BioOne COMPLETE

Two New Species and New Records of Springtails (Collembola: Entomobryidae, Paronellidae) from Nevis, Lesser Antilles

Authors: Soto-Adames, Felipe N., and Anderson, Evan W.

Source: Florida Entomologist, 100(1) : 32-41

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.100.0107

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

Two new species and new records of springtails (Collembola: Entomobryidae, Paronellidae) from Nevis, Lesser Antilles

Felipe N. Soto-Adames[1,2,3,] and Evan W. Anderson[4]*

Abstract

We present the first records of species of Entomobryidae and Paronellidae (Collembola) from the Caribbean island of Nevis, from leaf litter collections on Mt. Nevis. We report 6 genera and 7 species, of which *Dicranocentrus icelosmarias* **sp. nov.** and *Metasinella radkei* **sp. nov.** are described as new. Evaluation of the dorsal chaetotaxy of *D. icelosmarias* **sp. nov.** suggests a closer affinity of *Dicranocentrus* to *Heteromurus* than to *Orchesella*. We provide a new interpretation of the homology of the dorsal chaetotaxy in *Metasinella* based on analysis of *M. radkei* **sp. nov.** The 6 genera reported here are widely distributed in the Greater Antilles, and the species composition shows a combination of endemics with affinities to other Antillean species (*Dicranocentrus* sp., *Lepidocyrtus* sp., *Metasinella* sp., *Trogolaphysa* sp.), species widespread throughout the northeastern Antilles (*Entomobrya linda* Soto-Adames), and adventive Neotropical species (*Lepidocyrtus nigrosetosus* Folsom, *Seira brasiliana* [Arlé]).

Key Words: West Indies; chaetotaxy; biogeography

Resumen

Presentamos el primer reporte de Entomobryidae y Paronellidae (Collembola) para la isla de Nevis, a partir de colecciones de hojarasca provenientes de Mt. Nevis. Las muestras incluyen 6 géneros y 7 especies de la cuales *Dicranocentrus icelosmarias* **sp. nov**. y *Metasinella radkei* **sp. nov**, son nuevas. Nuestra interpretación de la quetotaxia dorsal de *D. icelosmarias* **sp. nov**. indica que *Dicranocentrus* es más afín a *Heteromurus* que a *Orchesella*. Presentamos una nueva interpretación de la homología de la quetotaxia dorsal en *Metasinella* basada en el estudio de *M. radkei* **sp. nov.** Los 6 géneros reportados aquí están ampliamente distribuidos en las Antillas Mayores, mientras que las especies comprenden una combinación de formas endémicas con afinidades a otras especies antillanas (*Dicranocentrus* sp., *Lepidocyrtus* sp., *Metasinella* sp., *Trogolaphysa* sp.), formas de distribución amplia en el noreste antillano (*Entomobrya linda* Soto-Adames) y formas neotropicales adventicias (*Lepidocyrtus nigrosetosus* Folsom y *Seira brasiliana* [Arlé]).

Palabras Clave: Antillas; quetotaxia; biogeografía

The Collembola fauna of Nevis (Lesser Antilles) is poorly known. Only 2 species, *Weinera ghislaineae* Thibaud and *Folsomina onychiurina* Denis are known for the island (Thibaud 2014). During a recent trip to Nevis, the junior author had the opportunity to collect springtails along the southeastern slope of Mt. Nevis. The samples include 6 genera and 7 species of Entomobryoidea, 4 of which are new to science. However, only 2 forms in the genera *Dicranocentrus* and *Metasinella* (*Sulcuncus*) are represented by sufficient material to allow formal description.

Species circumscription in the genus *Dicranocentrus* is based on the pattern of dorsal head and body macrosetae, which are traditionally represented as simple, diagrammatic distributional maps (e.g., Mari Mutt 1979; Bellini et al. 2013). The nature of these maps often limits assessment of the homology of elements and may hide information that could help to distinguish species with similar numbers of macrosetae. Here we describe, for the first time, the complete dorsal chaetotaxy of a species of *Dicranocentrus* using Szeptycki's (1979) system to provide the foundation for future analyses of chaetotaxy evolution and species diagnosis. We also reassess a previous hypothesis (Soto-Adames 2002) about the homology of setae on the metathorax and 1st abdominal segment of *Metasinella* based on the evaluation of the new species from Nevis. In addition to describing the new species, we discuss the significance of the material recorded here for advancing the understanding of the biogeography of Antillean Collembola.

Materials and Methods

Individuals were cleared in Nesbitt's solution and slide mounted in Mark André II (Mari Mutt 1979). Nomenclature of the dorsal chaetotaxy of head and body follows Soto-Adames (2008) and Szeptycki (1979), respectively.

All material examined was hand collected in leaf litter by the junior author as follows:

Locality 1: 2.4 km WSW Brick Kiln, 17.16374°N, 62.5723°W; 298.4 m elevation; 19.XII.2014.

[1]Department of Entomology, University of Illinois, 606 E. Healey St., Champaign, IL 61820, USA; E-mail: fsoto@illinois.edu (F. N. S.-A.)
[2]Department of Biology, University of Puerto Rico, San Juan, PR 00931, USA
[3]Current address: Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Gainesville, FL 32608, USA
[4]Department of Biological Sciences, Murray State University, Murray, KY 42071-3361, USA; E-mail: eanderson6@murraystate.edu (E. W. A.)
[*]Corresponding author; E-mail: fsoto@illinois.edu (F. N. S.-A.)

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

Locality 2: 2.2 km WSW Brick Kiln, 17.16519°N, 62.57144°W; 277.7 m elevation; 19.XII.2014.

Locality 3: 1.2 km WSW Brick Kiln, 17.1716°N, 62.56453°W; 209.1 m elevation; 19.XII.2014.

Abbreviations used in the descriptions are Ant., Th., and Abd. for antennae, thorax and abdomen, respectively. In all figures, open circles, dots, triangles, "v", and crossed open circles represent macrosetae, meso- or microsetae, fan-shaped ciliate setae, scales, and pseudopores, respectively. In the macrosetae formula, the last 3 numerals, representing the number of elements on the 4th abdominal segment, refer to columns AB + column C + elements external to column T.

All types were deposited in the Florida State Collection of Arthropods

Results

Superfamily Entomobryoidea Womersley

Family Entomobryidae Schäffer

Dicranocentrus icelosmarias **sp. nov.** Soto-Adames & Anderson (Figs. 1–12)

DESCRIPTION

Size. Largest specimen (holotype) 2.6 mm.

Color. Background color greenish white or orange.

Scale Distribution. Antennal segments 1 to 3, head, body, legs to tibiotarsus, collophore scales only on posterior face, and ventral face of furcula.

Head. Antennae missing 2 apical segments. Eyes apparently 6+6, but actual number and relative size of individual eyes not clearly seen; interocular setae 3 or 4, scales absent. Dorsal chaetotaxy as in Fig. 1: row An with 7 to 10 macrosetae; rows A, M, and S with 3, 3, 6 paired macrosetae, respectively, unpaired macrosetae A0 and S0 present; anterior microsetae A5, M3p, Ps2, Ps3, and Ps5 present; macroseta Pa5 present, all other postero-medial macro- and microsetae absent. Prelabral and labral setae smooth; inner labral papilla conic, outer papilla blunt (Fig. 2). Basal seta of outer maxillary palp variable, either sharply tapered (Fig. 3) or parallel-sided (Fig. 4), macroseta-like; sublobal plate with 4 smooth appendages. Labial papilla E with 5 guard seta-like projections, lateral appendage short, not reaching tip of papilla. Labial palps with 5+5 smooth proximal setae. Labial triangle series M with 6 or 7 setae of diverse sizes, 2 innermost setae ciliate, other setae in series M smooth; R smooth and slightly shorter than E; E, L1, L2, and series A smooth. Postlabial setae smooth, consisting of 3+3 setae along cephalic groove, 2+2 companion setae, and 12 lateral setae (Fig. 5).

Body. Dorsal macrosetae on Th. 2 to Abd. 4 as 10, 9/3, 3, 4, 5 + 0 + 7 and distributed according to Figs. 6–8, 10–12. Abd. 4 (Fig. 12) macroseta A5 inserted in field anterior to pseudopore and bothriotrix T4; macroseta B6 anterior to, but displaced towards seta Ae; only 1 macroseta external to column F.

Legs. Trochanteral organ L-shaped, with up to 23 smooth, stiff, acuminate setae. Posterior face of hind tibiotarsus with 2 rows of smooth setae. Tenet hair smooth and spatulate on all legs (Fig. 9). Unguis with 3 small inner teeth (Fig. 9), basal pair aligned and subequal, slightly longer than unpaired tooth. Unguiculus lanceolate, smooth.

Furcula. Manubrium dorsally with 4+4 erect, stiff, smooth setae; 2+2 similar setae present on base of dens. Dens with 2 inner rows of short spines, one row with ≈ 9 spines, other row with 11 spines. Mucro bidentate, apical tooth longer than basal tooth; basal spine smooth, reaching basal tooth.

TYPE MATERIAL

Holotype: Nevis, 2.4 km WSW Brick Kiln, 17.16374°N, 62.5723°W; 298.4 m elevation, leaf litter; 19.XII.2014; slide mounted. Paratypes: same information as holotype, 1 on slide and 9 in alcohol; 1.2 km WSW Brick Kiln, 17.16519°N, 62.57144°W; 277.7 m elevation, leaf litter; 19.XII.2014, 1 on slide and 1 in alcohol.

DISTRIBUTION AND HABITAT

Nevis and Panama (see Remarks below), leaf litter in moist tropical forest.

REMARKS

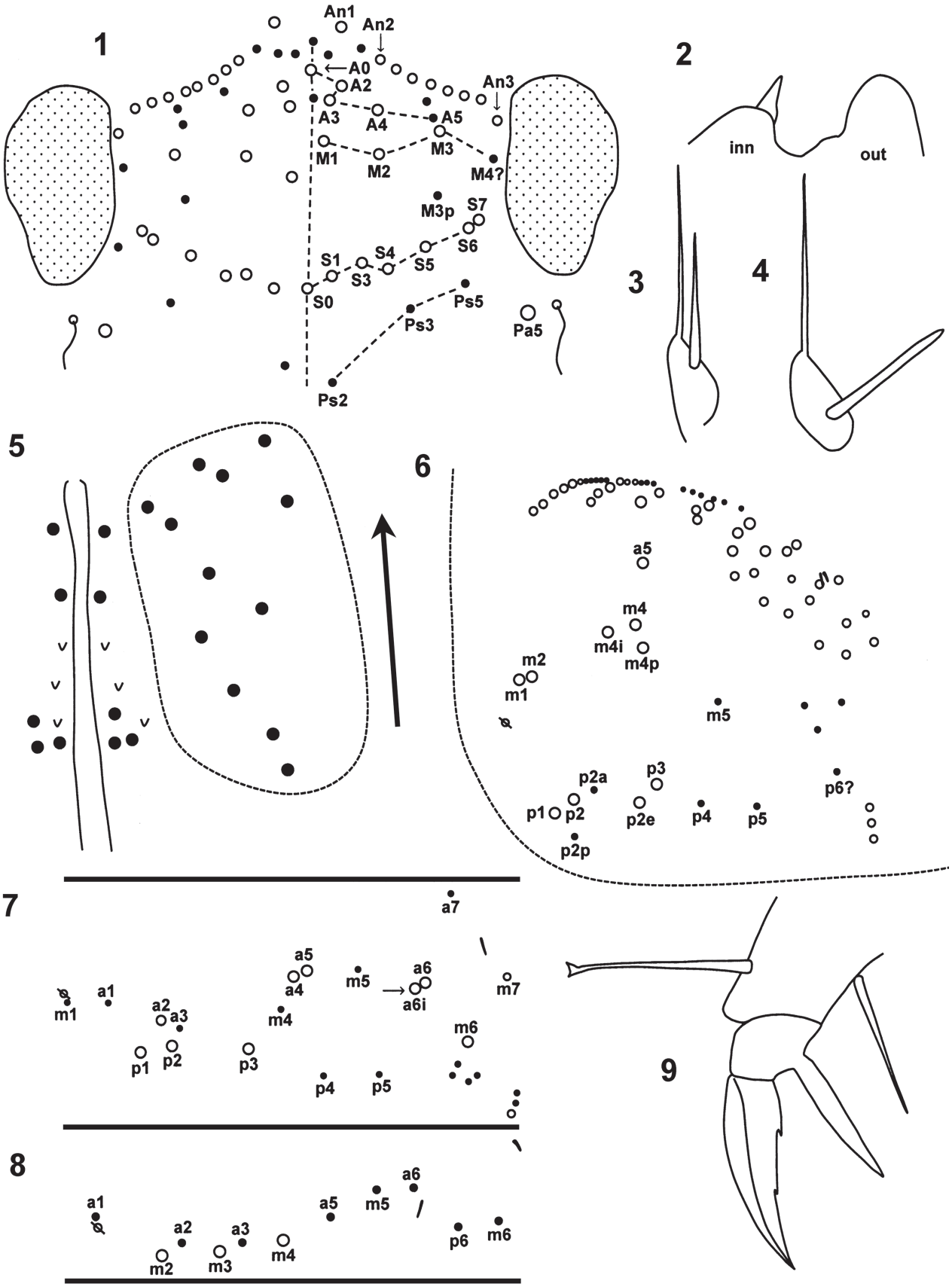
Dicranocentrus icelosmarias **sp. nov.** is the only member of the *D. marias* group with 3 inner macrosetae on Th. 3 that also carries lateral macroseta a6i on Th. 3 (arrow in Fig. 7) and 5 inner macrosetae on Abd. 4. The new species is part of the *D. marias* species complex (see below) and differs from *D. marias* Wray from Puerto Rico in having macroseta a6i on Th. 3 (microsetae in *D. marias*) and in having 5 macrosetae on Abd. 4 (4 in *D. marias*, Fig. 13). We examined 17 individuals of *D. marias* collected at various locations throughout Puerto Rico, including populations from Isabela (Guajataca), Mayaguez (Miradero), Villalba (Toro Negro), Orocovis, and Rio Grande (el Yunque), and all of them lack macroseta a6i on Th. 2 and all have 4 inner macrosetae on Abd. 4 The new species also differs from *D. marias* in that head element A5 is always a microseta, but in small adults of *D. marias* A5 is also a microseta.

In his revision of the genus *Dicranocentrus*, Mari Mutt (1979) reported 4 forms of *D. marias*, each with a unique combination of macrosetae on Abd. 1 and Abd. 4. Populations of *D. marias* from Mexico have 2 macrosetae on Abd. 1 and 4 or 5 on Abd. 4; individuals from Puerto Rico (species type locality) and Panama carry 3 macrosetae on Abd. 1, but whereas the Puerto Rican form has 4 macrosetae on Abd. 4, the individuals from Panama carry 5 macrosetae. Given the geographic isolation of each variant and the apparent stability in the number of macrosetae, it is likely that all these forms represent distinct species. The new species from Nevis is identical in all described details to *D. marias* from Panama, but the condition of macroseta a6i on Th. 3 remains unreported for the Panamanian form. We are provisionally assigning the populations from Panama to *D. icelosmarias* **sp. nov**., but a final decision on their identity awaits analysis of fresh material.

As indicated in the introduction, the idiochaetotaxy (i.e., all differentiated elements of the chaetotaxy, including microsetae, macrosetae, and sensilla) of *Dicranocentrus* is represented as diagrammatic macrosetae maps that lack the necessary information to evaluate the homology of individual elements. Figures 1, 6–8, and 10–15 show a first attempt at describing the dorsal idiochaetotaxy within the framework developed by Soto-Adames (2008) and Szeptycki (1979). Comparison of the idiochaetotaxy of *D. icelosmarias* **sp. nov.** with that of *Orchesella flavescens* (Bourlet), *Heteromurus nitidus* (Templeton), *Pseudosinella alba* (Packard), *Cyphoderus albinus* Nicolet, and *Seira dowlingi* (Wray) (Szeptycki 1979; Soto-Adames 2008) indicate that:

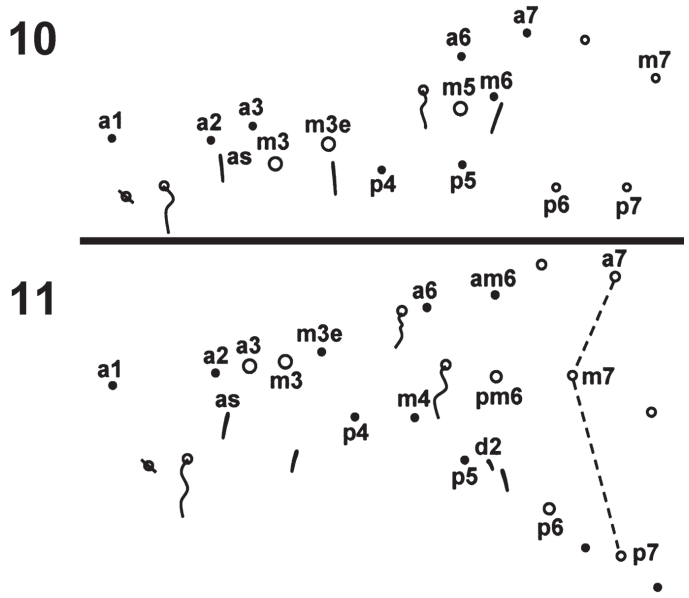
A. The anterior chaetotaxy of the head (i.e., rows A, M, S, and Ps) is almost complete, only element M0 is absent. The nomenclature proposed for elements in row S (Fig. 1) is provisional, based on the alignment of S3 and S5 with Ps3 and Ps5. The posterior section of the head of all mounted specimens is densely covered by scales and with the exception of element Pa5 appears to lack all setae posterior to row Ps. The *D. marias* species group is characterized by the absence of posterior head macrosetae and it is possible that even the inner microsetae in rows Pa–Pp have been lost.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



Figs. 1–9. *Dicranocentrus icelosmarias* **sp. nov.** Open circles, dots, and "v" represent macrosetae, microsetae, and scales, respectively. (1) Dorsal head chaetotaxy. (2) Papilla on distal margin of labrum, inn and out refer to inner and outer papilla, respectively. (3) Basal setae of maxillary palp in holotype. (4) Maxillary palp in paratype. (5) Distribution of postlabial setae, arrow points anteriorly. (6) Mesothorax. (7) Metathorax. (8) First abdominal segment. (9) Hind leg claw complex, basal paired teeth are subequal and aligned, and only 1 is visible in this perspective.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



Figs. 10–11. *Dicranocentrus icelosmarias* **sp. nov.** dorsal chaetotaxy. (10) Second abdominal segment. (11) Third abdominal segment.

B. The idiochaetotaxy of the mesothorax (Fig. 6) includes the primary elements retained in most scaled species, except, perhaps, m1. The identity of the elements closest to the pseudopore is unclear; they may represent m1 and m2, or a duplicated m2 (i.e., m2 and m2i). The simplest interpretation is to consider these setae as m1 and m2. However, the relative position of the elements to each other and to the pseudopore suggest they represent m2 and m2i; when present, m1 is inserted well anterior to m2, whereas in *D. icelosmarias* **sp. nov.**, the 2 macrosetae are very close to each other, forming a row. Following the simple assumptions proposed by Szeptycki (1979) for identifying the homology of individual elements, we propose the inner macroseta is m1 (Fig. 6). Nevertheless, this interpretation will need to be confirmed with evidence from studies of postembryonic development.

C. The metathorax (Fig. 7) retains all the primary elements, although the identity of p6 is unclear and it is not identified in Fig. 7. Most macrosetae can be identified with primary elements and only macroseta a6i is the result of a duplication.

D. The 1st abdominal segment (Fig. 8) retains all primary elements except p5. Seta p5 is also lost in adult *H. nitidus* and *C. albinus*.

E. The idiochaetotaxy of the 2nd abdominal segment (Fig. 10) is almost identical to that in *H. nitidus*, including the absence of element m4. Seta m4 is also absent in *Seira* and *Cyphoderus*, but whereas in *Heteromurus* the seta is absent in the 1st instar, in *Seira* and *Cyphoderus* the loss is secondary.

F. The 3rd abdominal segment (Fig. 11) retains all primary elements and is identical in organization to that of *H. nitidus*.

G. The number of inner elements on the 4th abdominal segment is reduced and their homology is difficult to ascertain. Figures 12 and 13 show putative homologies in *D. icelosmarias* **sp. nov.** and *D. marias*, respectively, following the pattern proposed by Szeptycki (1979). Homologies in those figures are based on the chaetotaxy of *O. flavescens* because in *H. nitidus* the number of elements is even more reduced than in *Dicranocentrus* and homologies are also uncertain. Figures 14–15 show alternative homology propositions for *D. marias*: Fig. 14 is consistent with the unique condition in *H. nitidus* in which only 2 columns are retained, whereas Fig. 15 is consistent with all other scaled entomobryoids so far described in retaining 3 columns. The lateral chaetotaxy of this segment (Figs. 12, 13) is well conserved and the homology of the 9 main elements (D1–D3, E1–E3, and F1–F3) present in the 1st instar of almost all entomobryoids is evident.

In summary, the chaetotaxy of *Dicranocentrus* shows clear affinities with that of *Heteromurus*. This affinity is most evident on the 2nd and 3rd abdominal segments where *Dicranocentrus* and *Heteromurus* share the absence of m4 (Abd. 2) and presence of m3e (Abd. 3). The homology of several elements remains uncertain: the identity of lateral elements in series S on the head; the element near the pseudopore on the mesothorax; whether the loss of element p5 on Abd. 1 is primary or secondary; and more crucially, the identity of inner elements on Abd. 4. Resolution of these uncertainties will require analysis of 1st instar chaetotaxy.

ETYMOLOGY

The epithet means 'similar to marias', referring to the similarity with *D. marias*.

Lepidocyrtus nigrosetosus Folsom

DISTRIBUTION AND HABITAT

Nevis, Puerto Rico, US Virgin Islands (St. Thomas), Jamaica, Galapagos, Colombia, Brazil (Mari Mutt & Bellinger 1990; Soto-Adames 2002; Bellini & Zeppelini 2009; Katz et al. 2016). This species is common in leaf litter in disturbed habitats, including urban forest patches, and marginal wooded areas.

MATERIAL EXAMINED

Locality 3: 1 on slide.

Lepidocyrtus sp.

DISTRIBUTION AND HABITAT

Nevis. Leaf litter in transition zone between disturbed margin of moist woods and grassy roadside.

REMARKS

The single individual collected clearly represents a new species, but we defer formal description until additional material becomes available.

MATERIAL EXAMINED

Locality 3: 1 on slide.

Metasinella (*Sulcuncus*) *radkei* **sp. nov.** Soto-Adames & Anderson (Figs. 16–30)

DESCRIPTION

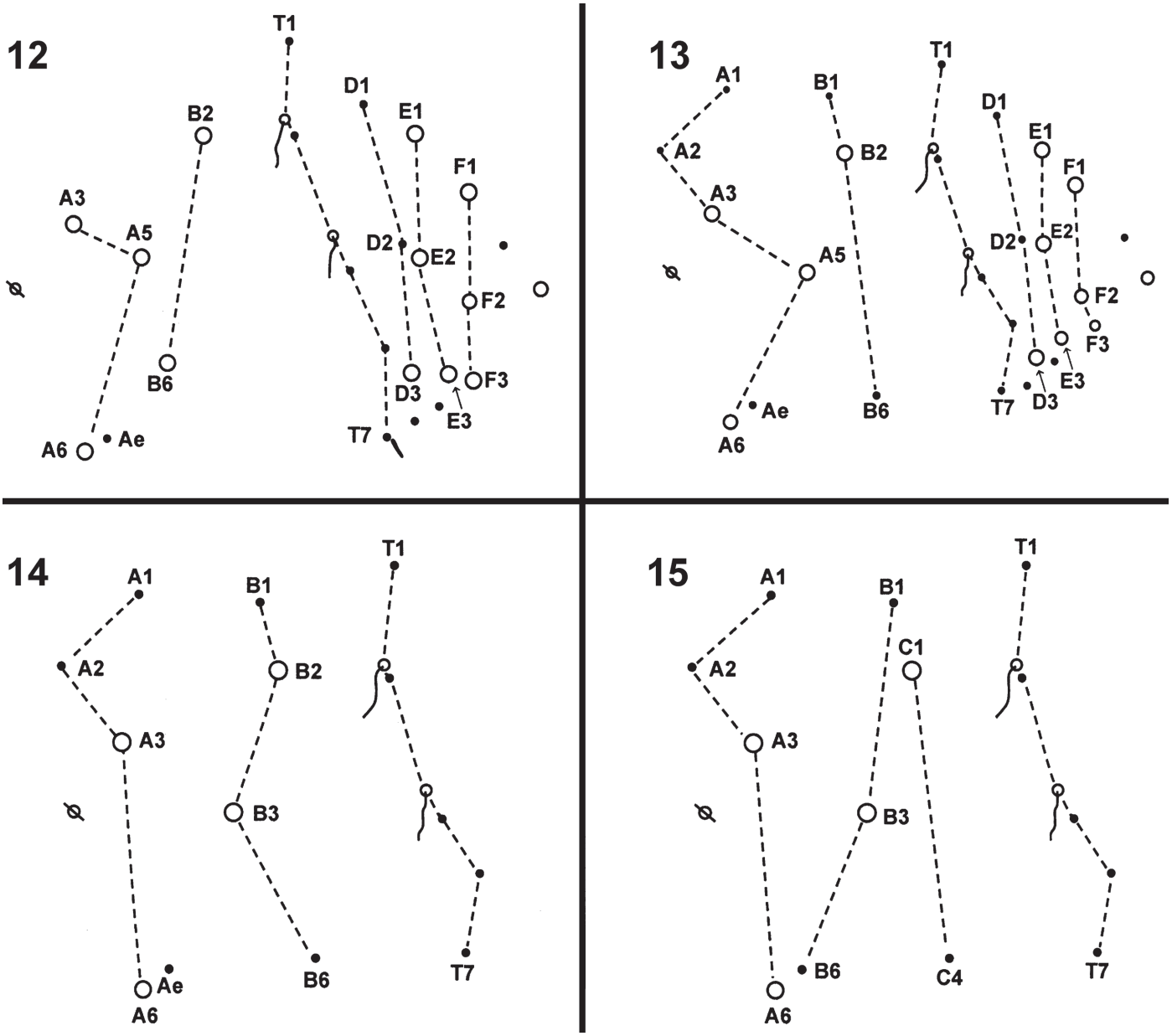
Size. Largest specimen 1.2 mm; holotype 1.1 mm.

Color. Light blue, evenly distributed through head and body; most intense on eye patch.

Scales distribution. Head, body, and ventral face of furcula.

Head. Antennae 0.34 times as long as head and body. Ant. 4 without apical bulb; subapical sense organ with capitate sensillum and apically truncate guard seta. Eyes 2+2. Head dorsal chaetotaxy as in Fig. 16: row An with 8 macrosetae; inner margin of eye patch with 1 macroseta; 1 unpaired (A0) and 2 paired (A2, A3) anterior macrosetae; 1 paired posterior macroseta (Pa5) present; row S with 1 unpaired (S0) and 4 paired microsetae (S2, S3, S4, S5); microsetae Ps2, Ps3, and Ps5 present. Prelabral setae ciliated; proximal row of labral setae sparsely ciliated, setae on medial and distal rows smooth;

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



Figs. 12–15. Dorsal chaetotaxy of 4th abdominal segment. (12) *Dicranocentrus icelosmarias* **sp. nov.** 13–15. *Dicranocentrus marias*, (13) Nomenclature following Szpetycki (1979). (14–15) Alternative interpretations of homology of inner elements.

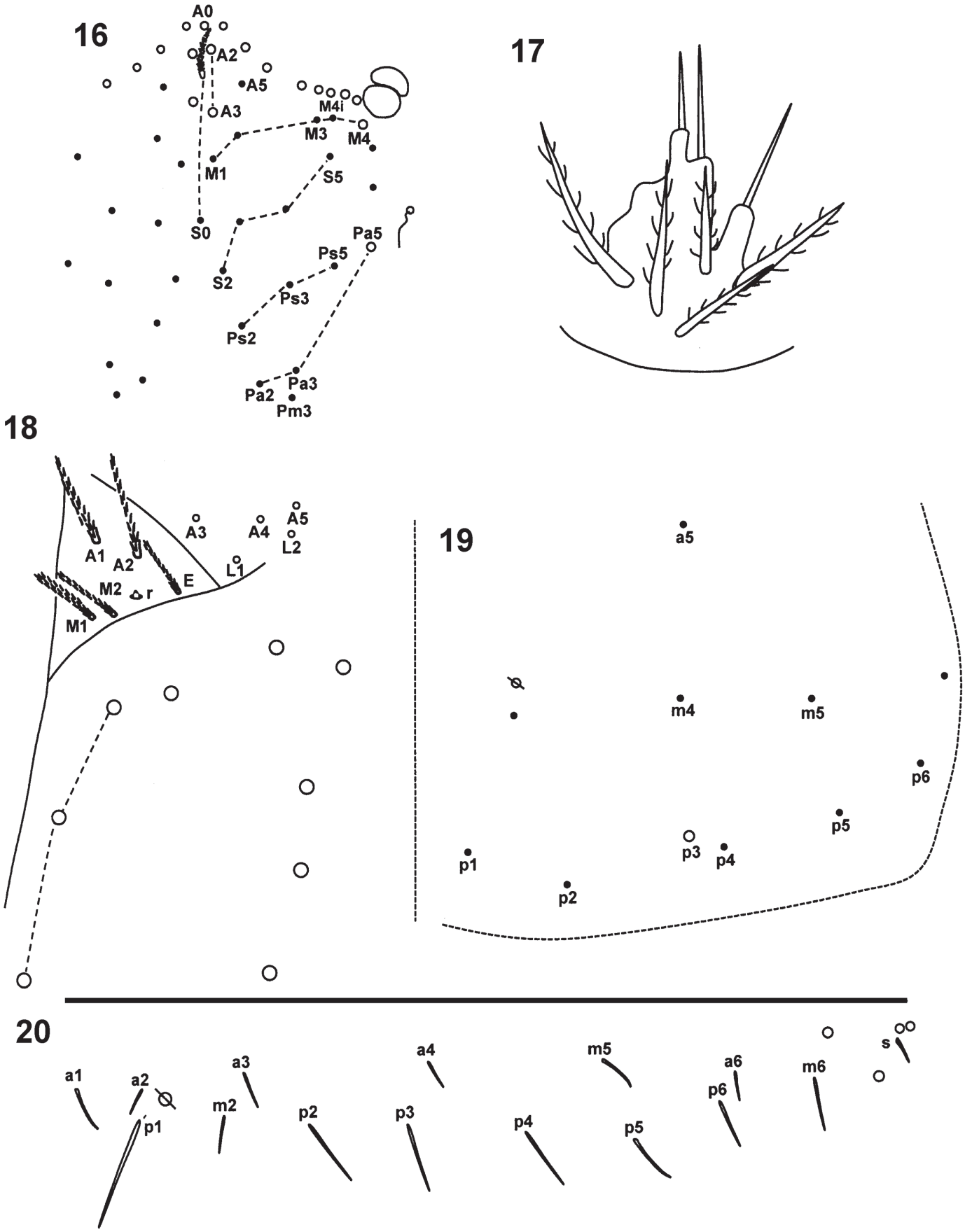
distal margin of labrum smooth. Pleural setae ciliated, proximal seta longer than distal. Maxillary palp with basal seta coarsely ciliated, apical appendage smooth and as long as basal seta; sublobal plate with 3 smooth seta-like appendages. Labial papilla E with 3 guard appendages; lateral appendage anteriorly curved, blunt and surpassing tip of papilla. Proximal labial setae 5, all serrated (Fig. 17). Labial triangle (Fig. 18) as M1M2rEL1L2A1-5: r a conic microseta, all other setae coarsely ciliated; L1 shorter than L2. All postlabial setae ciliated, with 3+3 setae along cephalic groove (Fig. 18); field of columns C-O with 6–10 setae.

Body. Body macrosetae formula 10/0232+0+4; regular sensilla (labeled "s" in figures) formula for Th. 2 to Abd. 3 11/011; micro sensilla (labeled "ms" in figures) formula 10/101. Mesothorax (Fig. 19) with macroseta p3; anterolateral regular and micro sensilla present; all setae smooth. Metathorax as in Fig. 20, inner posterior setae longer than those on anterior and medial rows: p1 longest, a2 shortest; seta m4 absent, latero-anterior regular sensillum present. First abdominal segment (Fig. 21) with 8 setae and 1 latero-anterior micro sensillum; setae a3, a5, and a6 absent. Chaetotaxy of Abd. 2–3 as in Figs. 22–23; relative insertion of micro sensillum d2 on Abd. 3 variable. Fourth abdominal segment with 2 inner and 5 lateral macrosetae (Fig. 24); posterior setae absent. Fifth abdominal segment with 13 macrosetae, and 3 regular sensilla distributed as in Fig. 25.

Legs. Trochanteral organ V-shaped, with up to 13 setae (Fig. 26). Femoral organ with 9–12 short blunt ciliate setae (Fig. 26). Tenet hair smooth, weakly spatulate (Fig. 27). Unguis with 3 inner teeth (Fig. 27–28): basal teeth asymmetric, one longer; unpaired tooth as long as or longer than smaller of basal teeth. Dorsal ungual tooth minute, inserted at base of ungues; lateral teeth inconspicuous, ending on basal quarter. Unguiculus lanceolate, with large posterior tooth (Fig. 27).

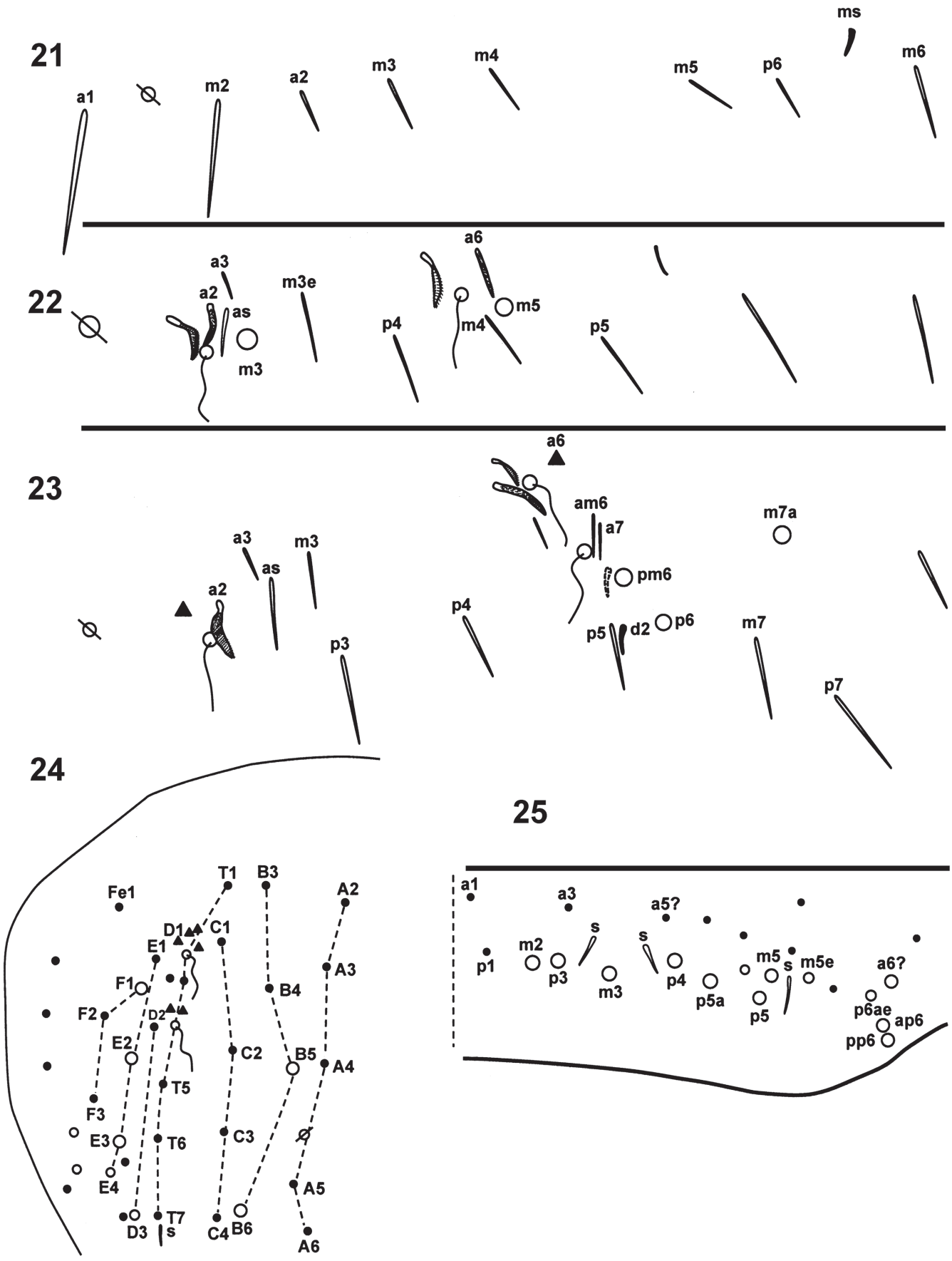
Collophore. Posterior face with 3 rows of finely ciliate or denticulate setae, distal row with 3+3 setae (Fig. 29).

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



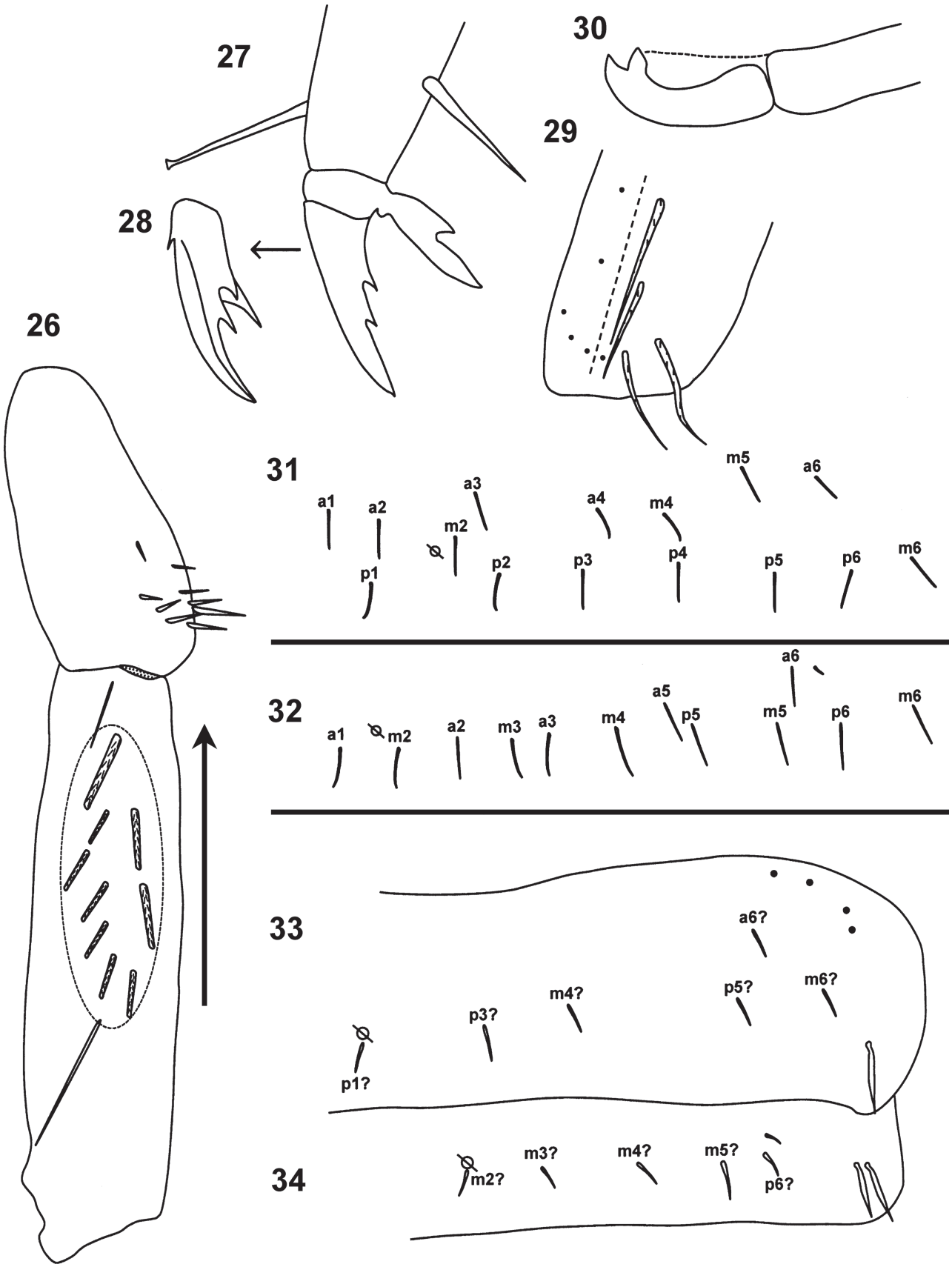
Figs. 16–20. *Metasinella radkei* **sp. nov.** (16) Dorsal chaetotaxy of head. (17) Proximal setae of labial palp. (18) Labial and postlabial setae, all elements are coarsely ciliate. (19) Mesothorax. (20) Metathorax.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



Figs. 21–25. *Metasinella radkei* **sp. nov.** Abdominal chaetotaxy on (21) 1st segment; (22) 2nd segment; (23) 3rd segment, hatched line shows alternative insertion of d2; (24) 4th segment; (25) 5th segment.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



Figs. 26–34. (26–30) *Metasinella radkei* **sp. nov.** (26) Inner face of hind leg trochanter and femur showing trochanteral and femoral (enclosed by hatched line) organs, arrow points basally. (27) Hind claw complex. (28) Hind unguis in holotype. (29) Posterior face of collophore. (30) Mucro. (31–32) *Lepidocyrtus nigrosetosus*. (31) Metathorax. (32) First abdominal segment. (33–34) *Pseudosinella violeta*. (33) Metathorax. (34) First abdominal segment.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

Furcula. Mucro bidentate, with basal membrane, without basal spine (Fig. 30); teeth subequal.

TYPE MATERIAL

Holotype, male: Nevis, 2.4 km WSW Brick Kiln, 17.16374°N, 62.5723°W; 298.4 m elevation, leaf litter; 19.XII.2014; slide mounted. Paratypes, 1 male and 2 females, same as holotype, on slides, 5 in alcohol; 1.2 km WSW Brick Kiln, 17.16519°N, 62.57144°W; 277.7 m elevation, leaf litter; 19.XII.2014; 3 in alcohol.

DISTRIBUTION AND HABITAT

Endemic to Nevis. Leaf litter in moist tropical forest.

REMARKS

Following Mari Mutt & Gruia (1983), the presence of a femoral organ places the new species in the subgenus *Sulcuncus*. *Metasinella* (*Sulcuncus*) *radkei* **sp. nov.** is the only member of the genus with bidentate mucro, 2 eyes, and 3 paired (A2, A3, Pa5) dorsal head macrosetae; all other described *Metasinella* have 5 (A2, A3, M2, S3, Pa5) or 6 (A2, A3, A5, M2, S3, Pa5) paired macrosetae. The new species keys out to *M.* (*S.*) *millsi* Mari Mutt & Gruia in Mari Mutt & Gruia (1983), but *M. millsi* carries 5 paired dorsal head macrosetae whereas *M. radkei* **sp. nov.** has 3 macrosetae; in addition, *M. millsi* has 4 inner ungual teeth and the dorsal tooth is inserted at the level of the basal inner teeth, whereas the new species carries 3 inner teeth and the dorsal tooth is inserted near the base of the unguis.

The genus *Metasinella* comprises 2 well characterized subgenera (Mari Mutt & Gruia 1983): *Metasinella* s. str. with long antennae, 2 mesothoracic macrosetae, trochanteral organ with long flexible setae, dental spines, and lacking femoral organ; and *Sulcuncus* with short antennae, 1 mesothoracic macroseta, trochanteral organ with short, stiff, spine-like setae, femoral organ present, and without dental spines. The separation of the genus *Metasinella* into 2 subgenera is taxonomically sound, as each taxon is diagnosable by non-overlapping discreet characters, but they clearly are part of the same lineage. Most species in the subgenus *Sulcuncus* are known only from surface collections and show few adaptations to subterranean life. Some of the distinguishing characters of *M.* (*M.*) *acrobates* Denis, on the other hand, likely represent adaptations to living in caves. For example, evolution of large body size and long antennae is common in troglomorphic species (Christiansen 1961), and the dental spines may provide traction while jumping in wet, slippery surfaces. Similar adaptations are present in *Pseudosinella spinosa* (Delamare-Debouteville), the largest *Pseudosinella* in North American, and one of the most morphologically adapted cave forms (Delamare-Debouteville 1949). Thus, it seems appropriate to retain *Sulcuncus* as a subgenus of *Metasinella*.

As pointed out by Soto-Adames (2002), the dorsal chaetotaxy of the metathorax and 1st abdominal segments in *Metasinella* is reduced with respect to most *Lepidocyrtus* and *Pseudosinella* (cf. Figs. 20–21 and 31–32). The original interpretation of the metathoracic chaetotaxy by Soto-Adames (2002) indicated the absence of seta m2, a seta considered by Szeptycki (1979) to be diagnostic of Lepidocyrtini. The interpretation of Soto-Adames (2002) is here amended (Fig. 20) based on the clear observation of the complete chaetotaxy of the segment; the small size of the inner element closest to the pseudopore suggests it is m2, whereas the long element external to m2 is interpreted as p2. Provided this new interpretation, the only element missing in the metathorax of *Metasinella* is m4. The nomenclature of Abd. 1 (Fig. 21) is also amended with respect to that proposed by Soto-Adames (2002). Based on their relative size and insertion, the elements external to a2 are most likely homologous to m3 and m4. The new species also carries element m5, which is absent in the species from the Virgin Islands.

Minor reductions in idiochaetotaxy are relatively common in Lepidocyrtini. Some species of *Lepidocyrtus* lack Abd. 1 seta a6 (e.g., *L. lanuginosus* [Gmelin]), whereas in *P. hirsuta* (Delamare-Debouteville) and *L. nigrosetosus* species groups Abd. 2 lacks seta m3e (Christiansen & Bellinger 1998; Bernard et al. 2015). A more extensive reduction in the chaetotaxy of Th. 3 and Abd. 1 is seen in *P. violeta* Mari Mutt (Figs. 33–34). *Pseudosinella violeta* is also an Antillean species and it might represent part of the lineage from which *Metasinella* was derived.

ETYMOLOGY

The epithet honors Garett Radke, who provided accommodations in Nevis that made the collecting trip possible.

Seira brasiliana (Arlé)

DISTRIBUTION AND HABITAT

This species is found in disturbed, grassy road-sides as well as secondary forests in Brazil, Bolivia, Puerto Rico, the Virgin Islands (Mari Mutt & Bellinger 1990; Mari Mutt et al. 1997–2016), the Dominican Republic, and the state of Florida (the last 2 localities are unpublished records).

MATERIAL EXAMINED

Locality 3: 1 in alcohol.

Entomobrya linda Soto-Adames

DISTRIBUTION AND HABITAT

This species is known from Puerto Rico and the US Virgin Islands where it is frequent in leaf litter in secondary forests (Soto-Adames 2002).

MATERIAL EXAMINED

Locality 3: 1 on slide, 6 in alcohol.

Family Paronellidae Börner

Trogolaphysa sp.

MATERIAL EXAMINED

Locality 1: 1 on slide, 2 in alcohol. Locality 2: 2 in alcohol.

REMARKS

This appears to be a new species, closely related to *T. sauron* Soto-Adames, Jordana & Baquero but all individuals are small juveniles.

Discussion

Knowledge about the distribution of Entomobryidae and Paronellidae genera in the Lesser Antilles is incomplete. The fauna of the Greater Antilles includes 14 genera of Entomobryoidea (Thibaud 2014), but only *Salina thibaudi* Soto-Adames from Guadeloupe and *T. sauron* from Martinique (Soto-Adames 2010; Soto-Adames et al. 2014) have been recorded from the Lesser Antilles. The present study adds 5 genera to the fauna of the Lesser Antilles.

The 6 genera reported here are widespread on the American continent and their presence in Nevis is not surprising. *Lepidocyrtus* and *Entomobrya* are cosmopolitan, commonly found throughout the American mainland; *Dicranocentrus* has a pantropical distribution; *Seira* is a tropical and subtropical genus almost exclusively limited to land masses of Gondwanan origin; *Trogolaphysa* also has an almost exclusive Gondwanan distribution, but it is strictly tropical; whereas the genus *Metasinella* is the closest to an endemic Antillean genus, as

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

all but one species (*M. falcifera* [Mills] from Mexico) are known only from the Antilles. The absence in Nevis of some genera common in the Greater Antilles (e.g., *Heteromurtrella*, *Pseudosinella*, *Campylothorax*, *Cyphoderus*, and *Salina*) may be an artifact of the small number of samples collected. It is likely that more intensive sampling in the forest around Mt. Nevis will produce examples of at least *Pseudosinella* and *Cyphoderus*, whereas sampling on grasses will likely produce specimens of *Salina*.

The species reported here were collected in 2 distinct habitats: *Dicranocentrus*, *Metasinella*, and *Trogolaphysa* are typically associated with closed forest habitats in the large islands and in Nevis were collected in 2 wooded areas around Mt. Nevis; *Seira*, *Lepidocyrtus* and *Entomobrya* are often associated with disturbed habitats on the large islands and in Nevis were collected in a transition zone at the margin of the woods and a grassy roadside. *Seira brasiliana* and *L. nigrosetosus* appear to be adventive species, as they are widespread throughout the larger islands, some regions of the Neotropical mainland (Mari Mutt 1986a,b; Mari Mutt & Bellinger 1990; Christiansen & Bellinger 2000; Bellini & Zeppelini 2009), and the state of Florida (F. Soto-Adames unpublished observation of *S. brasiliana*). *Entomobrya linda* appears to be endemic to the Antilles, but its presence in Nevis, Puerto Rico, and the Virgin Islands (Soto-Adames 2002) suggests the species is widespread in the northeastern islands. The new species from Nevis are members of the 4 most speciose Entomobryoidea genera in the large islands: *Lepidocyrtus*, with 20 described species, is the largest genus of Entomobryoidea in the Greater Antilles, followed by the 11 species of *Trogolaphysa*, and *Metasinella* and *Dicranocentrus* each with 8 species (Thibaud 2014). Extrapolating from the preliminary pattern of genera and species distribution in Nevis, we can expect each island bank in the Lesser Antilles to harbor at least 1 new species in each of the 4 speciose genera.

Acknowledgments

We would like to thank Mr. Garett Radke for providing facilities that allowed the junior author to collect the material reported here. We acknowledge the constructive comments made by 2 reviewers; their suggestions helped considerably to improve the present contribution. We thank Andrew Suarez, for providing working space at the University of Illinois that allowed us to complete this study. Publication of this work was made possible by a contribution from the Department of Biology of the University of Puerto Rico, San Juan.

References Cited

Bellini BC, Zeppelini D. 2009. Registros da fauna de Collembola (Arthropoda, Hexapoda) no Estado da Paraíba, Brasil. Revista Brasileira de Entomologia 53: 386–390.

Bellini BC, De Morais JW, Oliveira FGL. 2013. A new species of *Dicranocentrus* Schött (Collembola, Entomobryidae, Orchesellinae) from Brazilian Amazonia. Zootaxa 3709: 296–300.

Bernard EC, Soto-Adames FN, Wynne JJ. 2015. Collembola of Rapa Nui (Easter Island) with description of five endemic cave-restricted species. Zootaxa 3949: 239–267.

Christiansen K. 1961. Convergence and parallelism in cave Entomobryidae. Evolution 15: 288–301.

Christiansen K, Bellinger P. 1998. The Collembola of North America North of the Rio Grande: A Taxonomic Analysis. Second Edition. Grinnell College, Grinnell, Iowa.

Christiansen K, Bellinger P. 2000. A survey of the genus *Seira* (Hexapoda: Collembola: Entomobryidae) in the Americas. Caribbean Journal of Science 36: 39–75.

Delamare-Debouteville C. 1949. Collemboles cavernicoles du Tennessee et de l'Alabama. Notes biospéologiques 4: 117–124.

Katz AD, Taylor SJ, Soto-Adames FN, Addison A, Hoese GB, Sutton MR, Toulkeridis T. 2016. New records and new species of springtails (Collembola: Entomobryidae, Paronellidae) from lava tubes of the Galápagos Islands (Ecuador). Subterranean Biology 17: 77–120.

Mari Mutt JA. 1979. A revision of the genus *Dicranocentrus* Schött (Insecta: Collembola: Entomobryidae). Agricultural Experiment Station University of Puerto Rico Bulletin 259: 1–79.

Mari Mutt JA. 1986a. Puerto Rican species of *Lepidocyrtus* and *Pseudosinella* (Collembola: Entomobryidae). Caribbean Journal of Science 22: 1–48.

Mari Mutt JA. 1986b. Puerto Rican species of *Seira* (Collembola: Entomobryidae). Caribbean Journal of Science 22: 145–158.

Mari Mutt JA, Bellinger P. 1990. A catalog of the Neotropical Collembola. Flora & Fauna Handbook 5: 1–237.

Mari Mutt JA, Gruia MM. 1983. A revision of the genus *Metasinella* Denis (Collembola: Entomobryidae). Journal of Agriculture of the University of Puerto Rico 67: 121–147.

Mari Mutt JA, Bellinger P, Janssens F. 1997–2016. Checklist of the Collembola: Supplement to the Catalog of the Neotropical Collembola, May 1996 to 2016. http://www.collembola.org/publicat/neotrcat.htm (last accessed 12 Sep 2016).

Soto-Adames FN. 2002. Four new species and new records of springtails (Hexapoda: Collembola) from the US Virgin Islands and Puerto Rico, with notes on the chaetotaxy of *Metasinella* and *Seira*. Caribbean Journal of Science 38: 77–105.

Soto-Adames FN. 2008. Postembryonic development of the dorsal chaetotaxy in *Seira dowlingi* (Collembola, Entomobryidae); with an analysis of the diagnostic and phylogenetic significance of primary chaetotaxy in *Seira*. Zootaxa 1683: 1–31.

Soto-Adames FN. 2010. Review of the New World species of *Salina* (Collembola: Paronellidae) with bidentate mucro, including a key to all New World members of *Salina*. Zootaxa 2333: 26–40.

Soto-Adames FN, Jordana R, Baquero E. 2014. Comparative analysis of the dorsal chaetotaxy of *Troglopedetes*, *Trogolaphysa* and *Campylothorax* supports the synonymization of tribes Paronellini and Troglopedetini (Collembola: Paronellidae). Journal of Insect Science 14: 278–293.

Szeptycki A. 1979. Chaetotaxy of the Entomobryidae and its phylogenetical significance. Morpho-systematic studies of Collembola, IV. Polska Akademia Nauk, Zaklad Zoologii Systematycznej Doswiadczalnej, 219 p.

Thibaud JM. 2014. Essai sur l'état des connaissances de la diversité des Collemboles de l'Archipiel des Antilles. Russian Entomological Journal 23: 227–248.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use