

# The Genera of Collembola (Insecta) in Puerto Rico: Keys, Diagnoses, and General Comments<sup>1</sup>

*José A. Mari Mutt*<sup>2</sup>

## ABSTRACT

Keys are presented to the families and genera of Collembola of Puerto Rico. Generic diagnoses also are presented. A previously unrecorded family and genera are added to the known Collembola of Puerto Rico.

## INTRODUCTION

The present work was the result of one year of collecting throughout Puerto Rico. Most collecting was by the author, but others contributed material. The principal collection was by Berlese funnels. Hand collecting provided additional material.

All Puerto Rican genera of Collembola are not represented herein. Detailed study of ecological niches such as the epigeon, caves, littoral zones, etc. doubtlessly will furnish additional records to those included here.

The keys and diagnoses presented have been designed for the nonspecialist. These keys are not as simple to use as the pictorial keys by Scott (40), but the illustrations and characters used will make them useful to anyone with a general knowledge of entomology and some experience in morphology of Collembola.

The classical five-family classification was adopted for the sake of simplicity. More elaborate systems, such as that proposed by Salmon (34), was not justified by the nature and coverage of the present work.

The synonymy presented in the diagnoses corresponds to the first and last synonyms that have appeared for the given genus. For complete synonymy until 1964, refer to Salmon (34). The author has detailed synonymy which appeared since 1964.

<sup>1</sup> Manuscript submitted to Editorial Board September 30, 1974.

<sup>2</sup> Graduate Student, Department of Entomology, University of Illinois, Urbana-Champaign 61801. The author expresses appreciation to Dr. David L. Wray, Department of Entomology, North Carolina State University, Raleigh, N.C.; Dr. Kenneth Christiansen, Department of Biology, Grinnell College, Grinnell, Iowa; and Dr. Peter F. Bellinger, Department of Biology, California State University, Northridge, California, for checking the determinations; to Silverio Medina Gaud and Dr. Jenaro Maldonado Capriles, for the additional insect material they contributed, to Dr. Maldonado for suggesting the theme and for his encouragement throughout investigation conducted under his guidance in the Department of Biology, University of Puerto Rico, Mayagüez, Puerto Rico.

When several genera share many characteristics in common, a fairly detailed diagnostic description for one of the genera has been made. The diagnoses for the related genera include only differences with respect to the first.

Ant. 1, and Abd. 1, etc., means first, second, etc., antennal or abdominal segment, respectively.

#### REVIEW OF LITERATURE

In 1948 Wolcott (50) cited seven genera of Collembola for Puerto Rico: *Lepidocyrtus*, *Entomobrya*, *Cyphoderus*, *Salina*, *Campylothorax*, *Xenylla*, and *Hypogastrura* (*Achorutes* of Wolcott). Wray (51) added nine additional genera: *Pseudosinella*, *Dicranocentrus*, *Dicranocentrophia*, *Dicranocentruga*, *Portachorutes*, *Brachystomella*, *Sphyrotheca*, *Folsomia*, and *Isotomiella*. These papers, together with that of Ramos (30) in which *Lepidocyrtinus* is recorded from Mona Island, and Wray's (52) record of *Drepanocyrtus*, constitute all that had been published on the Collembola of Puerto Rico. Eleven new records of genera are added herein to the collembolan fauna of Puerto Rico. These are marked with an asterisk (\*) in the keys.

In 1953 Wray (51) cited *Isotoma minor* from Puerto Rico. This species was transferred to the genus *Isotomiella*. Since no species of *Isotoma* was collected in Puerto Rico, the record was eliminated.

For preparation of the keys some decisions must be explained to avoid misunderstanding.

Wray (51) divided *Dicranocentroides* Imms into two subgenera: *Dicranocentroides* s. str. and *Dicranocentrophia*. Salmon (34) raised the latter subgenus to generic status. Wray (53) agreed with Salmon, therefore, Salmon's change was adopted.

*Dicranocentrus* Schott was divided by Wray (51) into the subgenera *Dicranocentrus* s. str. and *Dicranocentrella*. Salmon (34) eliminated the latter subgenus synonymizing it with *Dicranocentrus*. Wray used *Dicranocentrella* as a genus. Again, Salmon was followed.

Rapoport (31) cited *Dicranocentroides fasciculatus* Imms and *Dicranocentrus gracilis* Schött for Puerto Rico, apparently unaware of Salmon's changes. *Dicranocentroides fasciculatus* has not been found in Puerto Rico and neither has *Dicranocentrus gracilis*. The species present here is *Dicranocentrus mariae* Wray.

Rapoport (32) considered *Portachorutes* Wray (51), as "dubious" and did not include it in his list of the endemic Nearctic genera. However, following Salmon (34), the author considered the genus cited to hold generic status.

## GENERAL COMMENTS

Some authors regard *Entomobryoides* as a genus. Others consider it to be a subgenus of *Entomobrya* as originally proposed. They differ chiefly in that *Entomobryoides* has a double row of smooth hairs (simple setae) on the inner face of the tibiotarsus, which *Entomobrya* s. str. lacks. Following Maynard (26), the author considered *Entomobryoides* to be a subgenus of *Entomobrya*. Material has been collected in Puerto Rico belonging to both subgenera.

Some authors regard *Ballistrura* as a subgenus of *Proisotoma*. Others regard it as a genus. They differ in that *Proisotoma* s. str. has the dentes dorsally slightly crenulated and ventrally clothed with a few setae. *Ballistrura* lacks both these characters. The author followed Maynard (26), Gisin (19), and Christiansen (13) in regarding *Ballistrura* as a subgenus. The material collected in Puerto Rico belongs to the latter subgenus.

Similarly, *Sphaeridia* is regarded by some authors as a subgenus of *Sminthurides*, and to hold generic ranking by others. They differ chiefly in that *Sphaeridia* lacks the tibiotarsal organ. The author followed Maynard (26), and Gisin (19) and regarded *Sphaeridia* as a subgenus. The material collected in Puerto Rico belongs to the subgenus *Sphaeridia*.

Many of the characters used in differentiating genera, and particularly subgenera in the Sminthuridae, are structures which are usually difficult to see or interpret. For this reason, the key to this family is not based on these characters. They have, nevertheless, been mentioned in the diagnoses so that the interested reader may get acquainted with their names and locations.

The generic collembolan fauna of Puerto Rico has not been compared with that of the Caribbean or Neotropical region because the fauna of these areas is too poorly known. For example, as far as the author knows, only one genus has been reported thus far from the Dominican Republic where forty or more may occur.

## KEY TO THE WORLD FAMILIES OF COLLEMBOLA

1. Body globular; thoracic and abdominal segments fused (suborder Symphypleona) (Plate I, fig. 2) . . . . . Sminthuridae  
Body elongate; segmentation distinct, except sometimes in Abd. 4-6 or Abd. 5-6 (Plate I, figs. 1, 2) (suborder Arthropleona) . . . . . 2
2. Prothorax well developed, similar to meso- and metathorax, clothed with setae dorsally (Plate I, figs. 8, 9) . . . . . 3

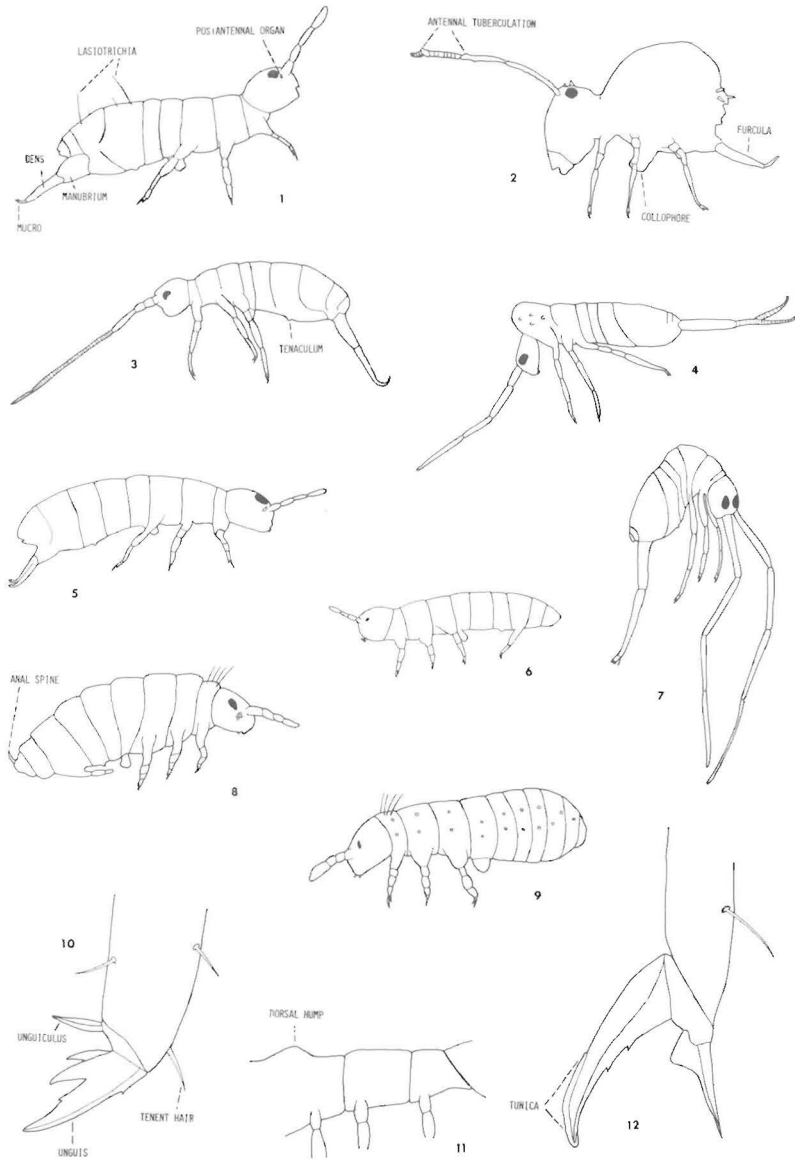


PLATE I: Fig. 1. *Isotomurus* sp.; fig. 2. *Ptenothrix* sp.; fig. 3. *Dicranocentrus* sp.; fig. 4. *Lepidocyrtus* sp.; fig. 5. *Cryptopygus* sp.; fig. 6. *Folsomides* sp.; fig. 7. *Dicranocentrophya* sp.; fig. 8. *Hypogastrura* sp.; fig. 9. *Onychiurus* sp.; fig. 10. *Pseudosinella* sp., claw and tenent hair; fig. 11. *Campylothorax* sp., part of body showing dorsal hump on metathorax; fig. 12. *Dicyrtomina* sp., claw with tunica.

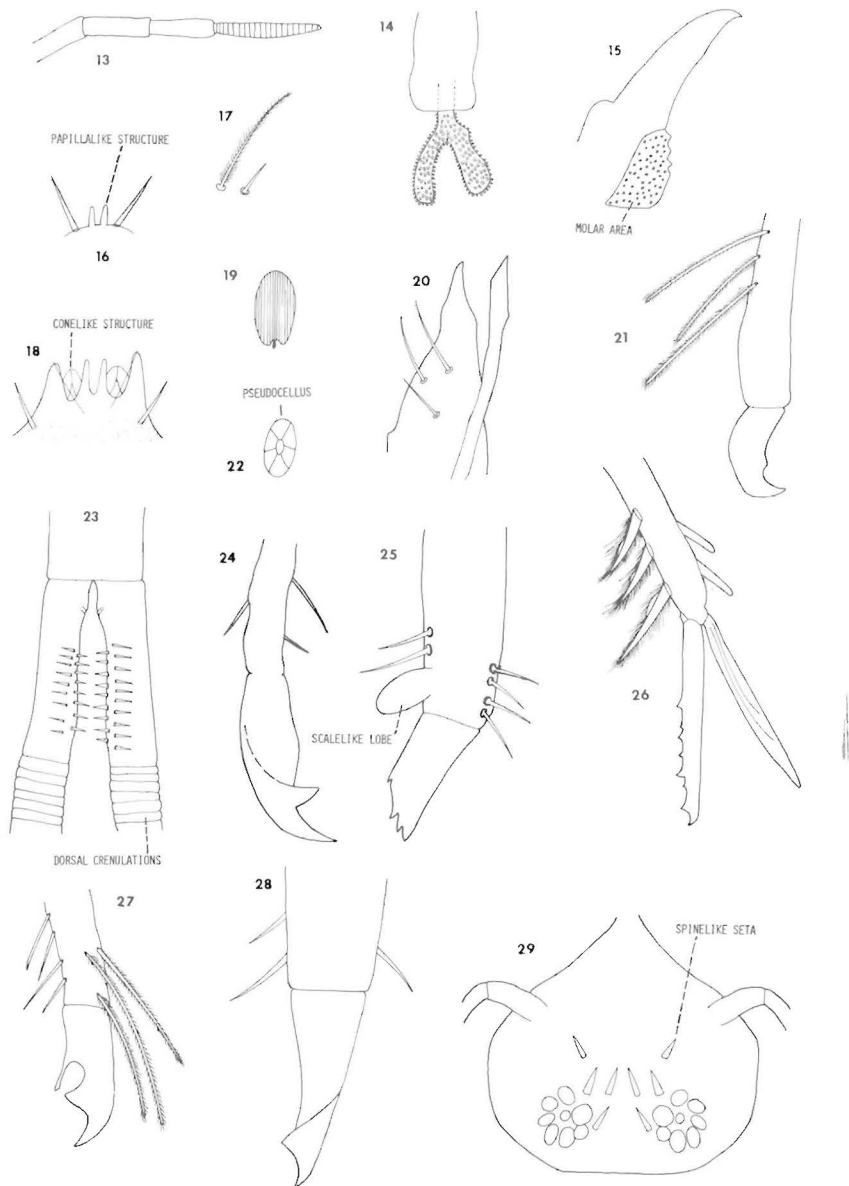


PLATE II: Fig. 13. *Lepidocyrtus* sp., antenna with annulations; fig. 14. *Sphyrotheca* sp., exsertile filaments of colophore; fig. 15. *Hypogastrura* sp., mandible with molar area; fig. 16. *Hypogastrura* sp., Ant. 3 sense organ with papilla-like structures and setae; fig. 17. *Isotomurus* sp., lasiotrichia and normal setae; fig. 18. *Onychiurus* sp., Ant. 3 sense organ with papilla-like, conelike structures, and setae; fig. 19. *Lepidocyrtus* sp., scale of body; fig. 20. *Pseudachorutes* sp., mandible and maxilla; fig. 21. *Drepanocyrtus* sp., mucro; fig. 22. *Onychiurus* sp., pseudocellus; fig. 23. *Dicranocentrus* sp., dorsal view of end of manubrium and proximal half of dentes; fig. 24. *Cryptopygus* sp., mucro; fig. 25. *Salina* sp., mucro; fig. 26. *Cyphoderus* sp., mucro; fig. 27. *Lepidocyrtus* sp., mucro; fig. 28. *Proisotoma* sp., mucro; fig. 29. *Sphyrotheca* sp., dorsal view of head with spinelike setae.

- Prothorax reduced, partially or completely hidden by mesothorax, not clothed dorsally (Plate I, figs. 3, 4) . . . . . 4
3. Integument with regularly distributed pores (pseudocelli) (Plate I, fig. 9, Plate II, fig. 22); Ant. 3 sense organ composed of conelike and papilla-like structures (Plate II, fig. 18); eyes absent; generally unpigmented . . . . . Onychiuridae  
Pseudocelli always absent; Ant. 3 sense organ only with papilla-like structures (Plate II, fig. 16); eyes usually present; usually pigmented . . . . . Poduridae
4. Abd. 4 dorsally at least 1.5 times Abd. 3 (usually many times longer); furcula long and completely developed, reaching forward to the colophore; scales often present; (Plate II, fig. 19); postantennal organ usually absent (Plate I, figs. 4, 7) . . . . . Entomobryidae  
Abd. 4 shorter than Abd. 3, subequal, or when longer, slightly so; furcula reaching or not to the colophore; scales always absent; postantennal organ usually present (Plate, I, figs. 1, 5) . . . . Isotomidae

FAMILY ENTOMOBRYIDAE TOMOSVARY, 1882 (44)  
SENSU LATO

Key to the Genera of Entomobryidae of Puerto Rico

1. Dens crenulated dorsally (Plate I, fig. 4, Plate II, fig. 23); furcula tapering considerably along its length (Plate I, fig. 3) . . . . . 2  
Dens smooth dorsally; furcula tapering little (Plate I, fig. 7) . . . . . 7
2. Antennae 6-segmented; dentes bearing spines (Plate II, fig. 23); Abd. 4 dorsally not over 1.5 times Abd. 3 (Plate I, fig. 3) . . . *Dicranocentrus*  
Antennae 4-segmented; dentes without spines; Abd. 4 dorsally over 2.5 times Abd. 3 (Plate I, fig. 4) . . . . . 3
3. Scales absent . . . . . *Entomobrya*  
Scales present . . . . . 4
4. Eyes less than eight to each side; claws with two basal winglike teeth which are variable in size (Plate I, fig. 10) . . . . . *Pseudosinella*  
Eyes 8-8; claws without winglike teeth . . . . . 5
5. Ant. 4 annulated (Plate II, fig. 13) . . . . . *Lepidocyrtinus*  
Ant. 4 not annulated . . . . . 6
6. Mucrones with two teeth and a basal spine (Plate II, fig. 27).  
. . . . . *Lepidocyrtus*  
Mucrones falcate (Plate II, fig. 21) . . . . . *Drepanocyrtus*
7. Dentes dorsally with large, conspicuous, ciliated scales (Plate II, fig. 26); mucrones long, at least one-fifth the length of the dentes . . . . . *Cyphoderus*  
Dentes not as above; mucrones many times smaller than the dentes . . . . . 8
8. Manubrium longer than dentes; Ant. 4 annulated, in some speci-

- mens slightly ..... *Dicranocentruga*  
 Dentes longer than manubrium; Ant. 4 not annulated ..... 9
9. Scales absent; dentes with a characteristic scalelike lobe at apex  
 (Plate II, fig. 25); teeth of mucrones no more than four ..... *Salina*  
 Scales present, dentes without apical scalelike lobe; mucrones with  
 five or more teeth ..... 10
10. Thorax normal in shape (Plate I, fig. 7); eyes 8-8 .. *Dicranocentroph*  
 Metathorax with a dorsal hump (Plate I, fig. 11); eyes 6-6  
 ..... *Campylothorax*

Genus *Lepidocyrtus* Bourlet

*Lepidocyrtus* Bourlet, 1839: 391 (11).

*Paidium* Koch, 1840: 356 (21).

*Ascocyrtus* Yosii, 1962: 9 (55).

Antennae 4-segmented, not annulated; eyes 8-8 on dark patches; postantennal organ absent; scales present, conspicuous or transparent; mesonotum dorsally obscuring pronotum, often projecting over the head; tenent hairs present, well developed; Abd. 4 dorsally over 2.5 times Abd. 3; dentes scaled ventrally, crenulated dorsally; mucrones with two teeth and a basal spine.

Genus *Lepidocyrtinus* Börner

*Lepidocyrtinus* Börner, 1903: 154 (8).

Differs from *Lepidocyrtus* in that Ant. 4 is annulated and the mucrones are falciform.

Genus *Drepanocyrtus* Handschin

*Drepanocyrtus* Handschin, 1924: 17 (20).

Differs from *Lepidocyrtus* in that the mucrones are falciform, and from *Lepidocyrtinus* because Ant. 4 is not annulated.

Genus *Pseudosinella* Schaeffer

*Tullbergia* Lie-Pettersen, 1896: 16 (22).

*Pseudosinella* Schaeffer, 1897: 38 (36).

*Pettersenia* Scherbakow, 1898: 61 (37).

Differs from *Lepidocyrtus* in that the eyes are less than eight to each side; tenent hairs often reduced in size; claws bear two winglike teeth.

Genus *Entomobrya* Rondani SENSU LATO

*Entomobrya* Rondani, 1861: 40 (33).

*Choreutes* Burmeister, 1838: 449 (12).

*Parentomobrya* Dahl, 1912: 424 (14).

Contrary to *Lepidocyrtus*, *Entomobrya* lacks scales and the mesonotum is not prominent.

Genus *Dicranocentrus* Schött

*Dicranocentrus* Schött, 1893: 21 (38).

*Dicranocentrella* Wray, 1953: 140 (51).

Antennae 6-segmented, segments 5-6 annulated; ocelli 8-8 on dark patches; postantennal organ absent; mesonotum not prominent; scales present; Abd. 4 not over 1.5 times Abd. 3; dentes scaled ventrally, dorsally crenulated, and with longitudinal rows of spines; mucrones with two teeth and a basal spine.

Genus *Cyphoderus* Nicolet

*Cyphoderus* Nicolet, 1841: 381 (29).

*Cyphodurus* Nicolet, 1841: 384 (29).

*Beckia* Lubbock, 1870: 279 (25).

Antennae 4-segmented; eyes absent; postantennal organ absent; Abd. 4 much longer than Abd. 3; claws with large winglike teeth; dens smooth dorsally, with conspicuous fringed scales larger near the apex, also scaled ventrally; mucrones long, from one-half to one-fifth the length of dentes, with a variable number of teeth.

Genus *Salina* MacGillivray

*Salina* MacGillivray, 1894: 107 (28).

*Cremastocephalus* Schött, 1896: 175 (39).

Antennae 4-segmented, not annulated, longer than body; eyes 8-8, on dark patches; postantennal organ absent; mesonotum not prominent; tenent hairs present, well developed; Abd. 4 many times longer than Abd. 3; furcula long, tapering little throughout its length; dentes not crenulated, longer than manubrium, with an apical scalelike lobe at apex, not bearing spines; mucrones with up to four teeth; scales absent.

Genus *Dicranocentruga* Wray

*Dicranocentruga* Wray, 1953: 141 (51).

Differing from *Salina*, *Dicranocentruga* has: Antennae shorter than body, fourth segment annulated; ocelli 6-6; scales present; manubrium longer than dentes; dentes with spines and a long apical process not scalelike; mucrones with five teeth.

Genus *Dicranocentrophia* Wray

*Dicranocentrophia* Wray, 1953: 144 (51).

The characters that separate this genus from *Salina* are: Scales



present; dentes with spines, apical scalelike lobe absent; mucrones with five to seven teeth.

### Genus *Campylothorax* Schött

*Campylothorax* Schött, 1893: 18 (38).

This genus differs from *Salina* in: Ocelli 6-6; scales present; dorsal hump present on metathorax; dentes with spines, without apical scalelike lobe; mucrones with six teeth.

The author has reason to believe that this determination might be in error. *Dicranocentrapha* (not described) when Wolcott's paper appeared, could have been taken easily for *Campylothorax*. It has been impossible to trace the material cited by Wolcott. Also, *Campylothorax* has not appeared in these collections, while *Dicranocentrapha* is abundant everywhere in Puerto Rico.

## FAMILY ISOTOMIDAE BÖRNER, 1913 (10)

### Key to The Genera of Isotomidae of Puerto Rico

1. Furcula long, reaching forward to the collophore; dentes crenulated dorsally (Plate I, fig. 1) ..... 2  
    Furcula short, not reaching the collophore; dentes crenulated or not (Plate I, fig. 5) ..... 3
2. Eyes absent; postantennal organ absent; Abd. 5-6 fused; lasiotrichia (bothriotrichia of other authors) absent ..... *Isotomiella*  
    Eyes present; postantennal organ present; Abd. 5-6 separated; lasiotrichia present (Plate I, fig. 1, Plate II, fig. 17) ..... *Isotomurus*\*
3. All abdominal segments separated; body elongated, tubelike (Plate I, fig. 6) ..... *Folsomides*\*
- Abd. 4-6 or Abd. 5-6 partially or completely fused; body not as above ..... 4
4. Abd. 4-6 fused into a single mass ..... *Folsomia*  
    Abd. 4-6 not fused; Abd. 5-6 partially or completely fused ..... 5
5. Mucrodens joint distinct (Plate II, fig. 28) ..... *Proisotoma*\*
- Mucrodens joint indistinct (Plate II, fig. 24) ..... *Cryptopygus*\*

### Genus *Isotomurus* Börner

*Isotomurus* Börner, 1906: 71 (9).

Antennae 4-segmented, not annulated; eyes 8-8 on dark patches; postantennal organ present; tenent hairs absent; Abd 5-6 not fused; lasiotrichia present; furcula long, reaching the collophore; dentes dorsally crenulated, without spines; mucrones with four teeth.

Genus *Isotomiella* Bagnall

*Isotoma* Bourlet, 1839: 401 (11) in part.

*Isotomiella* Bagnall, 1939: 95 (2).

Differing from *Isotomurus*, *Isotomiella* has: Eyes, postantennal organ, and lasiotrichia absent; Abd. 5-6 fused; mucronal teeth less than four.

Genus *Proisotoma* Börner SENSU LATO

*Proisotoma* Börner, 1901: 172 (7).

*Scutisotoma* Bagnall, 1948: 535 (3).

*Folsomidiella* Bagnall, 1949: 59 (4).

Antennae 4-segmented, not annulated; eyes 8-8, on dark patches; postantennal organ present; Abd. 4 subequal or slightly longer than Abd. 3; Abd. 5-6 partially fused; lasiotrichia absent; furcula not reaching the colophore; dentes with or without ventral setae, crenulations present or absent; mucrones with 2-3 teeth; mucrodens joint distinct.

Genus *Cryptopygus* Willem

*Cryptopygus* Willem, 1902: 11 (48).

*Isotomina* Börner, 1903: 140 (8).

*Hemisotoma* Bagnall, 1949: 94 (5).

This genus differs from *Proisotoma* mainly in the following: Abd. 4 subequal to, or shorter than Abd. 3; Abd. 5-6 completely fused; mucrodens joint indistinct.

Genus *Folsomia* Willem

*Folsomia* Willem, 1902: 280 (49).

*Litsteria* Bagnall, 1949: 60 (4).

*Hemisomia* Bagnall, 1949: 92 (5).

This genus differs from *Proisotoma* mainly as follows: Eyes vary in number from 0 to 8-8; Abd. 4-6 fused.

Genus *Folsomides* Stach

*Folsomides* Stach, 1922: 17 (41).

The characters that separate *Folsomides* from *Proisotoma* chiefly are: Eyes 5,2, or 1 to each side; body much elongated, tubelike; Abd. 5-6 separated.

## FAMILY PODURIDAE LUBBOCK, 1870 (25) SENSU LATO

## Key to the Genera of Poduridae of Puerto Rico

- |  |   |
|--|---|
| 1. Anal spines present (Plate I, fig. 8) ..... | 2 |
| Anal spines absent .....                       | 4 |

2. Mandibles without a molar area; anal spines 2-15 ..... *Friesea*\*
- Mandibles with a well-developed molar area (Plate II, fig. 15); anal spines 2 ..... 3
3. Eyes 8-8; unguiculus present; postantennal organ present (Plate I, fig. 8) ..... *Hypogastrura*
- Eyes 5-5; unguiculus absent; postantennal organ absent ..... *Xenylla*
4. Eyes 5-5; postantennal organ absent ..... *Portachorutes*
- Eyes 8-8; postantennal organ present ..... 5
5. Mandibles present; maxillae styliform (Plate II, fig. 20) ..... *Pseudachorutes*\*
- Mandibles absent; maxillae with several teeth ..... *Brachystomella*

#### Genus *Pseudachorutes* Tullberg

*Pseudachorutes* Tullberg, 1871: 155 (46).

*Brachysius* MacGillivray, 1893: 317 (27).

*Neoafricella* Salmon, 1964: 115 (34).

Antennae 4-segmented, conical, subequal to head in length; eyes 8-8 on dark patches; postantennal organ present, composed of a variable number of tubercles; mouthparts projected forward, like in a cone; mandibles with one or more teeth; maxillae styliform; body plump; integument tuberculate; anal spines absent; furcula short, not reaching the colophore but fully developed; mucro spoonlike.

#### Genus *Portachorutes* Wray

*Portachorutes* Wray, 1953: 147 (51).

This genus differs from *Pseudachorutes* chiefly in: eyes 5-5; postantennal organ absent.

#### Genus *Brachystomella* Ågren

*Brachystomella* Ågren, 1903: 127 (1).

*Schoettella* Schaeffer, 1896: 175 (35) in part.

*Brachygastrura* Rapoport, 1962: 443 (31).

Differing from *Pseudachorutes*, *Brachystomella* has: mandibles absent; maxillae with several teeth.

#### Genus *Friesea* Dalla Torre

*Friesea* Dalla Torre, 1895: 14 (15).

*Triaena* Tullberg, 1871: 155 (46).

*Neocolonavis* Salmon, 1964: 267 (34).

This genus differs from *Pseudachorutes* in: Eyes vary from 0 to 8-8; postantennal organ absent; mouthparts not so markedly projecting

forward; maxillae sickle-shaped; anal spines present, 2-15; furcula very small, rudimentary, well developed, or absent.

Genus *Hypogastrura* Bourlet

*Podura* Linné, 1758: 608 (23) in part.

*Hypogastrura* Bourlet, 1839: 404 (11).

*Cyclograna* Yosii, 1960: 263 (54).

*Hypogastrura* can be readily separated from *Pseudachorutes* in: Mouthparts not projecting forward; mandibles with one to several teeth, and with a well-developed molar area; maxillae with several teeth; unguiculus present; anal spines present, 2.

Genus *Xenylla* Tullberg

*Xenylla* Tullberg, 1869: 11 (45).

This genus differs from *Pseudachorutes* essentially in the same characters as *Hypogastrura*. It differs from the latter genus in: Eyes 5-5; postantennal organ and unguiculus absent.

FAMILY ONYCHIURIDAE BÖRNER, 1913 (10) SENSU LATO

Only one genus of this family is known to occur in Puerto Rico: *Onychiurus* and this is the first record of the family in this country. The material collected in Puerto Rico belongs to the subgenus *Onychiurus* s. str.

Genus *Onychiurus* Gervais SENSU LATO

*Lipura* Burmeister, 1838: 447 (12).

*Onychiurus* Gervais, 1841: 372 (18).

*Orthonychiurus* Stach, 1954: 26 (41).

Body stout; head dorsally as wide or wider than prothorax; antennae 4-segmented, subequal to head in length; Ant. 3 apically with a sensory organ composed of various different structures; postantennal organ present, compound, with many small tubercles; pseudocelli present, regularly distributed throughout head and body; unguiculus present; furcula usually absent, or represented by a rudimentary structure; pigment generally absent.

FAMILY SMINTHURIDAE LUBBOCK, 1862 (24) SENSU LATO

Key to the Genera of Sminthuridae of Puerto Rico

1. Ant. 4 longer than Ant. 3, no antennal segment with swellings or protuberances along the margin .....2

- Ant. 4 much smaller than Ant. 3, Ant. 2-3 with swellings or protuberances along the margin (Plate I, fig. 2) ..... 4
2. Parts of body and top of head with spinelike setae (Plate II, fig. 29);  
Ant. 4 subsegmented; exsertile filaments of collophore tuberculate  
(Plate II, fig. 14) ..... *Sphyrotheca*  
Body and head without spinelike setae; Ant. 4 not subsegmented;  
exsertile filaments of collophore smooth ..... 3
3. Eyes 8-8 ..... *Sminthurides*\*  
Eyes 4-4 ..... *Collophora*\*
4. Ant. 3-4 subsegmented (Plate I, fig. 2); claw without a tunica  
..... *Ptenothrix*\*  
Ant. 4 not subsegmented; claw with a tunica (sometimes barely  
visible) (Plate I, fig. 12) ..... *Dicyrtomina*\*

#### Genus *Sphyrotheca* Börner

*Sphyrotheca* Börner, 1906: 183 (9).

*Lipothrix* Börner, 1906: 183 (9).

*Afrosminthurus* Delamare Devoutteville and Massoud, 1965: 186 (17).

Ant. 4 subsegmented; eyes 8-8; parts of body and top of head with spinelike setae; body without trace of segmentation; trochanteral organ absent; claw with a tunica; tenent hairs absent; exsertile filaments of collophore tuberculate; mucrones spoonlike; mucronal spine (bristle) absent.

#### Genus *Sminthurides* Börner SENSU LATO

*Sminthurides* Börner, 1900: 616 (6).

*Prosminthurus* Willem, 1900: (47).

*Jeannenotia* Stach, 1956: 10 (43).

Ant. 4 not subsegmented; eyes 8-8; body or head with spinelike setae; segmentation of body sometimes barely visible as light lines; Ant. 2-3 of male modified into a clasping organ; trochanteral organ absent; tenent hairs absent; mucronal bristle absent; tibiotarsal organ present or absent; mucrones without lamellae.

#### Genus *Collophora* Richards

*Collophora* Richards, in Delamare Debutteville and Massoud 1964: 34 (16)

This genus differs from *Sminthurides* mainly as follows: Eyes 4-4; trochanteral organ present.

Genus *Dicyrtomina* Börner

*Dicyrtomina* Börner, 1903: 167 (8).

Antennae 4-segmented, not annulated, Ant. 4 much shorter than Ant. 3, Ant. 2-3 with several swellings or protuberances extending shortly from the margin; eyes 8-8; tenent hairs absent; claw with a tunica; mucrones spoonlike.

Genus *Ptenothrix* Börner

*Ptenothrix* Börner, 1906: 185 (9).

This genus differs from *Dicyrtomina* chiefly in: Ant. 3-4 subsegmented, claw without a tunica.

## RESUMEN

Se presentan claves para las familias y géneros de colémbolos de Puerto Rico. Se incluye además un diagnóstico para los géneros. Once nuevos géneros y una nueva familia se añaden por primera vez a la lista anterior de colémbolos presentes en Puerto Rico.

## LITERATURE CITED

1. Ågren, H., Diagnosen einiger neuen Achorutiden aus Schweden (Vorläufige Mittheilung), Entomol. Tidskr. 24: 126-8, 1903.
2. Bagnall, R. S., Notes on British Collembola, Entomol. Mon. Mag. 75: 901-102, 1939.
3. —, Contributions towards a knowledge of the Isotomidae (Collembola), I-VI. Ann. Mag. Natur. Hist. 12(1): 529-41, 1948.
4. —, Notes on British Collembola, Entomol. Mon. Mag. 85(1017): 51-61, 1949.
5. —, Contributions towards a knowledge of the Isotomidae (Collembola), VII-XV. Ann. Mag. Natur. Hist. 12(2): 82-96, 1949.
6. Börner, C., Vorläufige Mitteilung zur Systematik des Sminthuridae Tullb. insbesondere des Genus *Sminthurus* Latr., Zool. Anz. 23: 609-18, 1900.
7. —, Zur Kenntnis der Apterygotenfauna von Bremen und der Nachbardistrikte Beitrag zur einer Apterygotenfauna Mitteleuropas, Abhandl. Ver. Bremen 17: 1-141, 1901.
8. —, Über neue altweltliche Collembolen, nebst Bemerkungen zur Systematik der Isotominen und Entomobryinen, S.B. Ges. Naturforsch. Berlin, 1903: 129-82, 1903.
9. —, Das System der Collembolen, nebst Beschreibungen neuer Collembolen des Hamburger Naturhistorischen Museums, Mitt. Nat. His. Hamburg, 23: 147-88, 1906.
10. —, Die Familien der Collembolen, Zool. Anz. 41: 315-22, 1913.
11. Bourlet, A., Mémoire sur les Podures, Mém. Soc. Sci. Agr. Lille, 1: 377-417, 1839.
12. Burmeister, H., Collembola, In Handbuch der Entomologie, 2(2): 445-58, 1838.
13. Christiansen, K., Personal Communication, 1974.
14. Dahl, F., Ueber die Fauna des Plagefenngebietes. Part A: Analytische Übersicht der unter A. genannten Tiere, Beitr. Naturdenkin. Berlin, 3: 341-638., (Collembola: 420-7), 1912.
15. Dalla Torre, K. W., Die Gattungen und Arten der Apterygogenea (Brauer) Sep, 46 *Prog. Staats. Gym.* Innsbruck: 1-23, 1895.
16. Delamare Deboutteville, C., and Massoud, Z., *Collophora remanei* n. sp., Collembole

- Symphyléone du Perou et remarque sur sa position systématique, *Zool. Anz.* 172: 30-36, 1964.
17. — et —, Collemboles Symphyléones de l'Angola (Première Note), *Diamang (Companhia de deumantes de l'Angola), Publicações Cult.* 68: 65-103, 1965.
  18. Gervais, P., Designation of type and description of genus *Onychiurus*, *Echo Monde Savant*, 8: 372, 1841.
  19. Gisin, H., *Collembolenfauna Europas*, *Ed. Mus. Hist. Nat. Genève*: 1-312, 1960.
  20. Handschin, E., Neue Myrmecophile und Termitophile Collembolenformen aus Süd-Amerika, *N. Beitr. Syst. Insektenk.* Berlin, 3: 13-9, 21-8, 1924.
  21. Koch, C. L., Poduridae, In *Fauna Ratisbonensis*, by Herrick-Schaeffer, *Fürnrohr. Naturh. Topogr. Regensburg.* III: 353-9, 1840.
  22. Lie-Pettersen, O. J., Norges Collembola. Fortegnelse over de i Norge hidtil observerede arter, *Bergens Mus. Aarbog*, No. 8: 1-24, 1896.
  23. Linné, C., *Systema Naturae (Aptera)*, ed. 10: 608-9, 1758.
  24. Lubbock, J., Notes on the Thysanura, Pt. 1: Smythuridae., *Trans. Linn. Soc.* 23(3): 429-48, 1862.
  25. —, Notes on the Thysanura, Pt. 4. *Trans. Linn. Soc.* 27: 277-97, 1870.
  26. Maynard, E., A monograph of the Collembola or springtail insects of New York state, *Comstock Publ. Co. Ithaca, New York*, pp. 1-339, 1951.
  27. MacGillivray, A. D., North American Thysanura, I-IV. *Can. Entomol.* 25: 127-8, 173, 218-20, 313-8, 1893.
  28. —, North American Thysanura, V. *Can. Entomol.* 26: 105-10, 1894.
  29. Nicolet, H., Note sur la *Desoria saltans*, Insecte de la Famille des Podurelles, *Bibl. Univ. Genève*, 32: 381-7, 1841.
  30. Ramos, J. A., The insects of Mona Island, *J. Agr. Univ. P.R.* 30(1): 1-74, 1946.
  31. Rapoport, E. H., Colémbolos de Bahía Blanca (Argentina). IV. *Acta Zool. Lilloana* 28: 443-455, 1962.
  32. —, The geographical distribution of Neotropical and Antarctic Collembola, *Pacif. Ins. Mon.* 25: 99-118, 1971.
  33. Rondani, C., *Entomobrya pro Degeeria* Nic., In *Rondani-Dipterol.* Ital. *Prodr.* 4: 40, 1861.
  34. Salmon, J. T., An index to the Collembola, *Bull. Roy. Soc. New Zeal.* 7: 1-651, 1964.
  35. Schaeffer, C., Die Collembolen der Umgebung von Hamburg und Benachbarter Gebiete, *Mitt. Nat. Hist. Mus. Hamburg* 13: 149-216, 1896.
  36. —, Apteriygoten, *Hamburger Magelhaerische Sammelreise*, pp. 1-48, 1897.
  37. Scherbakow, A. M., Einige Bemerkungen über Apteriygoteneae, die bei Kiew 1896-1897 gefunden wurden, *Zool. Anz.* 21: 57-65, 1898.
  38. Schött, H., Beiträge zur Kenntnis der Insektenfauna von Kamerun, I. Collembola, *Bih. Svenska. Ak.* 19(2): 1-28, 1893.
  39. —, North American Apteriygoteneae, *Proc. Calif. Acad. Sci.* 2(6): 169-96, 1896.
  40. Scott, H. G., Collembola: Pictorial keys to the Nearctic genera, *Ann. Entomol. Soc. Amer.* 55(5): 104-13, 1961.
  41. Stach, J., Apteriygoten aus dem Nord Westlichen Ungarn, *Ann. Mus. Nat. Hung.* 19: 1-75, 1922.
  42. —, The Apteriygotan fauna of Poland in relation to the world-fauna of this group of insects. Family Onychiuridae, *Polska Akad. Nauk. Inst. Zool.* 1954: 1-129, 1954.
  43. —, The Apteriygotan fauna of Poland in relation to the world-fauna of this group of insects. Family Sminthuridae, *Polska Akad. Nauk. Inst. Zool.* 1956: 1-287, 1956.
  44. Tomosvary, O., Adatok Hazánk Thysanure-Faunájához, *Math. Term. Közlem. Magyar Akad.* 18: 119-130, 1882.

45. Tullberg, T., Om Skandinaviska Podurider af Underfamiljen Lipurinae, Akad. Afhandl. Uppsala, pp. 1-20, 1869.
46. —, Fortelkning öfver Svenska Podurider, *Öfv. K. Vet.-Akad. Förh* 28(1): 143-155, 1871.
47. Willem, V., Recherches sur les Collemboles et les Thysanoures. Mém. Cour. Mém. Sav. étr. Acad. Roy. Belgique, 58: 1-144 (Collembola: p-72), 1900.
48. —, Collemboles Recuillés par l'Expédition Antarctique Belge. Resultats du Voyage du S. Y. Belica: 1-19, 1902.
49. —, Note préliminaire sur les Collemboles des Grottes de Han et de Rochefort. Ann. Soc. Entomol. Belgique, 46: 275-83, 1902.
50. Wolcott, G. N., The insects of Puerto Rico, *J. Agr. Univ. P.R.* 32: 1-975, 1948.
51. Wray, D. L., New Collembola from Puerto Rico, *J. Agr. Univ. P.R.* 37(2): 140-150, 1953.
52. —, Some new records of Caribbean Collembola, *Bull. Brooklyn Entomol. Soc.* 54(3): 67-68, 1959.
53. —, Personal Communication, 1974.
54. Yosii, R., Studies on the collembolan genus *Hypogastrura*. *Amer. Midl. Natur* 64(2): 257-281, 1960.
55. —, On some Collembola of Hindukush, with notes on *Isotoma* Bourlet and its allies. In *Uéno Insect Fauna of Afghanistan and Hindukush*. Res. Kyoto Univ. Sci. Exp. Karakoram and Hindukush 1955, 4: 3-42, 1962.