Two new genera and a new species of schizomids (Arachnida: Schizomida) from Isla de Pinos, Cuba

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Abstract
The schizomid fauna of Isla de Pinos (the second largest island in the Cuban archipelago), is revised. A new genus is described to accommodate Schizomus insulaepinorum Armas, 1977 (currently in the genus Luisarmasius Reddell & Cokendolpher, 1995), which is redescribed and fully illustrated according to the modern standards in schizomid taxonomy; its geographical distribution is also updated, with a new locality record. A second new, monotypic genus with a new species is also described from the same geographical area: the residual marble hills of the northeast of the island. As results, the schizomid fauna of Isla de Pinos is now known to comprise two nominal genera and species (both endemic to the island), the Cuban schizomid fauna reaches 13 genera and 57 species (being endemics 10 and 56 of them, respectively), and Luisarmasius is left monotypic and becomes the only genus endemic to Puerto Rico.

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

Introduction
Isla de Pinos is the second largest island of Cuba, with an area of 2,199 km². It is located in the Canarreos Archipelago, the main insular group of western Cuba, about 53 km offshore the closest point in Pinar del Río Province. According to Núñez Jiménez et al. (1972), it is one of the three oldest tectonic units in the entire Antilles and has a highly complex geological history and composition, being essentially a mixture of very old (down to Mesozoic) volcanic and sedimentary rock formations. Nevertheless, Iturralde-Vinent (1969) and Iturralde-Vinent and MacPhee (1999) concluded that the westernmost extremity of Cuba and Isla de Pinos were covered by sea during the Miocene, 23.03–5.33 Mya.

The first schizomids from Isla de Pinos were recorded by Armas (1977), who described Schizomus insulaepinorum Armas, 1977 from "Loma de Columbia" (= Cerro Columbia). The occurrence of undetermined populations at Sierra de Caballos, Loma Bibijagua and Cayo Piedra was mentioned (Armas, 1977: 4–5), but no details on composition of the samples were specified. Thereafter, most of the published references of the schizomids from this island just echoed that original source, e.g., Armas (1984, 2004),
Armas & Teruel (2002), Harvey (2003), and Teruel (2003, 2007, 2011, 2017a); the few papers that contributed additional or relevant information, are listed as follows.

First, Armas (1989) described the female flagellum and spermathecae of Schizomus insulaepinorum and recorded one additional female from a second locality: Cueva del Lago in Cerro de las Guanábanas, near the type locality. However, Armas (1989) did not disclose the collection data of the female described therein (e.g., whether it was a paratype, a topotype or the one from Cueva del Lago), thus, it is impossible to define its conspecificity with the holotype (see further discussion on this problem below, in the section corresponding to this species). Second, Reddell & Cokendolpher (1995) transferred Schizomus insulaepinorum to the genus Luisarmasius Reddell & Cokendolpher, 1995, described therein for another species from Puerto Rico. And last, Armas & Teruel (in Armas & Alayón, 2014: 47) regarded the undetermined population from Sierra de Caballos as an undescribed genus and species.

As part of his continued work on the Cuban arachnid fauna, the present author and his collaborators have been undertaking an intensive campaign of fieldtrips all over the archipelago. Very recently, additional schizomid material was collected from Isla de Pinos and its careful study and direct comparison to the holotype of Schizomus insulaepinorum led to the following conclusions. 1. This taxon does not belong in Luisarmasius or any other Hubbardiinae genus described so far, thus, it must be transferred to a new genus. 2. Another new species occurs syntopically there, and represents a second new genus. The descriptions of the three new taxa (two genera and one species) are presented in this paper, which also includes the rectifications of some critical errors detected in the original description of Schizomus insulaepinorum.

Material and Methods

Specimens were studied, measured and photographed under an AmScope SM-1T-PL LED trinocular stereo microscope, equipped with a 20X calibrated line scale 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 cartographic maps. The traditional toponym "Isla de Pinos" as used here refers only to the island, in order to distinguish it accurately from the current "Isla de la Juventud", i.e., the administrative entity than includes the complete Canarreos Archipelago; see further details in Teruel & Rodríguez-Cabrera (2017).

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), with the following exceptions: subdivision of female flagellum (Monjaraz-Ruedas et al., 2016) and female spermathecae (Reddell & Cokendolpher, 1995, modified by Moreno-González et al., 2014). Flagellar setation pattern is today a contentious issue, without full agreement amongst competing schemes because each one has its own pros and cons; see a commented review in Moreno-González & Villarreal (2017). Until a generalized consensus is achieved about one based on unambiguous homologies across the entire order, to avoid shifting back and forth, this paper keeps following Monjaraz-Ruedas et al. (2016), as used last by the present author (Teruel, 2017a–b).

Classification of adult males in heteromorphic and homomorphic forms follows Armas (1989), i.e., pedipalps either different from or similar to females, respectively. The subdivision of the former into "α and β heteromorphics" by Giupponi et al. (2016) is not followed here. Although obvious and generally correct, it fails to cover the complete variation range in heteromorphics: when samples large enough become available for any species, it is common to find one or more discrete forms that do not match the dichotomy of Giupponi et al. (2016), by being either intermediate or outside the range. For detailed examples of such greater variation, see Armas & Teruel (2002: 48–49, 51; tabs. II–III), Teruel (2003: 46, 57, 61; tabs. I, VI–VII), and Teruel (2017b: 73; tab. I).
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 formula means that each of the six tergites has only two setae (the standard for Hubbardiinae).

Conservation status follows the guidelines of UICN (2001, 2003), as applied by Teruel (2011, 2012).

Specimens studied herein are preserved in 80% ethanol and deposited in the following repositories: Instituto de Ecología y Sistemática, Havana, Cuba (IES) and personal collection of the author (RTO).

**Systematics**

_Siguanesiotes gen. n._

Figs. 1–2, 6. Table I

_Schizomus_ [in part: references to _S. insulaepinorum_ only]: Armas, 1977: 1–5, 8; figs. 1–2; tab. 1. Armas, 1984: 9. Armas, 1989: 1–2, 16–17, 30, 34, 36; figs. 3, 5d. Reddell & Cokendolpher, 1995: 6, 160–161. Harvey, 2003: 368.

_Luisarmasius_ [in part: references to _L. insulaepinorum_ only]: Reddell & Cokendolpher, 1995: 1, 12, 19, 81–82, 140–141, 160; tabs. 2–3. Armas & Teruel, 2002: 45. Armas, 2004: 46. Harvey, 2003: 11, 368. Teruel, 2003: 40, 42. Teruel, 2007: 40, 51. Teruel, 2011: 12, 87. Armas & Alayón, 2014: 47–48. Teruel, 2017a: 46.

**Type species.** _Schizomus insulaepinorum_ Armas, 1977 (= _Siguanesiotes insulaepinorum_ [Armas, 1977] comb. n.), by both present designation and monotypy.

**Diagnosis.** Size moderately large for the family (4–5 mm). Coloration: immaculate light olivaceous, with subtle shades of orange to yellow on pedipalps and body. Body without clavate setae. Cheliceral movable finger: ventrointernal margin with serrula and guard tooth, ventroexternal margin with a smooth lamella progressively stronger and angled distally. Pedipalps slightly sexually dimorphic and apparently not polymorphic: only slightly longer in males, which all seem heteromorphic; trochanter with internal spur. Propeltidium without true ocelli, but with ordinary eyespots instead; anterior process with two apical setae (1 + 1), dorsal setae sexually not dimorphic: 2–3 pairs (second submedian pair sometimes incomplete) in both males and females. Metapeltidium divided. Tergite I lacking anterior microsetae (present on II) and with posterior margin shallowly notched; tergites II–VII with setation unmodified and sexually not dimorphic: standard formula 2 / 2 / 2 / 2 / 2 / 2. Leg IV femur moderately robust, anterodorsal margin angled at essentially 90°. Male: pedipalp trochanter with femoral articulation on mediiodorsal position (i.e., approximately horizontal to the trochanter longitudinal axis) and with apex strongly produced into a triangular flat projection; patella and tibia without strongly modified armature, only ventrodistally with thin, spiniform, paired macrosetae. Abdomen not attenuate, with setation slightly modified: segment XII with dorsoposterior pair of macrosetae modified (thickened and angled); segment XII unmodified, with posterdorsal process essentially absent. Flagellum broadly subpentagonal, much wider than deep and dorsally flat, pedicel/bulb angled roughly at 180°, but apex conspicuously raised upwards; pedicel short and compressed (much deeper than wide); bulb with dorsal surface lacking any conspicuous sculpturing, except for a pair of longitudinal submedian furrows all along; setation pattern: single _dm_1, _dm_4, _vm_1 and _vm_4, paired _dl_2, _dl_5, _vm_2, _vm_5, _vl_1 and _vl_2, with _dl_1 minute, _dm_1 located at pedicel-bulb junction and _dm_4 in apical position; setation moderately modified: _dm_1 and _vl_ enlarged, compressed and apically truncate, _dl_5 displaced to ventral surface and _vl_2 displaced medially. Female (no specimens available, data reinterpreted from Armas [1977] and Armas [1989: fig. 5d]): flagellum with three flagellomeres and two annuli; setation pattern unknown (not described). Spermathecae with three pairs of simple, subequal lobes: short, thick, club-shaped, lacking apical bulbs, and coarsely fenestrate, sometimes one outer lobe can be distally bifurcate. Chitinized arch well sclerotized, short and wide, subtriangular (i.e., with posterior branches straight and forming pointed lateral tips with anterior branches). Gonopod unknown (not described).
Comparisons. *Siguanesiotes* gen. n. must be compared first to *Luisarmasius* because this is the genus where its single species was placed. The former can be reliably distinguished by the following unambiguous characters:

1. **Setation of tergite I**: anterior microsetae absent. In *Luisarmasius* there are three pairs; see Camilo & Cokendolpher (1988: 57).

2. **Shape and armature of pedipalp trochanter**: apex strongly produced into a sharp triangular projection, internal spur located in standard subdistal position. In *Luisarmasius* the apex is not produced and the internal spur is displaced apically; see Camilo & Cokendolpher (1988: 57–58; fig. 10) and Reddell & Cokendolpher (1995: 153; fig. 62).

3. **Shape of male flagellum**: subpentagonal, without defined lateral lobes, dorsally with two submedian furrows which are long, shallow and medially convergent. In *Luisarmasius* it is obtusely trilobed, with clearly defined round lateral lobes and dorsally with two submedian circular depressions; see Reddell & Cokendolpher (1995: 153; figs. 63–65).

4. **Setation of male flagellum**: setae $dm_4$ and $vl_1$ enlarged, compressed and apically truncate, $dl_3$ displaced to ventral surface and $vl_2$ displaced medially. In *Luisarmasius* the setae $dm_4$ and $vl_1$ are not modified (thin, acuminate), $dl_3$ are located in standard dorsal surface and $vl_2$ are located in standard subapical position; see Camilo & Cokendolpher (1988: 57–58; fig. 10) and Reddell & Cokendolpher (1995: 153; fig. 62).

5. **Structure of female spermathecae**: lobes club-shaped, chitinized arch subtriangular, with posterior branches straight and forming pointed lateral tips with anterior branches; see Armas (1989: 16, 36; fig. 5d). In *Luisarmasius* the lobes are piriform, the chitinized arch is widely cordiform and lacks lateral tips due to evenly, roundly continuous anterior and posterior branches; see Camilo & Cokendolpher (1988: 58; fig. 12) and Reddell & Cokendolpher (1995: 153; fig. 61).
Table I. Dimensions (mm) of two schizomid species from Isla de Pinos. Abbreviations: length (L), width (W), depth (D).

| Measurements | Propeltidium L / W | Metapeltidium L / W | Abdomen L | Flagellum L | Bulb L / W / D | Pedipalp L | Trochanter L / D | Femur L / D | Patella L / D | Tibia L / D | Tarsus L / D | Claw L | Total L |
|--------------|--------------------|---------------------|-----------|------------|----------------|-----------|----------------|------------|-------------|------------|------------|--------|---------|
| Siguanesiotes insulaepinorum comb. n. | ♂ (holotype) 1.50 / 0.75 | ♂ (Sierra Chiquita) 1.27 / 0.65 | ♂ (Sierra Chiquita) 1.00 / 0.45 | ♂ (holotype) 0.58 | ♂ (Sierra Chiquita) 0.45 / 0.28 | ♂ (Sierra Chiquita) 0.45 / 0.42 / 0.24 | ♂ (Sierra Chiquita) 0.40 | ♂ (Sierra Chiquita) 0.40 / 0.38 / 0.20 | ♂ (Sierra Chiquita) 0.40 / 0.22 | ♂ (Sierra Chiquita) 0.40 / 0.22 | ♂ (Sierra Chiquita) 0.32 / 0.45 / 0.25 | ♂ (Sierra Chiquita) 0.30 / 0.25 | ♂ (Sierra Chiquita) 0.25 / 0.10 | ♂ (Sierra Chiquita) 0.25 / 0.09 | ♂ (Sierra Chiquita) 0.25 / 0.09 | ♂ (Sierra Chiquita) 0.15 | ♂ (Sierra Chiquita) 0.13 | ♂ (Sierra Chiquita) 0.09
| Pinero marmoreus sp. n. | ♂ (holotype) 0.45 / 0.68 | ♂ (holotype) 0.37 / 0.65 | ♂ (holotype) 0.30 / 0.45 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 | ♂ (holotype) 0.52 |

Among the remaining Neotropical genera, Siguanesiotes gen. n. most closely resembles Cokendolpherius Armas, 2002 by sharing similar habitus, coloration, shape and armature of male pedipalps, and especially by lacking anterior microsetae on tergite I (a very unusual character). But the latter can be easily distinguished from the former by: 1. Cheliceral movable finger with ventroexternal margin lacking armature (i.e., lamella or teeth). 2. Tergite I with posterior margin deeply notched. 3. Male flagellum narrowly trident-shaped in dorsal view (i.e., bulb with three very long, narrow and essentially parallel lobes) and with dm₄ seta located basally to medially on bulb. 4. Female spermathecae with two pairs of moderately long lobes.

Distribution (fig. 6). This genus is endemic to Isla de Pinos, with its single species restricted to three nearby, isolated, residual marble hills of the northeastern quadrant of the island.

Etymology. The selected epithet is an arbitrary combination of letters, mixing the original Taino toponym for Isla de Pinos ("Siguanea") and the Latinized Greek name for an islander ("nesiotes"). The generic epithet is designed here of common gender; see Article 30.2.2 of the Code (ICZN, 1999: 37).

Siguanesiotes insulaepinorum comb. n.
Figs. 1–2, 6. Table I

Type data. CUBA: ISLA DE LA JUVENTUD SPECIAL MUNICIPALITY: Isla de Pinos: Loma de Columbia; 17/June/1974; L. F. de Armas; 1♂ heteromorphic holotype (IES: 3.1679). Examined. Note: specimen in poor condition, see details and additional data below in Remarks section.

Additional material examined. CUBA: ISLA DE LA JUVENTUD SPECIAL MUNICIPALITY: Isla de Pinos: Northern tip of Sierra Chiquita (new record); 10/July/2018; T. M. Rodríguez; under rock at cliff base; 1♂ heteromorph (RTO).

Diagnosis. As for the genus (see above).
Fig. 2. Adult male of Siguanesiotes insulaepinorum comb. n., from Sierra Chiquita (see fresh, perfectly preserved specimen): a) habitus, dorsal; b) habitus, lateral; c) pedipalps, lateral; d) abdominal segments IX–XII and flagellum, dorsal; e) abdominal segments IX–XII and flagellum, lateral.

Redescription (heteromorphic male holotype, unless otherwise noted). Coloration (fig. 2: male from Sierra Chiquita; see bleached holotype in fig. 1): immaculate light olivaceous, slightly darker on legs IV, abdomen and flagellum. Chelicerae and pedipalps with a subtle orange shade. Eyespots translucent, pale yellowish to whitish. Abdominal segment XII with posterodorsal area progressively darker distally, due to heavier sclerotization.

Pedipalp (fig. 1c, see male from Sierra Chiquita in fig. 2c): slightly elongate (1.57 times shorter than body, 1.54 times in male from Sierra Chiquita). Trochanter lanceolate (2.21 times longer than deep, 2.36 times in male from Sierra Chiquita), compressed, straight, and apically produced into a flat, triangular projection curved inwards; dorsal margin convex and bare; ventral margin convex, with 11–12 long, spiniform setae; inner surface with 3–4 spiniform setae arranged into a curved row, essentially parallel to ventral margin, internal spur medium-sized and located near the dorsal margin. Femur fusiform, stout (2.05 times longer than deep, 2.40 times in male from Sierra Chiquita), straight and not bent basally; dorsal margin widely convex, with 5–6 pairs of medium-sized spiniform setae; ventral margin widely convex, with two parallel rows of short, thick spiniform setae (one ventrointernal and two ventroexternals). Patella club-shaped, stout (3.08 times longer than deep, 2.73 times in male from Sierra Chiquita) and weakly bent basally; dorsal margin smooth, with 4–5 pairs of medium-sized, sedose setae; ventral margin with two rows of long, paired, rigid macrosetae (none especially modified), plus a similar, single macrosetae in subdistal position between the rows. Tibia subcylindrical, stout (3.40 times longer than deep, 2.89 times in male from Sierra Chiquita), vestigially bent basally; dorsal margin with 11–12 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 5–6 setae (some plumose or sinuose), and the ventroexternal row with four setae (unmodified). Tarsus conical, stout (1.20 times longer than deep, 2.50
times in male from Sierra Chiquita), straight and densely covered with variously sized, sedose setae; apical spurs almost symmetric (outer only slightly longer). Claw medium-sized, sharp, and shallowly curved.

Propeltidium (figs. 1a–b, see male from Sierra Chiquita in figs. 2a–b): with 1 + 1 apical and two pairs of dorsal setae. Eyespots large and subtriangular.

Mesopeltidia (figs. 1a–b, see male from Sierra Chiquita in figs. 2a–b): triangular, widely separated.

Metapeltidium (figs. 1a–b, see male from Sierra Chiquita in figs. 2a–b): completely divided into two well separated, obliquely paraboloid plates.

Legs (figs. 1a–b, see male from Sierra Chiquita in figs. 2a–b): I conspicuously attenuate, II–III slender. Leg IV femur elongate and robust, with anterodorsal margin angled at slightly less than 90°.

Abdomen (figs. 1a–b, d–e, see male from Sierra Chiquita in figs. 2a–b, d–e): not attenuate. Tergite I lacking anterior microsetae, II with 2–3 pairs. Tergites II–VII with setal formula standard: 2 / 2 / 2 / 2 / 2 / 2, setae large and rigid. Segment XII with dorsoposterior pair of macrosetae thick, dark and angled downwards; posterodorsal process absent.

Flagellum (figs. 1d–e, see male from Sierra Chiquita in figs. 2d–e): broadly subpentagonal, with pedicel/bulb angled at about 180°. Pedicel short and compressed (remarkably deeper than wide). Bulb in dorsal view very wide (1.07 times longer than wide in both available specimens), anterior margin very obtusely angled, lateral margins almost straight and slightly diverging backwards; bulb in lateral view moderately bulky (1.71 times longer than deep, 1.87 times in male from Sierra Chiquita), dorsally flat but apically raised, ventrally angled at about 95° (90° in male from Sierra Chiquita); dorsal surface with two longitudinal submedian furrows all along, which converge medially to resemble inverted parentheses; dm$_1$ seta located on pedicel/bulb joint, dm$_4$ in apical position; apex acute in dorsal view, conical and raised upwards in lateral view.

**Distribution** (fig. 6). As for the genus (see above).

**Conservation status.** Vulnerable (VU), meeting IUCN criteria B1a+2a;D2: known from only three fragmented localities, comprising a pooled area smaller than 7 km$^2$.

**Ecological notes.** According to the detailed data kindly supplied by its collector (Tomás M. Rodríguez-Cabrera, pers. comm.), the specimen from Sierra Chiquita was found under a rock semi-buried in the leaf litter of a semideciduous forest, at the base of a limestone cliff. Here it lives syntopically with the new species described below, whose holotype was collected under an adjacent rock.

Apart from this, only scant information has been published. Armas (1977: 4) declared that the type series was collected under rocks and leaf litter, in low semideciduofoliolous forest at Cerro Columbia. Armas (1989: 16) recorded an additional capture on a cave wall, about 1.5 m over the floor of the semidarkness zone of Cueva del Lago, at Cerro de las Guanábanas.

**Remarks.** In the original description, the type series was declared to include six paratypes: two males, three females and a subadult of undisclosed sex (Armas, 1977: 4). Later, Armas (1989: 16–17) mentioned an additional female from Cueva del Lago and last, Armas (2004: 46) stated that this species has been collected several times. Nevertheless, the only specimen present today at IES collection is (fortunately) the holotype.

However, the holotype is in poor condition due to deficient preservation and careless manipulation. It has decayed moderately by having been long stored in too diluted alcohol: the coloration is bleached, the exoskeleton has become translucent and detached from internal tissues, most setae of cephalothorax and flagellum are gone, and the metapeltidium and abdomen are distorted apparently by application of an excessive pressure with forceps (fig. 1).

The direct study of the holotype revealed that the original description based on this specimen has some serious errors, which will be corrected as follows. First, Armas (1977: 3) described the metapeltidium as "... with insinuation of median suture" (originally in Spanish, italics and English translation added here), but it is fully divided into two separate plates, as also seen in the additional male from Sierra Chiquita (fig. 2a). Second, the drawing of the flagellum in lateral view (Armas, 1977: fig. 1c) wrongly depicts the pedicel/bulb angle at approximately 90° and the bulb much shorter and bulkier, whilst actually the angle is about 180° and the bulb is remarkably longer and flatter (compare to figs. 1e and 2e herein).

The pedipalps of Siguanesiotes insulaepinorum comb. n. pose an interesting problem. In none of the two currently available specimens, these appendages possess the degree of elongation usually regarded as
heteromorphic, but neither as short as in a standard homomorphic. As there is anyway certain degree of elongation, they both are classified here as heteromorphics.

At least in Cuba, this kind of slightly elongate but robust pedipalps is typical of the large, pale Hubbardiinae genera such as *Cokendolpherius*, *Cubacanthozomus*, *Guanazomus*, *Heterocubazomus*, *Reddellzomus*, and *Troglocubazomus*. The lack of a close morphological resemblance amongst them seems to indicate that it does not represent a monophyletic group, but the surviving relicts of an old lineage that became largely replaced by more modern and ecologically successful taxa, such as *Rowlandius* and *Stenochrus*.

The holotype and the additional male from Sierra Chiquita show some minor differences, e.g., in pedipalp elongation and shape of flagellum (see figs 1–2), which could indicate the existence of more than one species across these isolated hills. However, it is more prudent to treat *Siganesiotes gen. n.* as monotypic until larger samples become available and the variability within and between populations can be assessed.

**Pinero gen. n.**

Figs. 3–5, 7. Table I

*Schizomus* [in part: record from Sierra de Caballos]: Armas, 1977: 4–5, 8; fig. 2.

"Un género y una especies [sic] nuevos para la ciencia": Armas & Teruel in Armas & Alayón, 2014: 47.

**Type species.** *Pinero marmoreus sp. n.*, by both present designation and monotypy.

![Fig. 3. Adult male holotype of *Pinero marmoreus sp. n.*: a) habitus, dorsal; b) habitus, lateral; c) pedipalps, lateral; d) abdominal segments IX–XII and flagellum, dorsal; e) abdominal segments IX–XII and flagellum, lateral.](image)
**Diagnosis** (males only, female unknown). Size medium for the family (3–4 mm). Coloration: immaculate brownish green, with subtle shades of orange to yellow on pedipalps and body. Body without clavate setae. Cheliceral movable finger: ventrointernal margin with serrula and guard tooth, ventroexternal margin with a smooth, vestigial lamella. Pedipalps sexually dimorphic and polymorphic: moderately to very long and slender in heteromorphics; trochanter with internal spur. Propeltidium without true ocelli, but with ordinary eyespots instead; anterior process with two apical setae (1 + 1), two pairs of dorsal setae. Metapeltidium entire. Abdominal tergites I–II with 2–3 pairs of anterior microsetae; tergites II–VII with setation slightly modified: formula 2 / 4 / 2 / 2 / 2 / 2. Leg IV femur very robust, anterodorsal margin angled at slightly more than 90°. Pedipalp trochanter elongate and with femoral articulation on apical to subapical position (i.e., angled at 45°–85° with respect to the trochanter longitudinal axis) and with apex not conspicuously produced; patella and tibia club-shaped and ventrodistally armed with large knife-like macrosetae, patella with some of them arising from enlarged setiferous tubercles in larger heteromorphics. Abdomen not attenuate; segments XI–XII without modified setae except for segment XII with dorsoposterior pair of macrosetae thickened and curved downwards; segment XII unmodified and with posterdorsal process large and massive. Flagellum broadly spade-shaped, depressed (wider than long and much wider than deep) and dorsally flat; pedicel short and compressed (much deeper than wide), pedicel/bulb angled roughly at 180°, with tip slightly raised upwards; bulb dorsal surface with a very large, dumbbell-like protuberance, flaked basally and distally by large, subrectangular depressions; setation pattern: single $dm_1$, $dm_4$, $vm_1$ and $vm_5$, paired $dl_2$, $dl_3$, $vm_2$, $vm_3$, $vl_1$ and $vl_2$, with $dm_1$ located at pedicel-bulb junction and $dm_4$ in subapical position.

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**Fig. 4.** Adult male of Pinero marmoreus sp. n. from Sierra de Caballos (large heteromorphic, not type): a) pedipalps, lateral; b) distal part of pedipalp patella, tibia and tarsus, lateral; c) abdominal segments X–XII and flagellum, dorsal; d) abdominal segments IX–XII and flagellum, lateral. Photos courtesy Luis F. de Armas.
NEW GENERA AND SPECIES OF SCHIZOMIDS FROM ISLA DE PINOS, CUBA

Comparisons (males only). Pinero gen. n. possesses more than two setae in abdominal tergite II, a conspicuous diagnostic character shared in Hubbardiinae by only four other genera: Antillostenochrus Armas & Teruel, 2002 (Greater Antilles), Clavizomus Reddell & Cokendolpher, 1995 (Southeast Asia), Mayazomus Reddell & Cokendolpher, 1995 (Western Central America), and Paradraculoides Harvey, Berry, Edward & Humphreys, 2008 (Western Australia). All of them can be clearly distinguished from the new genus as follows:

- **Antillostenochrus.** 1. Pedipalp patella greatly reduced, always the shortest segment in heteromorphics and shorter than at least both the femur and the tibia in homomorphics. 2. Heteromorphic pedipalp trochanter not elongated and conspicuously curved upwards. 3. Heteromorphic pedipalp tibia ventrally armed with two parallel rows of large, dark, knife-like spiniform macrosetae. 4. Abdominal segment XII lacking posterodorsal process. 5. Flagellum bulb lanceolate, longer than wide and dorsally with a median dome usually flanked laterally by a pair of small depressions (occasionally absent).

- **Clavizomus** (data taken from original descriptions and figures of Reddell & Cokendolpher [1995]). 1. Pedipalp densely covered with thick spiniform setae. 2. Pedipalp trochanter lacking internal spur. 3. Entire body and legs covered with clavate setae. 4. Propeltidium with a single seta on anterior process. 5. Metapeltidium divided. 6. Femur IV with anterodorsal margin angled at clearly less than 90°. 7. Abdominal segment XII with posterodorsal process vestigial. 8. Flagellum bulb long and slender, dorsally with two sharp submedian prominences followed by two deep submedian depressions.

- **Mayazomus** (data taken from descriptions and figures of the two most recent generic revisions: Monjaraz-Ruedas & Francke [2015a–b]). 1. Heteromorphic pedipalp trochanter with femoral articulation on mediadorsal position (i.e., approximately parallel to the trochanter longitudinal axis) and with apex strongly produced into a triangular flat projection. 2. Heteromorphic pedipalp femur and tibia each distally with 1–2 large ventrointernal spurs, usually ending in a short spiniform seta. 3. Heteromorphic pedipalp patella strongly curved downwards. 4. Abdominal segment XII lacking posterodorsal process. 5. Cheliceral movable finger with ventroexternal margin smooth, lacking any accessory teeth or lamella.

- **Paradraculoides** (data taken from original description and figures of Harvey et al. [2008]). 1. General aspect completely different, troglomorphic: coloration pale yellowish, ocular eyespot absent. 2. Metapeltidium divided. 3. Pedipalp trochanter lacking internal spur. 4. Propeltidium with 2 + 1 setae on anterior process. 5. Abdominal segment XII with posterodorsal process vestigial. 6. Flagellum stocky, with pedicel short, thick and deeper than bulb, which dorsally lacks any median depression.

It must be noted here that the monotypic genus Dumitrescoella Teruel, 2017 (very recently described from western mainland Cuba) also has increased setation in abdominal tergites, but only in females; males have a standard 2 / 2 / 2 / 2 / 2 / 2 setal formula on tergites II–VII. Apart from this, males of Dumitrescoella can also be distinguished safely from Pinero gen. n. by the following characters: 1. Coloration much darker, with chelicerae and pedipalps reddish. 2. Abdominal segment XII with posterodorsal process vestigial. 3. Flagellum bulb lanceolate, longer than wide, dorsally with a broadly Y-shaped dome, and with dt1 setal pair.

**Distribution** (fig. 7). This genus is endemic to Isla de Pinos, with its single species restricted to two nearby, isolated, residual marble hills of the northeastern quadrant of the island.

**Etymology.** The selected epithet is directly taken from the Spanish noun used in Cuba to name the people native from Isla de Pinos. It is masculine in gender; see Article 30.2.1 of the Code (ICZN, 1999: 37).

**Remarks.** It is highly recommended to describe new schizomid genera always from both sexes, because female spermathecae structure and flagellar subdivision and setation are important too at this taxonomic level. Nevertheless, in this case the male exhibits such a distinctive combination of characters that its description is warranted.

**Pinero marmoreus sp. n.**
Figs. 3–5, 7. Table I

*Schizomus* [in part: record from Sierra de Caballos]: Armas, 1977: 4–5, 8; fig. 2.
"Un género y una especies [sic] nuevos para la ciencia": Armas & Teruel in Armas & Alayón, 2014: 47.
**Type data.** CUBA: ISLA DE LA JUVENTUD SPECIAL MUNICIPALITY: Isla de Pinos; northern tip of Sierra Chiquita; 10/July/2018; T. M. Rodríguez; under rock at cliff base; 1♂ heteromorphic holotype (RTO).

**Additional material examined** (not type). CUBA: ISLA DE LA JUVENTUD SPECIAL MUNICIPALITY: Isla de Pinos: northern tip of Sierra de Caballos; C. M. Martínez-Muñoz; under log bark at cliff base; 1♂ heteromorphic (IES). **Note.** This specimen is now missing from this collection.

**Diagnosis.** As for the genus (see above).

**Description** (heteromorphic male holotype). Coloration (fig. 3): immaculate brownish green, slightly darker on legs IV, abdomen and flagellum. Chelicerae and pedipalps with a subtle orange shade. Eyespots translucent, pale yellowish to whitish. Abdominal segment XII with posterodorsal process progressively darker distally, due to heavier sclerotization.

Pedipalp (figs. 3c): slightly elongate (1.48 times shorter than body). Trochanter spatulate (2.00 times longer than deep), compressed, straight, and apically not produced; dorsal margin shallowly convex and bare; ventral margin convex, with 8–10 variously sized setae (most of them short and spiniform); inner surface with three spiniform setae arranged into a curved row, essentially parallel to ventral margin, internal spur small and located near the ventral margin. Femur fusiform, stout (2.89 times longer than deep), straight and not bent basally; dorsal margin widely convex, with 5–6 pairs of short spiniform setae; ventral margin widely convex, with two parallel rows of short spiniform setae (three ventrointernals and four ventroexternals). Patella club-shaped, stout (3.44 times longer than deep) and weakly bent basally; dorsal margin smooth, with 16–18 variously sized, thin setae (most of them short); ventral margin very shallowly convex, with two rows of rigid, irregularly paired setae: the ventrointernal row spanning all along and with five setae (the three distalmost larger, thicker and darker), and the ventroexternal row restricted to distal half of the segment and with four setae (the subbasal and subdistal large, thick and dark). Tibia club-shaped, stout (2.93 times longer than deep), and not bent basally; dorsal margin with 8–10 variously sized setae, most of them sedose; ventral margin with three irregular rows of long, rigid setae all along: the ventrointernal row with five setae (some plumose or sinuose), the ventromedian row with 4–5 setae (some plumose or sinuose), and the ventroexternal row with five setae (the two distalmost much larger, thicker and darker). Tarsus slightly conical, elongate (2.78 times longer than deep), straight and densely covered with variously sized, sedose setae; apical spurs asymmetric (outer larger). Claw medium-sized, sharp, and shallowly curved.

Propeltidium (figs. 3a–b): with 1 + 1 apical and two pairs of dorsal setae. Eyespots small, triangular. Mesopeltidia (figs. 3a–b): subtriangular to sickle-shaped, widely separated. Metapeltidium (figs. 3a–b): entire, without any traces of median suture or pale band. Legs (figs. 3a–b): I moderately attenuate, II–III of standard elongation. Leg IV femur very robust, with anterodorsal margin angled at slightly more than 90°.

Abdomen (figs. 3a–b, d–e): not attenuate. Tergite I with two pairs of anterior microsetae, II with three pairs. Tergites II–VII with setal formula slightly increased: 2 / 4 / 2 / 2 / 2 / 2, setae large, dark and rigid. Segment XII with dorsoposterior pair of macrosetae thick, dark and curved downwards; posterodorsal process large, massive and subtriangular.

Flagellum (figs. 3d–e): broadly spade-shaped, with pedicel/bulb angled at about 180°. Pedicel medium-sized and compressed (remarkably deeper than wide). Bulb in dorsal view very wide (1.19 times wider than long), anterior margin straight, lateral margins rounded and angled at about 135°; bulb in lateral view moderately bulky (1.78 times longer than deep), dorsally concave, ventrally angled at about 95°; dorsal surface with a very large, dumbbell-like protuberance, flaked basally and distally by large, subrectangular depressions (the distal one much deeper and longer); dm1 seta located on pedicel/bulb joint, dm2 in subapical position; apex obtuse in dorsal view, subrectangular and slightly raised in lateral view.

**Distribution** (fig. 7). As for the genus (see above).

**Conservation status.** Vulnerable (VU), meeting UICN criteria B1a+2a;D2: known from only two fragmented localities, comprising a pooled area smaller than 5 km².
Ecological notes. According to the data kindly supplied by its collectors (Tomás M. Rodríguez-Cabrera and Carlos M. Martínez-Muñoz, pers. comm.), the specimens were collected in semideciduous forest at the base of limestone cliffs (fig. 5). The holotype was found under a rock semi-buried in the leaf litter and the male from Sierra de Caballos under the bark of a rotten log.

In the type locality, it lives syntopically with Siguanesiotes insulaepinorum comb. n., which was collected under an adjacent rock.

Etymology. The selected epithet is a Latin adjective that names anything related to marble. It alludes to the habitat of this interesting schizomid: the marble hills of the northern Isla de Pinos.

Remarks. The additional male from Sierra de Caballos is a large heteromorphic, with pedipalps much more elongated and strongly armed than the holotype (figs. 4a–b).
Unfortunately, this specimen vanished from IES collection before it could be measured and photographed in higher resolution (see above, in Additional Material Examined section), but both specimens are clearly conspecific. All other morphologically relevant characters match perfectly, e.g., shape, relative size and setation of abdominal segment XII and flagellum (compare herein figs. 3d–e to 4c–d). Moreover, the localities are separated by only 2.4 km air distance and Sierra Chiquita actually is a southern spur of Sierra de Caballos, fragmented by erosion across a 220 meter-wide pass.

Fig. 6. Geographical distribution of *Siguanesiotes* gen. n. and *Siguanesiotes insulaepinorum* comb. n.: previous records (red symbols), new record (yellow symbol). Image frame = 500 x 220 km, inset = 20 x 13 km. Fig. 7. Geographical distribution of *Pinero* gen. n. and *Pinero marmoreus* sp. n. (yellow symbols, the southernmost is the type locality). Image frame = 500 x 220 km, inset = 20 x 13 km.

**General Remarks**
In the succinct catalog of the Pedipalpi from western Cuba by Armas (2013), all schizomids from Isla de Pinos are missing, which is an obvious error since all other taxa of whipspiders and whipscorpions known from Isla de Pinos were listed, as were all schizomids from the other provinces of this region.

The schizomid fauna of Isla de Pinos has now doubled its known diversity for both genera and species; nevertheless, it is evidently still underestimated. Two of the undetermined populations recorded by Armas (1977: 4–5) remain as such: Loma de Bibijagua and Cayo Piedra. The former belongs to the same group of residual marble hills and must correspond to either *Pinero* gen. n. or *Siguanesiotes* gen. n. The latter is found far to the south, in an area of much more recent origin and with a completely different landscape (it is a very low, Quaternary limestone karstic plain), and could well correspond to a different
genus. Moreover, the genera *Rowlandius*, *Guanazomus* and *Dumitrescoella* are widespread across the western mainland Cuba and could be expected to occur in Isla de Pinos as well. Schizomids typically have very restricted distributions, and at least additional variant species of the two new genera described herein are expected to occur in other isolate marble hills, which have been long isolated as biogeographical "islands within an island".

With the present addition, the diversity of the Cuban schizomid fauna reaches 13 genera and 57 species, of which 10 and 56, respectively, are national endemics. Also, the genus *Luisarmasius*, which now is monotypic, becomes the single schizomid genus endemic to Puerto Rico.

**Key to the schizomid genera of Cuba**

1. Leg IV femur with anterodorsal margin angled at 65–83° and sexually dimorphic: angle always much more acute in male ..............................................................2
   - Leg IV femur with anterodorsal margin angled at approximately 90° and sexually non-dimorphic: angle essentially identical in both sexes .............................................................3

2. Leg IV femur with anterodorsal margin angled at 65–70°. Tergite I with posterior margin conspicuously notched medially. Male: flagellum with more than 40 setae, but lacking dm₁. Female: flagellum with vm₂ setae; spermathecae with median and lateral lobes clearly longer than lateral lobes, both pairs long, slender and match-shaped to subcylindrical ..............................................................................*Reddellzomus*
   - Leg IV femur with anterodorsal margin angled at 70–83°. Tergite I with posterior margin not conspicuously notched. Male: flagellum with standard setation, including dm₁. Female: flagellum lacking vm₂ setae; spermathecae with median and lateral lobes similarly sized, short, thick and pyriform ...........................................................................................................*Heterocubazomus*

3. Tergite I lacking anterior microsetae ..............................................................................................................4
   - Tergite I with 2–3 pairs of anterior microsetae (sometimes asymmetric) .......................................................5

4. Male: flagellum narrowly trident-shaped in dorsal view: bulb with three very long, narrow and essentially parallel lobes; dm₁ seta located basally to medially on bulb. Female: spermathecae with two pairs of moderately long and slender lobes .................................................................*Cokendolpherius*
   - Male: flagellum bulb broadly subpentagonal in lateral view; dm₁ seta located apically on bulb. Female: spermathecae with three pairs of short and thick lobes ..............*Siguanesiotes* gen. n.

5. Habitus troglomorphic: coloration pale yellowish, with pedipalps light orange, eyespots absent, walking legs conspicuously attenuate. Male: abdominal segments IX–XII with highly modified macrosetae (enlarged, much thickened and sinuose to curved downwards) .........................................................6
   - Habitus non-troglomorphic: coloration uniformly greenish or yellowish brown to blackish green, usually with pedipalps reddish, eyespots usually present, legs not especially attenuate. Male: abdominal segments IX–XII with standard setation, at most only with the dorsoposterior pair of macrosetae of XII slightly modified (thickened and angled to curved downwards) ........................................7

6. Pedipalp trochanter lacking internal spur. Male: flagellum in dorsal view with pedicel long and bulb lanceolate, dm₁ seta located medially on pedicel. Female: spermathecae with median and lateral lobes cylindrical, basally fused into a V-shape ..............................................................................*Cubacanthozomus*
   - Pedipalp trochanter with internal spur. Male: flagellum in dorsal view with pedicel very short and bulb round, dm₁ seta located basally on bulb. Female: spermathecae with median and lateral lobes conical, not fused ..............................................................................*Troglocubazomus*

7. Tergite II with 4–8 setae .........................................................................................................................8
   - Tergite II with two setae ..................................................................................................................9

8. Male: pedipalp patella conspicuously reduced, being always the shortest segment in heteromorphics and much shorter than both femur and tibia in homomorphics, patella ventrodistally with a bunch of
very strong spiniform macrosetae; abdominal segment XII lacking posterodorsal process; bulb of flagellum lanceolate, dorsally with an oval, dome-like protuberance, usually flanked laterally by two small depressions ......................................................... *Antilostenochoirus*

- Male: pedipalp patella not reduced, actually the longest pedipalp segment, patella ventrodistally with two parallel rows of spiniform macrosetae; abdominal segment XII with posterodorsal process large and massive; bulb of flagellum broadly spade-shaped, dorsally with a dumbbell-like protuberance, flaked basally and distally by large, subrectangular depressions.............................. *Pinero* gen. n.

9 Male: flagellum bulb in dorsal view hexagonal, with a large, circular median depression. Female: spermathecae with median and lateral lobes heavily sclerotized, club-shaped and perforate by large, conspicuous glandular pores ........................................................................................ *Stenochoirus*

- Male: flagellum bulb in dorsal view variable, but never hexagonal nor with a large, circular median depression. Female: spermathecae with median and lateral lobes variable, but never markedly sclerotized (except occasionally for apical bulbs, when present) and smooth or perforate by small, inconspicuous glandular pores ........................................................................... 10

10 Metapeltidium fully divided into two separate plates. Female: spermathecae with median and lateral lobes of each side fused basally into a Y-shape and lacking apical bulbs; flagellum with three flagellomeres and two annuli ............................................................................................. *Cubazonus*

- Metapeltidium entire (sometimes an incomplete, pale median line may occur; which is never a true plate division). Female: spermathecae with median and lateral lobes of each side usually not fused, if so, then also at least one pair with well-defined apical bulbs and flagellum with four flagellomeres and three annuli ................................................................. 11

11 Male: abdominal segment XII with posterodorsal process minute and pointed; heteromorphic pedipalp tibia ventrodistally with a very large setiferous tubercle (highly reduced in homomorphic), bearing a very thick spiniform macroseta opposed to tarsus. Female: spermathecae with median and lateral lobes cylindrical and lacking apical bulbs............................................................................... *Guanazonus*

- Male: abdominal segment XII with posterodorsal process variable, but never minute and pointed; heteromorphic pedipalp tibia variable ventrodistally, but never with such large setiferous tubercle. Female: spermathecae with median and lateral lobes either match-shaped or at least one pair with well-defined apical bulbs ......................................................................................... 12

- Cheliceral movable finger ventroexternally with a crenulate lamella. Male: abdominal segment XII with posterodorsal process weak; flagellum bulb dorsally with a large distal depression flanked basally by a single, broadly Y-shaped protuberance. Female: tergites III–VII with 4–16 setae; spermathecae with median and lateral lobes match-shaped ........................................... *Dumitrescoella*

- Cheliceral movable finger ventroexternally with several teeth. Male: abdominal segment XII with posterodorsal process moderate to very strong; flagellum bulb dorsally lacking a distal depression and with a transverse pair of conical to round protuberances. Female: tergites III–VII with only two setae; spermathecae with median and lateral lobes variable, but at least one pair with well-defined apical bulbs .................................................................................. *Rowlandius*

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