Revista Ibérica de Aracnología, nº **32** (30/06/2018): 93–99.
Grupo Ibérico de Aracnología (S.E.A.). ISSN: 1576 - 9518.

A NEW SPECIES OF *ANTILLOCHERNES* (PSEUDOSCORPIONES: CHERNETIDAE: CHERNETINI) FROM COLOMBIA

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Abstract: A first record of the genus *Antillochernes* Muchmore (Pseudoscorpiones: Chernetidae: Chernetini) from Colombia is presented, with the description of a new species, *A. bullerenguesis* **sp. nov.** from north-western Colombia, in the department of Cordoba. This is the first report of the genus from the southern hemisphere of America. A distribution map is included, with both new and previously published records; an identification key is given for the pseudoscorpion species of the genus *Antillochernes*.
Key words: Pseudoscorpiones, Chernetidae, taxonomy, new species, Puerto Escondido, Cordoba, Colombia.

Una especie nueva de *Antillochernes* (Pseudoscorpiones: Chernetidae: Chernetini) de Colombia
Resumen: Se presenta un primer registro del género Antillochernes Muchmore (Pseudoscorpiones: Chernetidae: Chernetini) de Colombia, con la descripción de una nueva especie *A. bullerenguesis* **sp. nov.** del noroccidente de Colombia, en el departamento de Córdoba. Este es el primer reporte del género en el hemisferio sur de América. Se incluye un mapa de distribución, con registros nuevos y publicados previamente, y se presenta una clave taxonómica para las especies de pseudoescorpiones del género *Antillochernes*.
Palabras clave: Pseudoscorpiones, Chernetidae, taxonomía, especie nueva, Puerto Escondido, Córdoba, Colombia.

Taxonomy / Taxonomía: *Antillochernes bullerenguesis* **sp. nov.**

Introduction

The family Chernetidae was created for the first time by Menge (1855), this was revalidated and redefined by Chamberlin (1931) and Beier (1932). Additionally, Judson (1985) demonstrating that Myrmochernetidae should be considered as a synonym of Chernetidae. Apart from the inclusion of new taxa, the family has not significantly altered in extent since then (Harvey, 2013). Currently, three subfamilies are recognized but their interrelationships are poorly understood (Murienne *et al*., 2008; Harvey, 2013). These are defined by the shape and appearance of the female spermathecae (Muchmore, 1975), Goniochernetinae, Lamprochernetinae, and Chernetinae, this latter is divided into two tribes: Chernetini Menge with 567 species and Mirmochernetini Chamberlin with 5 species respectively (Harvey, 2013). The family Chernetidae can be considered cosmopolitan, represented by 701 valid species. It is the most diverse family of the order, found all over the world, occurring under the bark of trees, in leaf litter, in caves, as well as a variety of other habitats (Harvey, 1992, 2013).

The genus *Antillochernes* was created by Muchmore (1984), It is closely related to the genus *Parachernes* Chamberlin, of which, it differs by the presence of setae on the pleural membrane of the abdomen (Dumitresco & Orghidan, 1977; Muchmore, 1984). Currently, this genus is represented by six species: *A. muchmorei* (Dumitresco & Orghidan, 1977), *A. jamaicensis* Muchmore, 1984, *A. floridensis* Muchmore, 1984, *A. cruzensis* Muchmore, 1984, *A. biminiensis* Muchmore, 1984 and *A. bahamensis* Muchmore, 1984 (Muchmore, 1984; Harvey, 2013). The only important change was transferring the species *Parachernes muchmorei* (Dumitresco & Orghidan, 1977) by presents all the characteristics of the genus Antillochernes and the possession of setae on the pleural membrane of the abdomen (Muchmore, 1984).

In the Colombian Caribbean few investigations have been carried out on pseudoscorpions, the first reports of the region were made by Banks (1909), who described the species *Garypus viridans* from Santa Marta (Magdalena), later Muchmore (1982; 1993) described the species *Ideoblothrus colombiae* and *I. kochalkai* from Santa Marta and *Dasychernes inquilinus* for the localities of Rio Frio and Seville (Magdalena). In the department of Córdoba, only reports of tropical dry forest and mangrove forest are known (Bedoya *et al*., 2014; Bedoya, 2015; Bedoya *et al*., 2015; Bedoya *et al*., 2017), for this reason, it was considered convenient to initiate studies on the fauna of pseudoscorpions in insular areas of the department of Córdoba, Colombian Caribbean, resulting in the new species described in this study.

Materials and methods

Study area

The study was realized in Tortuguilla Island (Department of Cordoba), It is located at 9°01'39.2"N; 76°20'27.6"W, to 9 km from the coast of the municipality of Puerto Escondido, it is formed by a submerged sub-fossil coral reef and it has a surface area of 0.1 km^2 (Fig. 1A), the predominant vegetation consists of palms of *Cocos nucifera* Linneo, fruit trees and *Conocarpus erectus* Linneo in the southern half of the island (Estela, 2006; IDEAM, 2010). The island was selected for its state of conservation, the structure of vegetation and easy access (Fig. 1B).

Sampling of pseudoscorpions

The methodologies described by Gabbutt (1970), Mahnert & Adis (2002) and the recommendations made by Adis *et al*. (1998) were adapted and applied for sampling. The free

search without restriction was used to examine the bark of 20 trees at random (Adis *et al*., 1998). A quadrant of 1m^2 was used for the soil; the collected leaf litter was deposited in hermetically sealed bags to be subsequently examined in the laboratory; the pseudoscorpions were extracted using Berlese's funnel processing (Gabbutt, 1970).

Laboratory stage

The specimens were subjected to dissection processes, a leg I and IV, a chelicera and a pedipalp, of which the chela was separated. The dissected portions have been returned to a microvial and preserved in 70% ethanol in the same vial as the rest of each specimen. The specimens were studied using temporary mounts glycerin, a process carried out in the Entomology and Zoology laboratories of the University of Cordoba. The specimens were studied with the help of a microscope Carl Zeiss, plus Axiostar, Germany. Multifocal photographs were taken in the Microscopy laboratory of the University of Córdoba, with an HD digital camera attached to the Carl Zeiss stereomicroscope, Axiostar, and then united by the image stacking software AxioVision Carl Zeiss (Rel.4.8.2. SP3). Measurements were taken using a micrometer attached to a Carl Zeiss stereomicroscope, Axiostar, in conjunction with software AxioVision Carl Zeiss (Rel.4.8.2. SP3). Genital organs observed after immersion in lactic acid for a few hours or longer, if necessary, or in 10% KOH solution. The pseudoscorpions collected, were identified as members of the family Chernetidae and the genus *Antillochernes*, using the morphological descriptions made by Dumitresco & Orghidan (1977) and the taxonomic key proposed by Muchmore (1984). Terminology and mensuration mostly follow Chamberlin (1931), except for the nomenclature of the pedipalps, legs and with some minor modifications to the terminology of the trichobothria (Harvey, 1992), chelicera Harvey & Edward (2007) and Judson (2007) and face of appendages Harvey *et al*. (2012). The measurements are expressed in millimeters (mm); the width is measured dorsally, except for the legs that are measured laterally. The specimens identified were deposited in the collection of the Entomology Laboratory of the University of Córdoba, Monteria, Colombia (LEUC).

Abbreviations: distribution of trichobothria on the fingers of the chela (Chamberlin, 1931; Harvey, 1992): external trichobothria, fixed finger: ***et***: terminal exterior, ***est***: exterior subterminal, ***esb***: exterior subbasal, ***eb***: exterior basal; internal trichobothria, fixed finger: ***it***: interior terminal, ***ist***: interior subterminal, ***isb***: interior subbasal, ***ib***: interior basal; trichobothria movable finger, external surface: ***t***: terminal, ***st***: subterminal, ***sb***: subbasal, ***b***: basal. Other abbreviations: ***es:*** exterior setae, ***bs:*** basal setae, ***sbs:*** subbasal setae, ***Sg***: glandular setae of the sternites, **TS**: tactile setae.

Systematic

Family Chernetidae Menge, 1855

Subfamily Chernetinae Menge, 1855

Tribe Chernetini Menge, 1855

Chernetini Menge: Beier, 1932: 106; Beier, 1933: 510-511; Roewer, 1937: 292; Morikawa, 1960: 142; Murthy & Ananthakrishnan, 1977: 136.

Genus *Antillochernes* Muchmore, 1984

Antillochernes bahamensis Muchmore, 1984, by original designation.

***Antillochernes bullerenguesis* sp. nov.**

Figures 2-5.

MATERIAL EXAMINED:

Holotype: 1 ♀, Puerto Escondido, Córdoba: Isla Tortugilla, 9°1'14.121"N, 76°20'26.61"W, July 6, 2013, mangrove forest, E. Bedoya-Roqueme leg. (deposited in LEUC; Ps-IT-012).

Paratypes: 2 tritonymphs, Puerto Escondido, Córdoba: Isla Tortugilla, 9° 1' 14.121"N, 76° 20' 26.61"W, July 6, 2013, mangrove forest, E. Bedoya-Roqueme leg. (deposited in LEUC; Ps-IT-013).

DIAGNOSIS (♂ unknown): ♀, *Antillochernes bullerenguesis* sp. nov., is characterized by the distribution of trichobothria *st-sb-b* on the movable finger of the chela of the pedipalp; by the position of trichobothria *ist* on the fixed finger, being proximal to *it* and at the same level to *est*; the movable finger strongly curved; the length/width of the femur 1.9 times and Patela 2.08 times; by the number of teeth present in the fingers of the chela, fixed finger with 30 teeth and four prolateral teeth and five retrolateral teeth, movable finger with 35 teeth and eight prolateral teeth and five retrolateral teeth and by the presence of 2-3 setae on each side in segments 5-10 of the pleural membrane of the abdomen.

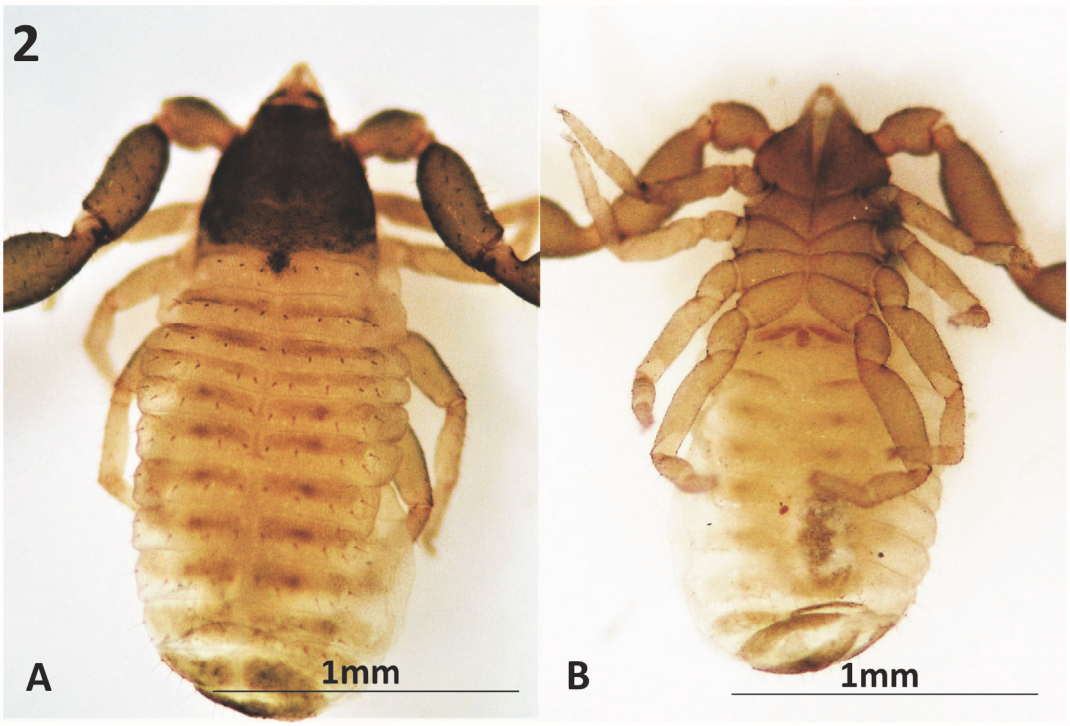
DESCRIPTION

Female (Male Unknown): Small species, the pattern of body coloration equal to that presented by Muchmore (1984) for the genus *Antillochernes* (Fig. 2A); carapace with two well-marked transverse furrows, granulated surface, with two eyes spots, carapace with rather short 50 setae, dentate and clavate, anterior and posterior margin of the carapace with six and five setae respectively (Fig. 3A y 3B). Tergites and sternites indistinctly divided, dark sclerites surrounded by light, area membranous, surface scaly (Figs. 2A y 2B). Tergal chaetotaxy of holotype ♀: tergites I-XII: 10: 8: 10: 10: 10: 10: 10: 12: 12: 12: 10 [2TS]: 2, setae denticulate, the surface of the tergites granulated (Fig. 2A). Sternal chaetotaxy of holotype ♀: sternites II-XII: 26: (2)10(2) :(1) 8 (1): 14: 14: 14: 12: 12: 12: 12 [4TS]: 2; tergite 11 and sternite 11 with two and four long and acuminate setae respectively, anal cone setae denticulate. The genital region of the holotype female, with a cluster of 14 small setae on separate sclerites with five small setae each, posterior genital plate with a marginal row of 10 small setae (Fig. 5A); spermathecae with two sacs curved and expanded distally (Fig. 5B). Pleural membranes longitudinal, irregularly striate, bearing 2-3 short clavodentate setae on each side in segments 5-10.

Chelicera with five setae on the hand, setae *bs,* and s*bs* serrated, *es* long and acuminate; rallum with three blades, with one distal denticulate; fixed finger with two teeth, movable finger with tooth-like subapical lobe; galea slender with several bifid branches; serrula exterior with 18 blades (Fig. 4D).

Pedipalp robust of color dark brown, granulated surface, setae acuminate and dentate, trochanter 1.45 times; femur 1.95 times; Patela 2.1 time; Chela with pedicel 2.67 times; Hand with pedicel 1.48 times (Fig. 4A); fingers longer than the hand with pedicel and movable finger strongly curved (Fig. 4A y 4B); chelal hand lightly granulate, fingers smooth. Trichobothria on fixed finger only *et* distal of middle of finger, the others grouped near the base, with *it* proximal to *ist* and *est*, trichobothria *ist* near level of *est*; trichobothria *isb* distal level of *ib*; on movable finger only *t* distal of middle, *st*





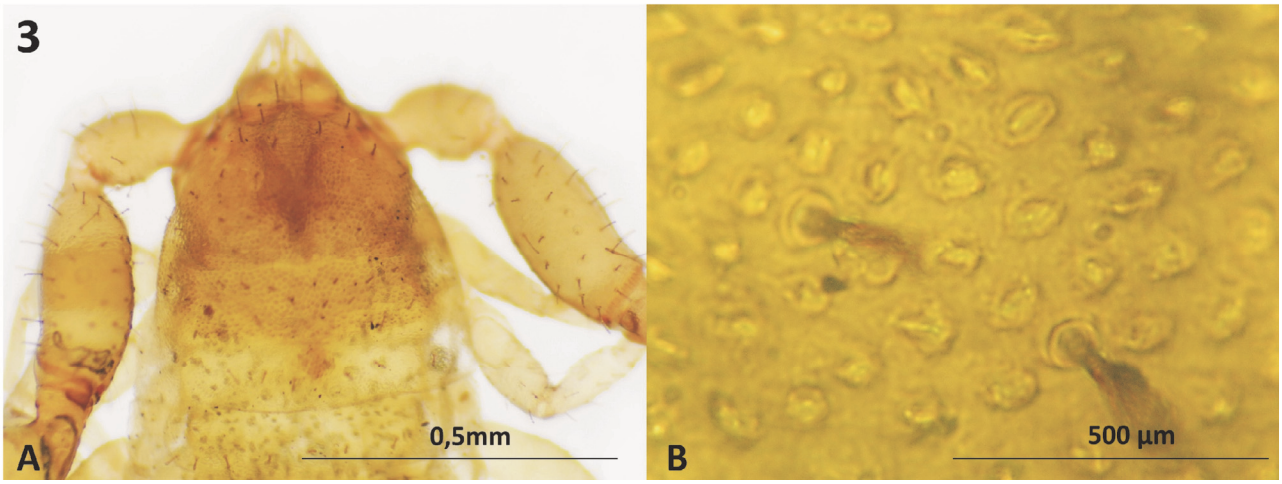


Fig. 1. Tortuguilla Island, Puerto Escondido: **A,** Panoramic view. **B,** Mangrove forest. **Fig. 2.** *Antillochernes bullerenguesis* sp. nov., female holotype: **A,** *habitus*, dorsal view. **B,** *habitus,* ventral view. **Fig. 3.** *Antillochernes bullerenguesis* sp. nov., female holotype: **A,** carapace, dorsal aspect. **B,** granulation of the metazone, carapace, dorsal view.

equidistant of *t* and the group formed by trichobothria *sb* and *b* (Fig. 4B). Fixed finger with 30 marginal teeth, four prolateral and five retrolateral teeth. Movable finger with 35 marginal teeth, eight prolateral teeth and five retrolateral teeth (Fig. 4B). Venom apparatus well developed in the movable finger and vestigial in the fixed finger (Fig. 4B).

Legs robust, all legs light yellow, surface smooth with some granulations, all setae acuminate; leg I femur 1.42 times; patella 2.33 times; tibia 3.85 times; tarsus 6.4 times longer than deep. Leg IV Femur+Patella 3.3 times; tibia 4.4 times; tarsus 6.0 times longer than deep, tarsus with subterminal setae tactile smooth, curved; undivided arolia shorter than smooth claws (Fig. 4C).

Tritonymphs: carapace with two well-marked transverse furrows, granulated surface, with two indistinct eyes spots, anterior and posterior margin of the carapace with four and five setae respectively, the posterior part of the carapace appears separate from the anterior part. Tergites and sternites indistinctly divided, area membranous and surface scaly. Tergal chaetotaxy for two mounted specimens paratype: tergites I-XII: 8: 8: 8: 8: 10: 10: 10: 10: 10: 12: 10 [2TS]: 2. Sternal chaetotaxy of paratype: sternites II-XII: 6: (2)6(2) :(1) 8 (1): 10: 10: 10: 10: 10: 10: 12 [4TS]: 2; sternite II y III with three small setae on each side; tergite 11 and sternite 11 with two and four long and acuminate setae respectively, anal cone setae denticulate. Pleural membranes longitudinal, irregularly striate, bearing 2 short clavodentate setae on each side in segments 5-10. Chelicera with five setae on the hand, setae *bs,* and s*bs* serrated, *es* long and acuminate; rallum with three blades, with one distal denticulate; galea slender with several bifid branches.

Pedipalp robust, granulated surface, setae acuminate and dentate, trochanter 1.3 times; femur 1.7 times; Patela 1.9 time; Chela with pedicel 2.5 times; Hand with pedicel 1.3 times; chelal hand lightly granulate, fingers smooth. Distribution of trichobothria similarly to the adult female, trichobothria *sb* absent on the movable finger. Fixed finger with 27 marginal teeth, three prolateral and four retrolateral teeth. Movable finger with 29 marginal teeth, five prolateral teeth, and three retrolateral teeth. Venom apparatus well developed in the movable finger and vestigial in the fixed finger.

Legs robust, all legs light yellow, surface smooth with some granulations, all setae acuminate; leg I: femur 1.3 times; patella 1.7 times; tibia 3.74 times; tarsus 4.1 times longer than deep. Leg IV: Femur+Patella 2.6 times; tibia 3.7 times; tarsus 5.5 times longer than deep, tarsus with subterminal setae tactile smooth, curved; undivided arolia shorter than smooth claws.

Measurements (mm):

Holotype female (LEUC): total Length: 2.2; Carapace 0.53/0.64. Pedipalp: trochanter 0.29/0.20, femur 0.43/0.22, patella 0.53/0.25, chela with pedicel: 0.99/0.37, hand with pedicel 0.55/0.37, pedicel length 0,07, movable finger 0.492. Leg I: femur 0.17/0.12, patella 0.28/0.12, tibia 0.27/0.07, tarsus: 0.32/0.05. Leg IV: Femur + patella 0.50/0.15, tibia 0.40/0.09, tarsus 0.36/0.06.

Paratype Tritonymph (LEUC): ranges for two mounted specimens, total Length: 1.7-1.9; Carapace 0.23-0.27/0.34-0.36. Pedipalp: trochanter 0.23-0,26/0.17-0,19, femur 0.33-0.34/0.19-0.20, patella 0.39-0.41/0.20-0.21, chela with pedicel: 0.83-0.84/0.33-0.34, hand with pedicel 0,45-0.47/0.34, pedicel length 0,03, movable finger 0.17-0.19. Leg I: femur 0.12-0.13/0,09-0.10, patella 0.17-0.18/0.10-0.11, tibia 0.15-0.17/0.04-0.05, tarsus: 0.12-0.13/0.03-0.05. Leg IV: Femur + patella 0.32-0.33/0.12-0.13, tibia 0.15/0.06-0.07, tarsus 0.22-0.23/0.04-0.05.

ETYMOLOGY: The specific epithet (*bullerenguesis*) is in honor to the culture of the Bullerengue, a Caribbean dance performed in the locality where the species was collected.

REMARKS. According to descriptions made by Dumitresco & Orghidan (1977) and the taxonomic key proposed by Muchmore (1984), *Antillochernes bullerenguesis* sp. nov. differs from the other members of the genus as follows: of *A. muchmorei* which possess two to three setae on the pleural membrane only in abdominal segments eight to ten; differs from *A. cruzensis* by its carapace length greater than 0.9 mm (*A. bullerenguesis* ♀, 0.53 mm), the tergal and sternal chaetotaxy, by the length of the femur 0.77 mm and patella 0.76 mm (*A. bullerenguesis* ♀, length of the femur 0.43 mm and patella 0.53 mm) and differs by presenting two to three short clavodentate setae on each side in abdominal segments 5-10. Differs of the species *A. floridensis*, and *A. bahamensis*, for the short length of the femur of the pedipalp 0.59 mm and 0.62 mm respectively (*A. bullerenguesis* ♀, 0.43 mm), the number of teeth in the fingers of the pedipalpal chela (fixed finger with 30 marginal teeth, four prolateral and five retrolateral teeth; movable finger with 35 marginal teeth, eight prolateral and five retrolateral teeth), by the shape and aspect of the spermathecae (*A. bullerenguesis*, spermathecae with two sacs curved and expanded distally). It differs of *A. biminiensis* Muchmore, 1984 by the shape and aspect of the pedipalp less slender (see Muchmore, 1984; figures 12 and 13), by presenting two to ten short clavodentate setae on each side in abdominal segments three to ten, and occasionally a setae in segment two and by the shape and aspect of the spermathecae.

This new species resembles *A. jamaicensis* Muchmore, 1984, known from Jamaica, in the small length of the carapace (♀, 0.53 mm), in the small length of the pedipalpal patella (♀ 0.53 mm) and the teething of the fingers of the chela with approximately 30 teeth or less. It differs by having two well-marked transverse furrows on the carapace, two to three short clavodentate setae on each side in segments five to ten, and the position of trichobothrium *st*, equidistant of *t* and the group formed by *b* and *sb*. Main differences between both species are the strong curvature of the movable chelal finger, clearly more curved en *A. bullerenguesis* sp. nov., less curved in *A. jamaicensis*, the number of setae in the segments of the pleural membrane, two to three short clavodentate setae on each side in abdominal segments five to ten in *A. bullerenguesis,* two to seven clavodentae setae on each side in abdominal segments three to seven and the position of the trichobothria *it* distal of *ist* and *est* in the Colombian species and proximal or at the level of *ist* and *est* in *A. jamaicensis*.

Antillochernes bullerenguesis sp. nov. was collected, associated with remains of coral in mangrove forests of *Conocarpus erectus*, in Tortuguilla Island and it's exclusive of Puerto Escondido, department of Cordoba. This species exhibits a cryptic habit, apparently, the crevices of coral remains are used as a refuge by this species, therefore, more samplings on the island are necessary to understand the natural history of this species. The Chernetidae family, in other regions of Colombia, has been reported; zones corresponding to terrestrial ecosystems and marine environments, however, the genus *Antillochernes* had not been reported (Ceballos &Florez, 2007; Romero-Otriz, 2015; Bedoya *et al*., 2016; Bedoya *et al*, 2017). Therefore, this species can be considered endemic to the insular area of Tortuguilla and exclusive to the municipality of Puerto Escondido (department of Córdoba) Colombian Caribbean (Fig. 6).

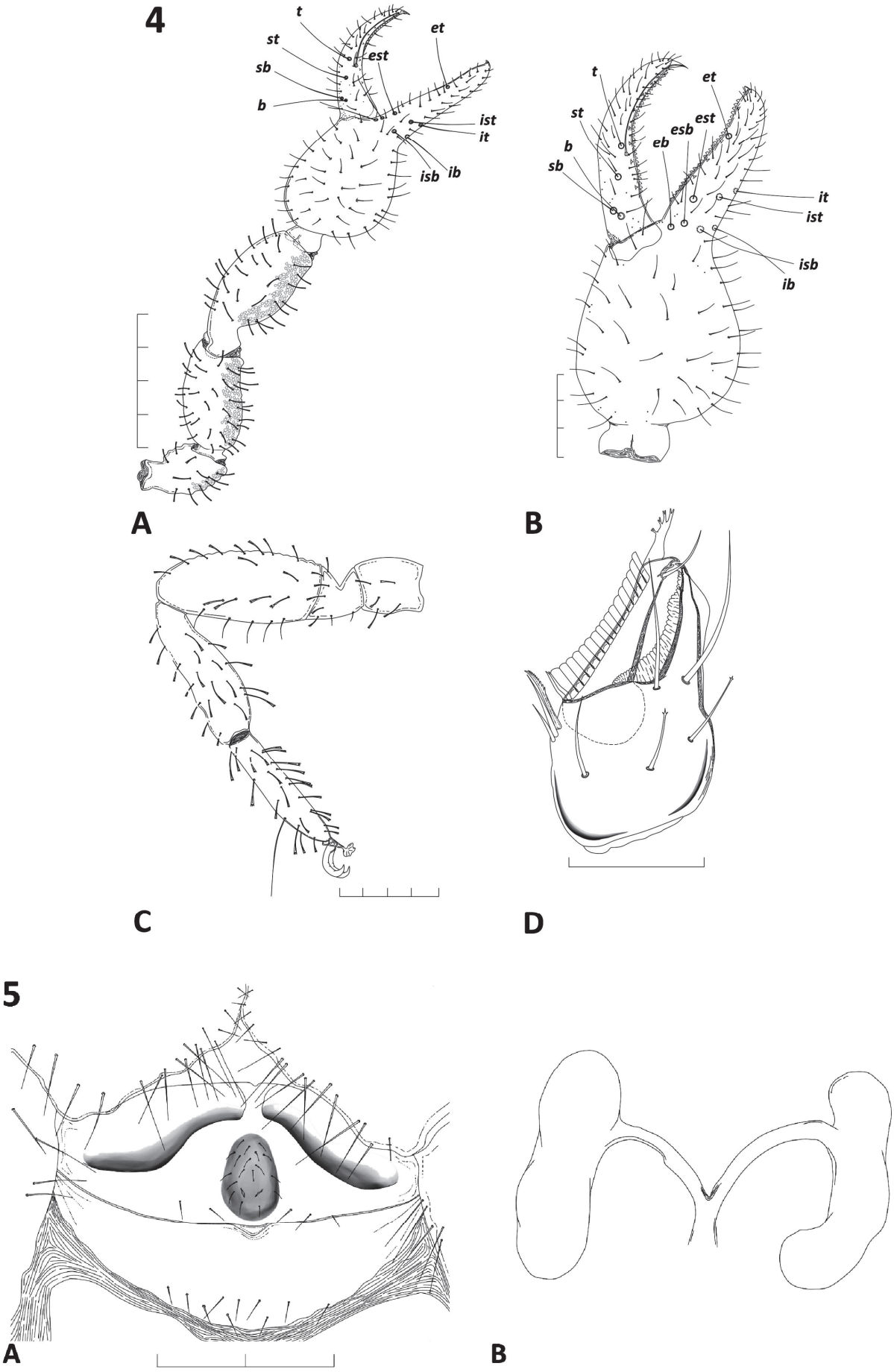


Fig. 4-5. *Antillochernes bullerenguesis* sp. nov., female holotype: **4**. **A,** left pedipalp, **B,** Pedipalpal chela, lateral view. **C,** left leg IV. **D,** Right chelicera. **5.**: **A,** genital region. **B,** spermathecae, aspect. Scale= 0,2 mm (Fig. 4A, 4C); 0,1 mm (Fig. 4B, 4D, 5A).

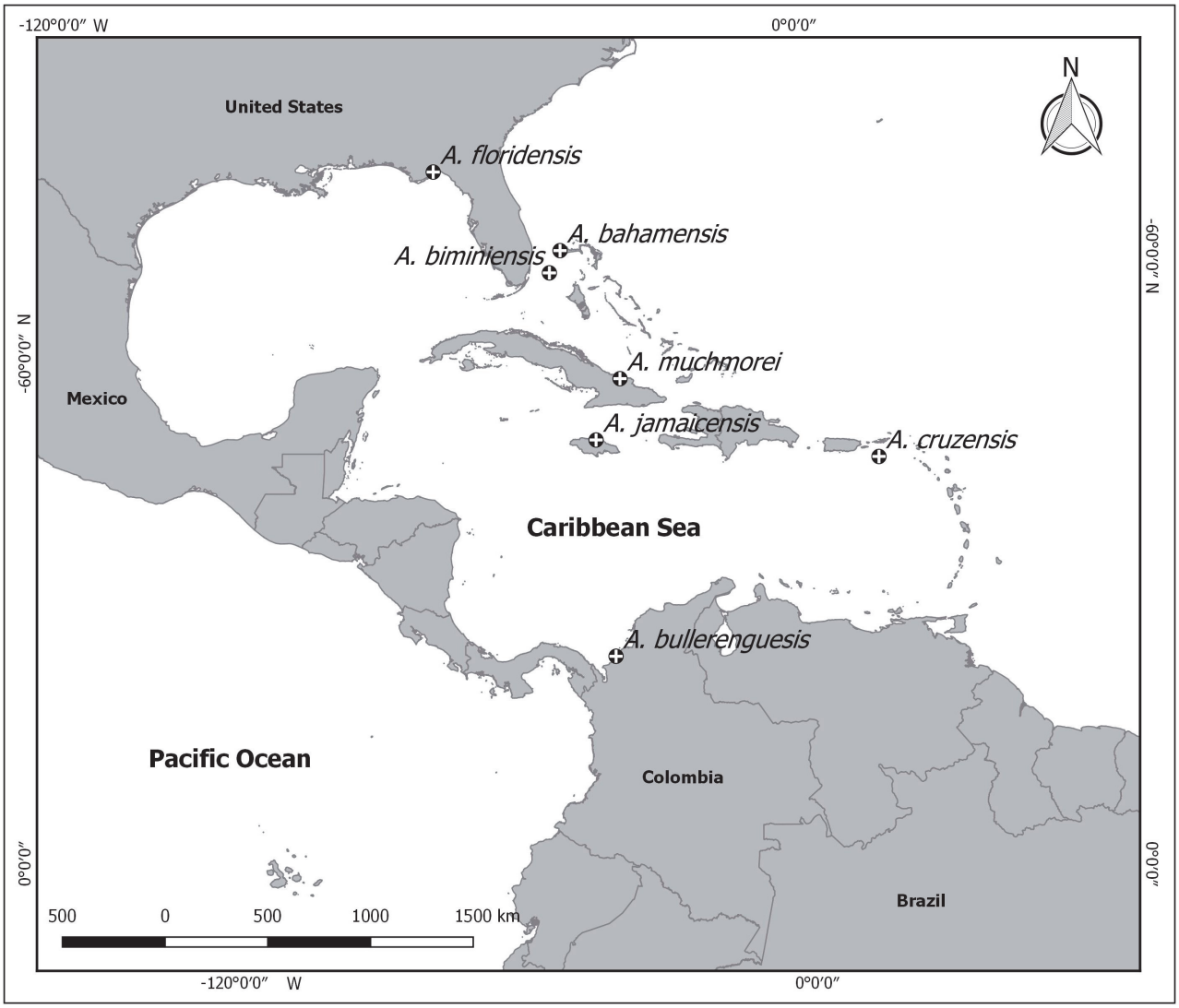


Fig. 6. Maps showing known distribution of species of *Antillochernes* Muchmore, 1984.

IDENTIFICATION KEY TO THE SPECIES OF THE GENUS *ANTILLOCHERNES* FROM THE WEST INDIES

An adaptation and extension of the original key made up by Muchmore (1984).

1 Setae on pleural membranes in abdominal segments 3-10 2
− Setae on pleural membranes in abdominal segments 8-10; from cuba ..... *A. muchmorei* (Dumitresco & Orghidan).
2 Carapace length greater than 0.9 mm; from U.S. Virgin Islands ..... *A. cruzensis* Muchmore.
− Carapace length less than 0.9 mm 3
3 Palpal chela with 1/w greater than 2.7 4
− Palpal chela with 1/w less than 2.7..... .5
4 The depth of chelal hand noticeably greater than the width; from Florida..... *A. floridensis* Muchmore.
− The depth of chill hand about equal to width; from the Bahamas..... *A. biminiensis* Muchmore.
5 Palpal patela length greater than 0,53 mm; from the Bahamas ..... *A. bahamensis* Muchmore.
− Palpal patela less than 0,53 mm 6
6 With one well-marked transverse furrows on the carapace; 2-7 clavodentae setae on each side in abdominal segments 3-10 ..... *A. jamaicensis* Muchmore.
− With two well-marked transverse furrows on the carapace; 2-3 short clavodentate setae on each side in abdominal segments 5-10; from Colombia ..... *A. bullerenguesis* sp.nov.

Acknowledgements

To Dr. Volker Mahnert (Museum of Natural History of the Ville de Genève, Switzerland) for collaborating during the process of taxonomic identification. To the Microscopy laboratory of the University of Córdoba for their help in photographing the material examined. To the Entomology laboratory of the University of Córdoba for their help and cooperation. To Estefania Padilla Montiel, assistant laboratory, for their collaboration in the Zoology laboratory of the University of Córdoba. To Maria Acosta Berrocal and Juan Vergara for the collaboration in the collection of the material examined.

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