

A new cave-dwelling *Neoallochernes* Hoff, 1947 (Pseudoscorpiones: Chernetidae) from northeast Brazil

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Abstract. During a study of the pseudoscorpion fauna of caves in northeastern Brazil, a new species of the genus *Neoallochernes* Hoff, 1947 was discovered. Morphological analysis suggests that the new species, named *Neoallochernes catimbauensis* sp. nov., is closely related to *N. cubanus* Muchmore, 1992. *Neoallochernes catimbauensis* can be distinguished from other congeners by its spermathecae morphology, trichobothria *ib* and *ist* positioned subbasally, trichobothrium *isb* located subdistally to the middle of the finger and proximal to *est*. Femur length/width ratios were $2.83 \times$ (♀) and $2.42\text{--}2.62 \times$ (♂); patella width ratios were $2.34 \times$ (♀) and $2.29\text{--}2.31 \times$ (♂); and chela (without pedicel) ratios were $3.34 \times$ (♀) and $3.18\text{--}3.21 \times$ (♂). In addition, ecological observations, distribution maps including past and present records, and a taxonomic identification key are provided.

Keywords: Arachnida, biospeleology, Caatinga, Neotropics, zoogeography
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Chernetidae is the third most diverse family of pseudoscorpions, currently represented by at least 739 species (WPC 2024). Chernetids can be recognized by various characteristic traits, such as the presence of a proximal raised slit sensillum on the pedal tarsi, the absence or substantial reduction of the venom apparatus in the fixed finger of the pedipalp chela (well-developed in the movable finger) and the chelal fingers that often bear accessory teeth (Harvey 1992; Mahnert & Adis 2002). The subfamilies within Chernetidae are primarily differentiated by the shape of the posterior margin of the carapace and the morphology of the spermatheca (Harvey 1992, 1995).

The genus *Neoallochernes* was established by Hoff (1947) based on the species *Chelanops garcianus*, originally described by Banks (1909). *Chelanops garcianus* was later transferred to the genus *Dinocheirus* Chamberlin in 1929 (Beier 1932; Roewer 1937), and *Neoallochernes* was designated as the type genus by original designation (Hoff 1947). Another significant change occurred when *Teja-chernes* Hoff, 1957, was synonymized as a junior synonym of *Neoallochernes* by Muchmore (1992), who also transferred the species *Dinocheirus stercoreus* Turk, 1949, resulting in the new combination *Neoallochernes stercoreus* (Turk, 1949).

Muchmore (1992) described *Neoallochernes cubanus* from Mayajigua, Cuba, and *Neoallochernes incertus* from Lonesome Ridge, United States. In 1996, Muchmore described *Neoallochernes minor* from Antigua and Barbuda. The most recent addition was made by Harvey & Mahnert (2019), who established the type specimens of the genus *Coprochernes* Beier, 1976, as a junior synonym of *Neoallochernes*, transferring *C. costaricensis* Beier, 1976 (from Costa Rica), and *C. quintanaroensis* (from Mexico) to *Neoallochernes*. This designation resulted in the new

combinations *N. costaricensis* (Beier, 1976) and *N. quintanaroensis* (Muchmore, 1991), though they noted that this transfer may be provisional.

One of the most important characteristics for defining chernetid genera is the shape of the spermathecae (Vachon 1957; Muchmore 1975; Callaini 1986; Harvey 1995; Harvey & Mahnert 2019). Representatives of the genus *Neoallochernes* Hoff, 1947, can be easily distinguished by a combination of characters, including (1) the shape of the spermatheca, which is tubular with darkened tips, and (2) the presence of only four setae on the cheliceral hand, with the exception of *Neoallochernes quintanaroensis*, which has five setae (Muchmore 1991; Harvey & Mahnert 2019). Another important feature of all species within *Neoallochernes* is the presence of a denticulate *sb* seta on the cheliceral hand, except for *N. incertus*, which has an acuminate *sb* seta (Muchmore 1992). Therefore, we agree that the most reliable characteristic for identifying species within this genus is the shape and structure of the female spermatheca.

Currently, the genus *Neoallochernes* Hoff, 1947, is represented by seven cave-dwelling species: *Neoallochernes costaricensis* (Beier, 1976) from Costa Rica; *Neoallochernes cubanus* Muchmore, 1992, and *N. garcianus* (Banks, 1909) from Cuba; *Neoallochernes incertus* Muchmore, 1992, and *N. stercoreus* (Turk, 1949) from the United States; *Neoallochernes minor* Muchmore, 1996 from Antigua and Barbuda; and *Neoallochernes quintanaroensis* (Muchmore, 1991) from Mexico, distributed mostly in Central and North America and the Caribbean Islands. Here, we describe the species *Neoallochernes catimbauensis* sp. nov. from a cave in northeastern Brazil, and the first record of the genus in this country.

METHODS

Pseudoscorpion specimens were collected from the aphotic zone of the “Meu Rei” cave (08°29′14.1″S, 37°16′48.8″W; approximately 780 m a.s.l.) in the Catimbau National Park, municipality of Tupanatinga, state of Pernambuco, northeastern Brazil. The park is located within the Caatinga domain, the largest dry forest in South America (Silva et al. 2017). The cave is a sandstone formation with a horizontal projection of 162 m and a single entrance, and it shelters a large colony of naked-backed bats, *Pteronotus gymnotus* (Otálora-Ardila et al. 2020; Leal & Bernard 2021). All pseudoscorpions were found in the deepest part of the cave, approximately 150 m from the entrance, in association with bat guano.

Pseudoscorpions were analyzed at the Arachnid Diversity, Behavior and Conservation Laboratory at the State University of Goiás. Specimens were studied by preparing temporary slide mounts through immersion in 70% lactic acid at room temperature for approximately 24 hours after dissecting a chelicera, legs I and IV, the left pedipalp and its chela, or by submersion in 5–10% KOH for internal genitalia examination (Judson 1992). The specimens were examined using a Nikon Eclipse compound microscope. After examination, the specimens were rinsed in water, transferred to 70% ethanol, and the dissected parts were stored in a microvial together with the original specimens. Multifocal photographs were taken using an HD digital camera connected to the microscope. Measurements were taken using the digital images and ImageJ software (Rasband 2015).

Measurements were taken at the highest possible magnification using the same software, calibrated with an ocular graticule attached to the compound microscope. The terminology and measurements followed Chamberlin (1931), with some modifications for the nomenclature of pedipalps and legs, and slight adjustments in the terminology for trichobothria (Harvey 1992), chelicerae (Harvey & Edward 2007; Judson 2007), and the surfaces of the appendages (Harvey et al. 2012). The proportions provided (\times) represent length/width for the carapace, chelicerae, and pedipalps, and length/depth for the legs. When two items are compared, the ratio refers to the length/width index. Measurements are expressed in millimeters (mm). Anatomical structures were drawn from high-definition images using a Wacom KSO-B422(A) tablet with the support of Inkscape software. Subsequently, the specimens were logged into the arachnid collection of the Laboratory of Diversity, Behavior and Conservation of Arachnids, State University of Goiás, Anápolis, Brazil.

Abbreviations.—Trichobothria on chelal fingers (Chamberlin 1931; Harvey 1992): external trichobothria of the fixed finger: *et*: exterior terminal, *est*: exterior subterminal, *esb*: exterior subbasal, *eb*: exterior basal; internal trichobothria of the fixed finger: *it*: interior terminal, *ist*: interior terminal, *isb*: interior subbasal, *ib*: interior basal. Trichobothria of movable finger: *t*: terminal, *st*: subterminal, *sb*: subbasal, *b*: basal. Other abbreviations: *es*: exterior seta, *bs*: basal seta, *sbs*: subbasal seta, *TS*: tactile seta. For the description of the genitalia (Legg 1974, 1975): *ejc*: ejaculatory canal, *da*: dorsal apodeme, *dmg*: duct of the median genital sac, *ov*: oviduct, *sp*: spermathecae, *la*: lateral apodeme, *lr*: lateral rod, *lgs*: lateral genital sac, *mgs*: median genital sac.

RESULTS

Taxonomy

Family Chernetidae

Genus *Neoallochernes* Hoff, 1947

Neoallochernes Hoff, 1947: 499. Type species: *Chelanops garcianus* Banks, 1909, by original designation.

Tejachernes Hoff, 1957: 83–84 (synonymized by Muchmore 1992: 140). Type species: *Dinocheirus stercoreus* Turk, 1949, by original designation.

Coprochernes Beier, 1976: 3. (synonymized by Harvey & Mahnert, 2019: 7–13). Type species: *Coprochernes costaricensis* Beier, 1976, by original designation.

Genus diagnosis.—Pseudoscorpions of the genus *Neoallochernes* Hoff, 1947 can be easily distinguished from other chernetids by the tubular shape of the spermathecae with darkened tips. The chelicerae possess four setae on the hand (*sbs* absent), except in *N. quintanarooensis*. The trichobothria pattern is characterized by *it* situated midway between *isb* and the tip of the fixed finger. The rallum consists of three blades, and there is an absence of tactile setae on tarsus III and IV (Muchmore 1992; Harvey & Mahnert 2019).

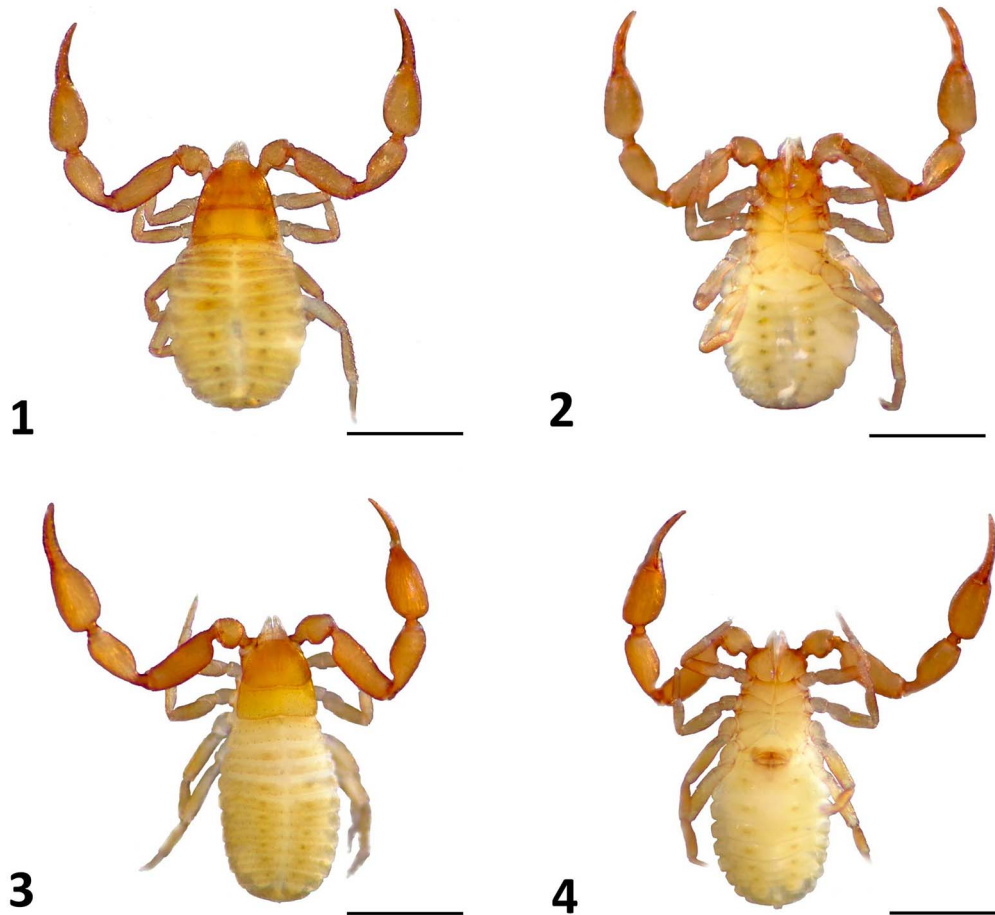
Neoallochernes catimbauensis sp. nov.

Zoobank registration number: <https://zoobank.org/NomenclaturalActs/4374CF82-8DA3-428C-81D2-166647B686D6>

Figs. 1–16

Type material examined.—Brazil: Pernambuco: Holotype female, cave Meu Rei, 08°29′14″S, 37°16′48″W, [780 m], 22 March 2019; collection by hand inside the cave on bat guano; Barbier, E. (LECA; Ps-010). Paratypes. BRAZIL: Pernambuco: 3 males: cave Meu Rei, (same as holotype), 09 May 2019; collection by hand inside the cave, under rocks and on bat guano; Barbier, E. (LECA; Ps-011).

Diagnosis.—*Neoallochernes catimbauensis* sp. nov. differs from other species of the genus as follows: (1) *N. costaricensis* is distinguished by its stouter pedipalps; all segments are very robust, with the female femur measuring 2.30–2.60 \times and the male femur 2.0 \times (in contrast, the female femur of *N. catimbauensis* sp. nov. is 2.83 \times and the male femur is 2.42–2.62 \times). The female patella measures 2.00–2.20 \times and the male patella 1.90–2.04 \times (compared to 2.34 \times in females and 2.29–2.31 \times in males of *N. catimbauensis* sp. nov.). Trichobothrium *ib* is located subbasally to *est* (Harvey & Mahnert 2019; Fig. 9). (2) *Neoallochernes cubanus* is smaller with more slender pedipalps (male: 2.95–3.25 \times). Trichobothrium *ib* is positioned near the level of *eb*, and *esb* is subdistal to *ist*. The spermathecae are elongated sacs with a small terminal cribriform plate and a short, slender tubule leading into a single median chamber with a large ovoid cribriform plate (Muchmore 1992; fig. 20), and the internal genitalia of the male (Muchmore 1992; Fig. 19). (3) *N. incertus* is characterized by the acuminate cheliceral seta *sb* and nodus ramosus proximal to the stinger (Muchmore 1992; fig. 24), as well as slender pedipalps, with the male femur measuring 3.05 \times . (4) *N. garcianus* has a slender pedipalp patella in males (1.85–1.95 \times longer than broad), with trichobothrium *isb* always slightly distal to the level of *est*. (5) *N. minor* has a shorter palpal chela in males (0.72–0.78 mm compared to 0.85 mm), and the terminal sacs of the spermathecae in females are narrower (Muchmore



Figures 1–4.—Habitus, *Neoallochernes catimbauensis* sp. nov., holotype female (LECA; Ps-010). (1) Dorsal aspect. (2) ventral aspect. Paratype male (LECA). (3) Dorsal aspect. (4) ventral aspect. Scale line: 1 mm.

1996; Fig. 1). (6) *N. quintanarooensis* has cheliceral seta *sbs*, and spermathecae with two elongated sacs without dark tips and two short, thick tubules (Muchmore 1991; Fig. 11). (7) *N. stercoreus* has a completely smooth retrolateral face of the chelal hand. The spermathecae are relatively short, with the distal one-half of each spermathecae being weakly swollen.

Descriptions of adults.—*Color*: In both females and males, the carapace and pedipalps are red-brown. The tergites and coxal region are pale red-brown, while the legs are pale yellow (Figs. 1–4).

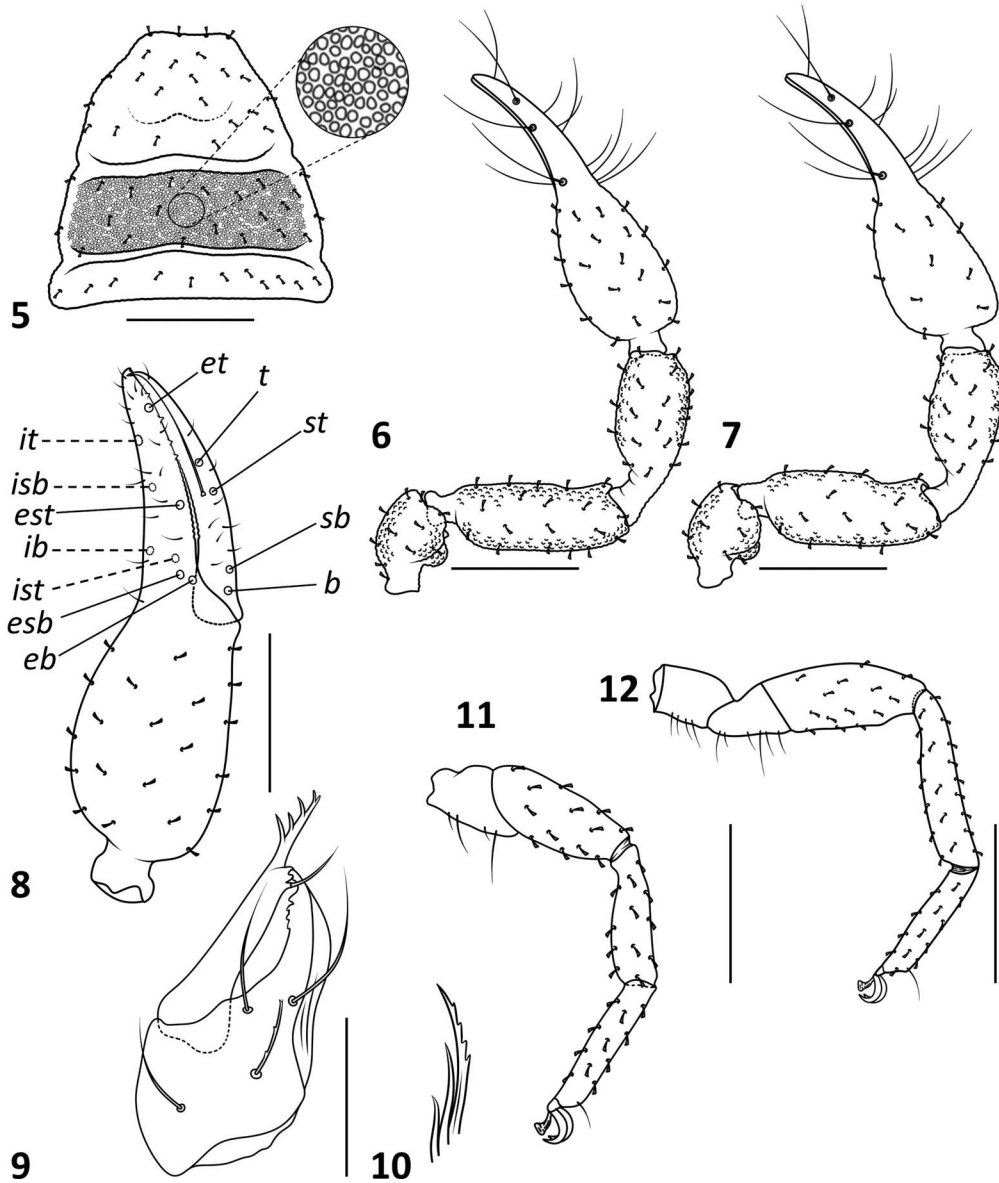
Carapace (Fig. 5): Coarsely granulate, with the female being $1.12\times$ (male $1.06\text{--}1.14\times$) longer than broad. Small eye spots are present. All setae are distinctly clavate, with both sexes having four setae near the anterior margin and ten setae near the posterior margin. The female has approximately 84 setae (male, 80). Two deep transverse furrows are present, with a posterior furrow slightly closer to the posterior margin than to the anterior furrow. The posterior margin is straight.

Pedipalps (Figs. 6–7): Trochanter, femur, and patella are coarsely granulated. The chela hand is granulated on the prolateral and retrolateral regions. All setae are distinctly clavate, and the segments are very thin. Trochanter is $1.41\times$ (male $1.43\text{--}1.71\times$) longer than broad, femur is $2.83\times$ (male $2.42\text{--}2.62\times$), patella is $2.34\times$ (male $2.29\text{--}2.31\times$), chela (with pedicel) is $3.42\times$ (male $3.36\text{--}3.47\times$), chela (without pedicel) is $3.34\times$ (male $3.18\text{--}3.21\times$), and hand is $1.53\times$ (male $1.45\text{--}1.58\times$) longer

than wide. Movable finger is $1.36\times$ (male $1.25\text{--}1.36\times$) longer than broad. The chela fixed finger has eight trichobothria, while the movable finger has four trichobothria (Fig. 8). Trichobothria *eb* and *esb* are located basally, with trichobothrium *est* closer to *esb* than to *et* and near the level of *eb*. Trichobothria *ib* and *ist* are located subbasally. Trichobothrium *ish* is subdistal to the mid-point of the finger and proximal to *est*. Trichobothrium *st* is closer to *t* than to *sb*, and *sb* is closer to *b* than to *st*. The venom duct is long, terminating in nodus ramosus slightly basal to *st* (Fig. 8). Chelal marginal teeth are slightly pointed, with basal teeth more rounded. The female fixed finger has 32 teeth, four retrolateral accessory teeth, and six prolateral teeth, while the movable finger has 40 teeth, two retrolateral teeth, and no prolateral accessory teeth. The male fixed finger has 36 teeth, four retrolateral teeth, and four prolateral teeth, while the movable finger has 42 teeth, two retrolateral teeth, and no prolateral accessory teeth.

Coxal Region: The maxillae are smooth, except for the granulate anterior region, and the coxae are smooth. The manducatory process is somewhat triangular, with two apical acuminate setae. Chaetotaxy of coxae I–IV: female 18: 26: 22: 40 (male 22: 28: 26: 42).

Opisthosoma: All tergites are divided (except for XI), with a medial suture line. Tergal chaetotaxy of the female holotype: 12: 14: 14: 16 (2): 14(2): 16(2): 14(2): 16(2): 12(2): 10(2): 4: 2; male paratypes: 12–14: 12–14: 12–14: 14–16 (2): 16–18(2): 16–18(2): 14–16(2): 14–16(2): 12–14(2): 10–12(2): 4–6: 2. All setae



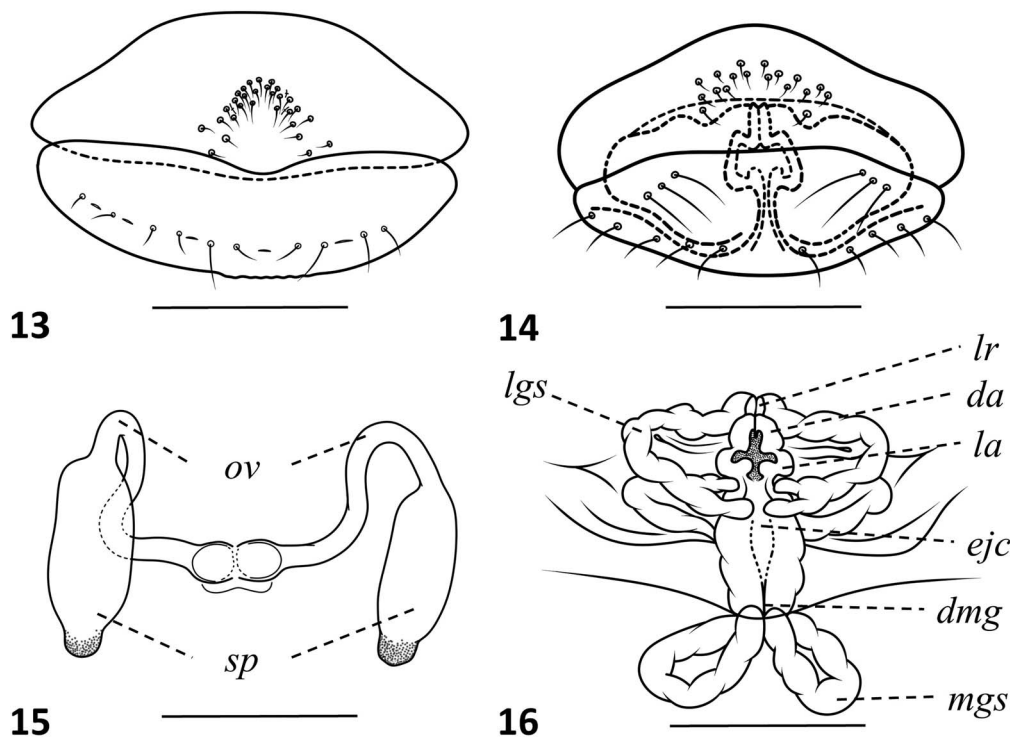
Figures 5–12.—*Neoallochernes catimbauensis* sp. nov., holotype female (LECA; Ps-010). (5) carapace, dorsal (circle indicated, metazone granules). (6) right pedipalp, female. (7) right pedipalp, male paratype. (8) right chela, lateral, setae included. (9) left chelicera, dorsal. (10) left rallum. (11) leg I, lateral. (12) leg IV, lateral. Scale line: 0.25 mm (5–8); 0.05 mm (10); 0.1 mm (9); 0.2 mm (11–12).

(except on tergite XII) are strongly clavate and dentate. Sternal chaetotaxy of the female holotype: 30: (2)10(2): (1)12(1): 12 (2 setae in the pleural membrane): 16 (two short setae): 18: 16: 18: 12: 6 (two short setae): 2; male paratypes: 18: (2)10: 12:12 (two setae in the pleural membrane): 16–18 (two short setae): 14–16: 14–16: 16–18: 12: 4 (two short setae): 2. The membrane is finely longitudinally striate, without setae, except for one pair near sternite V in both females and males.

Chelicera (Fig. 9): In both the holotype female and the male paratypes, there are four setae on the hand and one subdistal seta on the movable finger. Seta *sbs* is absent, setae *bs* are dentate, and setae *ls*, *is*, and *es* are acuminate. Two lyrifissures are present. The serrula exterior has 18 blades in males and 20 blades in females. The fixed finger has eight teeth, with the apical teeth being smaller and contiguous, while the basal teeth are larger with a small intermediate tooth. The galea in females is

slender, with five small branches and a larger branch distal to the base. The male galea is less slender than the female galea and has four small branches. The rallum has three blades, with one distal denticulate blade and two smaller, acuminate proximal blades (Fig. 10).

Legs: Leg I (Fig. 11): Female trochanter is $1.11\times$ (male $1.12\text{--}1.24\times$) longer than broad. Female femur is $1.51\times$ (male $1.52\text{--}1.51\times$), female patella is $2.35\times$ (male $2.37\text{--}2.38\times$), female tibia is $2.81\times$ (male $2.87\text{--}2.95\times$), and female tarsus is $3.15\times$ (male $2.64\text{--}3.15\times$). **Leg IV (Fig. 12):** Female trochanter is $1.81\times$ (male $1.82\text{--}1.84\times$) longer than broad, female femur + patella is $2.45\times$ (male $2.42\text{--}2.46\times$), female tibia is $1.81\times$ (male $2.73\text{--}3.25\times$), and female tarsus is $4.91\times$ (male $4.96\text{--}5.12\times$). The junction between the femur and patella I is strongly oblique to the long axis (Figs. 11–12). The junction between the femur and patella IV is very angulate (Figs. 11–12). Tibia I and IV are strongly



Figures 13–16—*Neoallochernes catimbauensis* sp. nov. (13) genital sternites, ventral female holotype. (14) genital sternites, ventral male paratypes. (15) spermathecae, ventral, female holotype. (16) internal genitalia, male paratype. Scale line: 0.2 mm (13–14); 0.1 mm (15–16).

angled. Tarsi I and IV lack tactile setae. Subterminal tarsal setae are arcuate and acute. Claws are unmodified. The arolium is slightly shorter than the claws.

Genital Region.—The setae are arranged in an inverted U pattern, with a central set of 30 setae on the anterior operculum (Fig. 13). The posterior operculum has 10 marginal setae. The spermatheca consists of a pair of tubules with darkened tips connected to the median cribriform plate by thin ducts (Fig. 15).

Male Paratypes: The genital region has a cluster of 24 setae (Fig. 14). There are three long setae on each side of the genital chamber, with a posterior operculum containing approximately 10–12 marginal setae. The internal genitalia of the male, characteristic of the genus, are heavily sclerotized and large (Fig. 16).

Measurements (mm).—**Female Holotype:** Body length: 2.24. Carapace: 0.67/0.60. Pedipalps: trochanter: 0.33/0.23, femur: 0.63/0.22, patella: 0.50/0.21, chela (with pedicel): 0.98/0.28, chela (without pedicel): 0.98/0.28, movable finger: 0.51/0.03. Chelicera: 0.15/0.09, movable finger length: 0.12. Leg I: trochanter: 0.15/0.13, femur: 0.20/0.13, patella: 0.28/0.12, tibia: 0.27/0.09, tarsus: 0.17/0.05. Leg IV: trochanter: 0.24/0.13, femur + patella: 0.44/0.17, tibia: 0.29/0.15, tarsus: 0.39/0.08.

Male Paratypes: Body length: 2.03–2.25. Carapace: 0.64–0.71/0.62–0.60. Pedipalps: trochanter: 0.38–0.38/0.21–0.26, femur: 0.62–0.68/0.26–0.25, patella: 0.61–0.62/0.26–0.27, chela (with pedicel): 1.04–1.04/0.30–0.31, chela (without pedicel): 0.95–0.99/0.30–0.31, movable finger: 0.49–0.54/0.03–0.30. Chelicera: 0.14/0.09, movable finger length: 0.12–0.12. Leg I: trochanter: 0.13–0.15/0.12–0.13, femur: 0.19–0.21/0.12–0.14, patella: 0.26–0.29/0.11, tibia: 0.24–0.27/0.08, tarsus: 0.16–0.17/0.05–0.06. Leg IV: trochanter: 0.22–0.24/0.12–0.13, femur + patella: 0.34–0.44/0.16–0.18, tibia: 0.26–0.29/0.09, tarsus: 0.35–0.39/0.07–0.08.

Etymology: The specific epithet “catimbauensis” refers to “Catimbau National Park,” which constitutes the type locality of the species.

Distribution: Known only from the type locality (Pernambuco, Catimbau National Park, Meu Rei Cave, Brazil) (Figs. 17–19).

Remarks: Compared with the species described by Hoff (1947), Muchmore (1991, 1992, 1996), and Harvey & Mahnert (2019), *Neoallochernes catimbauensis* sp. nov. resembles *Neoallochernes cubanus* Muchmore, 1992, known from Las Villas, Cuba. *Neoallochernes catimbauensis* sp. nov. has slenderer pedipalps compared to *N. cubanus*, with the female femur measuring $2.83\times$ ($\text{♂ } 2.42\text{--}2.62\times$) long, and the patella measuring $2.34\times$ ($\text{♂ } 2.29\text{--}2.31\times$), while *N. cubanus* has a female femur of $3.0\times$ ($\text{♂ } 2.55\text{--}3.2\times$) and a patella of $2.54\times$ ($\text{♂ } 2.1\text{--}2.7\times$). *Neoallochernes catimbauensis* sp. nov. has 18 blades on the exterior serrula of the chelicerae and a rallum with a denticulate distal blade, whereas *N. cubanus* has two denticulate blades. In *N. catimbauensis* sp. nov., the chela (without pedicel) is $3.34\times$ ($\text{♂ } 3.18\text{--}3.21\times$) longer than wide, and the ♀ hand is $1.53\times$, while in *N. cubanus*, the chela (without pedicel) is $3.0\times$ ($\text{♂ } 2.95\text{--}3.3\times$), and the ♀ hand is $1.4\text{--}1.7\times$ ($\text{♂ } 1.6\times$) longer than wide. The chela marginal teeth in *N. catimbauensis* sp. nov. are slightly pointed, with basal teeth more rounded, and the fixed fingers have 32 (♀) and 36 (♂) teeth, while the movable fingers have 40 (♀) and 42 (♂) teeth. In *N. cubanus*, each finger has 35–45 cusped marginal teeth. In *N. catimbauensis* sp. nov., trichobothria *eb* and *esb* are located basally, trichobothrium *est* is closer to *esb* than to *et* and near *eb*, trichobothria *ib* and *ist* are located subbasally, *isb* is subdistal to the midpoint of the finger, and proximal to *est*. Trichobothrium *st* is closer to *t* than to *sb*, and *sb* is closer to *b* than to *st*. In *N. cubanus*, trichobothrium *isb* is distal to *est* near the middle of the finger, and trichobothrium *ib* is basal, near the level of *eb*.

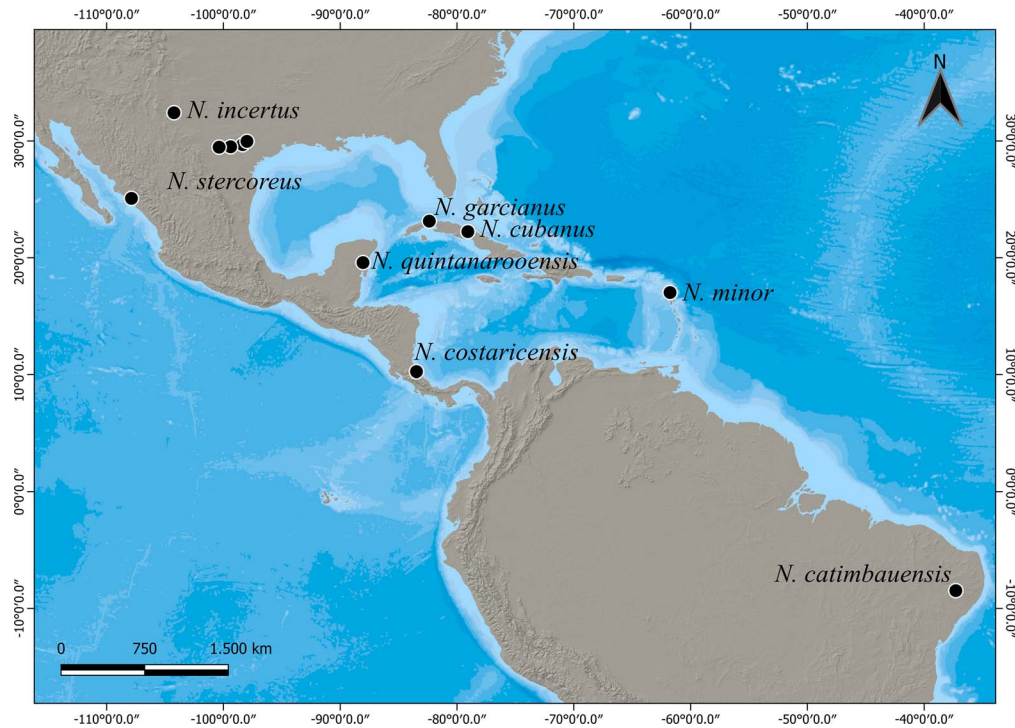
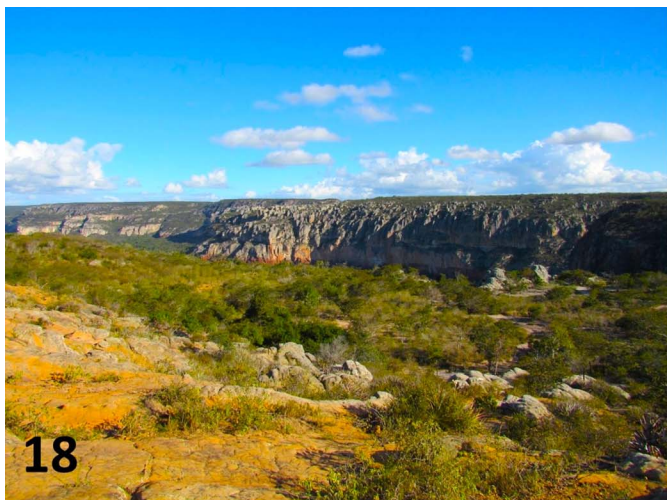


Figure 17.—Known distribution map of the species of the genus *Neoallochernes* Hoff, 1947, in North America, South America, and the Caribbean archipelago. Raster map data, online at www.naturalearthdata.com.

Comments.—At least seven of the eight described species of *Neoallochernes* have been found either in cave environments or in association with bat guano (Table 1). In caves, pseudoscorpions are often associated with this type of substrate. *Neoallochernes catimbauensis* sp. nov. was found on or near piles of insectivorous bat guano 150 meters from the cave entrance, in the dark zone. The absence of pedipalp and leg enlargement in this species may suggest that it is an accidental epigean rather than a troglotic species.

Neoallochernes catimbauensis sp. nov. cohabits the cave, sharing a niche with another pseudoscorpion species, *Maxcheres kapinawai* Bedoya-Roque, Tizo-Pedroso, Barbier and Lira, 2023 (Chernetidae), although the latter appears to be more

abundant (Bedoya-Roque et al. 2021). Like most chernetids, *N. catimbauensis* sp. nov. does not exhibit morphological specializations that would prevent its development in epigean environments, so this new species is considered troglophile, with well established population inside the cave habitat (Trajano & Carvalho 2017). On the other hand, cave habitats often have characteristics that promote high endemism, including species restricted to a single cave (Trajano & Bichuette 2010). This highlights the importance of preserving the integrity of natural underground environments for the conservation of species that inhabit them. Further studies on *N. catimbauensis* sp. nov. are needed to better understand its biology, ecology, and natural history.



Figures 18, 19.—(18) Typical landscape of Catimbau National Park, state of Pernambuco, northeastern Brazil; (19) Chamber of the Meu Rei cave where *Neoallochernes catimbauensis* sp. nov. was collected.

Table 1.—Known species of *Neoallochernes* Hoff, 1947 and their microhabitat preferences. Adapted from Harvey & Mahnert (2019).

Species	Habitat	Reference
<i>Neoallochernes catimbauensis</i> sp. nov.	Guano of insectivorous bats <i>Pteronotus gymnotus</i> , in an aphotic zone, approximately 150 m from the cave entrance	This study
<i>Neoallochernes costaricensis</i> (Beier, 1976)	Rat and bat feces	Beier (1976); Harvey & Mahnert (2019)
<i>Neoallochernes cubanus</i> Muchmore 1992	In or at a roost of the bats <i>Nyctinomops laticaudatus</i> (= <i>Tadarida laticaudata</i>) (E. Geoffroy, 1805), and <i>T. minuta</i> (Miller) (=uncertain species) in a palm <i>Copernicia vespertilionum</i>	Muchmore (1992); Harvey & Mahnert (2019)
<i>Neoallochernes garcianus</i> (Banks, 1909)	Habitat data not stated	Banks (1909); Muchmore (1992); Harvey & Mahnert (2019)
<i>Neoallochernes incertus</i> Muchmore, 1992	Bottom of cave	Muchmore (1992); Harvey & Mahnert (2019)
<i>Neoallochernes minor</i> Muchmore, 1996	Bat guano	Muchmore (1996); Harvey & Mahnert (2019)
<i>Neoallochernes quintanarooensis</i> (Muchmore, 1991)	In organic debris and bat guano	Muchmore (1991); Harvey & Mahnert (2019)
<i>Neoallochernes stercoreus</i> (Turk, 1949)	Bat guano in caves	Ceballos (2004); Muchmore (1992); Harvey & Mahnert (2019)

TAXONOMIC KEY TO THE SPECIES OF THE GENUS *NEOALLOCHERNES* HOFF, 1947

Key based on the descriptions by Beier (1976), Muchmore (1991, 1992, 1996), and Harvey & Mahnert (2019).

1. Cheliceral hand with five setae, setae *sbs* present; palpal femur $2.5\text{--}2.6\times$ (σ) longer than broad, patella $1.95\text{--}2.01\times$ (σ), chela with pedicel $2.5\text{--}2.6\times$ (σ), chela without pedicel $1.3\text{--}1.35\times$ *N. quintanarooensis* (Muchmore, 1991).
- 1'. Cheliceral hand with four setae, seta *sbs* absent (2)
2. Seta *sb* on the cheliceral hand acuminate; femur $3.05\times$ (σ), patella $2.4\times$ (σ), chela without pedicel $3.15\times$ (σ), nodus ramosus mid-way between trichobothria *t* and *st* *N. incertus* Muchmore, 1992.
- 2'. Seta *sb* on the cheliceral hand denticulate..... (3)
3. Small species; chelal hand entirely granulate; pedipalps rather stout (σ femur $2.25\text{--}2.35$, σ $2.35\text{--}2.6\times$; σ patella $1.95\text{--}2.05$, σ $2.1\text{--}2.3\times$; σ chela without pedicel $2.55\text{--}2.65$, σ $2.9\text{--}3.15\times$; σ hand without pedicel $1.2\text{--}1.25$, σ $1.4\text{--}1.55\times$); terminal sacs of the spermathecae in females narrower... *N. minor* Muchmore, 1996
- 3'. Larger species; fine granulations only on the retrolateral face of the chelal hand or at the base of the chelal finger; pedipalps with more slender proportions; tubular spermathecae with darkened tips..... (4)
4. Pedipalps slender; σ femur $2.55\text{--}3.2\times$, σ patella $1.9\text{--}2.4\times$, spermathecae in females in the form of an elongated sac with a small terminal cribriform plate and a short slender tubule.. (5)
- 4'. Pedipalps robust; σ femur $2.0\text{--}2.4\times$, σ patella $1.9\text{--}2.4\times$, spermathecae in females in the form of an elongated sac with darkened tips and a long, thin tubule..... (6)
5. Palps rather robust, more so in males than in females; length/width of σ patella $0.75\text{--}0.90/0.27\text{--}0.35$, σ patella $0.67\text{--}0.81/0.28\text{--}0.36$; σ chela without pedicel $0.73\text{--}0.74/0.23\text{--}0.24$, σ chela $1.04\text{--}1.25/0.33\text{--}0.41$; trichobothrium *isb* distal to the level of *est* near the middle of the finger, and trichobothrium *ib* basally near the level of *eb* .. *N. cubanus* Muchmore, 1992
- 5'. Pedipalps slender in both females and males; length/width of femur $0.619\text{--}0.680/0.259\text{--}0.250$ (σ $0.632/0.222$); σ patella $0.617\text{--}0.623/0.268\text{--}0.272$ (σ $0.505/0.218$); σ chela with pedicel $1.044\text{--}1.045/0.304\text{--}0.311$ (σ $0.987/0.288$); trichobothrium *isb* subdistal to the midpoint of the finger and proximal to *est*, trichobothrium *ib* distal to the level of *eb*.. *N. catimbauensis* sp. nov.
6. Serrula exterior of the chelicerae with only 16 blades; slender pedipalp patella (σ σ) $1.85\text{--}1.95\times$ longer than broad; nodus ramosus of the movable finger nearly level with trichobothrium *t*..... *N. garcianus* (Banks, 1909)
- 6'. Serrula exterior of the chelicerae with 17–19 blades; pedipalps moderately stout; pedipalp patella $2.15\text{--}2.4\times$; venom duct long, nodus ramosus slightly basal to *st*.. (7)
7. Fine granulations on the retrolateral face of the chelal hand; pedipalps, all segments very robust; σ femur $2.20\text{--}2.27$, σ $2.30\text{--}2.60\times$; σ patella $1.90\text{--}2.04$, σ $2.00\text{--}2.20\times$; σ chela with pedicel $2.78\text{--}2.98$, σ $3.09\text{--}3.32\times$; σ chela without pedicel $2.66\text{--}2.78$, σ $2.80\text{--}2.92$; chelal marginal teeth slightly pointed, basal teeth more rounded ... *N. costaricensis* (Beier, 1976)
- 7'. Fine granulations absent on the retrolateral face of the chelal hand, surface completely smooth; pedipalps moderately stout; σ femur $2.32\text{--}2.5$, σ $2.06\text{--}2.2\times$; σ patella $2.08\text{--}2.3$, σ $1.97\text{--}2.0\times$; σ chela with pedicel $2.71\text{--}3.07$, σ $2.58\text{--}2.7\times$; chelal teeth well-developed, strongly cuspidate marginal teeth on each finger..... *N. stercoreus* (Turk, 1949)

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