Rare or poorly known Caribbean orthopterans. Part 1. The true generic identity of *Hygronemobius histrionicus* Zayas, 1976 (Orthoptera: Trigonidiidae: Nemobiinae)

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**Abstract**

The Cuban endemic *Hygronemobius histrionicus* Zayas, 1976 is revised. As a result, a new genus is described to accommodate this species, which is redescribed and further data are given on its morphology, morphometry and ecology. Moreover, the type locality is clarified from the original labels of the syntypes. The paper includes a thorough illustrative complement, with color photographs of habitus, taxonomically diagnostic characters and habitat, as well as a precise distribution map.

**Key words:** cricket, taxonomy, natural history, distribution, Greater Antilles, Cuba, Isla de Pinos.

**Introduction**

*Hygronemobius histrionicus* was described by Zayas (1976) from "Isla de Pinos" without further precision on the type locality. Apart from having a nice habitus drawing, the original description was very poor and did not follow many of the standard taxonomic procedures (fig. 1). In subsequent taxonomic papers on Nemobiinae, all other authors merely cited this species without asking themselves whether its generic placement was right or not (e.g., Otte & Perez-Gelabert, 2009; Ribeiro Pereira et al., 2013; Desutter-Grandcolas & Hugel, 2016). The most probable reason was that no specimens were available except for the syntypes, all deposited in the private collection of Fernando de Zayas, who died in 1983.

The author of this paper is currently conducting a thorough revision of some elusive Caribbean orthopterans that for a long time have remained neglected or poorly known. As a first approach, a new genus is described herein to accommodate *H. histrionicus*, which is redescribed and redefined on the basis of the external morphological characters and internal genitalia, the latter being illustrated and characterized for the first time.
TRUE GENERIC IDENTITY OF HYGRONEMOBIUS HISTRIONICUS ZAYAS, 1976

Material and Methods

The crickets were detected by direct search during the day. On the spot, high resolution, full-color photographs of some individuals and their habitat were taken with a Nikon Coolpix P510 digital camera. Then, all specimens were sacrificed by immersion in 70% ethanol. Final preservation was made in 80% ethanol and the samples were deposited in the collection of the author (SY). Collecting and identification labels were laser-printed in Spanish, but transcribed into English here.

The specimens were studied and measured under an AmScope SM-1T-PL LED trinocular stereo microscope, equipped with a 20x calibrated line scale ocular micrometer. All microscopic photographs were taken with a Nikon Coolpix S8100 digital camera attached to the upper ocular tube of the microscope. Photographs of habitus were taken with a Nikon Coolpix B500. All photographs of preserved specimens were taken immersed in ethanol to avoid dehydration. 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.

Male genitalia were treated for three hours with a 10% aqueous solution of sodium hydroxide (NaOH) to bleach membranes, and photographed under an Olympus optical microscope with an Olympus D520Z digital camera attached to the ocular tube. The genitalia terminology applied here combines Desutter (1987, 1988) and Desutter-Grandcolas (1993).

All along the text, counts are given as fractions for left/right sides. Some data were verified using the Orthoptera Species File Online (OSF), version 5.0/5.0 (Cigliano et al., 2018).

Repositories are abbreviated using the following acronyms:
FZ: Private collection of Fernando de Zayas (formerly at Havana, Cuba, current whereabouts unknown).
SY: Private collection of Sheyla Yong, Havana, Cuba.

Systematics

Family Trigonidiidae Saussure, 1874
Subfamily Nemobiinae Saussure, 1877
Pineronemobius new genus

Figures 1–12, Table I

Hygronemobius: Zayas, 1976: 82, 84; fig. 76. Misidentification: mention to H. histrionicus.

Type species: Hygronemobius histrionicus Zayas, 1976 (Pineronemobius histrionicus [Zayas, 1976] n. comb.), by both present designation and monotypy.

Diagnosis. Size medium for Nemobiinae (5–7 mm). Tegmina and alae completely absent in both sexes. Protibia lacking tympana. Metatibia with 3:3 /3:3 subapical spines and five apical spurs (two inner and three outer), dorsal inner apical spur almost as long as metabasitarsus. Male internal genitalia very small, subtriangular in shape; ephiphalic sclerite sclerotized, completely divided medially and slightly folded inwards; ectoparameres wide, completely divided medially and slightly folded inwards; dorsal cavity short; ephiphalic fold very simple and poorly sclerotized; ephiphalic apodeme not crossing or surpassing the rami; endophallus subdivided into three sclerites (wider lateral ones and a narrower in the middle). Ovipositor shorter than abdomen and strongly sclerotized; dorsal and ventral pair of valves separated by a deep notch, all four with tips shallowly curved upwards and armed dorsally and ventrally with minute denticles.

Etymology. The generic epithet is a composite word, which combines the name of the island where the new genus occurs (Isla de Pinos) and the last part of the closely-related genera Hygronemobius Hebard, 1913 and Absonemobius Desutter-Grandcolas, 1993. It is masculine in gender.

Comparisons. Pineronemobius n. gen. is closely related to the genera Hygronemobius and Absonemobius. The most obvious characters that distinguish Pineronemobius n. gen. from them can be found in male internal genitalia and external morphological characters.
Figure 1. Photographic copy of the pages from Zayas (1976), containing the original description of *Pineronemobius histrionicus* n. comb. (highlighted).

Figure 2. All syntypes of *Pineronemobius histrionicus* n. comb. and their labels, in the original entomological box at the private collection of Fernando de Zayas. See the poor condition of specimens.
Figures 3-4. 3 Adult male *Pineronemobius histrionicus* n. comb. from Sierra Chiquita, full-body views: a) dorsal; b) lateral; c) ventral. Scale bar in millimeters. See fresh, perfectly preserved specimen. 4 Adult female *Pineronemobius histrionicus* n. comb. from Sierra Chiquita, full-body views: a) dorsal; b) lateral; c) ventral. Scale bar in millimeters. See fresh, perfectly preserved specimen.

*Pineronemobius* n. gen. must be compared first with *Hygronemobius* because this is the genus where its single species was originally placed. The former can be distinguished of the latter by the following characters:

1. **Habitus**: Small size, prominent eyes occupying almost totally the surfaces of the genae, body stout and short. *Hygronemobius* the size is larger, the eyes are smaller and do not occupy totally the genae, and the body is generally larger and narrower (see Desutter-Grandcolas, 1993; Ribeiro Pereira et al., 2013).
2. **Tympana of the protibia**: Totally absent. In *Hygronemobius*, they are present on outer face of protibia (See Desutter-Grandcolas, 1993).
3. **Tegmina and alae**: Both sexes aterous. In *Hygronemobius*, tegmina are always present in males and usually reduced to triangular lateral pads in females, whereas alae are largely absent in both sexes (see Desutter-Grandcolas, 1993; Ribeiro Pereira et al., 2013).
4. **Male internal genitalia**: Subtriangular in shape; ectophallic fold very simple and poorly sclerotized; apex of epiphallus without apical lobes. In *Hygronemobius* it is rectangular, the ectophallic fold is very large and forms a big median disc on the ventral face of genitalia (perfectly visible in lateral view), and
the apex of the epiphallus possesses two large membranous lobes directed ventrally (see Desutter-Grandcolas, 1993; Ribeiro Pereira et al., 2013).

Among the remaining Neotropical genera of Nemobiinae, *Pineronemobius n. gen.* most closely resembles *Absonemobius* by sharing similar characters, e.g., the apterous condition in both sexes, the prominent eyes and the absence of tympana in the protibia. The new genus can be distinguished from the latter as follows: 1. Body stouter and gibbose in lateral view. 2. Coloration pattern vivid and not uniform, with very well defined spots and stripes in yellow and black. 3. Metatibiae armed with five apical spurs (two inner and three outer), dorsal inner apical spur almost as long as metabasitarsus. 4. Male genitalia subtriangular in shape and without apical lobes. Epiphallal sclerite completely divided medially and slightly folded inwards. Ectoparameres wide, completely divided medially and slightly folded inwards. Dorsal cavity shorter. Epiphallal fold very simple and poorly sclerotized. Ectophallic apodeme not crossing or surpassing the rami. Endophallus subdivided into three sclerites (wider lateral ones and a narrower in the middle), perfectly visible in both dorsal and ventral views.

**Figures 5-6.** 5 Adult male *Pineronemobius histrionicus n. comb.* from Sierra Chiquita, close-up views: a) head and pronotum, dorsal; b) head and pronotum, lateral; c) head, frontal; d) hind tibia and tarsus, external; e) hind tibia and tarsus, internal. 6 Adult female *Pineronemobius histrionicus n. comb.* from Sierra Chiquita, close-up views: a) head and pronotum, dorsal; b) head and pronotum, lateral; c) head, frontal.
**Distribution** (fig. 12). The only species is endemic to Isla de Pinos (second largest island in Cuban archipelago), where it has been found only in three isolated marble hills known from the northeast: Sierra de Casas (up to 262 m. a.s.l.), Sierra de Caballos (up to 295 m. a.s.l.) and Sierra Chiquita (up to 157 m. a.s.l.).

Isla de Pinos belongs to the Canarreos Archipelago, the main insular group of western Cuba. It is one of the three oldest tectonic units in the Antilles, with a highly complex geological history and composition, being essentially a mixture of very old (down to Mesozoic) volcanic and sedimentary rock formations (Núñez Jiménez et al., 1972).

### Table I. Measurements of an adult pair of *Pineronemobius histrionicus* n. comb. from Sierra Chiquita. Abbreviations: length (L), width (W), depth (H), not applicable (NA).

| Dimensions (mm)     | Male                  | Female                |
|---------------------|-----------------------|-----------------------|
| Head L / W / H      | 1.25 / 2.10 / 1.50    | 1.25 / 2.30 / 1.80    |
| Interocular distance| 0.72                  | 0.70                  |
| Scapus L / W        | 0.40 / 0.25           | 0.40 / 0.30           |
| Maxillary palp L    | 2.10                  | 2.05                  |
| Segment I L         | 0.20                  | 0.15                  |
| Segment II L        | 0.25                  | 0.20                  |
| Segment III L       | 0.55                  | 0.60                  |
| Segment IV L        | 0.40                  | 0.40                  |
| Segment V L         | 0.70                  | 0.70                  |
| Pronotum L / W      | 1.20 / 2.05           | 1.25 / 2.20           |
| Abdomen L           | 3.30                  | 4.00                  |
| Supra-anal plate L / W | 0.75 / 0.90           | 0.85 / 0.75           |
| Subgenital plate L / W | 0.65 / 1.00           | 0.55 / 0.85           |
| Ovipositor L        | NA                    | 2.65                  |
| Cercus L            | 2.60                  | 2.80                  |
| Profemur L          | 2.00                  | 2.10                  |
| Protibia L          | 1.75                  | 1.85                  |
| Probasitarsus L     | 1.15                  | 1.10                  |
| Mesofemur L         | 2.00                  | 2.05                  |
| Mesotibia L         | 1.75                  | 1.75                  |
| Mesobasitarsus L    | 1.10                  | 1.10                  |
| Metafemur L / W     | 4.50 / 1.65           | 4.80 / 1.80           |
| Metatibia L         | 4.25                  | 4.50                  |
| Metabasitarsus L    | 1.50                  | 1.55                  |
| **Body (total) L**   | **5.75**              | **6.50**              |

*Pineronemobius histrionicus* (Zayas, 1976) n. comb.

Figures 1–12. Table I

*Hygronemobius histrionicus* Zayas, 1976: 82, 84; fig. 76. Ribeiro-Pereira et al., 2013: 1, 4, 17. Yong & Perez-Gelabert, 2014: 1, 416. Desutter-Grandcolas & Hugel, 2016: 323.

**Types.** CUBA: ISLA DE LA JUVENTUD SPECIAL MUNICIPALITY: Isla de Pinos; Sierra de Casas; June/1957; F. de Zayas; 1♂, 2♀♀ syntypes (FZ). Sierra de Caballos; June/1974; L. R. Hernández; 1♀ syntype (FZ). Examined, all four in poor condition.

**Additional material examined:** CUBA: ISLA DE LA JUVENTUD SPECIAL MUNICIPALITY: Isla de Pinos: Sierra Chiquita (new record); 21°51'42"N - 82°46'26"W; 30 m a.s.l.; 10/July/2018; T. M. Rodríguez-Cabrera; 6♂♂, 5♀♀, 1♀ juvenile (SY).

**Diagnosis.** See genus diagnosis above.
Figures 7-8. 7 Adult male *Pineronemobius histrionicus n. comb.* from Sierra Chiquita, close-up views: a) apex of abdomen, dorsal; b) apex of abdomen, lateral; c) apex of abdomen, ventral. 8 Adult female *Pineronemobius histrionicus n. comb.* from Sierra Chiquita, close-up views: a) apex of abdomen and ovipositor, dorsal; b) apex of abdomen and ovipositor, lateral; c) apex of abdomen and ovipositor, ventral; d) ovipositor tip magnified, dorsal; e) ovipositor tip magnified, lateral; f) ovipositor tip magnified, ventral.

**Redescription** (adult male from Sierra Chiquita).
Size medium for the subfamily (total length 5.75 mm). Tegument smooth and coriaceous, whole surface of body and appendages covered by two types of rigid, dark setae: some are minute and thin, and others are long and thick. Coloration with base beige and a very conspicuous pattern of stripes and spots in black and yellow. Head entirely beige; eyes dark (brown in life, fades to darker after preservation); vertex with five parallel black stripes: a single median (very short, extending only from eyes midpoint forwards), a pair of submedian stripes (longest, complete and prolonged frontally to almost reach the clypeus base) and a pair of lateral stripes (very short, extending only from eyes midpoint backwards); mouthparts in frontal view with three black vertical stripes. Antennae annulated, with segments dark brown and joints beige; scapus beige, with a dark brown, longitudinal, Y-shaped spot. Pronotum beige, decorated with a very conspicuous, irregular, symmetric black design. Legs mostly beige, with large black spots; hind legs gradually turning orange distally, with a pair of oblique black stripes basally and black knees. Abdomen with a very conspicuous pattern of transverse black stripes on tergites and sternites, on the former broader and enclosing sharply contrasting vivid yellow spots (arranged in three rows along the abdomen: a median row of rhomboidal spots, paired submedian rows of oval spots and paired lateral rows of elongate transverse spots). Cerci broadly annulated in black and beige. See figures 3–8, 10 and table I.
Head (figs. 3, 5, 10b). Large, wider than long (ratio = 1.7). Tegument smooth and coriaceous, with large, dark, rigid setae scattered all over. Vertex slightly convex in lateral view. Eyes very large (almost occupying the whole genal surface), prominent and suboval. Ocelli small, inconspicuous. Genae smooth, convex in frontal view. Maxillary palps very long and slender. Antennae filiform, much longer than body and covered with minute setae all over; scapus longer than wide (ratio = 1.6), apically swollen, oval in cross-section, densely covered with minute dark setae; pedicellus much smaller than scapus.

Thorax. Smooth and coriaceous, with large, dark, rigid setae scattered all over. Pronotum (figs. 3, 5a–b, 10b) wider than long (ratio = 1.7); anterior margin essentially convex, posterior margin almost straight, lateral margins subquadrate; with setae scattered all over (longer and stronger mainly along anterior and posterior margins). Tegmina and alae completely absent.

Legs (figs. 3, 5, 10b). Covered all over by two very distinct types of setae: minute and rigid ones and others longer and stronger, both being more abundant on fore and mid legs. Profemur stout, longer than protibia, subrectangular, unarmed, oval in cross section; protibia very slender, straight, without tympana, with two medium-sized apical spurs; probasitarsus long, slightly shorter than protibia, second tarsomere very short, both the probasitarsus and the second tarsomere armed ventrally with a few minute and very thin spines, third tarsomere longer than second but shorter than first; tarsal claws very short. Mid legs similar to fore legs in structure. Metafemur very robust, unarmed, as long as metatibia (ratio = 1.0), oval in cross-section; metatibia with 3:3:3 dorsal subapical spines and five apical spurs: two inner (the dorsal one almost as long as metabasitarsus, the ventral one shorter) and three outer (the dorsal one shortest, the ventral one longer, the one in between longest); metabasitarsus long, shorter than metatibia (ratio = 2.8), armed distally with a pair of conical apical spurs (the inner one longer, both slightly longer than second tarsomere); second tarsomere very short, third tarsomere longer than second but shorter than first; tarsal claws very short.

Abdomen (figs. 3, 7, 10b). Longer than head + pronotum (ratio = 1.3) and slightly wider than pronotum, swollen, gibbose in lateral view. Tegument smooth and coriaceous, covered all over by two very distinct types of setae: one minute and rigid and other longer and stronger. Supra-anal plate wider than long (ratio = 1.2), paraboloid, with base subrectangular and apex strongly convex. Subgenital plate wider than long (ratio = 1.5), pentagonal, with anterior margin convex, lateral margins basically straight and posterior margin acutely convex. Cerci shorter than abdomen (ratio = 0.8), conical and densely covered by the three very distinct types of setae standard for all Grylloidea: small clavate setae in basalmost portion only, plus two types of filiform setae all over (one type very short and rigid, another type very long and silky).

Figure 9. Adult male *Pineronemobius histrionicus* n. comb. from Sierra Chiquita, close-up views of genitalia: a) dorsal; b) lateral; c) ventral.
Figure 10. Live *Pineronemobius histrionicus* n. comb., photographed in their natural habitat (walking on limestone cliff) at Sierra Chiquita: a) adult female (left) and subadult female (right); b) adult male. Photos courtesy of Tomás M. Rodríguez-Cabrera.
Figure 11. Habitat of *Pineronemobius histrionicus* n. comb., i.e., semicaducifolious forest on karstic limestone relief: a) Sierra de Casas, detail; b) Sierra de Caballos, overview. Photos courtesy of Rosario Domínguez.
Genitalia (fig. 9). Very small, subtriangular in shape, remarkably concave in dorsal view and convex in ventral view, without any apical lobes. Ephiphallic sclerite minutely setose (visible in dorsal view), sclerotized, completely divided medially and slightly folded inwards. Ectoparameres wide, completely divided medially and slightly folded inwards. Dorsal cavity short. Ectophallic fold very simple and poorly sclerotized, visible in dorsal and ventral views. Ectophallic apodeme not crossing or surpassing the rami. Endophallus subdivided into three sclerites (wider lateral ones and a narrower in the middle). Ventral valves very well developed, sclerotized, densely covered by spinules.

Adult female. Very similar to male in coloration and structure except as follows. Body larger (total length 6.50 mm) and more robust. Legs slightly longer. Supra-anal plate slightly longer than wide (ratio = 1.1); subgenital plate wider than long (ratio = 1.5), trapezoidal, with posterior margin very shallowly bilobed. Ovipositor shorter than abdomen (ratio = 0.7) and strongly sclerotized; upper margin slightly concave and lower margin almost straight; dorsal and ventral pair of valves separated by a deep notch, all four with tips shallowly curved upwards and armed dorsally and ventrally with minute denticles. See figures 4, 6, 8, 10a and table 1.

Variation. Coloration is essentially identical in all 12 fresh specimens; the few minor inconsistencies are attributable to differences in preservation.

Distribution (fig. 12). As for the genus (see above).

Figure 12. Geographical distribution of the genus Pineronemobius gen. n. and its single species Pineronemobius histrionicus n. comb.: previous records (yellow symbols) and new record (red symbol). Image frame = 500 x 220 km, inset = 20 x 13 km.

Ecological notes. According to the data kindly supplied by its collector (Tomás M. Rodríguez-Cabrera, personal communication), the specimens from Sierra Chiquita were active on a limestone cliff at the base of a hill, inside semideciduous forest.

Remarks. The original description of this species (Zayas, 1976), suffers from considerable omissions that made this redescription necessary; also, the precise locality and composition of the type series was not disclosed.

In September 2013, the present author examined it and obtained all the missing data from their original labels, handwritten by Fernando de Zayas himself: it is composed of one male and two females from Sierra de Casas, and one female from Sierra de Caballos (see herein fig. 2 and Material Examined).

Due to an inadequate preservation for such delicate, weakly sclerotized specimens (technique of double montage: dry, glued to pinned cardboard), their current condition is poor, e.g., all are dehydrated, distorted and some crucial structures are impossible to observe. Thus, the present redescription is based on...
the perfectly preserved, freshly collected specimens from Sierra Chiquita, once their conspecificity with the examined syntypes was corroborated beyond any doubts. According to the Article 76.1 and Recommendation 76A of the Code (ICZN, 1999: 71), the original labels of the syntypes (fig. 2) unambiguously establish that the type locality (not stated in the original description), is collectively "Isla de Pinos: Sierra de Casas and Sierra de Caballos", and it is herein formally fixed as such. This had already been suggested by Yong & Perez-Gelabert (2014: 416), but only implicitly. Last, Yong & Perez-Gelabert (2014: 401, 416) "designated" four syntypes for this species. This was totally unnecessary and a misconception, i.e., Article 73.2 of the International Code of Zoological Nomenclature (ICZN, 1999: 67), clearly rules that syntypes either can be fixed only in the original description, or automatically include all specimens of the type series if a holotype or lectotype has not been designated. The latter is exactly the case for this species, as the above-mentioned statement by Yong & Perez-Gelabert (2014) neither constitutes an inadvertent lectotype designation, i.e., Article 74.7 of the Code (ICZN, 1999: 68) rules that after 1999, such designation to be valid must employ the term "lectotype" or an exact translation, a criterion not fulfilled by Yong & Perez-Gelabert (2014), who only referred to "syntypes".

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