close relationship between them and *Saronomus*. Apart from that, the chelicera of the male of *S. capensis* has a very characteristic morphology that is worth men-



tioning. That chelicera appears as though it had one FSD tooth, a secondary tooth that is absent in the conspecific female (Maury 1982: figs 1, 7). If this were the case, it would represent another difference between *Saronomus* and the other three mentioned genera. Careful examination of *S. capensis*, however, suggests that this peculiar, sexually dimorphic aspect of the cheliceral morphology of this species could be an artifact, produced by the presence of two FSM teeth (as opposed to one FSM and one FSD teeth) in the male, but only one in the female. This allows to consider the FSD tooth series as being absent in both sexes.

The current delimitation of Ammotrechinae is also problematic. Traditionally, Ammotrechinae has been delimited upon a few characters: tibia of legs II and III dorsally without apical spiniform seta, ventrally with pair of apical spiniform setae; telotarsi of legs I–III uni-segmented (undivided), of leg IV 3-segmented; telotarsus of leg IV with first (basal) segment longest, with two pairs of spiniform setae ventrally, second segment as long as broad or broader than long, with one pair of spiniform setae ventrally, third (distal) segment slightly shorter than first (Roewer 1934; Mello-Leitão 1938). The three species of *Ammotrecha* examined during this study do not suit this diagnosis of the subfamily by not having the telotarsi of legs II and III uni-segmented (undivided). This calls for the need to amend the subfamilial diagnosis to alleviate some of the existing discordance. In response to that, it is proposed that Ammotrechinae s.str., here defined upon a series of old and new characters, be recognized to group genera that fit the revised diagnosis that is provided for this subfamily. Accordingly, *Eutrecha* and *Xenotrecha* are herein formally placed into Ammotrechinae.

Many genera presently belonging into Ammotrechinae could not be examined during this investigation, thus preventing us from making a solid determination as to which of them fit into Ammotrechinae s.str. We abstain from making decisions on those genera and propose that they all be kept in Ammotrechinae s.l. until their systematic position can be properly addressed. Similarly, we do not make decisions on the status or composition of Saronominae, as the means to adequately address these aspects have not yet been granted.

## 2. Material and methods

### 2.1. Material

Material is deposited in the following collections: the American Museum of Natural History (AMNH), New York; the Natural History Museum (BMNH), London; the Coleção de História Natural, Universidade Federal do Piauí (CHNUFPI), Floriano, Brazil; the Instituto de Investigación de Recursos Biológicos “Alexander von Humboldt” (IAvH), Villa de Leyva, Colombia; the Arachnological Collection of the Instituto de Ciencias Naturales (ICN), Universidad Nacional de Colombia, Bogotá;

the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN), Buenos Aires, Argentina; the Manuel Ángel González Sponga (MAGS) Private Collection, presently housed at the Museo del Instituto de Zoología Agrícola “Francisco Fernández Yépez” (MIZA), Maracay, Venezuela; the Museu Nacional do Rio de Janeiro (MNRJ), Brazil; the Museo Javeriano de Historia Natural “Lorenzo Uribe, S.J.,” Pontificia Universidad Javeriana (MPUJ), Bogotá; the Museu de Zoologia, Universidade de São Paulo (MZUSP), Brazil; the Rijksmuseum van Natuurlijke Historie (RMNH), Leiden, The Netherlands; and the Zoologisches Museum der Universität Hamburg (ZMH), Germany. See full data of examined specimens in Table S1.

### 2.2. Descriptions and terminology

Style and terminology used for the taxonomic descriptions follow works on Mummuciidae by the first author (Botero-Trujillo 2016; Botero-Trujillo et al. 2017, 2019b, 2019a). Nomenclature for the spiniform setae on the basitarsi of the walking legs follows Botero-Trujillo et al. (2019a).

For the most part, the identification of individual teeth used the criteria for primary homology assessment of dentition (Bird et al. 2015: p. 83). Accordingly, the dentition of the male of *E. florezi* is here reinterpreted, based upon comparisons with the dentition of the conspecific female and with that of males of other species (Figs 2, 3). Some conflicting interpretations were identified in literature (e.g., Bird et al. 2015), regarding the identity of the RFM (retrofondal medial) tooth in Ammotrechidae and, as a byproduct, on whether an RFA (retrofondal apical) tooth is present in this family. According to Bird et al. (2015: p. 64), “Retrofondal apical teeth appear to be absent in, e.g., Ammotrechidae, Daesiidae, and Solpugidae (pl. 23).” However, in the referenced pl. 23 of these authors’ publication the retrofondal tooth adjacent to FP is identified as the RFA, and not as the RFM, in the ammotrechid *Pseudocleobis andinus* (Pocock, 1899), in a fashion similar to that of two mummuciid species also therein depicted. By contrast, illustrations of various ammotrechid species provided in other parts of that publication (Bird et al. 2015: figs 147, 148) – among them other illustrations of *P. andinus* – identify the tooth that occupies the same position on the finger (relative to FP) as corresponding to the RFM, and not to the RFA which, according to that interpretation, would be absent. Bird et al. (2015: p. 64), acknowledged difficulties in discerning between certain teeth of the retrofondal series, a difficulty that we can only agree with, especially when it comes to certain Ammotrechidae among the South American fauna. The difficulty to identify and homologize retrofondal teeth has further extended into Mummuciidae – compare designs for males of *Gaucha fasciata* Mello-Leitão, 1924 and a species of *Uspallata* Mello-Leitão, 1938 (Bird et al. 2015: pls. 23Z, 23a). However, it is currently widely accepted that in Mummuciidae the retrofondal tooth adjacent to FP is the RFA (e.g., Bird et al. 2015: pls.

151C, F, 152C; Botero-Trujillo 2016; Botero-Trujillo et al. 2017, 2019a; Carvalho and Botero-Trujillo 2019). All things considered, until novel research has re-addressed the homologies of the distal retrofendal teeth, the distal-most tooth of the retrofendal series of *Eutrech*a and *Xenotrech*a is here given the same identity assessment as in Mummuciidae and, therefore, considered to correspond to the RFA. Accordingly, it is herein considered that, in these genera, the second distalmost retrofendal tooth corresponds to the RFM whereas the RFSM tooth is absent (Figs 2, 3).

The term “movable finger retroventral longitudinal carina” (MRVC), first used by Botero-Trujillo (2018 [unpublished]), is adopted to identify a carina on the distal half or third of the cheliceral movable finger of males and females of some ammotrechid genera. Unlike the “movable finger retrolateral longitudinal carina” (MRLC), which consists of a series of granules along the retrolateral surface of the finger (extending into the retrolateral edge carina), the MRVC consists of a smooth and pronounced ridge situated distally on the retroventral surface (Figs 2, 3). Iuri et al. (2021: p. 152) interpreted this carina as a displaced MRLC, when describing it as “movable finger mucron retrolateral carina running near the ventral margin” (see Iuri et al. 2021: fig. 5A). Here, the MRVC is considered a different structure in alignment with Botero-Trujillo (2018 [unpublished]). The term “fixed finger median apical diastema” (FMAD), by definition a distinct notch between FSD and FD teeth (Botero-Trujillo et al. 2017), is here used to identify a notch between FM and FD in males of *Eutrech*a. Since the FSD tooth series is absent in this genus (and others), the FMAD needs to be understood as a notch between FD and whichever the tooth closest to it is (FM or FSD). The term “plumose setiform organ” is established for the featherlike structure that is present on the prolateral surface of the flagellum of *X. huebneri* and is used in replacement of other names applied to this structure in the past, such as plumose hair (Maury 1982) or plumose seta (Bird et al. 2015). The term “ctenidia” is used in the same way used by Maury (1982) for the genera *Eutrech*a and *Xenotrech*a, making reference to short setae that, in these genera, are somewhat “fleshy” in appearance and occur on certain opisthosomal sternites of males only.

### 2.3. Examination and documentation

Photographs of preserved specimens of *E. florezi* and *X. huebneri*, obtained at the MACN, were taken with a Leica DFC 290 digital camera adapted to a Leica M165 C stereomicroscope. Those of *E. belenensis*, obtained at the IAvH, were taken with a Leica MC-190HD digital camera attached to a Leica S8Ap0 stereomicroscope. Extended focal range images were composed with Helicon Focus 6.2.2 Pro software (available at <http://www.heliconsoft.com/heliconsoft-products/helicon-focus>). For SEM preparations, pieces were dissected, cleaned with a fine-bristle paintbrush, dehydrated via 80% – 87% – 96% – 100% ethanol series, fixed to aluminum stubs, and

gold-palladium coated in a VG Scientific SC 7620 mini sputter-coater. SEM micrographs were taken under high vacuum with a Philips FEI XL30 TMP at the MACN. Vector images were produced from photos in Adobe Illustrator 2020. The distribution map was produced using ArcGIS 10.3 (Environmental Systems Research Institute – ESRI 2014, Redlands, California).

### 2.4. Comparative material

The following specimens, belonging to other genera of Ammotrechidae, were examined during the present investigation to evaluate the occurrence of selected morphological features. These include representatives of the five ammotrechid subfamilies and of the type genus of all but Mortolinae.

*Ammotrech*a *itzaana* Muma, 1986: **MEXICO**: Yucatán: Chichén Itzá [20°41'03.43"N 88°34'04.02"W], L.J. Stannard, holotype ♂, paratype ♂ (AMNH IZC 325113).

*Ammotrech*a *nigrescens* Roewer, 1934: specimens identified as types in the external label (BMNH old 1894.4.1.348): 1 ♂, 1 ♀, identified as “co-types,” Guatemala, F.D. Godman (Roewer N° 8606; BMNH old 1952.10.17.21–22). 1 ♂, Guatemala (BMNH old 1894.4.1.308). 2 ♀, without data, labeled “44.” 3 juveniles, without data, labeled “b03.”

*Ammotrech*a *stollii* (Pocock, 1895): specimens identified as types in the external label (BMNH old 1894.4.1.309–311): 1 ♀, identified as “type,” Guatemala, Retalhuleu [14°31'28.37"N 91°41'08.84"W, as “Retalhuleu”], O. Stoll (BMNH old 1894.4.1.309). Subadults (presumably ♀), identified as “co-types,” same data (Roewer N° 8605; BMNH old 1894.4.1.310–311). 2 ♀, North America, Colorado (Roewer N° 8672, N° 8673). 1 juvenile, without data, labeled “? S. Amer.” 1 ♂, labeled “22.” 1 juvenile, labeled “1412.”

*Nothopuga telteca* Iuri, 2021: **ARGENTINA**: Mendoza: Lavalley, Reserva Natural y Cultural Bosques Telteca, 100 m of Seccional El Pichón, 32°22'32.1"S 68°02'46.8"W, 558 m, 7–14.xi.2015, R. Botero-Trujillo and A.L. Carbajal, 4 ♂, 1 ♀ (MACN Ar).

*Olticola gomezi* Roewer, 1934: **ARGENTINA**: Mendoza: 6 Km W of El Retamo, 11.xii.1979, E.A. Maury and A. Roig, 1 ♂, 2 ♀, 2 juveniles (MACN Ar). Lavalley, Reserva Natural y Cultural Bosques Telteca, 100 m of Seccional El Pichón, 32°22'32.1"S 68°02'46.8"W, 558 m, 7–14.xi.2015, R. Botero-Trujillo and A.L. Carbajal, 4 ♂, 1 juvenile (MACN Ar).

*Procleobis patagonicus* (Holmberg, 1876): **ARGENTINA**: Río Negro: Valcheta, train station, 40°41'19.07"S 66°08'40.88"W, ii.2013, H.A. Iuri, 7 ♂, 3 ♀ (MACN Ar).

*Pseudocleobis huinca* Maury, 1976: **ARGENTINA**: Río Negro: Valcheta [40°40'49.69"S 66°09'46.09"W], 23.i.1975, E. Maury, A. Toth, P. Domínguez, and C. Césari, holotype ♂ (MACN Ar 6865), allotype ♀ (MACN Ar 6866), 1 ♂, 2 ♀ paratypes (MACN 6867). Valcheta, train station, 40°41'19.07"S 66°08'40.88"W, ii.2013, H.A. Iuri, 1 ♂, 4 ♀, 2 juveniles (MACN-Ar).

*Saronomus capensis* (Kraepelin, 1899): **COLOMBIA**: La Guajira: 5 km SE of Uribia, Merochón [11°43'N 72°19'W], at light on wall, B. Malkin, 2–3.ix.1969, 1 ♂ (AMNH IZC 325111). Ipapure [11°41'14.93"N 71°55'31.01"W], 22–23.ix.1968, B. Malkin, 1 ♀ (AMNH IZC 325112).

### 3. Results

#### 3.1. Systematics

##### Family Ammotrechidae Roewer, 1934

##### 3.1.1. Subfamily Ammotrechinae Roewer, 1934

Figs 1–19, Table 1

Ammotrechinae Roewer, 1934: 590–591; Mello-Leitão 1938: 22; Muma 1951: 123; Muma 1970: 44; Muma 1971: 11–12; Muma 1976: 24–25; Harvey 2003: 200; Brookhart and Brookhart 2006: 323.

**Revised diagnosis.** Ammotrechinae s.str. genera feature the one characteristic that typically defines Ammotrechidae: having the flagellum of the chelicera of males shaped as an open bowl, with the opening placed prolaterally (i.e., facing the opposite chelicera) (e.g., Figs 6A, 8D, 16A) (Roewer 1934; Maury 1984; Bird et al. 2015). Ammotrechinae s.str., as defined in these lines, is presumed to be a monophyletic group of solifuges (see generic composition below) that exhibit the following combination of features (applicable to males and females unless otherwise specified). **i)** Cheliceral movable finger with retroventral longitudinal carina (MRVC) (Figs 2, 3). **ii)** Movable finger prolateral (MPL) tooth present (Fig. 6B). **iii)** Cheliceral fixed finger without subdistal (FSD) tooth/teeth (Figs 2, 3). **iv)** Fixed finger of female with pronounced angular dorsal crest at level of FP-RFA tooth (Figs 3A, 9A, B, 14A, B). **v)** Pedipalp femur retroventral surface with a suture-like cleavage plane that allows autotomy (Figs 17, 18). **vi)** Legs II and III without retroventral spiniform setae on distal segment of telotarsus.

**Revised generic composition.** Ammotrechinae s.str.: *Ammotreacha* Banks, 1900, *Eutreacha* Maury, 1982, *Xenotreacha* Maury, 1982. Other genera in Ammotrechinae s.l.: *Ammotrechella* Roewer, 1934, *Ammotrechesta* Roewer, 1934, *Ammotrechinus* Roewer, 1934, *Ammotrechula* Roewer, 1934, *Antillotreacha* Armas, 1994, *Campostreacha* Mello-Leitão, 1937, *Chileotreacha* Maury, 1987, *Mummuciona* Roewer, 1934, *Neocleobis* Roewer, 1934, and *Sedna* Muma, 1971.

**Remarks.** Two monotypic genera, *Mummuciona* Roewer, 1934 and *Sedna* Muma, 1971, were listed, incorrectly, as members of Mummuciidae in Harvey's (2003) catalogue. Maury (1982) transferred *Mummuciona* to Ammotrechidae – which that author already considered as a family separate from Mummuciidae despite not having yet formally elevated Mummuciinae to the family rank, which he did shortly thereafter (Maury 1984) – whereas the same author transferred *Sedna* to the same family a few years later (Maury 1987). Although both genera have

since remained unassigned into Ammotrechidae, Iuri et al. (2021) recovered *Sedna* as belonging to an unresolved clade containing Ammotrechinae and Saronominae genera and proposed that *Mummuciona* could potentially belong to the same clade. In the absence of conclusive phylogenetic data on the systematic position of *Mummuciona* and *Sedna*, both genera are here included, conservatively, into Ammotrechinae s.l. The same decision is made for *Chileotreacha*, which Iuri et al. (2021) recovered in the same clade as *Sedna*.

##### 3.1.2. *Eutreacha* Maury, 1982

<http://zoobank.org/5DD9F28C-C72D-4402-B6FD-D3B43A1E4384>

Figs 1, 2, 4–10; Table 1

*Eutreacha* Maury, 1982: 125, 138; Harvey 2003: 210; Hernández and Colmenares 2008: 447; Acosta-Berrocal et al. 2017: 64; Villareal-Blanco et al. 2017: 139, 142, fig. 15; Iuri et al. 2021: 153.

**Revised diagnosis.** A member of Ammotrechinae s.str. as herein defined. *Eutreacha* is presumed to be a monophyletic group of solifuges, whose males exhibit the following combination of features that allows to readily distinguish the genus from all other genera in Ammotrechinae s.l. **i)** Cheliceral fixed finger with FSM, FM, and FD teeth moderately reduced (i.e., evidently visible but smaller than MSM tooth of movable finger, in *E. belenensis*) (Figs 2C, 5B, 6) to much reduced or undistinguishable (*E. florezi* and *E. longirostris*) (Figs 2A, B, 8B). **ii)** Cheliceral fixed finger with medial notch (MN) between FM and FSM teeth, when these teeth are present (even if greatly reduced) (Figs 2B, C, 5B, 6, 8B). **iii)** Fixed finger median apical diastema (FMAD) present between FM and FD teeth, when these are present (Figs 2B, C, 5B, 8B). **iv)** Flagellum without prolateral plumose setiform organ (Figs 5D, 8D). **v)** Ctenidia, in the form of short “fleshy” setae, present only on 1st post-genital sternite (spiracular sternite I) (Figs 4D, 7B).

**Affinities.** In having the same or similar pattern of spiniform setae on the basitarsi and telotarsi of the walking legs and the same segmentation pattern of the leg telotarsi, *Eutreacha* most closely resembles *Xenotreacha* than it does resemble *Ammotreacha*.

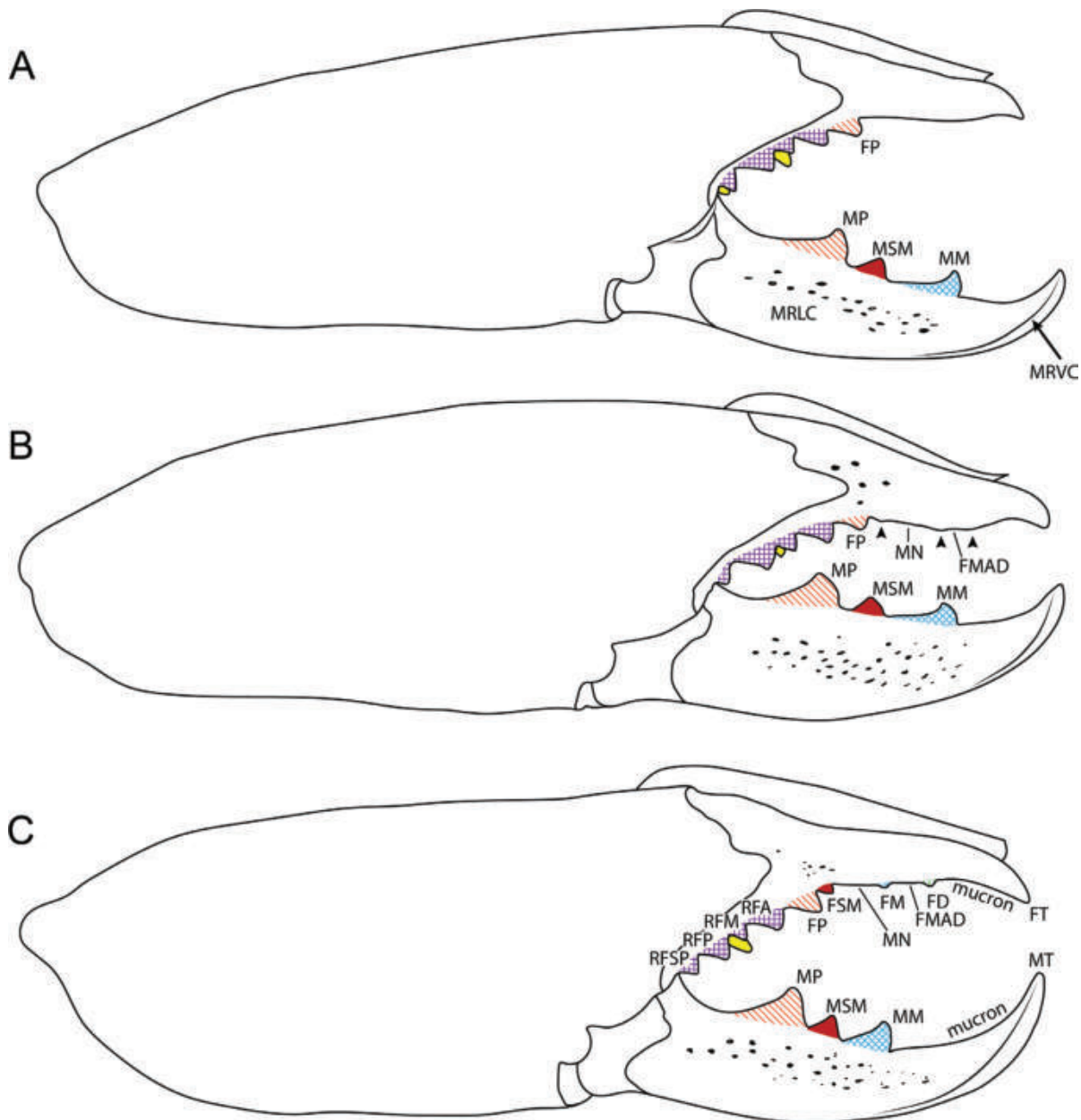
**Species composition.** *Eutreacha belenensis* sp. nov.; *Eutreacha florezi* Villareal-Blanco, Armas and Martínez 2017; *Eutreacha longirostris* Maury, 1982.

##### 3.1.3. *Eutreacha belenensis* sp. nov.

<http://zoobank.org/47E7B90D-ECCB-4855-951F-729291FC3483>

Figs 1, 2C, 4–6; Table 1





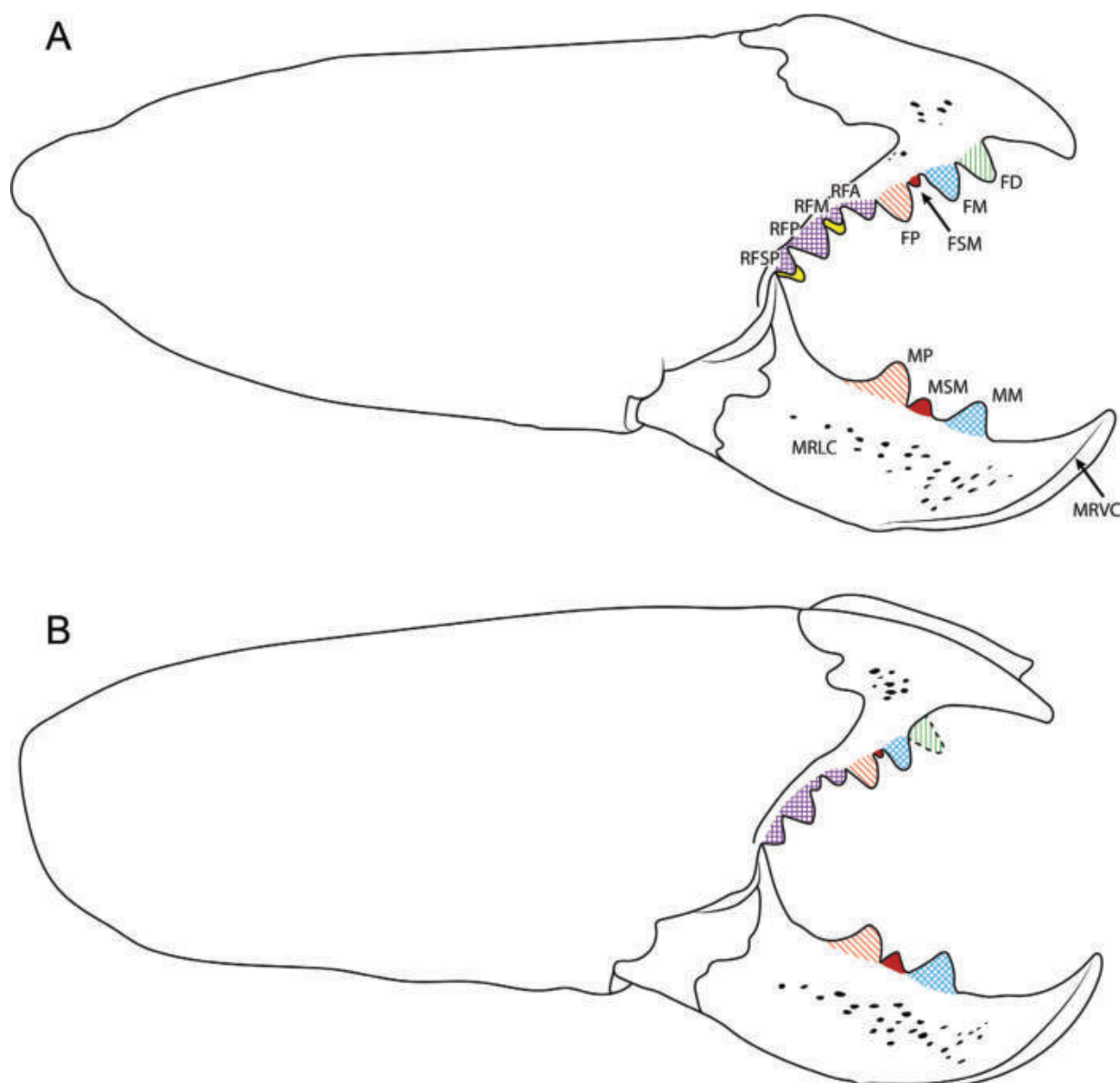
**Figure 2.** *Eutreacha* Maury, 1982, schematic representation of cheliceral morphology, retrolateral aspect. **A** *Eutreacha longirostris* Maury, 1982, holotype ♂ (MAGS 167). **B** *Eutreacha florezi* Villareal-Blanco, Armas and Martínez, 2017, ♂ (IAvH I 472), Santuario de Flora y Fauna Los Colorados, Bolívar Department, Colombia. **C** *Eutreacha belenensis* sp. nov., holotype ♂ (ICN Aso 008). Abbreviations: FD, fixed finger, distal tooth; FM, fixed finger, medial tooth; FMAD, fixed finger, median apical diastema; FP, fixed finger, proximal tooth; FSM, fixed finger, submedial tooth; FT, fixed finger, terminal tooth; MM, movable finger, medial tooth; MN, movable finger, medial notch; MP, movable finger, proximal tooth; MRLC, movable finger, retrolateral carina; MRVC, movable finger, retroventral longitudinal carina; MSM, movable finger, submedial tooth; MT, movable finger, terminal tooth; RFA, retrofondal apical tooth; RFM, retrofondal medial tooth; RFP, retrofondal proximal tooth; RFSP, retrofondal subproximal tooth. Arrowheads in B indicate extremely reduced FSM, FM, and FD teeth.

**Material examined. Holotype. COLOMBIA** • 1 ♂; Norte de Santander, Playa de Belén, Área protegida Los Estoraques, Centro Administrativo; 08°13'15.3"N 73°14'18.25"W; 1400 m.a.s.l.; 17 Dec. 2015; E. Henao leg.; ICN Aso 008.

**Etymology.** Latinized gentilicium that identifies this species as an inhabitant of Playa de Belén.

**Diagnosis.** The male of *Eutreacha belenensis* features a series of morphological characteristics, each unique to

this species among known species of *Eutreacha*, which allow to readily separate it from its congeners and provides a robust delimitation of the species on morphological grounds. These are: **i)** Cheliceral fixed finger with FM and FD teeth reduced in size (e.g., smaller than MSM, which is of normal size for a secondary tooth), yet both teeth evident (Figs 2C, 5B, 6). **ii)** Ventral margin of fixed finger asetose area (i.e., where distal teeth are situated) predominantly linear in lateral aspect (Figs 2C, 5B). **iii)** Movable finger of male moderately robust (e.g., relative



**Figure 3.** *Xenotrecha huebneri* (Kraepelin, 1899), schematic representation of cheliceral morphology, retrolateral aspect. **A** ♀ (CHNUFPI 1248), Serra do Tepequém, Roraima State, Brazil. **B** ♂ (CHNUFPI 1247), same locality. Abbreviations: FD, fixed finger, distal tooth; FM, fixed finger, medial tooth; FP, fixed finger, proximal tooth; FSM, fixed finger, submedial tooth; MM, movable finger, medial tooth; MP, movable finger, proximal tooth; MRLC, movable finger, retrolateral carina; MRVC, movable finger, retroventral longitudinal carina; MSM, movable finger, submedial tooth; RFA, retrofondal apical tooth; RFM, retrofondal medial tooth; RFP, retrofondal proximal tooth; RFSP, retrofondal subproximal tooth.

to height of MP tooth) (Figs 2C, 5D). **iv**) MM tooth moderately smaller than MP, larger than MSM (Figs 2C, 5B, D, 6B). **v**) MM tooth adjacent to MSM (Figs 2C, 5B, D). **vi**) Fixed finger mucron length more than twice height at its base; movable finger mucron length at least three times height at its base (Figs 2C, 5B, D). **vii**) Stridulatory apparatus consisting of a single set of ridges, all subparallel to the manus ventral surface (Fig. 5C, D). **viii**) Flagellum narrowing distally in prolateral aspect, apex entire (non-bifid) (Figs 5C, D, 6). **ix**) Attachment point of the flagellum subcircular (Fig. 5D). **x**) Pedipalp tibia and basitarsus with ventral rows of about seven to nine spiniform setae each (Fig. 4B, C). **xi**) Basitarsi of walking legs II and III, each with three proventral and two retrolateral spiniform setae (in addition to others on retroventral and

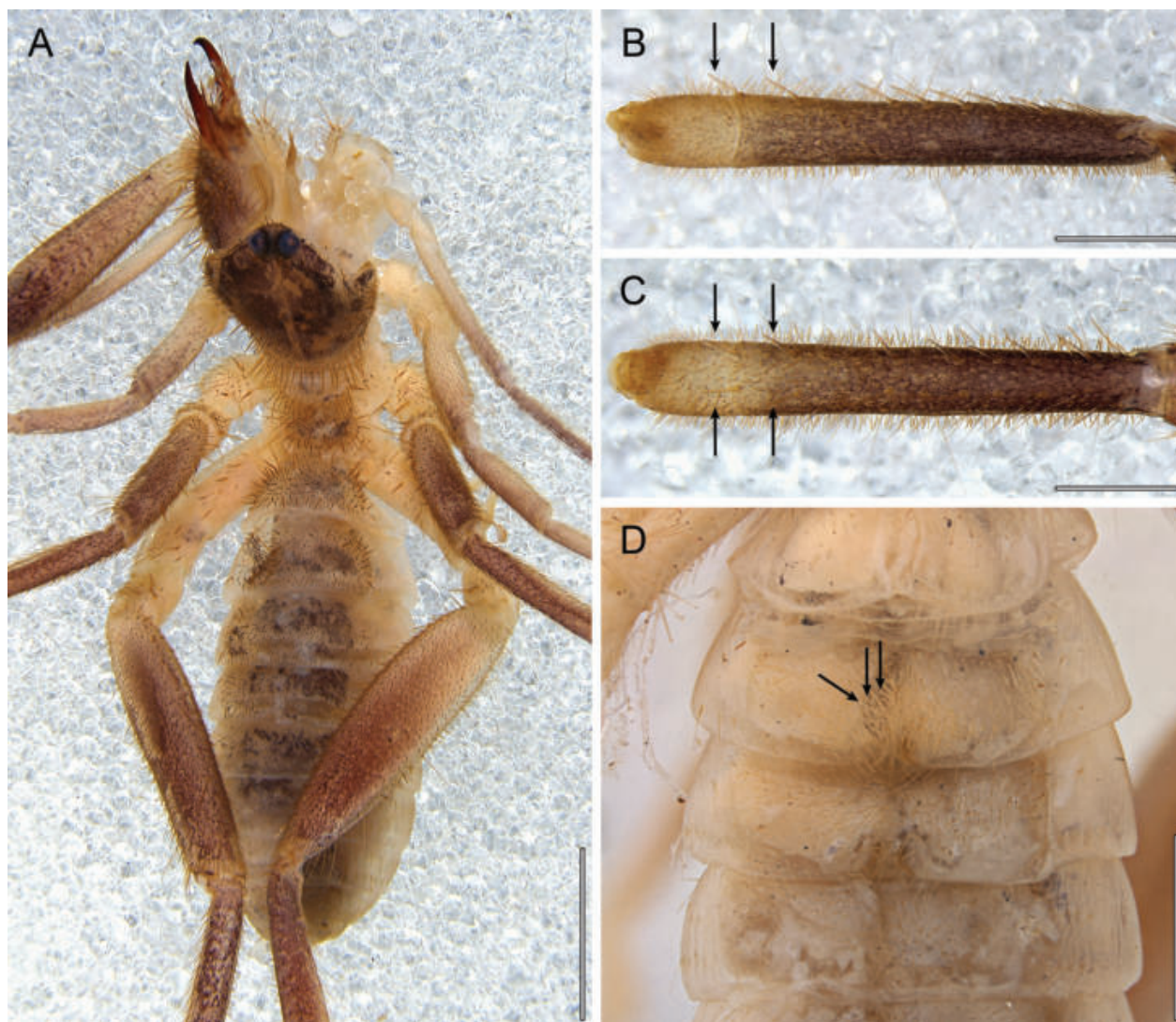
retrodorsal series). **xii**) Basitarsus of leg IV with two distal retroventral spiniform setae (in addition to others on proventral series). **xiii**) Opisthosoma of male, ctenidia arranged into a single large area on 1st post-genital sternite (spiracular sternite I) (Fig. 4D).

**Description of male.** Based on holotype (ICN Aso 008).

— **Measurements.** Linear measurements in Table 1.

**Color.** In 80% ethanol-preserved specimen. Prosomal dorsal shields and opisthosomal tergites with overall brown coloration (Fig. 4A). Propeltidium with abundant dark brown areas, several paler spots distributed unevenly, and a median longitudinal pale brown line; ocular tubercle blackish. Meso-, metapeltidium, and opisthosomal tergites predominantly light brown, with small dark spots.

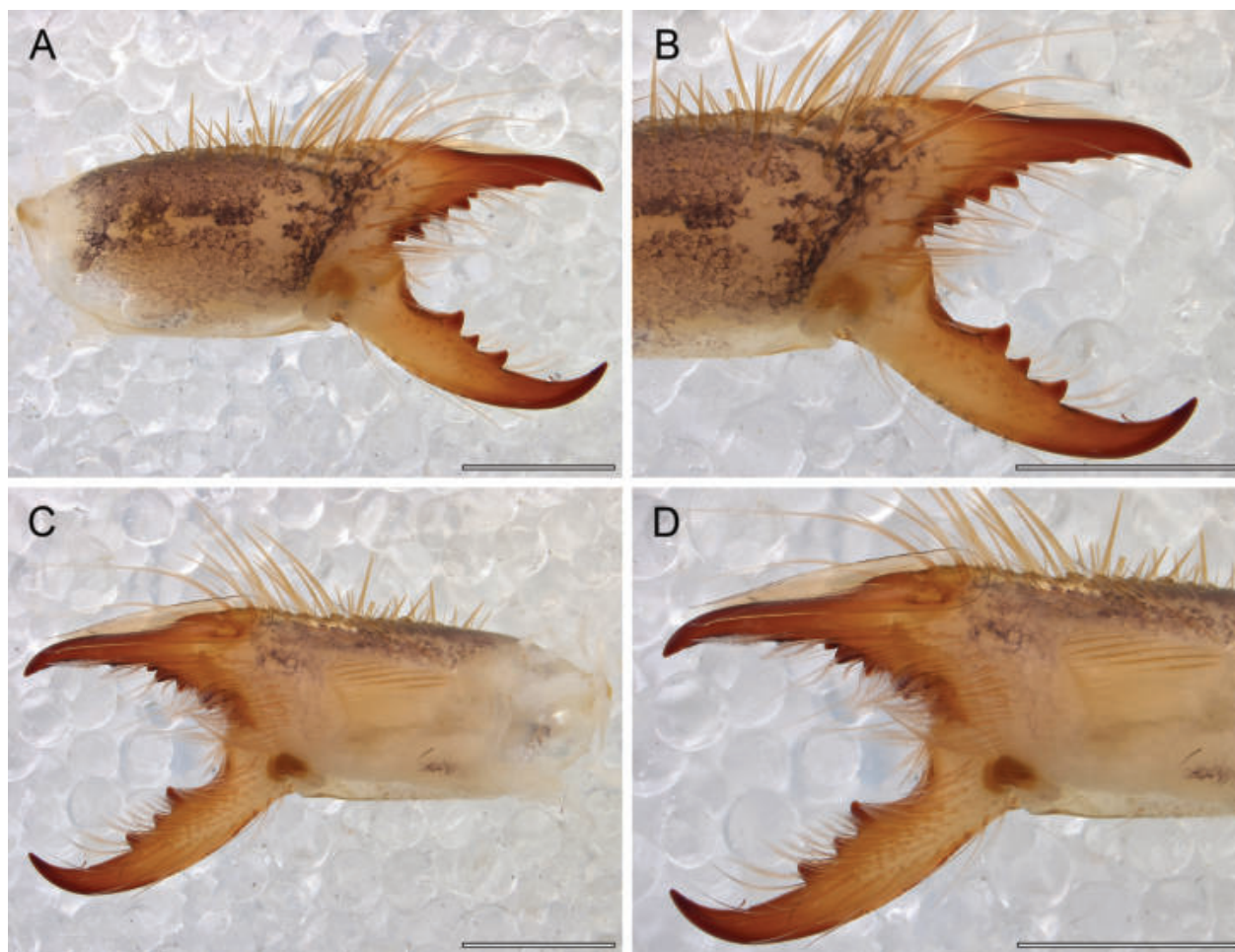




**Figure 4.** *Eutrecha belenensis* sp. nov., holotype ♂ (ICN Aso 008), habitus, dorsal aspect (A), sinistral pedipalp basitarsus and telotarsus, prolateral (B) and ventral (C) aspects, anterior opisthosomal sternites, with spiracular sternites centered (D). Scale bars = 2 mm (A, D), 1 mm (B, C). Arrows: spiniform setae (in B and C); ctenidia on 1st post-genital sternite (in D).

Chelicerae, base color pale brown (same as pale propeltidial areas) (Fig. 5A, B), with three dark brown longitudinal stripes on prodorsal, dorsal, and retrolateral surfaces of manus, which are interconnected distally by a broad, transverse stripe and posteriorly by a narrow, weakly defined stripe; stridulatory plate immaculately yellow (Fig. 5C, D), with a proventral proximal brown spot. Asetose area of fixed and movable fingers reddish, with all teeth darkened (Fig. 5B, D); movable finger setose area with ventral, brown-spotted area. Coxosternal region, opisthosomal sternites (Fig. 4D), pleural membranes, trochanters of legs and pedipalps (Fig. 4A), basifemora and telofemora of legs II–IV, and femur of leg I immaculately yellowish white; malleoli white. Pedipalp femur, tibia, and basitarsus dark brown (Fig. 4A, B), with faint paler areas; telotarsus yellowish (Fig. 4B, C). Legs with patella, tibia, basitarsus, and telotarsus brownish (Fig. 4A), with coloration pattern similar to that of pedipalps but paler. — **Prosoma.** Propeltidium wider than long (Table 1); central region covered with short, spicule-like stout setae which become longer towards the outer borders (Fig. 4A); the

longer of these setae fall off and break easily, unlike the shorter ones; all setae seem to be apically worn. Ocular tubercle slightly elevated, with abundant macrosetae. Anterolateral propeltidial lobes separated from the propeltidium principal shield by incomplete lateral groove. Eyespots elongated. Meso- and metapeltidium wider than long, with abundant long macrosetae (Fig. 4A). Coxae densely covered with abundant thin setae. Sternum glabrous. — **Chelicera-dentition and processes.** Fixed finger with median teeth series comprising well-developed FP tooth, whereas other primary teeth (FM and FD), as well as the FSM tooth, are small (Figs 2C, 5B, 6); FSD tooth absent; FM and FD teeth, each importantly displaced distally in the finger relative to the contiguous, more proximal tooth (FSM and FM, respectively), such that a medial notch (MN) and a median apical diastema (FMAD) are present; retrofondal teeth series uninterrupted (i.e., without FRFD), with four teeth (RFSP, RFP, RFM, RFA) (Fig. 6); basal retrofondal margin heavily sclerotized (Fig. 6A); profondal teeth series consisting of four teeth (PFSP, PFP, PFSM, PFM) (Fig. 6B). Fixed fin-

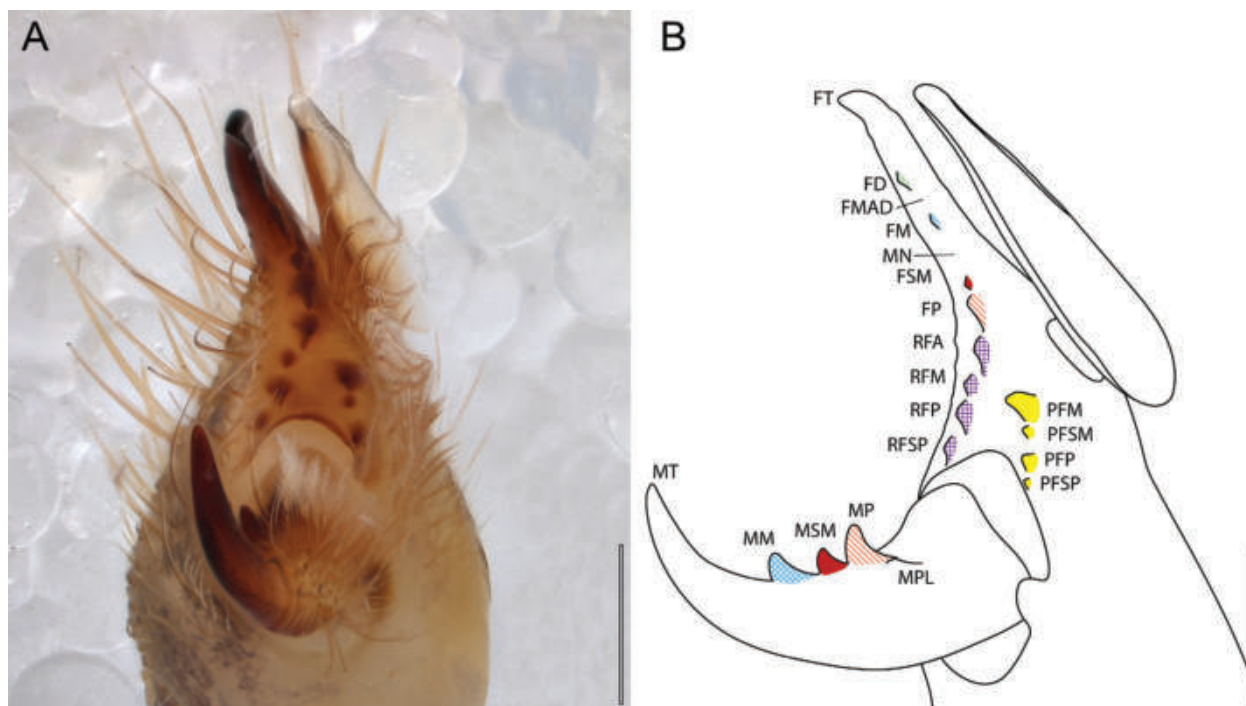


**Figure 5.** *Eutrecha belenensis* sp. nov., holotype ♂ (ICN Aso 008), dextral chelicera, retrolateral aspect (A) and close-up of fingers (B), prolateral aspect (C) and close-up of fingers and stridulatory plate (D). Scale bars = 1 mm.

ger asetose area sinuous, with ventral margin predominantly linear in lateral aspect; prodorsal carina sharp, not elevated in lateral aspect, without angular dorsal crest; proventral carina weakly pronounced on the mucron area; fixed finger retrolateral carina (FRLC) absent. Fixed finger mucron without subterminal (FST) teeth; apex (FT tooth) curved, hook shaped. Movable finger with median teeth series comprising well-developed MP and MM primary teeth, the former of which is larger, and one MSM secondary tooth that is smaller than MM (i.e., MP > MM > MSM) (Figs 2C, 5B); MP, MSM, and MM close together; MP and MM each adjacent to MSM; MSM upright and triangular. Movable finger prolateral carina (MPLC) evident, ending slightly basal to MP in a small prolateral (MPL) tooth (Fig. 6B). Movable finger without subproximal (MSP) or subterminal (MST) teeth; movable finger retroventral longitudinal carina (MRVC) present on distal half, or third, of finger, forming a smooth elevated ridge (Figs 2C, 5B); retrolateral longitudinal carina (MRLC) consisting of abundant conspicuous granules scattered on the retrolateral surface of finger. Movable finger mucron moderately long, with gnathal edge carina ordinary (not convex). Closure of RFA tooth basal to MP, of MM tooth distal to FM, when fingers are closed. — **Chelicera-setose areas and stridulatory plate.** Retrolateral and dorsal surfaces with abundant retrolateral manus (*rlm*) and

retrolateral finger (*rlf*) setae, of different sizes, which are predominantly straight and rigid (Figs 4A, 5); some of these setae are arranged in bilaterally symmetrical pattern, as are some principal retrolateral finger (*principal rlf*) setae that are more flexible than others; movable finger retrolateral proximal setal cluster (*rlpc*) dorsally with a single, long and markedly plumose seta. Prolateral surface with array of setal types (Fig. 5D), as follows: proventral distal (*pvd*) setae consisting of row of plumose setae, starting at level of the interdigital condyle (*pic*) and ending near level of RFA tooth; proventral subdistal (*pvsd*) setae arranged in rather disorganized pattern, *pvsd* comb not markedly differentiated; carpet-like field of bristle-like promedial (*pm*) setae broad. Stridulatory plate longer than high, occupying most of the prolateral surface of manus (Fig. 5C, D); stridulatory apparatus consisting of a single set of ridges, 6 or 7 in number, dorsalmost vestigial, all approximately parallel to the manus ventral surface. Distal limit of the prolateral setose area of movable finger reaching midpoint between MSM and MM teeth; movable finger prodorsal (*mpd*) setal series consisting of plumose setae arranged in a rather staggered row, adjacent to abundant non-plumose setae of the movable finger promedial (*mpm*) and proventral (*mpv*) setal series. — **Chelicera-flagellum.** Of the composite type, without shaft. A thin, translucent, membranous structure immov-





**Figure 6.** *Eutreacha belenensis* sp. nov., holotype ♂ (ICN Aso 008), dextral chelicera, fixed finger, ventral aspect (A), schematic representation of fixed and movable fingers dentition, proventral aspect (B). Scale bars = 0.5 mm. Abbreviations: FD, fixed finger, distal tooth; FM, fixed finger, medial tooth; FMAD, fixed finger, median apical diastema; FP, fixed finger, proximal tooth; FSM, fixed finger, submedial tooth; FT, fixed finger, terminal tooth; MM, movable finger, medial tooth; MN, movable finger, medial notch; MP, movable finger, proximal tooth; MPL, movable finger, prolateral tooth; MSM, movable finger, submedial tooth; MT, movable finger, terminal tooth; PFM, profondal medial tooth; PFP, profondal proximal tooth; PFSM, profondal submedial tooth; PFSP, profondal subproximal tooth; RFA, retrofondal apical tooth; RFM, retrofondal medial tooth; RFP, retrofondal proximal tooth; RFSP, retrofondal subproximal tooth.

ably attached prodorsally to the fixed finger (Figs 5D, 6); flagellar base general aspect bowl-shaped, long, and narrowing distally in prolateral aspect, nearly reaching the apex of the finger on its distal end; apex entire (non-bifid), bearing small spicules; attachment point subcircular, placed at the level of PFSM tooth. — **Pedipalp.** All segments coated with abundant short setae (Fig. 4A–C); those on ventral surface of tibia, basitarsus, and telotarsus stouter and more distinct than those on other surfaces. Femur with spicule-like macrosetae; tibia with proventral and retroventral rows of eight spiniform setae each, which are short and stout; basitarsus with proventral and retroventral rows of seven to nine spiniform setae each (Fig. 4B, C), stronger and longer than those on tibia; telotarsus without spiniform setae. Femur, tibia, basitarsus, and telotarsus with few long thin setae; clubbed setae apparently absent. Retroventral surface of femur proximally with a suture-like cleavage plane. Telotarsus with retrodorsal pore area on distal third. — **Leg I.** All segments coated with abundant short setae similar to those on pedipalps (Fig. 4A), without stout or spiniform setae; tibia and basitarsus with few long thin setae. Telotarsus with apical retrodorsal pore area similar to that of pedipalp; without claws or spiniform setae. — **Walking legs.** Covered with abundant short and a few long setae, like those on pedipalps and legs I (Fig. 4A). Legs II and III: basitarsus with seven or eight spiniform setae: three proventral (distal, subdistal, and sub-basal), one or rarely two retro-

ventral (distal), two retrolateral (subdistal and basal), and one retrodorsal (distal); telotarsus bi-segmented (consisting of large basal and small distal segments), with proventral row of four to six spiniform setae (along basal and distal segments) and a retroventral row of three or four (along basal segment only), in 2.2.2/1, 2.2.2/1.1, or 2.2.2.2/1.1 pattern; in addition, the basal segment of sinistral leg II telotarsus bears two extra spiniform setae adjacent to the retrolateral series (not aligned with the row but in more submedial position). Leg IV: basitarsus with row of three/four proventral and two distal retroventral spiniform setae; telotarsus 3-segmented (the two segmentation lines are complete), with proventral and retroventral rows of four spiniform setae each (along basal and median segments only), in 2.2.2/2/0 pattern. — **Opisthosoma.** Tergites with abundant setae similar to those on propeltidium (Fig. 4A); setation of the sternites comparable to that of coxae. Ctenidia present on 1st post-genital sternite (spiracular sternite I) (Fig. 4D); ctenidia in the form of abundant, short “fleshy” setae, densely arranged into what looks like a single large area on the sternite; other sternites without ctenidia.

**Female.** Unknown.

**Distribution.** *Eutreacha belenensis* is known only from the type locality in the department of Norte de Santander, Colombia (Fig. 1).



### 3.1.4. *Eutrecha florezi* Villareal-Blanco, Armas and Martínez, 2017

<http://zoobank.org/5CFAC13F-6AEA-4147-941F-5DE5EA-3D012A>

Figs 1, 2B, 7–10; Table 1

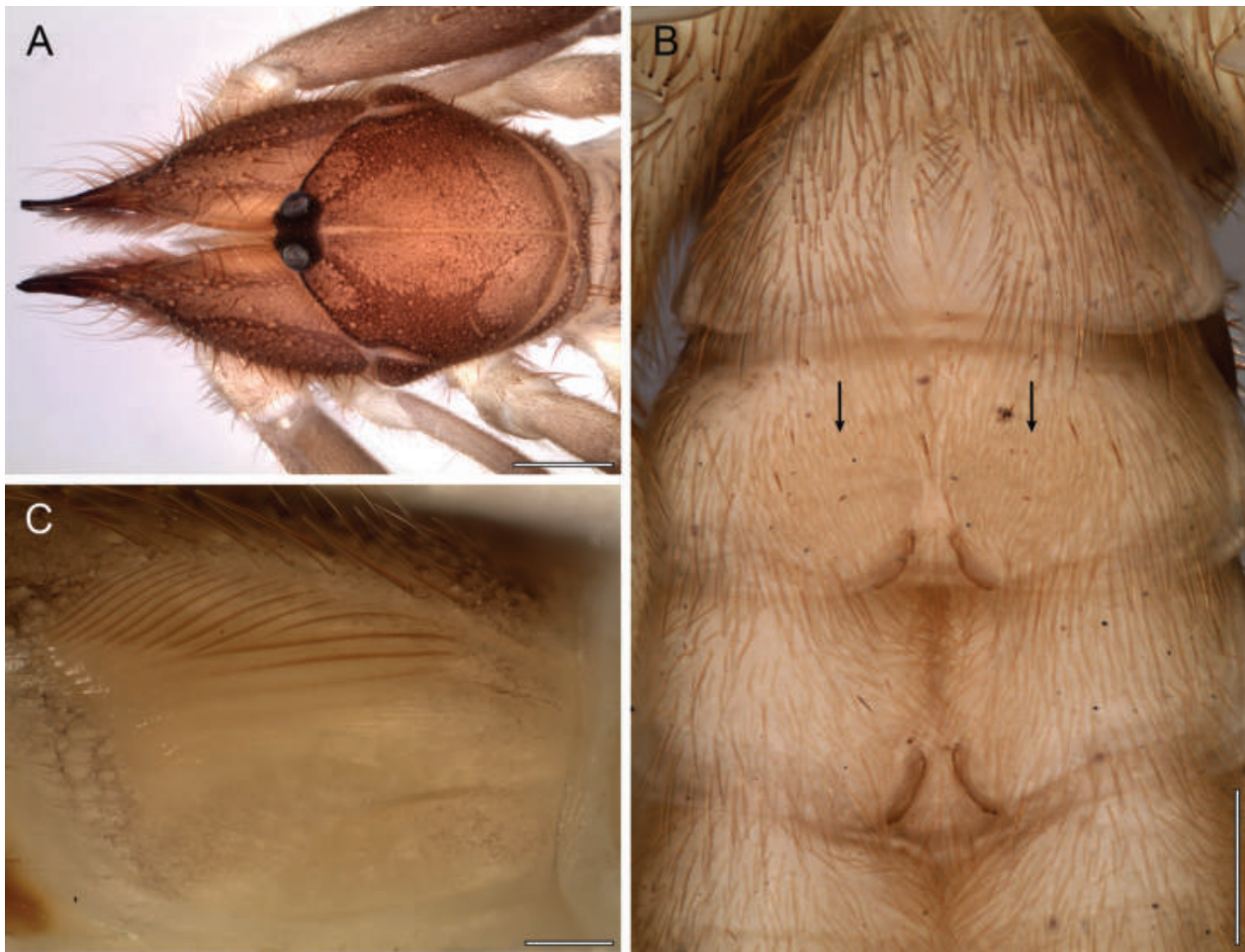
*Eutrecha florezi* Villareal-Blanco, Armas and Martínez, 2017: 140–143, figs 1–15.

**Material examined. Holotype.** COLOMBIA • 1 ♂, Bolívar, San Jacinto, Vereda Palenquito; 09°51'09.7"N 75°10'32.3"W; 324 m.a.s.l.; 06 Sep 2016; L. Martínez leg.; ICN Aso 015. **Paratypes.** • 1 ♀ (subadult), 1 juvenile; Atlántico, Usiacurí, Reserva Campesina La Montaña; 10°46'0.2"N 75°02'34.0"W; 47 m.a.s.l.; 22 Mar 2016; L. Martínez & E. Villareal leg.; ICN Aso 017; • 1 ♀, same data as preceding, except: 17 Oct 2015; L. Martínez & L. Quijano leg.; ICN Aso 016.

**Revised diagnosis.** *Eutrecha florezi* features a series of morphological characteristics that make it readily recognizable from *Eutrecha belenensis*. Conversely, not many aspects make *E. florezi* different from *E. longirostris*, species from which a solid morphological distinction will require of further research (see *E. longirostris*). Morphological characteristics of males of *E. florezi* by which this species differs from *E. belenensis* are: **i)** Cheliceral fixed finger with FSM, FM, and FD teeth extremely reduced (or undistinguishable) (Fig. 2B). **ii)** Ventral margin of fixed finger asetose area (i.e., where vestiges of distal teeth are situated) markedly emarginate in lateral aspect (Figs 2B, 8B). **iii)** Movable finger of male very robust (e.g., relative to the height of MP tooth) (Figs 2B, 8D). **iv)** MM tooth much smaller than MP, similar to or slightly smaller than MSM (Figs 2B, 8B, D). **v)** MM tooth displaced distally on finger, producing a diastema between MM and MSM (Figs 2B, 8B). **vi)** Fixed and movable finger mucra short, each with length no more than twice height at its base (Figs 2B, 8B, D). **vii)** Stridulatory apparatus consisting of two distinct sets of ridges, with ventral ridges subparallel to the manus ventral surface but dorsal ridges markedly oblique (Figs 7C, 8C). **viii)** Flagellum dorsal and ventral margins subparallel, apex bifid (Fig. 8D). **ix)** Attachment point of the flagellum elliptical, horizontally elongate (Fig. 8D). **x)** Pedipalp tibia and basitarsus with ventral rows of about three to six spiniform setae each. **xi)** Basitarsi of walking legs II and III, each with two proventral and one retrolateral spiniform setae (in addition to others on retroventral and retrodorsal series). **xii)** Basitarsus of leg IV with one distal retroventral spiniform seta (in addition to others on proventral series). **xiii)** Opisthosoma of male, ctenidia arranged into two paramedian areas on 1st post-genital sternite (spiracular sternite I) (Fig. 7B).

**Redescription of male.** Based on holotype and nontype male from Santuario de Flora y Fauna Los Colorados. — **Measurements.** Linear measurements in Table 1. — **Color.** In 80% ethanol-preserved specimens. Prosomal dorsal shields and opisthosomal tergites with overall brown coloration (Fig. 7A), traversed medially by a narrow longitu-

dinal yellow line that is most conspicuous on propeltidium and posterior opisthosomal segments. Propeltidium with a design of pale brown areas in a darker contour, one large that narrows anteriorly, and two small oval areas one on each side of the ocular tubercle, the latter of which is blackish; eyespots shiny white. Meso-, metapeltidium and opisthosomal tergites predominantly dark brown. Chelicerae, base color pale brown (same as pale propeltidial areas) (Fig. 8A, B), with three dark brown, narrow longitudinal stripes on prodorsal, dorsal, and retrolateral surfaces of manus, which fuse into a large brown retrolateral area on distal part of manus; stridulatory plate immaculately yellow (Figs 7C, 8C). Asetose area of fixed and movable fingers red, with all teeth darkened (Fig. 8B, D); movable finger setose area with ventral, brown-spotted area. Coxosternal region, opisthosomal sternites (Fig. 7B), pleural membranes, trochanters of legs and pedipalps, basifemora and telofemora of legs II–IV, and femur of leg I immaculately yellowish white; malleoli white. Pedipalp femur, tibia, and basitarsus dark brown, with faint paler areas; telotarsus yellowish. Legs with patella, tibia, basitarsus, and telotarsus yellowish to brown, with coloration pattern similar to that of pedipalps but notably paler. — **Prosoma.** Propeltidium longer than wide (Table 1); covered with small to medium-sized, spicule-like stout setae, straight and rigid (Fig. 7A); these setae fall off and break easily and, although some have shallowly bifid apex, others seem to be apically worn; at least the larger macrosetae exhibit a bilaterally symmetrical distribution on propeltidium. Ocular tubercle slightly elevated, with abundant macrosetae. Anterolateral propeltidial lobes separated from the propeltidium principal shield by incomplete lateral groove. Eyespots elongated. Meso- and metapeltidium wider than long, with abundant macrosetae similar to those on propeltidium. Coxae densely covered with abundant thin setae. Sternum glabrous. — **Chelicera-dentition and processes.** Fixed finger with median teeth series comprising well-developed FP tooth, whereas other primary teeth (FM and FD), as well as the FSM tooth, are extremely small, otherwise undistinguishable (Figs 2B, 8B); FSD tooth absent; FM and FD, when visible, each importantly displaced distally in the finger relative to the contiguous, more proximal tooth (FSM and FM, respectively), such that a medial notch (MN) and a median apical diastema (FMAD) are present; retrofodal teeth series uninterrupted (i.e., without FRFD), with four teeth (RFSP, RFP, RFM, RFA) (Fig. 2B); basal retrofodal margin heavily sclerotized; profondal teeth series consisting of four teeth (PFSP, PFP, PFSM, PFM). Fixed finger asetose area sinuous, with ventral margin notably curved in lateral aspect; prodorsal carina sharp, not elevated in lateral aspect, without angular dorsal crest; proventral carina weakly pronounced on the mucron area; fixed finger retrolateral carina (FRLC) obsolete, represented by few granules on the proximal region of the asetose area (Fig. 2B). Fixed finger mucron without subterminal (FST) teeth; apex (FT tooth) curved, hook shaped. Movable finger with median teeth series comprising well-developed MP and MM primary teeth, the former of which is notably larger, and one MSM secondary tooth

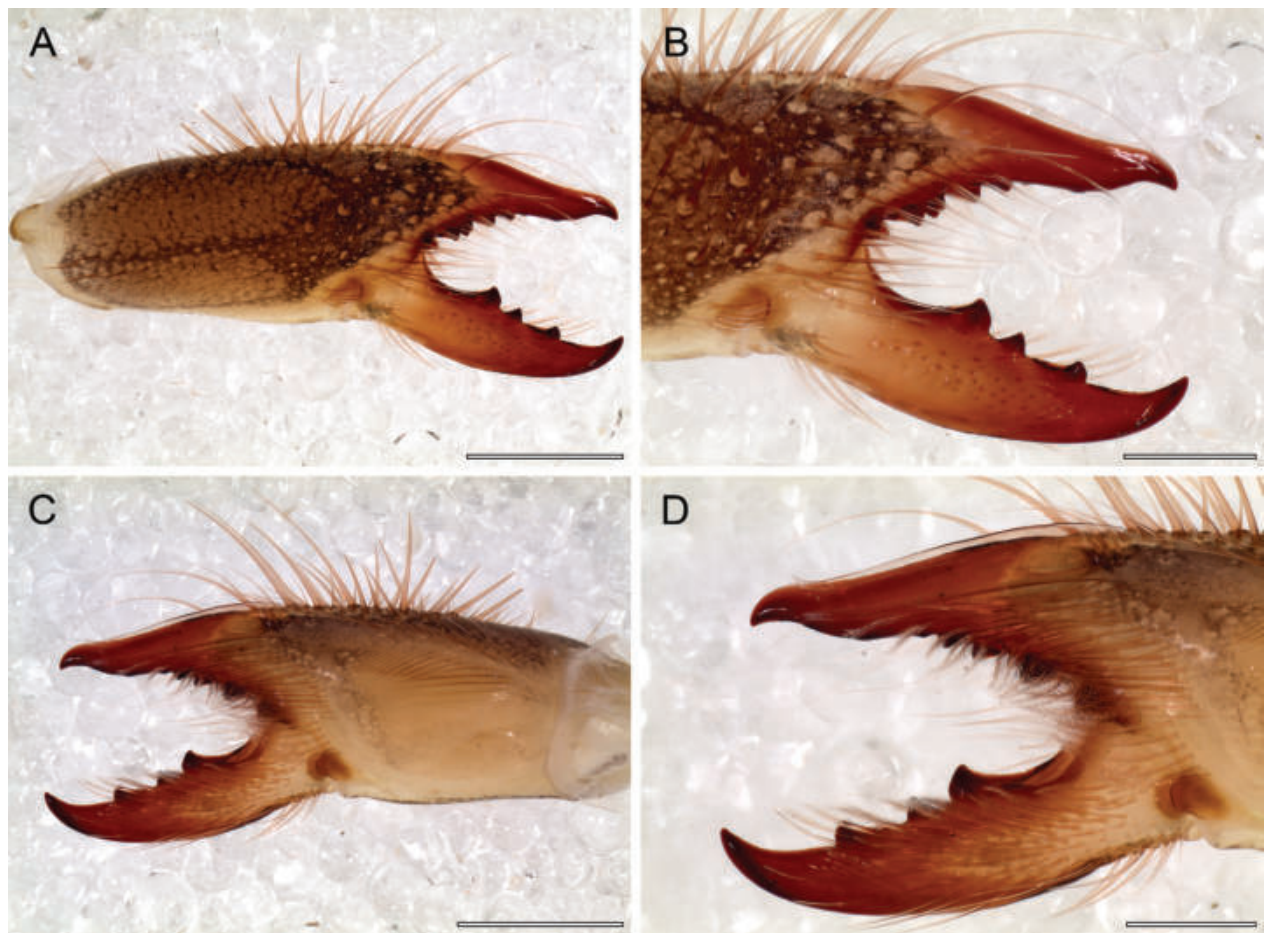


**Figure 7.** *Eutreacha florezi* Villareal-Blanco, Armas and Martínez, 2017, ♂ (IAvH I 472), Santuario de Flora y Fauna Los Colorados, Bolívar Department, Colombia, propeltidium (A), anterior opisthosomal sternites with spiracular sternites centered (B) [arrows indicate paramedian areas with ctenidia on 1st post-genital sternite], dextral chelicera, stridulatory plate, prolateral aspect (C) [note the modified stridulatory apparatus]. Scale bars = 1 mm (A, C), 0.5 mm (B).

that is similar in size to MM (i.e.,  $MP > MM \approx MSM$ ) (Figs 2B, 8B); movable finger MP and MSM teeth close to one another, MSM upright and triangular; MM displaced distally, producing a diastema between MM and MSM. Movable finger prolateral carina (MPLC) markedly developed, ending slightly basal to MP in a small but distinct prolateral (MPL) tooth, which is about half the size of MM and MSM tooth (Fig. 8D). Movable finger without subproximal (MSP) or subterminal (MST) teeth; movable finger retroventral longitudinal carina (MRVC) present on distal half, or third, of finger, forming a smooth elevated ridge (Figs 2B, 8B); retrolateral longitudinal carina (MRLC) consisting of abundant conspicuous granules scattered on the retrolateral surface of finger. Movable finger mucron short, with gnathal edge carina ordinary (not convex). Closure of RFA tooth distal to MP, when fingers are closed. — **Chelicera-setose areas and stridulatory plate.** Retrolateral and dorsal surfaces with abundant retrolateral manus (*rlm*) and retrolateral finger (*rlf*) setae, of different sizes, which are predominantly straight and rigid (Figs 7A, 8); some of these setae are arranged in bilaterally symmetrical pattern, as are some principal retrolateral finger (*principal rlf*) setae that are more flexible than others; movable finger retrolateral

proximal setal cluster (*rlpc*) dorsally with a single, long and markedly plumose seta. Prolateral surface with array of setal types (Fig. 8D), as follows: proventral distal (*pvd*) setae consisting of row of plumose setae, starting at level of the interdigital condyle (*pic*) and ending near level of RFA tooth; proventral subdistal (*pvsd*) setae arranged in rather disorganized pattern, *pvsd* comb not markedly differentiated; carpet-like field of bristle-like promedial (*pm*) setae narrow. Stridulatory plate longer than high, occupying most of the prolateral surface of manus (Fig. 8C); stridulatory apparatus consisting of two distinct sets of ridges: ventralmost set with 6 or 7 ridges approximately parallel to the manus ventral surface; dorsalmost set with 7–9 markedly oblique ridges (Figs 7C, 8C). Distal limit of the prolateral setose area of movable finger reaching the level of MSM tooth; movable finger prodorsal (*mpd*) setal series consisting of plumose setae arranged in a rather staggered row, adjacent to abundant non-plumose setae of the movable finger promedial (*mpm*) and proventral (*mpv*) setal series. — **Chelicera-flagellum.** Of the composite type, without shaft. A thin, translucent, membranous structure immovably attached prodorsally to the fixed finger (Figs 8D, 9D); flagellar base general aspect bowl-shaped, long and narrow, nearly reaching the apex





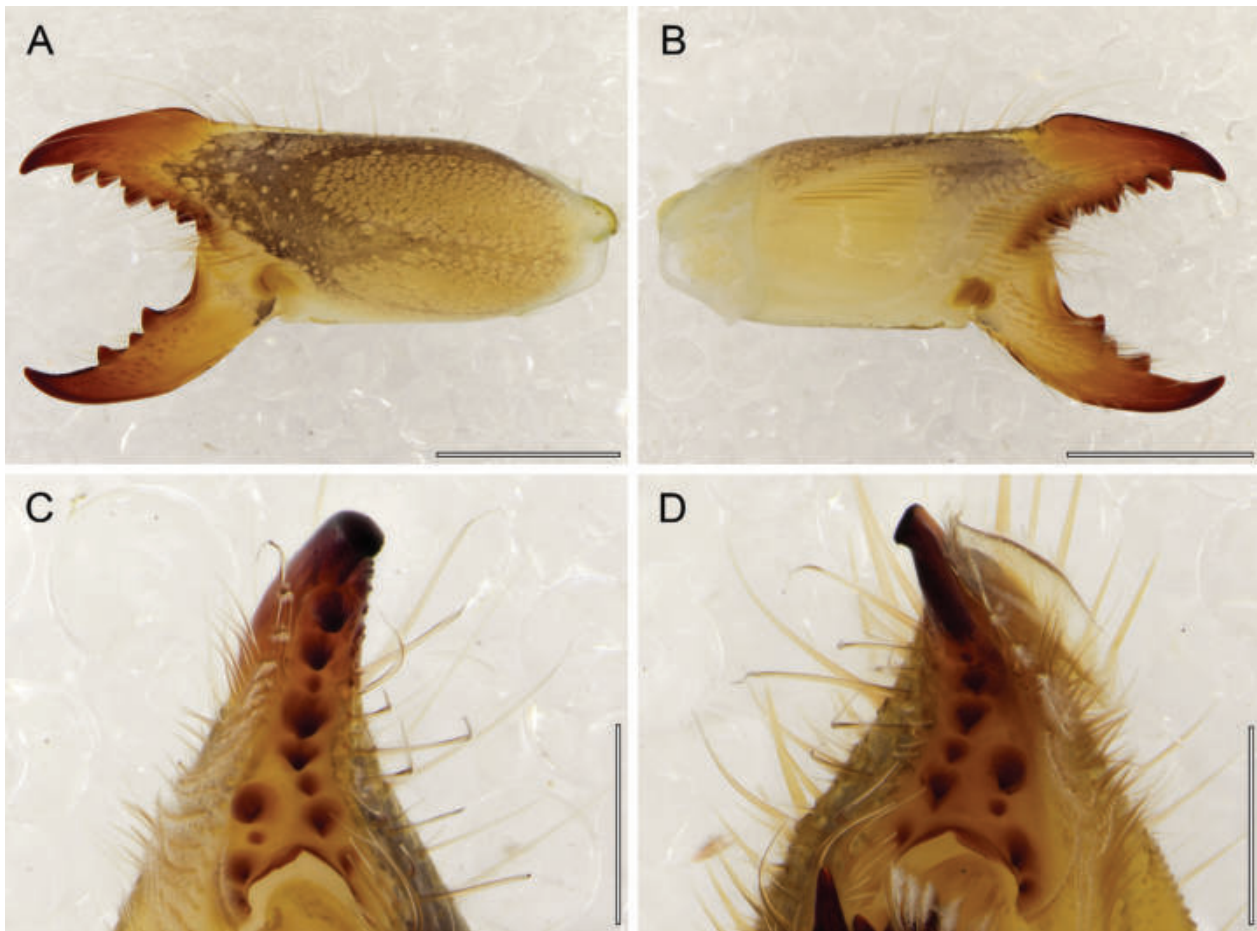
**Figure 8.** *Eutrecha florezi* Villareal-Blanco, Armas and Martínez, 2017, ♂ (IAvH I 472), Santuario de Flora y Fauna Los Colorados, Bolívar Department, Colombia, dextral chelicera, retrolateral aspect (A) and close-up of fingers (B), prolateral aspect (C) and close-up of fingers (D). Scale bars = 1 mm (A, C), 0.5 mm (B, D).

of the finger on its distal end; dorsal and ventral margins subparallel; with moderately pronounced subangular lobe ventroproximally; apex bifid, with dorsal and ventral tips protruding like fringes and these bearing small spicules; apex with dorsal margin curved dorsally, projecting over the prodorsal carina in lateral aspect; attachment point elliptical, horizontally elongate, placed at level of the PFM tooth. — **Pedipalp.** All segments coated with abundant short setae; those on ventral surface of tibia, basitarsus, and telotarsus stouter and more distinct than those on other surfaces. Proventral surface of femur with some spicule-like, somewhat spiniform macrosetae similar to those on propeltidium (Fig. 7A); tibia with proventral and retroventral rows of four spiniform setae each, which are short and stout; basitarsus with proventral and retroventral rows of three to six and four spiniform setae, respectively, similar to those on tibia; telotarsus without spiniform setae. Femur, tibia, basitarsus, and telotarsus with few long thin setae; clubbed setae apparently absent. Retroventral surface of femur proximally with a suture-like cleavage plane. Telotarsus with retrodorsal pore area on distal third. — **Leg I.** All segments coated with abundant short setae similar to those on pedipalps, without stout or spiniform setae; tibia and basitarsus with few long thin setae. Telotarsus with apical retrodorsal pore area similar to that of pedipalp; without claws or spiniform setae. —

**Walking legs.** Covered with abundant short and a few long setae, like those on pedipalps and legs I. Legs II and III: basitarsus with five spiniform setae: two proventral (distal and subdistal), one retroventral (distal), one retrolateral (subdistal), and one retrodorsal (distal); telotarsus bi-segmented (consisting of large basal and small distal segments), with proventral row of four or five spiniform setae (along basal and distal segments) and a retroventral row of three (along basal segment only), in 2.2.2/1 or 2.2.2/1.1 pattern. Leg IV: basitarsus with of three proventral and one distal retroventral spiniform setae, in 1.1.2 pattern; telotarsus 3-segmented (the two segmentation lines are complete), with proventral and retroventral rows of four spiniform setae each (along basal and median segments only), in 2.2.2/2/0 pattern. — **Opisthosoma.** Tergites with abundant setae similar to those on propeltidium; setation of the sternites comparable to that of coxae. Ctenidia present on 1st post-genital sternite (spiracular sternite I); ctenidia in the form of abundant, short “fleshy” setae, densely arranged into two paramedian round areas on the sternite (Fig. 7B); other sternites without ctenidia.

**Supplementary description of female.** Based on paratypes and nontype female from Usiacurí. Measurements in Table 1. Similar to the male in most aspects, but larg-





**Figure 9.** *Eutreacha florezi* Villareal-Blanco, Armas and Martínez, 2017, sinistral chelicera, retrolateral aspect (A), prolateral aspect (B), and ventral aspect of fixed finger (C), dextral chelicera, fixed finger, ventral aspect (D). A–C ♀ (MPUJ ENT 61896), San Jacinto, Bolívar Department, Colombia. D ♂ (IAvH I 472), Santuario de Flora y Fauna Los Colorados, Bolívar Department, Colombia. Scale bars = 1 mm (A, B), 0.5 mm (C, D).

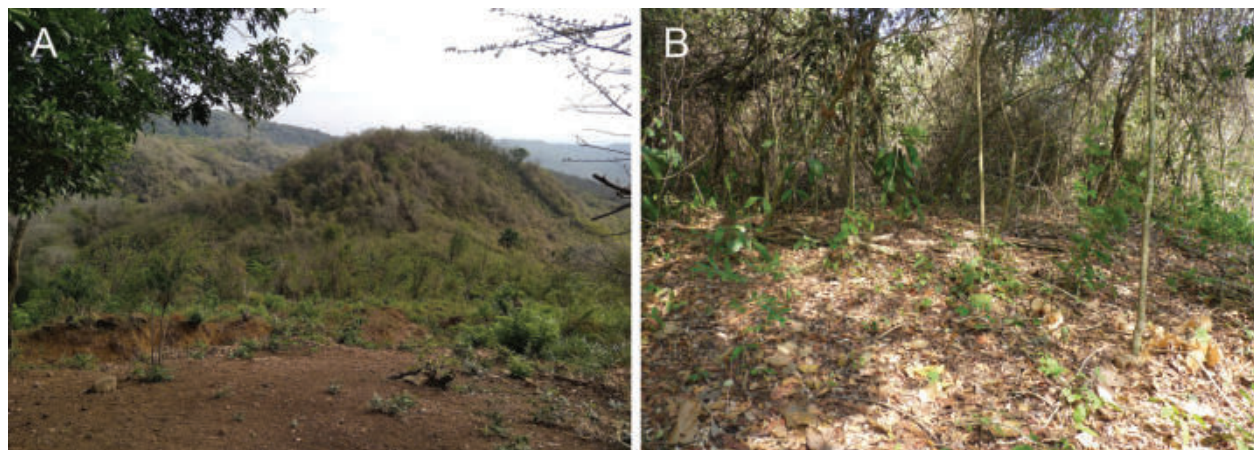
er in size and more robust in appearance. Pedipalp tibia and basitarsus with proventral and retroventral rows of short and stout spiniform setae (exact number unknown as some setae have fallen off). Tegument setation similar to that of male; setae on dorsal surfaces of prosomal and opisthosomal shields, and on dorsal and retrolateral surfaces of the chelicerae, weaker and more flexible. Opisthosoma without ctenidia; genital plate posterior margin with deep median indentation. Chelicera without the secondary sexual characteristics of males (Fig. 9A–C). Stridulatory apparatus with all the ridges parallel to each other and to the manus ventral surface (Fig. 9B); ridges short, progressively occupying a more distal position the more dorsal they are. Fixed finger, lateral aspect with distinct and pronounced angular dorsal crest at level of the RFM tooth (Fig. 9A, B); retrolateral carina (FRLC) more evident than in male (Fig. 9C). Fixed finger without FSD tooth; mucron short and tooth-like (i.e., ventral margin sublinear), without subterminal teeth (FST); FP and FSM teeth slightly fused in their base, forming a subtle bicuspid. Movable finger with MP, MM, and MSM teeth, MP being largest and MSM smallest (Fig. 9A); MM tooth not displaced distally. Movable finger prolateral carina (MPLC) ending in prolateral (MPL) tooth. Retrolateral longitudinal carina (MRLC) consisting of abundant gran-

ules; gnathal edge carina and retroventral longitudinal carina (MRVC) evident; subproximal (MSP) and subterminal (MST) teeth absent. Closure of RFA tooth immediately distal to MP, and that of FM immediately distal to MM, when fingers are closed.

**Distribution.** *Eutreacha florezi* is known from various localities in the departments of Atlántico and Bolívar, Colombia (Fig. 1).

**Natural history.** *Eutreacha florezi* inhabits tropical dry forests (Fig. 10). Females do not appear to be very active wanderers, having normally been found in small burrows inside of dry logs close to termite mounds. In contrast, males are active at night, especially in new moon, and have been observed actively wandering the vicinities of termite mounds. Our observations in the field also indicate that this species is attracted to UV light lamps. Most specimens of *E. florezi* have been collected after the rainy season, when food resources such as termites are abundant in tropical dry forest ecosystems.

**Additional material examined.** COLOMBIA • 1 ♀; Atlántico, Usiacurí, Reserva Campesina La Montaña; 10°46'0.2"N 75°02'34.0"W; 47 m.a.s.l.; 12 Jun 2018; L. Martínez leg.; MPUJ ENT 61897; • 1



**Figure 10.** Landscape (A) and habitat (B) of *Eutrecha florezi* Villareal-Blanco, Armas and Martínez, 2017 at type locality in San Jacinto, Bolívar Department, Colombia.

♂; **Bolívar**, Arjona, Conjunto Residencial Hacienda; 10°15'10.9"N 75°20'39.8"W; 59 m.a.s.l.; 02 Oct 2015; A. Segovia leg.; ICN Aso 019; • 1 ♂; **San Jacinto**, Vereda Palenquito, Reserva Campesina La Flecha; 09°51'09.8"N 75°10'32.3"W; 324 m.a.s.l.; 18 Jul 2017; L. Martínez leg. MPUJ ENT 60963; • 1 ♀ (subadult); same data as preceding; MPUJ ENT 61896; • 1 ♂; same data as preceding, except: 12 Oct 2019; MPUJ ENT 61895; • 1 ♂; Santuario de Flora y Fauna Los Colorados, Alto El Mirador; 09°54'N 75°07'W; 400 m.a.s.l.; Malaise trap; 24 Oct – 9 Nov 2001; E. Deulofeut leg.; IAvH I 472; • 1 ♀, 1 juvenile; same locality; IAvH I 2828; • 1 ♀; Turbaco, Jardín Botánico de Cartagena “Guillermo Piñeres”; 10°21'59"N 75°25'30"W; 130 m.a.s.l.; 15 Oct 2015; W. Zapata leg.; ICN Aso 018.

### 3.1.5. *Eutrecha longirostris* Maury, 1982

<http://zoobank.org/FDC052C9-908B-4B9B-BA3D-D862B-CE0F9B3>

Figs 1, 2A

*Eutrecha longirostris* Maury, 1982: 125, 126, 129, 137–139, figs 29–34; Harvey 2003: 210; Hernández and Colmenares 2008: 447, 448, figs 1, 2; Villareal-Blanco et al. 2017: 139, 140, 142, 143, fig. 15.

**Type material. Holotype.** VENEZUELA • ♂; **La Guaira** [formerly Vargas], Distrito Federal, Punta de Tarma; 10°33'52.48"N 67°09'13.00"W; 06 Dec 1978; M. von Dägel leg.; MAGS 167. Examined by photographs.

**Distribution.** *Eutrecha longirostris* is known only from two localities in the states of Lara and Vargas, Venezuela (Fig. 1).

**Remarks.** *Eutrecha longirostris* was described from a single male specimen from Punta de Tarma, in the state of Vargas, Venezuela (Maury 1982). That was the only record of this species for many years, until Hernández and Colmenares (2008) recorded a second male from Barquisimeto, in the nearby state of Lara (Fig. 1). No other records of *E. longirostris* exist to date and the female of this species remains unknown.

The holotype of *E. longirostris* is supposed to be currently deposited at the MIZA, where the MAGS collection is being taken care of. Unfortunately, we were unable to examine this specimen or the other known male. Based on the original description and photos of the holotype made available to us by a collaborator (P.A. Colmenares), it is certain that *E. longirostris* is closely related to *E. florezi*, species from which a solid morphological distinction is not possible at this moment.

Villareal-Blanco et al. (2017) presented a diagnosis to separate *E. florezi* from *E. longirostris*. Nevertheless, the diagnostic characters listed by these authors are rather discretionary and it is possible that some could be intra-specifically variable. For what is of interest to the scope of this manuscript, *E. longirostris* and *E. florezi* very much resemble one another, and future research will be necessary to elucidate whether both are indeed separate species.

Thanks to the photos shared with us, we can confirm that Maury's (1982) description and illustrations are a very accurate reflection of the actual morphology of the type specimen. Therefore, Maury's (1982) description of *E. longirostris* continues to be the clearest and most complete reference so far available for this species.

### 3.1.6. *Xenotrecha* Maury, 1982

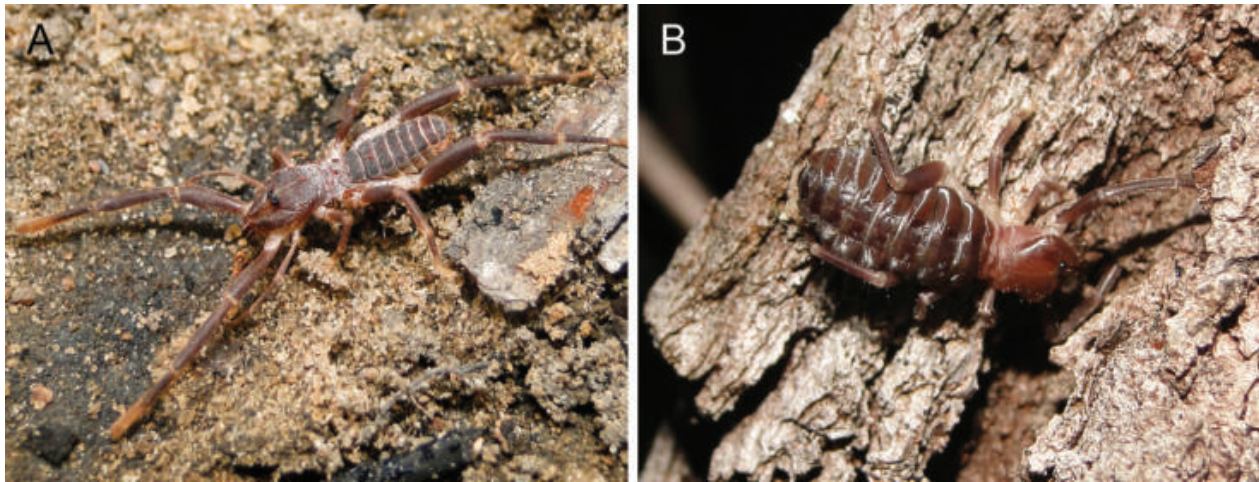
<http://zoobank.org/B6C72CE9-1409-4D64-BE71-7DED73C-CA4AF>

Figs 1, 3, 11–19; Table 1

*Xenotrecha* Maury, 1982: 125, 134; Rocha and Canello 2002b: 1, 2; Harvey 2003: 210; Hernández and Colmenares 2008: 447; Acosta-Berrocal et al. 2017: 64; Iuri et al. 2021: 153.

**Revised diagnosis.** A member of Ammotrechinae s.str. as herein defined. *Xenotrecha* remains a monotypic genus containing only *X. huebneri*, whose male exhibits the following combination of features that allows to readily distinguish the genus from all other genera in Ammo-





**Figure 11.** *Xenotrecha huebneri* (Kraepelin, 1899), live habitus of adults at Serra do Tepequém, Roraima State, Brazil. **A** ♂ (CHNUFPI 1247). **B** ♀ (CHNUFPI 1249).

trechinae s.l. **i)** Cheliceral fixed finger with FM and FD teeth well developed, of normal size for primary teeth (Fig. 3B). **ii)** Cheliceral fixed finger with the median teeth series uninterrupted, without medial notch or median apical diastema (Figs 3B, 14E, 15A). **iii)** Flagellum with prolateral plumose setiform organ (Figs 14F, 16A, B). **iv)** Ctenidia, in the form of short and thick lanceolate setae, present only on 1st and 2nd post-genital sternites (spiracular sternites) (Fig. 13C).

**Affinities.** In having the same or similar pattern of spiniform setae on the basitarsi and telotarsi of the walking legs and the same segmentation pattern of the leg telotarsi, *Xenotrecha* most closely resembles *Eutreacha* than it does resemble *Ammotrecha*.

**Species composition.** *Xenotrecha huebneri* (Kraepelin, 1899).

### 3.1.7. *Xenotrecha huebneri* (Kraepelin, 1899)

<http://zoobank.org/DC49C067-3E91-4885-8F56-2EF-75F196AD3>

Figs 1, 3, 11–19; Table 1

*Cleobis hübnerei* Kraepelin, 1899: 239–240; Weidner 1959: 109; Maury 1982: 124.

*Cleobis huebneri* Kraepelin, 1899: Harms and Dupérré 2018: 12–13, figs 5a–c.

*Ammotrecha hübnerei* (Kraepelin, 1899): Kraepelin 1901: 112–114.

*Ammotrechella hübnerei* (Kraepelin, 1899): Roewer, 1934: 593, 594–595, 598, figs 336b, 338c.

*Ammotrechella hübnerei* (Kraepelin, 1899): Muma and Nazario 1971: 506, 507; Muma 1976: 25.

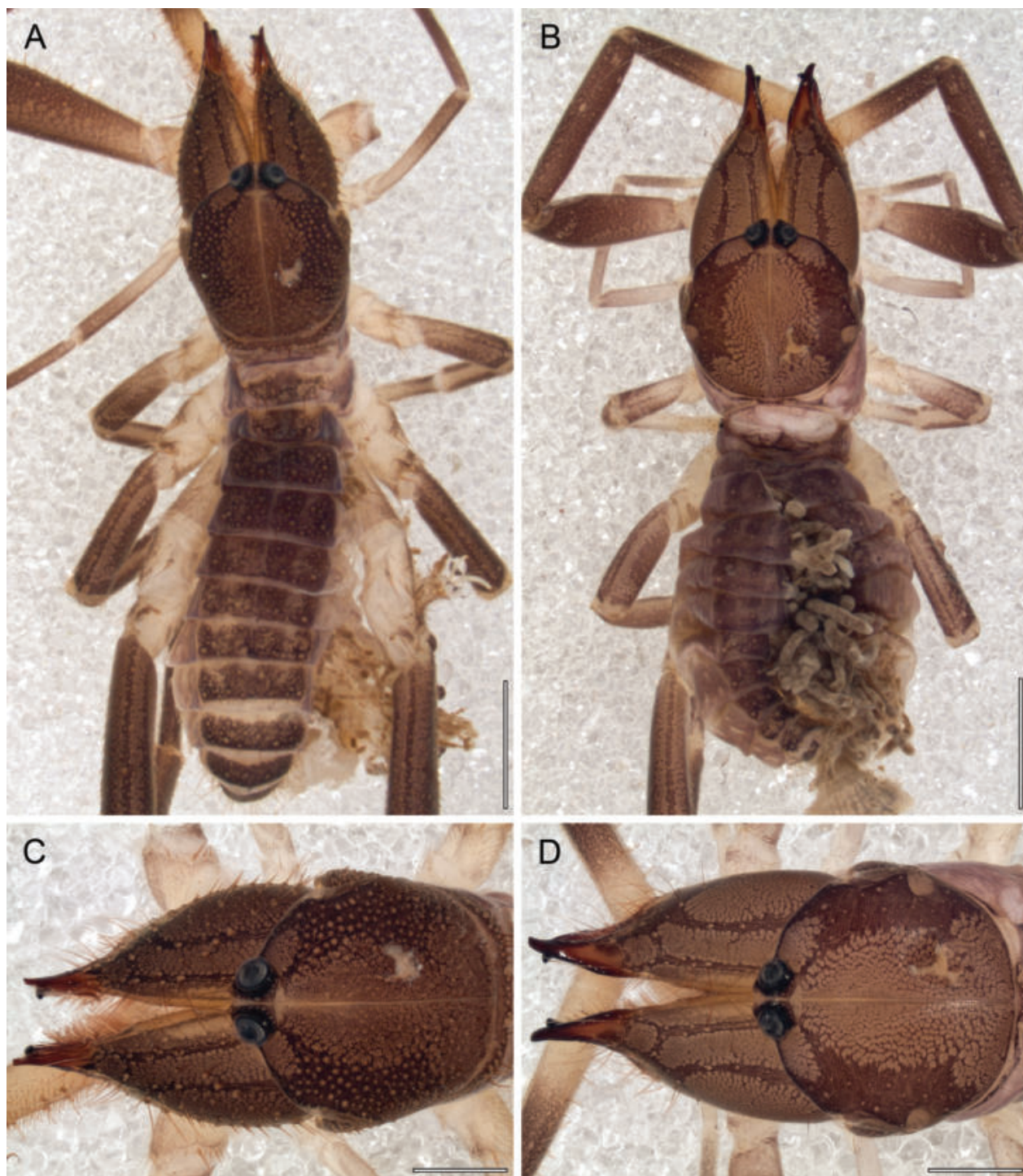
*Xenotrecha huebneri* (Kraepelin, 1899): Maury 1982: 125–127, 129, 134–138, figs 18–28; Maury 1984: 75, fig. 11; Rocha and Cancellato 2002a: 4; Rocha and Cancellato 2002b: 2; Harvey 2003: 210–211; Bird et al. 2015: 123; Harms and Dupérré 2018: 13.

**Type material. Holotype. VENEZUELA** • 1 ♀; “South Venezuela” [locality not specified]; 25 Nov 1898; G. Hübner & O. Schneider leg; ZMH. Examined by images from Harms and Dupérré (2018).

**Revised diagnosis.** As for the genus.

**Redescription of male.** Based on nontype male from Vila Tepequém (CHNUFPI 1247). — **Measurements.** Linear measurements in Table 1. — **Color.** In 80% ethanol-preserved specimen. Prosomal dorsal shields and opisthosomal tergites with overall brown coloration (Fig. 12A, C). Propeltidium with a design of pale brown areas in a darker contour (Fig. 12C), one large that narrows anteriorly, and two small oval areas one on each side of the ocular tubercle, the latter of which is blackish; eyespots shiny white (Fig. 13A). Meso-, metapeltidium, and opisthosomal tergites predominantly dark brown (Fig. 12A), with scattered faded patches. Chelicerae, base color pale brown (same as pale propeltidial areas) (Figs 12C, 14C, E), with three dark brown, narrow longitudinal stripes on prodorsal, retrolateral, and retroventral surfaces of manus, which fuse into a large dark brown retrolateral area on distal part of manus; stridulatory plate predominantly yellow, with brownish stridulatory ridges (Fig. 14D). Asetose area of fixed and movable fingers red, with all teeth darkened (Fig. 14E); movable finger setose area with ventral, brown-spotted area. Pedipalp coxae yellowish white, trochanter pale brown, femur and tibia dark brown, with faint paler areas (Fig. 17), as are the patella and tibia of legs. Pedipalps and legs, basitarsus proximal half dark brown, distal half yellowish brown, same color as telotarsus. Coxosternal region and trochanters of legs immaculately yellowish white (Fig. 13B). Femora of legs I–II, basifemora and telofemora of legs III–IV yellowish white, with scattered darker patches, mostly on dorsal surface. Malleoli white. Opisthosomal pleural membranes with faded, dark brown color dorsally, paler towards the venter. Sternites yellowish white (Fig. 13C), except for three posteriormost sternites which have some scattered dark brown patches. — **Prosoma.** Propeltidium



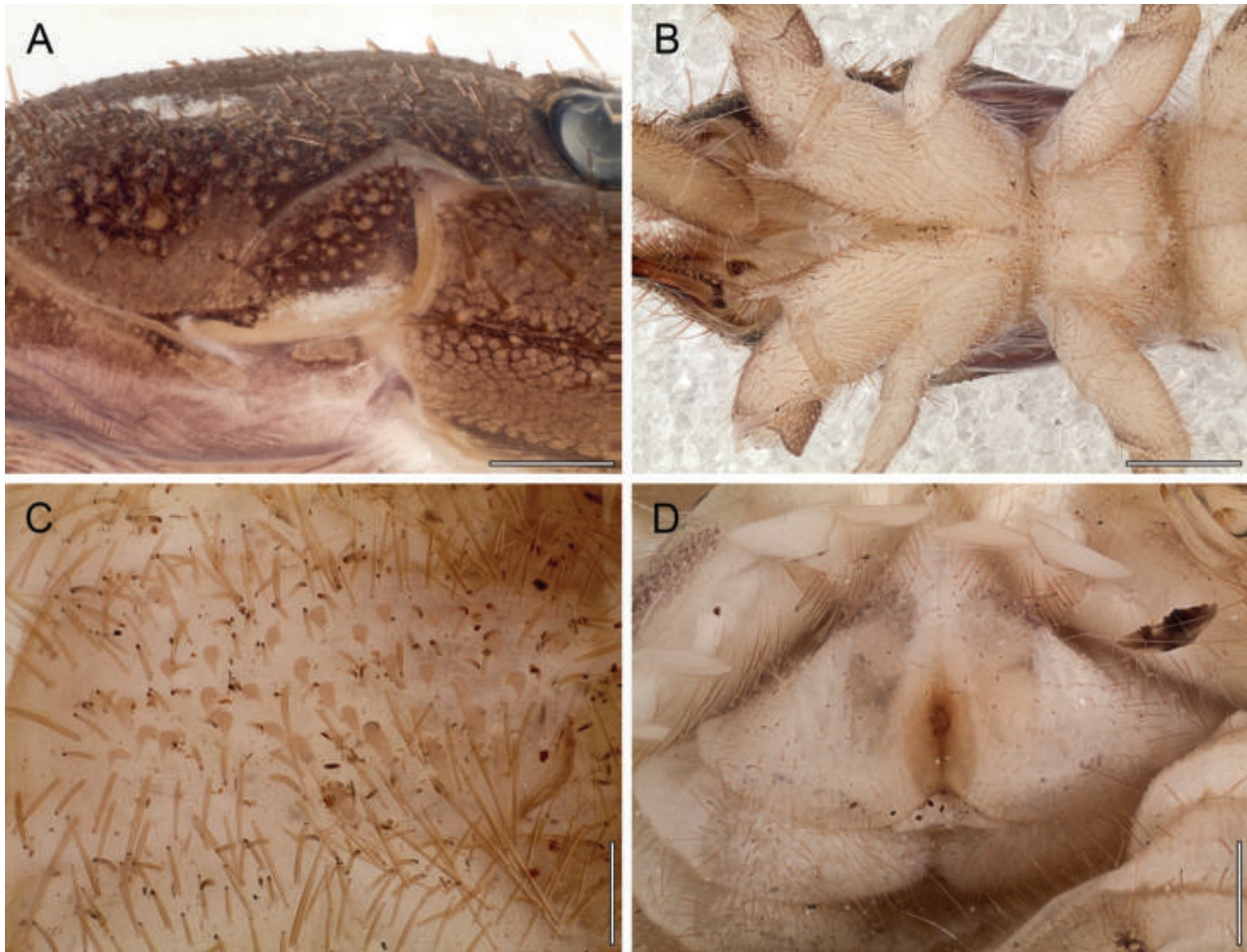


**Figure 12.** *Xenotrecha huebneri* (Kraepelin, 1899), habitus, dorsal aspect (A, B), propeltidium (C, D). A, C ♂ (CHNUFPI 1247), Serra do Tepequém, Roraima State, Brazil. B, D ♀ (CHNUFPI 1248), same locality. Scale bars = 2 mm (A, B), 1 mm (C, D).

longer than wide (Table 1); covered with small to medium-sized, spicule-like stout setae, straight and rigid (Fig. 12C); these setae fall off and break easily; at least the larger macrosetae exhibit a bilaterally symmetrical distribution on propeltidium. Ocular tubercle slightly elevated, with abundant macrosetae. Anterolateral propeltidial lobes separated from the propeltidium principal shield by incomplete lateral groove (Fig. 13A). Eyespots elongated, its length approximately half the length of the anterolateral propeltidial lobe ventral margin. Meso- and metapeltidium wider than long, with abundant macrose-

tae similar to those on propeltidium (Fig. 12A). Coxae densely covered with abundant thin setae (Fig. 13B). Sternum glabrous. — **Chelicera-dentition and processes.** Fixed finger with median teeth series comprising well-developed primary teeth (FP, FM, and FD) and very small FSM tooth (Figs 3B, 14E, 15A); FSD tooth absent; FSM and FM contiguous to adjacent teeth (i.e., without medial notch or FMAD); retrofonda teeth series uninterrupted (i.e., without FRFD), with four teeth (RFSP, RFP, RFM, RFA) (Figs 3B, 15A); basal retrofonda margin heavily sclerotized (Fig. 15A); profundal teeth series con-





**Figure 13.** *Xenotrecha huebneri* (Kraepelin, 1899), prosoma, anterolateral propeltidial lobe, lateral aspect (A), anterior part of coxosternal region, ventral aspect (B) [note the severed dextral pedipalp], ctenidia on 2nd post-genital sternite (C), genital plate, ventral aspect (D). A–C ♂ (CHNUFPI 1247), Serra do Tepequém, Roraima State, Brazil. D ♀ (CHNUFPI 1249), same locality. Scale bars = 0.5 mm (A, D), 1 mm (B), 0.2 mm (C).

sisting of four teeth (PFSP, PFP, PFSM, PFM). Fixed finger asetose area with dorsal and ventral margins notably curved; prodorsal carina sharp, not elevated in lateral aspect, without angular dorsal crest; proventral carina weakly pronounced on the mucron area; fixed finger retrolateral carina (FRLC) obsolete, represented by few granules on the proximal region of the asetose area (Figs 3B, 14E). Fixed finger mucron without subterminal (FST) teeth; apex (FT tooth) curved. Movable finger with median teeth series comprising well-developed and similar-sized MP and MM primary teeth, and one MSM secondary tooth which is smaller than MP and MM (i.e., MP  $\approx$  MM > MSM) (Figs 3B, 14E); all three teeth of the median series adjacent to each other; MSM upright and triangular. Movable finger prolateral carina (MPLC) markedly developed, ending slightly basal to MP in a small but distinct prolateral (MPL) tooth, which is about half the size of MSM tooth (Fig. 14D). Movable finger without subproximal (MSP) or subterminal (MST) teeth; movable finger retroventral longitudinal carina (MRVC) present on distal half, or third, of finger, forming a smooth elevated ridge (Figs 3B, 14E, 16D); retrolateral longitudinal carina (MRLC) consisting of scattered conspicuous granules on the retrolateral surface of finger (Fig. 3B). Mov-

able finger mucron moderately long, with gnathal edge carina ordinary (not convex). Closure of FM tooth distal to MM, when fingers are closed. — **Chelicera-setose areas and stridulatory plate.** Retrolateral and dorsal surfaces with abundant retrolateral manus (*rlm*) and retrolateral finger (*rlf*) setae, of different sizes, which are predominantly straight and rigid (Figs 12C, 14C–F); some of these setae are arranged in bilaterally symmetrical pattern, as are some principal retrolateral finger (*principal rlf*) setae that are more flexible than others; movable finger retrolateral proximal setal cluster (*rlpc*) dorsally with a single, long and markedly plumose seta (Figs 14E, 16D). Prolateral surface with array of setal types (Fig. 14D, F), as follows: row of plumose proventral distal (*pvd*) setae starting at level of the interdigital condyle (*pic*) and ending near level of FP tooth; proventral subdistal (*pvsd*) setae arranged in rather disorganized pattern, *pvsd* comb slightly differentiated; carpet-like field of bristle-like promedial (*pm*) setae narrow (Fig. 16C). Stridulatory plate longer than high, occupying approximately two-thirds of the prolateral surface of manus (Fig. 14D); stridulatory apparatus consisting of eleven distinct ridges approximately parallel to the manus ventral surface (Fig. 16C); most ridges not reaching the limit with the *pm* setae

field. Distal limit of the prolateral setose area of movable finger reaching the level of MSM tooth; movable finger prodorsal (*mpd*) setal series consisting of plumose setae (similar to the *pvd* setae), adjacent to abundant non-plumose setae of the movable finger promedial (*mpm*) and proventral (*mpv*) setal series. — **Chelicera-flagellum.** Of the composite type, without shaft. A thin, translucent, membranous structure immovably attached prodorsally to the fixed finger (Figs 14F, 15A); flagellar base general aspect bowl-shaped, long and narrow, with apex reaching about two thirds of the mucron length; prolateral surface with plumose setiform organ arising from the center of the flagellar base (Figs 14F, 16A, B); plumose setiform organ robust basally, long, progressively narrowing distally, its apex almost reaching the apex of the flagellar base, covered with acuminate fringes over distal two thirds of its length; other than fringes on the plumose setiform organ, the flagellum is predominantly smooth; flagellum dorsal margin visible over the prodorsal carina in retrolateral aspect; attachment point elliptical, horizontally elongated, placed at level of the PFM tooth. — **Pedipalp.** All segments coated with abundant short and delicate setae (Fig. 17A); those on ventral surface of tibia, basitarsus, and telotarsus stouter and more distinct than those on other surfaces. Proventral surface of femur with some spicule-like, somewhat spiniform macrosetae similar to those on propeltidium (Fig. 12A); tibia with proventral and retroventral rows of six spiniform setae each, which are short and stout, distributed along distal two thirds of tibia, in addition to a basal pair of conspicuous, thinner, and slightly longer setae (Fig. 17A); basitarsus with proventral and retroventral rows of eight and eleven spiniform setae, respectively, similar to those on tibia; telotarsus without spiniform setae. Femur, tibia, basitarsus, and telotarsus with few long thin setae; clubbed setae apparently absent. Retroventral surface of femur proximally with a suture-like cleavage plane (Figs 17, 18). Telotarsus retrodorsal pore area, if present, not visible under light stereomicroscopy. — **Leg I.** All segments coated with abundant short and delicate setae similar to those on pedipalps, without stout or spiniform setae; tibia and basitarsus with few long thin setae. Telotarsus without claws or spiniform setae; retrodorsal pore area, if present, not visible under light stereomicroscopy. — **Walking legs.** Covered with abundant short and delicate setae, in addition to a few long setae like those on pedipalps and legs I. Legs II and III: basitarsus with five spiniform setae: two proventral (distal and subdistal), one retroventral (distal), one retrolateral (subdistal), and one retrodorsal (distal); telotarsus bi-segmented (consisting of large basal and small distal segments), with proventral row of four spiniform setae and a retroventral row of three, in 2.2.2/1 pattern. Leg IV: basitarsus with row of three proventral and one distal retroventral spiniform setae, in 1.1.2 pattern; telotarsus 3-segmented (the two segmentation lines are complete), with proventral and retroventral rows of four spiniform setae each, in 2.2.2/2/0 pattern. — **Opisthosoma.** Tergites with abundant setae similar to those on propeltidium; setation of the sternites comparable to that of coxae. Ctenidia present on 1st and

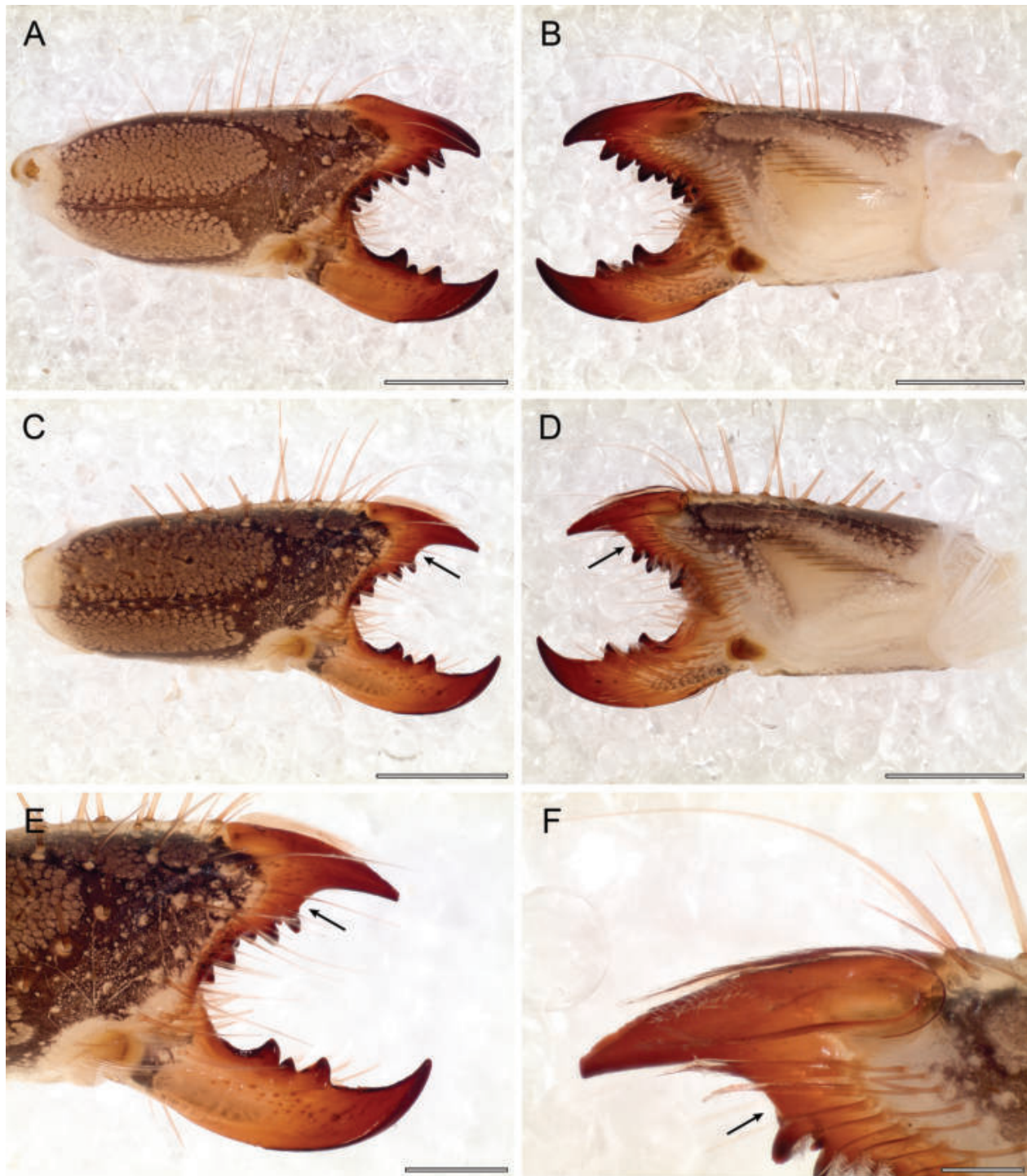
2nd post-genital sternites (spiracular sternites I and II) (Fig. 13C); ctenidia short, in the form of abundant, lanceolate setae irregularly distributed on the sternites; other sternites without ctenidia.

**Supplementary description of female.** Based on non-type female from Vila Tepequém (CHNUFPI 1248). Measurements in Table 1. Similar to the male in most aspects, including size and general appearance. Pedipalps with short and stout spiniform setae on the ventral surface of basitarsus only, arranged in proventral and retroventral rows of seven and nine spiniform setae, respectively. Tegument setation similar to that of male; setae on dorsal surfaces of prosomal and opisthosomal shields, and on dorsal and retrolateral surfaces of the chelicerae and legs, weaker and more flexible. Opisthosoma without ctenidia. Genital plate posterior margin with deep median indentation (Fig. 13D); posteromedian region conspicuously glabrous and shiny, with a central pocket. Chelicera without the secondary sexual characteristics of males (Figs 14A, B, 15B). Stridulatory apparatus with all the ridges parallel to each other and to the manus ventral surface, as in male (Fig. 14B); ridges short, progressively occupying a more distal position the more dorsal they are. Fixed finger, lateral aspect with distinct and pronounced angular dorsal crest at level of the RFM tooth (Fig. 14A, B); retrolateral carina (FRLC) evident, as in male (Fig. 15B). Fixed finger without FSD tooth; mucron short and tooth-like (i.e., ventral margin sublinear), without subterminal teeth (FST). Movable finger with MP, MM, and MSM teeth, MP being largest and MSM smallest (Fig. 14A); MM tooth not displaced distally. Movable finger prolateral carina (MPLC) ending in small but distinct prolateral (MPL) tooth, which is less than half the size of the MSM tooth. Retrolateral longitudinal carina (MRLC) consisting of abundant granules; gnathal edge carina and retroventral longitudinal carina (MRVC) evident; subproximal (MSP) and subterminal (MST) teeth absent.

**Variability.** One female (CHNUFPI 1248) has nine spiniform setae on the retroventral series of the pedipalp basitarsi, whereas the other female (CHNUFPI 1249) has ten.

**Distribution.** Originally described from an unspecified locality in southern Venezuela (Kraepelin 1899), *X. huebneri* has also been recorded from the Henri Pittier National Park and Pardillar, respectively in the states of Aragua and Carabobo (Mauray 1982), and from El Rincón, in the state of Sucre (Rocha and Cancelló 2002a), all in northern Venezuela (Fig. 1). In Brazil, a record of *Xenotrecha* (as “*Xenotrecha* sp.”) has been presented from Furo do Firmino, southeastern Maracá Island in the state of Roraima (Rocha and Cancelló 2002a), locality that is situated some 50 km south of Vila Tepequém (record here presented; Fig. 1). Records from Brazil are located some 350 km east of the headwaters of the Orinoco River, where the type specimen was most likely collected (Harms and Dupérré 2018). An additional record of *X. huebneri* from an unspecified locality in Suriname was identified in the Global Information Facility (GBIF) (Goud et al. 2020),



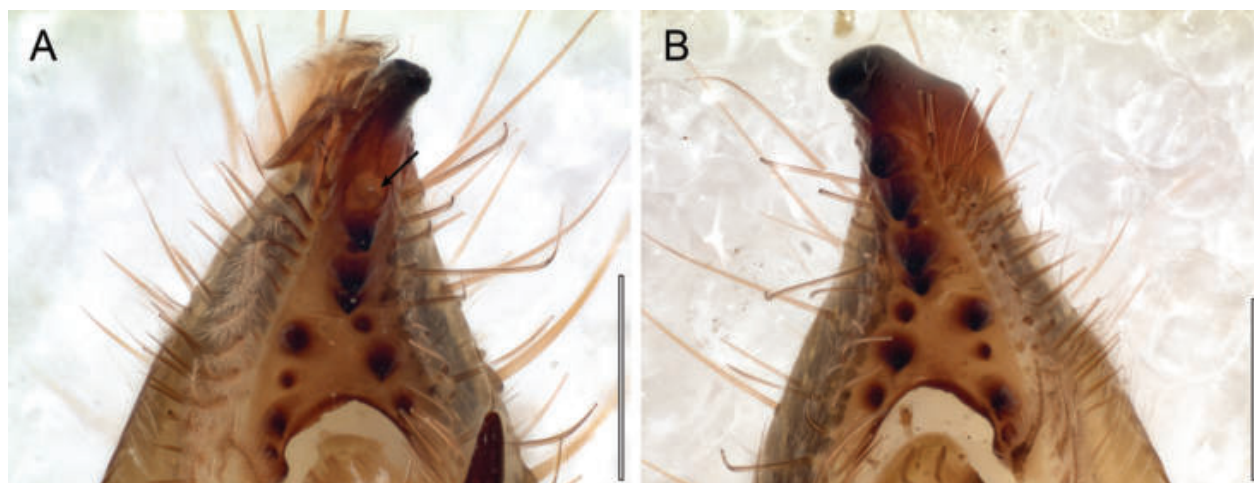


**Figure 14.** *Xenotrecha huebneri* (Kraepelin, 1899), dextral chelicera, retrolateral aspect (A, C) and close-up of fingers (E), prolateral aspect (B, D) and close-up of flagellum (F). A, B ♀ (CHNUFPI 1248), Serra do Tepequém, Roraima State, Brazil. C–F ♂ (CHNUFPI 1247), same locality. Scale bars = 1 mm (A–D), 0.5 mm (E), 0.2 mm (F). Arrows in C–F indicate the position of hole left by broken FD tooth.

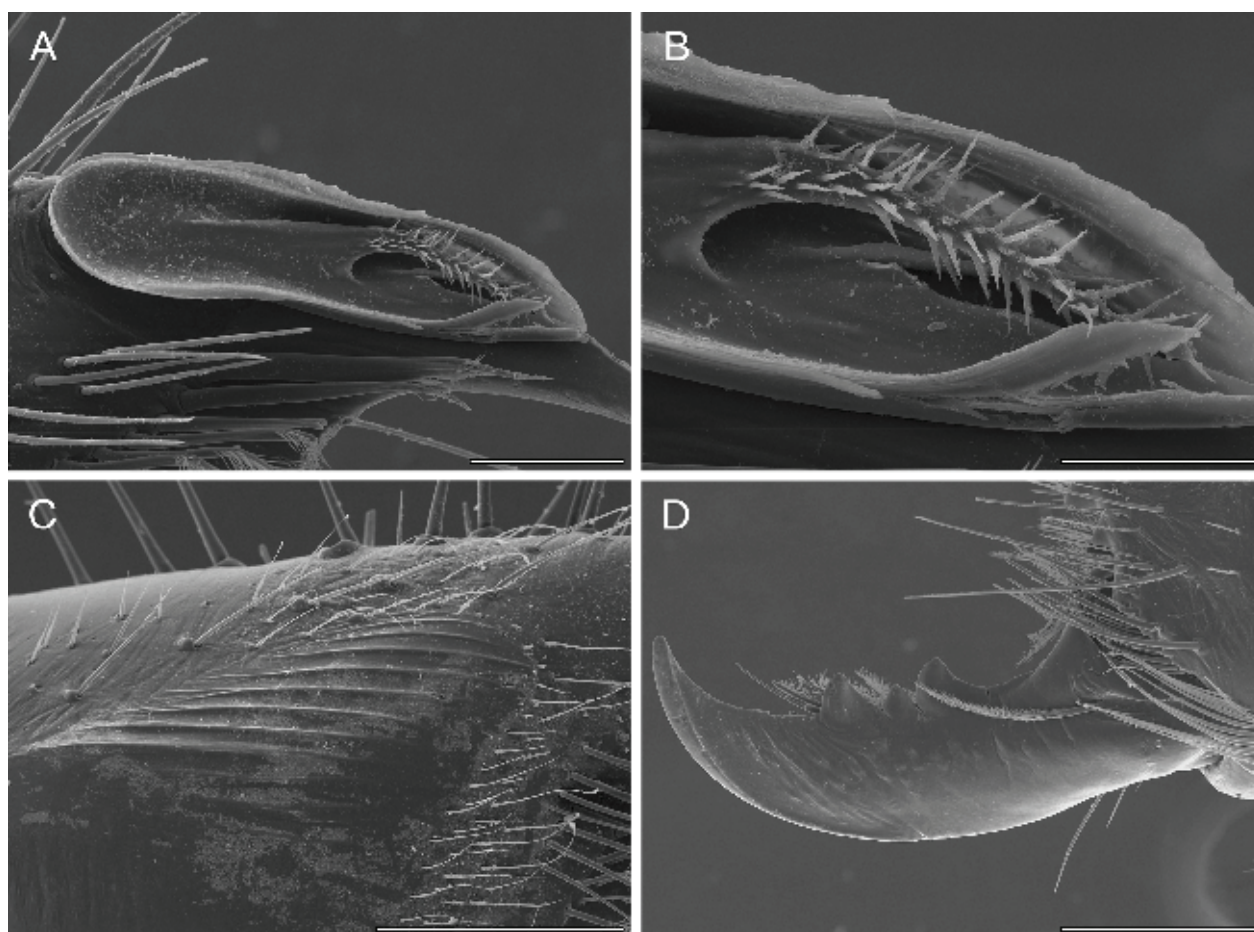
further extending the putative distribution of the genus far eastward.

**Natural history.** Specimens from Serra do Tepequém were collected at night. All specimens were found on *Curatella americana* L. (Dilleniaceae) tree trunks. One female (CHNUFPI 1249) was observed foraging, moving upwards in the tree trunk while inspecting small holes and under the tree barks, using both pedipalps to sense the sur-

face (Fig. 11B). The sampling locality (Fig. 19) is a small tepui (reaching 1100 m), forested on its slopes and with savannas on the higher plateaus (Almeida et al. 2009). Several other specimens of *C. americana* were inspected at other sampling localities in the municipalities of Boa Vista (02°52'08.4"S 60°43'13.1"W, at ca. 90 m.a.s.l.) and Bonfim (03°16'20.5"S 60°03'09.3"W, at 140 m.a.s.l.), but no additional specimens of *X. huebneri* were detected at these localities. However, an unidentified *Ammotrecha*



**Figure 15.** *Xenotrecha huebneri* (Kraepelin, 1899), sinistral (A) and dextral (B) chelicera, fixed finger, ventral aspect. A ♂ (CHNUFPI 1247), Serra do Tepequém, Roraima State, Brazil. B ♀ (CHNUFPI 1248), same locality. Scale bars = 0.5 mm. Arrow in A indicates hole left by broken FD tooth.



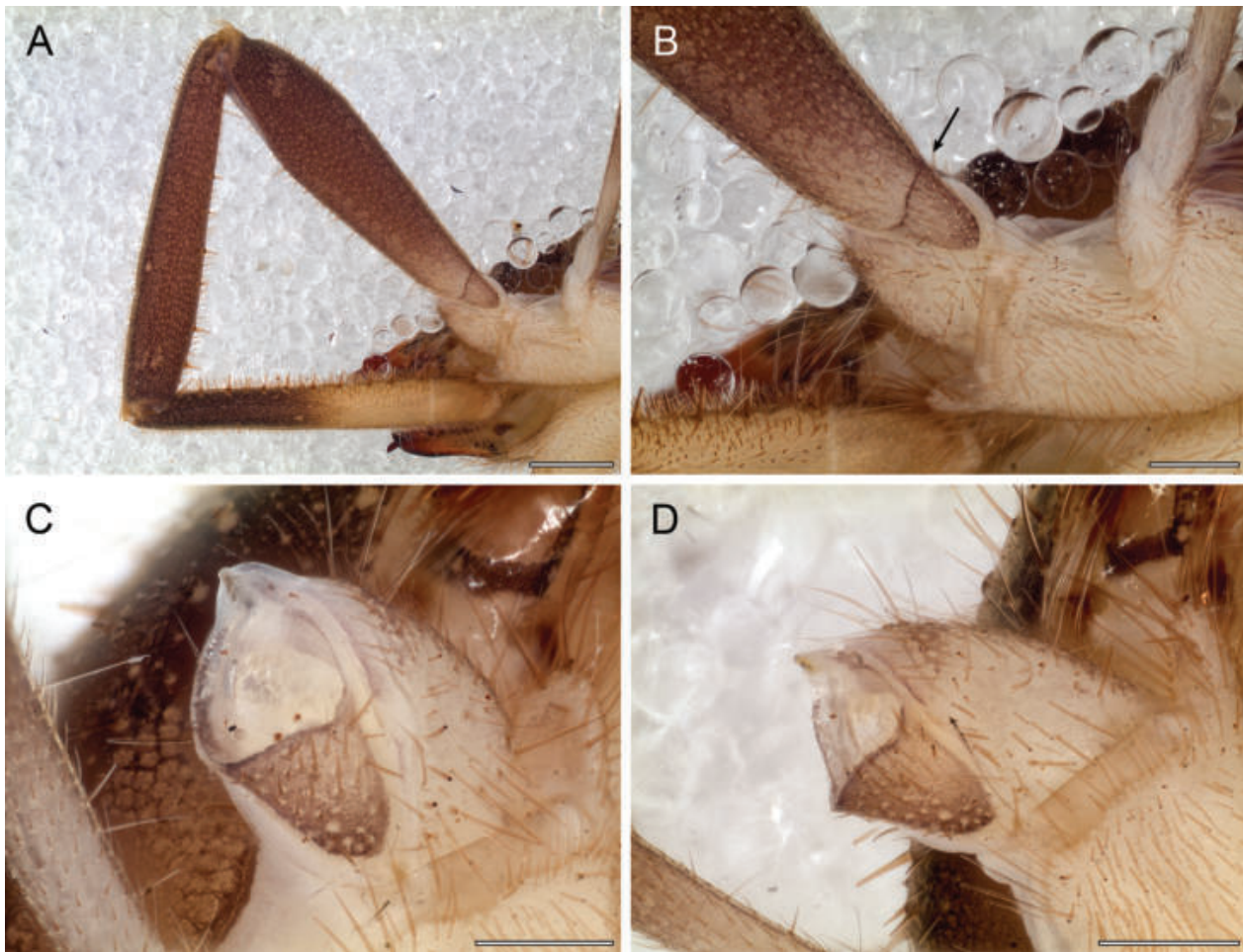
**Figure 16.** *Xenotrecha huebneri* (Kraepelin, 1899), ♂ (CHNUFPI 1247), Serra do Tepequém, Roraima State, Brazil, sinistral chelicera, flagellum, prolateral aspect (A) and closeup of the plumose setiform organ (B), stridulatory apparatus, prolateral aspect (C), movable finger, retrolateral aspect (D). Scale bars = 0.2 mm (A), 0.1 mm (B), 0.5 mm (C, D).

species was found in the inspected trees at Bonfim, locality that is situated close to the Brazil-Guiana border. The specimen of *X. huebneri* reported by Rocha and Canello (2002a) from El Rincón was found inside of a dead tree-trunk in a forest with many lianas, whereas the specimen from Maracá Island was collected in a forest inside of a

termite mound of a possibly undescribed *Araujotermes* Fontes, 1982 (Isoptera, Termitidae) species.

**Other material examined.** BRAZIL • 1 ♂; Roraima, Amajari, Serra do Tepequém, Vila Tepequém, near Pousada PSJ; 03°47'10.4"S 61°43'15.3"W; 640 m.a.s.l.; 17 Jul 2014; J. Cabra-García leg.; CH-





**Figure 17.** *Xenotrecha huebneri* (Kraepelin, 1899), ♂ (CHNUFPI 1247), Serra do Tepequém, Roraima State, Brazil, sinistral pedipalp, retrolateral aspect (A) and close-up of cleavage plane proximally on femur (B) [indicated by arrow], healed severed stump of dextral pedipalp femur (post-autotomy in nature), retrodorsal (C) and retrolateral (D) aspects. Scale bars = 1 mm (A), 0.5 mm (B–D).

NUFPI 1247; • 2 ♀♀; same data, except: L.S. Carvalho leg.; CHNUFPI 1248–1249.

**Literature records (material not examined).** **BRAZIL** • 1 sex not specified; **Roraima**, Alto Alegre, southeastern Maracá Island, Uraricoera River, Furo do Firmino; 03°23'60"N 61°25'60"W; 01 Nov 1986, E.M. Cancellato and C.R.F. Brandão leg.; MZUSP 14295; listed as “*Xenotrecha* sp.” **SURINAME** • 1 sex not specified; 07 Aug 1959; RMNH. SOL.11; gbifID 2434367917; **VENEZUELA** • 1 sex not specified; **Sucre**, El Rincón; 10°38'14"N 64°14'09"W; 27 Sep 1987; O.F.F. Souza leg.; MZUSP 14296. These records were obtained from Rocha and Cancellato (2002a) and Goud et al. (2020).

## 4. Discussion

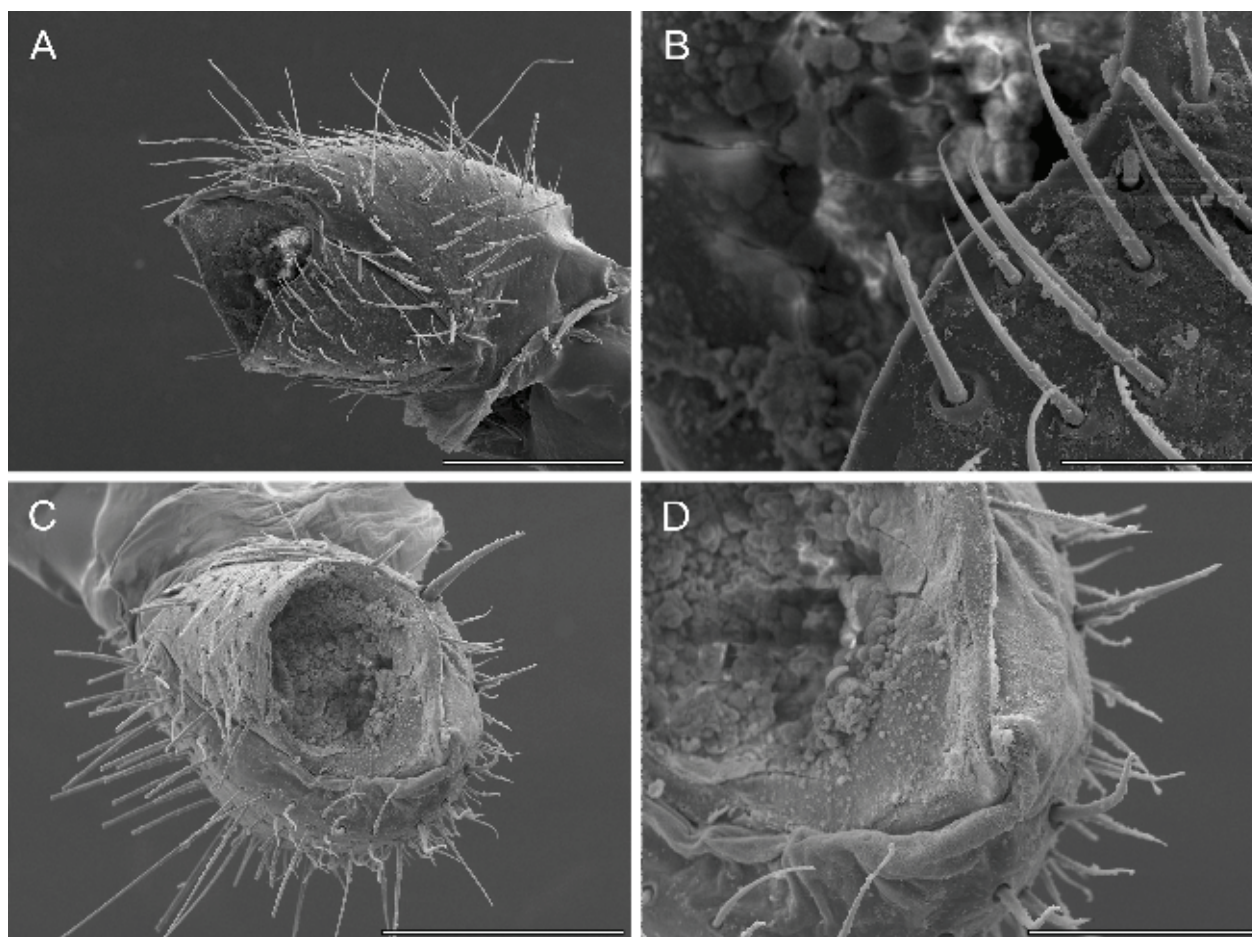
### Ammotrechinae and Saronominae

After the passing of Dr. Emilio A. Maury (1940–1998) – former Chief of the Division of Arachnology at the MACN and one of the prominent solifuge workers of the second half of the 20th century – South American (pri-

marily continental) solifuges have received little attention by the arachnological research community. As a result, the diversity of Ammotrechidae (as that of other families) is presumed to remain significantly unexplored, while little is known about its evolutionary history. Only the recent work of Iuri et al. (2021) has addressed the internal classification of Ammotrechidae in a phylogenetic framework, providing the first insights into the relationships of its constituent genera. Nonetheless, the taxonomy of the family, which should aim at harmonizing both aspects (i.e., diversity and evolutionary history), is yet to be comprehensively built.

The delimitation for Ammotrechinae s.str. presented in this work intends to contribute to the above endeavor. It presents a revised framework to determine whether genera/species hitherto in Ammotrechinae (or incorrectly classified somewhere else) could be considered members of this subfamily, based, at the time, upon affinities with *Ammotrecha*. This purely taxonomic approach does not belittle the importance of generating a phylogenetic framework. Contrarily, there is pressing need for a broadly inclusive phylogenetic study that aims at investigating in depth the systematics of the entire family Ammotrechidae, venture that has become more urgent in the midst





**Figure 18.** *Xenotreacha huebneri* (Kraepelin, 1899), ♂ (CHNUFPI 1247), Serra do Tepequém, Roraima State, Brazil, scanning electron micrographs of cleavage plane on healed severed stump (post-autotomy in nature) of dextral pedipalp femur, retrolateral aspect (A) and close-up of edge (B), inclined, anterior aspect (C) and close-up of pointy process on prolateral part of stump (D). Scale bars = 0.5 mm (A, C), 0.1 mm (B), 0.2 mm (D).

of the remarkable fashion by which interest on Solifugae research has renewed in recent years. Efforts on this arena are currently underway by H.A.I., as part of his doctoral studies, especially with regards to the ammotrechid fauna of the Patagonia, the Andes, the deserts of northern Chile and southern Peru, and the Chacoan region.

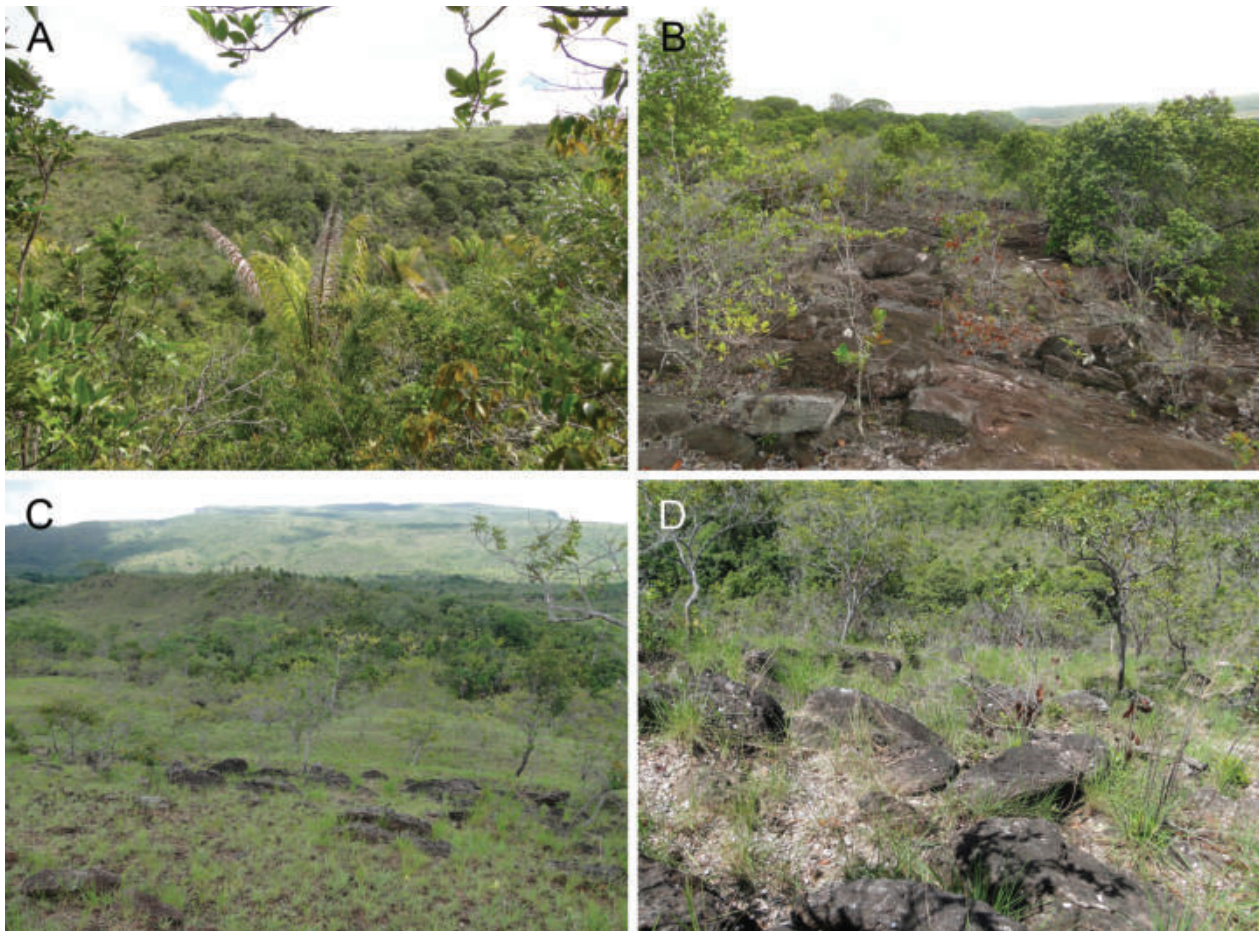
Naturally, the redefinition of Ammotrechinae needs to be allowed some dynamism. For instance, an ammotrechid solifuge exhibiting some of the features listed here for Ammotrechinae s.str. but not all of them, could be considered a member of this group so long as it does not fit into any of the other subfamilies – most importantly, not into the type genera that the subfamilies are typified upon and that represent their foundation. This brings us back to Saronominae and to the conundrum produced by the affinities that its type genus, *Saronomus*, has to genera of Ammotrechinae s.str., discussed earlier in this work. As far as nomenclature goes, should only one of these two subfamilies be recognized at the end, Ammotrechinae should prevail for it being the nominotypical subfamily.

Other aspects need also be considered when it comes to Saronominae and its constituent genera. Maury (1977) assigned *Procleobis* Kraepelin, 1899 to Saronominae after realizing that this genus had been incorrectly classified

in Mummuciinae (presently Mummuciidae). Nevertheless, *Procleobis* does not exhibit the one feature that currently defines Saronominae – the telotarsus of legs I–IV uni-segmented (undivided)) – in the same manner that *Saronomus* does not either. Unlike *Saronomus*, however, *Procleobis* does also not conform with the morphological features of Ammotrechinae s.str., except for the absence of the FSD tooth series—aspect which, to note, is common to several other unrelated solifuge taxa as well, including *Nothopuga* Maury, 1976 and *Oltacola* Roewer, 1934 among Ammotrechidae (Iuri et al. 2021). These inconsistencies contravene the core taxonomic concept of Saronominae and raise the suspicion that this subfamily, as currently defined, could be para- or polyphyletic. In the end, whether Saronominae is recognized will depend on how a sound phylogenetic hypothesis for Ammotrechidae resolves and on where in the topology other genera will situate relative to *Saronomus*.

### *Xenotreacha*

*Xenotreacha huebneri* is a remarkable species intriguing to solifuge workers. This is owed to the peculiar morphology of its flagellum, first described by Maury (1982), on whose surface the presence of a plumose setiform organ



**Figure 19.** Landscape and habitat of *Xenotrecha huebneri* (Kraepelin, 1899) at Serra do Tepequém, Roraima State, Brazil. Note the dense vegetation (A), grasslands, and rocky outcrops (B–D) present in the area.

has made some authors suspect that it could be abnormal (Bird et al. 2015). The finding of a second male, herein described, allows clearing off the source of confusion on this respect, by confirming that the flagellar morphology of *X. huebneri* has indeed this unique morphology.

Maury (1982: 136) interpreted the flagellum of *X. huebneri* as having a plumose seta originating from it, which he described as identical to the *pvd* setae. Bird et al. (2015: 123) accurately noted that such flagellar “seta” possesses a broad base, even proposing the possibility that a seta of the finger could have perforated the base of the flagellum. With the new data here presented, it is demonstrated that the plumose setiform organ of *X. huebneri* is not a plumose seta but, instead, a structure of the flagellar base that happened to converge to a morphology reminiscent to that of the fixed finger *pvd* setae. Although the function of this organ, that is unique among solifuges, remains unknown, it is possible that it could be involved in courtship or mating behaviors (e.g., physical stimulation to the female or cleaning of genital structures).

Prior to this investigation, *Xenotrecha huebneri* was known from two females and one male from Venezuela (Maury 1982), in addition to some vague records from Brazil and Suriname (see Systematics). The specimens newly reported here confirm the presence of *X. huebneri* in northern Brazil, providing this species a north-to-south distributional range of over 900 km.

## *Eutrecha*

*Eutrecha* is a small group of solifuges for which little knowledge exists. Two of the three species currently known in the genus, *E. florezi* and *E. longirostris*, are so similar in morphology to one another (see Maury 1982; Hernández and Colmenares 2008; Villareal-Blanco et al. 2017) that a solid, character-rich distinction between the two of them is not possible at this moment. On the contrary, the third species in the genus, *E. belenensis*, is significantly different to its congeners. The number of morphological aspects by which this new species differs from its closest relatives is highly unusual in solifuges. Despite of the remarkable differences, the data here presented pose a strong, non-conflicting indication of close relationship between the three species.

The fact that there may exist many other new species of *Eutrecha* not yet discovered needs to be taken into consideration when classifying peculiar species like *E. belenensis*. For instance, had a new monotypic genus been erected for the new species, so doing could have resulted impractical, from the taxonomical and nomenclatural standpoints, once other species of *Eutrecha* had been discovered and a phylogenetic hypothesis of the subfamily exists. When it comes to poorly known groups like *Eutrecha*, it is advisable to have the species-level diversity and phylogenetic relationships explored before a new genus



**Table 1.** Measurements (mm) for *Eutreacha belenensis* sp. nov., *Eutreacha florezi* Villareal-Blanco, Armas and Martínez, 2017, and *Xenotreacha huebneri* (Kraepelin, 1899). Material deposited in the Coleção de História Natural, Universidade Federal do Piauí (CHNUFPI), Floriano, Brazil; the Instituto de Investigación de Recursos Biológicos “Alexander von Humboldt” (IAvH), Villa de Leyva, Colombia; the Arachnological Collection of the Instituto de Ciencias Naturales (ICN), Universidad Nacional de Colombia, Bogotá; the Museo Javeriano de Historia Natural “Lorenzo Uribe, S.J.,” Pontificia Universidad Javeriana (MPUJ), Bogotá. <sup>1</sup> Excludes chelicerae. <sup>2</sup> Excludes claws.

Species		<i>E. belenensis</i>	<i>E. florezi</i>		<i>X. huebneri</i>	
Type/sex		Holotype ♂	♂	♂	♂	♀
Collection		ICN Aso 008	IAvH I 472	MPUJ ENT 61895	CHNUFPI 1247	CHNUFPI 1248
Total body length <sup>1</sup>		9.94	11.31	12.42	10.37	9.31
Propeltidium	Length	2.06	3.13	3.14	3.03	2.9
	Width	2.26	3	2.48	2.73	2.9
Chelicera	Length	3.52	3.5	3.95	3.27	3.33
	Width	1.01	1.3	1.11	1.33	1.5
	Height	1.04	1.17	1.22	1.2	1.33
Pedipalp total length		12.88	14.03	14.36	14.04	10.56
Femur	Length	4.09	4.66	4.9	4.66	3.5
	Width	0.81	0.87	1	0.97	0.73
	Height	0.69	0.97	0.87	1.07	0.83
Tibia	Length	4.43	4.98	4.98	4.72	3.53
	Width	0.64	0.73	0.87	0.73	0.6
	Height	0.59	0.77	0.76	0.77	0.57
Basitarsus + telotarsus	Length	4.36	4.39	4.48	4.66	3.53
Leg I total length		8.03	7.6	8.13	6.97	5.84
Patella	Length	2.38	2.33	2.51	2.17	1.83
Tibia	Length	2.83	2.67	2.9	2.43	2.07
Basitarsus	Length	1.76	1.6	1.71	1.5	1.17
Telotarsus	Length	1.06	1	1.01	0.87	0.77
Leg IV total length		14.07	14.25	13.79	13.24	11.06
Patella	Length	4.6	4.79	4.43	4.32	3.56
	Width	0.68	0.97	0.99	0.83	0.73
	Height	1.02	1.4	1.44	1.33	1.1
Tibia	Length	4.68	4.66	4.8	4.39	3.73
	Width	0.46	0.62	0.57	0.6	0.52
Basitarsus	Length	3.17	3.3	3.17	3.3	2.77
Telotarsus <sup>2</sup>	Length	1.62	1.5	1.39	1.23	1

is created to classify a new species, so long as the new species fits in one of the existing genera.

## Pedipalp autotomy

The suture-like cleavage plane herein reported for Ammotrechinae s.str. (Figs 17, 18), first identified by Botero-Trujillo (2018 [unpublished]), represents the first account of pedipalp autotomy in Solifugae. The cleavage plane appears as a distinct, darkened line that is visible on the base of the pedipalp femur when the animal is upside down. Various pedipalp-severed specimens of different genera of Ammotrechinae were examined during this investigation. In all cases, the pedipalp had been neatly cut along the suture line and in no case was it cut anywhere else. Most solifuges walk with the second to fourth pairs of legs, whereas their pedipalps and first pair of legs are used to sense the environment as they mobilize, and to anticipate obstacles or objects in front of them. The latter include natural enemies and potential preys, which exposes these appendages to extra dangers. Although no

events of pedipalp autotomy could be observed in nature, all the mutilated specimens examined by us had developed a healing scar and smooth edges in the cuticle of the severed stump, observations that are comparable to those made on scorpions of the genus *Ananteris* Thorell, 1891 that had autotomized the metasoma (Mattoni et al. 2015). Altogether, these observations present compelling evidence of pedipalp autotomy in Ammotrechinae s.str.

## 5. Acknowledgments

R.B.-T. was supported by a Theodore Roosevelt Postdoctoral Research Fellowship from the AMNH Richard Gilder Graduate School (RGGS); U.S. National Science Foundation (NSF) grant DEB 1655050 to Lorenzo Prendini; Doctoral Fellowship associated to PICT 2011-01007 from the “Fondo para la Investigación Científica y Tecnológica – FON-CyT,” Argentina; and Doctoral Fellowship from the “Consejo Nacional de Investigaciones Científicas y Técnicas – CONICET,” Argentina. Financial support was received from PICT 2010-1764 to A.A.O.-A., and PICT 2011-1007 and PIP 2012-0943 to Martín J. Ramírez. Fieldwork



in Brazil was supported by funding from the Fundação de Amparo à Pesquisa do Estado de São Paulo, FAPESP (2011/21643-1). The authors thank the curators and managers of institutional collections who loaned, or otherwise facilitated access to, specimens of Solifugae examined for this contribution: Lorenzo Prendini, Pío A. Colmenares, and Louis N. Sorkin (AMNH); Janet Beccaloni and Danniella Sherwood (BMNH); Jhon C. Neita Moreno (IAvH); Eduardo Flórez (ICN); Martín J. Ramírez and Cristian Grismado (MACN); Dimitri Forero and Giovanni Fagua (MPUJ). We thank Ricardo Pinto da Rocha (MZUSP) for providing data on specimens deposited at the MZUSP; Fabián Tricárico for assistance with the scanning-electron microscope at the MACN; Marielle Schneider (Universidade Federal de Mato Grosso, Brazil) and Jimmy Cabra García (Universidad del Valle, Colombia) for assistance with the field expeditions that produced the collection of the studied *Xenotrecha* specimens; P.A. Colmenares (AMNH) for sharing photos of the holotype of *E. longirostris*; Tharina L. Bird (DITSONG National Museum of Natural History, Pretoria, South Africa) and two anonymous referees for helpful comments on an earlier version of the manuscript. Additional thanks to the Universidad del Atlántico (Colombia) for allowing L.M. the use of space and equipment at its facilities, and to the Descriptive and Applied Biology Research Group of the Universidad de Cartagena (Colombia) for undertaking fieldwork efforts relevant to this project.

## 6. References

- Acosta-Berrocal M, Bedoya-Roque E, Salleg-Pérez G, Quiros-Rodríguez JA (2017) Una especie nueva de *Ammotrechella* Roewer 1934 (Solifugae: Ammotrechidae), de Colombia. *Revista Ibérica de Aracnología* 31: 64–70. <http://sea-entomologia.org/PDF/BSEA-49ARACNO/B49083.pdf>
- Almeida DA, Parente-Junior WC, Beserra-Neta LC, Costa ML (2009) Erodibilidade do solo e erosividade da chuva na serra do Tepequém – Roraima. *Revista Acta Geográfica* 6: 39–46. <https://doi.org/10.5654/acta.v3i6.223>
- Armas LF de (1996) Sistemática del orden Solpugida (Arachnida) en Centroamérica: situación actual y perspectivas. *Revista Nicaragüense de Entomología* 35: 29–35. <http://www.bio-nica.info/RevNicaEntomo/35-Solpugida.pdf>
- Armas LF de, Teruel R (2005) Los solífugos de Cuba (Arachnida: Solifugae). *Boletín de la Sociedad Entomológica Aragonesa* 37: 149–163. <http://sea-entomologia.org/PDF/BSEA37ARACNO/B37-149.pdf>
- Bird TL, Wharton R, Prendini L (2015) Cheliceral morphology in Solifugae (Arachnida): primary homology, terminology and character survey. *Bulletin of the American Museum of Natural History* 394: 355 pp. <http://dx.doi.org/10.5531/sd.sp.8>
- Botero-Trujillo R (2016) The smallest known solifuge: *Vempironiella aguillari*, new genus and species of sun-spider (Solifugae: Mummuciidae) from the coastal desert of Peru. *Journal of Arachnology* 44: 218–226. <https://doi.org/10.1636/JoA-S-16-012>
- Botero-Trujillo R (2018) Revisión Sistemática y Filogenia de los Solífugos de la Familia Mummuciidae (Arachnida, Solifugae). PhD Thesis. Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina. Volumes I and II: 336 pp. + 209 pp. [unpublished].
- Botero-Trujillo R, Iuri HA (2015) *Chileotrecha romero* (Kraus, 1966) comb. nov. and *Pseudocleobis patagonicus* (Roewer, 1934) comb. nov. transferral from Mummuciidae to Ammotrechidae (Arachnida, Solifugae). *Zootaxa* 3990(3): 437–443. <https://doi.org/10.11646/zootaxa.3990.3.8>
- Botero-Trujillo R, Ott R, Carvalho LS (2017) Systematic revision and phylogeny of the South American sun-spider genus *Gaucha* Mello-Leitão (Solifugae: Mummuciidae), with description of four new species and two new generic synonymies. *Arthropod Systematics & Phylogeny* 75(1): 3–44. [https://www.senckenberg.de/wp-content/uploads/2019/07/01\\_asp\\_75\\_1\\_botero\\_3-44.pdf](https://www.senckenberg.de/wp-content/uploads/2019/07/01_asp_75_1_botero_3-44.pdf)
- Botero-Trujillo R, Lagos-Silnik S, Fernández-Campón F (2019a) *Curanahuel aconcagua*, a new genus and species of sun-spider (Solifugae: Mummuciidae) from the Cuyan High Andean biogeographic province of Argentina. *Journal of Arachnology* 47: 351–359. <https://doi.org/10.1636/0161-8202-47.3.351>
- Botero-Trujillo R, Ott R, Mattoni CI, Nime MF, Ojanguren-Affilastro AA (2019b) Two new species of the sun-spider genus *Gaucha* from Argentina and Brazil (Solifugae, Mummuciidae). *Zootaxa* 4551(2): 180–194. <https://doi.org/10.11646/zootaxa.4551.2.3>
- Brookhart JO, Brookhart IP (2006) An annotated checklist of continental North American Solifugae with type depositories, abundance, and notes on their zoogeography. *Journal of Arachnology* 34: 299–329. <http://dx.doi.org/10.1636/H04-02.1>
- Carvalho LS, Botero-Trujillo R (2019) On the sun-spiders of the *ibirapemussu* species-group of the genus *Gaucha* Mello-Leitão, 1924 (Solifugae, Mummuciidae), with description of a new species. *Zootaxa* 4700: 289–298. <https://doi.org/10.11646/zootaxa.4700.2.8>
- ESRI - Environmental Systems Research Institute (2014) ArcGIS Desktop: Release 10.3. – Redlands, CA.
- Goud J, van der Bijl B, Creuwels J (2020) Naturalis Biodiversity Center (NL) – Chelicerata and Myriapoda. Naturalis Biodiversity Center. Occurrence dataset <https://doi.org/10.15468/63lozv> accessed via <https://www.gbif.org> on 2020-10-01.
- Harms D, Dupérré N (2018) An annotated type catalogue of the camel spiders (Arachnida: Solifugae) held in the Zoological Museum Hamburg. *Zootaxa* 4375(1): 1–58. <https://doi.org/10.11646/zootaxa.4375.1.1>
- Harvey MS (2001) *Ammotrecha* Banks, 1900 and *Ammotrechula* Roewer, 1934 (Arachnida, Solifugae): proposed conservation by the designation of *Galeodes limbata* Lucas, 1835 as the type species of *Ammotrecha*; and *Eremobates* Banks, 1900 and *Eremorhax* Roewer, 1934: proposed conservation by the designation of *Galeodes pallipes* Say, 1823 as the type species of *Eremobates*. *Bulletin of Zoological Nomenclature* 58(3): 196–201.
- Harvey MS (2003) Catalogue of the Smaller Arachnid Orders of the World. CSIRO Publishing, Collingwood, Victoria, Australia. First Edition. 397 pp.
- Hernández HLA, Colmenares GPA (2008) Segundo registro de *Eutrechella longirostris* Maury, 1982 (Solifugae: Ammotrechidae) de Venezuela. *Boletín de la Sociedad Entomológica Aragonesa* 42: 447–448. <http://sea-entomologia.org/PDF/BSEA42ARACNO/B42447.pdf>
- Iuri HA, Iglesias MA, Ojanguren-Affilastro AA (2014) A new species of *Chileotrecha* Maury, 1987 (Solifugae: Ammotrechidae) from Argentina with notes on the genus. *Zootaxa* 3827(1): 20–30. <https://doi.org/10.11646/zootaxa.3827.1.2>
- Iuri HA, Ramírez MJ, Mattoni CI, Ojanguren-Affilastro AA (2021) Revision and cladistic analysis of subfamily Nothopuginae (Solifugae, Ammotrechidae). *Zoologischer Anzeiger* 295: 126–155. <https://doi.org/10.1016/j.jcz.2021.10.001>
- Kraepelin K (1899) Zur Systematik der Solifugen. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg* 16: 195–258.
- Kraepelin K (1901) Palpigradi und Solifugae. *Das Tierreich* 12: 1–159.

- Kury AB, Giupponi APL, Mendes AC (2018) Immolation of Museu Nacional, Rio de Janeiro – unforgettable fire and irreplaceable loss. *Journal of Arachnology* 46: 556–558. <https://doi.org/10.1636/JOA-S-18-094.1>
- Kury AB, Nogueira ALC (1999) Annotated check list of type specimens of Arachnida in the Museu Nacional–Rio de Janeiro. I. Scorpiones, Pseudoscorpiones and Solifugae. *Publicações Avulsas do Museu Nacional* 77: 1–19.
- Mattoni CI, García-Hernández S, Botero-Trujillo R, Ochoa JA, Ojanguren-Affilastro AA, Pinto-da-Rocha R, Prendini L (2015) Scorpion sheds ‘tail’ to escape: consequences and implications of autotomy in scorpions (Buthidae: *Ananteris*). *PLoS One* 10: e0116639. <https://doi.org/10.1371/journal.pone.0116639>
- Maury EA (1977) Notas sobre la sistemática y distribución geográfica de *Procleobis patagonicus* (Holmberg 1876) (Solifugae, Ammotrechidae, Saronominae). *Physis* (Buenos Aires) secc. C 36(92): 283–293.
- Maury EA (1982) Solífugos de Colombia y Venezuela (Solifugae, Ammotrechidae). *Journal of Arachnology* 10: 123–143.
- Maury EA (1984) Las familias de solífugos americanos y su distribución geográfica (Arachnida, Solifugae). *Physis* (Buenos Aires), secc. C, 42(103), 73–80.
- Maury EA (1987[1985]) Consideraciones sobre algunos solífugos de Chile (Solifugae: Ammotrechidae, Daesiidae). *Revista de la Sociedad Entomológica Argentina* 44: 419–432.
- Mello-Leitão C (1938) Solífugos de Argentina. *Anales del Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”* 40: 1–32.
- Muma MH (1951) The arachnid order Solpugida in the United States. *Bulletin of the American Museum of Natural History* 97: 35–141.
- Muma MH (1970) A synoptic review of North American, Central American, and West Indian Solpugida (Arthropoda: Arachnida). *Arthropods of Florida and Neighboring Land Areas* 5: 1–62.
- Muma MH (1971) The solpugids (Arachnida, Solpugida) of Chile, with descriptions of a new family, new genera, and new species. *American Museum Novitates* 2476: 1–23.
- Muma MH (1976) A review of solpugid families with an annotated list of western hemisphere solpugids. Publication of the Office of Research, Western New Mexico University, Silver City, New Mexico, 2(1): 1–33.
- Muma MH, Nazario ML (1971) New solpugids (Arachnida: Solpugida) from Puerto Rico. *Journal of Agriculture of the University of Puerto Rico* 55: 506–512.
- Rocha LS, Cancellato EM (2002a) South American Solifugae: New records, occurrence in humid forest and concurrence with termites. *Newsletter of the British Arachnological Society* 93: 4–5.
- Rocha LS, Cancellato EM (2002b) Arachnida – Solifugae. *Fauna da Amazonia Brasileira* 22: 1–3.
- Roewer CF (1934) Solífuga, Palpigrada. In: Bronn HG (Ed.), *Klassen und Ordnungen des Tierreichs. V Band: Arthropoda. IV Abteilung: Arachnoidea und kleinere ihnen nahegestellte Gruppen*. Akademische Verlagsgesellschaft mbH. Leipzig, pp. 481–723.
- Villareal-Blanco E, Armas LF, Martínez L (2017) Una especie nueva del género *Eutrecha* Maury, 1982 del Caribe Colombiano (Solifugae: Ammotrechidae). *Revista Ibérica de Aracnología* 30: 139–143.
- Weidner H (1959) Die Entomologischen Sammlungen des Zoologischen Staatsinstituts und Zoologischen Museums Hamburg. I. Teil. Pararthropoda und Chelicerata I. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 57: 89–142.

## Supplementary material 1

### Table S1

**Authors:** Botero-Trujillo R, Martínez L, Iuri HA, Ojanguren-Affilastro AA, Carvalho LS (2023)

**Data type:** .xls

**Explanation note:** Table of localities for each species examined in the present study.

**Copyright notice:** This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.

**Link:** <https://doi.org/10.3897/asp.81.e95181.suppl1>