Two remarkable new species of Hubbardiidae Cook, 1899 (Arachnida: Schizomida) from eastern Cuba

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Abstract
Two new, remarkable species of schizomids are described in the present paper, both from eastern Cuba. One of them is the second known member of Troglocubazomus Teruel, 2003, which allows the redefinition of the generic diagnosis and expands the known range of this genus more than 200 km to the west, but still in the same orographic system (the Sierra Maestra Mountains). The other represents the ninth Cuban member of Antillostenochrus Armas & Teruel, 2002, but the first to be found living here in a desertic habitat (only one Hispaniolan species was previously known to live under the same aridity conditions). As results, the schizomid fauna of Cuba reaches 59 species (58 national endemics), with 39 of them occurring in its eastern region (35 regional endemics).

Key words: Hubbardiidae, Hubbardiinae, taxonomy, new taxa, Cuba, Greater Antilles.

Introduction
Cuba is by far the richest insular territory for schizomids (also called "tailless whipscorpions"), with a nominal fauna of 57 species unequally distributed among 13 genera as follows: Antillostenochrus Armas & Teruel, 2002 (8 species), Cokendolpherius Armas, 2002 (2), Cubacanthozomus Teruel, 2007 (1), Cubazonus Reddell & Cokendolpher, 1995 (3), Dumitrescoella Teruel, 2017 (1), Guanazonus Teruel & Armas, 2002 (1), Heterocubazomus Teruel, 2007 (1), Pinero Teruel, 2018 (1), Reddellzomus Armas, 2002 (1), Rowlandius Reddell & Cokendolpher, 1995 (35), Siguanesiotes Teruel, 2018 (1), Stenochrus Chamberlin, 1922 (1), and Troglocubazomus Teruel, 2003 (1). Of these genera, eight are endemic to mainland Cuba (Cokendolpherius, Cubacanthozomus, Cubazonus, Dumitrescoella, Guanazonus, Heterocubazomus, Reddellzomus and Troglocubazomus) and two to Isla de Pinos (Pinero and Siguanesiotes); intriguingly, these two larger islands do not share any genus or species in common. Of the remaining three genera, one is endemic to the Greater Antilles (Antillostenochrus) and two are widespread across tropical America (Rowlandius and Stenochrus).
Almost all species (56) are endemic from the Cuban archipelago, with the cosmopolite *Stenochrus portoricensis* Chamberlin, 1922 being the single exception.

The overwhelming majority of this diversity is located in the eastern region of Cuba, with 37 species in seven genera as follows: *Antillostenochrus* (8), *Cubacanthozomus* (1), *Cubazomus* (3), *Heterocubazomus* (1), *Rowlandius* (22), *Stenochrus* (1) and *Troglocubazomus* (1). Four genera are endemic to this region (*Cubacanthozomus*, *Cubazomus*, *Heterocubazomus* and *Troglocubazomus*), as are 33 species; only *Rowlandius digitiger* (Dumitresco, 1977), *Rowlandius negreai* (Dumitresco, 1973) and the above-mentioned *S. portoricensis* do extend their distribution further to the west, while *Antillostenochrus longior* Teruel, 2013 is a very peculiar case by occurring exactly at the borderline between the central and eastern regions.

It is noteworthy to point out here that these impressive numbers are still far from definitive because of two facts. On one hand, many taxonomically undefined populations are currently under study and significant increases will follow soon (R. Teruel and collaborators, in preparation). On the other hand, almost every fieldtrip to a new remote locality reveals at least one undescribed species and even genera, so the list of new additions keep continuously growing. As a good example of the latter, two new, highly remarkable and recently collected species are herein described from eastern Cuba: the second discovered member of *Troglocubazomus* and the first Cuban *Antillostenochrus* from a desertic habitat.

**Material and Methods**

Specimens were studied, measured and photographed under an AmScope SM-1T-PL LED trinocular stereomicroscope, equipped with a line scale calibrated at 20x for measuring. The literature cited here is not an exhaustive compendium for each taxon, but a selection of those more relevant to the subject of the present paper: original descriptions, redescriptions, taxonomic revisions, and those contributing relevant information on ecology and geographical distribution.

All photographs were taken with a Nikon Coolpix S8100 digital camera. Microscopic shots were taken by manually attaching the camera to the upper ocular tube of the microscope. High-resolution images were processed with Adobe Photoshop CS5, only for contrast and brightness optimization, background cleanup and plate composition. Distribution maps were constructed in Mapinfo Professional ver.10, using precise coordinates either taken *in situ* with a portable GPS device (Datum WGS84) or extracted from 1: 25,000 military-reference maps.

Unless otherwise noted, all character descriptions and measurements given in the text refer to adults of both sexes. General nomenclature corresponds to Reddell & Cokendolpher (1995), except for female spermathecae (Reddell & Cokendolpher, 1995, modified by Moreno-González et al., 2014) and setation pattern and subdivision of flagellum (Monjaraz-Ruedas et al., 2016), but see further discussion in Teruel (2018: 34). Classification of adult males in heteromorphics and homomorphics by the degree of attenuation and modification of the pedipalps follows Armas (1989), but see further discussion in Teruel (2015: 78–79) and Teruel (2018: 34, 39–40).

Measurements taken after Teruel (2003): adult size refers to total length and includes the flagellum, which in males includes the pedicel. In male flagellum, pedicel/bulb angle was determined after Teruel (2015). Setal formula of tergites II–VII follows Teruel (2017a), i.e., a 2 / 2 / 2 / 2 / 2 / 2 / 2 formula means that each of the six tergites has only two setae (the standard for Hubbardiinae). The same coding scheme was introduced herein for anterior microsetae of tergites I–III: a 1 / 2–3 formula means that the former has only one pair of microsetae and the latter may have two or three pairs, when numbers are variable (one or more setae may be originally absent), it is always further specified in the text.

Conservation status was assessed following the guidelines of UICN (2001, 2003), as applied previously by Teruel (2011, 2012).

Specimens studied herein are preserved in 80% ethanol and deposited in the personal collection of the senior author (RTO).
Systematics

Family Hubbardiidae Cook, 1899
Subfamily Hubbardiinae Cook, 1899
Genus Antillostenochrus Armas & Teruel, 2002

Antillostenochrus eremita, sp. n.
Figs. 1–4, 9, 12. Table I

Type data. CUBA: GUANTÁNAMO PROVINCE: Imías Municipality: Yacabo Abajo (20°03'16"N - 74°41'51"W, 12 msnm); 11/September/2015; R. Teruel, T. M. Rodríguez-Cabrera; 1♂ heteromorphic holotype (RTO), 1♀ paratype subadult? (RTO).

Diagnosis. Adult size large for the genus (male 5.2 mm, female 4.6 mm). Coloration immaculate pale olivaceous, with chelicerae, pedipalps and flagellum slightly darker. Propeltidium with two pairs of dorsal setae; eyespots vestigial. Heteromorphic male: pedipalps slightly elongated and robust (0.56 times longer than body; length/depth ratio of trochanter, femur, patella, tibia and tarsus = 1.73, 2.30, 2.41, 3.50 and 4.00, respectively); trochanter lanceolate and apically produced into a flat conical projection; femur straight and with five pairs of ventral spiniform macrosetae; patella ventrally armed with 3–4 pairs of spiniform macrosetae; tibia ventrally with 4–5 triads of macrosetae (those of the ventroexternal row very large, thick and knife-shaped). Tergal setation: I (2), II (4), III (2), IV (2), V (2), VI (2), VII (2), VIII (6), IX (4), X (8), XI (8), XII (12). Flagellum lanceolate and slender (2.90 times longer than wide, 1.11 times wider than deep), with the dorsal dome narrow and flanked laterally by two large, deep, angulose depressions directly opposing two ventral pits of the same size, shape and depth, subdistal keel or pit absent; pedicel/bulb angled at about 170°.
Homomorphic male: unknown. Female: slightly smaller and less slender. Pedipalps shorter and robust (0.53 times longer than body; length/depth ratio of trochanter, femur, patella, tibia and tarsus = 1.59, 1.51, 2.26, 3.06 and 3.00, respectively), with setation much weaker. Tergal setation: I (2), II (4), III (2), IV (2), V (2), VI (2), VII (4), VIII (6), IX (6), X (8), XI (8), XII (12). Flagellum cylindrical and long (6.14 times longer than wide). Spermathecae unknown (single available specimen apparently immature).

Description (heteromorphic male holotype). Coloration (fig. 1): immaculate pale olivaceous, slightly darker on chelicerae, pedipalps and flagellum due to heavier sclerotization. Eyespots translucent. Abdominal segment XII with posterodorsal area progressively darker distally due to heavier sclerotization.

Pedipalp (fig. 3a): slightly elongate (1.78 times shorter than body). Trochanter lanceolate (1.73 times longer than deep), compressed, straight, and apically produced into a flat conical projection slightly curved downwards; dorsal margin convex and bare; ventral margin convex, with 9–10 very long, spiniform macrosetae; inner surface with 3–4 spiniform setae arranged into a curved row, essentially parallel to ventral margin, internal spur medium-sized and located not too close to the dorsal margin. Femur fusiform, stout (2.30 times longer than deep), straight and not bent basally; dorsal margin convex, with 10–12 large spiniform setae arranged into a longitudinal row irregularly bifurcate distally; ventral margin shallowly convex, with five pairs of large, thick spiniform setae arranged into two parallel longitudinal rows (ventrointernal and ventroexternal). Patella club-shaped, stout (2.41 times longer than deep) and weakly bent basally; dorsal margin smooth, with about 15 rigid macrosetae irregularly arranged into three longitudinal rows; ventral margin with two rows of long, paired, thick spiniform macrosetae (four ventroexternals, three smaller ventrointernals), plus a single macroseta in subdistal position between both rows. Tibia subcylindrical, stout (3.50 times longer than deep), vestigially bent basally; dorsal margin with 18–20 variously sized setae, most of them sedose; ventral margin with three essentially parallel rows of long, rigid setae all along: the ventrointernal row with four setae (some plumose or sinuose), the ventromedian row with five setae (some plumose or sinuose), and the ventroexternal row with five setae (very large, thick and knife-shaped, distally longer and thicker except for the distalmost one, which is much longer but thinner). Tarsus digitiform, stout (4.00 times longer than deep), straight and densely covered with variously sized setae (most of them sedose); apical spurs asymmetric (outer longer). Claw moderately large, sharp and evenly curved.

Propeltidium (figs. 1a–b): with 1 + 1 apical and two pairs of dorsal setae (very short and rigid). Eyespots vestigial (very small and inconspicuous) and irregularly subtriangular to Y-shaped.

Mesopeltidia (figs. 1a–b): triangular, widely separated.
Metapeltidium (figs. 1a–b): entire and lacking any traces of subdivision or pale median band, crescent-shaped.

Legs (figs. 1a–b): I attenuate, II–III slender. Leg IV femur short and moderately robust (2.54 times longer than deep), with anterodorsal margin angled at slightly less than 90°.

Abdomen (figs. 1a–b, 3b–c): slightly attenuate distally. Tergite I with two pairs of anterior microsetae, II with three pairs. Tergal setation: I (2), II (4), III (2), IV (2), V (2), VI (2), VII (2), VIII (6), IX (4), X (8), XI (8), XII (12); setae large and rigid, those on distal segments apically trifid. Segment XII with dorsoposterior pair of macrosetae large, thick and slightly curved downwards; posterodorsal process absent.

Flagellum (figs. 1a–b, 3b–c): narrowly spatulate and not depressed (1.11 times wider than deep), with pedicel/bulb angled at about 170°. Pedicel short and compressed (remarkably deeper than wide). Bulb in dorsal view narrow (2.25 times longer than wide), anterior margin almost straight, very acutely angled forwards (at about 40°) and gradually merging into pedicel, lateral margins almost straight, very acutely angled backwards (at about 40°) and steeply merging into the apex; bulb in lateral view narrow (1.71 times longer than deep), dorsally not flat and lacking any subdistal keel or pit, and ventrally angled at about 120°; dorsal surface mediadly with an oval dome-like protuberance flanked laterally by a pair of large, deep, subtriangular depressions directly opposing a pair of ventral pits of the same depth that continue anteriorly as a lateral pair of elongate, S-shaped furrows; dm₁ seta located on sub-basal position on bulb (just at 1/4 of bulb length), dm₄ in subdistal position (just at 3/4 of bulb length); apex paraboloid in dorsal view, truncate in lateral view.

Female (figs. 2, 4; table I). The single specimen available seems subadult (see below, in Remarks section), but non age-related sexual dimorphism is evident as follows. 1. Pedipalps without large, knife-shaped spiniform macrosetae on patella and tibia. 2. Tergites II–VII with setal formula 4 / 2 / 2 / 2 / 2 / 2 / 2. 3. Flagellum cylindrical and much narrower, with three flagellomeres and two annuli.
Table I. Dimensions (mm) of the types of the new species of the genera *Antillostenochrus* and *Troglocubazomus* described herein. Abbreviations: length (L), width (A), depth (D), not applicable (NA).

| Measurements | *A. eremita* sp. n. | *T. inexpectatus* sp. n. |
|--------------|-------------------|------------------------|
|              | ♂ holotype | ♀ paratype | ♂ holotype |
| Propeltidium | L / W  | 1.20 / 0.61 | 1.15 / 0.65 | 1.50 / 0.82 |
| Metapeltidium | L / W  | 0.38 / 0.60 | 0.32 / 0.60 | 0.46 / 0.85 |
| Abdomen | L | 3.00 | 2.68 | 3.15 |
| Flagellum | L / W / D  | 0.58 / 0.20 / 0.18 | 0.43 / 0.07 / 0.07 | 0.70 / 0.56 / 0.20 |
| Bulb | L | 0.45 | NA | 0.68 |
| Pedipalp | L | 2.90 | 2.45 | 3.98 |
| Trochanter | L / D | 0.52 / 0.30 | 0.43 / 0.27 | 0.80 / 0.37 |
| Femur | L / D | 0.62 / 0.27 | 0.53 / 0.35 | 0.85 / 0.45 |
| Patella | L / D | 0.53 / 0.22 | 0.52 / 0.23 | 0.82 / 0.32 |
| Tibia | L / D | 0.70 / 0.20 | 0.55 / 0.18 | 0.77 / 0.25 |
| Tarsus | L / D | 0.40 / 0.10 | 0.30 / 0.10 | 0.47 / 0.15 |
| Claw | L | 0.13 | 0.12 | 0.27 |
| Leg IV | L | 3.93 | 3.48 | 5.73 |
| Femur | L / D | 1.22 / 0.48 | 1.08 / 0.44 | 1.80 / 0.57 |
| Patella | L / D | 0.57 / 0.20 | 0.50 / 0.18 | 0.81 / 0.24 |
| Tibia | L / D | 0.90 / 0.21 | 0.78 / 0.20 | 1.32 / 0.24 |
| Basitarsus | L / D | 0.72 / 0.10 | 0.72 / 0.10 | 1.10 / 0.10 |
| Telotarsus | L | 0.52 | 0.40 | 0.70 |
| Total | L | 5.16 | 4.58 | 5.79 |

Comparisons. *A. eremita* sp. n. is very easy to distinguish from most other Cuban congeners by its uniform pale olivaceous coloration, i.e., the prevailing coloration in *Antillostenochrus* is pale yellowish body with dark orange to reddish pedipalps and chelicerae. Only *Antillostenochrus alticola* Teruel, 2003 and *Antillostenochrus longior* Teruel, 2013 diverge from this pattern by being greenish, but anyway are distinct: both are conspicuously darker and the former has pale brown pedipalps and chelicerae, besides lacking eyespots.

Apart from this, the tergal setation pattern in both sexes (tabs. I–III) unambiguously diagnoses this new species, especially for the great reduction in female counts. It is the least sexually dimorphic member of the genus for this character, e.g., the single species with females having less than 10 setae on tergites VI–VIII; all other Cuban congeners have 10–28 setae on these plates.

A third character diagnostic for *A. eremita* sp. n. is the sculpture of male flagellum: it is much more deeply carved than any other member of the genus, especially the dorsal submedian depressions and ventral submedian furrows, which are both much larger and deeper than in all other *Antillostenochrus*. Moreover, the flagellar setae are markedly thicker and more spiniform than in all other congeners.

Etymology. The selected epithet is a Latin noun that literally means "arid-dweller, hermit". It is used here in apposition and accurately reflects two peculiarities of the type-locality: its desertic condition and its isolation south of the Sagua-Baracoa mountains. All other Cuban congeners live in mesic to very humid forests of the northern watershed.

Distribution (fig. 12). This species is known only from the type-locality, enclaved in the arid southern coast of the Sagua-Baracoa mountains. All other Cuban congeners live in mesic to very humid forests of the northern watershed.

Ecological notes (fig. 9). Both available specimens of *A. eremita* sp. n. were found together, hanging to the underside of a very large limestone rock semi-buried in the dry leaf litter over clay soil, under a tree isolated in the coastal desert scrub, at the base of a cliff. Yacabo Abajo is located roughly in the center of the most arid zone of Cuba (fig. 9a), which is traditionally called "the Guantanamo Semi-Desert".
Figures 3-4. 3 Adult male holotype of Antillostenochrus eremita sp. n., close-ups: a) pedipalps, lateral view; b) abdominal segments IX–XII and flagellum, dorsal view; c) abdominal segments IX–XII and flagellum, lateral view. 4 Subadult (?) female paratype of Antillostenochrus eremita sp. n., close-ups: a) pedipalps, lateral view; b) abdominal segments VIII–XII and flagellum, dorsal view; c) abdominal segments VIII–XII and flagellum, lateral view.

It lives there syntopically with Rowlandius cf. marianae Teruel, 2003, one specimen of which was found even under the same rock as the types. It seems to be highly localized and/or scarce: another search three days later in the same exact spot did not yield any schizomids and other additional attempts there and in other sites along the same coast have been unproductive as well.

Remarks. By the degree of pedipalp attenuation, the holotype of A. eremita sp. n. represents a class-1 heteromorphic, i.e., the least attenuated (see Teruel, 2015: 78–79).

The single female available seems subadult, as suggested by its smaller size and less sclerotized exoskeleton, especially pedipalps; nevertheless, it could be instead a small adult shortly after its last ecdysis. We chose not to dissect its spermathecae because this process would inevitably damage external structures that are crucial for an accurate species identification in this genus, such as the spination and setation of the body and appendages.

With this addition, all Cuban Antillostenochrus may be identified using the following key:

1 Eyespots absent. Female: tergites II–VII with setal formula 8 / 10 / 10 / 18 / 20 / 24. Distribution: El Toldo High Plateau, in southeastern Holguín Province .......................................................... A. alticola
   - Eyespots variable in size and definition, but always present. Female: tergites II–VII with setal formula 4–6 / 2–4 / 2–8 / 2–12 / 2–14 / 4–22. Distribution: outside El Toldo High Plateau ............... 2

2 Coloration essentially monochromatic: uniform greenish overall. Eyespots very small and inconspicuous. Female: abdominal segments X–XI with setal formula 8 / 8 ......................................................... 3
   - Coloration essentially bicolor: body pale yellowish, chelicerae and pedipalps dark orange to reddish brown. Eyespots variable in size, but always larger and distinct. Female: abdominal segments X–XI with setal formula 5 / 7 ......................................................................................... 4

3 Coloration darker overall, deep green. Male: size smaller (4.4–4.7 mm); flagellum bulb much shorter, broader and flatter (length/width ratio = 1.46–1.48, width/depth ratio = 1.47), lanceolate in dorsal view, with the lateral depressions narrow and obliquely elongate. Female: tergites IV–VIII with setal formula 4 / 6 / 10 / 12 / 16. Distribution: northern mesic coast of central-eastern Cuba, at the border of Camagüey and Las Tunas Provinces ......................................................................................... A. longior
Coloration lighter overall, pale olivaceous. Male: size larger (5.2 mm); flagellum bulb much longer, narrower and deeper (length/width ratio = 2.25, width/depth ratio = 1.11), spatulate in dorsal view, with the lateral depressions very wide and subtriangular. Female: tergite IV–VIII with setal formula 2 / 2 / 2 / 4 / 6. Distribution: southern arid coast of Guantánamo Province ........................................A. eremita sp. n.

Male: flagellum bulb dorsally without lateral depressions. Female: tergite VI with 10 or 12 setae.... 5

- Male: flagellum bulb dorsally with two lateral depressions variable in size and depth, but always present. Female: tergite VI with 14 setae..................6

- Male: size smaller (3.9–4.4 mm); flagellum bulb much shorter, broader and flatter (length/width ratio = 1.67, width/depth ratio = 1.29), lanceolate in dorsal view; tergites VIII–XII with setal formula 4 / 4 / 7 / 7 / 14. Female: tergites VII–VIII with setal formula 14 / 16..............................A. alejandroi

- Male: size larger (4.7–4.9 mm); flagellum bulb much longer, narrower and deeper (length/width ratio = 2.11, width/depth ratio = 1.00), spatulate in dorsal view; tergites VIII–XII with setal formula 6 / 4 / 5 / 5 / 16. Female: tergites VII–VIII with setal formula 22 / 22.................................A. holguin

- Male: size smaller (3.4–3.9 mm); flagellum bulb dorsally with the lateral depressions vestigial. Female: tergites III–IV with setal formula 2 / 4..................................................A. planicauda

- Male: size larger (3.9–5.7 mm); flagellum bulb dorsally with the lateral depressions well developed. Female: tergites III–IV with setal formula 4 / 8..................................................7

- Male: flagellum bulb dorsally with an arcuate transverse carina between the dome-like protuberance and dmL seta; abdominal segments X–XII with setal formula 8 / 6 / 12.................................A. anseli

- Male: flagellum bulb dorsally lacking any carina between the dome-like protuberance and dmL seta; abdominal segments X–XII with setal formula 7 / 7 / 14–16........................................8

- Male: size much larger (5.6–5.7 mm); flagellum bulb longer and deeper (length/width ratio = 1.58, width/depth ratio = 1.25); tergite VIII with 2 setae, abdominal segment XII with 14. Female: size much larger (6.5–6.9 mm); tergite II with 6 setae, tergite V with 12. Distribution: between Baracoa and Maisí, in northeastern Guantánamo Province ........................................A. cokendolpheri

- Male: size much smaller (3.9–4.6 mm); flagellum bulb shorter and flatter (length/width ratio = 1.40, width/depth ratio = 1.47–1.67); tergite VIII with 6 setae, abdominal segment XII with 16. Female: size much smaller (4.3–4.6 mm); tergite II with 4 setae, tergite V with 8. Distribution: Gibara Range, in northwestern Holguín Province ........................................A. gibarensis

Genus Troglocubazomus Teruel, 2003
Figs. 5–8, 10–11, 13
Troglocubazomus Teruel, 2003: 39, 41–43. Armas, 2004: 37, 53. Teruel, 2007: 39, 46–52; fig. 11; tab. II. Armas & Teruel, 2009: 447–450. Teruel, 2011: 22, 33, 36, 81–82, 87; figs. 86–88; tabs. 3, 6. Moreno & Villarreal, 2012: 75; tab. 3. Moreno et al., 2014: 248; tab. 6. Armas et al., 2017: 534–536, 544. Teruel, 2017a: 46. Teruel, 2018: 40, 46.

Type species. Schizomus orghidani Dumitresco, 1977, by original designation.

Diagnosis (emended). Size moderately large for the family (4–6 mm). Coloration: immaculate pale yellowish, with chelicerae and pedipalps orange to light reddish and male abdominal segments X–XII and flagellum orange to reddish brown. Body without clavate setae. Cheliceral movable finger: ventrointernal margin with serrula and guard tooth, ventroexternal margin smooth (lacking lamella and teeth). Pedipalps sexually not dimorphic nor polymorphic (short and robust in both sexes); trochanter lanceolate, with femoral articulation very wide and on dorsal position (i.e., parallel to the trochanter longitudinal axis) and with apex conspicuously produced into a large, flat triangular projection, internal spur variable from moderate to absent (even between pedipalps of the same individual); patella and tibia subcylindrical and ventrally armed with spiniform macrosetae (not especially enlarged or knife-shaped). Propeltidium lacking true ocelli and eyespots; anterior process with two apical setae (1 + 1) and 2–4 pairs of dorsal setae (median pairs usually
incomplete or absent). Metapeltidium entire. Leg IV femur moderately slender, anterodorsal margin angled at 75° to slightly less than 90°. Male: abdomen slightly attenuate distally; tergites I–II with 1–2 / 2–3 pairs of anterior microsetae (one pair occasionally incomplete or missing); tergites II–VII with setation unmodified (standard formula 2 / 2 / 2 / 2 / 2 / 2 / 2); segment X slightly modified (slightly more sclerotized than usual and darkened); segment XI moderately modified (more sclerotized than usual, darkened, and with a dorsosubmedian pair of long, thickened, sinuose macrosetae); segment XII lacking posterodorsal process but highly modified: heavily sclerotized, swollen, darkened, dorsally with distal third sloped down at about 90° (so the flagellar joint is transversely semicircular instead of round), and with 3–4 pairs (dorsomedian, dorsosubmedian, dorsolateral and lateral) of enlarged, sinuose to sickle-shaped macrosetae. Flagellum large, with pedicel/bulb angled at 180°; pedicel very short and wide; bulb broadly oval and depressed, with a very large and deep pair of oblique ventrolateral furrows, dorsal surface shallowly convex and lacking any distinct relief such as conspicuous protuberances, pits or furrows (only with a very wide and shallow depression all along); setation pattern: single \( dm_1, dm_2, vm_1 \) and \( vm_5 \), paired \( dl_1, dl_2, dl_3, vm_2, vm_3, vl_1 \) and \( vl_2 \), with \( dm_1 \) located basally on bulb, \( dm_4 \) in subapical position, lateral patch of microsetae highly developed (setae conspicuously larger than usual). Female: flagellum with three flagellomeres and two annuli; setation pattern per flagellomere: none / single \( dm_1 \) and \( vm_1 \), paired \( dl_1 \) and \( vm_2 \) / single \( dm_4 \) and \( vm_5 \), paired \( dl_2, dl_3, dl_4, vm_2, vl_1 \) and \( vl_2 \). Spermathecae with two pairs of simple and very similar lobes (median pair clearly longer than lateral pair): not fused or bifurcate, elongate-conical, thick, sinuose, lacking apical bulbs and coarsely fenestrate. Chitinized arch very well sclerotized, broadly V-shaped. Gonopod short and wide.

**Subordinate taxa.** Only two widely allopatric, troglomorphic troglobite species are known to date: *Troglocubazomus orghidani* (Dumitresco, 1977) and *Troglocubazomus inexpectatus* sp. n.

![Figures 5-6. 5 Adult male holotype of *Troglocubazomus inexpectatus* sp. n., habitus: a) dorsal view; b) lateral view. 6 Adult male topotype of *Troglocubazomus orghidani* included here for comparison, habitus: a) dorsal view; b) lateral view.](image-url)
TWO NEW SPECIES OF HUBBARDIIDAE FROM EASTERN CUBA

Figures 7-8. 7 Adult male holotype of *Troglocubazomus inexpectatus* sp. n., close-ups: a) pedipalps, lateral view; b) abdominal segments IX–XII and flagellum, dorsal view; c) abdominal segments IX–XII and flagellum, lateral view. 8 Adult male topotype of *Troglocubazomus orghidani* included here for comparison, close-ups: a) pedipalps, lateral view; b) abdominal segments IX–XII and flagellum, dorsal view; c) abdominal segments IX–XII and flagellum, lateral view.

**Distribution** (fig. 13). This genus is endemic to southeastern Cuba, where it is known from two isolate coastal caves more than 200 km apart, in the opposite extremes of the Sierra Maestra Mountains.

**Remarks.** Several other independent, limestone karstic outcrops plenty of caves with the same ecological conditions (figs. 10–11) are scattered across the Sierra Maestra Mountains, especially along its southern coast between the two known occurrences of *Troglocubazomus*. Thus, it is reasonable to predict additional occurrences and the discovery of more species of this genus there.

*Troglocubazomus inexpectatus* sp. n.
Figs. 5, 7, 10, 13. Table I

**Type data.** CUBA: GRANMA PROVINCE: Niquero Municipality: Cabo Cruz: El Guafe: Cueva Funeraria # 2 (19°51’11”N - 77°42’52”W), 8 m a.s.l.; 24/October/2018; T. M. Rodríguez; under rock, dark zone; 1♂ homomorphic holotype (RTO). 28/October/2018; T. M. Rodríguez; under rocks, dark zone; 3 juveniles (RTO).

**Diagnosis.** Adult size large for the genus (male 5.8 mm). Coloration immaculate, pale olivaceous yellow, chelicerae and pedipalps light reddish, abdominal segments X–XII and flagellum reddish brown. Propeltidium with 2–3 pairs of dorsal setae. **Heteromorphic male:** unknown. **Homomorphic male:** Abdominal segment XII large, with the dorsal surface almost flat and with only three pairs of modified macrosetae (dorsolateral pair absent), which are all very large and very strongly curved. Flagellum large, very strongly sculptured (edges more raised and depressions deeper) and with microsetae patch strongly developed (microsetae much larger than usual); bulb in dorsal view broadly oval (1.21 times longer than wide), in lateral view conspicuously depressed (2.80 times wider than deep). **Female:** adult unknown (only a single immature specimen available).

**Description** (homomorphic male holotype). Coloration (fig. 5): immaculate, pale olivaceous yellow. Chelicerae and pedipalps light reddish. Abdominal segments X–XII and flagellum reddish brown. In general, the entire animal has a very pale olivaceous shade all over, which quickly fades to pale yellowish after preservation.
Table II. Tergal setation in males of most Cuban species of *Antilostenocharus* (unknown in *A. alticola*).

| Tergite | *A. anseli* | *A. alejandroi* | *A. cokendolpheri* | *A. eremita* sp.n. | *A. gibaretensis* | *A. holguin* | *A. longior* | *A. planicauda* |
|---------|-------------|----------------|--------------------|-------------------|------------------|--------------|--------------|----------------|
| I       | 2           | 2              | 2                  | 2                 | 2                | 2            | 2            | 2              |
| II      | 4           | 4              | 4                  | 4                 | 4                | 5            | 4            | 4              |
| III     | 2           | 2              | 2                  | 2                 | 2                | 2            | 2            | 2              |
| IV      | 2           | 2              | 2                  | 2                 | 2                | 2            | 2            | 2              |
| V       | 2           | 2              | 2                  | 2                 | 2                | 2            | 2            | 2              |
| VI      | 2           | 2              | 2                  | 2                 | 2                | 2            | 2            | 2              |
| VII     | 2           | 2              | 2                  | 2                 | 2                | 2            | 2            | 2              |
| VIII    | 4           | 4              | 2                  | 6                 | 6                | 6            | 4            | 4              |
| IX      | 4           | 4              | 4                  | 4                 | 4                | 4            | 4            | 4              |
| X       | 8           | 7              | 5                  | 8                 | 7                | 5            | 8            | 7              |
| XI      | 6           | 7              | 7                  | 8                 | 7                | 5            | 8            | 7              |
| XII     | 12          | 14             | 14                 | 12                | 16               | 16           | 14           | 14             |

Pedipalp (figs. 7a): short and robust (1.45 times shorter than body). Trochanter lanceolate (2.16 times longer than deep), compressed, straight, and apically produced into a large, flat, narrowly paraboloid projection; dorsal margin evenly concave and bare; ventral margin shallowly convex, with 10–12 spiniform macrosetae; inner surface with three spiniform setae arranged into a curved row, essentially parallel to ventral margin, internal spur vestigial (very small, translucent and located near the dorsal margin). Femur rhomboidal, stout (1.89 times longer than deep), straight and very slightly bent basally; dorsal margin strongly convex, with two irregular rows of spiniform macrosetae (five dorsoexternals, three dorsointernals); ventral margin strongly angulose (at about 130°), with two irregularly parallel rows of spiniform macrosetae (three ventrointernals and three ventroexternals). Patella club-shaped, stout (2.56 times longer than deep) and straight basally; dorsal margin smooth, with 14–16 variously sized, rigid macrosetae; ventral margin very shallowly convex, with four pairs of large, subequal macrosetae irregularly arranged into two rows (the ventrointernals sinuose and plumose, the ventroexternals rigid and spiniform). Tibia subcylindrical, stout (3.08 times longer than deep), and moderately bent basally; dorsal margin with 16–18 variously sized setae, most of them rigid (some spiniform); ventral margin with three irregular rows of long, rigid setae all along; the ventrointernal row with six setae (sinuose and plumose), the closely-set ventromedian row with six setae (sinuose and plumose), and the ventroexternal row with six setae (rigid and spiniform), inner surface with many macrosetae scattered all over, obscuring the row pattern. Tarsus conical, elongate (3.13 times longer than deep), straight and densely covered with variously sized, sedose setae; apical spurs very large, thick and asymmetric (outer larger). Claw very large, thick, sharp, and shallowly curved.

Propeltidium (figs. 5a–b): with 1 + 1 apical and two pairs of dorsal setae (large and rigid), plus a single smaller seta in between on the left side (incomplete median pair). Eyespots absent.

Mesopeltidia (figs. 5a–b): very short and wide, subtriangular and widely separated.

Metapeltidium (figs. 5a–b): entire (without any traces of median suture or pale band), subrectangular and much wider than long.

Legs (figs. 5a–b): I very attenuate especially I. Leg IV femur elongate but robust (3.16 times longer than deep), slightly curved downwards and with anterodorsal margin angled at about 75°.

Abdomen (figs. 5a–b, 7b–c): moderately attenuate distally. Tergite I with two pairs of anterior microsetae. II with three pairs. Tergites II–VII with setal formula standard: 2 / 2 / 2 / 2 / 2 / 2 / 2; setae very large, dark, rigid and erect. Segment X slightly modified: slightly more sclerotized than usual and darkened. Segment XI moderately modified: more sclerotized than usual, darkened, and armed with a dorsosubmedian pair of long, thickened, sinuose macrosetae. Segment XII highly modified: heavily sclerotized, swollen, darkened, dorsally with distal third concave and sloped down at about 90° (so the flagellar joint when viewed from behind is transversely semicircular, instead of round as in most schizomids), and armed with three pairs...
of modified macrosetae: a dorsomedian pair (very long, thick and distally curved downwards), a dorsosubmedian pair (long, thick and sickle-shaped), and a lateral pair (very long, thick and distally curved inwards); posterodorsal process absent. Sternites densely covered with long, rigid macrosetae, most of them with tip ramified (mostly trifid, a few bifid or with four points).

Flagellum (figs. 7b–c): large, with pedicel/bulb angled at about 180°. Pedicel very short and wide. Bulb in dorsal view broadly oval (1.21 times longer than wide), anterior and lateral margins undefined due to round outline; bulb in lateral view strongly depressed (3.40 times longer than deep, 2.80 times wider than deep), with dorsal and ventral surfaces parallel and largely flat, and with a very large and deep pair of oblique ventrolateral furrows; dorsal surface with a very wide and shallow depression all along, flanked basally by a coarse U–shaped carina; \( dm_1 \) seta located basally on bulb, \( dm_4 \) in subapical position; apex undefined in dorsal view due to round outline, and strongly depressed in lateral view.

| Tergite | A. alticola | A. alejandroi | A. cokendolpheri | A. eremita sp. n. | A. gibarensis | A. holguin | A. longior | A. planicauda |
|---------|-------------|--------------|------------------|------------------|--------------|------------|------------|--------------|
| I       | 2           | 2            | 2                | 2                | 2            | 2          | 2          | 2            |
| II      | 8           | 4            | 6                | 4                | 4            | 6          | 6          | 4            |
| III     | 10          | 4            | 4                | 2                | 4            | 4          | 2          | 2            |
| IV      | 10          | 4            | 8                | 2                | 8            | 8          | 4          | 4            |
| V       | 18          | 12           | 12               | 2                | 8            | 10         | 6          | 8            |
| VI      | 20          | 12           | 14               | 2                | 14           | 10         | 10         | 14           |
| VII     | 24          | 14           | 20               | 4                | 16           | 22         | 12         | 18           |
| VIII    | 18          | 16           | 28               | 6                | 20           | 22         | 16         | 16           |
| IX      | 8           | 8            | 8                | 6                | 8            | 6          | 6          | 6            |
| X       | 5           | 7            | 5                | 8                | 7            | 5          | 8          | 7            |
| XI      | 7           | 7            | 7                | 8                | 7            | 5          | 8          | 7            |
| XII     | 16          | 14           | 14               | 12               | 16           | 16         | 14         | 14           |

Female. No adults available, only one early-instar juvenile without evident sexual dimorphism except for the multi-segmented flagellum (three flagellomeres and two annuli).

Variation. No other adults are available, but the three juveniles exhibit very interesting variation in some non-maturity related features. First, the internal spur of pedipalp trochanter is slightly more developed. Second, the number of dorsal setae of propeltidium is the same as in the holotype, but the unpaired smaller seta is located on the right side of one specimen; evidently, the third (median) pair is in process of being either gained or lost.

Comparisons (males only). \( T. \) inexpectatus sp. n. is very easy to distinguish from the only other congener as follows:

1. Size. Much larger, up to 5.8 mm. \( T. \) orghidani is much smaller, 4.1–4.8 mm.
2. Coloration. More vivid and sharply contrasting, with chelicerae and pedipalps light reddish and abdominal segments X–XII and flagellum reddish brown. \( T. \) orghidani is paler and duller, with chelicerae, pedipalps, abdominal segments X–XII and flagellum light orange.
3. Shape and setation of abdominal segment XII. Larger, with the dorsal surface almost flat and with only three pairs of modified macrosetae (dorsolateral pair absent), which are all much longer and less strongly curved. In \( T. \) orghidani it is smaller, with the dorsal surface inflate and with four pairs of modified macrosetae (dorsolateral pair present), all much shorter and strongly curved.
4. Shape and setation of flagellum. Larger, bulb with dorsal and ventral surfaces flattened, parallel and strongly sculptured and with the microsetae patch markedly more developed (microsetae longer and
thicker). In *T. orghidani* it is smaller, the bulb has dorsal and ventral surfaces convex, bulky and weakly sculptured and the microsetae patch is less developed (microsetae shorter and thinner).

5. **Shape of leg IV femur.** More slender and with posterodorsal margin angled at about 75°. In *T. orghidani* it is more robust and with posterodorsal margin angled at slightly less than 90°.

All these differences can be readily seen in detail in the photographs included here for comparison (figs. 6, 8). These show a standard-sized, adult male topotype *T. orghidani* with the following collecting data: CUBA: SANTIAGO DE CUBA PROVINCE: Santiago de Cuba Municipality: Siboney: Cueva Atabex (19°57'42"N - 75°42'57"W, type-locality), 50 m a.s.l.; 12/December/2009; R. Teruel, C. Martínez; walking on the floor, dark zone; 1♂ homomorphic (RTO).

**Etymology.** The selected epithet is a Latin adjective that literally means "unexpected". It alludes to the surprising discovery of a second member of this remarkable genus, plus an even more shocking fact: that it occurred in a locality sampled long and well by arachnologists and other skilled collectors.

**Distribution** (fig. 13). Known only from the type-locality, a limestone cave in the extreme western tip of the Sierra Maestra Mountains.

![Figures 9-11](image1)

**Figures 9-11.** 9 Ecological conditions at the type-locality of *Antillosthenochrus eremita* sp. n.: a) overview of the area; b) detail, the types were found under the larger tree at center; c) exact finding spot, see the large rocks semi-buried at the tree base. 10 Ecological conditions at the type-locality of *Troglocubazomus inexpectatus* sp. n.: a) overview of the area; b) detail, see the cave entrance at bottom right; c) exact finding spot, the holotype was found under the rock turned-over at center. 11 Ecological conditions at the type-locality of *Troglocubazomus orghidani* included here for comparison: a) overview of the area; b) detail, the cave entrance is located at bottom left; c) exact finding spot, see the senior author in the moment of collecting a topotype.
Ecological notes (fig. 10). All available specimens of *T. inexpectatus sp. n.* were found inside a phreatic cave, under rocks deeply buried in the damp clay soil, very near some dripping pools and water-filled burrows of the land crab *Cardisoma guanhumi* Latreille, 1825. The adult male was found in a small chamber more than 100 m away from the nearest entrance, but the three juveniles were all found in the semidarkness zone, less than 15 m deep from the cave main entrance. The male and two juveniles were located directly on the soil under the rocks, whereas the other juvenile was hanging to the underside of the rock. Air humidity and temperature along the cave were both relatively high, approaching 100% and 30°C in most chambers and galleries.

It lives syntopically with *Rowlandius digitiger* (Dumitresco, 1977), which is by far more abundant and widespread all along the cave. At least five different bat species use this cave as their diurnal roosting site, forming colonies up to several hundred individuals that cause the subsequent accumulation of guano on the soil. *R. digitiger* is particularly common in and around the bat guano (maybe due to the observed higher abundance of potential prey, such as mites, collembolans and micro-moth larvae), but *T. inexpectatus sp. n.* was found only on bare soil, devoid of bat guano.
Cabo Cruz is a limestone region composed of different levels of staggered marine terraces with abundant caves (fig. 10a–b). Therefore, it will not be surprising that _T. inexpectatus sp. n._ may be more widely distributed through the interconnected subterranean systems of the area. Moreover, since 1985 the region is under the protection of the Desembarco del Granma National Park, thus, the long-term conservation of this species seems legally warranted.

**Remarks.** The anterodorsal margin of leg IV femur angled at about 75° represents a striking attribute in _T. inexpectatus sp. n._, because such angle is only slightly less than 90° in the only other congener _T. orghidani_ and such intrageneric variation was unprecedented for Schizomida. In other words, the anterodorsal angling of the leg IV femur has been so far a 100% stable and reliable genus-level taxonomic character in the entire family, without any significant variation found to date in any genus despite how heterogeneous and speciose it could be, such as _Rowlandius_, _Stenochnus_ and _Surazomus_ Reddell & Cokendolpher, 1995, for example. With the material currently at hand, nothing else supports separating this species in a different genus; on the contrary, it matches _T. orghidani_ in all other odd characters that are currently diagnostic for _Troglocubazomus_. Anyway, such generic assignment will be confirmed only when adult females become available for study, especially their spermathecae.

**General Remarks**

With the present additions, the continuously growing diversity of the Cuban schizomid fauna reaches 59 species in 13 genera. Both additions are highly remarkable in different ways, as explained as follows.

On one hand, _A. eremita sp. n._ represents the first Cuban member of _Antillostenochrus_ that is found in a desertic habitat. Almost all species of this genus are forest-dwellers restricted to mesic to very humid conditions, which range from seasonally dry, coastal semicaducifolious forests through montane rainforests and even elfin forests. The single previous exception was the southern Hispaniolan endemic _Antillostenochrus subcerdoso_ (Armas & Abud, 1990), which also lives in a semidesert environment. Thereafter, such kind of arid habitats cannot be considered anymore as exceptional for the genus and additional occurrences (and even undescribed taxa) become expected.

On the other hand, the discovery of a second member of _Troglocubazomus_ is very important, because it allows the redefinition the generic diagnosis and for the first time to produce independent species-level diagnoses for its members. By the way, the redescriptions of _T. orghidani_ will follow very soon (R. Teruel, in preparation).

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