A Taxonomic Key to the Collembola in Four Seral Stages Leading to the Beech-Maple Climax

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Abstract

From April through July, 1968, 96 leaf litter samples were taken from an old field, oak and maple-oak dominated seral stages, and a beech-maple climax in Parke County, Indiana. Collembola were extricated by a modified Tullgren funnel apparatus, collected, and identified. A key was based on morphology and color for 32 species, which represent 20 genera and 5 families. A table of the distribution of each species by seral stage was included.

Introduction

From April through July, 1968, 96 leaf litter samples of 1.0 dm^2 each were taken from an old field, oak and maple-oak dominated seral stages, and a beech-maple climax in Allee Woods, Parke County, Indiana. Collembola were extricated by a modified Tullgren apparatus and identified (2, 3). With current keys, not all individuals could be identified to species. The key represents 1,533 individuals, 32 species, 20 genera and 5 families. The purpose of this paper was to present a simplified key to the species in the four seral stages leading to the beech-maple climax. The changes in Collembola populations as influenced by plant successional patterns was previously described (1).

Method

After all species were identified, the most obvious external characteristics were selected for these 32 species and a key was constructed. The key was based on color and morphology. The primary morphological characteristics were: 1) length and shape of the body; 2) degree of fusion and length of abdominal segments; 3) nature of prothorax; 4) presence of scales, body hair, and setae; 5) number of eyespots; and 6) number of segments and length of antennae. The distribution of each species by seral stage (Table 1) shows the relative abundance of each species per ecological area and hence could be helpful in confirming an identification of an individual from a comparable sere.

Taxonomic Key

1. Body elongate; abdominal segments distinct although IV, V, and VI or V and VI may be ankylosed ---------- 2
   suborder Arthropleona Borner

1′. Body globular; abdominal segments not distinct; the first four abdominal segments fused with thorax ---------- 26
   suborder Symphypleona Borner
   family Sminthuridae

2. Prothorax reduced and membraneous ---------- 3
   superfamily Entomobryoidea Womersley

2′. Prothorax similar to other segments ---------- 22
   superfamily Poduroidea Womersley

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3. Scales absent; body segments equal to subequal in length; antennae with 4 simple segments; last abdominal segments may be ankylosed ---- 4
family Isotomidae

3′. Scales and/or brush-like setae present; third or fourth body segment elongate; antennae with 4-6 segments, the third and fourth sometimes annulated; abdominal segments always distinct ---- 11
family Entomobryidae

4. Fourth, fifth, and sixth abdominal segments ankylosed ---- 5
Folsomia

4′. Fourth, fifth, and sixth abdominal segments not ankylosed ---- 6

5. Eyes absent; pigment absent ----
Folsomia fimentaria L.

5′. Eyes 2 and 2; pigment gray to black ----
Folsomia quadrioculata Tullberg

6. Body with bothriotrichia (long sensory body hairs) ----
Isotomurus palustris Muller

6′. Body without bothriotrichia ---- 7

7. Manubrium (single part of furcula; is attached to abdomen) much shorter than dentes (middle part of furcula; is forked), with many ventral setae; Abd. IV usually shorter than Abd. III ---- 8
Isotoma

7′. Manubrium often longer than dentes with few or no ventral setae; Abd. IV usually longer than Abd. III ---- 10
Proisotoma

8. Eyes 4 and 4 on round patches connected by an inverted V-shaped mark ----
**Isotoma eunotabilis* Folsom

8′. Eyes 8 and 8 on elongate patches without an inverted V-shaped mark ---- 9

9. Length 0.6 mm ----
Isotoma viridis Bourlet

9′. Length 1.5 mm ----
**Isotoma olivacea* Tullberg

10. Dentes shorter than manubrium ----
Proisotoma minuta Tullberg

10′. Dentes longer than manubrium ----
**Proisotoma immersa* Folsom

11. Abd. III longer than Abd. IV; mucrones (tip of furcula) hairy; Ant. III longest segment and annulated; antennae 4-segmented ---- 12
subfamily Tomocerinae
Tomocerus

11′. Abd. III shorter than Abd. IV; mucrones not hairy; antennae 4- to 6-segmented ---- 15
subfamily Entomobryinae

12. Maxilla bearded ---- 13

12′. Maxilla not bearded ---- 14

13. Antennae longer than body ----
**Tomocerus elongatus* Maynard

13′. Antennae shorter than body ----
**Tomocerus flavescens* Tullberg

14. Dental spines tridentate; Th. II overlapping but not obscuring Th. I dorsally ----
**Tomocerus minor* Lubbock

14′. Dental spines simple; Th. II obscuring Th. I dorsally ----
**Tomocerus vulgaris* Tullberg

15. Antennae with 6 segments ----
Orchesella ainsliei Folsom

15′. Antennae with 4 segments ---- 16

16. Body without scales ---- 17

16′. Body with scales ---------- 21
Lepidocyrtus

17. Eyes not on dark patches ----------
**Isotobryoides ochracius* Maynard

17′. Eyes on dark patches ---------- 18
Entomobrya

18. Body unicolorous without crossbands of contrasting color ---------- 19

18′. Body with dark dorsal and lateral spots or bands or both on light ground color ---------- 20

19. Color gray to olive green to bluish purple ----------
Entomobrya marginata Tullberg

19′. Color yellow to yellow-orange ----------
**Entomobrya atrocincta* f.
pseudoperpulchra Mills

20. Transverse bands on every segment ----------
**Entomobrya multifasciata* Tullberg

20′. Transverse bands on most segments; Abd. I with 2 dark dorsal spots ----------
Entomobrya assuta Folsom

21. Purple pigment on Abd. IV ----------
**Lepidocyrtus unifasciatus* James

21′. Purple pigment on antennae and legs. ----------
Lepidocyrtus curvicollis Bourlet

22. Eyes absent ----------
family Onychiuridae
**Onychiurus armatus* Tullberg

22′. Eyes present ---------- 23
family Poduridae

23. Pigment present ---------- 24

23′. Pigment absent ----------
**Neanura barberi* Handschin

24. Furcula well developed ---------- 25

24′. Furcula reduced ----------
**Xenylla welchi* Folsom

25. Color brown and yellow mottled; abdomen not considerably distended ----------
**Hypogastrura tigrina* Harvey

25′. Color dark gray to black; abdomen considerably distended ----------
**Pseudachorutes simplex* Maynard

26. Antennae shorter than head; eyes absent ---------- 27
Neelus

26′. Antennae longer than head; eyes present ---------- 28

27. Color white ----------
**Neelus albus* Maynard

27′ Color yellow with red speckles ----------
**Neelus maculosus* Maynard

28. Color purplish red ----------
**Arrhopalites binoculatus* Borner

28′. Color not purplish red ---------- 29

29. Black pigment spots present on abdomen ---------- 30

29′. Black pigment spots absent; eyes orange ----------
Katiannina macgillivrayi Banks

30. Antennae pale basally ----------
**Dicyrtomina variabilis* Maynard

30′. Antennae dark basally ---------- 31
Sminthurinus

31. Body with much dark purplish black pigment; antennae and legs banded with dark pigment _____
**Sminthurinus radiculus* Maynard

31'. Body with black pigment reduced in form of lateral polygons; buff and orange spots present _____
**Sminthurinus radiculus* f. *pictus* Maynard

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* Species first reported for Indiana.

TABLE 1. *Species distribution by seral stage.*

Species	Beech-maple	Maple-oak	Oak	Old field	Total
Arrhopalites binoculatus	2	1	3	1	7
Dicyrtominia variabilis	0	1	0	0	1
Entomobrya assuta	42	7	16	8	73
Entomobrya atrocincta f. *pseudoperpulchra*	16	8	41	2	67
Entomobrya marginata	13	8	10	11	42
Entomobrya multifasciata	44	69	121	19	253
Folsomia fimentaria	10	31	18	4	63
Folsomia quadrioculata	6	1	0	0	7
Hypogastrura tigrina	0	0	1	1	2
Isotobryoides ochracius	35	49	42	2	128
Isotoma eunotabilis	1	2	3	0	6
Isotoma olivacea	8	15	46	16	85
Isotoma viridis	0	1	0	0	1
Isotomurus palustris	2	2	3	0	7
Katiannina macgillivrayi	2	1	2	1	6
Lepidocyrtus curvicollis	5	3	1	0	9
Lepidocyrtus unifasciatus	0	2	0	0	2
Neanura barberi	0	0	2	0	2
Neelus albus	1	3	2	0	6
Neelus maculosus	0	0	1	0	1
Onychiurus armatus	94	124	43	4	265
Orchesella ainsliei	0	0	0	1	1
Proisotoma immersa	2	6	14	1	23
Proisotoma minuta	0	0	5	0	5
Pseudachorutes simplex	1	1	4	0	6
Sminthurinus radiculus	2	1	0	0	3
Sminthurinus radiculus f. *pictus*	5	3	17	0	25
Tomocerus elongatus	1	1	1	0	3
Tomocerus flavescens	2	2	2	0	6
Tomocerus minor	73	74	115	36	298
Tomocerus vulgaris	1	3	38	5	47
Xenylla welchi	20	10	33	20	83

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