

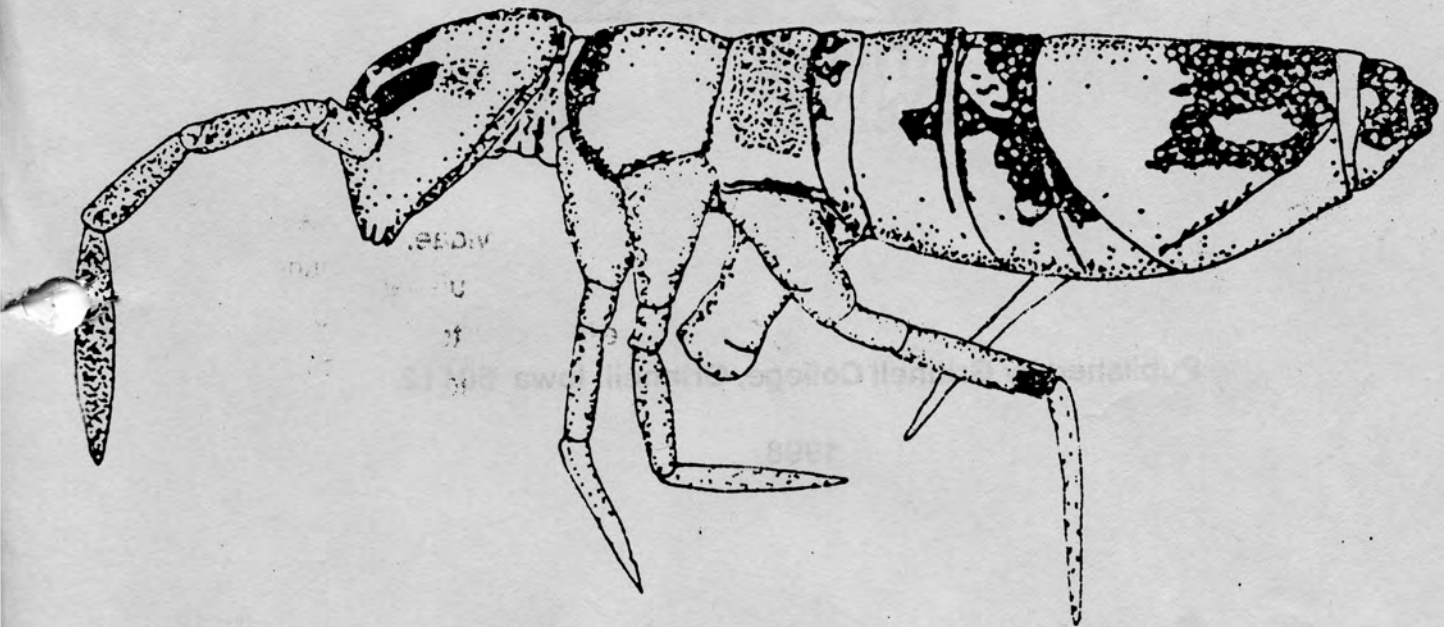
# THE COLLEMBOLA OF NORTH AMERICA

## NORTH OF THE RIO GRANDE

A taxonomic analysis

by

Kenneth Christiansen and Peter Bellinger



PART 3

Families

*entomobryidae*

*cyphoderidae*

*paronellidae*

*oncopoduridae*

*tomoceridae*



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1998

Families  
entomobryidae  
cypselophoridae  
paronellidae  
encopodidae  
tomoceridae

PART 3



### Entomobryoid Families

We include here those Nearctic Arthropleona with the pronotum reduced and lacking setae, and with scales or multilaterally ciliate macrochaetae or with the fourth abdominal segment much longer than the third. Almost all species have a trochanteral organ, a series of short, differentiated setae on the inner surface of the trochanter, but this organ is frequently difficult to see. Clothing in these species is diverse with a wide variety of setal types; among these are large, multilaterally ciliate or striate macrochaetae (Fig. 630) whose distribution is of great importance in the taxonomy of some families. Except where otherwise clearly indicated, we have followed the system of Szeptycki (1969, 1972) in describing this distribution (see Fig. 641). Scales are found in all these families (though not in all species), and their presence and form is diagnostic. The postantennal organ is usually absent. The ventral surface of the head has several features of taxonomic value, particularly in the Entomobryidae (Figs. 631-633). The unguis and unguiculus are always well developed, and the former has a characteristic lamellar structure (Fig. 634) in three of the families. The furcula is always well developed; the form of the dens and mucro are characteristic in the different families. Sexual dimorphism is never very pronounced.

In the first edition we treated these groups as subfamilies of the Entomobryidae. They are commonly treated as families, and the fact that they are easily distinguished and the strong possibility that several of them are actually more closely related to isotomids has encouraged us to follow general custom in this case. Some of their features are outlined in the following table.

Table XXVIII

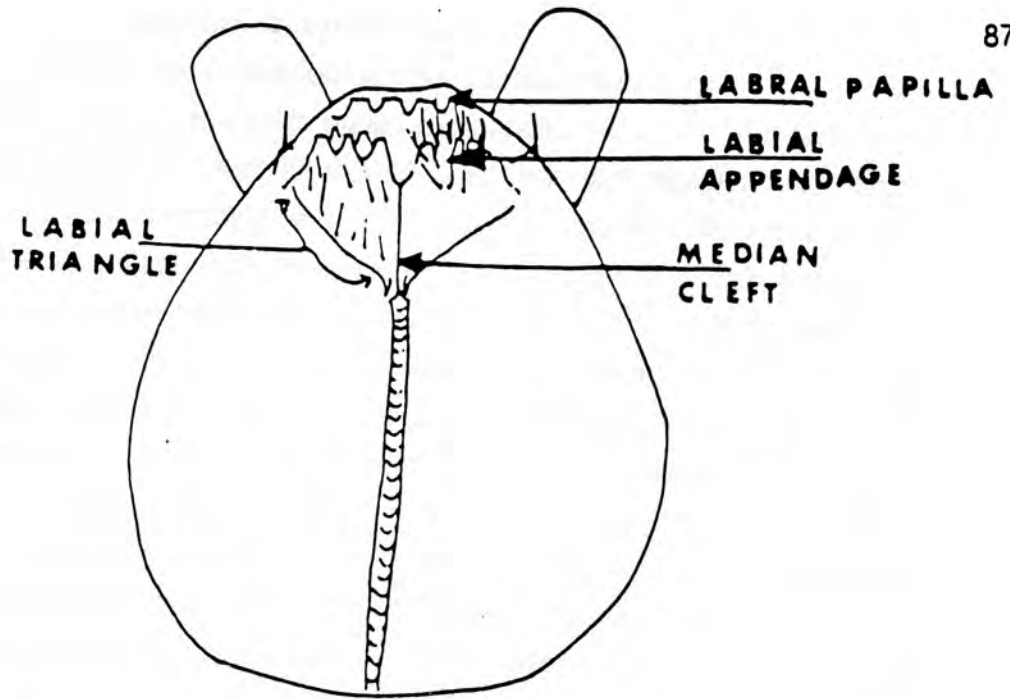
**Characteristics of Nearctic Members of Entomobryoid Families**

Family	Scales	Maximum Eye No.	Adult P.A.O.	Dental Spines	Mucro	Habitats
Entomobryidae	+ or -	8	-	+ or -	short, 1-2 teeth	All
Cyphoderidae	+	0	-	-	elongate	ant nests
Paronellidae	-	8	-	-	short, 2-4 teeth	vegetation or litter
Oncopoduridae	+	4 (usually 0)	+ or -	+	elongate	litter, soil, caves
Tomoceridae	+	6	- or +	+	elongate hairy	litter soil, caves

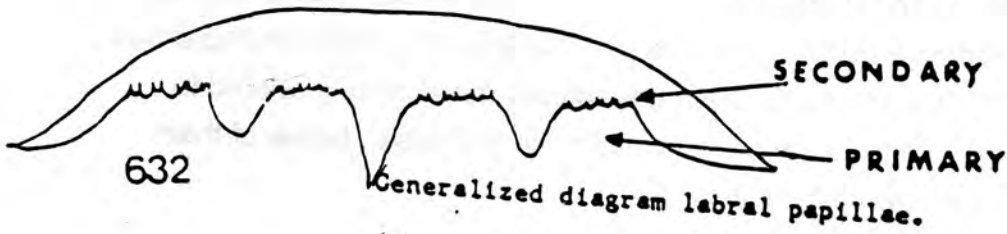


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Three types of entomobryid macrochaetae.

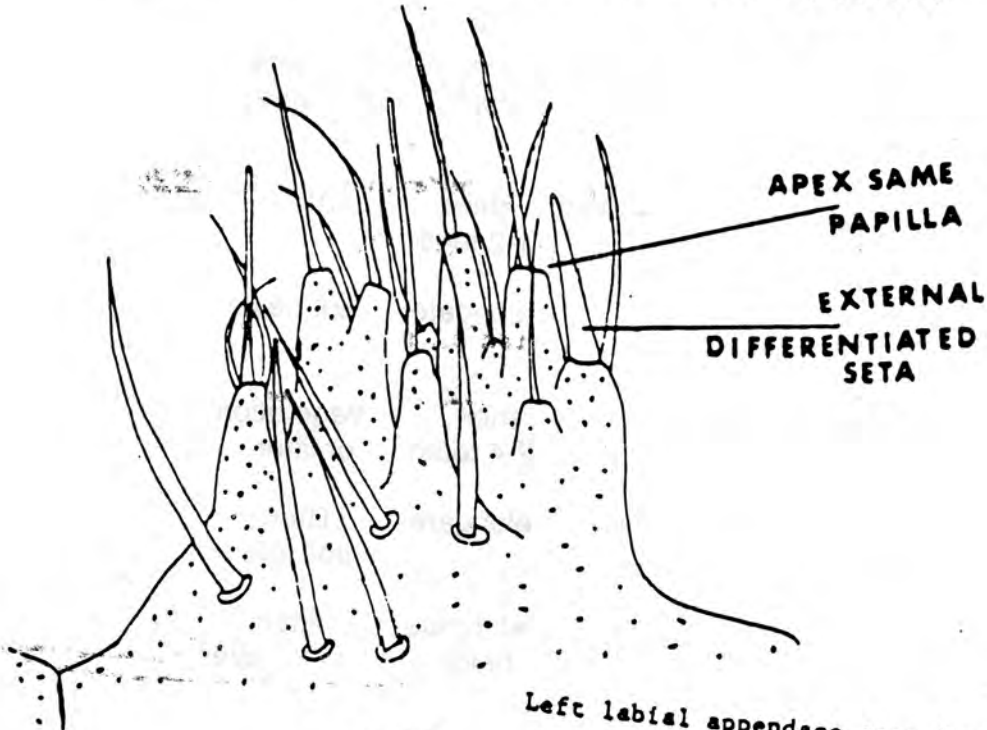


631 Head ventral view showing taxonomically important organs.



632

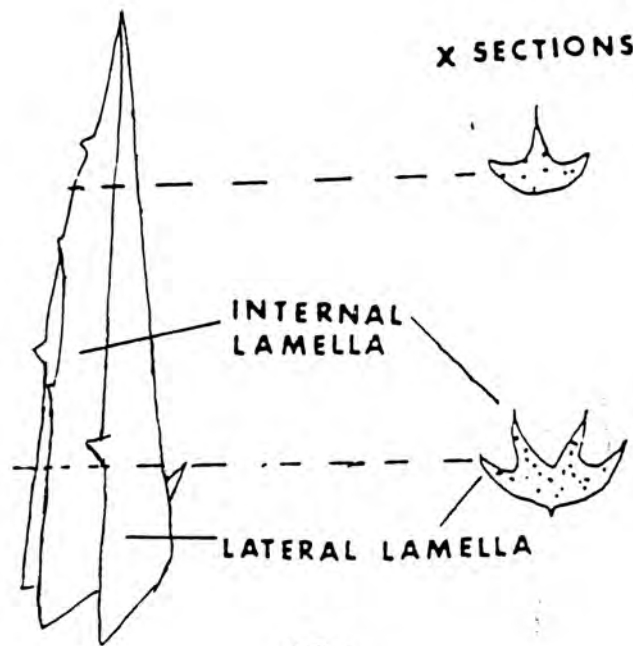
Generalized diagram labral papillae.



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Left labial appendage seen from below.

Schematic view of typical entomobryine unguis.

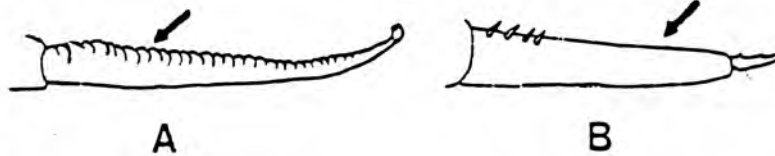


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Key to Nearctic Genera of Entomobryidae, Cyphoderidae, Paronellidae, Oncopoduridae, & Tomoceridae

- 1 ) Dentes smooth (Fig. 635B) ----- 2
- 1' ) Dentes crenulate (Fig. 635A) (Subfamily Entomobryinae) ----- 6

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- 2 ) Dental spines absent ----- 3
- 2' ) Dental spines present (Fig. 636 ) ----- 4

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- 3 ) Mucro at least 1/3 as long as dens (Subfamily Cyphoderinae) - Cyphoderus
- 3' ) Mucro less than 1/4 as long as dens (Subfamily Paronellinae) --- Salina

- 4 ) Dental spines relatively small, on basal portion of dens only (Fig. 637A) (Subfamily Tomocerinae) ----- Tomocerus

- 4' ) Dental spines relatively large, most conspicuous toward apex of dens (Fig. 637B) (Subfamily Oncopodurinae) ----- 5

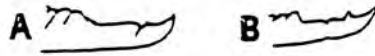
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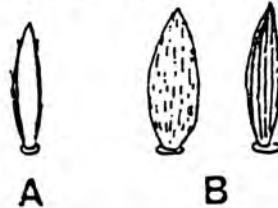
- 5 ) Eyes and pigment present ----- Harlomillisia
- 5') Eyes and pigment absent ----- Oncopodura
  
- 6 ) Body with scales ----- 7
- 6') Body without scales ----- 12
  
- 7 ) Mucro falcate (Fig. 638A) ----- Seira
- 7') Mucro bidentate (Fig. 638B) ----- 8

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- 8 ) Dentes with scales on ventral surface ----- 9
- 8') Dentes without scales ----- 11
  
- 9 ) Fourth abdominal segment at midline more than twice as long as third - 10
- 9') Fourth abdominal segment at midline less than twice as long as third  
----- Heteromurus
- 10 ) Eyes 8+8 ----- Lepidocyrtus
- 10') Eyes 6+6 or less ----- Pseudosinella
  
- 11 ) Scales narrow, without clear markings (Fig. 639A) ----- Americabrya
- 11') Scales broad, and clearly striate (Fig. 639B) ----- Willowsia

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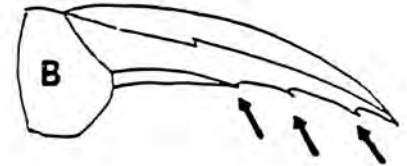
- 12 ) Eyes 4+4 or fewer ----- Sinella
- 12') Eyes 8+8 ----- 13
  
- 13 ) Fourth abdominal segment at midline less than 3 times as long as third  
----- 14
- 13') Fourth abdominal segment at midline more than 3 times as long as third  
----- Entomobrya

antennal segments subsegmented ----- Orchesella

14') Unguis with 3 unpaired inner teeth (Fig. 640B); antennal segments not

subsegmented ----- Corynothrix

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#### Subfamily Entomobryinae

This subfamily includes the majority of Nearctic entomobryids. It is distinguished from the other subfamilies by the dorsally crenulate dentes and the short, hooklike mucro. The chaetotaxy of the head, trunk, and labium, the structure of the labrum, foot, and mucro, and the eye number are particularly useful in identifying members of this subfamily. In analyzing chaetotaxy we follow the system of Szeptycki (see Fig. 641). Many species are brightly colored and have distinctive patterns, but caution must be used in identifying species by color and pattern, since there is considerable intraspecific variation.

In studying members of this subfamily special care must be taken in mounting. Observation of the body chaetotaxy and labral and labial structures requires well compressed dorsoventral mounts, which should be between cover slips so that they may be turned over. Dark specimens should be cleared sufficiently that pigment does not obscure the setae. If at all possible the setae should be intact, since they are hard to locate by the sockets until one has great familiarity with their distribution. The cephalic macrochaetae are unstable until after the fourth instar, and should not be relied upon for identification in earlier stages.

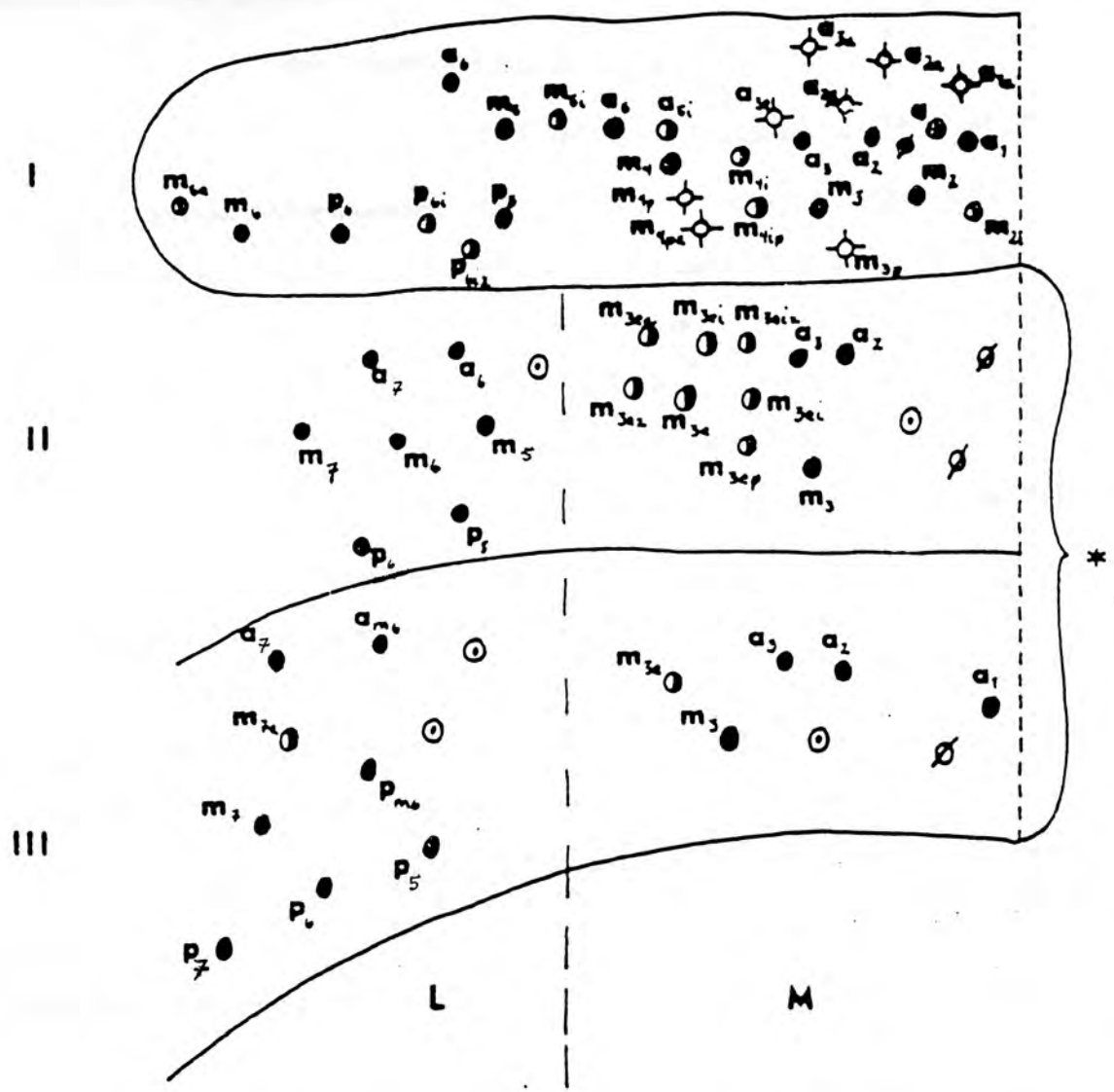
We assign the Nearctic species to 9 genera, which are rather easily recognized.

TABLE XXIX

## Characteristics of Nearctic Representatives of Genera of Entomobryinae

<u>Genus</u>	<u>Apical Antennal Bulb</u>	<u>Antennal Subsegmentation</u>		<u>Scales Body Dentes</u>		<u>Eye No.</u>	<u>Abd. III/IV</u>	<u>Mucronal Spine Teeth</u>	
		I	II						
<u>Corynothrix</u>	-	-	-	-	-	8	<2	+	2
<u>Entomobrya</u>	+,-	-	-	-	-	8	>3	+,-	1-2
<u>Heteromurus</u>	-	+	-	+	+	0-2	<2	+	2
<u>Americabrya</u>	+	-	-	+	-	8	>3	+	2
<u>Lepidocyrtus</u>	-,+	-	-	+	+	8	>3	+	2
<u>Orchesella</u>	-(+)	+	+(-)	-	-	8	<2	+	2
<u>Pseudosinella</u>	-	-	-	+	+	0-6	>2.5	+(-)	2
<u>Seira</u>	+	-	-	+	+	8	>3	-	1
<u>Sinella</u>	-(+)	-	-	-	-	0-3	>3	+	(1)2
<u>Willowsia</u>	+	-	-	+	-	8	>3	+	2





- - primary setae (existing from instar I)
- ⊙ - secondary setae
- ⊖ - bothriotrachia
- ⊘ - pseudopore
- ⊗ - secondary macrochaetae; Orchesella only
- \* - Entomobrya and Sinella only

Figure 641  
 Chaetotaxy in Entomobryinae, after Szeptycki.

Type species: C. borealis Tullberg, 1876

This genus contains the only Nearctic Entomobryinae having the fourth abdominal segment less than twice as long as the third, pointed or truncate tenent hairs, 8+8 eyes, and a bidentate mucro with a basal spine. Scales are absent. The general appearance is isotomid, but most structural features are typically entomobryid. The ungual structure is unique; the inner lamellae meet at the basal tooth, so that there are only 3 inner teeth, all unpaired. The bothriotracha are unusually short and slightly anomalous in position, but have the segmental arrangement of other Entomobryinae. There is no post-antennal organ; a trochanteral organ is present, and there are well-developed type 1 macrochaetae, though these are less sharply distinguished from other setal types than usual, making chaetotactic patterns difficult to make out. There is a single Nearctic species, C. borealis.

Corynothrix borealis Tullberg, 1876

Fig. 642

Refs.: " Öfvers. K. VetenskAkad. Förh. 33(5):34; Martynova, 1970; Martynova et al, 1973.

#### Description

Color: green to greenish-yellow, with pigment evenly distributed except for dark eye patches, interantennal band, and a small V on the dorsum of the head; antennae may be dark. Apical antennal bulb absent; pin seta well-developed and like type 4 of the genus Orchesella; apical organ of third antennal segment of 2 simple oval pegs. Eye patches usually appear to have small internal supplementary eyes in addition to the normal 8. Fourth abdominal segment subequal to or slightly longer than third. Body setae of type 5 narrowly fusiform and multilaterally ciliate over almost entire length. Maximum length 3.0 mm.

#### Remarks

This unique species is confined to the high arctic in Asia and western North America.

Localities: Alaska - Chandler Lake; Point Barrow. Canada: N.W.T. - Banks Harbour.

Corynothrix borealis

All figures after Martynova.

A) Habitus.

FIGURE 642

B) Chaetotaxy, left half of second abdominal segment.

C) Same for third segment.

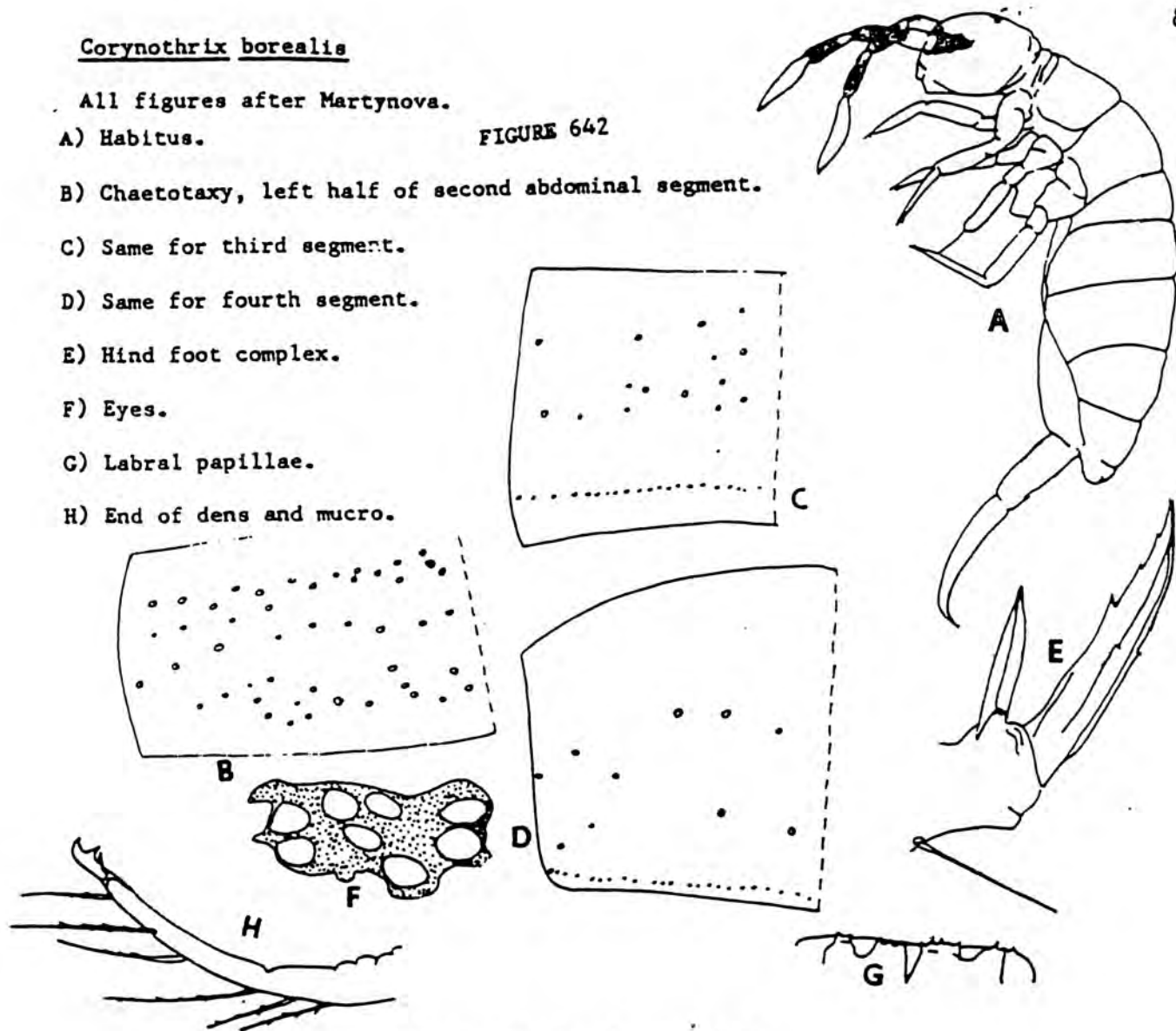
D) Same for fourth segment.

E) Hind foot complex.

F) Eyes.

G) Labral papillae.

H) End of dens and mucro.



Genus Orchesella Templeton, 1835

Type species: Podura cincta Linnaeus, 1758

We include in this genus all Nearctic scaleless Entomobryinae having a bidentate mucro with a basal spine, clavate tenent hairs, and the fourth abdominal segment less than 3 times as long as the third (less than twice as long in adults of our species). In intact specimens, except early instars, the antennae have basal subsegments of the second, and sometimes the first segment, and the fourth and sometimes the third segment showing distinct signs of annulation or setal whorling. The unguis has 4 small inner teeth; the unguiculus is always acuminate and usually has a small external tooth. The body setae are of the same 5 types seen in Entomobrya, but are less varied in shape than



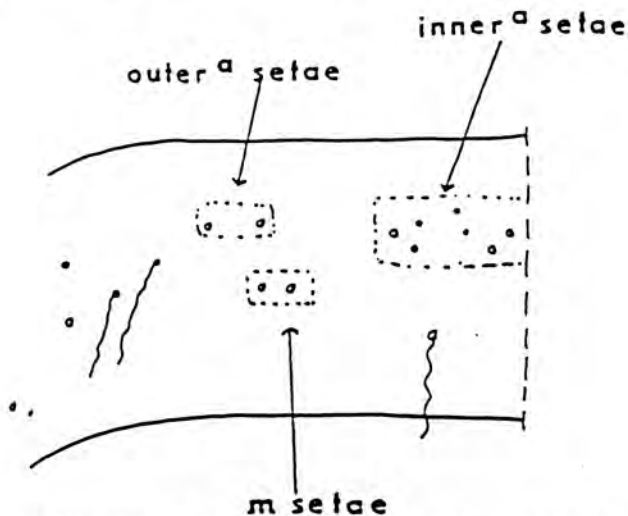
in that genus. The body setae of type 5, which are the smallest body setae, are of two sorts, cylindrical and tapered (Fig. 643A) and narrowly fusiform (Fig. 643B); the difference is slight.

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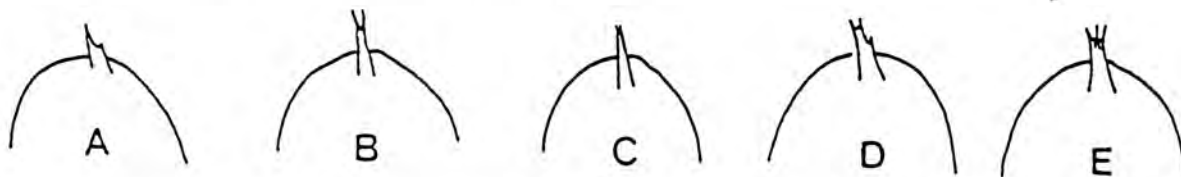


The macrochaetae of the abdomen are very regular in distribution and show consistent interspecific differences. Their distribution is not easily analyzed in terms of Szeptycki's system (see Entomobrya), and we use the terminology shown in Fig. 644.

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The chaetotaxy of the fourth abdominal segment shows intraspecific variation as well as specific differences, and we therefore have not used it taxonomically. The "pin" seta of the antennal apex differs in form between species; we have classified the types as shown in Fig. 645.



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A = Type 1; B = Type 2; C = Type 3; D & E = Type 4;

While most species can be identified by their pattern, there are several with extremely pale forms which can only be distinguished by morphological criteria.

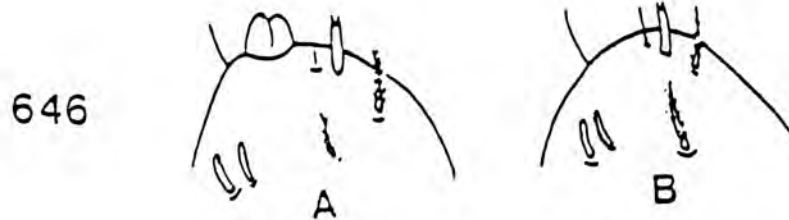
There are 18 Nearctic species: 1) sp. ainsliei, 2) sp. albosa, 3) alpa, 4) annulicornis, 5) bulba, 6) carneiceps, 7) sp. celsa, 8) cincta, 9) fishmani, 10) flora, 11) folsomi, 12) gloriosa, 13) hexfasciata, 14) imitari, 15) manitobae, 16) texensis, 17) villosa, 18) zebra.

Table XXX  
 Characteristics of Nearctic species of *Orchesella*

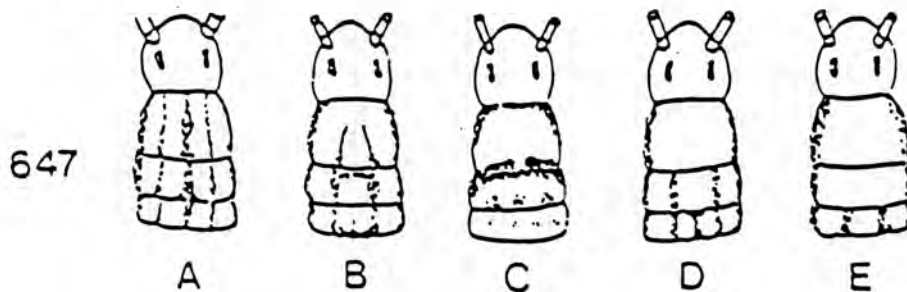
Species	Antennae			Abdomen III macrochaetae			Typical Pattern Characteristic
	pin seta type	apical bulb	ratio eye G/F	inner a	outer a	m	
<i>ainsliei</i>	1-2	-	.70-.9	3-4	1	2	Longitudinal lines + posterior irregular transverse bands
<i>albosa</i>	1	-	.66-.8	3-6	1	2	none
<i>alpa</i>	1-2	-	.7-.9	4-5	1	2-3	Posterior transverse bands or none
<i>annulicornis</i>	?	?	.65	3	0-1	3	Front of head, segmental margins and mid dorsal line.
<i>bulba</i>	4	+	.65-8	2-3	0	2	Lateral thoracic margins and mid dorsal stripe
<i>carneiceps</i>	3?	-	.65	?	0?	3?	Dark body, pale head
<i>celsa</i>	4	-	.5-.7	3	0	2(3)	Longitudinal lines + transverse bands on abd. II & III or lateral margins of thorax and irregular pigment over abd. II-VI
<i>cincta</i>	2,4	-	.5-.65	4	0	3	From anterior stripes and posterior bands to almost entirely dark.
<i>fishmani</i>	4	-	.55-.75	4-5	1	2-3	Thorax to abdomen III with mid dorsal and lateral stripes; transverse markings on abd. II and abd. III
<i>flora</i>	4	-	.5-.7	3	0	2(3)	Thorax (and abdomen I) solid dark
<i>folsomi</i>	4	-	.55-.7	2?	0	3-4	Dark except for head and mesothorax
<i>gloriosa</i>	4	-	≈ .5	3	0	2	5 Irregular longitudinal markings
<i>hexfasciata</i>	2(4)	-	.56-.76	3	0	3	Transverse bands
<i>imitari</i>	1	-	≈ .85	3	0	3	Head pale, Thorax II & Abdomen I pale with anterior transverse bands, Abdomen V-VI with T shaped mark, remaining segments dark with pale posterior lines.
<i>manitobae</i>	4	-	.75	3-5	1	2-4	Body uniformly lightly pigmented, head with patches
<i>texensis</i>	2	-	.65-.75	3	0-1	2(3)	5 lines running whole length of body or pale, unpatterned
<i>villosa</i>	4	-	.5-.69	5	2-3	3-4	Longitudinal anterior, transverse & diagonal posterior lines
<i>zebra</i>	3-4 (2)	-	.55-.85	4-6	1(0)	3	5 longitudinal lines

Key to Nearctic Species of Orchesella

- 1) Apical antennal bulb present (Fig. 646A) ----- O. bulba
- 1') Apical antennal bulb absent (Fig. 646B) ----- 2

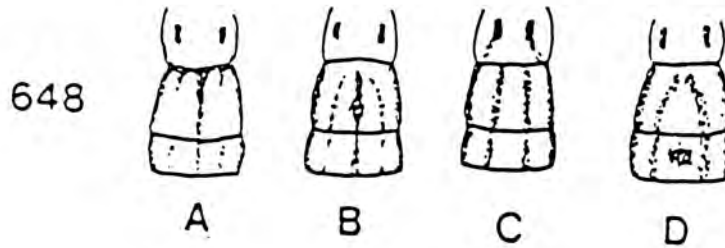


- 2) Pigment well-developed on body ----- 3
- 2') Pigment vestigial or lacking on body ----- 25
- 3) Pigment irregular over body, patchy on head ----- O. manitobae Mari-Mutt, 1985
- 3') Pigment in patterns or absent from head or some part of body ----- 4
- 4) One or more segments completely pigmented dorsally and laterally ( except for posterior, marginal lines) ----- 5
- 4') No segment completely pigmented dorsally and laterally ----- 10
- 5) Second thoracic segment mostly pale ----- 6
- 5') Second thoracic segment dark ----- 9
- 6) Second abdominal segment pale ----- O. cincta
- 6') Second abdominal segment dark or heavily patterned ----- 7
- 7) Third thoracic segment very dark ----- 8
- 7') Third thoracic segment mostly pale ----- O. celsa
- 8) First abdominal segment entirely dark ----- O. folsomi
- 8') First abdominal segment mostly pale ----- O. imitari Snider 1997
- 9) Fourth abdominal segment pale ----- O. flora
- 9') Fourth abdominal segment dark ----- O. carneiceps
- 10) Second and third thoracic segments with some more or less continuous longitudinal dorsal markings (Fig. 647A&B) ----- 11
- 10') Second and third thoracic segments without continuous longitudinal markings (Fig. 647C) or with only lateral longitudinal lines (Fig. 647D,E) ----- 18





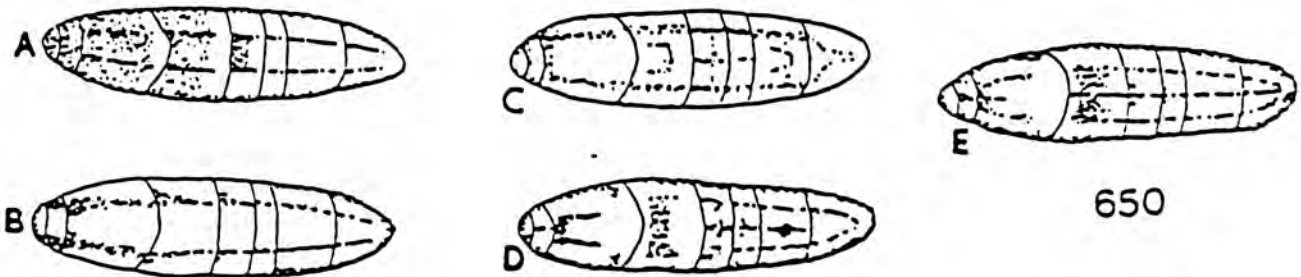
- 11) Posterior half, and generally most, of second abdominal segment without clear pigment ----- Q. cincta
- 11') Posterior half of second abdominal segment well pigmented ----- 12
- 12) With a clear mid-dorsal line or stripe on second thoracic segment (Fig. 648A,B) ----- 13
- 12') Without a clear mid-dorsal thoracic line or stripe (Fig. 648C,D) ----- 19



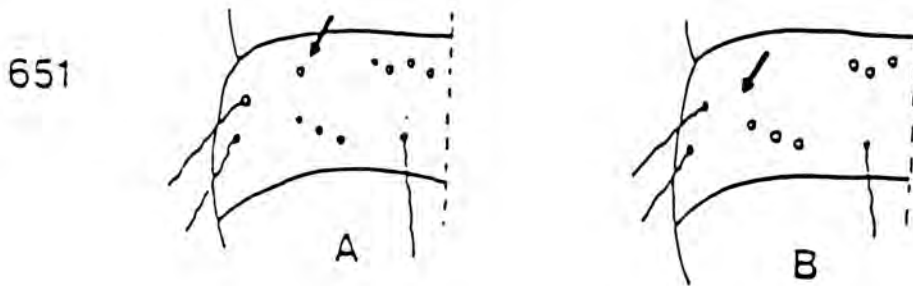
- 13) With a clear mid-dorsal stripe or band running length of body ----- 14
- 13') Mid-dorsal band or stripe absent from 4th abdominal segment ----- 16
- 14) Inner A setae on abd. II 4-6 ----- Q. zebra
- 14') Inner A setae on abd. II 3 ----- 15
- 15) Eye G .65 or > than eye F ----- Q. texensis Snider 1997
- 15') Eye G .50 or < than eye F ----- Q. gloriosa Snider 1997
- 16) Second and third abdominal segments with transverse, curved, anteriorly concave markings (Fig. 649) ----- Q. villosa
- 16') Second and third abdominal segments without such markings ----- 17



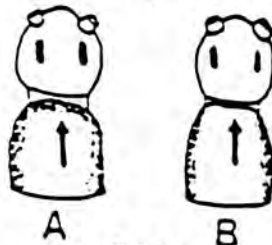
- 17) Fourth abdominal segment mostly dark ----- Q. alpa
- 17') Fourth abdominal segment mostly pale ----- 13
- 18) Third abdominal less completely pigmented than second ----- Q. fishmani
- 18') Third abdominal segment about as well, or more heavily pigmented than second (Fig. 650E) ----- Q. celsa



- 19) Third abdominal segment with 1 outer A macrochaeta (Fig. 651A); thoracic and first abdominal segments without a mid-dorsal stripe (Fig. 650A,B) -----Q. ainsliei  
 19') Third abdominal segment lacking an outer A macrochaeta (Fig. 651B); mid-dorsal line present on first abdominal segment at least and sometimes on adjacent segments (Fig. 650C-E) -----Q. celsa

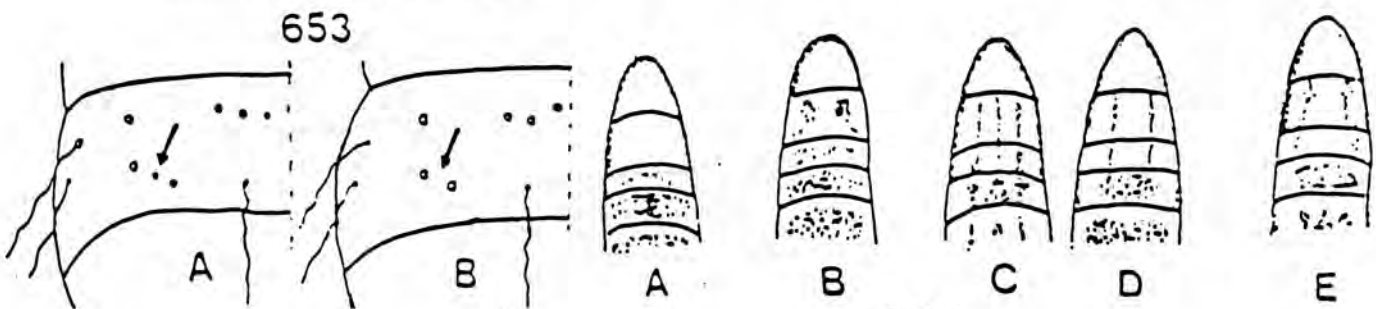


- 20) Second thoracic and fourth abdominal segments without clear pigment spots, or with minor smudges -----Q. annulicornis  
 20') Second thoracic and/or fourth abdominal segments with clear pigmented patterns -----21  
 21) Basal subsegment of second antennal segment almost entirely dark; third abdominal segment without outer A macrochaeta (Fig. 651B) -----Q. cincta  
 21') Basal subsegment of second antennal segment pale or apically ringed with dark -----22  
 22) Mesothorax with clear band along anterior margin (Fig. 652A) -----Q. hexfasciata  
 22') Mesothorax without clear band along anterior margin (Fig. 652B) -----23



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- 23) Third abdominal segment with 3 M macrochaetae (Fig. 653A); metathorax without dorsal pigment (Fig. 654A) or dorsal markings not continuous longitudinal lines through first abdominal segment (Fig. 654B) -----Q. alpa  
 23') Third abdominal segment with 2 M macrochaetae (Fig. 653B); metathorax and first abdominal segment with continuous dorsal longitudinal stripes and with or without a mid-dorsal stripe (Fig. 654C-E) -----24

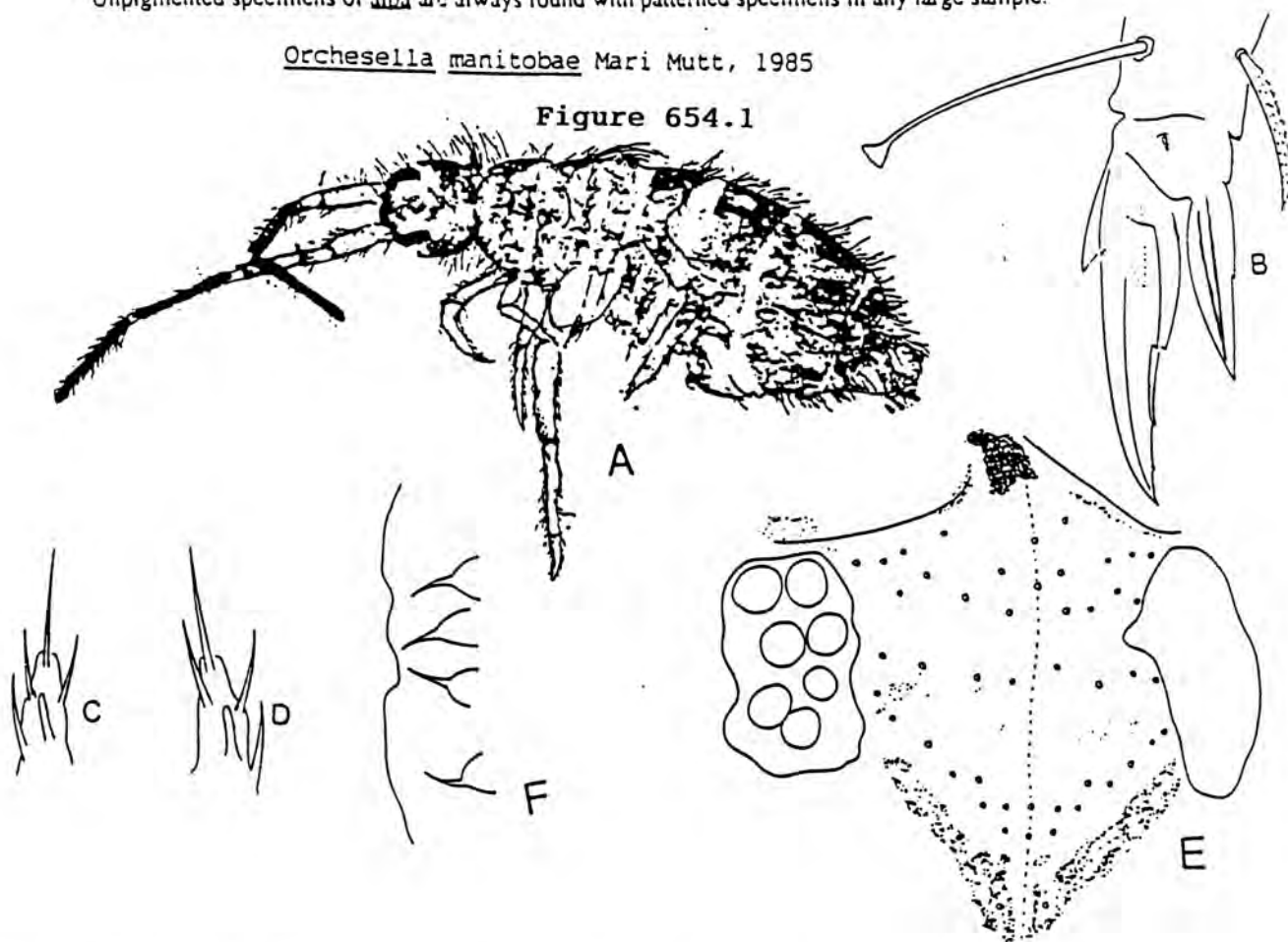


- 24) Third abdominal segment without an outer A macrochaeta (Fig. 651B); with a mid-dorsal stripe from the metathorax to second abdominal segment (Fig. 654C) ----- *Q. celsa*
- 24') Third abdominal segment with 1 outer A macrochaeta (Fig. 651A); metathorax and first two abdominal segments lacking a mid-dorsal stripe (Fig. 654D,E) ----- *Q. ainsliei*
- 25) Third abdominal segment with 1 outer A macrochaeta (Fig. 651A) ----- 26
- 25') Third abdominal segment without outer A macrochaeta (Fig. 651B) ----- 29
- 26) Antennal pin seta of type 4 (Fig. 645 D,E) ----- *Q. manitobae* Mari-Mutt, 1985
- 26') Antennal pin seta of type 1 or 2 (Fig. 645A,B) ----- 27
- 27) Antennal pin seta almost always type 2 (Fig. 645B), alpine western species ----- *Q. alpa*<sup>1</sup>
- 27') Antennal pin seta of type 1 (Fig. 645A), widespread lowland species ----- *Q. albosa*
- 28) Third abdominal segment with 3 M macrochaetae (Fig. 653A); antennal pin seta usually of type 2 (Fig. 645B) ----- *Q. hexfasciata*
- 28') Third abdominal segment usually with 2 M macrochaetae (Fig. 653B); antennal pin seta of type 4 (Fig. 645D,E) ----- *Q. celsa*

<sup>1</sup> Unpigmented specimens of *alpa* are always found with patterned specimens in any large sample.

*Orchesella manitobae* Mari Mutt, 1985

Figure 654.1



*Q. manitobae*. A) Habitus; B) Hind foot complex; C) right and D) left outer labial papilla with differentiated seta; E) Eyes and dorsal cephalic chaetotaxy; F) Labral papillae. After Mari Mutt 1985.

Not included in key:

<u>diagonalis</u> Maynard, 1951	form of <u>villosa</u>
<u>flavescens</u> Bourlet, 1839 ( <u>Heterotoma</u> )	North Carolina record probably <u>ainsliei</u> ; California record (Reuter) unplaceable
<u>flavopicta</u> Packard, 1873	= <u>cincta</u>
<u>irregularilineata</u> Stach, 1960	Nearctic record = <u>zebra</u> or <u>bulba</u>
<u>pallens</u> Maynard, 1951, nec Latzel, 1918	unplaceable without types
<u>pallida</u> Reuter, 1895	<u>flavescens</u> f.; unplaceable without specimens
<u>pallida</u> Kos, 1936	<u>cincta</u> f.
<u>rubra</u> Scott, 1963	<u>Isotoma viridis</u> (Bellinger 1985)
<u>rufescens</u> Wulfen, 1788 ( <u>Podura</u> )	unplaceable, not Nearctic
<u>vaga</u> Linnaeus, 1767 ( <u>Podura</u> )	<u>cincta</u> form

Orchesella ainsliei Folsom, 1924

Fig. 655

Refs.: Amer. Mus. Novit. 108:6; Maynard 1951.

n. syn.: indigena Stach, 1966, Acta zool. cracov. 11:214 (Entomobrya).

### Description

Color: background pale yellow to white; blue to purple pigment on lateral margins of thorax, and with a pair of continuous paramedial lines from the middle of the mesothorax through the fifth abdominal segment, or replaced behind the first abdominal segment by wide dorsal and lateral pigmented areas, sometimes almost entirely covering these segments; one series of specimens shows only traces of pigment; on the body with the first antennal segments apically banded, fourth uniformly pigmented. Eyes A & B slightly larger than C & D. Third abdominal segment .65 - .75 as long as fourth. Setae of type 5 cylindrical for most of length and tapering for about apical 1/3; unilaterally ciliate for apical 1/5. Maximum length 2.0 mm.

We have not seen the chaetotaxy on type specimens; our analysis is based on other material having the same pattern as the types. O. ainsliei is similar to O. alpa in many respects, but differs in chaetotaxy and basic pattern.

Localities: Illinois - Champaign Co. (type), Henderson Co.; Iowa - Boone Co., Butler Co., Dickinson Co., Jackson Co., Jasper Co.

Additional records: Indiana (Pedigo, 1970); Kentucky (Lesshafft, 1977); Louisiana (Hepburn & Woodring, 1963); Maryland (Ostdiek, 1961); Michigan (Snider, 1967); Minnesota (Jensen et al, 1973); Missouri (Bueker, 1939); New York (Folsom, 1924); North Carolina (Brimley, 1938); South Carolina (DuRant, 1966); Tennessee (Folsom, 1924); Virginia (Mitchell & Turner, 1969); West Virginia (Lippert & Butler, 1970); Wisconsin (Lussenhop, 1973). Ontario (James, 1933). Texas records (Mills, 1932; Scott & Stojanovich, 1962) may well be O. fishmani.

Orchesella ainsliei

A) Habitus, after Folsom.

B) Pattern, specimen, from Illinois.

C) Pattern, specimen from Missouri, after Bueker, 1939.

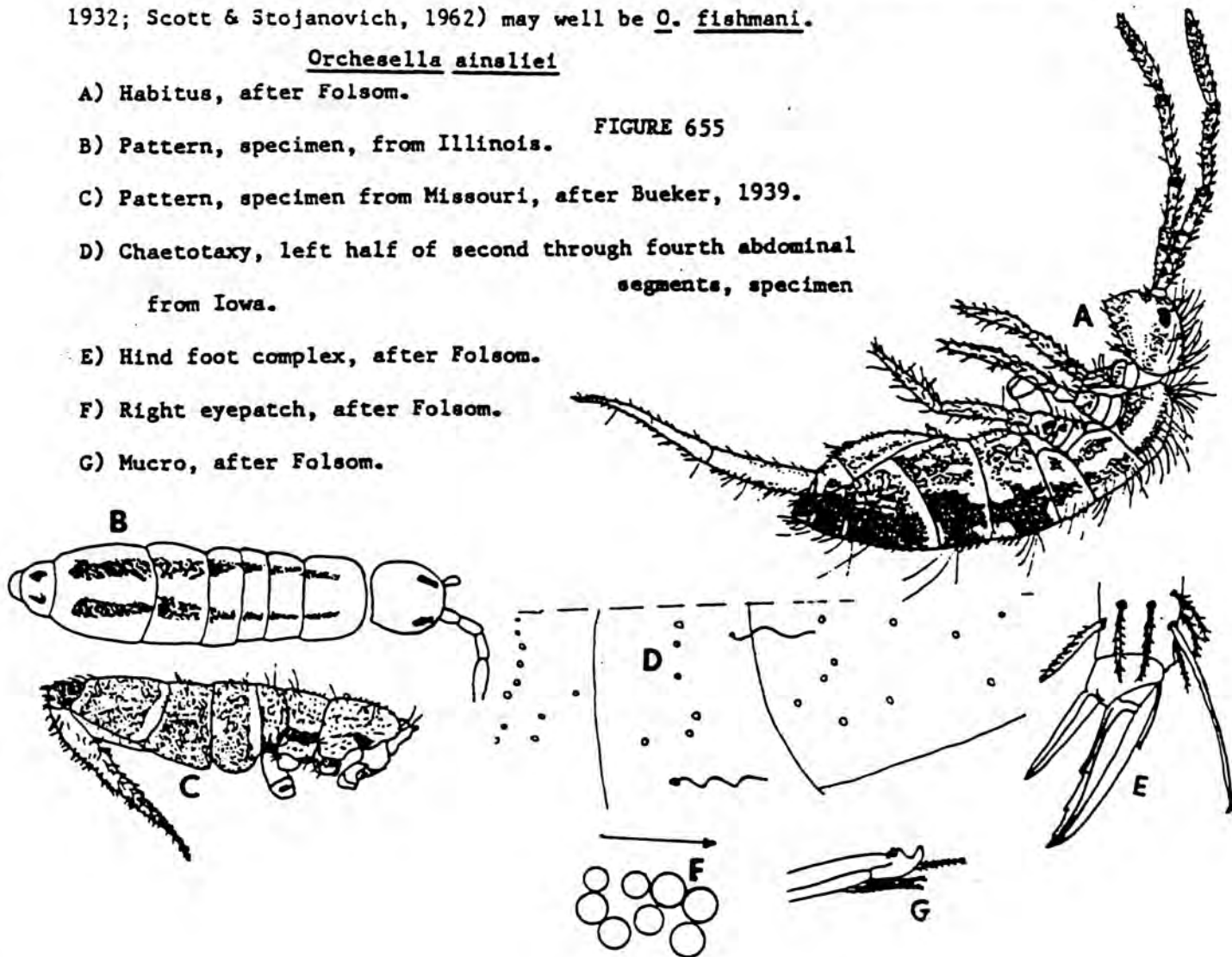
D) Chaetotaxy, left half of second through fourth abdominal segments, specimen from Iowa.

E) Hind foot complex, after Folsom.

F) Right eyepatch, after Folsom.

G) Mucro, after Folsom.

FIGURE 655





Ref.: Collembola of Minnesota: 61.

Description

Color: pigment lacking except for eyes and occasionally an interantennal dark spot. Eye A clearly larger (about 1 1/2 times) than C & D, and slightly larger than B. Third abdominal segment 2/3 - 3/4 as long as fourth. Body setae of type 5 narrowly fusiform and unilaterally ciliate for apical 5/6 of length. Maximum length 2.0 mm.

Remarks

This is a problematic species. What we call albosa is not certainly the same as Guthrie's species, since he does not figure the eyes as seen in most of our specimens. We are using the name for the residual group of entirely unpigmented forms, which can be separated from pale forms of other species only on morphological grounds. O. albosa in our sense may be conspecific with ainsliei; however, we prefer to keep the 2 separate for the moment, since they have not been found associated and appear to differ in minor morphological features. Some unpigmented specimens of O. alpa have 2 m setae on the third abdominal segment and may key out to albosa.

Localities: Illinois - Massac Co.; Minnesota - Hennepin Co. (type); Massachusetts - Essex Co., Norfolk Co.; Wyoming - Carbon Co.

Published records are suspect because of possible confusion with pale forms of other species.

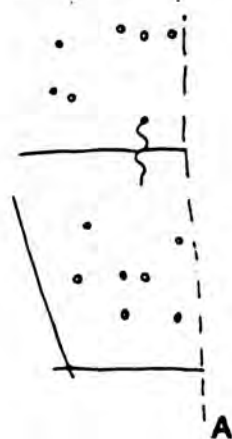
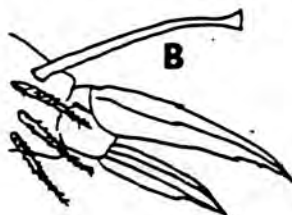
Orchesella albosa

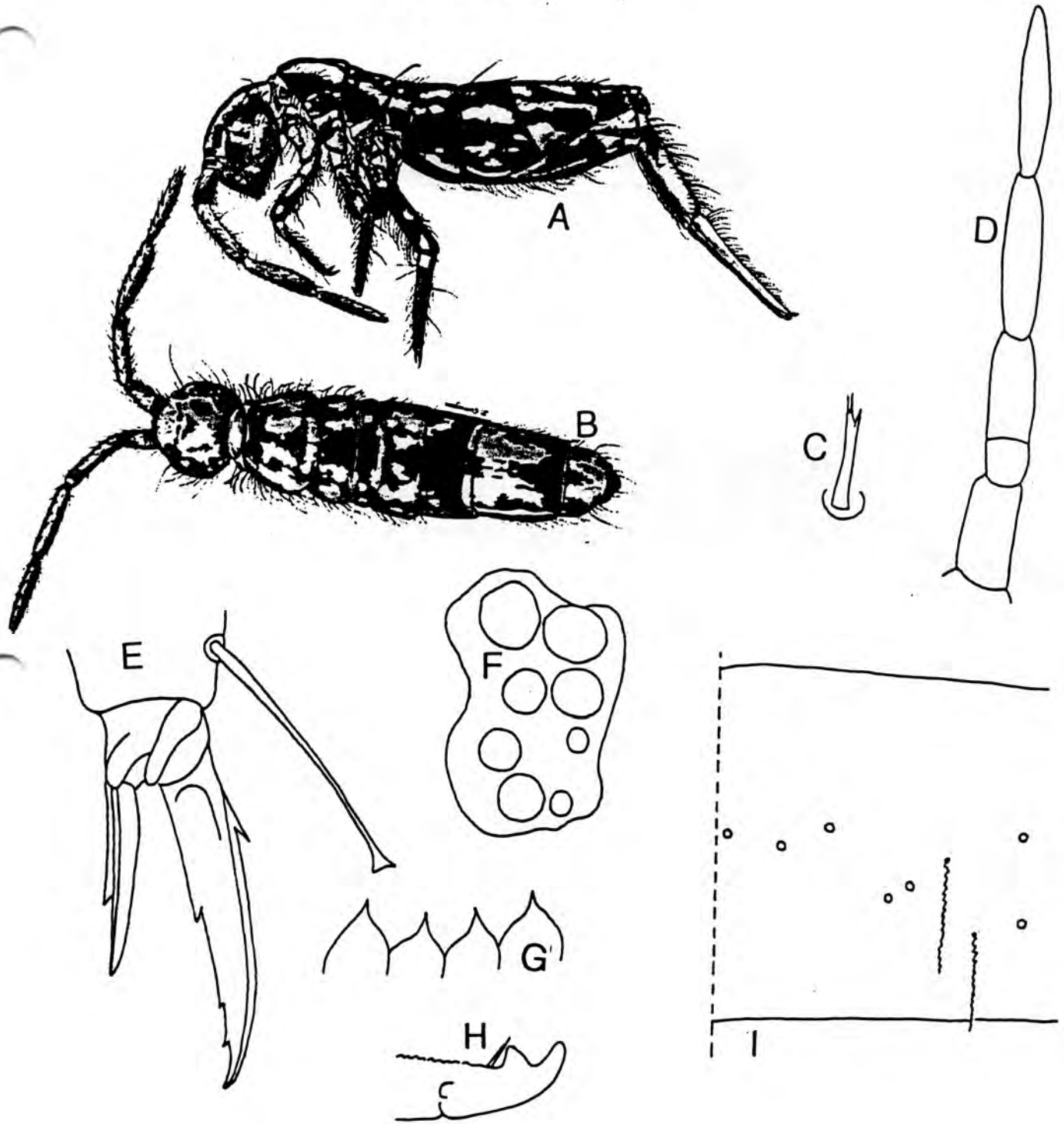
A) Chaetotaxy of third and fourth abdominal segments of left side, specimen from Massachusetts.

B) Front foot complex, after Mills, 1934.

C) Mucro, specimen from Norfolk Co., Massachusetts.

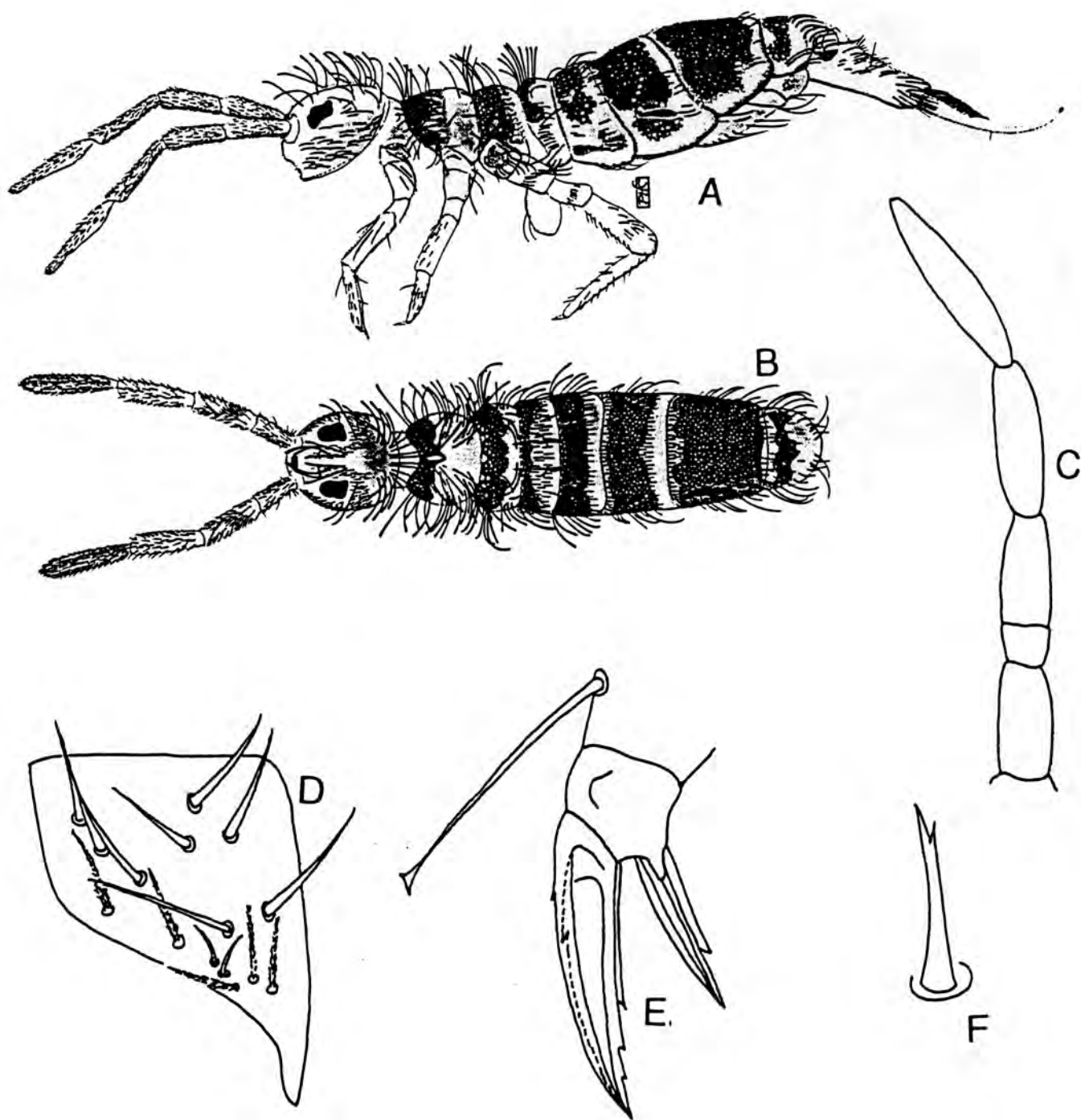
FIGURE 656



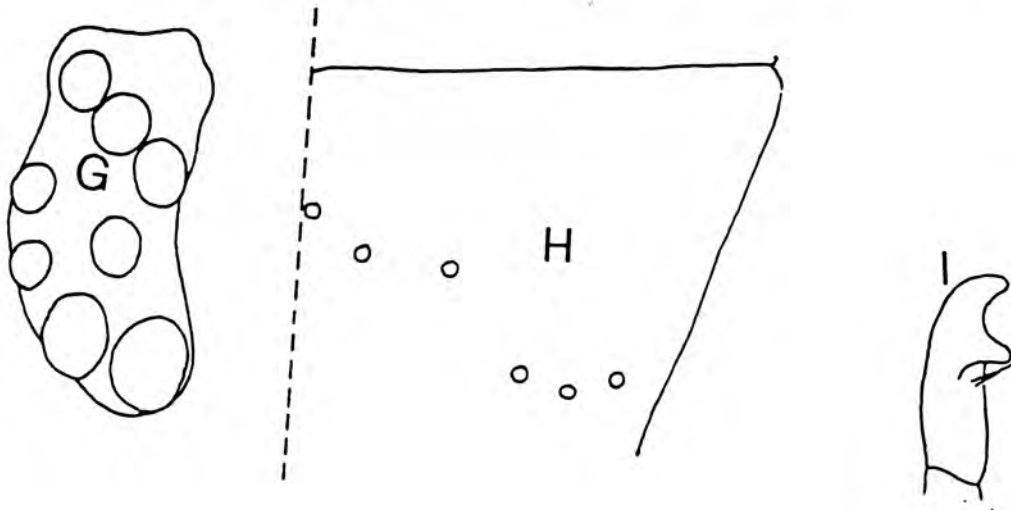


*O. gloriosa*. A) Habitus, side view; B) Habitus, dorsal view; C) Pin seta of 4th antennal segment; D) Antennal outline; E) Hind foot complex; F) Left eyepatch; G) Labral papillae; H) Mucro; I) Dorsal chaetotaxy, right side, third abdominal segment. After Snider 1997.

*Orchesella imitari* Snider 1997  
Figure 656.2



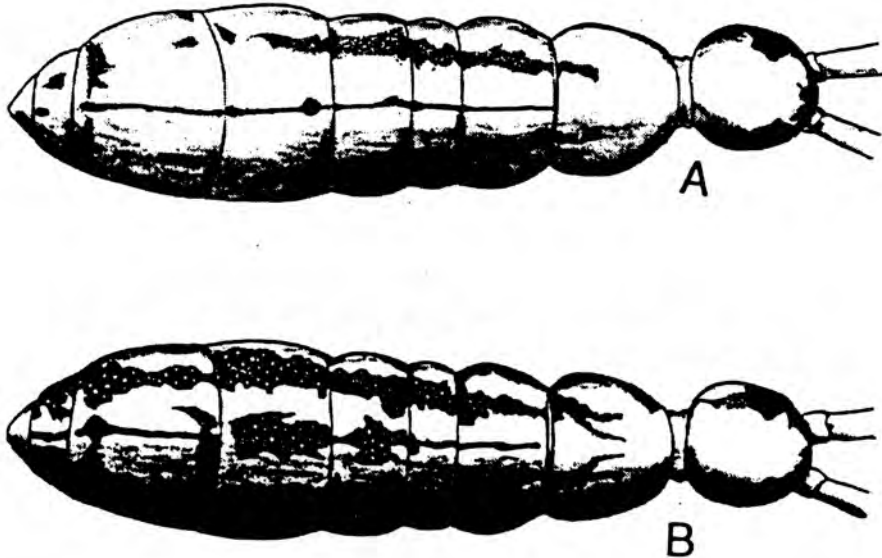
*O. imitari*. A) Habitus, lateral view; B) Habitus, dorsal view; C) Antennal outline; D) Right labial triangle; E) Hind foot complex; F) Pin seta of 4th antennal segment. After Snider 1997.

Orchesella imitari Snider 1997 Continued

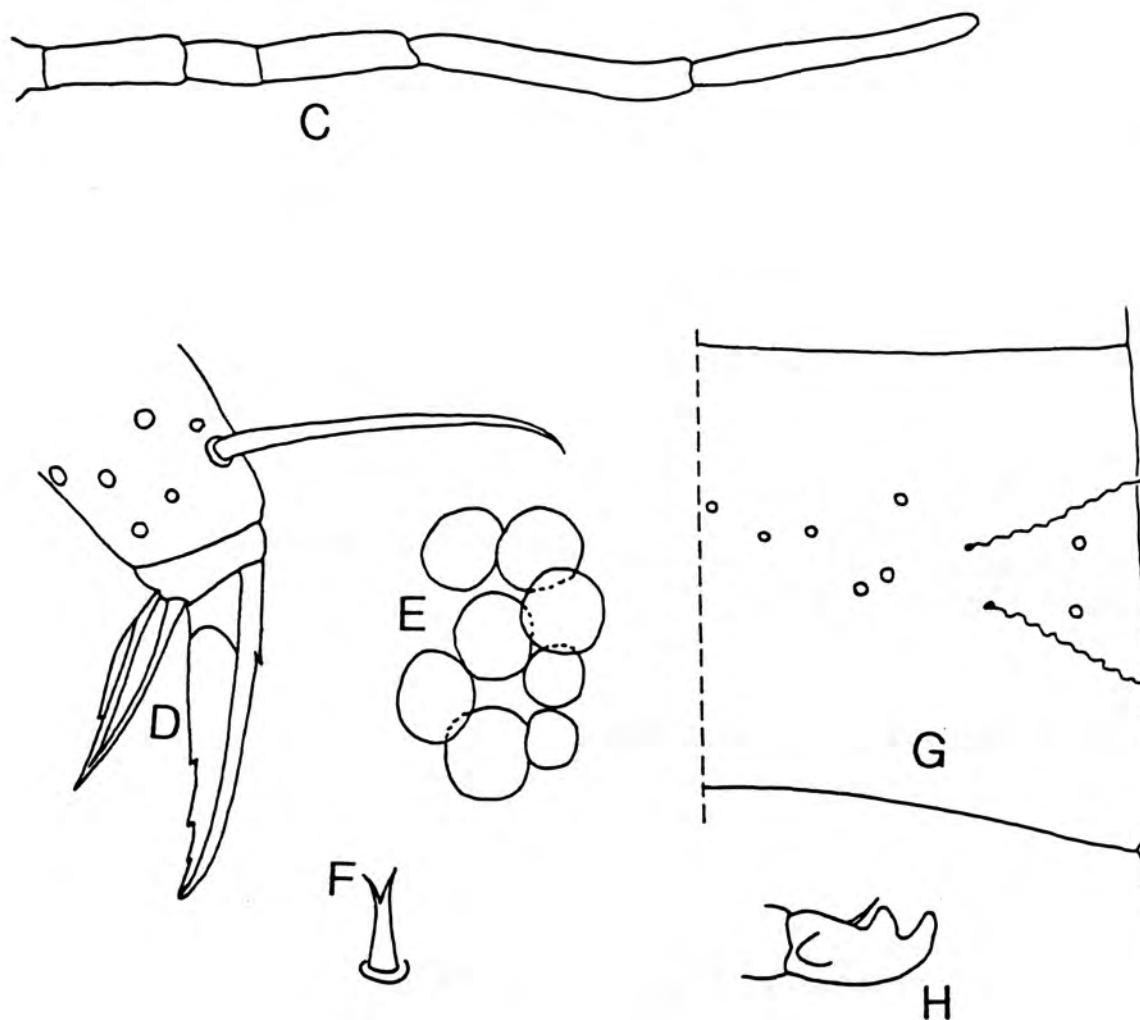
O. imitari. G) Left eyepatch; H) Dorsal chaetotaxy, right side, third abdominal segment; I) Mucro. After Snider 1997.

Orchesella texensis Snider 1997

Figure 656.3



O. texensis. A) Dorsal view of reduced color pattern; B) Dorsal view of full color pattern. After Snider 1997.

Orchesella texensis Snider 1997 Continued

O. texensis C) Antennal outline; D) Hind foot complex; E) Left eyepatch; F) Pin seta of fourth antennal segment; G) Dorsal chaetotaxy, right side, third abdominal segment; H) Mucro. After Snider 1997



Ref.: Proc. Iowa Acad. Sci. 84:8.

Description

Color: background yellowish; pigment blue to purple-brown, generally in transverse bands on the second and third abdominal segments and a broad mid-dorsal rectangle on the fourth abdominal segment; sometimes with transverse bands on all segments, or with the body uniformly dark except for intersegmental membranes and the middorsal head region; sometimes completely pale except for the eyes, antennal bases, and interantennal spot; antennae pale, but in dark specimens sometimes uniformly pigmented except for the basal subsegment of the second antennal segment. Eyes A & B only slightly larger than C, D, & E. Setae of type 5 narrowly fusiform, ciliate for apical 7/8 of length on all surfaces except for 1. Maximum length 2.7 mm.

Remarks

This species resembles O. hexfasciata in some respects, but differs in typical pattern and chaetotaxy, as well as in a number of minor characters. So far it has been taken only in high altitude localities in the West. A population from Carbon Co., Wyoming had rare specimens with only 2 m setae on the third abdominal segment, and the pale forms might be confused with O. albosa.

Localities: Colorado - Chaffee Co., Huerfano Co., San Juan Co.; New Mexico - Sierra Co., Taos Co. (type); Utah - Summit Co.; Wyoming - Albany Co., Carbon Co.

Orchesella alpa

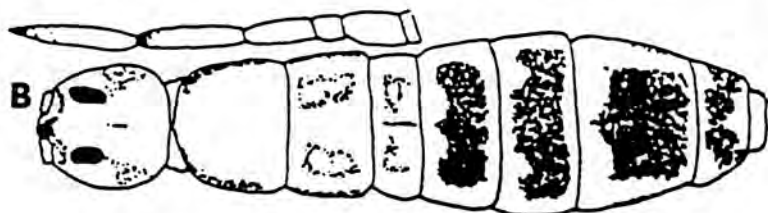
A) Habitus, specimen from Wyoming, after Christiansen and Tucker. FIGURE 657

B) - D) Pattern variations, specimens from New Mexico, after Christiansen and Tucker.

E) Chaetotaxy of left side of second through fourth abdominal segments, specimen from Taos Co., New Mexico.

F) Hind foot complex, specimen from Albany Co., Wyoming.

G) Mucro, specimen from Albany Co., Wyoming.



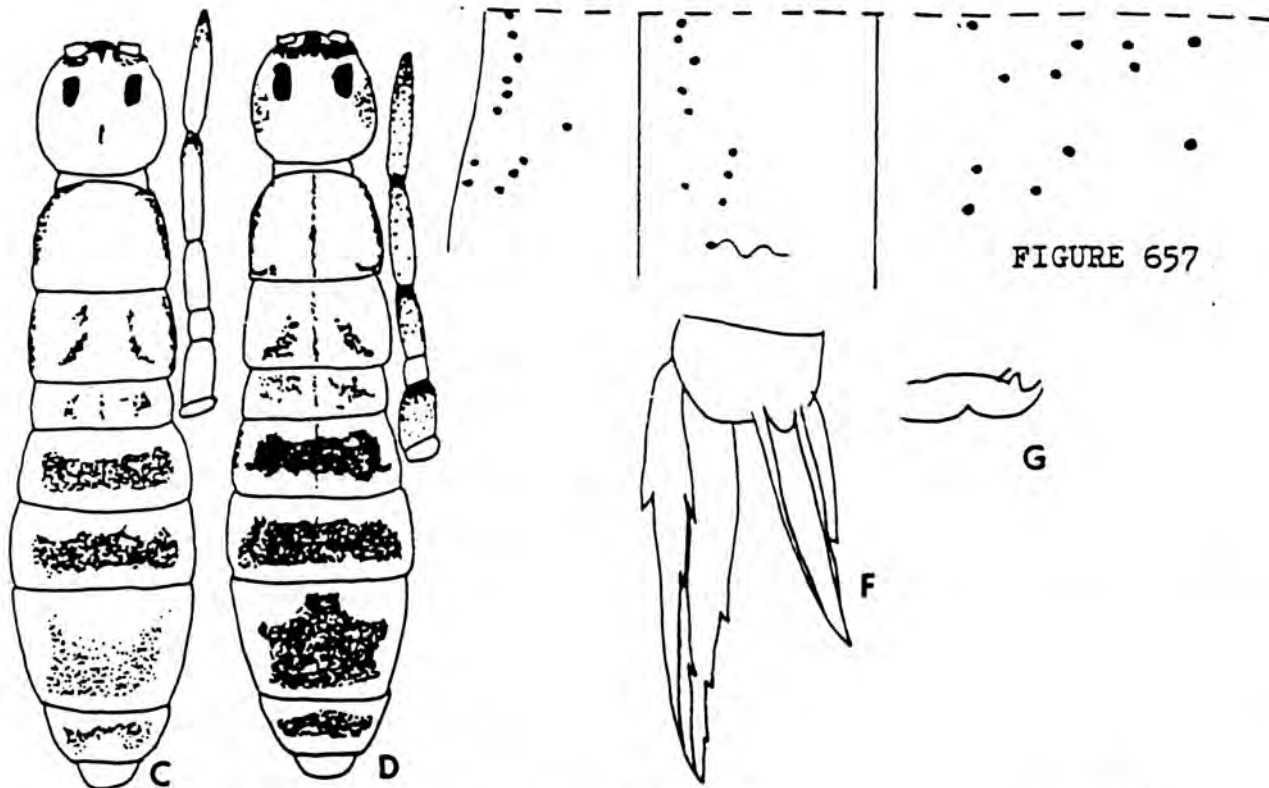


FIGURE 657

Orchesella annulicornis Mills, 1934

Fig. 658

Ref.: Collembola of Iowa: 18.

#### Description

Color: background tawny yellow to buff; front of head deep blue; scattered purple pigment at segmental margins and forming a fine interrupted middorsal line, most evident from the metathorax to the third abdominal segment, and suggestions of ventrolateral and lateral lines on each side; venter bluish. Eyes A & B slightly larger than C & D. Third abdominal segment .65 - .75 as long as fourth. Body setae of type 5 narrowly fusiform and unilaterally or bilaterally ciliate for apical 7/8 of length. Maximum length 2.2 mm.

#### Remarks

The only specimens we have seen are the types. The species has not been recorded since the original description; it is possibly a variant of hexfasciata, but there appears to be a minor difference in the chaetotaxy of the third abdominal segment in addition to the striking difference in pattern. An outer a seta may or may not be present on the third abdominal segment. In view of the discovery of bulba we regard Mills' record of annulicornis from Florida as dubious and requiring verification.

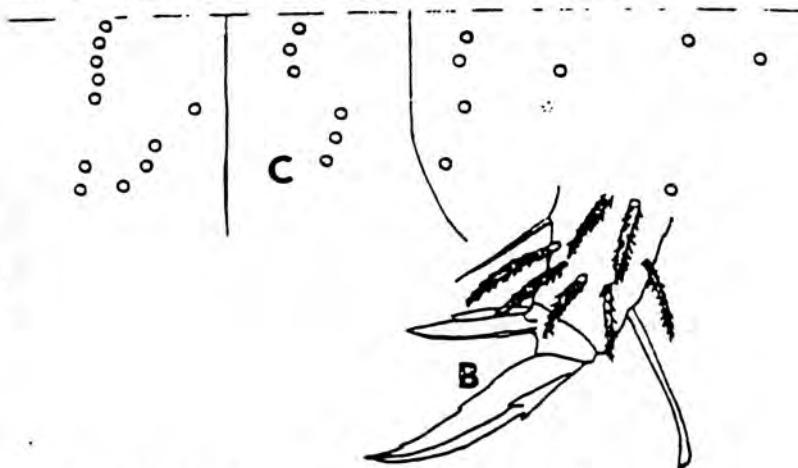
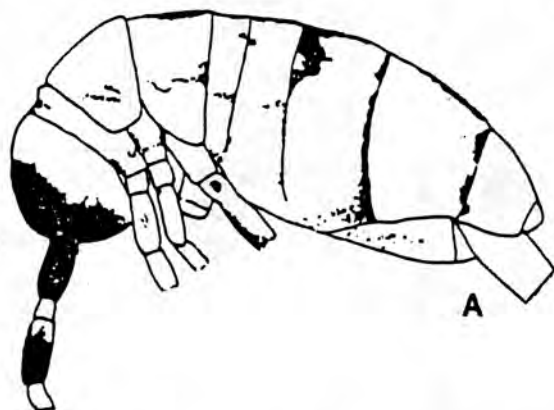
Localities: Iowa - Wapello Co. (type).

A) Habitus, after Mills.

B) Hind foot complex, after Mills.

C) Chaetotaxy of left side dorsum of second through fourth abdominal segments, type specimen (dotted circle indicates seta found on one side only).

FIGURE 658



Orchesella bulba Christiansen & Tucker, 1977

Ref.: Proc. Iowa Acad. Sci. 84:1.

Fig. 659

#### Description

Color: background white, with blue pigment usually limited to rings on apices of first 2 antennal segments and subsegment of second, interantennal spot or band, faint cheek patches, and lateral margins of second and third thoracic segments; dark specimens have irregular pigment on the dorsum of these body segments and, rarely, suffusing the posterior abdominal segments or forming a pair of light, irregular longitudinal stripes on these segments. Eyes A & B no larger than C & D, giving eyepatch a rectangular shape. Third abdominal segment .55 - .65 as long as fourth. Body setae of type 5 narrowly fusiform and ciliate for apical 7/8 of length. Maximum length 2.24 mm.

#### Remarks

This species is clearly distinguished from all others by the presence of the apical antennal bulb. The Florida specimens differ from those from Louisiana in having an additional  $m$  seta on the second abdominal segment.

Localities: Arkansas - Chico Co.; Florida - Dade Co. (type), Highlands Co., Monroe Co.; Louisiana - Ouachita Par.

Orchesella bulba

- A) Habitus, type specimen.  
 B) - E) Pattern variations, after Christiansen and Tucker.  
 B) Specimen from Dade Co., Florida.  
 C) - E) Specimens from Ouachita Par., Louisiana.  
 F) Chaetotaxy of left side of second and third abdominal segments, type specimen.  
 G) & H) Chaetotaxy of left side of fourth abdominal segments, two different type specimens.  
 I) Hind foot complex, type specimen.  
 J) Antennal apex, after Christiansen and Tucker.  
 K) Mucro, type specimen.

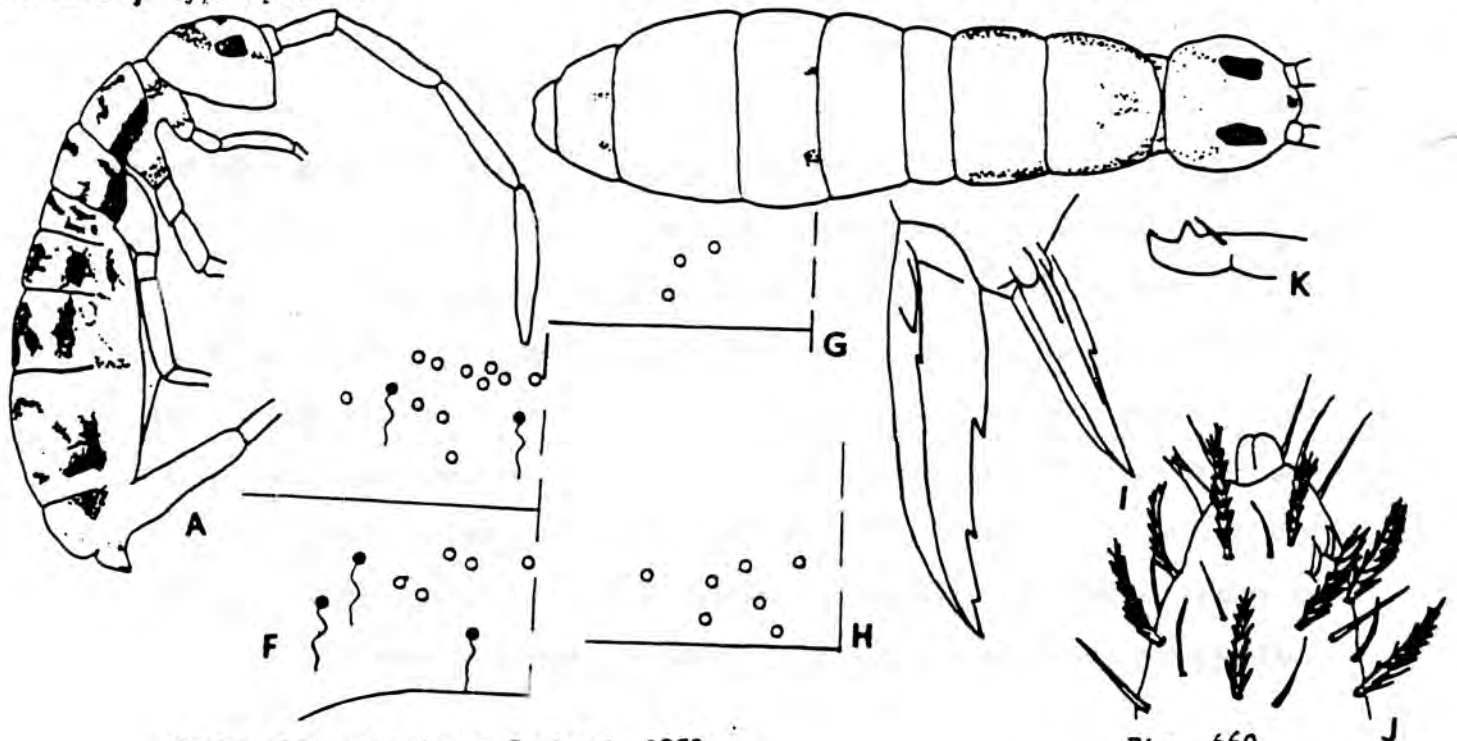
Orchesella carneiceps Packard, 1873

Fig. 660

Ref.: Rep. Peabody Acad. Sci. 5:40.

## Description

Color: background flesh-colored to yellow; dark purplish blue pigment covering body except for narrow intersegmental lines; head and furcula pale; antennae with segmental apices and entire fourth segment dark. Eyes A & B much larger than C & D. Third abdominal segment about 3/4 as long as fourth.



Body setae of type 5 narrowly fusiform and unilaterally ciliate for apical  $4/5$  of length. Maximum length 2.0 mm.

Remarks

We saw only 2 poor specimens of this species other than a smashed type specimen. It could be conspecific with folsomi or hexfasciata, but appears to differ from the former in chaetotaxy and the latter in color, in addition to the obvious difference in pattern; a final decision on its status requires better material.

Localities: Illinois - Karnak; Tennessee - Knox Co. (type).  
Additional record: North Carolina (Wray, 1967).

FIGURE 660

Orchesella carneiceps



A) Habitus, specimen from Illinois.

B) Hind foot complex, same specimen.

C) Mucro, same specimen.

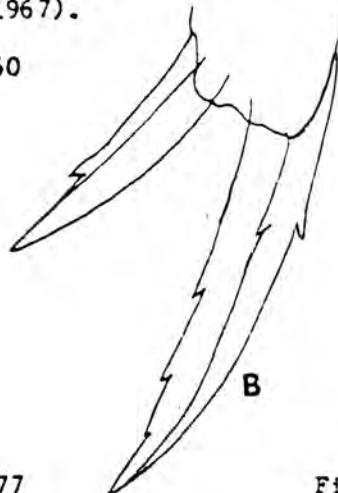


Fig. 661

Orchesella celsa Christiansen & Tucker, 1977

Ref.: Proc. Iowa Acad. Sci. 84:3.

Description

Color: background white; blue pigment generally in irregular and incomplete cross bands on second and third abdominal segments, and 2-5 more or less well-developed longitudinal lines on the anterior and sometimes the posterior body segments; markings may be reduced to vestiges, or in dark specimens may be accompanied by additional lighter patches on the fourth through sixth abdominal segments; antennal segments apically darkened. Eyes A & B larger than or subequal to C & D. Third abdominal segment .6 - .7 as long as fourth. Body setae of type 5 basally cylindrical, apically tapering or narrowly fusiform, and unilaterally ciliate for  $7/8$  of length. Maximum length 2.7 mm.

Remarks

The basic pattern - cross bands on the second and third abdominal segments combined with longitudinal markings elsewhere - is difficult to define but generally very striking. Some earlier records of O. ainsliei and O. hexfasciata probably refer to this form. The specimens from South Carolina are somewhat



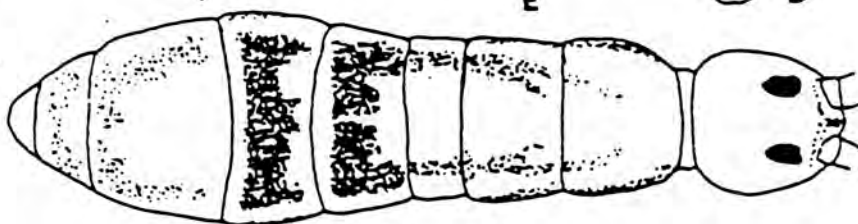
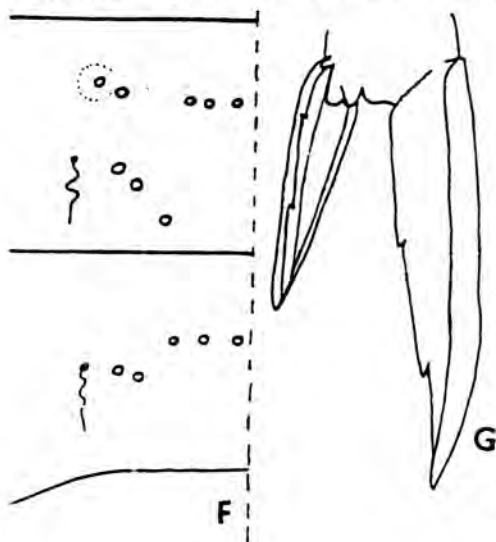
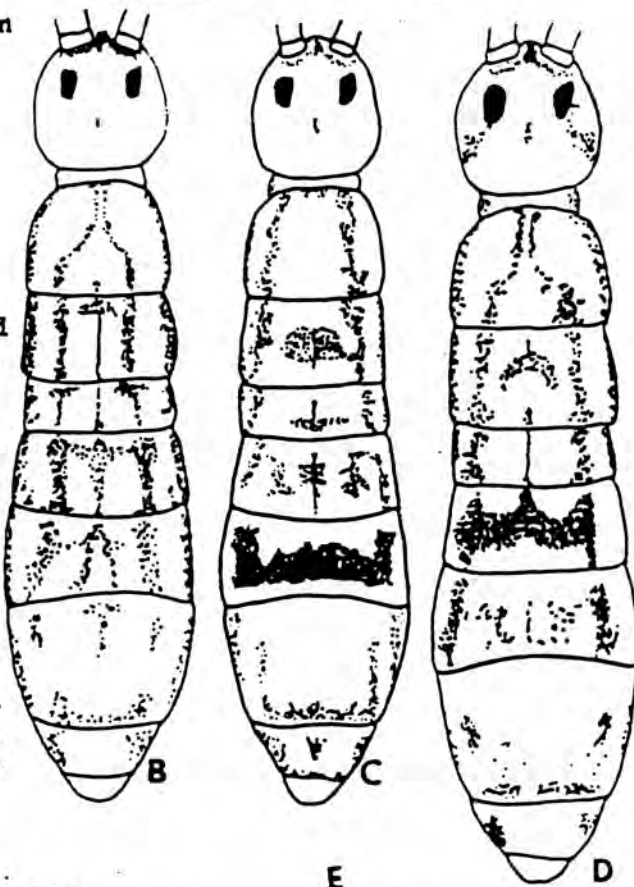
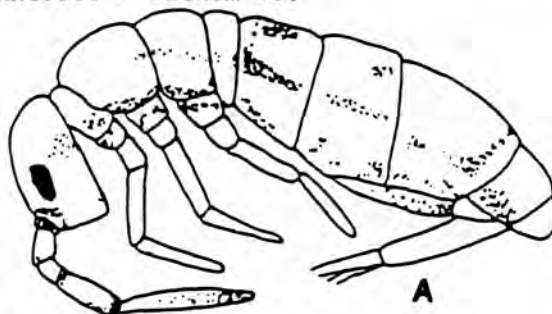
unusual, and at least sometimes have 3+3 m setae on the second abdominal segment; they may belong to a closely related species, or represent local variation.

Localities: Arkansas - Hot Springs Co., Union Co.; Illinois - Hancock Co.; Iowa - Jasper Co.; Louisiana - Ouachita Par., Winn Par.; Missouri - Boone Co.; North Carolina - New Hanover Co. (type); Pennsylvania - Bedford Co., Centre Co.; South Carolina - Oconee Co.; Tennessee - Putnam Co.

FIGURE 661

Orchesella celsa

- A) Habitus, after Christiansen and Tucker.  
 B) - E) Pattern variations, after Christiansen and Tucker.  
 B) Specimen from Hot Springs Co., Arkansas.  
 C) Specimen from Putnam Co., Tennessee.  
 D) Specimen from Ouachita Par., Louisiana.  
 E) Specimen from Hancock Co., Illinois.  
 F) Chaetotaxy of left side of second and third abdominal segments, specimen from Ouachita Par., Louisiana.  
 G) Hind foot, specimen from same locality.  
 H) Mucro, specimen from same locality.



Orchesella cincta (Linnaeus), 1758

Fig. Fig. 662

Refs.: Systema Naturae, ed. 10:609; Stach, 1960.

Syns.: vaga Linnaeus, 1767, Systema Naturae, ed. 12:1013; flavopicta Packard, 1873, Rep. Peabody Acad. Sci. 5:41.

#### Description

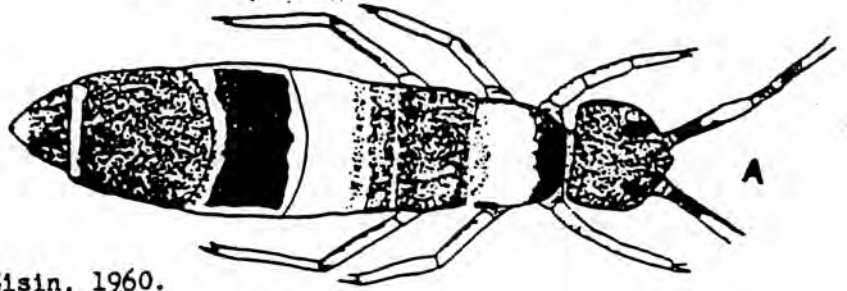
Color: background yellowish to off-white; pigment varying from blue to purplish brown, generally very dark, usually in the form of broad cross bands with some irregularly longitudinal markings anteriorly, and consistently covering the third abdominal segment solidly in contrast to the second segment, which is almost entirely pale dorsally; basal subsegment of second antennal segment often dark. Eyes A & B slightly larger than C & D. Third abdominal segment .55 - .70 times as long as fourth. Body setae of type 5 curved and unilaterally ciliate for apical 4/5 of length. Maximum length 4.5 mm.

#### Remarks

The unusual chaetotaxy of the second abdominal segment which we figure is seen only in large specimens; in smaller individuals there are 2+2 outer and 10+10 inner a macrochaetae. We have examined the Massachusetts types of flavopicta, and they appear to be inseparable from cincta. The Texas specimens identified by Packard as flavopicta are clearly a different species. This is probably an introduced species which is well established only in the north-eastern United States and Canada.

Localities: Maine - Knox Co.; Massachusetts - Essex Co., Middlesex Co.; Vermont - Windsor Co. Nova Scotia - Kings Co., Lunenburg Co., Picton Co.

Additional records: Idaho (Wray & Knowlton, 1956); Kentucky (Lesshaft, 1977); Louisiana (Hepburn & Woodring, 1963); Michigan (Snider, 1967); New York (Maynard, 1951); North Carolina (Wray, 1967); Oregon (Scott, 1942); Utah (Wray & Knowlton, 1953). Canada: Grande Miquelon, Newfoundland & St. Pierre (Stach, 1966). We believe that southern and western records require verification, in light of the description of O. alpa and other species.

Orchesella cincta

A) Pattern, after Stach.

B) Pattern variation, after Gisin, 1960.

C) Chaetotaxy of left side of second through fourth abdominal segments

(encircled setae present only on largest specimens), specimens from Nova Scotia.

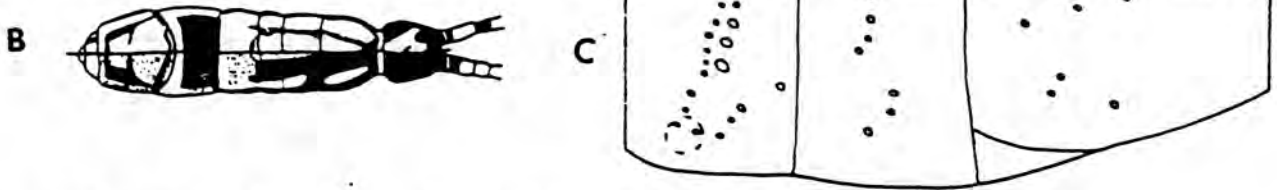
Orchesella fishmani Christiansen & Tucker, 1977

Fig. 663

Ref.: Proc. Iowa Acad. Sci. 84:5.

## Description

Color: background (in old alcoholic specimens) yellow; blue to blue-black pigment in a complex and variable pattern, but generally with a wide middorsal longitudinal stripe on the thorax and lateral stripes from the thoracic margins to the third abdominal segment; second abdominal segment largely dark; fourth with a patch of pigment in each posterolateral corner (pattern on third and fourth abdominal segments varies greatly); first antennal segment and distal subsegment of second segment generally dark and remaining segments pale. Eyes A & B about 1 1/4 times as large as C & D. Third abdominal segment .6 - .8 times as long as fourth. Body setae of type 5 narrowly fusiform and ciliate for apical 7/8 of length. Maximum length 2.7 mm.

## Remarks

This unusual species is the only lowland form we have seen from the Southwest. The single very large collection shows considerable pattern variation. It appears to be closest to alpa, but differs strikingly in pattern and habitat.

Locality: Texas - Calhoun Co. (type).

Orchesella fishmani

- A) Habitus, type specimen.  
 B) - E) Pattern variations, after Christiansen and Tucker.  
 F) Chaetotaxy of left side of second through fourth abdominal segments, type specimen.  
 G) Hind foot complex, type specimen.  
 H) Mucro, type specimen.

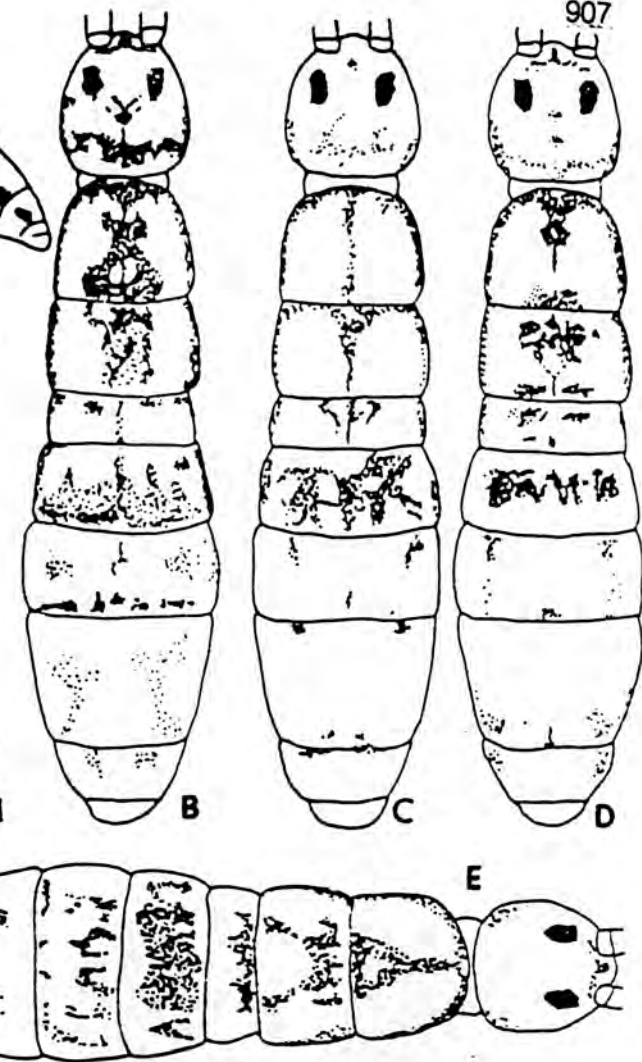
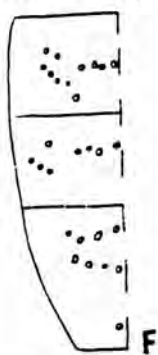
Orchesella flora Christiansen & Tucker, 1977

Fig. 664

Ref.: Proc. Iowa Acad. Sci. 77:5.

## Description

Color: background yellow to orange; dark blue pigment, limited to eyepatches, uniform covering of thorax and usually first abdominal segment, and apical rings on antennal segments; occasionally with lighter pigment on leg bases, metathoracic femur, and lateroventral margins of second and third abdominal segments. Eyes A & B slightly larger than C & D. Third abdominal segment .6 - .75 times as long as fourth. Body setae of type 5 cylindrical for basal 3/4, apically tapered, and unilaterally ciliate for apical 7/8 of length. Maximum length 2.43 mm.

## Remarks

This species shows some resemblance in pattern to both O. carneiceps and O. folsomi, but if the pattern we saw is consistent could easily be distinguished from both: it also appears to differ in chaetotaxy, so far as we can tell from



our poor material of the latter 2 species.

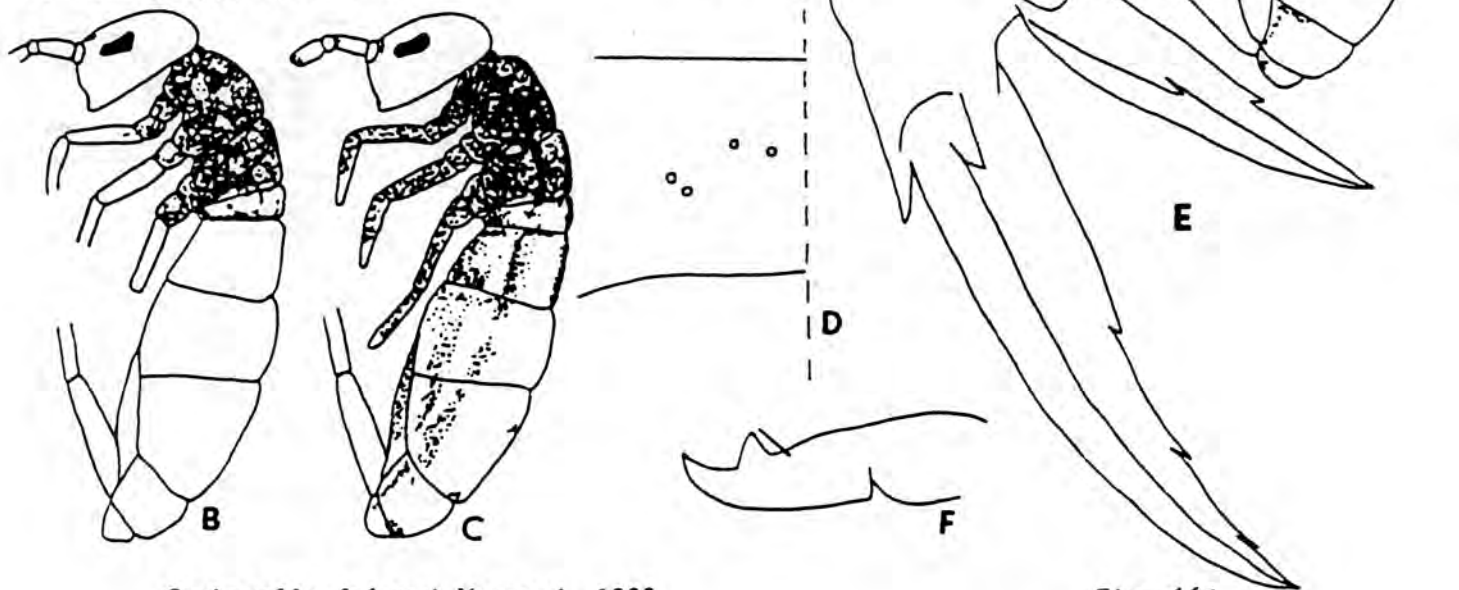
Localities: Florida - Liberty Co. (type); Indiana - Crawford Co.; North

Carolina - Graham Co.; Virginia - Fairfax Co.

FIGURE 664

Orchesella flora

- A) Habitus, specimen from Florida, after Christiansen and Tucker.
- B) & C) Pattern variations, after Christiansen and Tucker.
- B) Specimen from Liberty Co., Florida.
- C) Specimen from Crawford Co., Indiana.
- D) Chaetotaxy of left side of second and third abdominal segments, type specimen.
- E) Hind foot complex, type specimen.
- F) Mucro, type specimen.



Orchesella folsomi Maynard, 1933

Fig. 665

Refs.: in James, Trans. R. Can. Inst. 19:102; Maynard, 1951.

Description

Color: background white to pale yellow; pigment blue to dark purple, uniform except for head, mesothorax, and occasionally pale bands on the posterior margin of the fourth and anterior and posterior margins of the fifth abdominal segment; interantennal spot and sometimes lateral margins of mesothorax pigmented; antennae generally pigmented except at the segmental bases;



hind legs pigmented, other appendages pale. Body setae of type 5 cylindrical for 1/2 of length, then uniformly tapered, unilaterally ciliate for apical 7/8 of length. Second abdominal segment with 3 m setae and 1 exterior a seta. Maximum length 2.0 mm.

## Remarks

We have seen 3 specimens referable to this species. The chaetotaxy is only moderately clear, but appears to show several features which distinguish it from O. carneiceps; however, in view of the meagre material of these species it is not certain that they are distinct. The Louisiana and Indiana specimens differ in some respects and may belong to different taxa.

Localities: Indiana - Wayne Co., Louisiana - Ouachita Par.; New York (type).

Additional records: West Virginia (Lippert & Butler, 1976). Ontario (James, 1933).

FIGURE 665

Orchesella folsomi

- A) Habitus, after Maynard.  
 B) Chaetotaxy of second through fourth abdominal segments, specimen from Wayne Co., Indiana.  
 C) Hind foot complex, after Maynard.  
 D) Eyes, right side, after Maynard.  
 E) Mucro, after Maynard.

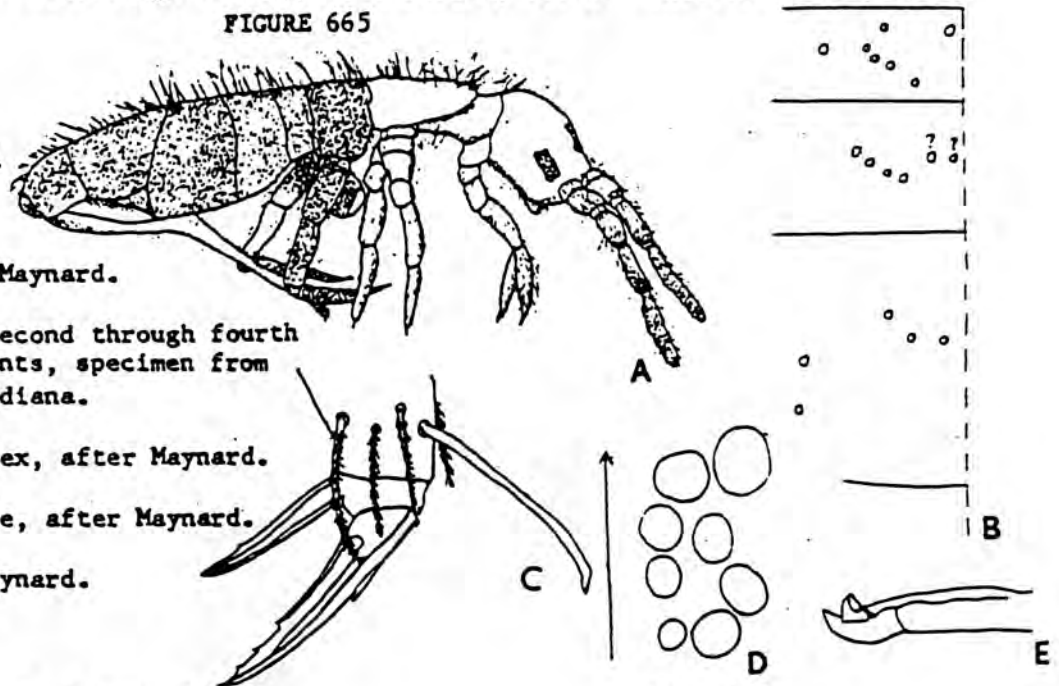
Orchesella hexfasciata Harvey, 1895

Fig. 666

Refs.: Psyche, Camb. 7:196; Maynard, 1951.

## Description

Color: background yellow to orange; blue pigment in transverse bands, usually somewhat broken, on the body; fourth abdominal segment band very irregular and often projecting forward laterally; head with interantennal patch and eyepatches only dark; rarely pigment absent except for eyes. Second antennal segment with basal subsegment weakly developed and always unpigmented. Eyes A & B larger than remainder. Third abdominal segment .6 - .75 times as long

as fourth. Body setae of type 5 slender and fusiform, heavily ciliate except on 1 side for 7/8 of length. Maximum length 3.0 mm.

Remarks

This relatively small species is the commonest form throughout much of the East and Midwest. It is superficially similar to alpa but the difference in chaetotaxy is distinctive. A single Illinois collection, lacking pigment except for the eyes, is otherwise like typical hexfasciata.

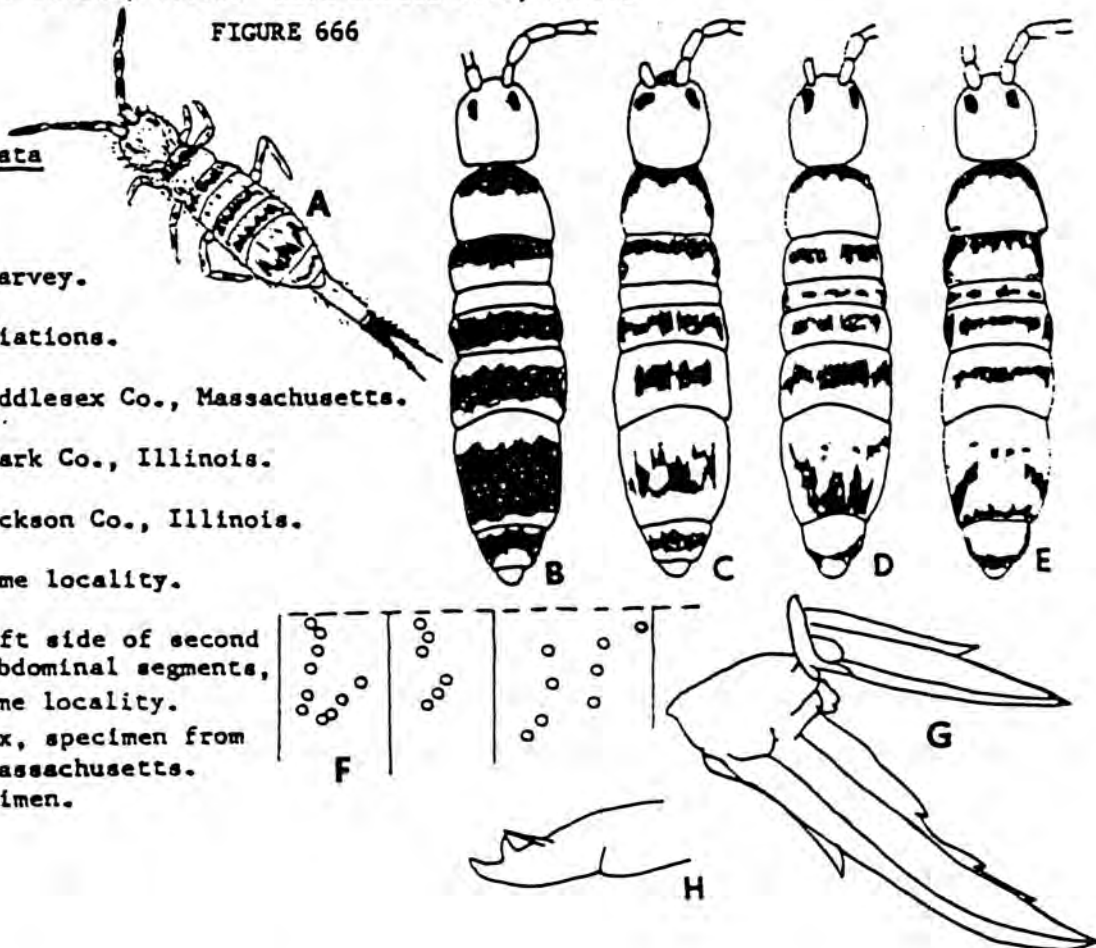
Localities: Connecticut - New Haven Co.; Illinois - Champaign Co., Clark Co., Effingham Co., Jackson Co., Vermillion Co.; Iowa - Linn Co., Story Co.; Kansas - Douglas Co.; Maine - Penobscot Co. (type), York Co.; Massachusetts - Franklin Co., Middlesex Co.; Michigan - Kalamazoo Co.; Ohio - Lorain Co.; Vermont - Addison Co., Chittenden Co., Lamouille Co. Ontario - Algona Dist.

Additional records: Indiana (Pedigo, 1970); Louisiana (Hepburn & Woodring, 1963); Maryland (Ostdiek, 1961); Missouri (Bueker, 1939); New York (Maynard, 1951); North Carolina (Brimley, 1942); Tennessee (Copeland, 1960); West Virginia (Lippert & Butler, 1976). Nova Scotia (Fox, 1967).

FIGURE 666

Orchesella hexfasciata

- A) Habitus, after Harvey.
- B) - E) Pattern variations.
- B) Specimen from Middlesex Co., Massachusetts.
- C) Specimen from Clark Co., Illinois.
- D) Specimen from Jackson Co., Illinois.
- E) Specimen from same locality.
- F) Chaetotaxy of left side of second through fourth abdominal segments, specimen from same locality.
- G) Hind foot complex, specimen from Middlesex Co., Massachusetts.
- H) Mucro, same specimen.



Refs.: Systema Naturae, ed. 10:1014; Maynard, 1951; Stach, 1960.

Syn.: f. diagonalis Maynard, 1951, Collembola of New York: 193.

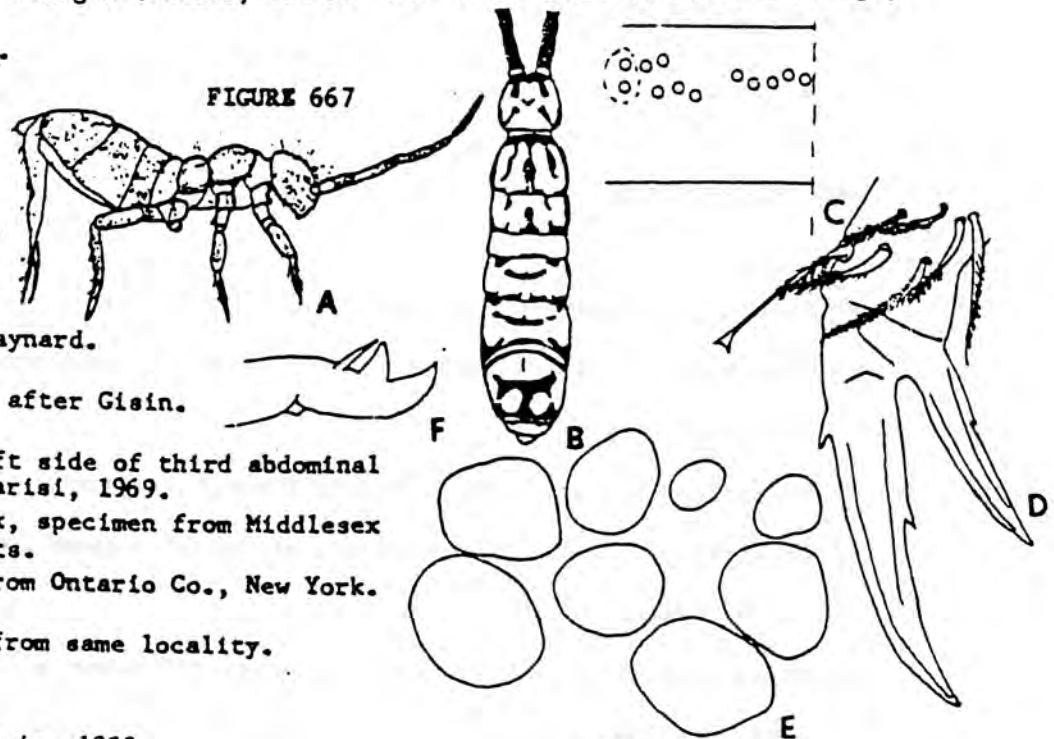
Description

Color: background yellowish white to brownish yellow; pigment purplish brown to purplish blue, in a complex pattern of short, narrow, broken markings, mostly longitudinal anteriorly and diagonal and transverse posteriorly; first 2 antennal segment usually pigmented but the last 2 often pale. Eyes A & B subequal to C & D. Third abdominal segment .5 - .6 as long as fourth. Maximum length 5.5 mm.

Remarks

This is probably an introduced species. The very large size and unusual pattern makes it easy to recognize; the unique chaetotaxy of large specimens distinguished it from all other Nearctic species, implying that it is not closely related to them. In some specimens from Ontario eye A is larger than B. Localities: Maine - York Co.; Massachusetts - Middlesex Co.; New York - Ontario Co. Additional record: Michigan (Snider, 1967). The Iowa record (O'Neill & Pedigo, 1969) is O. ainsliei.

Orchesella villosa



- A) Habitus, after Maynard.
- B) Pattern variant, after Gisin.
- C) Chaetotaxy of left side of third abdominal segment, after Parisi, 1969.
- D) Hind foot complex, specimen from Middlesex Co., Massachusetts.
- E) Eyes, specimen from Ontario Co., New York.
- F) Mucro, specimen from same locality.

Fig. 668

Orchesella zebra Guthrie, 1903

Ref.: Collembola of Minnesota: 61.

Description

Color: Background white; blue pigment in 5 interrupted longitudinal stripes, the middorsal stripe often reduced to a narrow line; head with only cheek patches and interantennal pigment (types), or with a clear middorsal

V-shaped mark; antennal segments 1-3 apically darkened, fourth segment moderately to heavily pigmented. Eyes A & B subequal to C & D or (in unusually large specimens) larger. Third abdominal segment .65 - .97 as long as fourth. Body setae of type 5 very narrowly fusiform to cylindrical, with apical 1/3 tapering, and unilaterally ciliate for 5/6 of length. Maximum length 3.0 mm.

#### Remarks

The only specimens we have seen are from the Minnesota type series and from Louisiana; the latter consistently have an outer A macrochaeta on the third abdominal segment, and dorsal head markings, while these are apparently lacking in the types. Nevertheless, the overall similarity is so great that we feel it best to treat them as belonging to one species for the moment.

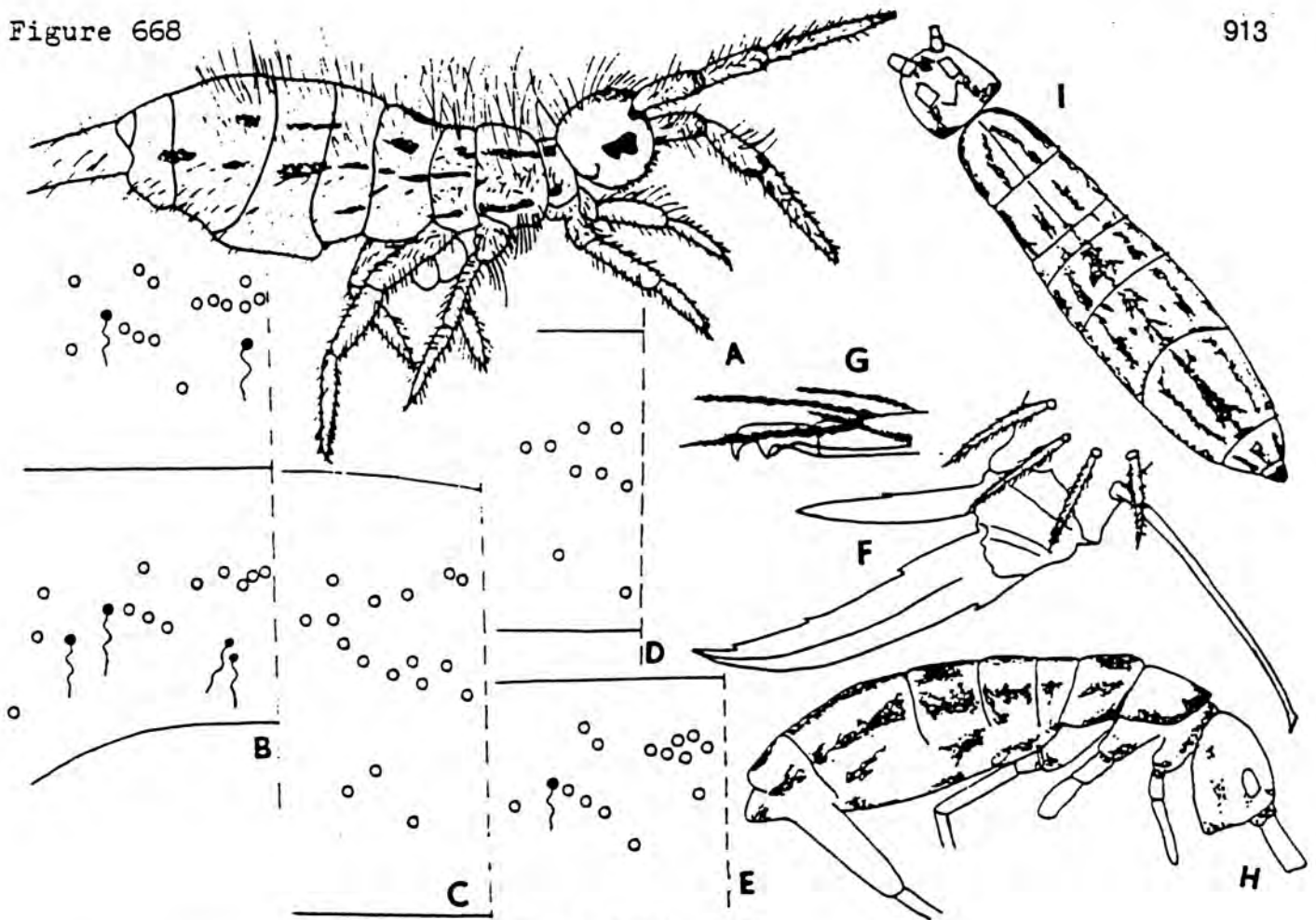
Localities: Louisiana - Catahoula Par., Ouachita Par.; Minnesota - Grey Cloud I. (type).

Additional records: Georgia (Coleman, 1970); Iowa (O'Neill & Pedigo, 1969); Maryland (Ostdiek, 1961).

#### FIGURE 668

#### Orchesella zebra

- A) Habitus, specimen from Ouachita Par., Louisiana.
- B) Chaetotaxy of left second and third abdominal segments, specimen from same locality.
- C) Chaetotaxy of left side of fourth abdominal segment, same specimen.
- D) Chaetotaxy of left side of fourth abdominal segment, different specimen from same locality.
- E) Chaetotaxy of second abdominal segment, different specimen from same locality.
- F) Hind foot complex, specimen from same locality.
- G) Mucro, after Guthrie.
- H) Pattern, specimen from Minnesota.
- I) Pattern, specimen from Ouachita Par., Louisiana.

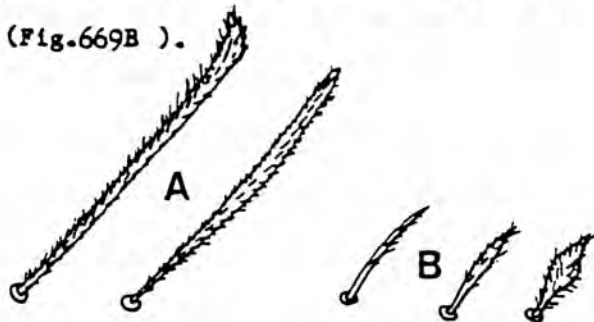
Genus Entomobrya Rondani, 1861

Type species: Degeeria muscorum Nicolet, 1842.

Syn: Degeeria Nicolet, 1842, nec Meigen, type species D. muscorum.

This genus includes all Nearctic scaleless Entomobrinea with 6+6 or more eyes, the fourth abdominal segment 3 or more times as long as the third, and greatly enlarged (type 1) setae on the body. The latter, called "flexed setae" by Salmon, are apically truncate, bent, or clavate (Fig. 669A). Four other types of setae exist (see Christiansen, 1958c), but of these the most important taxonomically are the common short body setae ("type 5"), which vary from simply tapering to enlarged and scalelike (Fig. 669B).

669





Members of this genus have the consistent entomobryine pattern of bothriotracha but the distribution of type 1 setae ("macrochaetae") is varied and taxonomically useful. In this work we have considered only the chaetotaxy of the first 3 abdominal segments; other segments will undoubtedly furnish additional information. In the classification of these setae we have attempted to follow Szeptycki's system as closely as possible. This system is illustrated in Fig. 641.

In view of the variation we have found in our species, we have found it necessary to adopt some more or less arbitrary conventions. The fundamental pattern on the second abdominal segment is an arc of macrochaetae, concave anteriorly and medially, between the inner and outer bothriotracha, consisting of the setae  $m_3$ ,  $m_{3ep}$ ,  $m_{3e}$ . A fourth seta in this arc which lies more anterior than the setae  $a_2$  and  $a_3$  is designated  $m_{3a}$ . A seta lateral to this arc but medial to the lateral bothriotrix is called  $m_{3e2}$ ; setae in the concavity of the arc but lateral to  $a_3$  are designated  $m_{3ei}$ . In some cases the proper nomenclature of setae is not clear, but in all such cases diagrams of the chaetotaxy have been provided. Students are advised that some practice may be required before chaetotactic patterns can be correctly analyzed.

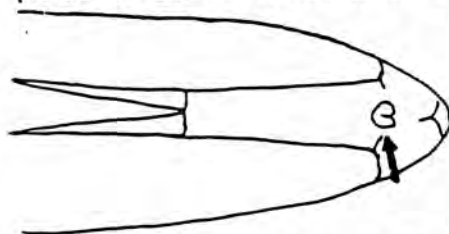
As elsewhere in the Collembola, in this genus the ratios of organs must be used with extreme care in specific identifications. If we consider any two populations of any species, it is possible to differentiate them on the basis of body ratios. The values given in the table for the subgenus Entomobrya are only for the purpose of showing major differences in scale.

All species of this genus except E. (M.) laguna and E. (Entomobrya) gisini have the characteristic 4 antennal segments without subsegmentation. Except for E. (M.) laguna, all Nearctic species have lanceolate unguiculi and clavate tenent hairs. The genus closely approaches Americabrya through E. (Entomobrya) assuta, and Sinella through E. (Entomobryoides) guthriei.

The male genital plate is one of the most critical features for identifying a number of species of the genus Entomobrya. This organ is located at the base of the furcula (see arrow in Fig. 723A of E. (Entomobryoides) guthriei) and is best seen on a mount in which the furcula is appressed to the body.

In ventral view the plate is then visible as in Fig. 670 .

670



There are many different setal types on the genital plates of different species, and their distribution and shape is highly consistent, intraspecific variation being known only in E. (Entomobryoides) guthriei.

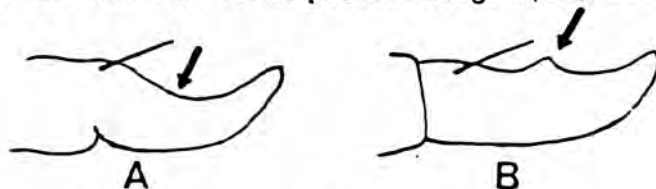
Pattern is of critical importance in this genus. In any one region the pattern of most species is generally distinct. There are, however, a number of species which intergrade and a number of pattern "mimics". In addition, the extreme variability of pattern makes it necessary to use great caution in using this character.

Various other characters of the genus, such as the chaetotaxy of the labium and ventral tube, may prove to be taxonomically useful. Preliminary examination, however, led us to conclude that a complete analysis would not contribute enough additional information to justify the time required; they are therefore not considered here.

Specimens are generally best examined in a dorsoventrally flattened mount. The mucro and claws are best seen in lateral view. Heavily pigmented specimens must be well cleared to show the pattern of macrochaetae.

Key to Nearctic Subgenera of Entomobrya s.l.

- 1 ) Antepical mucronal tooth absent<sup>1</sup> (Fig. 671A) ----- 2  
 1') Antepical mucronal tooth present (Fig. 671B) ----- 3



671

- 2 ) Basal mucronal spine present (Fig. 671A); unguis without internal cilia-  
 tions ----- subgenus Drepanura  
 2') Basal mucronal spine absent; unguis with internal cilia-  
 ----- subgenus Calx

Characteristics of Nearctic Subgenera of Entomobrya

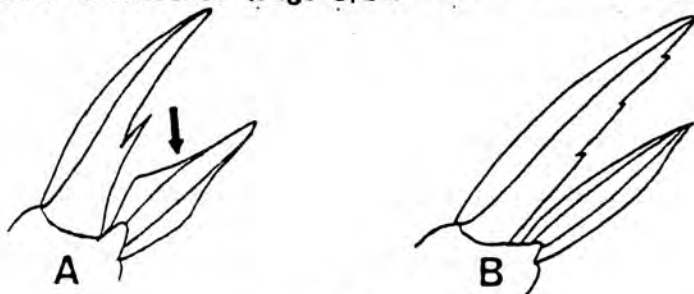
<u>Subgenus</u>	<u>Mucronal Teeth</u>	<u>Mucronal Basal Spine</u>	<u>Apical Antennal Bulb</u>	<u>Dental Spines in Adults</u>	<u>Unguiculus</u>	<u>Tenent Hair</u>	<u>Internal Tibiotarsal Setae</u>	<u>Habitat</u>
<u>Calx</u>	1	-	+	-	Acuminate	Clavate	Similar	Xeric
<u>Drepanura</u>	1	+	+	-	Acuminate	Clavate	Similar	Xeric
<u>Entomobrya</u>	2*	**	***	-	Acuminate	Clavate	Similar	Varied
<u>Entomobryoides</u>	2	+	-	-	Acuminate	Clavate	Differentiated	Varied, mostly Mesic
<u>Homidia</u>	2	+	+	+	Acuminate	Clavate	Similar	Subtropical
<u>Mesentotoma</u>	2	-	-	-	Excavate	Acuminate	Differentiated	Littoral

\*May be absent or reduced in E. unostriigata

\*\*Absent in E. sinelloides

3 ) Unguiculus truncate and excavate (Fig. 672A) ----- subgenus Mesentotoma

3') Unguiculus lanceolate (Fig. 672B) ----- 4



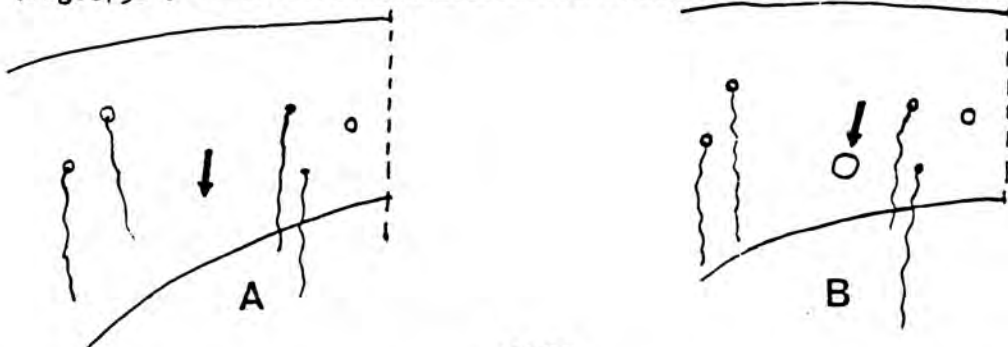
## 672

4 ) Adults with dental spines; third abdominal segment with seta  $m_3$  absent

(Fig. 673A) ----- subgenus Homidia

4') Without dental spines; third abdominal segment with seta  $m_3$  present

(Fig. 673B) ----- 5

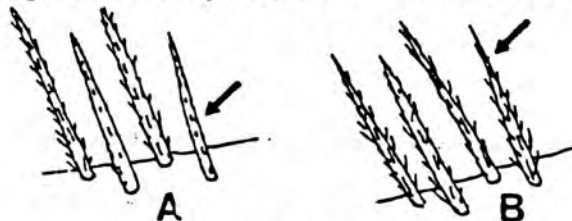


## 673

5 ) With 1 or 2 rows of inner tibiotarsal setae clearly less strongly ciliate than others (Fig. 674A); fourth antennal segment without apical bulb ----

----- subgenus Entomobryoides

5') Without differentiated rows of inner tibiotarsal setae (Fig. 674B); fourth antennal segment with apical bulb<sup>2</sup> ----- subgenus Entomobrya



## 674

<sup>1</sup>Some specimens of E. (Entomobrya) unostriata will run here; they may usually be recognised by the middorsal longitudinal pigment streak, unknown in our Calx and Drepanura.

<sup>2</sup>Except in E. (Entomobrya) sinelloides.

Type species: Entomobrya (Drepanura) sabulicola Mills, 1931.

This subgenus is characterized by a falcate mucro without a basal spine. The Nearctic species has a number of unusual features: 1) unguis with internal ciliations; 2) absence of an external differentiated seta on the labial appendage; 3) labral papillae with outer pair rounded and lacking setae; and 4) male genital plate with simple, undifferentiated setae. There is a single Nearctic species, E. (C.) sabulicola.

Entomobrya (Calx) sabulicola Mills, 1931

Fig. 675

Refs.: Am. Mus. Novit. 464:9; Christiansen, 1958c.

#### Description

Color: background yellow to dull gray; pigment dark blue to purple, varied in distribution but generally in irregular bands and patches. Second and third antennal segments with a single line of small oval pegs, 2-3 times as long as broad along outer dorsal margins. Head oval, about 1 1/2 times as long as broad. Body oval, circular in cross section. Body setae of type 1 very broad, sharply expanded basally and slightly expanded at apex. Setae of type 5 tapering for apical 2/3 of length, slightly expanded medially, and coarsely multilaterally ciliate for apical 1/2 to 2/3 of length. Maximum length 2.5 mm.

#### Remarks

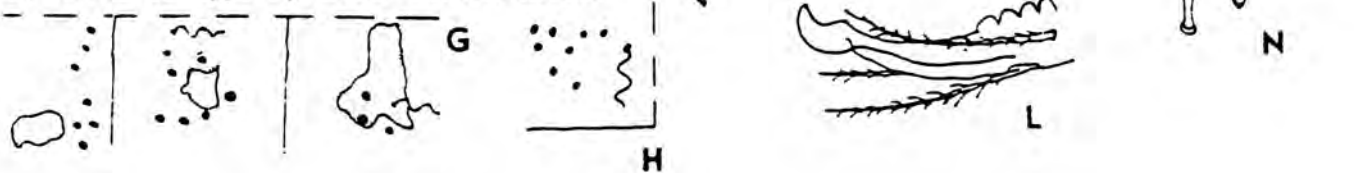
The pattern of this species varies greatly from one locality to another. The setae  $a_2$  and  $a_3$  on the second and third abdominal segments are not clearly visible on all specimens; they may be absent, but more likely are obscured by heavy pigmentation. This species is one of the most xerophilic in North America, and is often found in desert habitats.

Localities: Arizona - Cochise Co., Gila Co.; Colorado - Baca Co., Pawnee; Nebraska - Halsey; Texas - Brazos Co. (type), McLennan Co.; Wyoming - Sandy Hat. Additional record: Oklahoma (Fenton and Howell, 1957).



Entomobrya (Calx) sabulicola

- A) Habitus, after Christiansen.
- B) - F) Pattern variations, after Christiansen.
- G) Chaetotaxy of left side of first three abdominal segments, specimen from Cochise Co., Arizona.
- H) Chaetotaxy of left side of second abdominal segment, specimen from Pawnee, Colorado.
- I) Hind foot complex, after Christiansen.
- J) Apex of antenna, after Christiansen.
- K) Labral papillae, after Christiansen.
- L) Mucro, after Christiansen.
- M) Male genital plate, after Christiansen.
- N) Setae of type 5, after Christiansen.

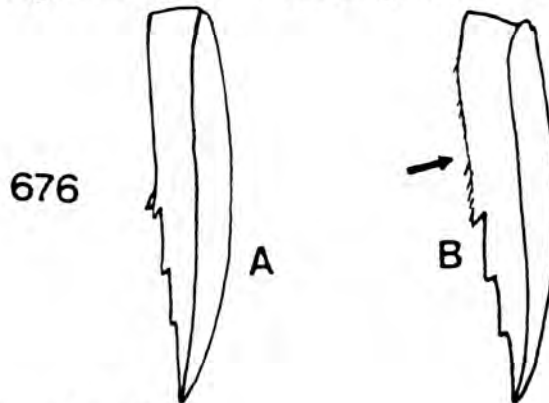
Subgenus Drepanura Schött, 1891

Type species: Drepanura californica Schött, 1891.

The members of this subgenus are readily distinguished by the mucro, which is falcate with a basal spine. The Nearctic members have low, conical, weakly unisetaceous labral papillae. The inner tibiotalarsal setae are all heavily ciliate. The foot complex is as in Entomobrya s.str. Our species appear to be closely related to the comparata group of the latter subgenus. We include in the key below E. (Entomobrya) unostriata, since the anteapical mucronal tooth in that species is often so minute as to be easily overlooked. There are 2 Nearctic species of Drepanura: 1) californica, 2) perpulchra.

Key to Nearctic species of subgenera Drepanura and Calx

- \* 1 ) Pigment, if present, in the form of a middorsal longitudinal line ---  
 ----- E. (Entomobrya) unostriata
- 1') Without a middorsal line; pigment generally distributed or on transverse bands or irregular markings ----- 2
- \*\* 2 ) Pigment limited to head and thorax ----- E. (D.) perpulchra
- 2') At least some pigment on abdomen ----- 3
- \* 3 ) Inner unguis margin not ciliate (Fig. 676A) ----- E. (D.) californica ↓
- \*\* 3') Inner unguis margin ciliate (Fig. 676B) ----- E. (C.) sabulicola



Not included in key:

- |                                    |                      |
|------------------------------------|----------------------|
| <u>annulicornuta</u> Scott, 1963a  | indeterminable       |
| ** <u>neomexicana</u> Scott, 1963a | = <u>californica</u> |
| ** <u>rolfsi</u> Mills, 1935       | = <u>californica</u> |
| <u>socorrensis</u> Scott, 1963a    | indeterminable       |

✓ Entomobrya cubensis Folsom, 1927 would run out here, but lacks transverse bands anterior to the fourth abdominal segment. Wray, 1959, records cubensis from Florida; we have seen no specimens.

Entomobrya (Drepanura) californica (Schött), 1891

Fig. 677

Refs.: Bih. K. svenska VetenskAkad. Förh. 17(4(8)):19 (Drepanura);

Christiansen, 1958c

Syns: D. rolfsi Mills, 1935, Bull. Brooklyn ent. Soc. 30:134; D.

neomexicana Scott, 1963, Ent. News 74:10.

## Description

Color: background yellow with purple or blue pigment, generally in the form of narrow transverse bands along the posterior and sometimes

anterior margins of the segments, and sometimes covering the third abdominal segment either diffusely or in irregular band; in a few populations the fourth through sixth abdominal segments may have irregular transverse bands and the fourth segment may have a pair of longitudinal stripes. Apical bulb of fourth antennal segment unlobed or indented, rarely appearing bilobed. Head roughly circular. Body oval, and circular in cross section. Mucronal spine sometimes absent. External differentiated seta of labial appendage about as thick as normal setae. Body setae of type 1 long and slender, lightly constricted (?) at point of insertion. Setae of type 5 apically acuminate, cylindrical and unilaterally ciliate for most of length. Maximum length 2.0 mm.

#### Remarks

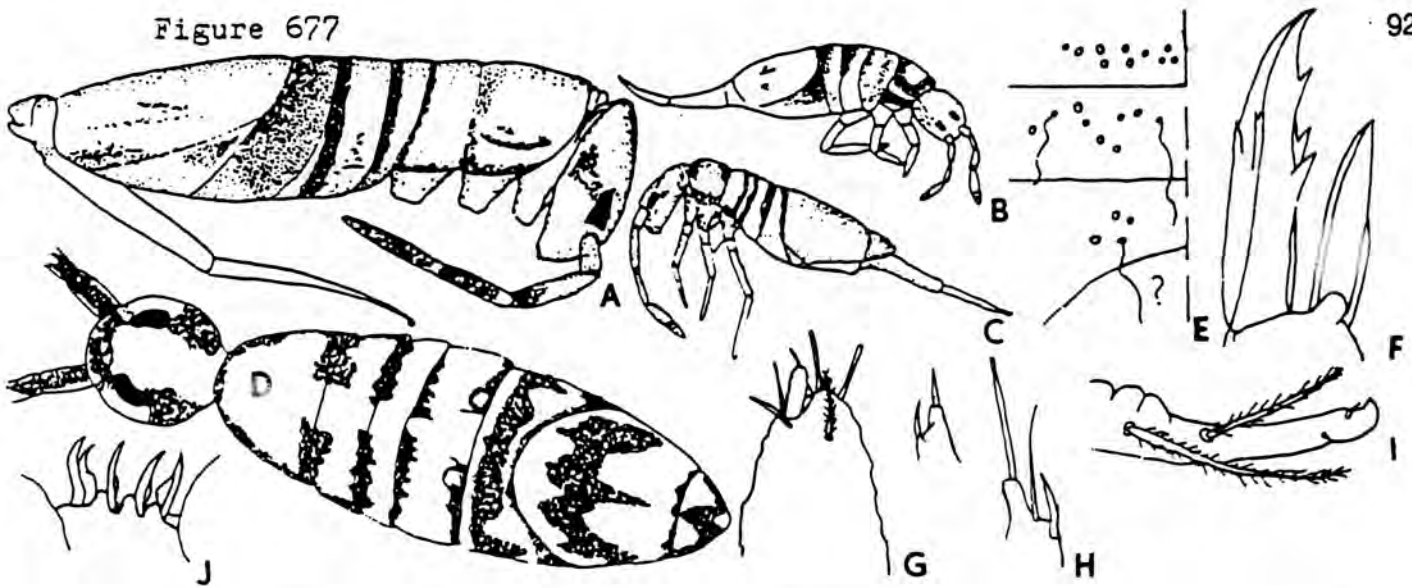
This species is quite variable in pattern. Unpigmented forms occur in a number of populations, but, in samples we have seen, always accompanied by pigmented forms. The type of *D. neomexicana* is clearly a well pigmented form of this species. Specimens from Eddy and Los Alamos counties, New Mexico, usually have setae  $m_{3e1}$  and  $m_{3e2}$  present on the second abdominal segment. These setae are not present on the type of *neomexicana*, which therefore is not separable on this basis. More detailed study will be required to determine if two species are involved. Further examination of new material from New Mexican and Texas caves indicates that there is probably a cluster of species presently falling under this name. These differ in relative antennal-CD. ratios as well as other features.

Localities: California - Calaveras Co. (cave), Fresno Co., Los Angeles Co., San Diego Co.; New Mexico - Eddy Co., Los Alamos Co., Sandoval Co., Santa Fe Co., Sierra Co.; Washington - Yakima Co.

#### FIGURE 677

##### Entomobrya (Drepanura) californica

- |  |  |
|--|--|
| A) Habitus, after Christiansen.  | F) Hind foot complex after Christiansen.                                 |
| B) Habitus, after Schött.  | G) Apex of antenna, same specimen, after Christiansen.                   |
| C) Habitus, type of <u>rolfsi</u> .  | H) External differentiated seta of labial appendage, after Christiansen. |
| D) Pattern, type of <u>neomexicana</u> .   | I) Mucro and end of dens, after Christiansen.                            |
| E) Dorsal abdominal chaetotaxy of left side of first three abdominal segments, specimen from Fresno, Co., California | J) Male genital plate, after Christiansen.                               |



Entomobrya (Drepanura) perpulchra (Packard), 1873

Fig. 678

Refs.: Rep. Peabody Acad. Sci. 5:38; Christiansen, 1958c.

#### Description

Color: background unclear, according to Packard purplish on head, thorax, and antennae, and honey yellow on rest of body; pigment black to gray on antennal bases and connecting these, in a dorsal V-shaped antennal mark, on mesothoracic margins, and covering metatergum; third and fourth abdominal segments with scattered gray areas. Apical bulb of fourth antennal segment unlobed. Head roughly circular. Body oval, circular in cross section. External differentiated seta of labial appendage about as thick as normal setae. Body setae of type 5 cylindrical for basal 1/2 to 2/3 of length, apically acuminate, and coarsely unilaterally ciliate. Maximum length 2.0 mm.

#### Remarks

This species has never been recorded since the original collections. Unfortunately the type specimens are in such poor condition that neither the chaetotaxy nor the genital plate could be observed. The unique pattern should make recognition easy if other collections are made.

Locality: Texas - McLennan Co. (type).

Entomobrya (Drepanura) perpulchra

All figures after Christiansen.

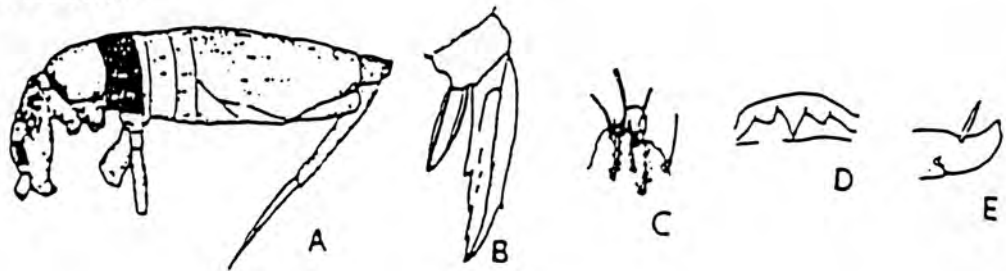
A) Habitus.

B) Hind foot complex.

C) Apex of antenna.

D) Labral papillae.

E) Mucro.

Subgenus Entomobrya s.str.Syn.: Isotobryoides Maynard, 1951, type species I. ochraceus Maynard, 1951, n. syn.

This subgenus includes all Nearctic forms of the genus having a bidentate mucro with a basal spine and lacking dental spines or clearly differentiated "smooth" setae on the inner surface of the tibiotarsus. All species except one (E. sinelloides) have a well developed apical antennal bulb. In one species (E. unostriata) the mucronal spine and antepical tooth may be reduced or apparently absent. The unguis is quite consistent, having 1 outer, 2 lateral, and 4 inner teeth; the unguiculus is always acuminate and externally smooth or very finely ciliate.

There are 27 Nearctic species: 1) arnaudi, 2) arula, 3) assuta, 4) atrocincta, 5) bicolor, 6) clitellaria, 7) comparata, 8) confusa, 9) decimfasciata, 10) erratica, 11) gisini, 12) griseoolivata, 13) intermedia, 14) kincaidi, 15) ligata, 16) multifasciata, 17) nigriceps, 18) nivalis, 19) quadrilineata, 20) sinelloides, 21) suzannae, 22) triangularis, 23) rogloodytes, 24) roglophila, 25) unostriata, 26) washingtonia, 27) zona.



TABLE XXXII  
Average Ratios & Other Characters of Nearctic Species of *Entomobrya* s.str.

Species	Labial Seta <sup>1</sup>	Labral Papillae <sup>2</sup>	Eyes G&H/ E&F	Antennal Bulb Lobes	Relative Lengths of Ant. Segments				Ratio of Antenna to Head	Ratio of Abd. IV to III	Ratio of Dens to Maubrium
					1	2	3	4			
<i>arnaudi</i>	=	2(3?)	=	2	1	1.25	1.4	1.75	4.0	5.0	1.75
<i>arula</i>	=	1	<	2(3?)	1	1.8	1.8	2.3	2.3	4.8	1.4
<i>assuta</i>	=	P	<	2-3	1	2.0	1.8	2.8	1.85	3.6	1.4
<i>atrocincta</i>	1.1-1.3	P(1?)	<	3	1	2.2	2.1	2.8	1.8	4.0	1.2
<i>bicolor</i>	1.3-1.5	1	<	1+1	1	1.7	1.8	2.4	2.4	9.0	1.3
<i>clitellaria</i>	1.0-1.1	1	<	1(2)	1	1.8	1.65	2.3	2.1	4.4	1.4
<i>comparata</i>	=	1	<	1(2)	1	1.95	1.95	2.7	1.7	4.2	1.3
<i>confusa</i>	1.0-1.3	1	<=	2-3	1	1.9	1.85	2.4	1.8	4.5	1.45
<i>decemfasciata</i>	1.5	1	<	1	1	1.65	1.7	1.8	2.9	5.5	1.4
<i>erratica</i>	=	1	=	2	1	2.0	1.5	2.5	2.5	4.0	1.3
<i>gisini</i>	.9	1	<	1	1	1.75	1.75	2.55	2.4	6.0	1.5
<i>griseoolivata</i>	.9-1.0	P	<	2-3(1)	1	1.9	1.9	2.65	1.8	3.3	1.6
<i>intermedia</i>	.8	P ?2-3	<	3	1	1.9	2.0	2.45	2.9	4.2	1.2
<i>kincaidi</i>	=	-	<=	2-3	1	2.4	2.3	3.0	2.2	3.9	1.3
<i>ligata</i>	.5	1	<	1	1	2.4	2.1	3.2	1.8	4.5	1.4
<i>multifasciata</i>	.9-1.0	P	<	3	1	2.0	1.95	2.4	2.5	3.6	1.4
<i>nigriceps</i>	1.3	1-2	<	1	1	1.5	1.2	1.7	2.8	4.8	1.2
<i>nivalis</i>	.9-1.0	P	<	3	1	1.8	1.7	2.1	2.75	3.8	1.2
<i>quadrilineata</i>	1.8-3.0	1	<	1(2)	1	1.45	1.45	1.7	3.5	5.5	1.4
<i>sinelloides</i>	1.2-1.6	1	<=	-	1	2.0	2.2	2.9	2.0	6.3	1.3
<i>suzannae</i>	.9	1	<	1	1	2.5	2.3	2.5	2.4	5.6	1.2
<i>triangularis</i>	=	1	<	2-3	1	2.0	1.9	2.5	1.9	4.1	1.3
<i>trogodytes</i>	.9	1	=	1	1	2.0	2.0	2.15	2.2	3.55	1.3
<i>troglophila</i>	1.2-1.5	1	<	1-2	1	1.43	1.55	1.70	3.1	5.7	1.20
<i>unostriata</i>	=	1-2(3)	=	1-2	1	2.2	1.9	2.8	2.6	3.75	1.3
<i>washingtonia</i>	1.2-2.0	1	<	2?	1	2.1	2.1	2.7	1.9	5.0	1.4
<i>zona</i>	1.0-1.2	1	<	1-2	1	2.4	2.4	2.0	2.8	3.4	1.3
sp. C. TX	1.6	1	<	1	1	1.63	1.64	2.01	2.4	4.6	1.23
sp. D. NM	=	2-3	<	2-3	1	2.1	2.0	2.30	2.3	2.6	1.35

<sup>1</sup> Ratio between length of differentiated seta and distance from its base to apex of adjacent papilla.

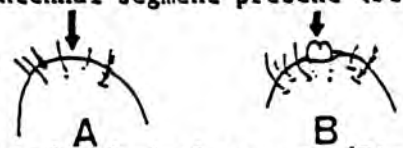
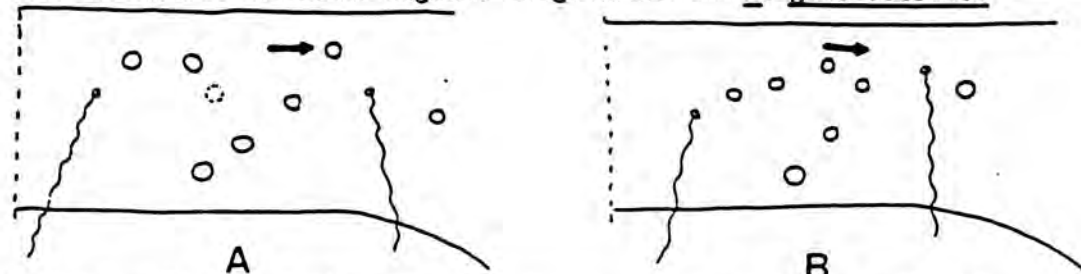
<sup>2</sup> Number of microsetae per papilla; P = papillata and multisetaceous.

Numbers in parentheses represent exceptional conditions.

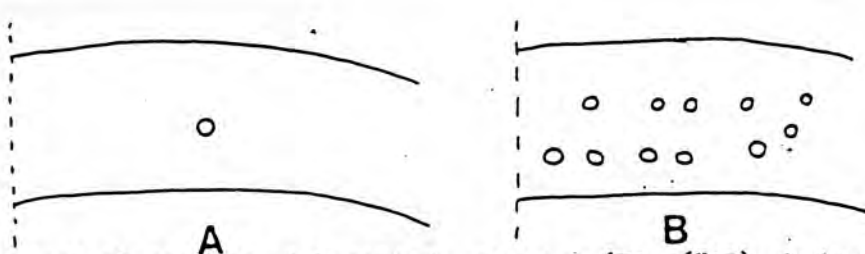
TABLE XXXIII  
 Inner Dorsal Chaetotaxy of Abdominal Segments of Nearctic Species of *Entomobrya* s.str.

Species	Third Segment							Second Segment					1st Segment no. per side	
	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	m <sub>3</sub>	m <sub>3e</sub>	m <sub>3</sub>	m <sub>3ep</sub>	m <sub>3e</sub>	m <sub>3e2</sub>	m <sub>3ea</sub>	a <sub>3</sub>	m <sub>3ei</sub>		
<i>arnaudi</i>	?	?	?	?	?	?	?	?	?	?	?	?	?	
<i>arula</i>	-	+	+	+	+	+	+	+	+	+	+	+	1-2	18-20
<i>assuta</i>	-	+	-	+	-	+(-)	-	-	+	-	-	-	-	1
<i>atrocincta</i>	+	+	-(+)	+	-	+	-	+	-	±?	+(-)	-	-	10
<i>bicolor</i>	-	+	+	+	-	+	+	+	-	+	+	1	-	9
<i>clitellaria</i>	-	+	+	+	-	+	+	+	-	+	+	1	-	11(13,?14)
<i>comparata</i>	-	+	+	+	-	+	+	+	-	+	+	1(-)	-	11(16)
<i>confusa</i>	-	+	+	+	-	+	+	+	-	+	+	1(-)	-	10
<i>decemfasciata</i>	-	+	+	+	-	+	+	+	+(-)	+	+	2-4	-	18
<i>erratica</i>	-	+	+	+	-	+	+	+	-	+	+	-	-	9
<i>gisini</i>	-	+	+	+	+	+	+	+	-	+	+	2	-	9
<i>griseoolivata</i>	+	+	+	+	+	+	+	+	-	=	+	1	-	8-11
<i>intermedia</i>	+	-	-	+	-	+	-	+	-	-	+	-	-	8?
<i>kincaidi</i>	-	+	-	+	-	+	+	-	-	-	-	-	-	3
<i>ligata</i>	-	-	-?	+	-	+	+(-)	+	-	-	-	-	-	4
<i>multifasciata</i>	+	+	+	+	-	+	-	+	-	-	+	-	-	7(8)
<i>nigriceps</i>	-	+	+	+	-	+	+	+	-	+	+	1	-	11(12)
<i>nivalis</i>	+	-	-	+	-	+	+	+	-	-	+	-	-	7
<i>quadrilineata</i>	-	+	+	+	-	+	2	+	-	+	+	1	-	11(12-13)
<i>sinelloides</i>	-	+	+	+	-	+	+	+	-	+	+	1	-	9
<i>suzannae</i>	-	+	+	+	-	+	+	+	-	+	+	1	-	10
<i>triangularis</i>	-	+	+	+	-	+	+	+	?	+	+	-	-	10
<i>troglydytes</i>	=	+	+	+	-	+	+	+	+	+	+	2	-	14
<i>troglophila</i>	-	+	+	+	-	+	+	+	-	+	+	-	-	11-13
<i>unostrigata</i>	+	-	-	+	-	+	+	+	-	+	+	-	-	7(8)(10?)
<i>washingtonia</i>	-	+	+	+	-	+	+	+	-	+	+	-(-1)	-	14(10)
<i>zona</i>	-	+	+	+	-	+	+	+	-	+	+	+	-	10
sp. C. TX	-	+	+	+	-	+	+	+	-	+	+	-	-	11-12
sp. D. NM	+	+	+	+	+	+	-	+	+	-	±	-	-	7

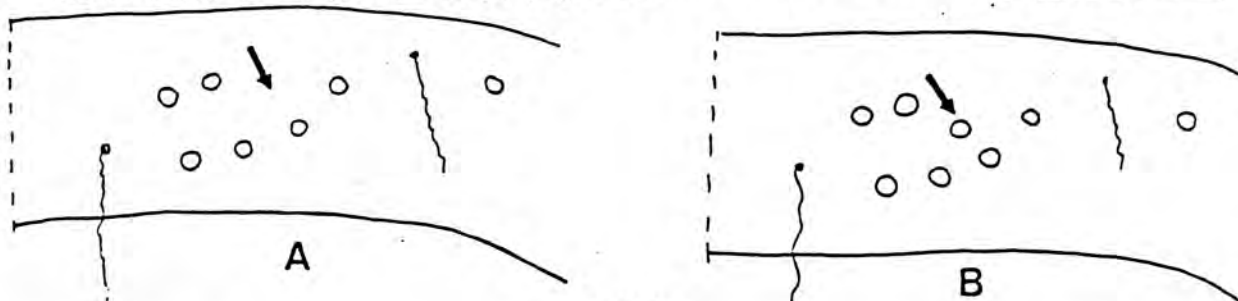
Symbols in parentheses represent exceptional conditions.

- 1 ) Pigment forming a distinct pattern ----- 2
- 1') Distinct pattern absent; pigment absent or uniformly distributed except for scattered pale spots and intersegmental membrane ----- 28
- 2 ) Dorsal pattern in the form of regular transverse bands or entirely pigmented segments; longitudinal markings limited to thoracic margins ----- 3
- 2') Dorsal pattern includes diagonal, longitudinal, or irregular markings ---- 10
- \* 3 ) Head in adults  $3/4$  or less as wide as long; thorax entirely dark and first abdominal segment pale ----- E. bicolor
- 3') Head  $4/5$  or more as wide as long; thorax pale dorsally, or first abdominal segment dark ----- 4
- 4 ) Pigment limited to narrow bands along posterior margins of segments ----- 5
- 4') Pigment covering most or all of some segments ----- 7
- \*\* 5 ) Apical bulb of fourth antennal segment absent (Fig. 679A) ---- E. sinelloides
- 5') Apical bulb of fourth antennal segment present (Fig. 679B) ----- 6
- 679 
- \*\* 6 ) Seta  $\pi_{3ea}$  present on second abdominal segment (Fig. 680A) ----- E. confusa
- \*\* 6') Seta  $\pi_{3ea}$  absent on second abdominal segment (Fig. 680B) --- E. griseoolivata
- 680 
- \* 7 ) Third abdominal segment without pigment ----- E. atrocincta
- 7') Third abdominal segment with some pigment ----- 8
- \*\* 8 ) First abdominal segment dorsally with 1+1 macrochaetae (Fig. 681A); labral papillae multisetaceous ----- E. assuta
- 8') First abdominal segment dorsally with 9+9 or more macrochaetae (Fig. 681B); labral papillae unisetaceous ----- 9

681

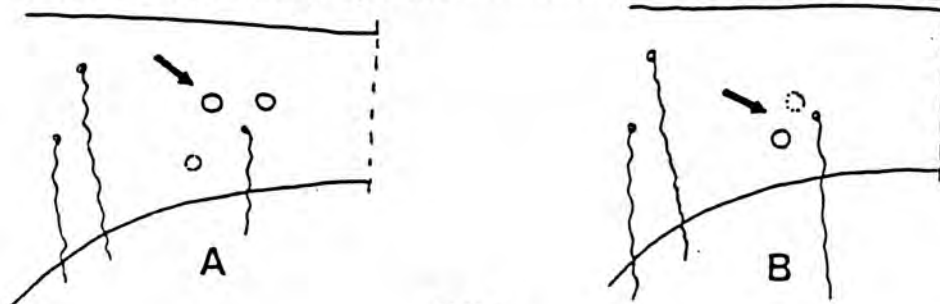


- \* 9 ) Second abdominal segment with seta  $m_{3ef}$  present (Fig. 682B); body dorsoventrally compressed; fifth abdominal segment sometimes unpigmented ----- E. clitellaria
- \* 9') Second abdominal segment without seta  $m_{3ef}$  (Fig. 682A); body not compressed; fifth abdominal segment always pigmented ----- E. triangularis



682

- 10 ) Irregular, diagonal, or dorsal longitudinal markings limited to fourth abdominal segment; broken transverse bands found only on third thoracic segment-11
- 10') Such markings found on other segments ----- 12
- \* 11 ) Third abdominal segment with 3+3 macrochaetae between lateral bothriotricha (Fig. 683A); western species ----- E. triangularis
- \*\* 11') Third abdominal segment with 1+1 or 2+2 macrochaetae between lateral bothriotricha (Fig. 683B); eastern species ----- E. ligata

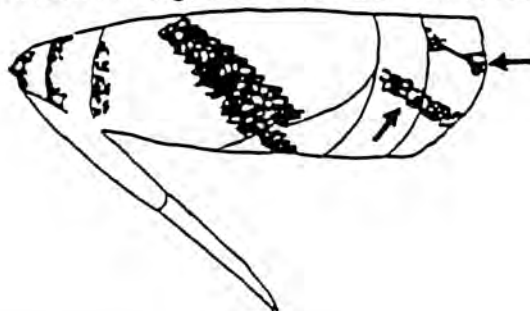


683

- \* 12 ) Main pattern element a median dorsal line on second thoracic and other segments; antepical mucronal tooth half as long as apical tooth or less ----- E. unostrigata
- 12') Middorsal line absent anteriorly or accompanied by conspicuous transverse banding; mucronal teeth subequal ----- 13

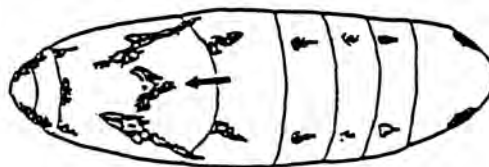
- 13) Pigment on second and third abdominal segments in the form of lateral diagonal bands (Fig. 684) -----14  
 13') Pigment on second and third abdominal segments varied but never as in Fig. 684 -----17

684



- 14) Head entirely dark -----*E. nigriceps*  
 14') Head not entirely dark -----15
- 15) If pigmented, the anterior dorsum of the body has 2 longitudinal stripes---- *E. quadrilineata*  
 15') If pigmented, the anterior dorsum of the body has no longitudinal marking -----16
- 16) Antennae > 3 times as long as cephalic diagonal-----*E. trogliphila*  
 16') Antennae < 3 times as long as cephalic diagonal----- *E. decemfasciata*
- 17) First abdominal segment with 1+1 or 2+2 macrochaetae (Fig. 681A) -----*E. assuta*  
 17') First abdominal segment with at least 7+7 macrochaetae (Fig. 681B) -----18
- 18) Pattern on second thoracic through second abdominal segments in the form of more or less broken longitudinal stripes -----19  
 18') Principal markings on these segments not longitudinal -----21
- 19) Antennae more than 3 1/2 times as long as head -----*E. araudi*  
 19') Antennae less than 3 1/2 times as long as head -----20
- 20) Body without middorsal markings -----*E. gisini*  
 20') Body with middorsal marking at least on fourth abdominal segment -----*E. intermedia*
- 21) Pigment on third abdominal segment absent or diffuse and not clear -----*E. nivalis*  
 21') Clear pigment spots on third abdominal segment -----22
- 22) Pigment on fourth abdominal segment in a more or less complete W-shaped mark; other pigment in the form of irregular longitudinal stripes (Fig. 685) and labral papillae each with 2-3 microsetae -----*E. intermedia*  
 22') Pigment not as above or labral papillae unisetaceous -----23

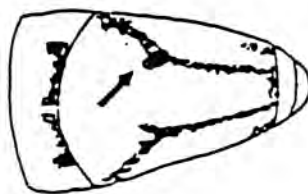
685





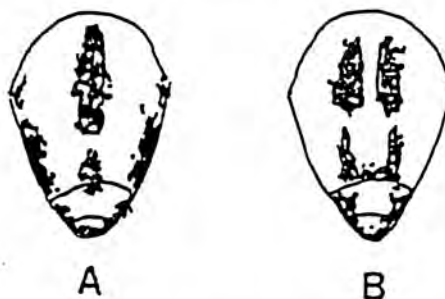
- 23) Fourth abdominal segment with clear U-shaped marking (Fig. 686) -----*E. nivalis*  
 23') Fourth abdominal segment markings not as in Fig. 686 -----24

686



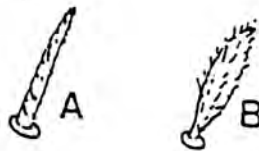
- 24) Second thoracic segment without dorsal markings or with an undivided middorsal longitudinal stripe, never with posterior transverse band -----*E. comparata*  
 24') Second thoracic segment with a pair of posterior spots or an irregular transverse band along the posterior margin, sometimes projecting slightly forward in the midline -----25
- 25) Head less than 3/4 as wide as long; sixth abdominal segment unpigmented ----*E. suzannae*  
 25') Head 4/5 or more as wide as long; sixth abdominal segment pigmented -----26
- 26) Labral papillae unisetaceous -----27  
 26') Labral papillae multisetaceous -----*E. multifasciata*
- 27) Posterior margin of fourth abdominal segment without median marking or with a single spot (Fig. 687A) -----*E. washingtonia*  
 27') Posterior margin of fourth abdominal segment with 2 elongate median spots (Fig. 687B) --  
 -----*E. zona*

687

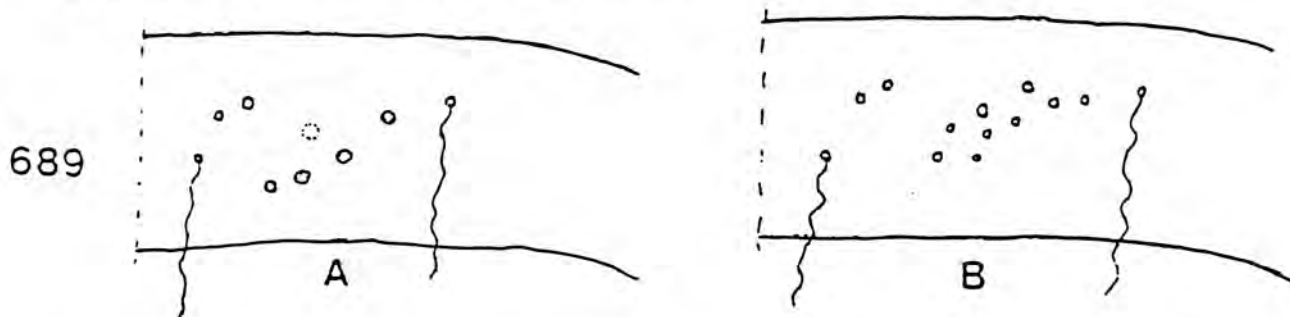


- 28) Body darkly pigmented with scattered pale spots -----29  
 28') Body lightly pigmented or without pigment -----33
- 29) Pigment green or olive -----30  
 29') Pigment blue or purple -----31
- 30) Body setae of type 5 only slightly expanded medially (Fig. 688A), not flattened; first abdominal segment with at least 8+8 macrochaetae -----*E. erratica*  
 30') Most body setae of type 5 greatly expanded medially and flattened (Fig. 688B); first abdominal segment with 3+3 macrochaetae -----*E. kincaidi*

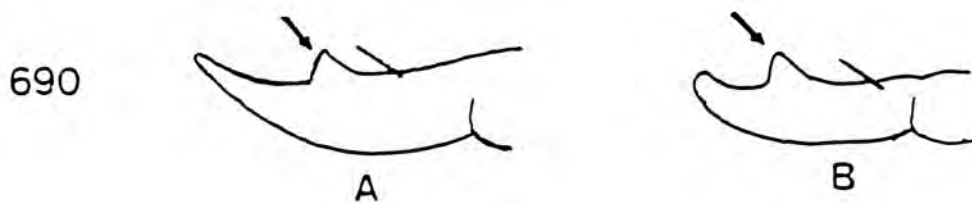
688



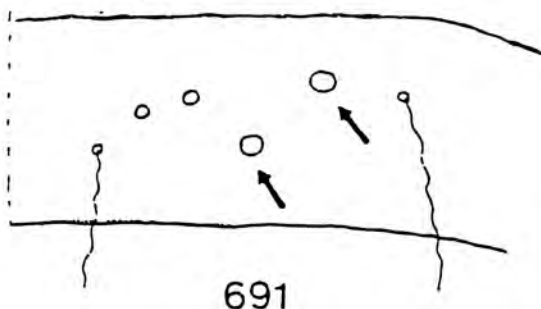
- 31) Body dorsoventrally flattened; first abdominal segment with 1+1 macrochaetae (Fig. 681A) -----*E. assuta*  
 31') Body not flattened; first abdominal segment with at least 8+8 macrochaetae (Fig. 681B) -----32
- 32) Antennae more than twice as long as head; fourth abdominal segment more than 8 times as long as third -----*E. bicolor*  
 32') Antennae less than twice as long as head; fourth abdominal segment less than 6 times as long as third -----*E. triangularis*
- 33) Most body setae of type 5 medially expanded and flattened (Fig. 688B); first abdominal segment with 3+3 dorsal macrochaetae -----*E. kincaidi*  
 33') Body setae of type 5 at most slightly expanded, not flattened (Fig. 688A); first abdominal segment with at least 8+8 macrochaetae -----34
- 34) Labral papillae unisetaceous -----35  
 34') Labral papillae multisetaceous -----40
- 35) Macrochaetae of middle of second abdominal segment at least 8+8 (Fig. 689B) -----36  
 35') Macrochaetae of middle of second abdominal segment at most 7+7 (Fig. 689A) -----37



- 36) Apical tooth of mucro clearly longer than anteapical (Fig. 690A); littoral species -----*E. arula*  
 36') Mucronal teeth subequal (Fig. 690B); cave species -----*E. roglodytes*



- 37) Anteapical mucronal tooth less than half as long as apical, or absent -----E. unostriata  
 37) Mucronal teeth subequal -----38
- 38) Eyes G & H subequal to E & F; arctic species -----E. erratica  
 38) Eyes G & H smaller than E & F, or western lowland species -----39
- 39) Background color yellow to yellow-green; apical antennal bulb simple or rarely 2-lobed; arctic-alpine species -----E. comparata<sup>1</sup>  
 39) Background color usually blue to lavender; apical antennal bulb with 2-3 lobes; western lowland species -----E. confusa
- 40) Second abdominal segment with only 2  $m_3$  setae (Fig. 691) -----E. atrocincta  
 40) Second abdominal segment with 4  $m_3$  setae (Fig. 682) -----E. griseolivata



Not included in key:

- |  |                                   |
|--|-----------------------------------|
| ** <u>agilis</u> Harvey, 1900 ( <u>Entomobrya</u> ( <u>Sinella</u> ))      | = <u>Pseudosinella sexoculata</u> |
| ** <u>albicollis</u> Franklin, 1905  | = <u>clitellaria</u>              |
| <u>anthera</u> Wray, 1952  | = <u>quadrilineata</u>            |
| ** <u>basidens</u> Bonet, 1934 ( <u>Entomobrya</u> ( <u>Parasinella</u> )) | <u>Sinella</u>                    |
| <u>beaucatcheri</u> Wray, 1946   | <u>Lepidocvrtus</u>               |
| <u>binoculata</u> Schött, 1896   | <u>Sinella</u>                    |

<sup>1</sup> Totally unpigmented specimens of E. clitellaria will key out here. We have always found them associated with typically pigmented forms. The species never occurs in arctic alpine habitats.

brunneicapilla Maynard, 1951  
californica Schött, 1891 (Drepanura)  
cavernarum Packard, 1888 (Degeeria)  
\*\* cavicola Banks, 1897a  
citrina Bonet, 1934a  
corticalls Nicolet, 1842 (Degeeria)  
curviseta Brook, 1882 (Sinella)  
cyanica Scott, 1942  
dissimilis Moniez, 1894  
duolineata Bueker, 1939  
fasciata Say, 1821 (Podura)  
flava Lie-Pettersen, 1897  
\*\* flavocincta Packard, 1972 (Degeeria)  
"flavopicta Packard" of Brook, 1883 (Degeeria)  
folsomi Bonet, 1934a  
\*\* frontalis Mills, 1935  
\*\* guthriei Mills, 1931  
hexfasciata Harvey, 1895  
hoefti Schaffer, 1896 (Sinella)  
indigena Stach, 1966  
\*\* intonsa Mills, 1932  
kanaba Wray, 1953c (Drepanura)  
laguna Bacon, 1913  
lanuginosa Nicolet, 1842 (Degeeria)  
lateropicta Hammer, 1953a  
\*\* lucifuga Folsom, 1902  
maizeae Wray, 1948  
marginata Tullberg, 1871 (Degeeria)  
millsi Bonet, 1942  
\*\* mineola Folsom, 1924

indeterminable without types 932

Drepanura

Sinella

Folsomia

= atrocincta

Nearctic records = ligata

Sinella

= clitellaria

Entomobryoides

= ligata

indeterminable; types lost

Nearctic record is atrocincta

composite, nomen dubium

imaginary

= comparata

= comparata

Entomobryoides

Orchesella

Sinella, extralimital

Orchesella, = ainsliei

= decemfasciata

= unostrigata

Mesentotoma

no valid Nearctic record

= comparata

= Sinella cavernarum

= assuta

no valid Nearctic records

= clitellaria

Entomobryoides

<u>muscorum</u> Nicolet, 1842 ( <u>Degeeria</u> )	no valid Nearctic records
<u>myrmecophila</u> Reuter, 1886	<u>Entomobryoides</u> , extralimital
** <u>neomexicana</u> Scott, 1963a	= <u>Drepanura californica</u>
<u>nigricincta</u> Denis, 1924	= <u>atrocincta</u>
** <u>ontarionensis</u> James, 1933	= <u>clitellaria</u>
** <u>perpulchra</u> Packard, 1873 ( <u>Degeeria</u> )	<u>Drepanura</u>
** <u>pseudoperpulchra</u> Mills, 1931	= <u>atrocincta</u>
** <u>purpurascens</u> Packard, 1873	<u>Entomobryoides</u>
<u>pygmaea</u> Harvey, 1895	indeterminable without types
** <u>rolfsi</u> Mills, 1935	= <u>Drepanura californica</u>
** <u>sabulicola</u> Mills, 1931 ( <u>Entomobrya</u> ( <u>Drepanura</u> ))	<u>Calx</u>
<u>sauteri</u> Börner, 1906 ( <u>Entomobrya</u> ( <u>Homidia</u> ))	<u>Homidia</u>
<u>sexoculata</u> Schött, 1896	<u>Sinella</u>
<u>socortensis</u> Scott, 1963a	<u>Drepanura</u> ?
<u>spectabilis</u> Reuter, 1892	Guthies's record from greenhouse is <u>assuta</u>
<u>stachi</u> Wray, 1957	= <u>decemfasciata</u>
<u>tampicensis</u> Mills, 1935	= <u>triangularis</u>
<u>trifasciata</u> Handschin of Weidner, 1983	= <u>clitellaria</u> ?

Entomobrya (Entomobrya) arnaudi Wray, 1953

Fig. 692

Refs.: Nature Notes, Raleigh, 1:7; Christiansen, 1958

**Description**

Color: background yellow; purple pigment distributed in the form of irregular and incomplete longitudinal lines and stripes. Head elongate oval. Body not flattened. Labral papillae are broad lobes each with 2 (-3? in one case) minute setae. External differentiated seta of labial appendage about as thick as normal setae. Apical tooth of mucro distinctly longer than antepical. Body setae of type 5 coarsely unilaterally ciliate. Maximum length 3.0 mm.

**Remarks**

The unusually long antennae serve to distinguish this species from all others except Entomobrya trogliphila. We have series of specimens from Caves in Tuolumne county, California which are similar to the descriptions and figures of arnaudi except for detail of the pattern ( see Fig. I) and the fact that eyes G & H are much smaller than the others. The larger size of these eyes is based entirely on Wray's drawing. Since he does not mention this in his description, and Christiansen did not see the eyes clearly when he examined the type it is possible that this is in error. Pending discovering topotypical specimens of this we consider the California specimens the same species and the listing of chaetotaxy features in Table XXXIII is based on the California specimens.

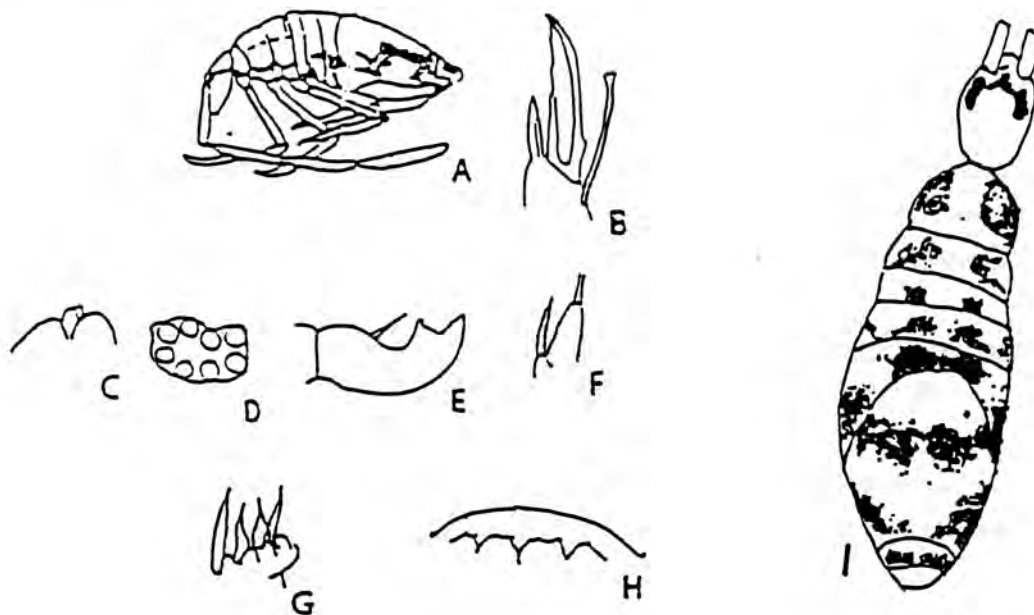


Localities: Washington - Fort Lewis( Type); California Tuolumne Co.(cave).

FIGURE 692

Entomobrya (Entomobrya) arnaudi (On next page)

- A) Habitus, after Wray. F) External differentiated seta of labial appendage, type specimen, after Christiansen.  
 B) Hind foot complex, after Wray. G) Basal portion of male genital plate, right side, type specimen, after Christiansen.  
 C) Apex of antenna, type specimen, after Christiansen. H) Labral papillae, type specimen, after Christiansen.  
 D) Left eyepatch, after Wray. I) Pattern, specimen form Tuolumne Co., CA.  
 E) Mucro, type specimen, after Christiansen.



Entomobrya (Entomobrya) arula Christiansen & Bellinger, 1980

Fig. 693

Description

Color: pale blue with pigment limited to eyepatches and antennae. Head oval, slightly longer than broad. Body oval and circular in cross section. Labral papillae weakly unisetaceous. External differentiated seta of labial appendage about as thick as normal setae. Mucro with apical tooth upcurved and 2-3 times as long as anteapical. Body setae of type 1 tapered from apex to base, strongly clavate at tip. Setae of type 5 coarsely unilaterally ciliate for apical half to two-thirds; mostly tapered from base but occasionally very slightly expanded medially. No genital plate has been seen. Maximum length 2.0 mm.

This remarkable species is known so far only from 3 poor specimens, but it shows a unique chaetotaxy as well as unusual mucrones and ungues. It appears to be most closely related to *E. troglodytes*, but its true relationships cannot be determined until an adult male has been seen. The littoral habitat is unique among Nearctic members of the subgenus, although *E. unostriata* is occasionally found on beaches.

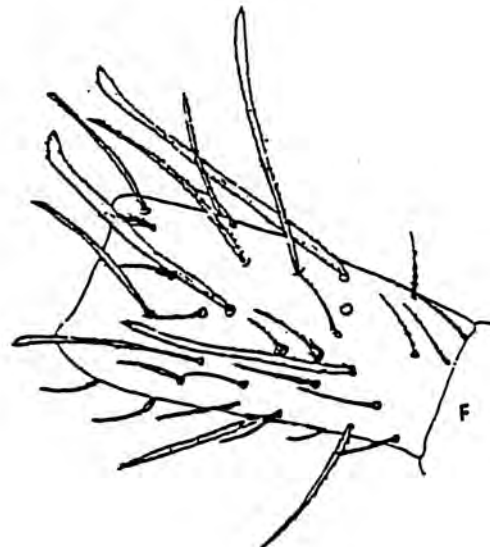
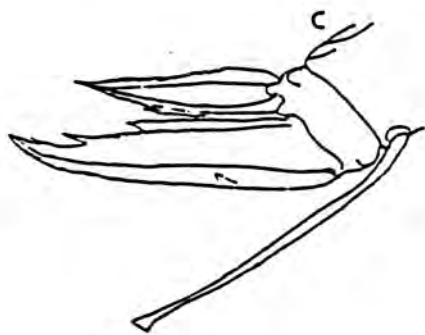
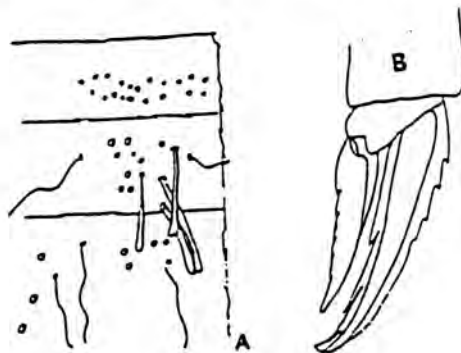
Type locality: Corona del Mar, Orange Co., Ca., in *Nereocystis* on beach gravel, 31 Aug. 1961.

FIGURE 693

*Entomobrya (Entomobrya) arula*

All figures of types.

- A) Chaetotaxy of first three abdominal segments of left side.
- B) Fore foot complex, seen from angle.
- C) Mid foot complex.
- D) Mucro.
- E) Apex of antenna.
- F) First antennal segment, from above.

*Entomobrya (Entomobrya) assuta* Folsom, 1924

Refs.: Am. Mus. Novit. 108:6; Christiansen, 1958c

Syn.: ~~maizcae~~ Wray, 1948, Bull. Brooklyn ent. Soc. 43:50.

Fig. 694

## Description

Color: background waxy yellow to off white; pattern variable, but most commonly with an irregular transverse band across the posterior margin of the second and the whole of the third abdominal segment, and with the posterior one-fourth of the body entirely dark except for 2 to 5 pale spots. Head roughly circular in dorsal outline. Body ovoid and clearly flattened dorsoventrally. Apical organ of fourth antennal segment bilobed or trilobed; apical sensillae of

third antennal segment slightly thinner than usual for genus. Labral papillae multisetaceous, with 3-4 (rarely 2) setae per papilla. External differentiated seta of labial appendage slightly thicker than normal setae and barely attaining apex of same papilla. Mucronal teeth subequal. Body setae of type 5 of 2 kinds: larger setae are uniformly tapered and coarsely multilaterally ciliate for apical 9/10 of length; smaller setae half as long as sparsely ciliate for apical half to 2/3 of length. Maximum length 2.0 mm.

#### Remarks

The unique chaetotaxy of this species places it near the Nearctic species of Janetschekbrya but far from other species of Entomobrya. The male genital plate is also unique in Nearctic species, though similar to that seen in some tropical forms. Seta  $m_3$  on the second abdominal segment may be absent, and when present varies considerably in position.

Localities: Arizona - Grant Co.; Connecticut - New Haven Co.; Florida - Micanopy; Illinois - Williamson Co., Winnebago Co.; Iowa - Poweshiek Co., Story Co.; Louisiana - Jefferson Par.; Massachusetts - Essex Co., Middlesex Co.; Michigan - Chippewa Co.; New York - Ontario Co. (type); South Carolina - Georgetown Co.; Texas - Brazos Co.; Utah - Millard Co.; Wisconsin - Columbia Co.; Ontario - Wellington Co.

Additional records: Indiana (Hart, 1969); Kentucky (Lesshafft, 1977); Maryland (Ostdiek, 1961); Missouri (Bueker, 1939); North Carolina (Wray, 1950); Vermont (Folsom, 1924); Ontario (James, 1933); Quebec (Matthewman and Pielou, 1971).

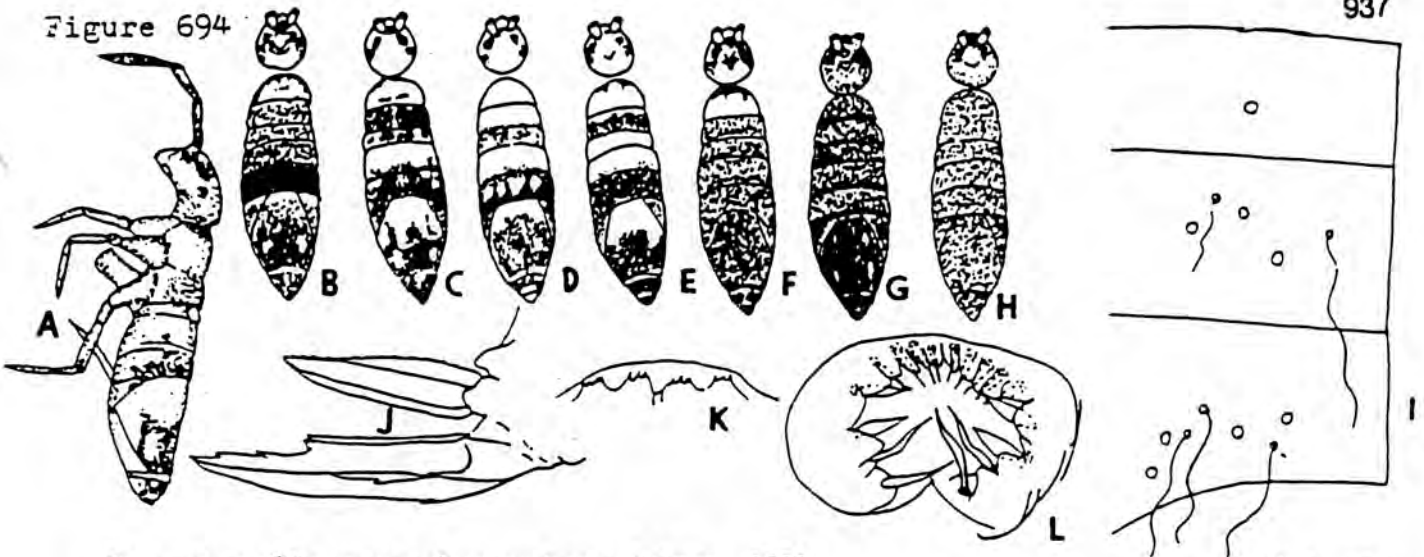
#### FIGURE 694

##### Entomobrya (Entomobrya) assuta

All figures except I from Christiansen.

- A) Habitus, specimen from New York.
- B) - H) Patterns from different localities:
  - B) Massachusetts
  - C) Iowa
  - D) New York
  - E) Utah
  - F) Massachusetts
  - G) Louisiana
  - H) Louisiana
- I) Chaetotaxy of left half of dorsum of first three abdominal segments, specimen from Louisiana.
- J) Hind foot complex, specimen from Massachusetts.
- K) Labral papillae, specimen from Massachusetts.
- L) Male genital plate, specimen from Massachusetts.

Figure 694



Entomobrya (Entomobrya) atrocincta Schött, 1896

Refs.: Proc. Calif. Acad. Sci. (2)6:184; Christiansen, 1958c.

Syn.: citrina Bonet, 1934, Eos, Madr. 9:149; nigrocincta Denis, 1924,

Bull. Soc. ent. Fr. 1923:54.

Fig. 695

#### Description

**Color:** background lemon yellow to orange with blue pigment along anterior border of second thoracic segment and in various solid transverse bands on any or all segments back to the second abdominal segment. Head roughly circular. Body fusiform and circular in cross section. Labral papillae with minute micropapillae bearing setae, but on some specimens one or more papillae may appear in some views to be broadly conical without clear apical setae. External differentiated seta of labial appendage slightly thicker than normal setae and exceeding apex of same papilla for 1/8 - 1/4 of its length. Mucro elongate, with apical tooth distinctly longer than antepical. Body setae of type 5 slender and coarsely ciliate for apical 2/3 to 4/5 of length. Maximum length 1.8 mm.

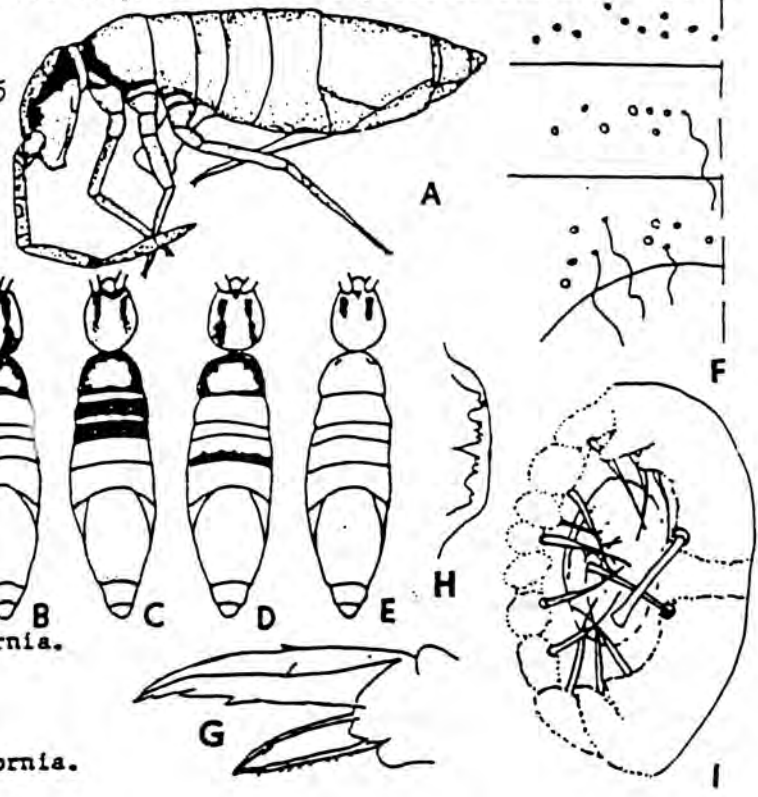
#### Remarks

The peculiar yellow background color is diagnostic of this species. The apparently variable structure of the labral papillae is confusing; scanning micrographs will be needed to resolve this problem; it is quite possible that 2 species are involved. Seta  $a_2$  of the second abdominal segment is absent in young specimens; seta  $a_3$  of the third abdominal segment may also be absent, but particularly on large specimens.

Localities: Arizona - Pima Co.; California - Kings Co. (type), Los Angeles Co., Marin Co., Sacramento Co.; Nevada - Washoe Co.; Texas - Brazos Co.; Utah - Utah Co  
 Additional records: Idaho (Wray & Knowlton, 1956); Indiana (Hart, 1970); Iowa (O'Neill & Pedigo, 1969); Kentucky (Lesshafft, 1977); Louisiana (Hepburn & Woodring, 1963); Maryland (Ostdiek, 1961); Tennessee (Copeland, 1960); Washington (Mills & Rolfs, 1933); West Virginia (Lippert & Butler, 1976).

Records from east of the Rockies are suspect because of possible confusion with E. clitellaria.

FIGURE 695



Entomobrya (Entomobrya) atrocincta

All figures except F after Christiansen.

- A) Habitus, specimen from California.
- B) - E) Pattern variations, specimens from California.
- F) Chaetotaxy of first three abdominal segments of left side, specimen from Utah; dotted seta usually absent.
- G) Hind foot complex, specimen from California.
- H) Labral papillae, specimen from Texas.
- I) Male genital plate, specimen from California.

Entomobrya (Entomobrya) bicolor Guthrie, 1903

Fig. 696

Refs.: Collembola of Minnesota: 73; Christiansen, 1958c

Description

Color: background dull waxy yellow with purple to chocolate brown dark pigment on whole body except for a pale band on the first 2 and one on the last 2 abdominal segments; occasionally with pale color extending onto anterior margin of third abdominal segment; exceptionally without pale bands; appendages pale with dark rings at some joints. Head subcircular in young specimens but elongate oval in adults. Body elongate fusiform. Apical sensillae of third antennal segment simple, rodlike, sunk into deep pits. Labral papillae conical and strongly unisetaceous. External differentiated seta of labial appendage



varying from very heavy to only slightly thicker than normal setae, exceeding apex of same papilla for 1/4 to 1/3 of its length. Mucro short and stout, with subequal teeth. Body setae of type 1 with unusually long reflexed apex. Setae of type 5 uniformly tapered and ciliate. Maximum length 3.0 mm.

Remarks

This species appears to be more constant than most in its pattern; two entirely dark specimens represent the only striking variation we have seen. A very distinctive species.

Localities: Iowa - Linn Co., Story Co.; Minnesota - Hennepin Co. (type); Missouri - Linn Co.; Nebraska - Thomas Co.; Oklahoma - Cleveland Co.; Pennsylvania - Centre Co.; Washington - King Co.

Additional records: Kentucky (Lesshafft, 1977); New Jersey (Christiansen, 1958); North Carolina (Brimley, 1938); Tennessee (Copeland, 1960).

FIGURE 696

Entomobrya (Entomobrya) bicolor

All figures except B after Christiansen.

A) Habitus and pattern, specimen from New Jersey.

B) Chaetotaxy of first three abdominal segments of left side, specimen from Minnesota.

C) Hind foot complex, specimen from Iowa.

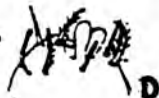
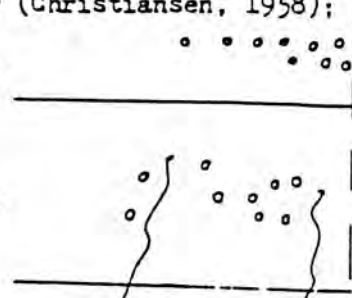
D) Apex of antenna, specimen from Iowa.

E) Mucrones, specimens from Iowa.

F) Male genital plate, specimen from Iowa.

G) Type 1 setae, specimen from Iowa.

H) Type 5 setae, specimen from Iowa.



Entomobrya (Entomobrya) clitellaria Guthrie, 1903

Fig. 697

Refs.: Collembola of Minnesota: 75; Christiansen, 1958c.

Syn.: albicollis Franklin, 1905, Ent. News 16:77; cyanica Scott, 1952,

Pan-Pacif. Ent. 18:180; millsi Bonet, 1942, Ciencia, Mèx. 5:57; ontarionensis

James, 1933, Trans. R. Can. Inst. 19:79; pseudoperpulchra Mills, 1931,

Am. Mus. Novit. 464:5.

### Description

Color: background pale to bright yellow-orange, with blue-black to pale purple pigment. Head circular; body broadly oval and dorsoventrally compressed. Apical sensillae of third antennal segment slightly swollen. Labral papillae strongly unisetaceous. External differentiated seta of labial appendage about as thick as normal setae. Mucro short and stout with subequal teeth. Body setae of type 1 generally brown in color; setae of type 5 smooth for basal third to half of length, distally with coarse, mostly multilateral ciliations. Maximum length 2.25 mm.

### Remarks

The species varies greatly in pattern; some forms resemble E. atrocincta, which, however, differs in body shape, labral papillae, chaetotaxy, and male genital plate. Specimens from California have been seen with bilobed or indented apical antennal bulbs, sometimes on only 1 antenna. One specimen from Ontario had 2 supplementary  $m_{3e}$  setae on the second abdominal segment, but another specimen from the same locality was normal. The chaetotaxy is very hard to observe on well pigmented specimens.

Localities: California - Madera Co.; Illinois - Champaign Co.; Iowa - Story Co.; Massachusetts - Essex Co., Middlesex Co.; Minnesota - "northern part of state" (type); New York - Tompkins Co.; Pennsylvania - Centre Co. Ontario - Wellington Co.

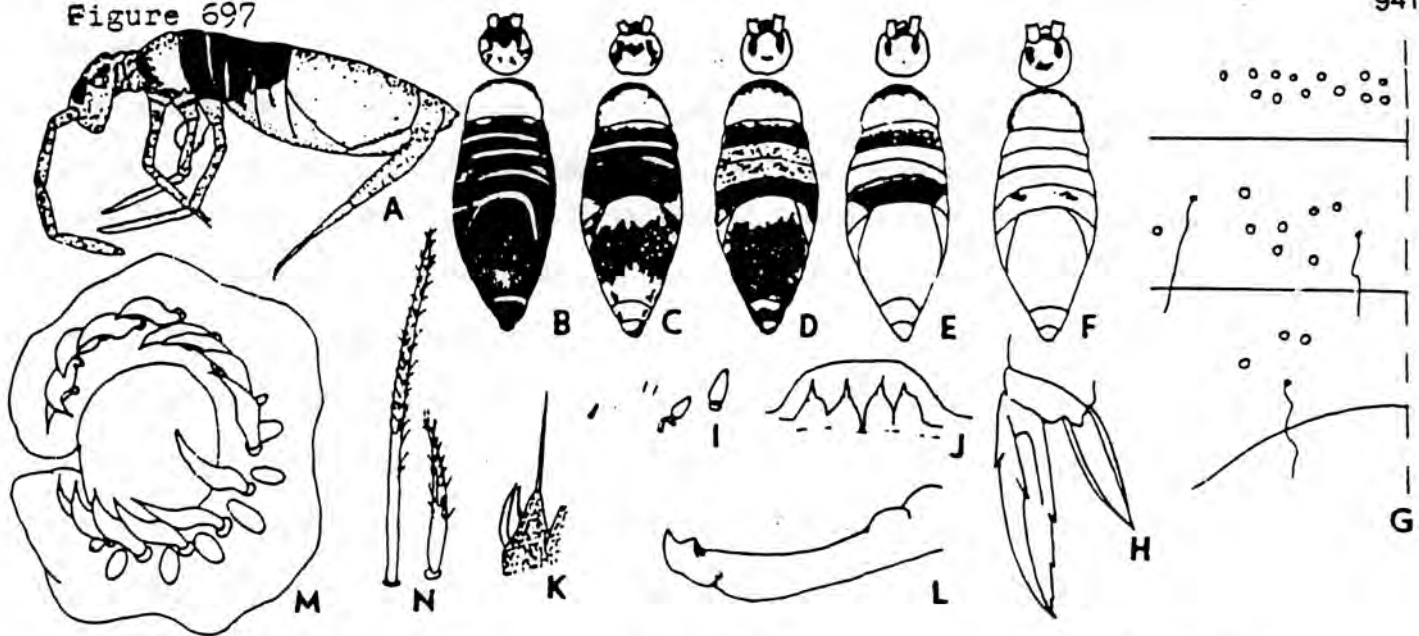
Additional records: Indiana (Hart, 1972); Louisiana (Hepburn and Woodring, 1963); Michigan (Snider, 1967); Oregon (Shelford, 1963). Quebec (Pielou and Matchewman, 1966).

### FIGURE 697

#### Entomobrya (Entomobrya) clitellaria

All figures except G after Christiansen.

- |   |   |
|---|---|
| A) Habitus, specimen from Massachusetts.  | H) Hind foot complex, specimen from Massachusetts.                    |
| B) - F) Variations in pattern   | I) Apical organ, third antennal segment, specimen from Massachusetts. |
| B) and C) Specimens from Iowa   | J) Labral papillae, specimen from Canada.                             |
| D) Specimen from Massachusetts  | K) Labial appendage, specimen from Massachusetts.                     |
| E) and F) Specimens from Canada.  | L) Mucro, specimen from Massachusetts.                                |
| G) Chaetotaxy of first three abdominal segments, left side, specimen from Middlesex Co., Massachusetts. | M) Male genital plate, specimen from Massachusetts.                   |
|   | N) Body setae of types 4 and 5.                                       |



Entomobrya (Entomobrya) comparata Folsom, 1919

Fig. 698

Refs.: Rep. Can. Arctic Exped. 3:13; Christiansen, 1958c.

Syn.: folsomi Bonet, 1934, Eos, Madr. 9:159; frontalis Mills, 1935, Bull.

Brooklyn ent. Soc. 30:136; lateropicta Hammer, 1953, Acta arct. 6:54.

#### Description

Color: background pale yellow to yellow-green or sometimes, in patterned forms, off-white; dark blue pigment limited in tundra forms to eyes, inter-antennal markings, and appendages; pattern of taiga forms geographically variable, but generally with some square-cornered markings on the dorsum of the second thoracic to second abdominal segments, and transverse bands on the third and fourth abdominal segments. Head broadly oval; body oval, circular in cross section. External differentiated seta of labial appendage  $1\frac{1}{2}$  to 2 times as thick as normal setae. Mucronal teeth subequal. Body setae of type 1 very narrow at point of insertion, gradually expanded for basal  $\frac{1}{5}$  to  $\frac{1}{2}$  of length, slightly bent for apical  $\frac{1}{10}$  to  $\frac{1}{5}$ . Setae of type 5 mostly uniformly tapered, but some are slightly expanded medially. Maximum length 2.5 mm.

#### Remarks

This is the most interesting species of the genus in North America. First, the senior author's earlier arctic material identified as this species belongs mainly to the related but distinct species E. erratica (see remarks under that species). E. comparata was described from Bernard Harbour, N.W.T., and Demarcation Point, Alaska; we have examined types from the latter locality and,

although in poor condition, they appear to be comparata as defined here and are definitely not erratica. E. comparata occurs in two forms across the United States in practically every high montane region, generally in sharply distinguished tundra and taiga patterns. The senior author studied the separation of these forms in some detail in southern Colorado. The conclusions of this study were: 1) the forms are not strictly a response to altitude; 2) there is a striking habitat difference, with the taiga forms occurring under bark or stones in relatively dry areas, and the tundra forms limited to moist areas under stones; 3) there are no morphological differences between forms even though the patterns are always distinct; 4) intermediates in pattern are most numerous at the edge of isolated patches of woodland; 5) the taiga forms are on the average larger than the tundra forms. In addition, there is striking geographic variation in the pattern of the taiga form.

Localities: Alaska - Demarcation Point (type), Umiat. We have records from many localities in mountains of the following states: California, Colorado, Idaho, Maine, Montana, Nevada, New Hampshire, New Mexico, Washington, Wyoming. Additional records: Canada - Alberta (Powell, 1971); Northwest Territories (Folsom, 1919a).

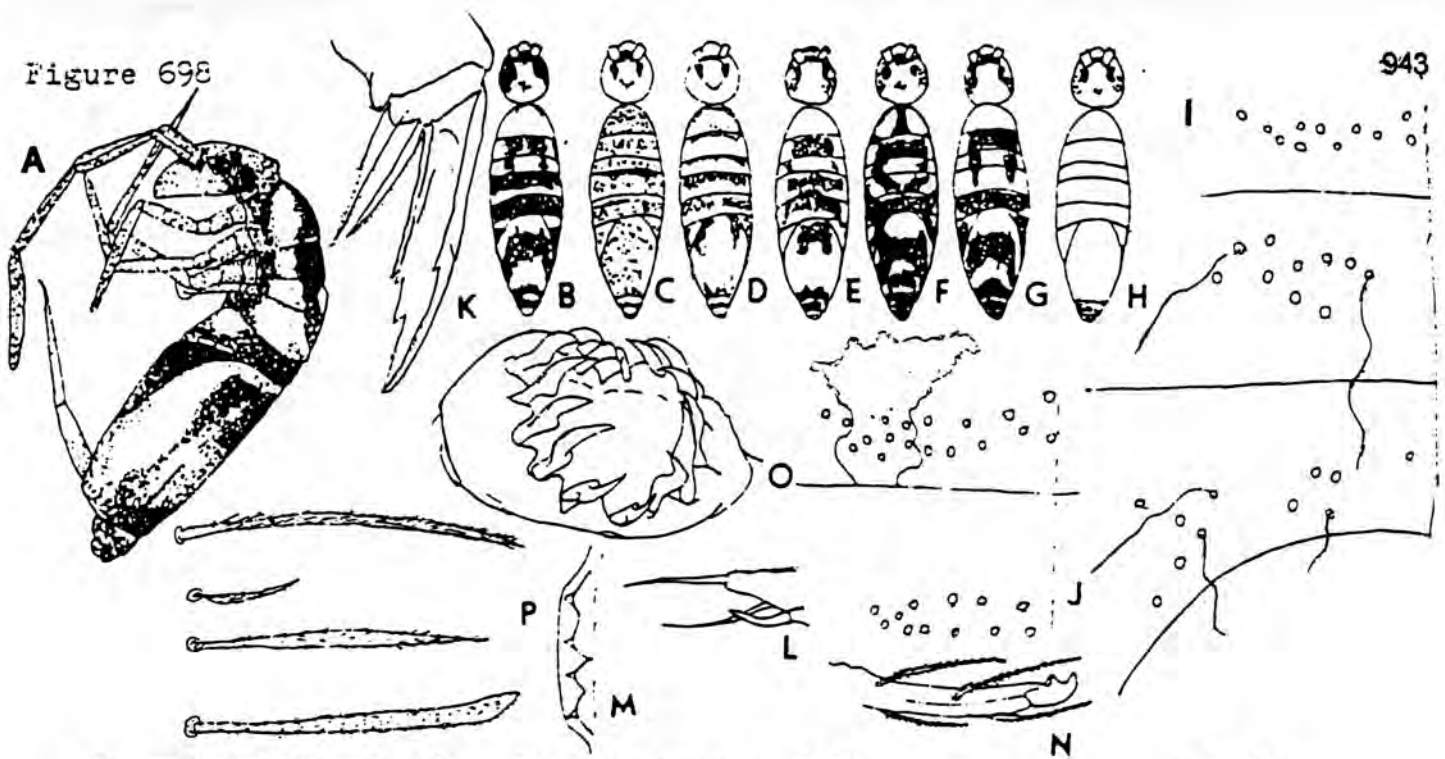
Entomobrya (Entomobrya) comparata

FIGURE 698

All figures except I, J, & N after Christiansen.

- |   |  |
|---|--|
| A) Habitus, specimen from California.   | M) Labral papillae.                            |
| B) - G) Pattern variations in taiga form.   | N) Mucro and apex of dens, after Folsom.       |
| B) Specimen from New Hampshire.   | O) Male genital plate, specimen from Colorado. |
| C) - E) Specimens from edge of Montana glacier.   | P) Body setae, specimen from Colorado.         |
| F) Specimen from Colorado.  |  |
| G) Specimen from Wyoming.   |  |
| H) Tundra pattern.  |  |
| I) Chaetotaxy of left side of dorsum of first three abdominal segments, specimen from Butte Co., Idaho.       |  |
| J) Chaetotaxy of left side of dorsum of first two abdominal segments, specimen from Santa Fe Co., New Mexico. |  |
| K) Hind foot complex, specimen from Colorado.   |  |
| L) Differentiated seta of labial appendage.   |  |





Entomobrya (Entomobrya) confusa Christiansen, 1958

Fig. 699

Ref.: Bull. Mus. comp. Zool. Harvard 118:494.

#### Description

Color: background pale yellow to white; blue to purplish brown pigment generally uniformly distributed except for posterior segmental margins which usually have darker bands, generally clear on the first four abdominal segments at least. Head broadly oval. Body oval, circular in cross section. Labral papillae weakly unisetaceous. External differentiated seta of labial appendage slightly thicker than normal setae. Mucronal teeth subequal. Body setae of type 1 only slightly expanded apically. Setae of type 5 acuminate, slightly expanded medially, and coarsely multilaterally ciliate for apical 1/2 to 3/4 of length. Maximum length 2.0 mm.

#### Remarks

Superficially this species resembles the eastern E. griseoolivata, but it differs in almost all morphological features. E. confusa also resembles the European E. marginata, but their male genital plates are quite different. In chaetotaxy this species resembles E. comparata, but it lacks the yellow to yellow-green background color of unpatterned comparata, and the patterned forms of the two species are quite different.

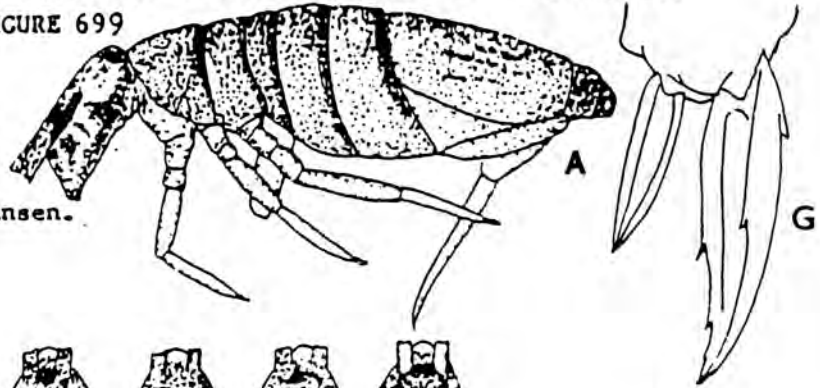


Localities: California - Fresno Co., Modoc Co., Shasta Co.; Colorado - Clear Creek Co. (type), Gunnison Co.; Iowa - Jackson Co.; Montana - Cascade Co., Gallatin Co., Glacier Co., Granite Co.; New Mexico - Los Alamos Co., Taos Co.; North Dakota - Dunn Co.; Wisconsin - Dean Co.; Wyoming - Sheridan Co.

FIGURE 699

Entomobrya (Entomobrya) confusa

All figures except F after Christiansen.



A) Habitus.

B) - E) Variations in head pattern.

B) Specimen from Idaho.

C) Specimen from Colorado.

D) & E) Specimens from Montana.

F) Dorsal chaetotaxy of left side of first three abdominal segments, specimen from Essex Co., Montana.

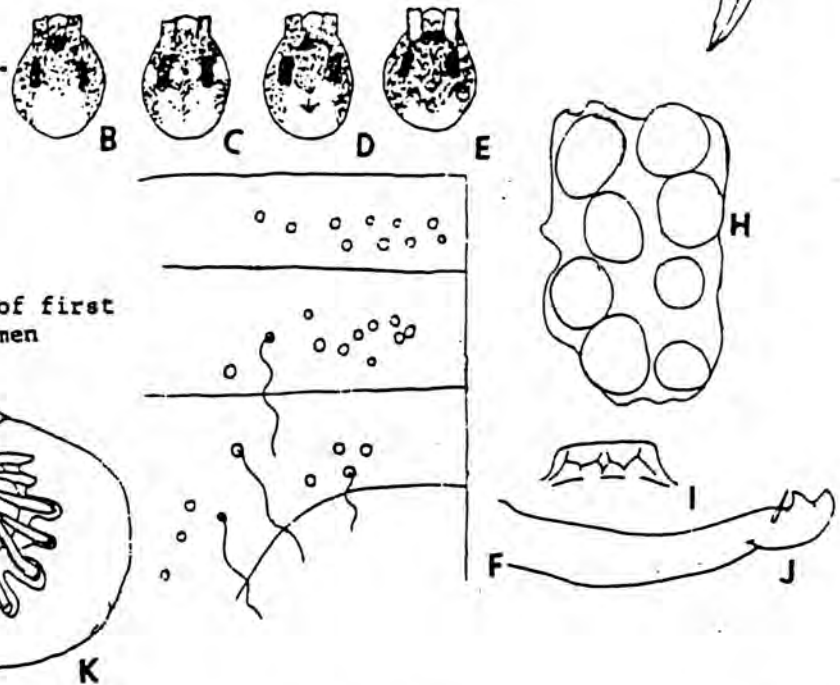
G) Hind foot complex.

H) Eyes of left side.

I) Labral papillae.

J) Mucro.

K) Male genital plate.



Entomobrya (Entomobrya) decemfasciata (Packard), 1873

Fig. 700

Refs.: Rep. Peabody Acad. Sci. 5:23 (Degeeria); Christiansen, 1958c.

Syn.: intonsa Mills, 1932, Iowa St. Coll. J. Sci. 6:265; stachi Wray, 1957, Acta zool. cracov. 6:114.

Description

Color: background white to dull yellow, with blue-black pigment in a more or less well developed cephalic V-shaped mark, on the lateral margins of the thorax, and in parallel angled bands on the second through fourth abdominal segments; darker specimens also have irregular transverse markings on the posterior margins of body segments. Head elongate elliptical. Body fusiform,

circular in cross section. Labral papillae rather strongly unisetaceous. External differentiated seta of labial appendage thicker than normal setae. Mucro stout, with subequal teeth. Body setae of type 1 not expanded apically. Setae of type 5 uniformly tapered and uniformly ciliate for apical 3/5 to 4/5 of length. Maximum length 3.5 mm.

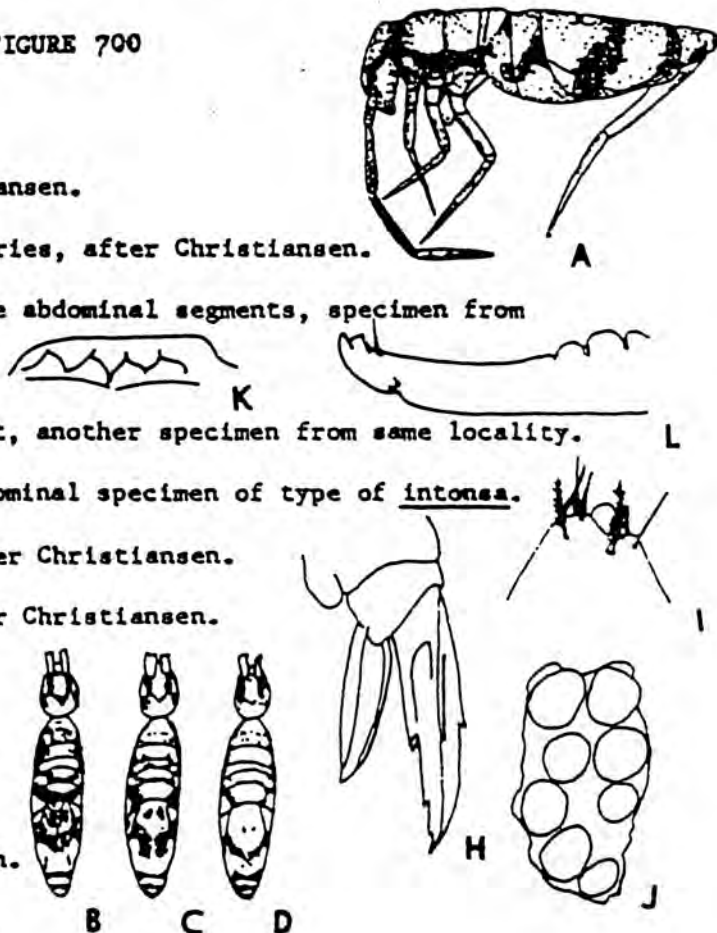
#### Remarks

The peculiar pattern, large size, and relatively short fourth antennal segment permit easy recognition of this species. It differs from the somewhat similar E. quadrilineata in typical pattern, male genital plate, antennal ratios, and chaetotaxy. The chaetotaxy of the second abdominal segment is extremely variable in the species as presently circumscribed; since the genital plate has been examined on only 1 specimen, it is possible that more than 1 species is involved. Localities: Alabama - Talladega Co.; Tennessee - London Co., Sevier Co.; Texas - Brazos Co., McLennan Co. (type); Virginia - Roanoke Co. Additional records: Kentucky (Lesshafft, 1977); North Carolina (Wray, 1967, as stachi).

#### Entomobrya (Entomobrya) decemfasciata

FIGURE 700

- A) Habitus, type specimen, after Christiansen.
- B) - D) Variations of pattern in type series, after Christiansen.
- E) Chaetotaxy of left side of first three abdominal segments, specimen from Talladega Co., Alabama.
- F) Chaetotaxy of second abdominal segment, another specimen from same locality.
- G) Chaetotaxy of left side of second abdominal specimen of type of intonsa.
- H) Hind foot complex, type specimen, after Christiansen.
- I) Apex of fourth antennal segment, after Christiansen.
- J) Eyepatch, after Folsom.
- K) Labral papillae, after Christiansen.
- L) Mucro, after Christiansen.
- M) Male genital plate, after Christiansen.
- N) Setae of type 1, after Christiansen.



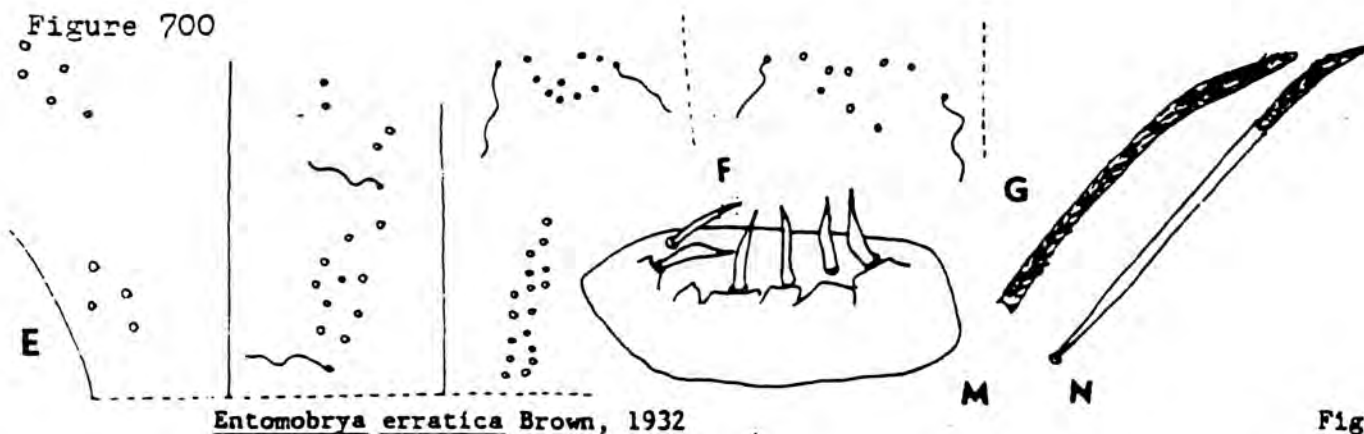
Entomobrya erratica Brown, 1932

Fig. 701

Ref.: Ann. Mag. nat. Hist. (10)10:336.

Description

Color: background yellow; pigment greenish, varying from pale to dark olive, covering entire animal except for intersegmental membranes and oval pale spots, not forming a pattern except for occasional slight marginal banding on posterior abdominal segments; or body unpigmented. Head roughly circular. Body oval, circular in cross section. All eyes subequal in size. Labral papillae strongly unisetaceous. External differentiated seta of labial appendage clearly thicker than normal setae. Apical mucronal tooth slightly larger than antepical. Body setae of type 5 multilaterally ciliate for most of length and slightly expanded medially. Maximum length 2.0 mm.

Remarks

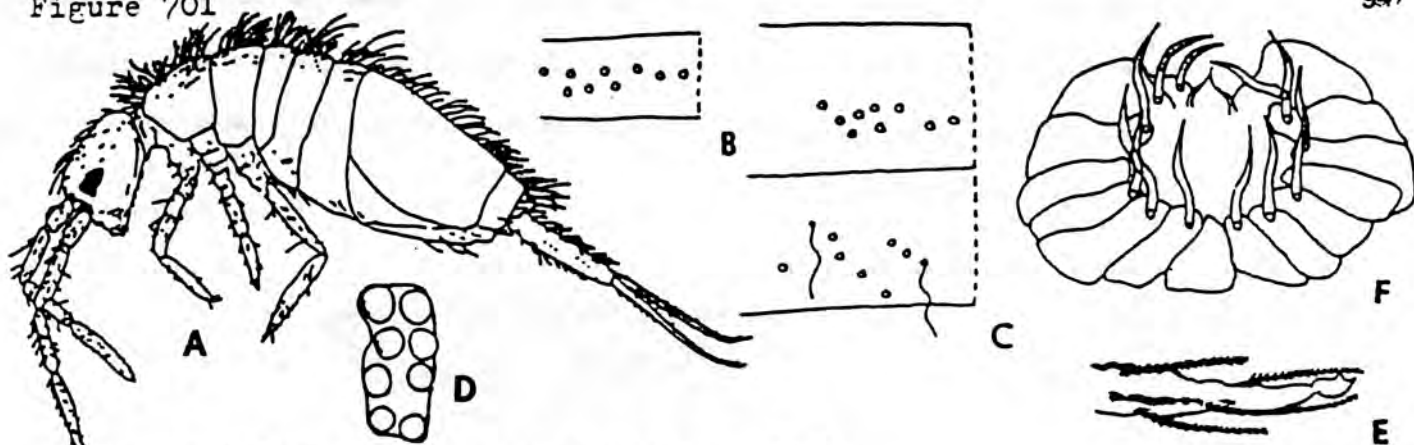
This species can easily be confused with E. comparata. While they are closely related, they are readily separable on the basis of the relative eye sized and the chaetotaxy of the first abdominal segment; the male genital plates (seen on only 1 specimen of erratica) and a number of minor features also distinguish them.

Localities: Alaska - Pt. Barrow, Umiat. Canada: Hudson Strait (type); N.W.T. - Ellesmere I., Sacks Harbor.

Entomobrya (Entomobrya) erratica

FIGURE 701

- |  |   |
|--|---|
| <p>A) Habitus, after Brown.</p> <p>B) Chaetotaxy of the first abdominal segment, specimen from Ellesmere Island, N.W.T.</p> <p>C) Chaetotaxy of the first two abdominal segments, specimen from Sacks Harbor. N.W.T.</p> | <p>D) Left eyepatch, after Brown.</p> <p>E) Mucro, after Brown.</p> <p>F) Male genital plate, specimen from Pt. Barrow, Alaska.</p> |
|--|---|



Entomobrya (Entomobrya) gisini Christiansen, 1958

Fig. 702

Ref.: Bull. Mus. comp. Zool. Harvard 118:502.

#### Description

Color: pale greenish yellow with gray to black pigment in broken longitudinal lines over body; head with clear dark dorsal V. Head elongate oval. Body fusiform, circular in cross section. Fourth antennal segment showing signs of ringing or subsegmentation. Apical organ of third antennal segment with accessory peg unusually elongate. Second antennal segment with a poorly demarcated basal subsegment. Labral papillae strongly unisetaceous. External differentiated seta of labial appendage slightly narrower than normal setae. Apical mucronal tooth slightly smaller than subapical. Body setae of type 1 greatly expanded just above insertion, uniform in width distally, and apically bent. Setae of type 5 finely multilaterally ciliate and fusiform. Maximum length 2.5 mm.

#### Remarks

The presence of a basal subsegment of the second antennal segment (visible in only half the specimens) would place this species in Orchesella; however, all body features other than this are clearly those of Entomobrya. The unusual combination of pattern and shape easily distinguish this from all Nearctic congeners. The only certain record of this species is from the type locality, but 2 specimens from Canada may belong here. One from Banff, Alberta, is similar in all features seen except the chaetotaxy of the second abdominal segment. The second is from Churchill, Manitoba, the type locality of E. lateropicta. It is



a fragmentary specimen and suggests the possibility that the latter species, 948 whose original description is incomplete, is actually a synonym of E. gisini rather than of E. comparata as suggested above; however, more material is needed to settle this question.

Locality: North Carolina - Yancey Co. (type).

Entomobrya gisini

FIGURE 702

All figures except C after Christiansen.

A) Habitus.

B) Pattern, specimen from Alberta.

C) Chaetotaxy of left side of first three abdominal segments, type specimen.

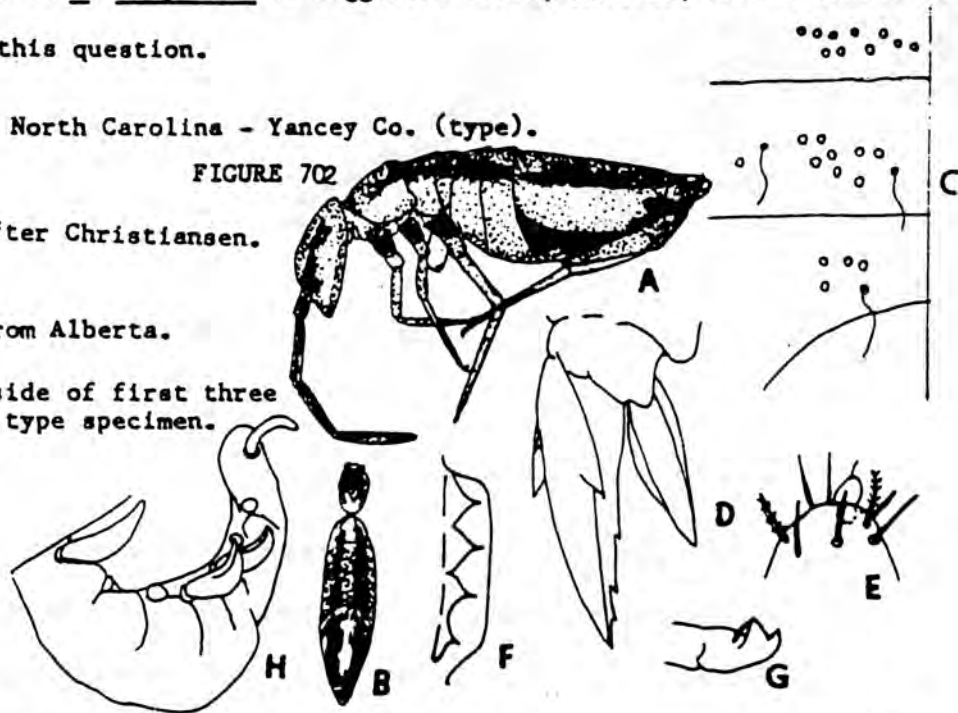
D) Hind foot complex.

E) Apex of antenna.

F) Labral papillae.

G) Mucro.

H) Male genital plate.



Entomobrya (Entomobrya) griseoolivata (Packard), 1873

Fig. 703

Refs.: Rep. Peabody Acad. Sci. 5:39 (Degeeria); Christiansen, 1958c.

Syn.: Isotobryoides ochracius Maynard, 1951, Collembola of New York:163,

Description

Color: background pale blue to white; purplish blue pigment uniform on body except for darker posterior segmental borders; head with characteristic pattern (see figures). Head roughly circular. Body oval, circular in cross section. Labral papillae multisetaceous, with minute micropapillae (often difficult to observe). External differentiated seta of labial appendage about as thick as normal setae. Mucro with apical tooth 2 - 3 times as long as antepical. Body setae of type 5 uniformly tapered and coarsely multilaterally ciliate for apical 1/2 to 2/3. Maximum length 2.0 mm.

Remarks

The chaetotaxy of this species distinguishes it from other Nearctic species. Specimens from the United States and Canada identified as E. marginata (a European species) probably belong here. Eastern forms have the apical ant-



ennial organ trilobed, while most from western localities have this organ unlobed; the latter may represent a closely related species, but so far no male genital plate has been seen on such specimens. The specimens from California come from a salt marsh; they are peculiar in a number of respects, and may represent a different taxon.

A single specimen labelled "Parentomobrya ochracea holotype" by Maynard, from the type locality of I. ochracius and collected on the same date, appears to be a very pale young specimen of this species.

Localities: Connecticut - Hartford Co.; Idaho - Jerome Co.; Iowa - Jackson Co. (cave); Maine - Sagadahoc Co.; Massachusetts - Essex Co. (type), Middlesex Co.; Montana - Gallatin Co.; Nevada - Washoe Co.; Pennsylvania - Montgomery Co., Potter Co.

Additional records: California (Wilkey, 1959); Colorado (Wilkey, 1951); Indiana (Pedigo, 1970a); Maryland (Ostdiek, 1961); Michigan (Snider, 1967); New York (Folsom, 1928); North Carolina (Graves et al, 1977); Tennessee (Styron and Dodson, 1973); Utah (Wray and Knowlton, 1953); Washington (Mills and Rolfs, 1933). Ontario (James, 1933).

FIGURE 703

Entomobrya (Entomobrya) griseopolivata

All figures except F after Christiansen.



A) Habitus, specimen from Massachusetts.

B) - E) Variations in cephalic pattern, specimens from Massachusetts.



F) Chaetotaxy of first 3 abdominal segments, left side, specimen from Middlesex Co., Massachusetts.

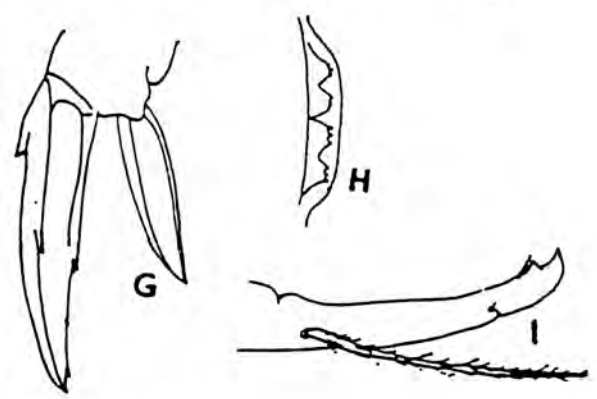
G) Hind foot complex, specimen from Maine.

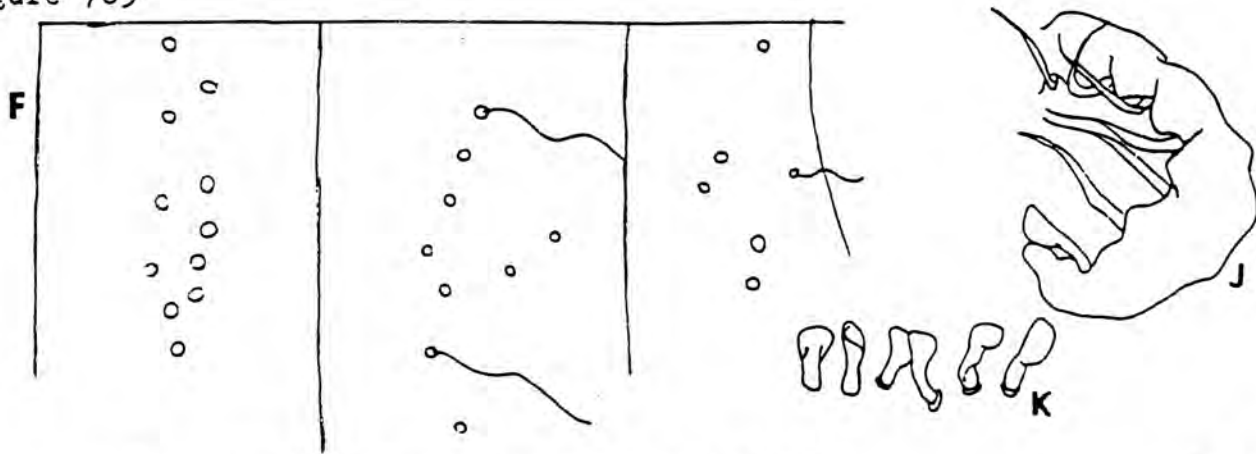
H) Labral papillae, specimen from Massachusetts.

I) Mucro, paratype.

J) Male genital plate, specimen from Maine.

K) Variations in basal setae of genital plate, specimens from Maine and Massachusetts.





Entomobrya (Entomobrya) intermedia Brook, 1883

Fig. 704

Refs.: J. Linn. Soc. Zool. 17:274; South, 1961.

#### Description

Color: background yellowish, with purple to blue pigment, variably distributed but generally in the form of broken irregular longitudinal stripes on the throax and first 3 abdominal segments, and with a more or less complete W-shaped mark on the fourth abdominal segment. Head oval, slightly longer than broad. Body fusiform and circular in cross section. Labial appendage with differentiated seta slightly thicker than normal setae. Mucronal teeth subequal. Body setae of type 5 narrowed from base and coarsely multilaterally ciliate for apical 3/4 to 7/8 of length. Maximum length 2.5 mm.

#### Remarks

This is one of the forms sometimes lumped under E. nivalis. We have examined English material of this species and except for the slightly shorter antennae do not find any differences between these and Nearctic specimens. The species is very similar to nivalis and multifasciata, but generally is larger, with longer antennae, and in well-marked specimens has the striking W-shaped mark on the fourth abdominal segment. The male genital plate of Nearctic specimens has not been seen.

Localities: California - Contra Costa Co.; Massachusetts - Plymouth Co.; Minnesota - St. Louis Co.; Nevada - Washoe Co.; Oregon - Benton Co.; Washington - Fort Lewis. Ontario - London.

Entomobrya (Entomobrya) intermedia

- A) - C) Pattern variations, after South.  
 D) Dorsal chaetotaxy of left side of second and third abdominal segments, specimen from St. Louis Co., Minnesota.  
 E) Labral papillae, specimen from Fort Lewis, Washington.  
 F) Mucro, same specimen.  
 G) Male genital plate, specimen from England.

Entomobrya (Entomobrya) kincaidi Folsom, 1902

Fig. 705

Refs.: Proc. Wash. Acad. Sci. 4:96; Christiansen, 1958c.

## Description

Color: yellow green to dark olive green, with darker specimens having oval to round pale spots and a slightly darker color suffusing the posterior lateral regions of the abdomen; head with dark antennal bases and sometimes a dark band connecting them. Head broadly oval to circular. Body oval and circular in cross section. Labral papillae clearly unisetaceous or bisetaeous. External differentiated seta of labial appendage about  $1 \frac{3}{4}$  as wide as normal setae. Mucronal teeth subequal. Body setae of type 1 distinctly clavate, not constricted at base, with apex slightly bent. Setae of type 5 flattened, medially expanded, and flexible, always finely multilaterally ciliate. Maximum length 1.9 mm.

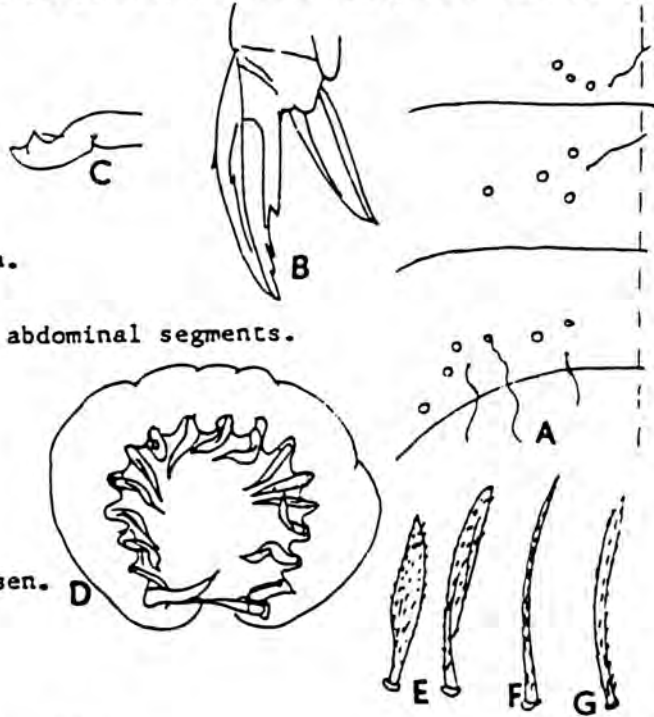
## Remarks

This species, like the Himalanura group of Entomobrya, falls close to Americabrya, but from the structure of the male genital plate it is nearer

to confusa. Eyes G & H vary strikingly in size from much smaller than D & F to subequal. The general intraspecific constancy of this feature, and the fact that specimens we have seen are poor, makes it possible that 2 species are involved.

Localities: Alaska - Anaktuvuk Pass, Atkasuk, Chandler Lake, Muir Glacier (type), Pt. Barrow.

FIGURE 705



Entomobrya (Entomobrya) kincaidi

All figures of specimens from Pt. Barrow, Alaska.

- A) Chaetotaxy of left side of dorsum of first 3 abdominal segments.
- B) Hind foot complex, after Christiansen.
- C) Mucro, after Christiansen.
- D) Male genital plate, after Christiansen.
- E) Normal body setae of type 5, after Christiansen.
- F) Same seen on edge.
- G) Exceptional cylindrical type 5 seta.

Entomobrya (Entomobrya) ligata Folsom, 1924

Fig. 706

Refs.: Am. Mus. Novit. 108:5; Christiansen, 1958c.

Syn.: duolineata Bueker, 1939. Trans. Acad. Sci. St. Louis 30:14.

Description

Color: background yellow to tan; pigment blue-black to (rarely) purple, in characteristic pattern of transverse bands and lateral marginal stripes (see figures). Head circular. Body oval, circular in cross section. Labral papillae weakly unisetaceous. External differentiated seta of labial appendage slightly thicker than normal setae. Mucronal teeth subequal. Body setae of type 1 clavate, sharply tapered from basal 1/10 of length. Setae of type 5 tapered from base, coarsely unilaterally ciliate for apical 3/4 to 1/2 of length. Maximum length 1.8 mm.

Remarks

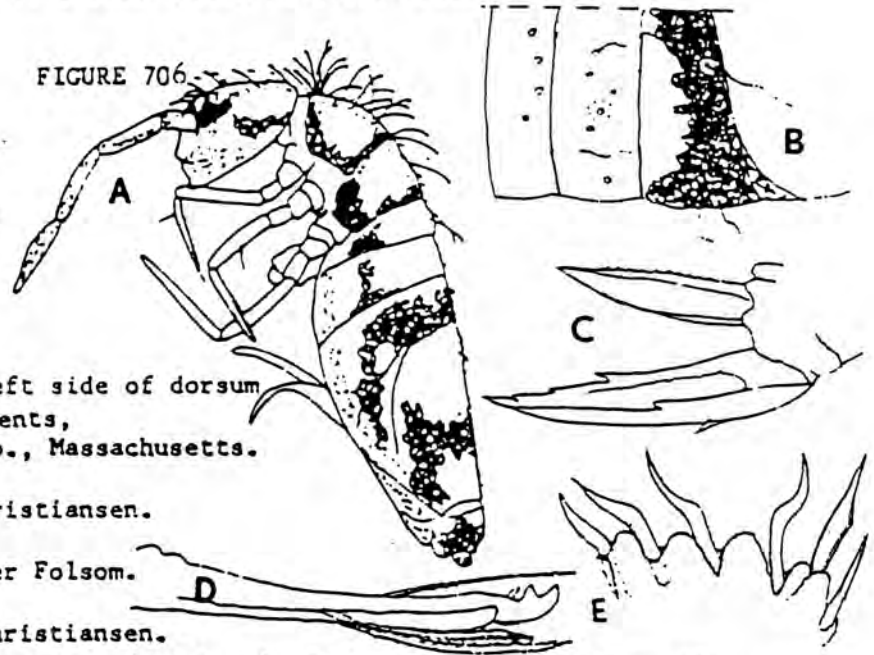
This very small species is in some respects similar to the western E. triangularis, but may easily be distinguished by the chaetotaxy. The pattern in E. ligata is the most uniform we have seen in the genus.

Localities: Connecticut - New Haven Co.; Maine - York Co.; Massachusetts - Essex Co., Norfolk Co., Suffolk Co.; New Jersey - Union Co.; New York - Nassau Co., Orange Co., Tompkins Co. (type); North Carolina - Graham Co., Linville, McDowell Co.; Pennsylvania - Black Hawk Gap., Centre Co.; Tennessee - Carter Co., Sevier Co.

Additional records: Maryland (Ostdiek, 1961); Missouri (Bueker, 1939, as duolineata).

Entomobrya (Entomobrya) ligata

- A) Habitus, after Folsom.  
 B) Chaetotaxy and pattern of left side of dorsum of first 3 abdominal segments, specimen from Middlesex Co., Massachusetts.  
 C) Hind foot complex, after Christiansen.  
 D) Apex of dens and mucro, after Folsom.  
 E) Male genital plate, after Christiansen.



Entomobrya (Entomobrya) multifasciata (Tullberg), 1871

Fig. 707

Refs.: Öfvers.k.Vetensk.Akad. Förh. 28:128 (Degeeria); South, 1961;

Stach, 1963.

Description

Color: background off-white, rarely yellowish; pigment blue, in extremely variable pattern, most commonly in the form of incomplete transverse bands on all segments of the body. Head circular. Body oval, circular in cross section. Labral papillae with very minute setae on micropapillae. External differentiated seta of labial appendage slightly thicker than normal setae. Apical mucronal tooth subequal to or slightly longer than antepical. Body setae of type 5 gradually tapered from base and coarsely multilaterally ciliate for distal 7/8 to 3/4 of length. Maximum length 2.0 mm.

Remarks

This species intergrades with nivalis and intermedia in pattern in North America, but is readily distinguished by its chaetotaxy. In other morphological characters the three species are very similar. Their typical patterns, however, are easily separable. One population from California may have seta  $m_{3ep}$  on the second abdominal segment present but variable in position.



Localities: Arizona - Pima Co.; California - Carmichael, Colusa Co., Contra Costa Co., San Joaquin Co. (?), Shasta Co.; Connecticut - Middlesex Co. Illinois - Coles Co.; Iowa - Story Co.; Maine - Cumberland Co., Sagadahoc Co.; Maryland - George Co.; Massachusetts - Barnstable Co., Middlesex Co., Norfolk Co.; New Jersey - Somerset Co.; New York - Tompkins Co.; Ohio - Logan Co.; Texas - Travis Co.; Utah - Utah Co.; Washington - Whitman Co. Ontario - Prescott; Dunn Township.

Published records are dubious because of confusion with other species.

FIGURE 707

Entomobrya (Entomobrya) multifasciata

A) Habitus, after Stach.

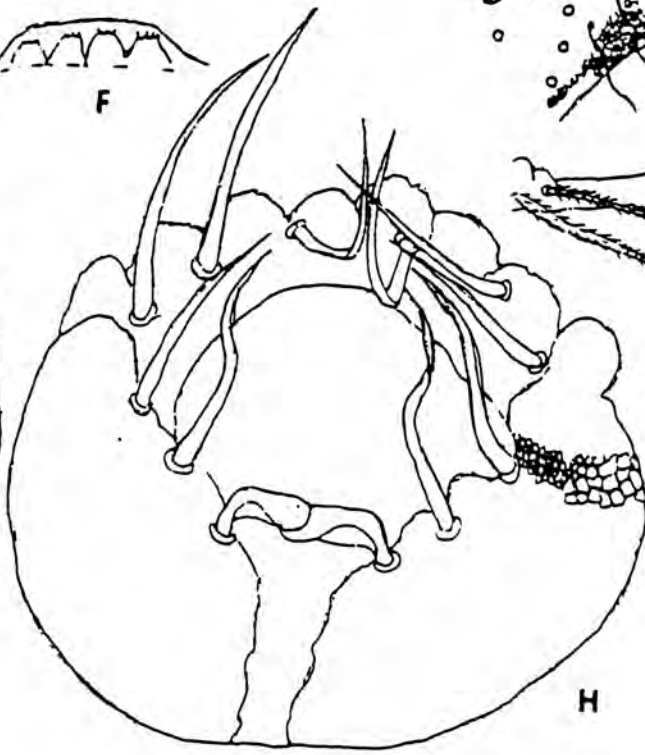
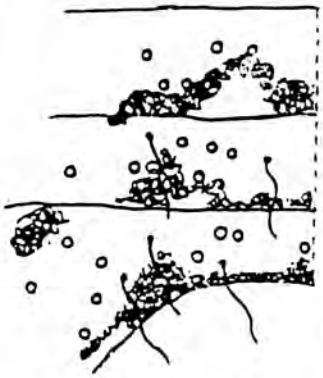
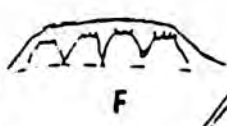
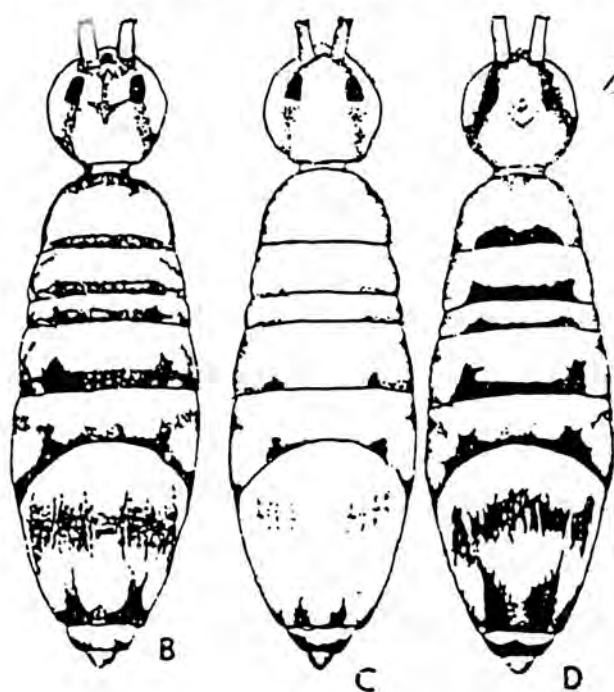
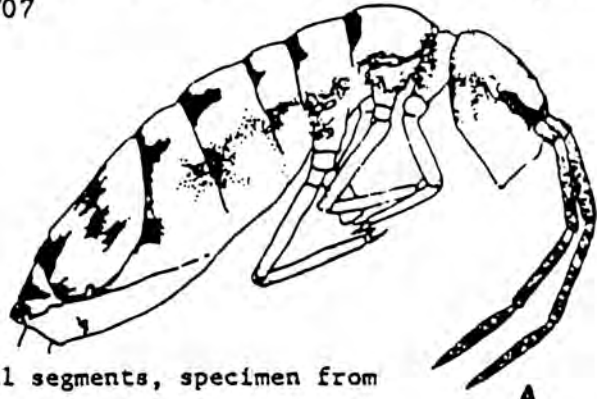
B) - D) Pattern variations, after Stach.

E) Chaetotaxy of the first three abdominal segments, specimen from Tompkins Co., New York.

F) Labral papillae, specimen from Massachusetts, after Christiansen.

G) Mucro, specimen from Massachusetts, after Christiansen.

H) Male genital plate, specimen from Massachusetts, after Christiansen.



Refs.: Iowa St. Coll. J. Sci. 6:268; Christiansen, 1958c.

Description

Color: background pale yellow, with blue-black pigment usually covering whole head and in 4 irregular longitudinal bands on the body. Head oval, clearly longer than wide. Body fusiform, slightly compressed laterally. External differentiated seta of labial appendage slightly narrower than normal setae. Mucronal teeth subequal. Body setae of type 1 strongly clavate. Setae of type 5 tapered only at extreme apex, unilaterally ciliate for most of their length and appressed. Maximum length 3.0 mm.

Remarks

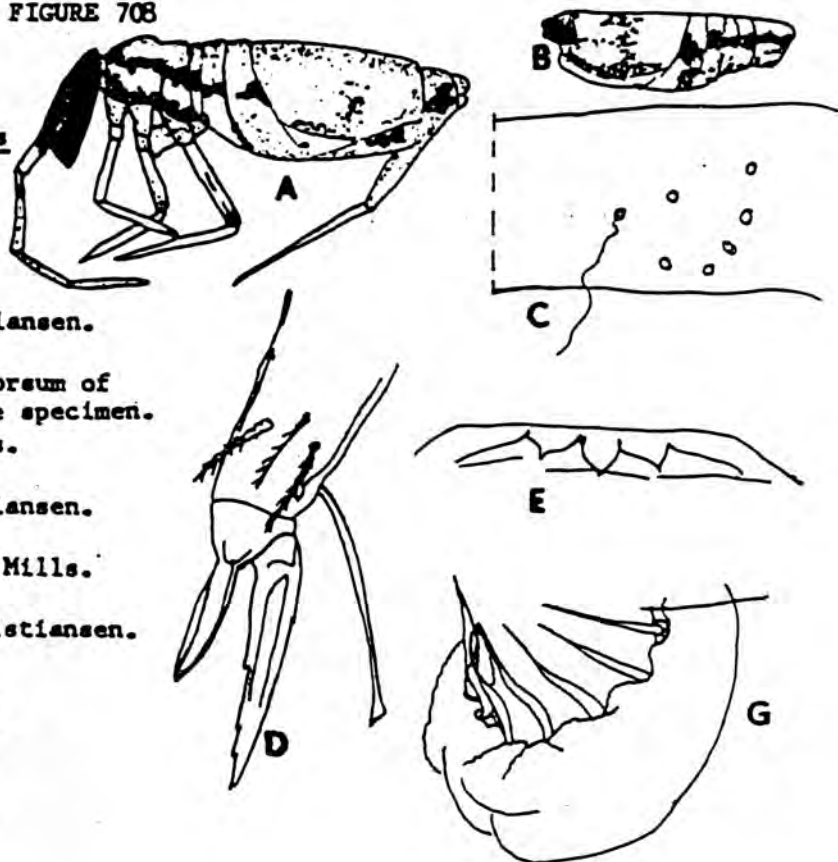
This is a striking and well marked species. It is fairly closely related to quadrilineata, but differs in pattern and chaetotaxy.

Locality: Texas - Brazos Co. (type).

FIGURE 708

Entomobrya (Entomobrya) nigriceps

- A) Habitus, after Christiansen.
- B) Pattern variant, after Christiansen.
- C) Chaetotaxy of right half of dorsum of second abdominal segment, type specimen.
- D) Hind foot complex, after Mills.
- E) Labral papillae, after Christiansen.
- F) Apex of dens and mucro, after Mills.
- G) Male genital plate, after Christiansen.



Refs.: Systema Naturae, ed. 10:609; Christiansen, 1958c (ad partem); South, 1961; Stach, 1963.

Description

Color: background yellow to off-white; pigment blue, variable in distribution but usually with a U-shaped mark on the fourth abdominal segment, and never with a transverse band across the anterior part of this segment. Head roughly circular. Body oval, circular in cross section. External differentiated seta of labial appendage subequal to or clearly thicker than normal setae. Mucronal teeth subequal or apical tooth slightly the larger. Body setae of type 5 tapered from base and coarsely multilaterally ciliate for apical 7/8 to 3/4 of length. Maximum length 2.0 mm.

Remarks

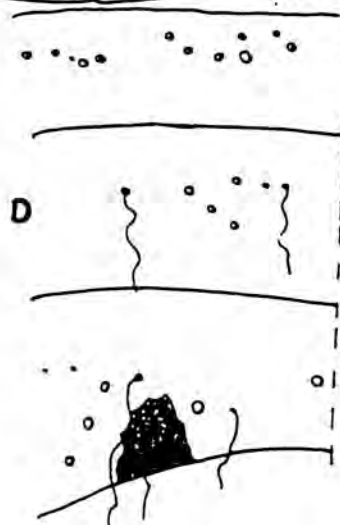
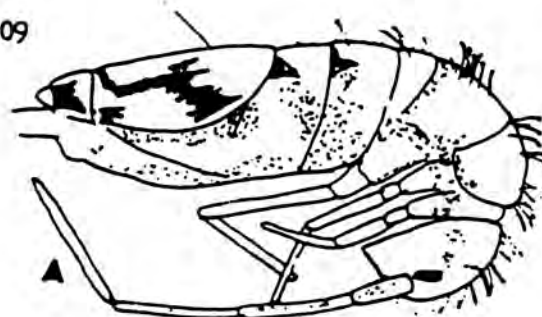
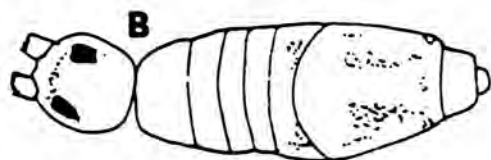
The pattern of this species intergrades with that of the closely related E. multifasciata, but the two are readily separated on the basis of the chaetotaxy. Earlier identifications, made without reference to this character and on the basis of the variable pattern, are dubious.

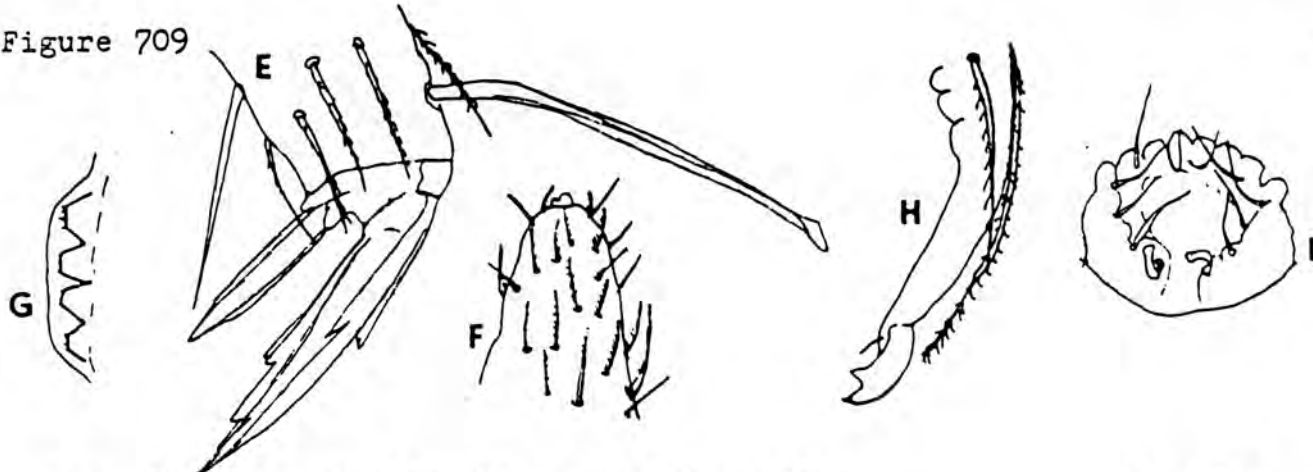
Localities: Massachusetts - Essex Co., Norfolk Co.; North Carolina - Whitelake; Wisconsin - Ashland Co. Ontario - Ottawa.

Entomobrya (Entomobrya) nivalis

FIGURE 709

- A) Habitus, after Stach.
- B) & C) Pattern variations, after South.
- D) Chaetotaxy of left side of dorsum of first 3 abdominal segments, specimen from Norfolk Co., Massachusetts.
- E) Hind foot complex, after Stach.
- F) Apex of antenna, after Christiansen.
- G) Labral papillae, after Christiansen.
- H) Apex of dens and mucro, after Stach.
- I) Male genital plate, after Christiansen.





Entomobrya (Entomobrya) quadrilineata Bueker, 1939

Fig. 710

Refs.: Trans. Acad. Sci. St. Louis 36:15; Christiansen, 1958c.

Syn.: antheme Wray, 1962, Bull. Brooklyn ent. Soc. 47:106.

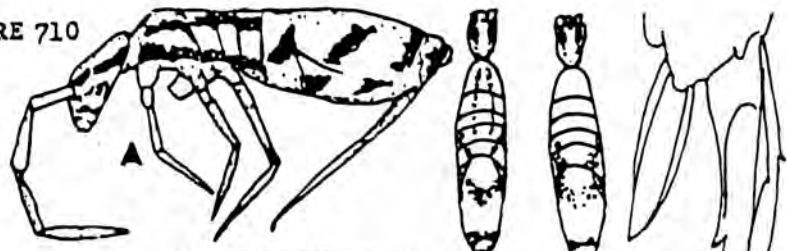
#### Description

Color: background dull white to yellow; pigment blue black, in very pale specimens with only faint indications of angled transverse bands on the third and fourth abdominal segments; most specimens have these bands clear, as well as longitudinal paramedian stripes on the anterior half of the body and parallel dark marginal stripes. Head elongate oval. Body fusiform, circular in cross section. Apical organ of third antennal segment of two oval pegs. Labral papillae weakly unisetaceous. External differentiated seta of labial appendage slightly thicker than normal setae. Mucro stout with subequal teeth. Body setae of type 1 only slightly expanded apically and strongly bent. Setae of type 5 slender, gradually tapered from base to apex, and coarsely unilaterally ciliate for apical 5/6 of length. Maximum length 3.0 mm.

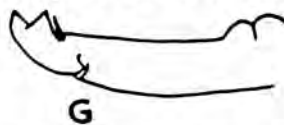
#### Remarks

This species is close to decemfasciata and may be a variant of that inadequately known form. It appears to differ in a number of morphological features (see remarks under decemfasciata), and the typical patterns are quite different. Localities: Arkansas - Logan Co., Sharp Co.; Illinois - Fayette Co., Lee Co.; Kentucky - Jefferson Co.; Louisiana - Ouachita Par.; Missouri - St. Louis Co. (type); Tennessee - Knox Co.

Additional record: Northwest Territories (Hammer, 1953a).

Entomobrya (Entomobrya) quadrilineata

- A) Habitus, after Christiansen.  
 B) & C) Pattern variations, after Christiansen.  
 D) Chaetotaxy of right half of dorsum of first 3 abdominal segments, specimen from Fayette Co., Illinois.  
 E) Hind foot complex, after Christiansen.  
 F) External differentiated labial seta, after Christiansen.  
 G) Apex of dens and mucro, after Christiansen.  
 H) Abdominal macrochaeta, after Christiansen.  
 I) Male genital plate, after Christiansen.

Entomobrya (Entomobrya) sinelloides Christiansen, 1958

Ref.: Bull. Mus. comp. Zool. Harvard 118:498.

Fig. 711

## Description

Color: background white; pigment ranging from dark blue to violet, generally distributed in short narrow bands along the posterior margins of the body segments and along the lateral margins of the thoracic tergites. Head broadly oval. Body elongate oval, circular in cross section. Labral papillae strongly unisetaceous. External differentiated seta of labial appendage clearly thicker than normal setae. Mucro with apical tooth clearly longer than antepical and strongly upturned. Body setae of type 1 weakly clavate. Setae of type 5 medially very slightly expanded and coarsely unilaterally ciliate for distal 4/5 of length. Maximum length 2.0 mm.

## Remarks

This species appears to be well marked, but the obscure nature of its distinguishing features makes it likely that it has commonly been misident-



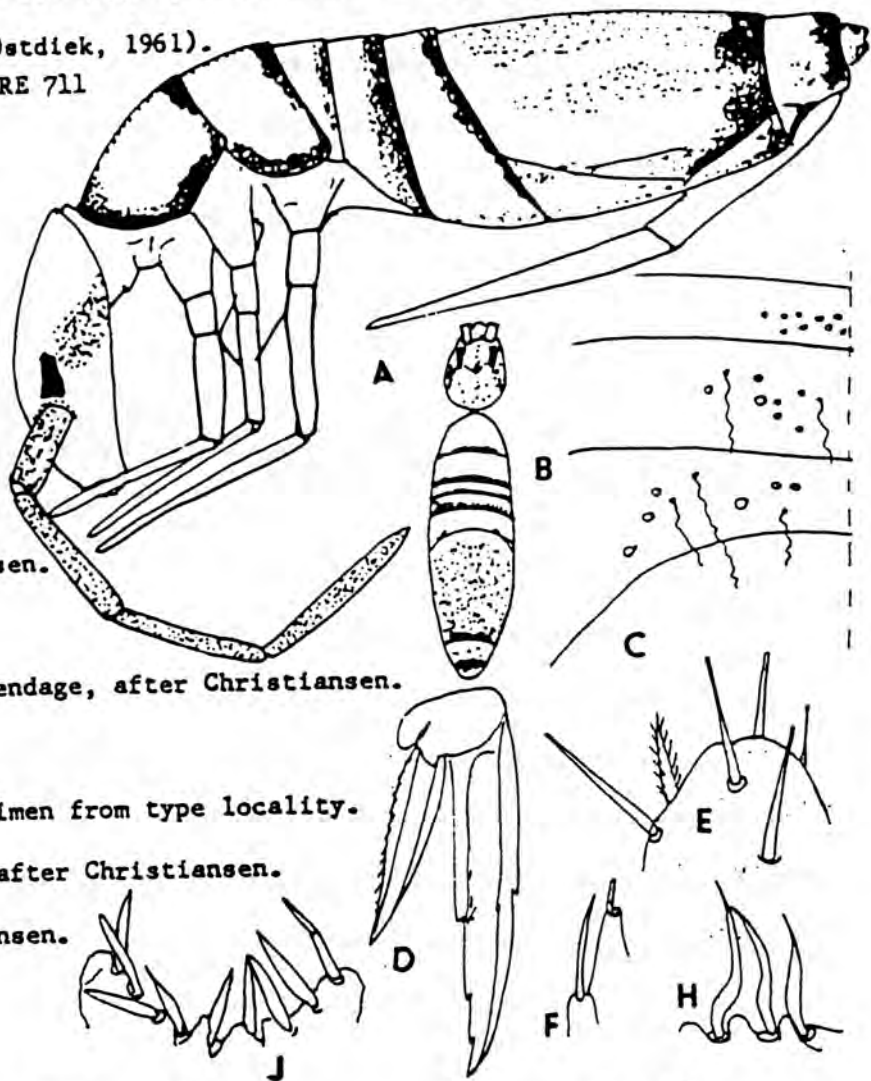
Localities: Colorado - Prowers Co. (type); South Dakota - Turner Co.

Additional record: Maryland (Ostdiek, 1961).

FIGURE 711

Entomobrya (Entomobrya) sinelloides

- A) Habitus, type specimen.
- B) Pattern, type specimen.
- C) Dorsal chaetotaxy of left side of first 3 abdominal segments, specimen from type locality.
- D) Hind foot complex, after Christiansen.
- E) Apex of antenna, type specimen.
- F) Differentiated seta of labial appendage, after Christiansen.
- G) Mucro, after Christiansen.
- H) Anterior genital plate setae, specimen from type locality.
- I) Basal seta of male genital plate, after Christiansen.
- J) Male genital plate, after Christiansen.



Entomobrya (Entomobrya) suzannae Scott, 1942

Fig. 712

Refs.: Pan-Pacif. Ent. 13:132; Christiansen, 1958c.

Description

Color: background yellow with dark blue pigment irregularly distributed over body in broken, erratic transverse bands. Head elongate oval. Body fusiform, circular in cross section. Labral papillae with strong setae. External differentiated seta of labial appendage about as thick as normal setae. Apical mucronal tooth slightly longer than antepical. Body setae of type 5 mostly tapered from base and coarsely unilaterally ciliate for apical half of length, but some setae are slightly expanded medially and appear to be coarsely multilaterally ciliate. Maximum length 2.5 mm.

This species is difficult to separate from the patterned form of *E. comparata*; however, the body ratios are quite different and the male genital plate shows that its true relationships are with *triangularis*.

Localities: California - Contra Costa Co., El Dorado Co. (cave), Monterey Co. (type), Santa Cruz Co.

FIGURE 712

*Entomobrya (Entomobrya) suzannae*

A) Habitus, after Christiansen.

B) - D) Pattern variations, after Christiansen.

E) Dorsal chaetotaxy of left side of first 3 abdominal segments,

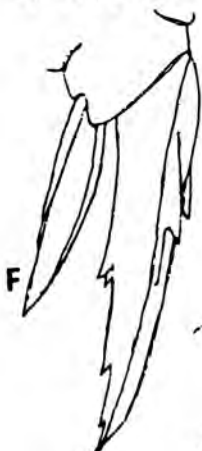
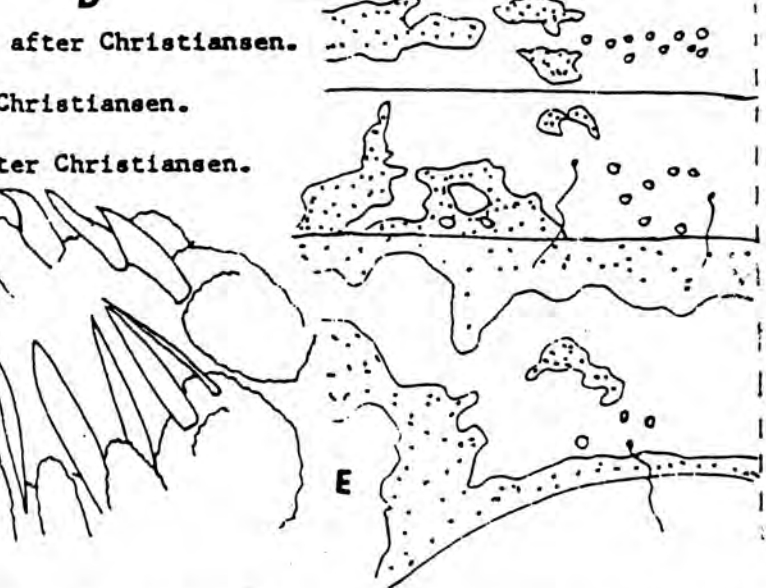
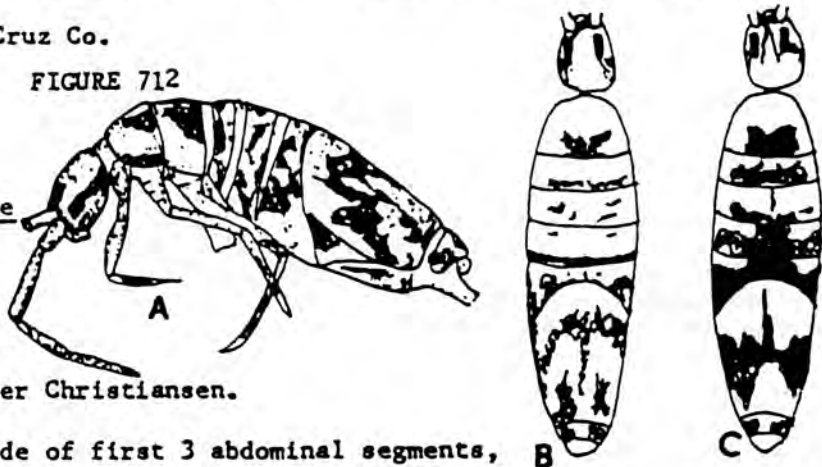
specimen from Alameda Co., California.

F) Hind foot complex, after Christiansen.

G) Differentiated seta of labial appendage, after Christiansen.

H) Male genital plate from an angle, after Christiansen.

I) Part of male genital plate from side, after Christiansen.



*Entomobrya (Entomobrya) triangularis* Schött, 1896

Fig. 713

Ref.: Proc. Calif. Acad. Sci. (2)6:182; Christiansen, 1958c.

Syn.: *tampicensis* Mills, 1935, Bull. Brooklyn ent. Soc. 30:137.

#### Description

Color: background off-white to yellow; pigment blue-black to purplish blue, normally in the form of transverse bands. Head roughly circular. Body

oval, circular to very slightly depressed in cross section. Labral papillae unisetaceous, with broad papillae and weakly developed setae. External differentiated seta of labial appendage slightly thicker than other setae and usually slightly exceeding apex of same papilla. Mucro short and stout, with subequal teeth; Body setae of type 5 coarsely multilaterally ciliate for apical 1/2 to 4/5 of length, and varying from uniformly tapered to very slightly expanded medially. Maximum length 2.0 mm.

#### Remarks

This species includes 2 color types: one with the pigment diffuse and blue or purple (tampicensis of Mills) and the typical form with sharply defined pigment patches, usually dark blue. The existence of intermediates between the 2 types, as well as the apparent lack of morphological distinctions, make it best to consider them as conspecific until further evidence is available. This small western species resembles E. ligata, but has quite different chaetotaxy.

Localities: California - Contra Costa Co., Marin Co., San Mateo Co. (type);

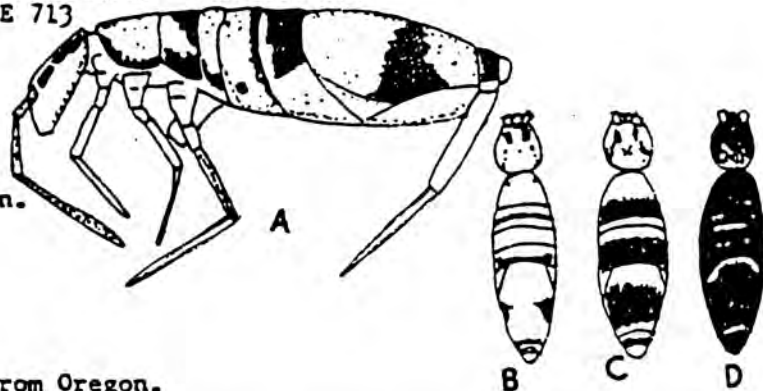
Oregon - Benton;<sup>CC</sup> Washington - King Co., Pierce Co., Whatcom Co., Yakima Co.;

Wyoming - Carbon Co. Canada: British Columbia - Chilliwack.

FIGURE 713

#### Entomobrya (Entomobrya) triangularis

All figures except E after Christiansen.



A) Habitus.

B) - D) Pattern variation, specimens from Oregon.

E) Dorsal chaetotaxy of left half of first 3 abdominal segments, specimen from Benton Co., Oregon.

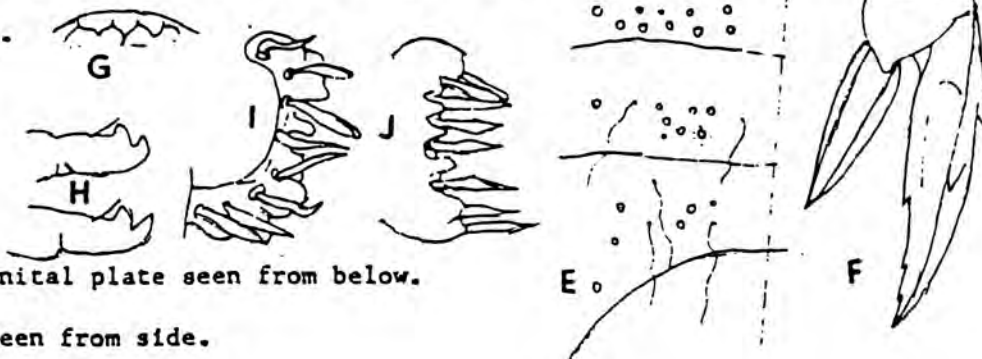
F) Hind foot complex.

G) Labral papillae.

H) Mucrones.

I) Left half of male genital plate seen from below.

J) Male genital plate seen from side.



Entomobrya (Entomobrya) troglodytes Christiansen, 1958

Fig. 714

Ref.: Bull. Mus. comp. Zool. Harvard 118:484.

Description

Color: completely white except for black eyepatches, pale blue antennal bases and connecting band, and pale gray antennae. Head roughly circular. Body oval, circular in cross section. Apical organs of third and second antennal segments with broadly oval sensillae. Labral papillae unisetaceous, with unusually heavy setae. External differentiated seta of labial appendage clearly thicker than normal setae. Mucro short and heavy, with apical tooth clearly longer than anteapical. Body setae of type 5 slender, uniformly tapered, and coarsely multilaterally ciliate for apical half of length. Maximum length 2.0 mm.

Remarks

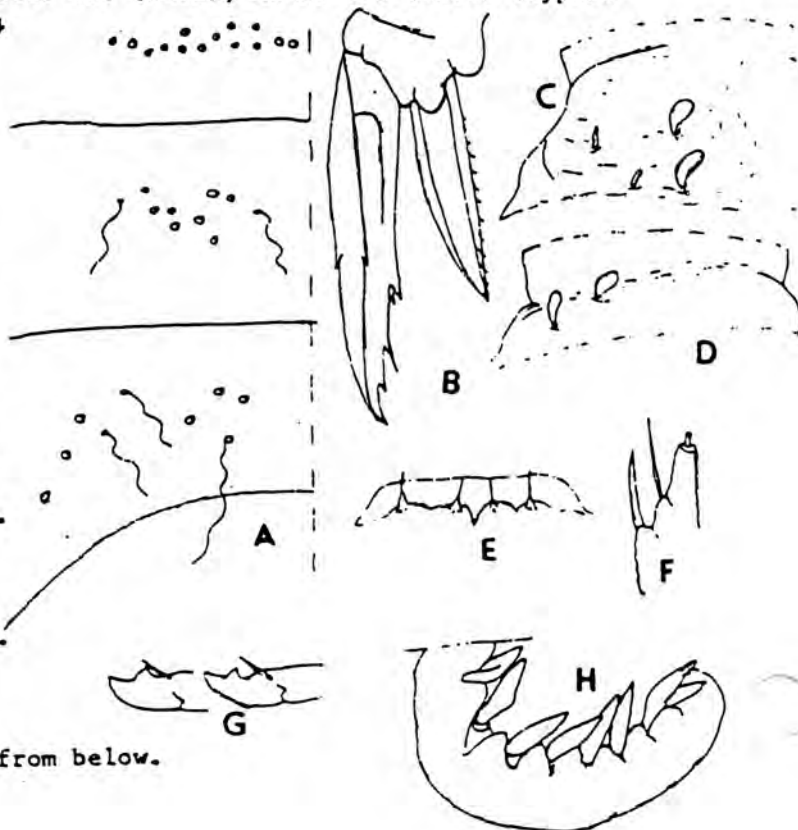
This unique species is most closely related to confusa, but differs from the latter in many morphological features. So far it is known from only 2 localities but more extensive collecting in western caves will probably reveal a wider distribution.

Localities: South Dakota - Custer Co. (cave), Meade Co. (cave) (type).

FIGURE 714

Entomobrya (Entomobrya) troglodytes

- A) Dorsal chaetotaxy of first 3 abdominal segments, left side, type specimen. All remaining figures after Christiansen.
- B) Hind foot complex.
- C) Apical organ of third antennal segment.
- D) Apical organ of second antennal segment.
- E) Labral papillae.
- F) Differentiated seta of labial appendage.
- G) Mucrones.
- H) Right half of male genital plate, seen from below.





**Description**

Color: background white with dark blue pigment covering most of the dorsum and lateral surfaces of abdominal segments 5 & 6. Abdominal 4 with an irregular median u shaped band and a posterior marginal band, sometimes connected by irregular longitudinal markings. Third abdominal with a divided median patch and diagonal lateral bands projecting onto the second abdominal segment. Second segment with additional inner diagonal bands. First segment with median divided transverse bands and third thoracic segment with or without similar lateral bands. Second and third thoracic segments with lateral darkening and second segment without other markings. Head with interantennal darkening and cheek patches. Antennae uniformly pigmented, except for pale first segment base in some, and furcula pale. Legs pigmented except for patches on coxae, an inner line on femur and the distal (and sometimes basal) portions of the tibiotarsus. Maximum length 2.1 mm. Ratio antennae to cephalic diagonal 3 - 4.6. Fourth antennal segment with 1 or 2 clear apical bulbs. Prelabral setae 5-4-5-4, posteriormost ciliate, others smooth. Labral papillae broad a low but clearly unisetaceous. Maxillary palp with 3 clear sublobal hairs. Eye H much smaller than C but eye F ranging from subequal to slightly smaller than F. Tenent hairs short and very heavy. Tibiotarsus with a distal region having a false joint at the end of the pigmented area; this is marked by a thinned area of unisetaceous cuticle which is usually bulging out but, when the area is flexed, pushed in. Male genital plate unique (see Figures 579.1 O & P) with very heavy short forked basal setae.

**Localities**

**Types** Holotype ♂ Texas, Williamson Co. Formation Forest Cave, May 5 1990, locality no. 7279; Also known from Texas, Burnet Co.. Simon Says Sink. November 12 1990, Locality no. 7221; Kinney Co. Baker's Crossing cave, April 30 1995, locality no. 9122 & Bell Co. Nolan Creek Cave, July 17 1993, litter, locality no. 7625. All collections by Reddell & Reyes. .

**Derivatio nominis**

Named after the term used by speleologists for species found both in and outside caves.

**Remarks**

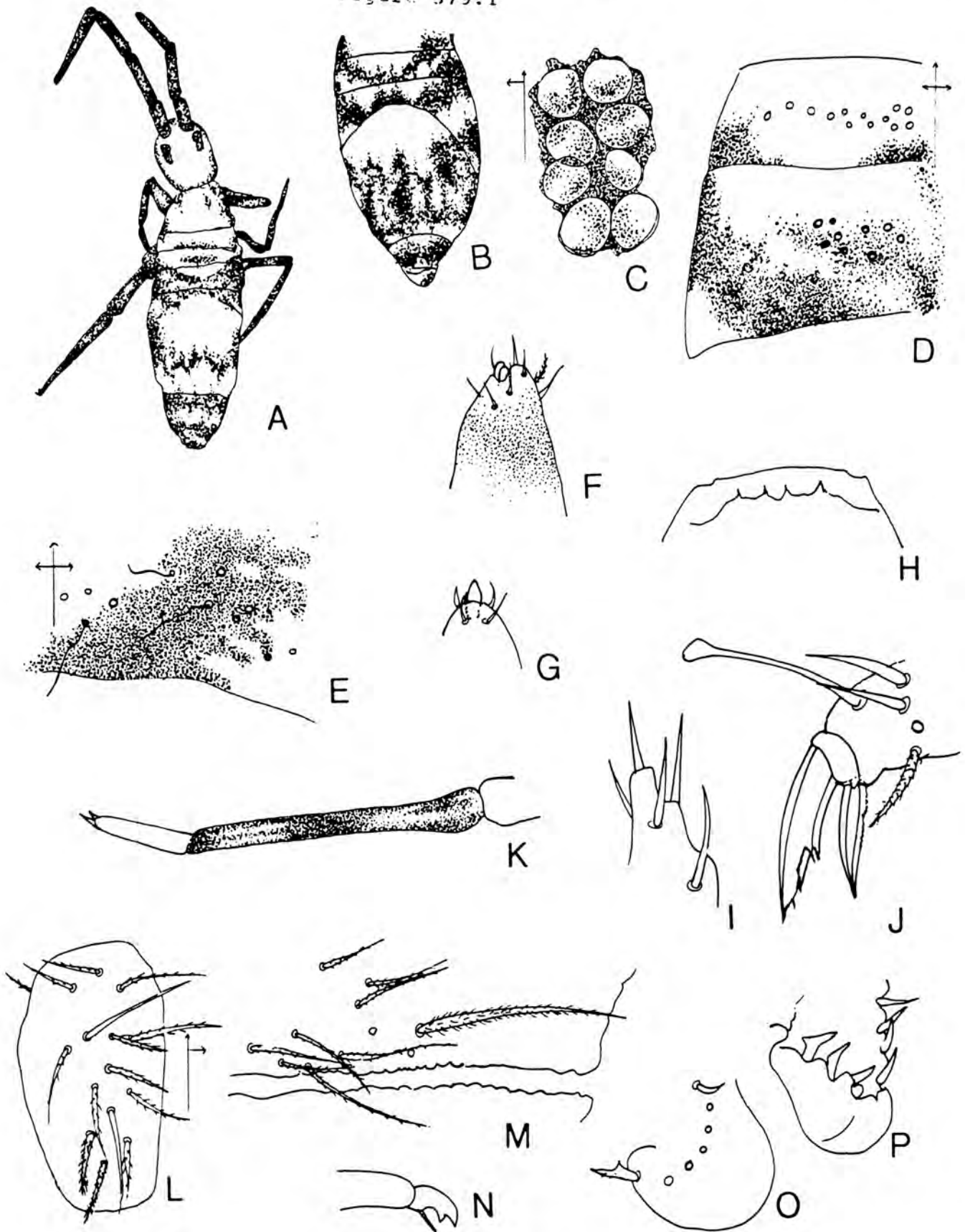
The peculiar feature of a false joint on the tibiotarsus is also seen in two other large species: *E. bicolor* and *E. "arnaudi"* (California specimens) but is much more strongly developed in *trogliphila* than in the other species. It is weakly developed or absent in *E. suzannae* but absent in all other species we examined including large species such as *E. zona* and species of the subgenus *Homidia*. The species is similar to the California specimens of *E. arnaudi* but can be distinguished on pattern and chaetotaxy. It is also similar to *E. quadrilineata* but can be separated by the longer antennae, chaetotaxy and the peculiar male genital plate. The specimens from Kinney Co. have the unguis teeth much longer than those from other localities.

**Legend for figures**

A) Habitus, holotype; B) Abdominal pigmentation, specimen from Burnet Co.; C) Left eyepatch, same locality; D) Chaetotaxy left half of 1st and 2nd abdominal segments, same specimen as B; E) Chaetotaxy, right side of abdominal segment 3, holotype; F) Apex of 4th antennal segment; same specimen as B; G) Same, Holotype.; H) Labral papillae seen from above, same specimen as B; I) Outer edge, labial palp, same specimen; J) Mid foot complex, same specimen; K) Outline of hind tibiotarsus, holotype.; L) Right disto-lateral patch ventral tube, same specimen as C; ; M) Anterior face ventral tube, same specimen; N) Mucro and dens, same specimen, O) Male genital plate, same specimen; P) Genital plate, specimen from Bell Co.



Figure 579.1



Refs.: Abh. senckenb. naturforsch. Ges. 42:63; Christiansen, 1958c;

Stach, 1963.

Syn.: kanaba Wray, 1953, Nature Notes, Raleigh, 1:4 (?).

#### Description

Color: white to orange-yellow or pale green; purple or blue-black pigment in the form of a slender mid-dorsal stripe, often expanded posteriorly on each anterior body segment and commonly with a posterior marginal band on the first and second abdominal segments; lighter pigment often suffuses the sides of all body segments; occasionally without pigment except for eyes and antennae. Head roughly circular. Apical organ of third antennal segment with sensillae distinctly bent. Labral papillae varying from unisetaceous to bisetaceous or occasionally trisetaceous. External differentiated seta of labial appendage about as thick as normal setae. Mucro with antepical tooth distinctly smaller than apical, often minute; basal mucronal spine also may be minute or (apparently ?) absent. Body setae of type 5 tapered from base and either unilaterally or multilaterally ciliate for apical 1/2 to 3/4 of length. Maximum length 2.5 mm.

#### Remarks

Nearctic material was originally described as having unisetaceous labral papillae, but later study showed variation in this character. European material described by Stach differs in a number of respects, including the presence of 2-4 setae per labral papilla and the consistent absence of lateral body pigment, but in view of the overlap in these and other characters we believe the populations are best regarded as conspecific. Wray's kanaba was originally described in Drepanura, but some specimens examined by Stach have a clearly bidentate mucro. Stach describes a genital plate for kanaba which is unlike that of unostrigata, and it is possible that the type series includes 2 species; however, specimens of kanaba examined both by Stach and ourselves, and the form described and figured by Wray, are clearly unostrigata in our sense.

Localities: California - Contra Costa Co., Fresno Co., Kings Co., Los Angeles Co., Merced Co., Sacramento Co., San Diego Co., Santa Barbara Co., Stanislaus Co., Tulare Co., Ventura Co.; Colorado - Larimer Co.; Delaware - New Castle Co.; New Mexico - Eddy Co. (cave), Santa Fe Co.; Texas - Lubbock Co.; Utah - Boxelder Co., Kane Co.

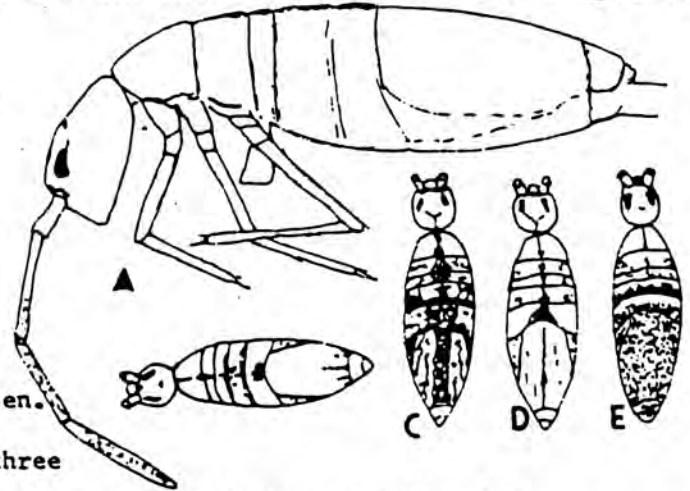
Additional record: Michigan (Snider, 1967).

This species has been introduced into the United States, and has been spreading from California since 1938.

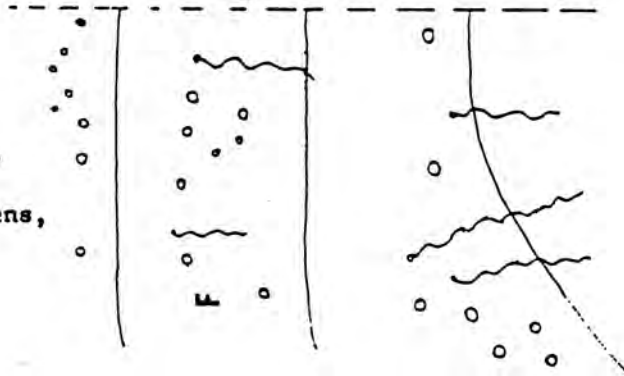
FIGURE 715

Entomobrya (Entomobrya) unostriigata

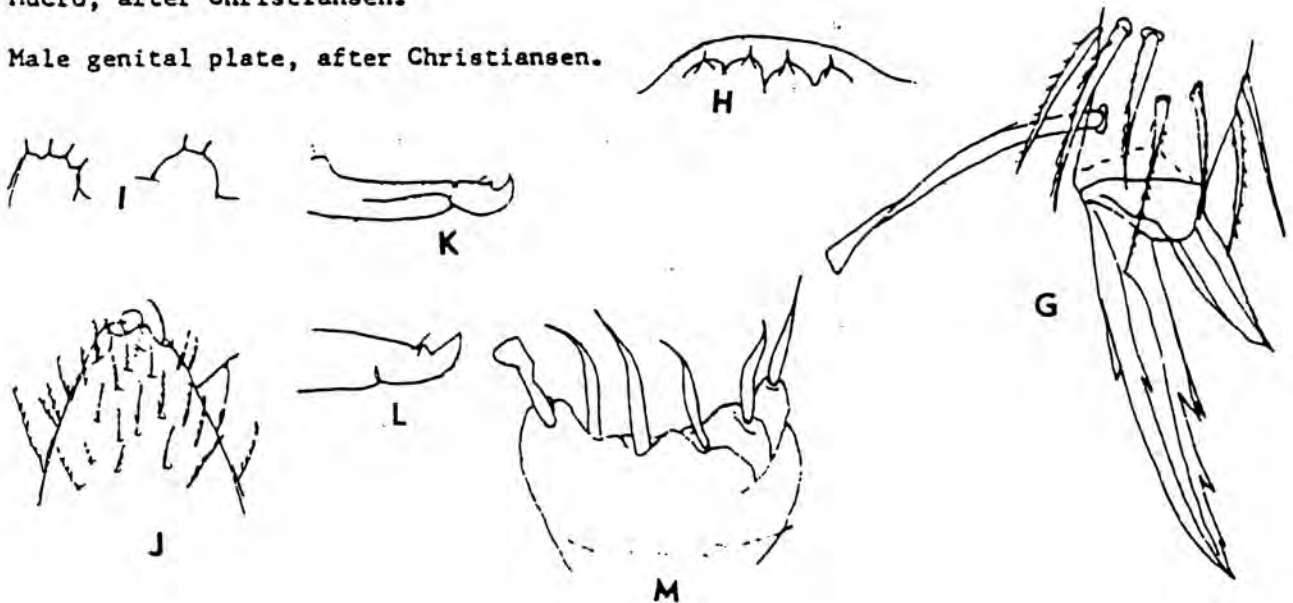
- A) Habitus, after Stach.
- B) - E) Pattern variations, after Christiansen.



- F) Dorsal chaetotaxy of left side of first three abdominal segments, specimen from Stanislaus Co., California.



- G) Hind foot complex, after Stach.
- H) Labral papillae, after Christiansen.
- I) Labral papillae of different specimens, after Stach.
- J) Apex of antenna, after Stach.
- K) Mucro, after Stach.
- L) Mucro, after Christiansen.
- M) Male genital plate, after Christiansen.



Refs.: Bull. Brooklyn ent. Soc. 30:135; Christiansen, 1958c.

Description

Color: background yellow to dull white; pigment blue to black, in irregular transverse bands along the posterior margins of all segments except the fourth abdominal segment, which has a middorsal and 2 irregular lateral longitudinal stripes. Head roughly circular. Body oval, circular in cross section. Labral papillae clearly unisetaceous. External differentiated seta of labial appendage clearly thicker than normal setae. Mucronal teeth subequal or apical tooth slightly smaller. Body setae of type 5 tapered from base and mostly multilaterally ciliate for apical 1/2 to 3/4 of length. Maximum length 2.0 mm.

Remarks

This species resembles some forms of suzannae in pattern but lacks the elongate head of that species. It is closely related to E. triangularis but differs in typical body pattern; it may be a local variant of that species.

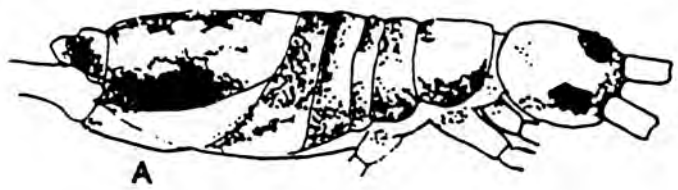
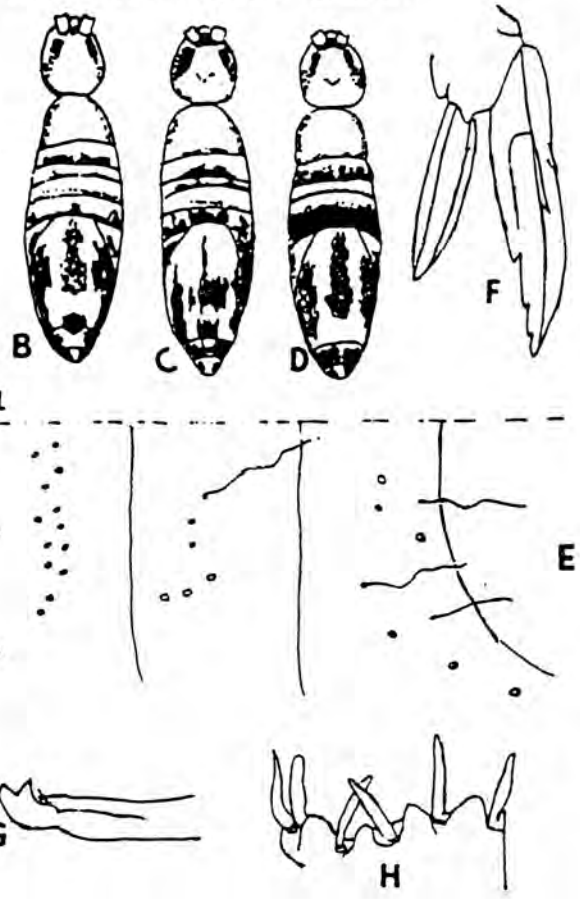
Localities: Oregon - Benton Co.; Washington - Yakima Co. (type). Canada:

British Columbia - Vancouver Is.

Additional record: California (Scott, 1942).

Entomobrya (Entomobrya) washingtonia FIGURE 716

- A) Habitus, after Mills.
- B) - D) Pattern variation, after Christiansen.
- E) Dorsal chaetotaxy of left side of first abdominal segments, composite drawing.
- F) Hind foot complex, after Christiansen.
- G) Mucro, after Mills.
- H) Male genital plate from side, after Christiansen.



Description

Color: background yellowish; blue pigment in broad, interrupted posterior bands on thoracic and first 3 abdominal segments, and in a median anterior and 2 lateral posterior bands on the fourth abdominal segment; head with dark inter-antennal band and small V-shaped dorsal mark. Head roughly circular. Body ovoid and not flattened. Apical organ of fourth antennal segment unlobed or weakly bilobed. Labral papillae strongly unisetaceous. External differentiated seta of labial appendage slightly thicker than normal setae and just attaining apex of same papilla for about 1/7 of length. Body setae of type 5 tapered from base and coarsely unilaterally ciliate for apical 2/3 to 3/4 of length. Maximum length 2.0 mm.

Remarks

This species was taken as high altitude (over 8,000 feet) in Wyoming in 1950 and 1971. It is possible that this species may have been mistaken for E. comparata; the male genital plate, however, is quite unlike that of comparata, resembling most closely that of E. troglodytes. Specimens from Wheeler Peak, New Mexico (probably over 10,000 feet), differ slightly in pattern but display the characteristic male genital plate. 2 specimens from Gothic, Colorado (taken at 9,600 feet) are similar in pattern to the types but do not show a genital plate. Large specimens have the fourth antennal segment subequal to or shorter than the third, but in small specimens it is slightly longer than the third. Type locality: Lizard Head Meadows, Shoshone National Forest, Fremont Co., Wyoming, 10,000 feet, dry spruce forest, on rotten wood, 11 August 1971 (K. Christiansen).

Other localities: California - Fresno Co.; Colorado - Gunnison Co.; New Mexico - Taos Co.; Wyoming - Teton Co.

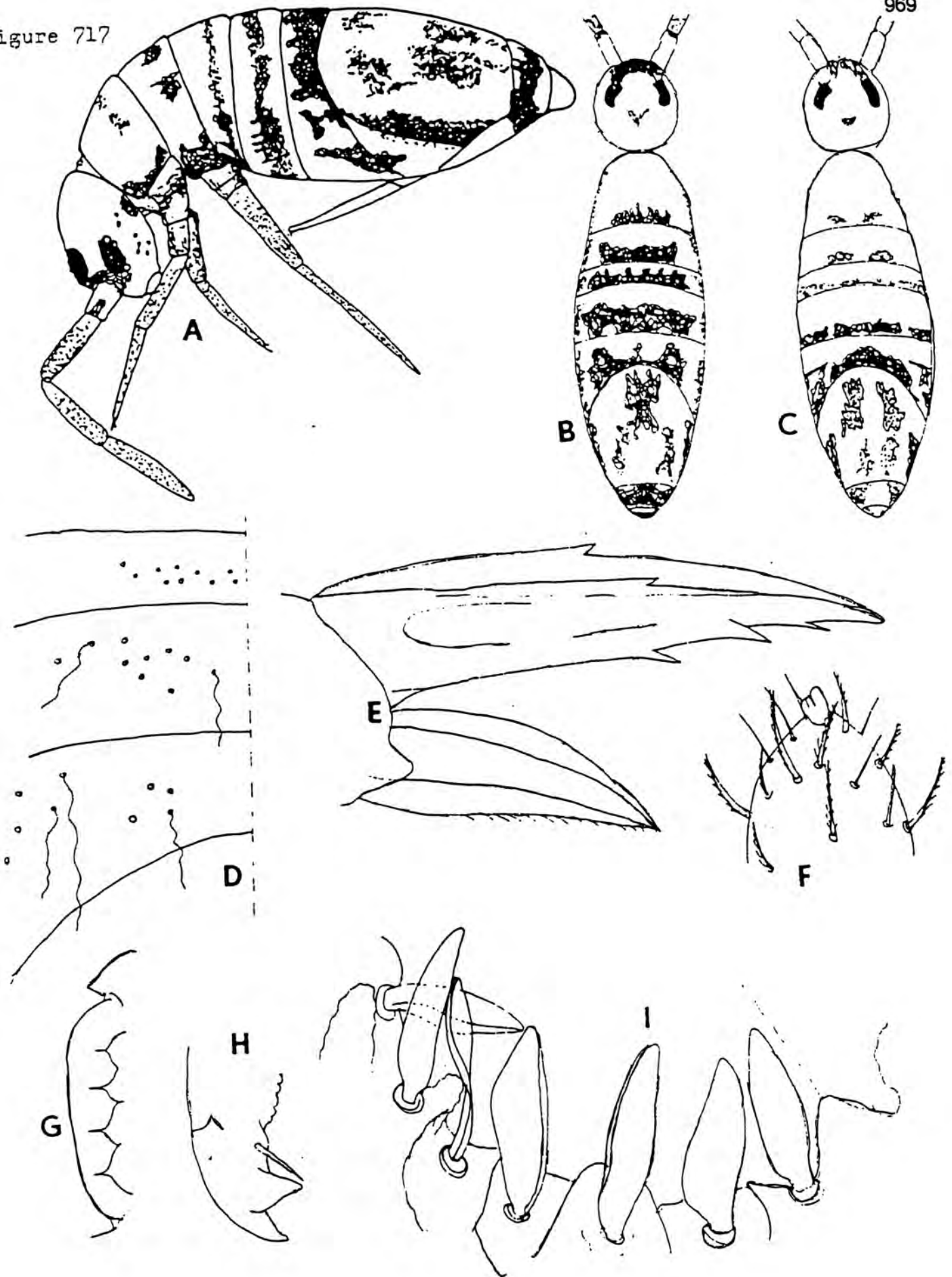
Entomobrya (Entomobrya) zona

FIGURE 717

- A) Habitus, specimen from Taos Co., New Mexico.
- B) Pattern, type specimen.
- C) Pattern, specimen from same locality as A.
- D) Dorsal chaetotaxy of left side of first 3 abdominal segments, type specimen.
- E) Hind foot complex, specimen from Teton Co., Wyoming.
- F) Apex of antenna, type specimen.
- G) Labral papillae, type specimen.
- H) Mucro, specimen from Teton Co., Wyoming.
- I) Male genital plate, same specimen.



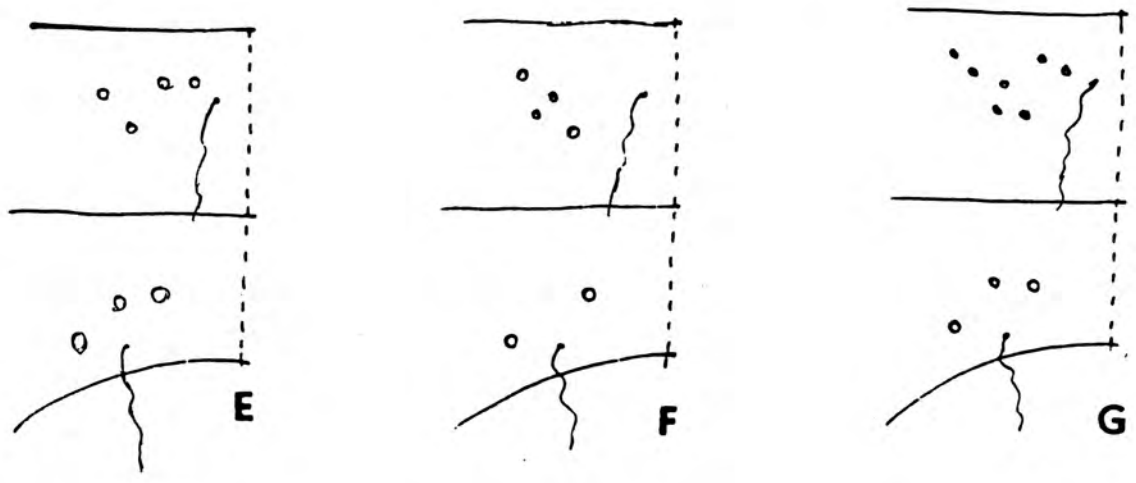
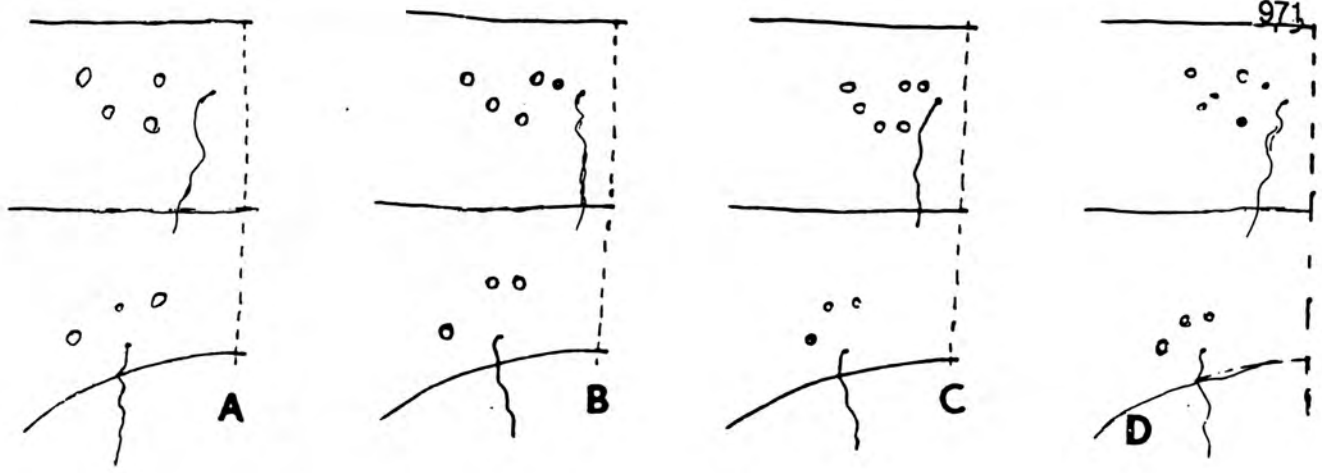
Figure 717



Type species: Degeeria purpurascens Packard, 1873.

The members of this subgenus are characterized by a bidentate macro with a basal spine, more or less sharply distinguished "smooth" (i.e. finely ciliate or striate) setae on the internal surface of the tibiotarsus, contrasting with adjacent strongly ciliate setae, and the absence of an apical retractile bulb on the antennae. The external differentiated seta of the labial appendage is very heavy and usually exceeds the apex of the same papilla. The body is never flattened. Body setae of type 5 are acuminate and coarsely unilaterally ciliate for the apical 1/2 to 3/4 of their length.

This group is among the most troublesome to deal with taxonomically in the whole order. The chaetotaxy of the second and third abdominal segments varies considerably (Fig.718A-C). In addition there is great variation in unguis structure and mucronal shape (Fig.718H-M), and other features such as pattern and labial appendage structure are equally variable. East of the Mississippi this variation is fairly discrete and congruent, so that the 3 species purpurascens, mineola, and dissimilis can be consistently identified and distinguished. West of the Mississippi independent variation of characters makes the taxonomic situation obscure. If we accept the male genital plate as a diagnostic feature, we have no validated record of dissimilis and only 1 (an introduction ?) of purpurascens from west of the Great Plains; all other identifiable males from this region have genital plates of the uniquely variable guthriei types. As previously reported (Christiansen, 1958), guthriei is variable in all features, and new analysis of additional features (relative eye size, chaetotaxy) only makes this variation more complex. The range of variation in guthriei encompasses that of both purpurascens and dissimilis in all characteristics except the male genital plate. In Louisiana, purpurascens, guthriei, and dissimilis all occur, and are sharply delimited. In Iowa and Minnesota, many guthriei-like adult females have been seen, but all male genital plates, except one



(guthriei), observed have been of the purpurascens type. The problem of specific characters is summarized in the table below.

TABLE XXXIII

<u>Species</u>	<u>Pattern</u>	<u>Setae of</u> <u>♂ genital</u> <u>plate</u>	<u>Chaetotaxy</u> <u>of Third</u> <u>Abdominal</u> <u>Segment</u>	<u>Eyes</u> <u>G&amp;H</u> <u>E&amp;F</u>	<u>Mucro</u>	<u>Labial</u> <u>Different-</u> <u>iated Seta/</u> <u>Apex of</u> <u>Papilla</u>	<u>Ungui</u>
<u>purpurascens</u>	uniform to dark posterior borders and lateral areas	angulate, constant	B, rarely A or C	<, very rarely ≈	K	1.2-1.5	I
<u>dissimilis</u>	uniform or irregular darkening	angulate, constant	A or C, rarely F	≈	M	1.8-2.5	H, rarely I
<u>mineola</u>	dorsolateral paired spots (rarely uniformly dark)	recurved, broad (constant?)	B (rarely C?)	≈	L	≈-1.3	I
<u>guthriei</u>	uniform or with marginal lines	straight or recurved (variable)	All types	absent to ≈	K, L, M	1.2-2.2	H, I

At the present time, then, species east of the Mississippi can be assigned to one of three species. Those west of the great plains must be considered to be guthriei unless equipped with male genital plates which will permit identification. Specimens from intermediate regions are doubtful, but in this area we have only seen guthriei from northern Louisiana, where they display the unguis type J which is found only in this species. Because of the complexity of the situation we have been unable to construct a workable key without using geographic criteria.

There are 4 Nearctic species: 1) dissimilis, 2) guthriei, 3) mineola, 4) purpurascens. In addition, we have seen 2 specimens of another species, large, patterned, and with a very short differentiated labial seta, from Sequoia National Park; in the absence of males we refrain from describing it at present.

- 1 ) Specimens from east of Mississippi ----- 2  
 1') Specimens from west of Mississippi ----- 4

\* 2 ) Differentiated seta of labial appendage exceeding apex of same papilla for more than 1/3 of total length (Fig. 719A); mucro of type L or M ----- E. dissimilis

2') Differentiated seta of labial appendage not exceeding apex of same papilla for more than 1/3 of total length (Fig. 719B); mucro of type K, rarely of type L ----- 3



\*\* 3 ) Body with 2 rows of dorsolateral dark spots, or (rarely) totally dark ----- E. mineola

\*\* 3') Body uniformly pigmented or with irregular dark patterning ----- E. purpurascens

\*\* 4 ) Specimens from west of Great Plains; setae of male genital plate not angulate (Fig. 720A) ----- E. guthriei

4') Specimens from between Great Plains and Mississippi ----- 5

\*\* 5 ) With irregularly patterned body ----- E. purpurascens

5') Without pattern, or with narrow posterior marginal bands ----- 6

\*\* 6 ) Setae of male genital plate not angulate (Fig. 720A) ----- E. guthriei

6') Setae of male genital plate angulate (Fig. 720B) ----- 7

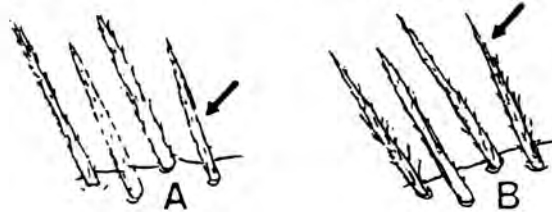


720



- 7 ) Some inner tibiotarsal setae differentiated from others (Fig. 721A);  
 external seta of labial appendage definitely thicker than normal setae  
 (Fig. 719 ) ----- 8
- \*\* 7') Inner tibiotarsal setae undifferentiated (Fig. 721B); external seta of  
 labial appendage subequal in thickness to normal setae -----  
 ----- E. (Entomobrya) sinelloides\*

721



- \* 8 ) Mucro of type M ----- E. dissimilis
- \*\* 8') Mucro of type K ----- E. purpurascens

\* Not in this subgenus, but might be misplaced here.

Not included in key:

myrmecophila Reuter, 1886

No valid Nearctic records

Entomobrya (Entomobryoides) dissimilis Moniez, 1894

Fig. 722

Refs.: Revue biol. Nord France 6:207; Christiansen, 1958c.

#### Description

Color: background white; pigment brown to purple, generally uniformly distributed but in heavily pigmented specimens with numerous irregular pale spots and sometimes pale intersegmental bands. Labral papillae low, conical, and unisetaceous or bisetaceous with small setae. Labial appendage with differentiated seta 1 1/2 to 2 times as thick as normal setae. Inner setae of tibiotarsus always include strongly differentiated striate setae as well as normal ciliate setae. Maximum length 3.0 mm.

Remarks  
 This species may easily be distinguished from either purpurascens or mineola by the differentiated seta of the labial appendage; in addition, the normal mucronal shape and chaetotaxy are different. It does blend into guthriei in all respects except the male genital plate. It is mostly found in ant nests.

This species has been regarded as a possible synonym of E. myrmecophila Reuter, but the male genital plate of the latter figured by Stach is unlike that of dissimilis.

Localities: Illinois - Platt Co.; Indiana - Grant Co.; Louisiana - Ouachita Par.; Massachusetts - Middlesex Co., Suffolk Co.; Nebraska - Thomas Co.; New Jersey - Union Co.; New York - Tompkins Co.; Pennsylvania - Centre Co., Susquehanna Co., Venango Co.; Virginia - Highland Co.; Washington D.C. (type); West Virginia - Hampshire Co.

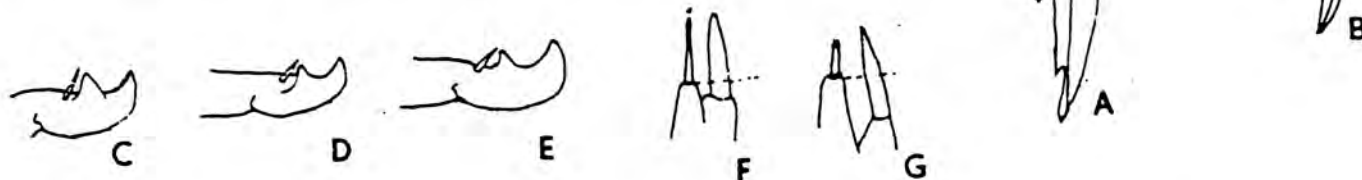
Additional record: Kentucky (Lesshafft, 1977).

Entomobrya (Entomobryoides) dissimilis

All figures after Christiansen.

FIGURE 722

- A) Hind foot complex, specimen from Massachusetts.  
 B) Same, specimen from Pennsylvania.  
 C) Mucro of unusual type.  
 D) & E) Normal mucrones, all from Pennsylvania.  
 F) Differentiated labial seta, specimen from Massachusetts.  
 G) Same, specimen from Virginia.



Entomobrya (Entomobryoides) guthriei Mills, 1931

Fig. 723

Refs.: Am. Mus. Novit. 464:4; Christiansen, 1958, 1958c.

Syn.: Orchesella rubra Scott, 1963, Ent. News 74:250,

Description

Color: background white or pale yellow; pigment blue to black (rarely purplish brown), generally scattered over the body in fine granules leaving oval to circular pale areas; dark pigment sometimes lines posterior margins of body segments. Labral papillae broadly conical and unisetaceous. External differentiated seta of labial appendage clearly thicker than normal setae. Internal "smooth" setae of tibiotarsus varying from slightly to strikingly

differentiated from normal setae. Maximum length 2.5 mm.

Remarks

976

The geographic variation in this species has been discussed elsewhere (Christiansen, 1958); newer data on additional characters do not appear to facilitate breaking the group into separate taxa. The unique property of the species is the variable male genital plate.

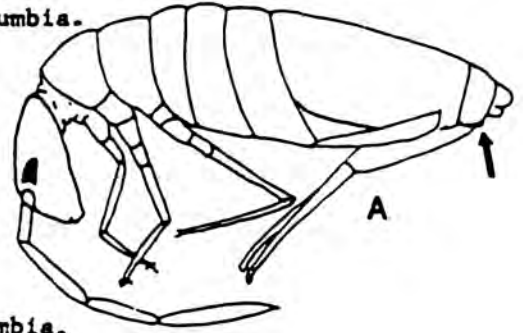
Localities: found in every state west of the Great Plains, as well as South Dakota, Iowa, and Louisiana. Canada: British Columbia.

Additional record: Michigan (Snider, 1967) (?).

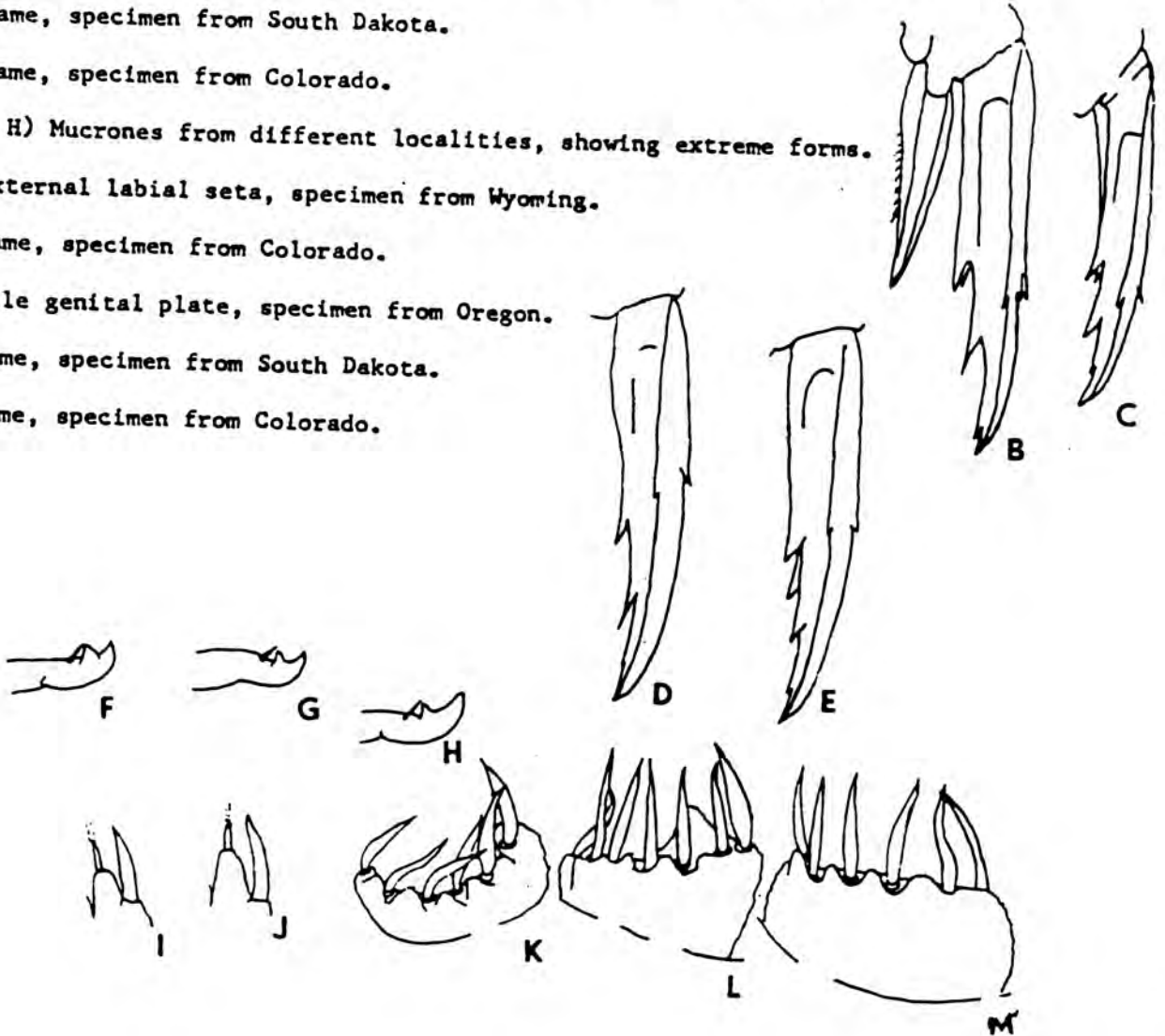
Entomobrya (Entomobryoides) guthriei

All figures after Christiansen.

FIGURE 723



- A) Habitus.
- B) & C) Ungues and unguiculus, specimens from British Columbia.
- D) Same, specimen from South Dakota.
- E) Same, specimen from Colorado.
- F) - H) Mucrones from different localities, showing extreme forms.
- I) External labial seta, specimen from Wyoming.
- J) Same, specimen from Colorado.
- K) Male genital plate, specimen from Oregon.
- L) Same, specimen from South Dakota.
- M) Same, specimen from Colorado.



Refs.: Am. Mus. Novit. 108:5; Christiansen, 1958c.

Description

Color: background yellow, sometimes suffused with blue or brown; pattern purple to black in the form of irregular mediolateral dark patches and lateral marginal dark borders. Labral papillae unisetaceous. Internal "smooth" setae of tibiotarsus varying from slightly to strongly differentiated. Maximum length 2.0 mm.

Remarks

There are occasional very dark specimens, but when these are bleached the underlying, characteristic pattern of paired spots can usually be seen. The chaetotaxy was seen on very few specimens, and may be more variable than indicated here. The male genital plate was seen clearly on one specimen; rather than being like that of purpurascens, as previously described, it appears to be intermediate between this type and that of guthriei (see figure).

Localities: Massachusetts - Middlesex Co., Norfolk Co., Plymouth Co.; New York - Nassau Co. (type), Tompkins Co.; North Carolina - Graham Co., Wake Co.; South Carolina - Georgetown Co. Additional record: Maryland (Ostdiek, 1961).

Entomobrya (Entomobryoides) mineola

A) Habitus, after Folsom.

B) Hind foot complex, specimen from Pennsylvania, after Christiansen.

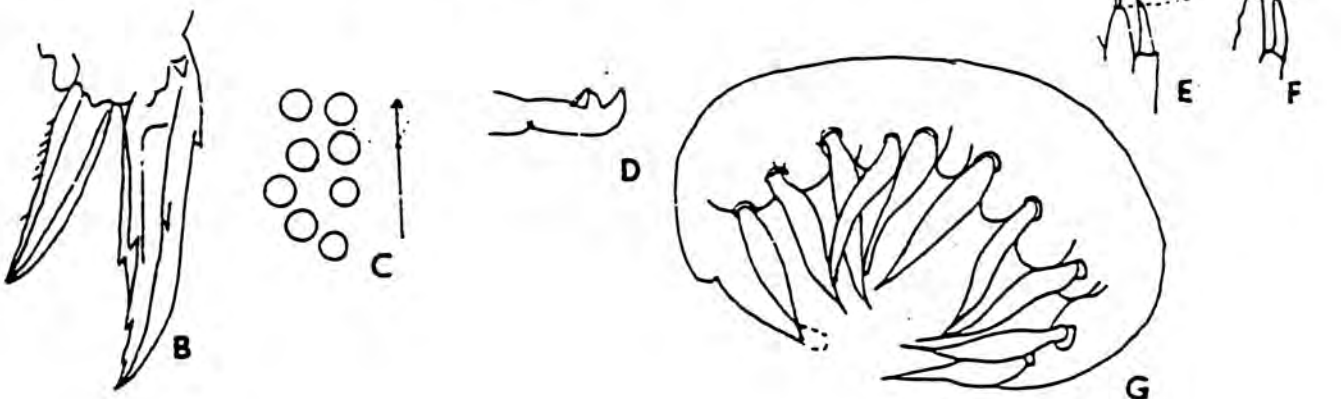
C) Eyes, after Folsom.

FIGURE 724

D) Mucro, specimen from Pennsylvania, after Christiansen.

E) & F) External differentiated labial setae, two specimens from different Massachusetts localities, after Christiansen.

G) Male genital plate, specimen from Middlesex Co., Massachusetts.



Refs.: Rep. Peabody Acad. Sci. 5:39; Christiansen, 1958c.

Description

Color: two rather distinct forms; northern form (A), background white with bluish or purplish pigment generally distributed except for darker segmental margins and cheek patches and a pale V-shaped middorsal mark on the head; southern form (B), somber background with definite but irregular and variable pattern of dark pigment (often purplish-brown) on the trunk, usually with pale anterior and medial areas and darker sides and posterior areas on all body segments, sometimes with very dark lines posteriorly on the first 3 abdominal segments. Labral papillae unisetaceous or bisetaceous, rarely trisetaceous. Differentiation of internal "smooth" tibiotarsal setae varying from weak to striking. Maximum length 2.5 mm.

Remarks

This is the commonest species of the subgenus in the eastern half of the United States. It is easily distinguished from mineola by the pattern, and from dissimilis by the differentiated seta of the labial appendage and, generally, by the mucro, unguis, and chaetotaxy.

Localities: we have this species from numerous localities in the United States and Canada. The form A appears to occur in Wisconsin, Minnesota, Iowa, eastern Canada, and all states east of the Mississippi and north of Tennessee. The patterned form B occurs south of central Tennessee and in east Texas, Louisiana, Missouri, Illinois, and Iowa. We have not seen populations from West Virginia or Kentucky. A record from Carlsbad Caverns, New Mexico, may represent an introduced population.

Additional records: California (Scott, 1942); Idaho (Wray and Knowlton, 1956); Oklahoma (Fenton and Howell, 1957); Oregon (Scott and Yosii, 1972); Utah (Wray et al, 1950); Washington (Mills and Rolfs, 1933). Alberta (Scott and Yosii, 1972). These records may actually represent the variable western guthriei, and need verification.

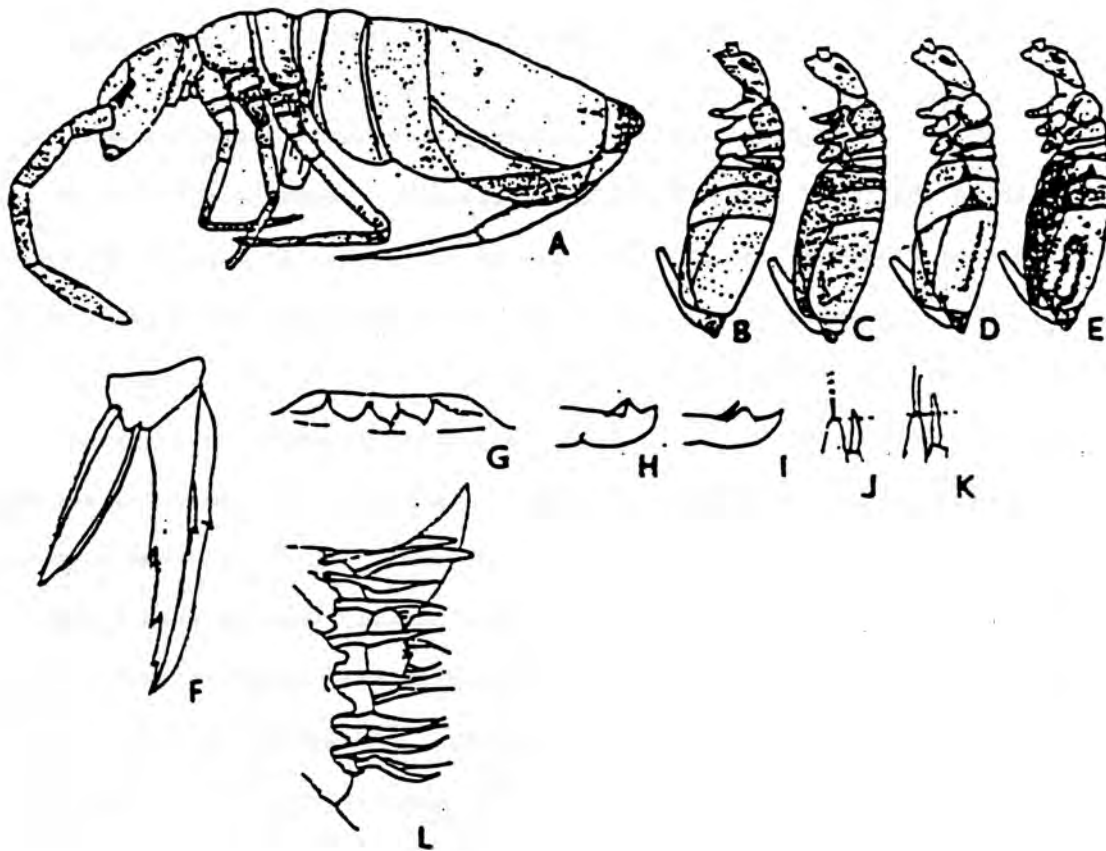
Biology: Willson, 1960.



Entomobrya (Entomobryoides) purpurascens

All figures after Christiansen.

- A) Habitus, specimen from Massachusetts.  
 B) Pattern of type A, specimen from Massachusetts.  
 C) - E) Pattern variations.  
 C) Specimen from Illinois.  
 D) Specimen from Iowa.  
 E) Specimen from Louisiana.  
 F) Hind foot complex, specimen from Louisiana.  
 G) Labral papillae, specimen from Massachusetts.  
 H) & I) Mucronal variations, specimens from Massachusetts.  
 J) & K) Variation in external labial papillae, specimen from Massachusetts.  
 L) Male genital plate, specimen from New Hampshire.



Type species: Entomobrya (Homidia) cingula Börner, 1906.

This subgenus is characterized by the presence of spines on the inner dorsal surface of the dens in adult specimens. In addition, the external differentiated seta of the labial appendage is much thinner than normal setae, and does not reach more than 3/4 of the way to the apex of the same papilla. The labral papillae are low and non-setaceous. In chaetotaxy, the subgenus is unusual in the absence of  $m_3$  on the third abdominal segment. This character distinguishes it from all other subgenera, and will allow recognition of juveniles, which, in at least one of our species, lack the dental spines.

There are two Nearctic species: 1) sauteri, 2) socia.

Key to Nearctic species of the subgenus Homidia

- \* 1) Third thoracic segment with a clear transverse band ---- E. (H.) sauteri  
 \* 1') Third thoracic segment without transverse band ----- E. (H.) socia

Entomobrya (Homidia) sauteri Börner, 1909

Fig. 726

Refs.: Sber. Ges. naturf. Freunde Berl. 1909:120; Christiansen, 1958c;  
 Stach, 1963.

Description

Color: background yellow to orange; blue-black pigment almost completely covering the third thoracic and third abdominal segments and forming broken, irregular transverse bands on the middle and posterior margins of the fourth abdominal segment and on the fifth and sixth abdominal segments; a thin band on the anterior and lateral margins of the second thoracic segment and sometimes on the anterior margin of the second abdominal segment. Head about 1.4 times as long as broad. Body not compressed. Apex of fourth antennal segment with 2 clear, separate, apparently retractile lobes. Third antennal segment with 2 large, elliptical, apical sensillae, definitely thicker than normal setae. Unguiculus of first pair of legs much shorter than those of second and third pair. Dental spines 18-33 on our specimens. Antepical mucronal tooth clearly larger than apical. Body setae of type 1 greatly expanded at apex and

strikingly bent. Setae of type 5 slender, multilaterally ciliate for 4/5 of length. Maximum length 3.5 mm.

Remarks

This very striking species is probably introduced. The chaetotaxy has been seen on only 2 specimens.

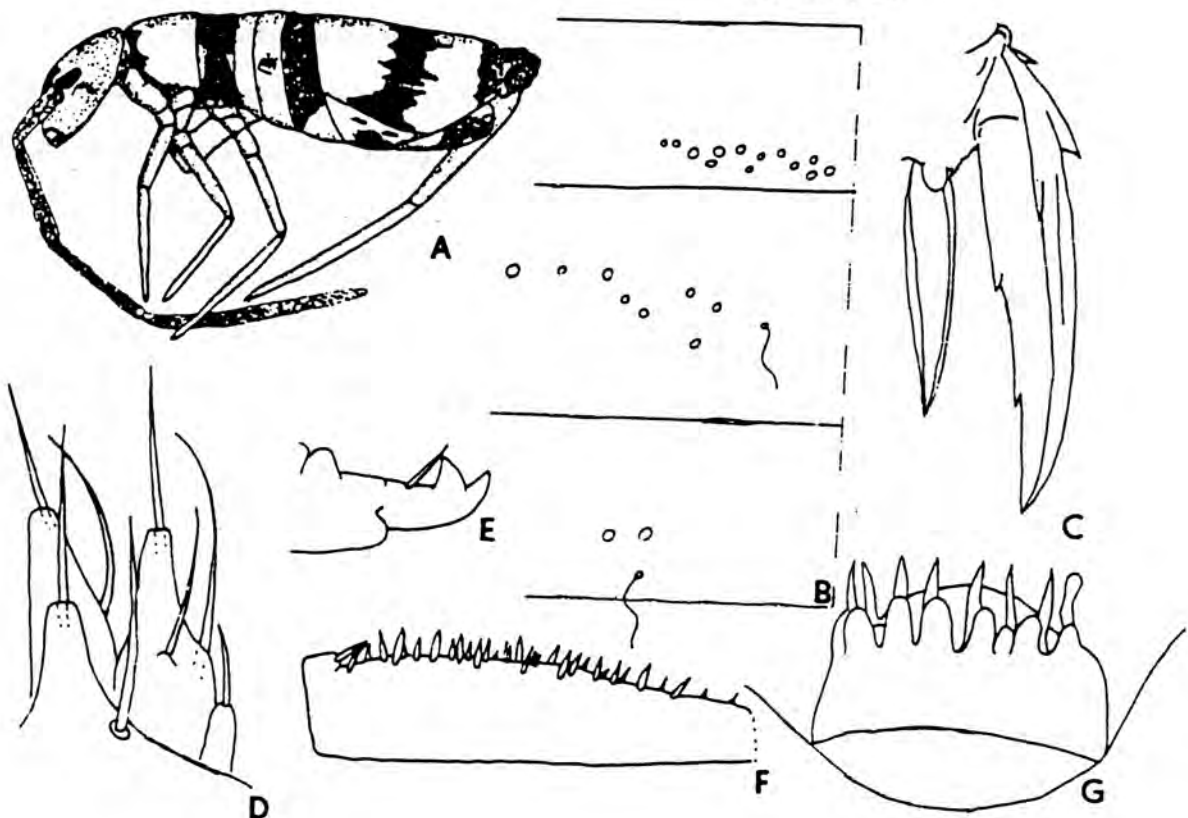
Localities: Louisiana - Jefferson Par., Ouachita Par., St. Charles Par.;  
Tennessee - Shelby Co.

Additional record: Kentucky (Lesshaft, 1977).

Entomobrya (Homidia) sauteri

- A) Habitus, specimen from Louisiana, after Christiansen.
- B) Chaetotaxy of left half of first three abdominal segments, specimen from Ouachita Par., Louisiana.
- C) Hind foot complex, specimen from Ouachita Par., Louisiana, after Christiansen.
- D) Outer portion labial organ, after Stach.
- E) Mucro, specimen from Louisiana, after Christiansen.
- F) Dental spines, specimen from Louisiana, after Christiansen.
- G) Male genital plate, after Stach.

FIGURE 726



Entomobrya (Homidia) socia Denis, 1939

Fig. 727

Refs.: Boll. Lab. Zool. gen. agr. Portici 22:310; Stach, 1965.

#### Description

Color: background yellowish; blue to blue-black pigment in the form of lateral stripes, usually a middorsal stripe, and some washings of paler pigment. Head slightly longer than broad. Body not compressed. Apical organ of fourth antennal segment with 2 separate bulbs. Apical organ of third antennal segment with 2 elliptical pegs, about as thick as largest neighboring setae. Unguiculus of the first pair of legs much shorter than that of the second or third pair. Dental spines absent in juveniles, up to 18+18 in adults. Apical mucronal tooth clearly smaller than antepical. Body setae of type 1 mostly with apex greatly expanded. Setae of type 5 slightly medially expanded and multilaterally ciliate for most of length. Maximum length 3.0 mm.

#### Remarks

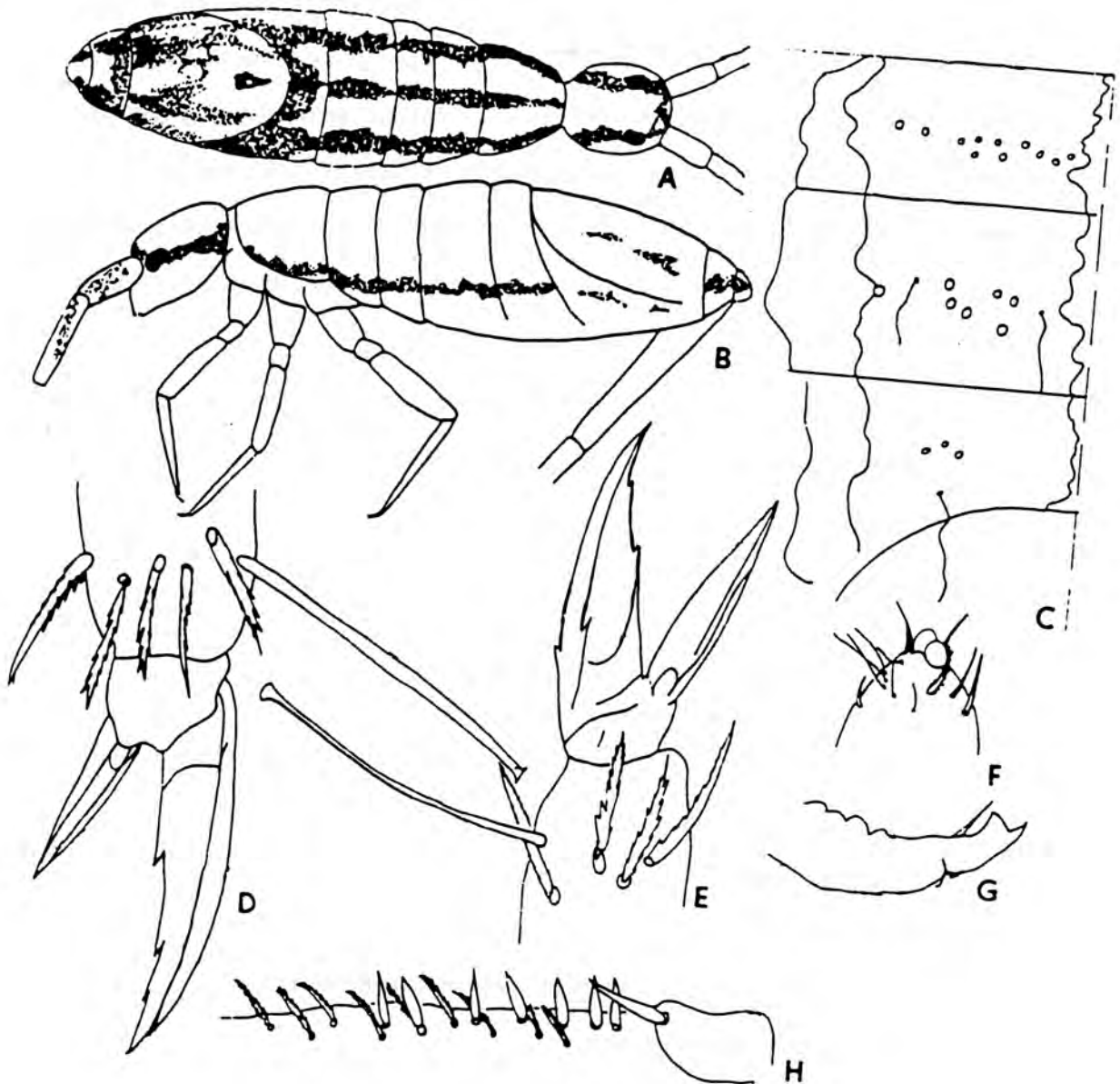
This species shows some variation in the chaetotaxy of the third abdominal segment, with a third seta between  $a_2$  and  $a_3$  present in about 1/4 of our specimens. The pattern also varies, but about 4/5 of all specimens we have seen have some vestige of the middorsal line. The male genital plate was seen indistinctly on one specimen only; it appears to be similar to that figured by Stach for E. (H.) sauteri. The species has been recorded only within the last 8 years, and probably is a recent introduction.

Localities: Georgia - Troup Co.; Illinois - Johnson Co. (cave); Louisiana - Baton Rouge Par., Ouachita Par.

All figures of specimens from Ouachita Par., Louisiana.

- A) & B) Diagrammatic views of pattern variations.
- C) Chaetotaxy of first three abdominal segments, left side.
- D) Fore foot complex.
- E) Hind foot complex.
- F) Apex of antenna.
- G) Mucro.
- H) Dental spines.

FIGURE 727





Type species: Mesentotoma exalga Salmon, 1942.

The Nearctic species of this subgenus is characterized by the bidentate mucro without a basal spine and the strongly excavate unguiculus. It also lacks an apical antennal bulb. There is a single species, E. (M.) laguna, restricted to the littoral zone in southern California.

Entomobrya (Mesentotoma) laguna Bacon, 1913

Fig. 728

Refs.: J. Ent. Zool. 5:202: Christiansen, 1956, 1958e.

Description

Color: gray-brown to gray-blue except for appendages, which are always blue; pigment generally distributed over body except for venter and irregular pale spots; head with a double dorsal V-shaped mark. Head roughly circular. Body oval, not flattened or compressed. Second antennal segment with a basal subsegment (sometimes indistinct). External differentiated seta of labial appendage very blunt and thick. Most inner tibiotarsal setae "smooth", i.e. without projecting ciliations. Apical mucronal tooth much longer than anteapical. Maximum length 2.0 mm.

Remarks

This species was described from a sandy beach, but is commonly collected on or under rocks between the tide lines on rocky coasts, together with Archisotoma.

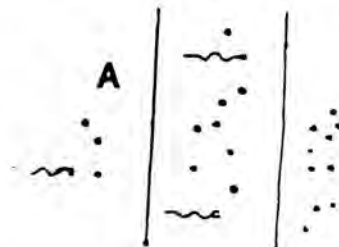
Localities: California - Los Angeles Co., Orange Co. (type).

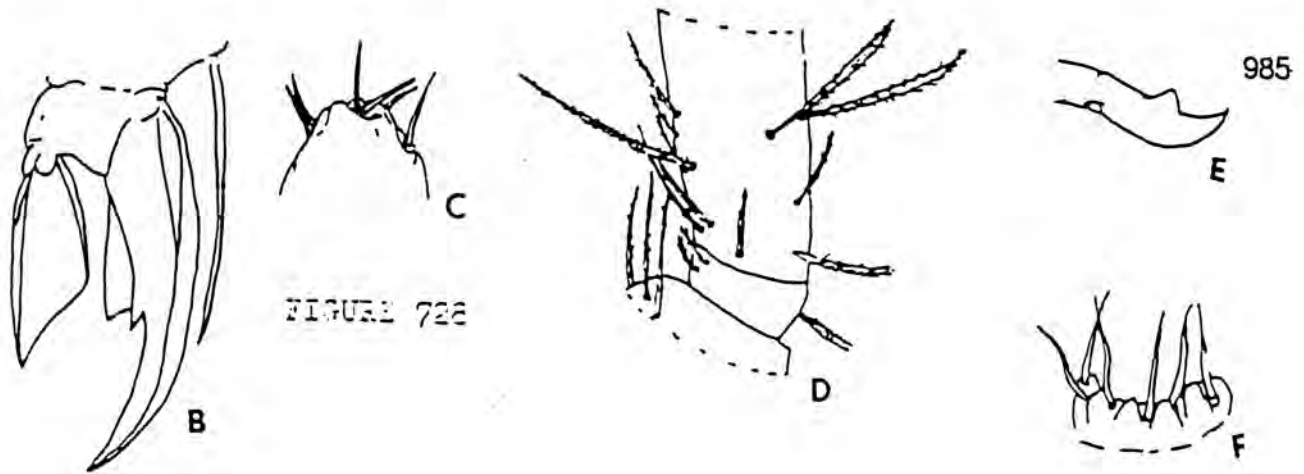
Entomobrya (Mesentotoma) laguna

FIGURE 728

All specimens from California.

- A) Dorsal chaetotaxy of left half of first three abdominal segments, specimen from Laguna beach.
- B) Hind foot complex, after Christiansen.
- C) Apex of antenna, after Christiansen.
- D) Base, second antennal segment, after Christiansen.
- E) Mucro, after Christiansen.
- F) Male genital plate, after Christiansen.





Genus Sinella Brook, 1882

Type species: curviseta Brook, 1882

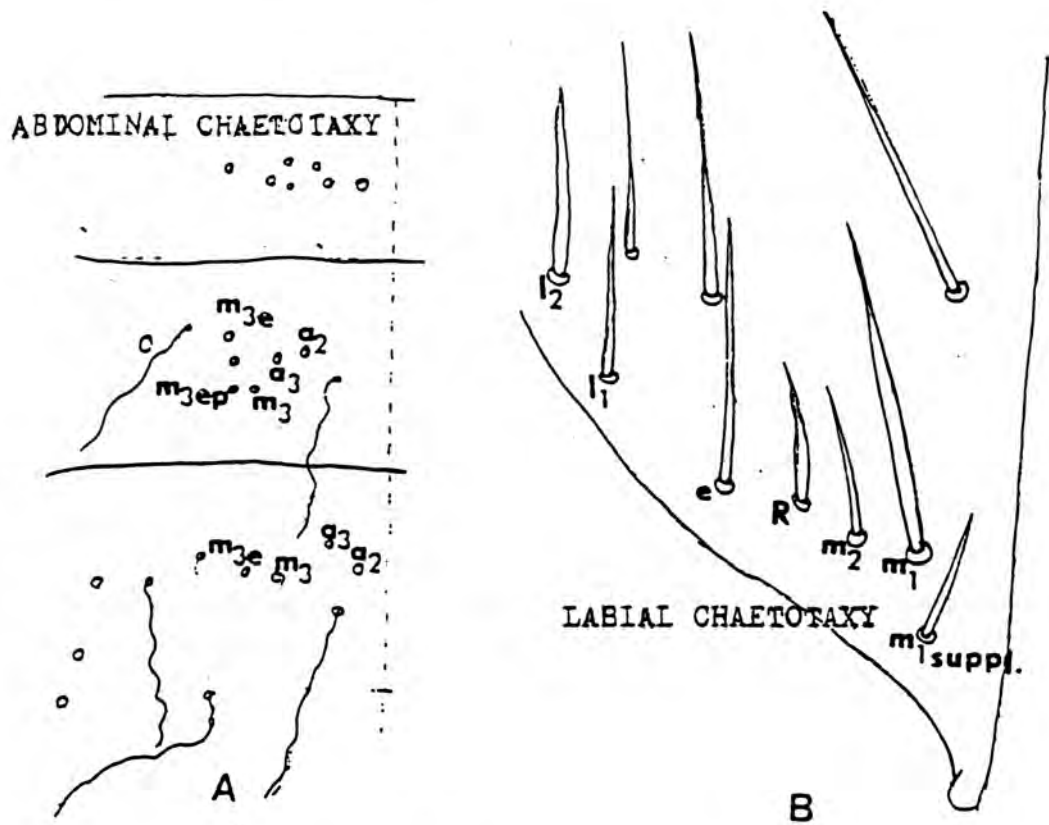
Syn.: Parasinella Bonet, 1934 (type species: cavernarum).

We include in this genus all the Nearctic scaleless Entomobryinae with fewer than 6+6 eyes. The general habitus, male genital plate, and most other characteristics are very similar to those of Entomobrya s.l., from which this genus differs consistently only in eye number. Most species, however, also differ in features associated with subterranean or cavernicole habitats, including loss of pigment, development and modification of antennal sensilla, and hypertrophy or basal displacement of ungual teeth. Tibiotarsal setae are (sometimes with 1 exception) all ciliate but the degree to which the ciliations are appressed to the axis varies greatly (Chen & Christiansen 1993). Those with the ciliations very closely appressed appear "smooth" or striate under the light microscope.

Remarks

The new characteristics introduced by Chen & Christiansen (1993) make the present classification of this genus entirely unreliable. Initial examination of a number of species show that their application to the Nearctic fauna would require considerable modification of the system. It has also shown that while some species (such as S. barri) appear to have the same parameters under the new system as under the old, others such as S. cavernarum and S. sexoculata would appear to consist of a number of distinct taxa. A realistic classification must await extensive study involving fresh material and a re-analysis of presently described taxa. We here describe one new species where we have ample materials and there is little question of it being part of an already described taxon, using the new criteria as possible. We enter this in the table and keys but limit the table to the old criteria, since we have neither the specimens nor the time to revise the Nearctic fauna of the whole genus. Below we reprint the appropriate remarks from the first edition.

The distribution of macrochaetae and bothriotricha on the trunk appears to be quite constant within species and shows significant interspecific differences. We have limited our consideration to the first three abdominal segments, where the setae are relatively easily studied; the variable setae are shown in Fig. 729A with the letter designations we have assigned to them. The labial setae are also of some use but their intraspecific variation makes them less valuable; Fig. 729B shows our labeling of these setae. Other features which may be taxonomically useful but which are not considered here include the labral papillae, which are obscure and difficult to see; the trochanteral organ, whose intraspecific variation needs analysis; and the chaetotaxy of other segments.



729

There are 18 described Nearctic species: 1) acra, 2) agna, 3) alata, 4) avita, 5) baca, 6) barri, 7) basidens, 8) binoculata, 9) caeca, 10) cavernarum, 11) curviseta, 12) hoffmani, 13) kekeleri, 14) quadrioculata, 15) recens, 16) sexoculata, 17) tecta, 18) tenebricosa.

TABLE XXXIV  
Characteristics of Nearctic Species of *Sinella*

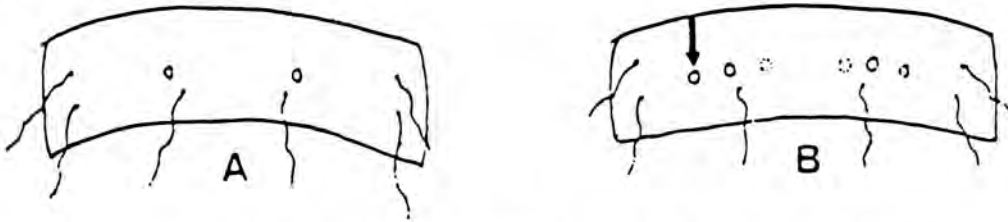
Species	Eye number	Inner Unguis		Outer Edge of Unguiculus	Abd. 1 number	Abdominal Macrochaetae (per side)						
		No. Teeth	Basal Pair <sup>1</sup>			Abd. 2	Abd. 3			M <sub>3e</sub>		
						a <sub>2</sub>	A <sub>3</sub>	M	A <sub>2</sub>		A <sub>3</sub>	M <sub>3</sub>
<u>aera</u>	2+2	3(-4)	≈	ciliate-serrate	6-7?	+	+	4	-	+	+	-
<u>agna</u>	0	2	=	smooth	7	+	+	4	+	+	+	+
<u>alata</u>	0	2	≠	tooth ±	?	+	+	4	+	+	+	-
<u>avita</u>	0	4	≠	smooth	?	+	+	4	+	+	+	-
<u>backa</u>	0	3	≠	ciliate	8	+	+	4	+	+	+	-
<u>barri</u>	0-2+2	3(-4)	=	ciliate-serrate	7	-(+)	+	3	+	+	+	-
<u>basidens</u>	0	2	≠	smooth	7(-9)	-(+)	+	3-4	-	+	+	-
<u>binoculata</u>	1+1	3(-4)	≠	ciliate-serrate	-78	+	+	4	+	+	+	-
<u>caeca</u>	0	3	≠	TOOTH	4	-	-	3	-	+	-	-
<u>cavernarum</u>	0	3	≠	(smooth)-serrate	7-9	+	+	3-4	+	+	+	-
<u>curviseta</u>	2+2	3-4	≈	serrate	6	-	+	3	-	-	+	-
<u>hoffmani</u>	0	2	≠	smooth	7-8	+	+	3-4	+	+	+	-
<u>kekeleri</u>	0	2	≈	smooth	7	-	+(-)	4	-	+	+	-
<u>quadroculata</u>	2+2	3	≈	ciliate-serrate	6-8	+	+	3-4	+	+	+	-
<u>recens</u>	1+1-3+3	4	≈	ciliate-serrate	7	+	+	4	(+)-	+	+	-
<u>sexoculata</u>	3+3	3	≈	smooth-ciliate	?	+	+	4	+	+	+	-
<u>tecta</u>	0-3+3	4	≈	ciliate	9-10	+	+	4-5	+	+	+	-
<u>tenebricosa</u>	0	3	≠	tooth	4	-	-	3	-	+	-	-

<sup>1</sup> ≠ = unequal

Key to Nearctic Species of *Sinella*

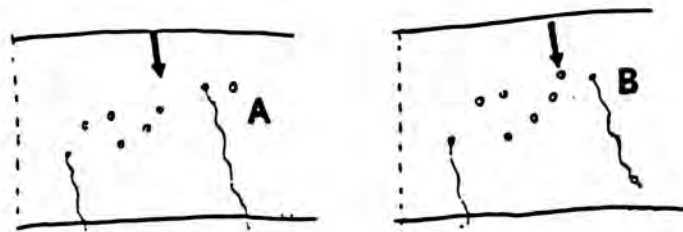
- 1) Eyes present -----2  
 1') Eyes absent -----10
- 2) Only 1+1 macrochaetae medial to lateral bothriotricha on the third abdominal segment (Fig. 730A) -----*S. (S.) curviseta*  
 2') 2+2 or 3+3 macrochaetae medial to lateral bothriotricha on third abdominal segment (Fig. 730B) -----3

730



- 3) Anterior macrochaeta in m arc on second abdominal segment missing; species found east of the Rocky Mountains (Fig. 731A) -----*S. (S.) barri*  
 3') Anterior macrochaeta in m arc on second abdominal segment normally present; (Fig. 731B); West Coast Species -----4

731



- 4) Apical tooth of unguis well developed (Fig. 731.1A) -----5  
 4') Apical tooth of unguis minute (Fig. 731.1B) or absent -----6



- 5) Apical tooth on unguis usually much longer than others, large (> 2 mm); cave species -----*S. (S.) tecta*  
 5') Apical tooth on unguis never longer than others, small (< 2mm); surface species -----*S. (S.) recens*
- 6) 2 Macrochaeta on abdominal segment 3 (without dotted macrochaeta. in Fig. 729A) -----*S. (S.) aera*  
 6') 3 Macrochaeta on abdominal segment 3 (with dotted macrochaeta in Fig. 729A) present -----7



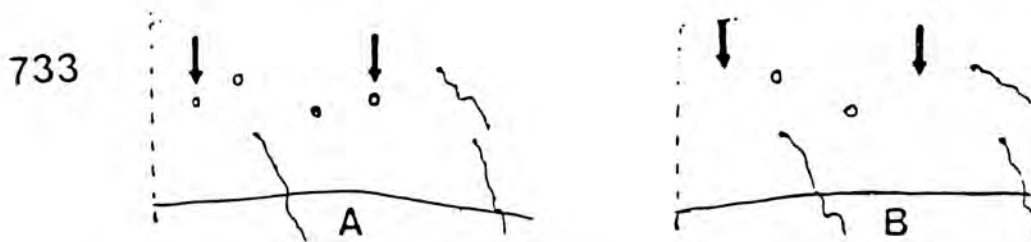
- 7) Eyes 3+3 ----- *S. (S.) sexoculata*  
 7') Eyes 1+1 or 2+2 ----- 8
- 8) Eyes usually 1+1; basal unguual teeth unequal ----- *S. (S.) binoculata*  
 8') Eyes 2+2; basal unguual teeth equal ----- 9
- 9) Eyes contiguous ----- *S. (S.) quadriculata*  
 9') Eyes widely separated ----- *S. (S.) aera*
- 10) Inner unguual teeth 3 or 4 ----- 11  
 10') Inner unguual teeth 2 ----- 18
- 11) Mucro with apical tooth and basal spine only ----- 12  
 11') Mucro with apical and antepical teeth and basal spine ----- 13
- 12) Basal spine of mucro not nearly reaching apex of mucro, some tenent hairs clavate -----  
 ----- *S. (C.) caeca*  
 12') Basal spine of mucro reaching apex of mucro, all tenent hairs acuminate -----  
 ----- *S. (C.) tenebricosa*
- 13) Anterior macrochaeta in m arc on second abdominal segment absent (Fig. 731A) ----- 14  
 13') Anterior macrochaeta in m arc on second abdominal segment present (Fig. 731B) ----- 15
- 14) Basal teeth of unguis subequal or only slightly different (Fig. 732A) ----- *S. (S.) barri*  
 14') Basal teeth of unguis strikingly different (Fig. 732B) ----- *S. (S.) cavernarum*

732



- 15) 4 inner unguual teeth ----- 16  
 15') 3 inner unguual teeth ----- 17
- 16) Apical unguual tooth elongate with filament ----- *S. (S.) recta*  
 16') Apical unguual tooth normal or minute ----- *S. (S.) avita*
- 17) Apex of external differentiated labial seta definitely exceeds apex of "same" papilla; basal unguual teeth subequal or with one slightly larger than the other (Fig. 732A); West Coast species ----- *S. (S.) bacca*  
 17') Apex of external differentiated labial seta usually about on level with apex of "same" papilla; one basal unguual tooth strikingly larger than the other (Fig. 732B); east of Rocky Mountains ----- *S. (S.) cavernarum*
- 18) Fourth antennal segment longer than cephalic diagonal; basal unguual teeth subequal and small (Fig. 732A) ----- 19  
 18') Fourth antennal segment shorter than cephalic diagonal; basal unguual teeth unequal with one very large (Fig. 732B) ----- 20

- 19) Macrochaetae  $A_2$  and  $M_{3a}$  present on third abdominal segment (Fig. 733A) — S. (S.) *agna*  
 19') Macrochaetae  $A_2$  and  $M_{3a}$  absent on third abdominal segment (Fig. 733B) — S. (S.) *krekeleeri*



- 20) Macrochaeta  $A_2$  on third abdominal segment absent ----- S. (S.) *basidens*  
 20') Macrochaeta  $A_2$  (dotted in Fig. 729B) present ----- 17
- 21) Apical tooth of mucro 3-3.5 times as long as anteapical tooth (Fig. 734A) -----  
 ----- S. (S.) *hoffmani*  
 21') Apical tooth of mucro twice as long as anteapical (Fig. 734B) ----- S. (S.) *alata*



Not included in key:

\*\**aglis* Harvey, 1900

\*\**guthriei* (Mills, 1931)

*hoefii* Schäffer, 1896

\*\**lucifuga* (Folsom, 1902)

*Pseudosinella*, = *sexoculata* ?

*Entomobrvoides*

no valid Nearctic records

= *cavernarum*

*Sinella (Sinella) aera*, Christiansen & Bellinger, 1980

Fig. 735

### Description

Color: white or bluish with 2+2 eyes, one in back of the other, on separate patches. Fourth antennal segment .5-.6 as long as cephalic diagonal, with a vestige of an apical bulb in the form of an indentation or sunken lobe; subapical organ not observed. Apical organ of third antennal segment with peglike sensilla. External differentiated seta of labial appendage barely attaining apex of same papilla or exceeding it by (rarely) as much as 1/5 of its length. All labial triangle setae smooth; seta  $m_2$  less than half as long as longest seta and variable in position; seta  $r$  about 2/3 as long as longest seta. Inner surface of tibiotarsus with some heavy setae having

striations visible only under high magnification. Tenent hair usually acuminae, but occasionally the third or second and third feet have weakly clavate tenent hairs. Unguis normally with 3 inner teeth; occasionally a minute fourth, subapical tooth is present. Unguiculus acuminate. Mucro with apical tooth 1 1/2 to 2 times as long as antepical tooth. Maximum length 1.6 mm.

#### Remarks

The eyes of the typical form of this species resemble those of *S. curviseta*, but the mucronal structure and chaetotaxy are quite different. In notes made much earlier on this species, some specimens are described as having 3+3 eyes on single patches; but all specimens in which we could determine the chaetaxy had the typical eye structure. The single California specimen differs from those from Oregon in lacking seta  $m_3$  on the second abdominal segment and having the unguiculus heavily serrate.

Type locality: Corvallis, Benton Co., Oregon, 20 April 1942 (R. Post).

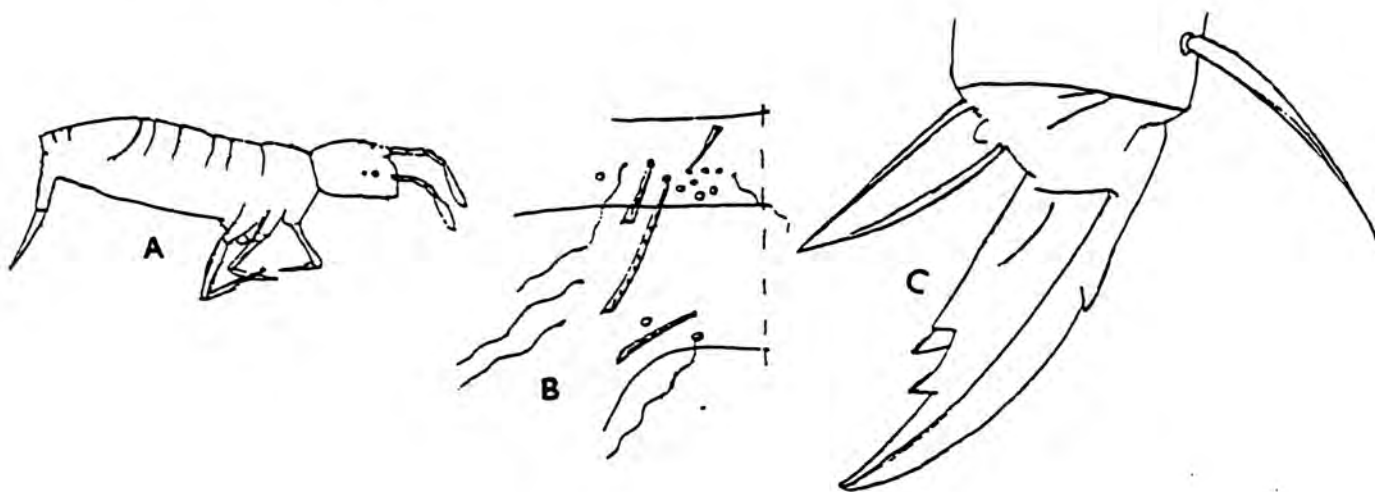
Additional locality: California - Fresno Co.

#### FIGURE 735

##### *Sinella (Sinella) aera*

All figures of specimens from type locality.

- A) Habitus.
- B) Dorsal chaetotaxy of left side of second and third abdominal segments.
- C) Hind foot complex.
- D) Apex of antenna.
- E) Apex of antenna of different specimen from same collection.
- F) Inner setae of tibiotarsus, contrasting the "smooth" with the ciliate setae.
- G) Male genital plate.



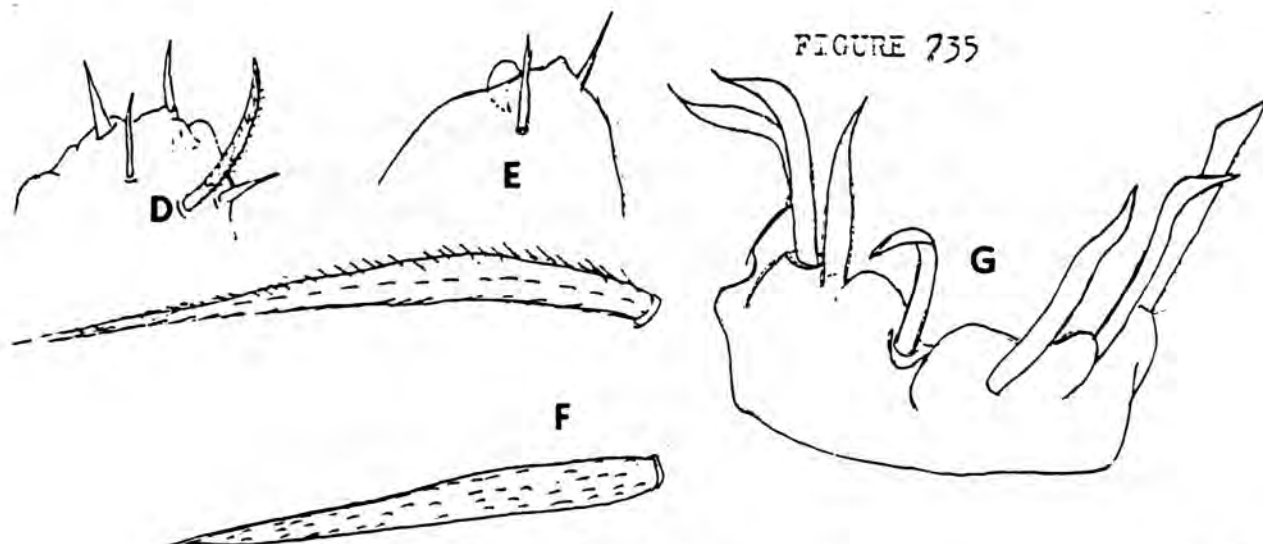


FIGURE 735

Sinella (Sinella) agna, Christiansen & Bellinger, 1980

Fig. 736

#### Description

Color: white without trace of pigment. Fourth antennal segment 1.1 - 1.8 times as long as cephalic diagonal, without apical bulb but with a forked "pin" seta and ovoid subapical organ. Third antennal segment with paddle-shaped apical sensillae, thickened along 1 margin, and with 15-20 slender blunt setae on ventral surface of apical third of segment. Labial appendage with ternal differentiated seta heavy and not reaching apex of same papilla. All labial triangle setae smooth; setae  $m_2$  and  $r\ 1/2$  to  $2/3$  as long as longest seta. Inner tibiotarsal setae all ciliate, with largest setae only slightly less coarsely ciliate than smallest. Tenent hair short and acuminate. Unguis elongate, with 2 small equal basal inner teeth on a common platform; lateral teeth small and basal. Unguiculus swollen basally. Ventral tube with about 40 anterior, 30 posterior, and 10+10 to 14+14 distal lateral setae. Micro extremely elongate, with apical tooth more than 3 times as long as antepical. Maximum length 4.5 mm.

#### Remarks

This species resembles S. krekeri strikingly in general morphology, but differs in the chaetotaxy and structure of the fourth antennal segment. It probably arose from S. hoffmani, from which it is easily distinguished by the chaetotaxy and structure of the unguis.

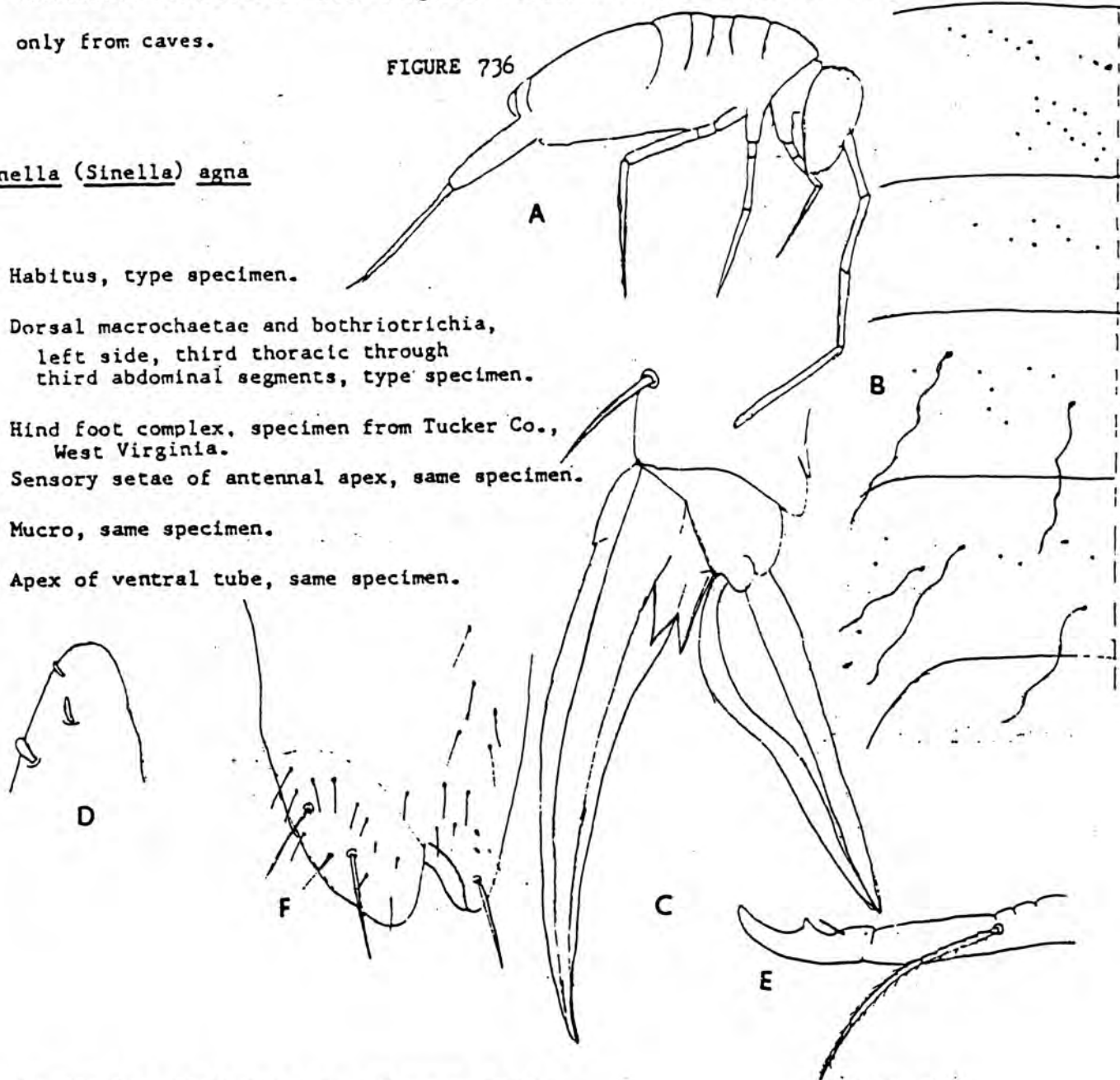
(Holsinger).

Additional localities: West Virginia - Preston Co., Randolph Co. Known only from caves.

FIGURE 736

Sinella (Sinella) agna

- A) Habitus, type specimen.
- B) Dorsal macrochaetae and bothriotrichia, left side, third thoracic through third abdominal segments, type specimen.
- C) Hind foot complex, specimen from Tucker Co., West Virginia.
- D) Sensory setae of antennal apex, same specimen.
- E) Mucro, same specimen.
- F) Apex of ventral tube, same specimen.



Sinella (Sinella) alata Christiansen, 1960

Ref.: Ann. ent. Soc. Am. 53:486.

Fig. 737

Description

Color: dull yellow to white without trace of pigment. Fourth antennal segment about 2/3 as long as cephalic diagonal; without apical bulb, with subapical organ peglike, with associated forked, peglike seta. Apical organ of third antennal segment with paddle-shaped sensillae with smooth margins;



apical ventral third of segment with 6-8 slender blunt setae. External differentiated seta of labial appendage very thick and just attaining apex of same papilla. All labial triangle setae smooth, with  $m_2$  and  $r$  about half as long as longest seta. Little or no differentiation in the ciliation of inner tibiotarsal setae. Tenent hair short and acuminate. Unguis with a small external tooth and a pair of large inner basal teeth, one over twice as long as the other. Unguiculus acuminate with, at least on some feet, a distinct outer tooth. Mucro with apical tooth about twice as long as antepical. Maximum length 2.2 mm.

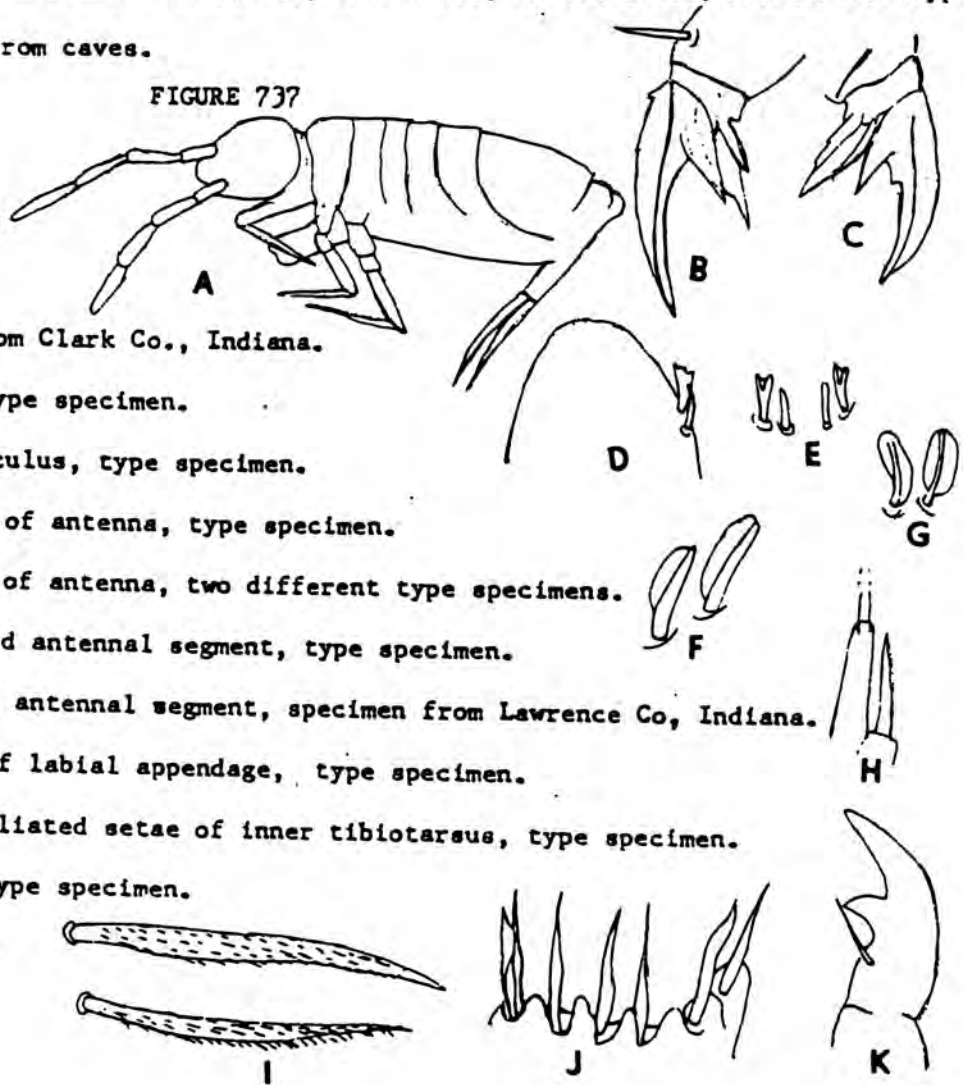
Remarks

This form clearly evolved from S. cavernarum, but the genital plate of the male, the toothed unguiculus, and the peculiar pegs of the fourth antennal segment all appear to justify separation.

Localities: Indiana - Clark Co., Greene Co., Lawrence Co., Monroe Co. (type); known only from caves.

FIGURE 737

Sinella (Sinella) alata



- A) Habitus, specimen from Clark Co., Indiana.
- B) Hind foot complex, type specimen.
- C) Mid unguis and unguiculus, type specimen.
- D) Subapical sense pegs of antenna, type specimen.
- E) Subapical sense pegs of antenna, two different type specimens.
- F) Apical organs of third antennal segment, type specimen.
- G) Apical organ of third antennal segment, specimen from Lawrence Co, Indiana.
- H) Differentiated seta of labial appendage, type specimen.
- I) Large "smooth" and ciliated setae of inner tibiotarsus, type specimen.
- J) Male genital plate, type specimen.
- K) Mucro, type specimen.

Ref.: Ann. ent. Soc. Am. 53:484.

Description

Color: white without pigment. Fourth antennal segment about 3/5 as long as cephalic diagonal, without apical bulb, with flanged subapical organ. Apex of third antennal segment with 2 oval pegs, and about 6 slender blunt setae ventrally. External differentiated seta of labial appendage definitely exceeding apex of same papilla and slightly thicker than apical seta. All setae of labial triangle smooth; seta  $m_2$  less than half, and seta  $r$  about 3/4, as long as seta  $m_1$ . Internal setae of tibiotarsus differ only slightly in ciliation. Tenent hair strongly clavate. Unguiculus acuminate. Ventral tube with about 7+7 distal lateral setae. Mucro with apical tooth about twice as long as anteapical. Maximum length 2.3 mm.

Remarks

The maintenance of this form as a species distinct from S. cavernarum is dubious. The clavate tenent hair and peculiar subapical antennal organ show intermediate conditions in 2 Illinois populations and 1 north central Kentucky population of cavernarum. However the normal differences in these characters and in foot structure lead us to maintain the separation pending further study.

Localities: Kentucky - Crittenden Co. (type), Harrison Co., Livingston Co.;

Missouri - Jefferson Co.; known only from caves.

FIGURE 738

Sinella (Sinella) avita

All figures of type specimens.

A) Habitus.

B) Hind foot complex.

C) Subapical sense organs of fourth antennal segment.

D) Apical organ of third antennal segment.

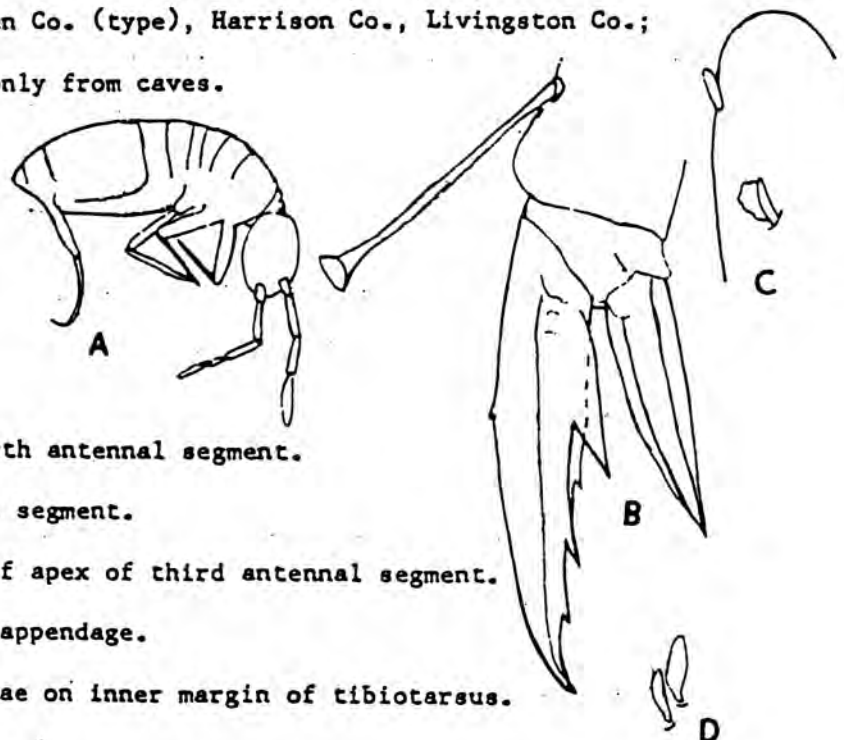
E) Blunt setae on opposite side of apex of third antennal segment.

F) Differentiated seta of labial appendage.

G) "Smooth" and ciliate large setae on inner margin of tibiotarsus.

H) Male genital plate, from side.

I) Mucro.



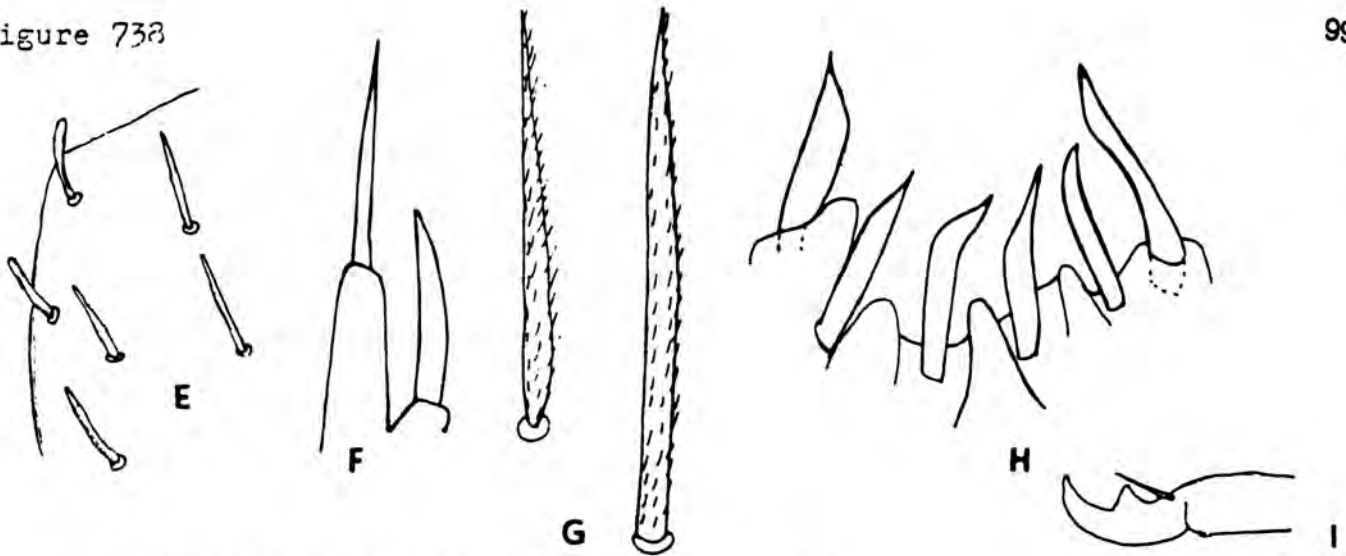
Sinella (Sinella) baca, Christiansen & Bellinger, 1980

Fig. 739

## Description

Color: white without trace of pigment. Fourth antennal segment .75 - .9 times as long as cephalic diagonal; without trace of apical bulb; with a peg-like subapical organ. Third antennal segment apicoventrally with some 15-20 slender blunt setae. External differentiated seta of labial appendage exceeding apex of same papilla by 1/6 - 1/4 of its length. Labial triangle with setae  $M_2$  and R usually ciliate and about half as long as longest seta. Some inner tibiotarsal setae with strikingly finer ciliation than others. Tenent hair truncate to clearly clavate. Basal pair of unguual teeth about twice as large as median tooth. Unguiculus acuminate. Ventral tube with 11+11 to 12+12 distal lateral setae. Mucro with apical tooth 1 1/2 to 2 times as large as antepical. Maximum length 3.0 mm.

## Remarks

This species is similar to S. sexoculata in many respects and probably represents a recent derivative. The apical organ of the third antennal segment was seen on only two specimens. The labial triangle setae appear to be quite variable, with M and R ciliate in 5 of 9 specimens examined and smooth in the others. This species resembles S. barri in many respects, but is easily distinguished by the chaetotaxy.

Type locality: Empire Cave, Santa Cruz Co., California, 29 Jan. 1960.

Additional localities: California - Butte Co., Calaveras Co. (cave), Contra Costa Co., Napa Co. (cave).

Sinella (Sinella) baca

All figures of type specimens.

- A) Outline of head and trunk.  
 B) Hind foot complex.  
 C) A single apical sensilla of third antennal segment.  
 D) Labial triangle, right side; encircled setae often ciliate.  
 E) Differentiated seta of labial appendage.  
 F) "Smooth" and ciliate large setae of inner tibia-tarsus.  
 G) Posterior half of right side of male genital plate.  
 H) Apex of dens and mucro.

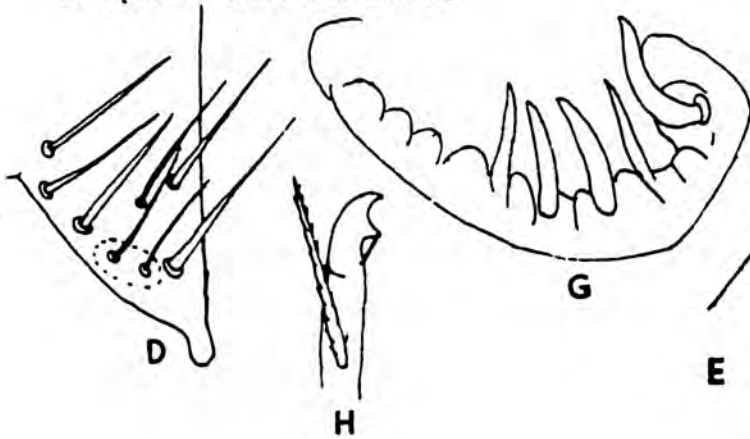
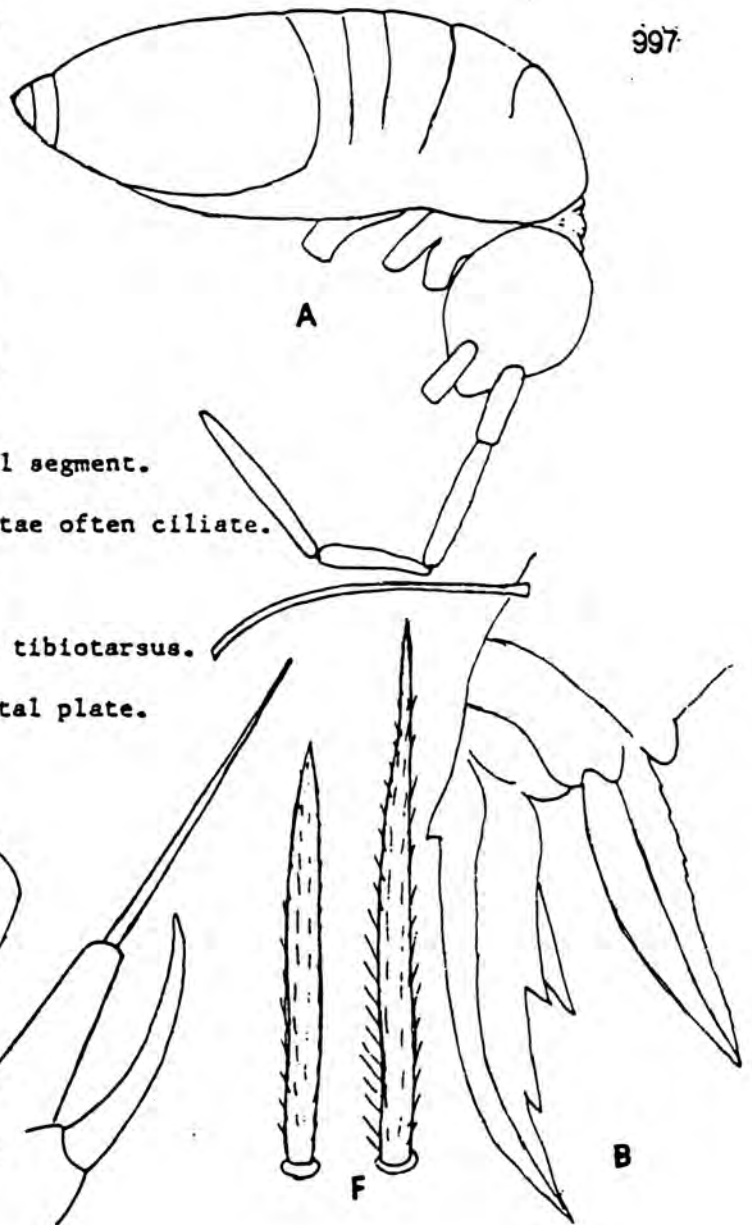
Sinella (Sinella) barri Christiansen, 1960

Fig. 740

Ref.: Ann. ent. Soc. Am. 53:488.

## Description

Color: ranging from white to yellow with scattered reddish or bluish pigment granules; eyes usually absent, occasionally 2+2, small and variously placed but always close together. Fourth antennal segment .7 - .9 times as long as cephalic diagonal, without retractile apical bulb or differentiated subapical organ. External differentiated seta of labial appendage exceeding apex of same papilla for 1/5 to 1/2 its length. Setae of labial triangle all smooth, varying considerably in number and size. Largest inner tibia-tarsal setae so finely ciliate as to appear smooth at low magnifications. Tenent

hair acuminate or (rarely) truncate. Unguis with median and subequal basal inner teeth, all relatively small; a fourth, minute, subapical tooth sometimes present. Unguiculus acuminate, with outer edge finely ciliate to serrate. Ventral tube with 28-36 anterior setae and 9+9 to 11+11 distal lateral setae. Mucro with apical tooth 2.6 to 3 times as long as antepical. Maximum length 3.0 mm.

#### Remarks

This species is extremely variable in many features; however, the variation does not appear to be sufficiently congruent to justify splitting it into a number of taxa. It is interesting that almost all the more western populations are eyed, as is the single surface collection, while none of the extreme eastern forms have eyes. The species has several constant features, including the absence of macrochaeta  $M_{3e}$  on the second abdominal segment; in this respect it resembles the introduced species S. caeca and curviseta, but among native species only S. hoffmani and (exceptionally) S. quadrioculata are similar.

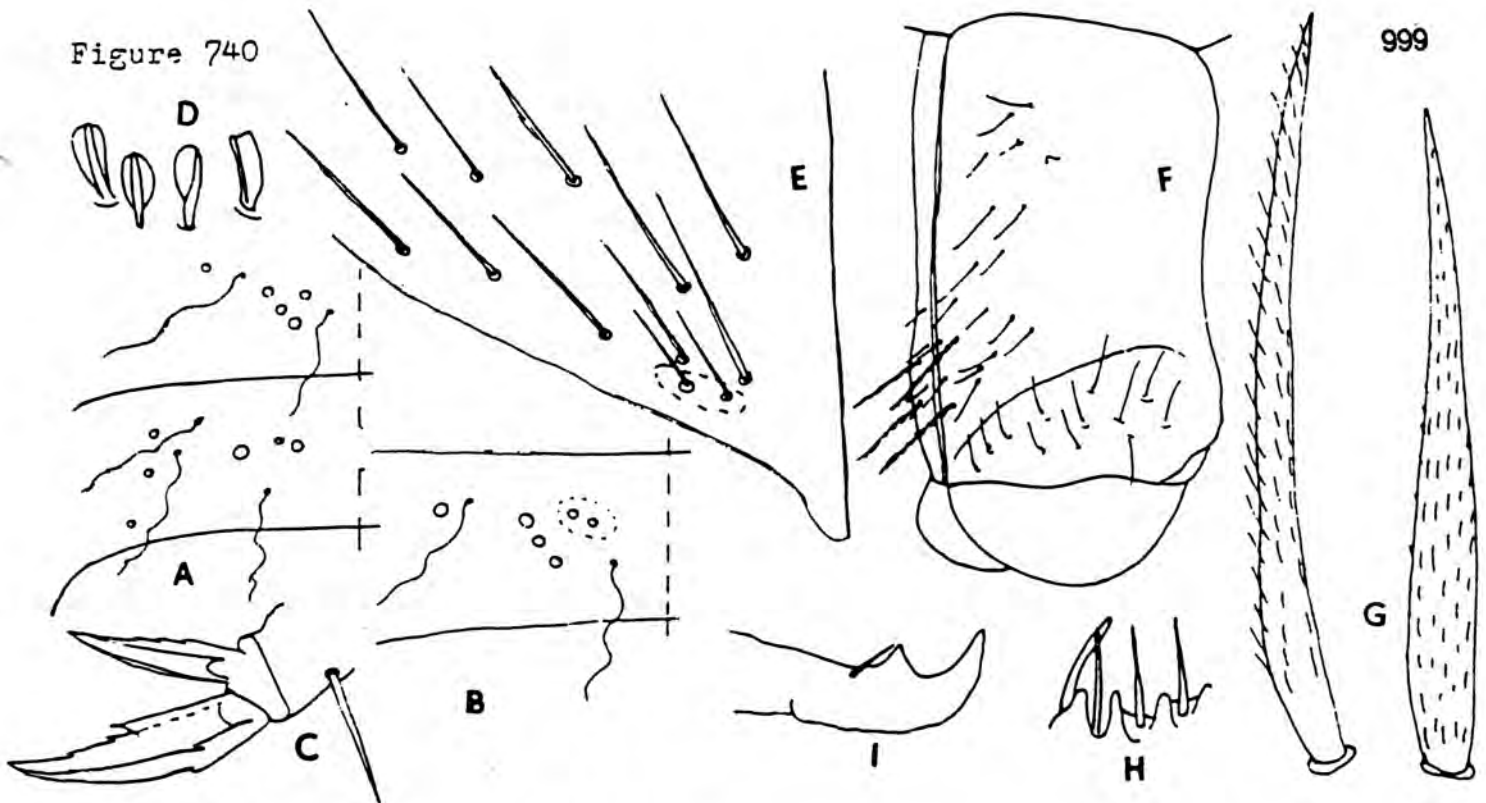
Localities: Arkansas - Clay Co., Randolph Co.; Illinois - Hardin Co.; Indiana - Fayette Co. (epigeic); Kentucky - Barren Co., Grayson Co., Henry Co., Ohio Co.; Missouri - Perry Co.; Tennessee - Blount Co., Cannon Co., Cumberland Co., DeKalb Co., Maury Co., Monroe Co., Perry Co. (type), Robertson Co., Sumner Co., Union Co., Wayne Co.; Virginia - Giles Co., Scott Co., Smythe Co., Washington Co. All localities from caves except as indicated.

Sinella (Sinella) barri                      FIGURE 740

- A) Normal chaetotaxy of left side of second and third abdominal segments.
- B) Rare type of chaetotaxy of second abdominal segment; encircled setae vary in position.
- C) Hind foot complex, specimen from cave, Robertson Co., Tennessee.
- D) Apical organs of third antennal segment showing different forms.
- E) Labial triangle, right side; encircled setae vary in position and may be absent.
- F) Right side of ventral tube, specimen from cave, Union Co., Virginia.
- G) "Smooth" and ciliate large setae of inner tibiotarsus, type specimen.
- H) Basal half of male genital plate, left side, specimen from cave, Robertson Co., Tennessee.
- I) Mucro, type specimen.



Figure 740



999

Sinella (Sinella) basidens Bonet, 1934

Fig. 741

Ref.: Arch. Zool. exper. gen. 76:368 (cavernarum var.); Christiansen, 1960a.

#### Description

Color: white without trace of pigment. Fourth antennal segment  $\frac{3}{4}$  to  $\frac{9}{10}$  as long as cephalic diagonal, without apical bulb or clearly differentiated subapical organ but with a clear apical "pin" seta which is sometimes forked. Third antennal segment with about 14 ventral, curved, blunt setae. Second antennal segment .43 to .57 as long as cephalic diagonal. External differentiated seta of labial appendage exceeding same papilla by  $\frac{1}{8}$  to  $\frac{1}{5}$  of its length. All labial triangle setae smooth; setae  $m_2$  and  $r \frac{1}{2}$  to  $\frac{2}{3}$  as long as longest seta and extremely variable in position. Trochanteral organ with setae strikingly spinelike. Inner tibiotarsal setae all clearly ciliate, with ciliations of largest setae only slightly smaller than those of small setae. Tenent hair short and acuminate. Unguis with lateral teeth very small. Unguiculus not normally swollen basally; outer edge smooth. Ventral tube with 32-36 anterior, 12+12 to 15+15 distal lateral, and about 26 posterior setae. Mucro with apical tooth 3 - 3.5 times as long as antepical. Maximum length 4.0 mm.

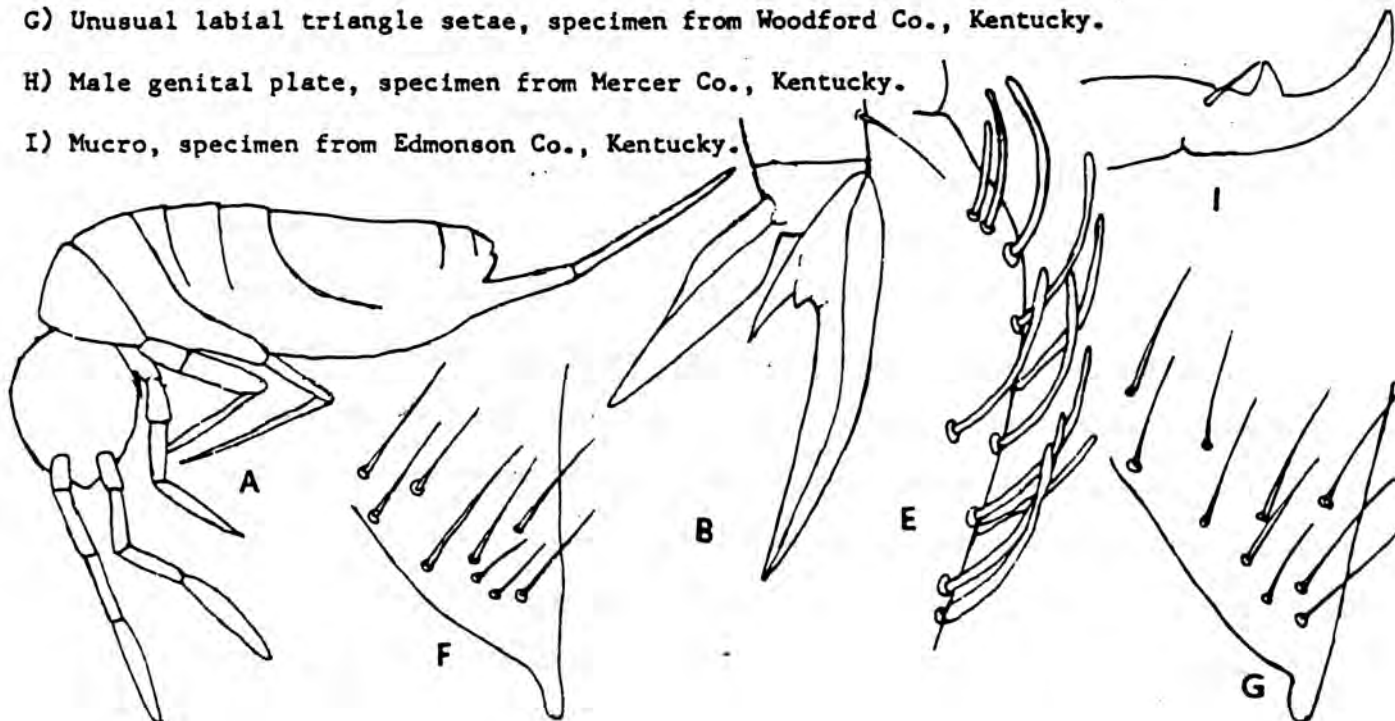
This species is very similar to S. krekeleri in many respects, but may be distinguished by the unguis structure and (most specimens) by the antennal ratios. The male genital plates are also quite different. The two outlying populations of this species (Carter Co., Ky. and Clay Co., Tenn.) show a number of minor differences from the typical form. No mature males of these populations have been seen, and study of the male genital plates may show that they are best considered to be distinct species.

Localities: Kentucky - Anderson Co., Carter Co.?, Fayette Co. (type), Jessamine Co., Mercer Co., Scott Co., Woodford Co.; Tennessee - Clay Co.? Known only from caves.

Sinella (Sinella) basidens

FIGURE 741

- A) Habitus, specimen from Woodford Co., Kentucky.  
 B) Hind foot complex, specimen from Mercer Co., Kentucky.  
 C) Apex of fourth antennal segment, same specimen.  
 D) Apical organ of third antennal segment, specimen from Mercer Co., Kentucky.  
 E) Blunt setae of opposite side of third antennal segment, specimen from Mercer Co., Kentucky.  
 F) Typical labial triangle setae, left side, specimen from Boyle Co., Kentucky.  
 G) Unusual labial triangle setae, specimen from Woodford Co., Kentucky.  
 H) Male genital plate, specimen from Mercer Co., Kentucky.  
 I) Mucro, specimen from Edmonson Co., Kentucky.



Ref.: Proc. Calif. Acad. Sci. (2)6:178 (Entomobrya).

Description

Color: white except for eyes. Fourth antennal segment .55 to .70 times as long as cephalic diagonal, with small subapical pit but no apical bulb. External differentiated seta of labial appendage exceeding apex of same papilla by 1/4 - 1/2 (usually 1/3 - 1/2) of its length. Labial triangle setae usually smooth; setae  $m_2$  and r are half as long as longest seta, and occasionally ciliate. Some inner tibiotarsal setae finely ciliate in strong contrast to others. Tenent hair usually clavate, occasionally acuminate. Inner unguis teeth variable; distal tooth minute when present. Unguiculus acuminate. Ventral tube with 8+8 - 9+9 distal setae. Mucro with apical tooth 2 - 2.5 times as long as antepical. Maximum length 1.8 mm.

Remarks

This species is distinguished from S. quadrioculata by the eye number, absence of an apical antennal bulb, thickened differentiated labial appendage seta, and unequal basal unguis teeth. These differences, however, vary independently, especially in specimens which we assign to S. quadrioculata but also (unguis teeth) in binocolata. The variation occurs mainly in California, where the 2 species are sympatric, but where some populations appear to be uniform in the variable characters as if genetically isolated. It is not clear whether there is a single locally variable species, a species complex with each local population being completely isolated and distinct, or two species with occasional hybridization between them; on the basis of present information we prefer the last possibility. S. binocolata in this sense may still include several distinct species; a single specimen from Corvallis, Oregon, with 1+1 eyes, has different abdominal chaetotaxy. See also remarks under S. tecta.

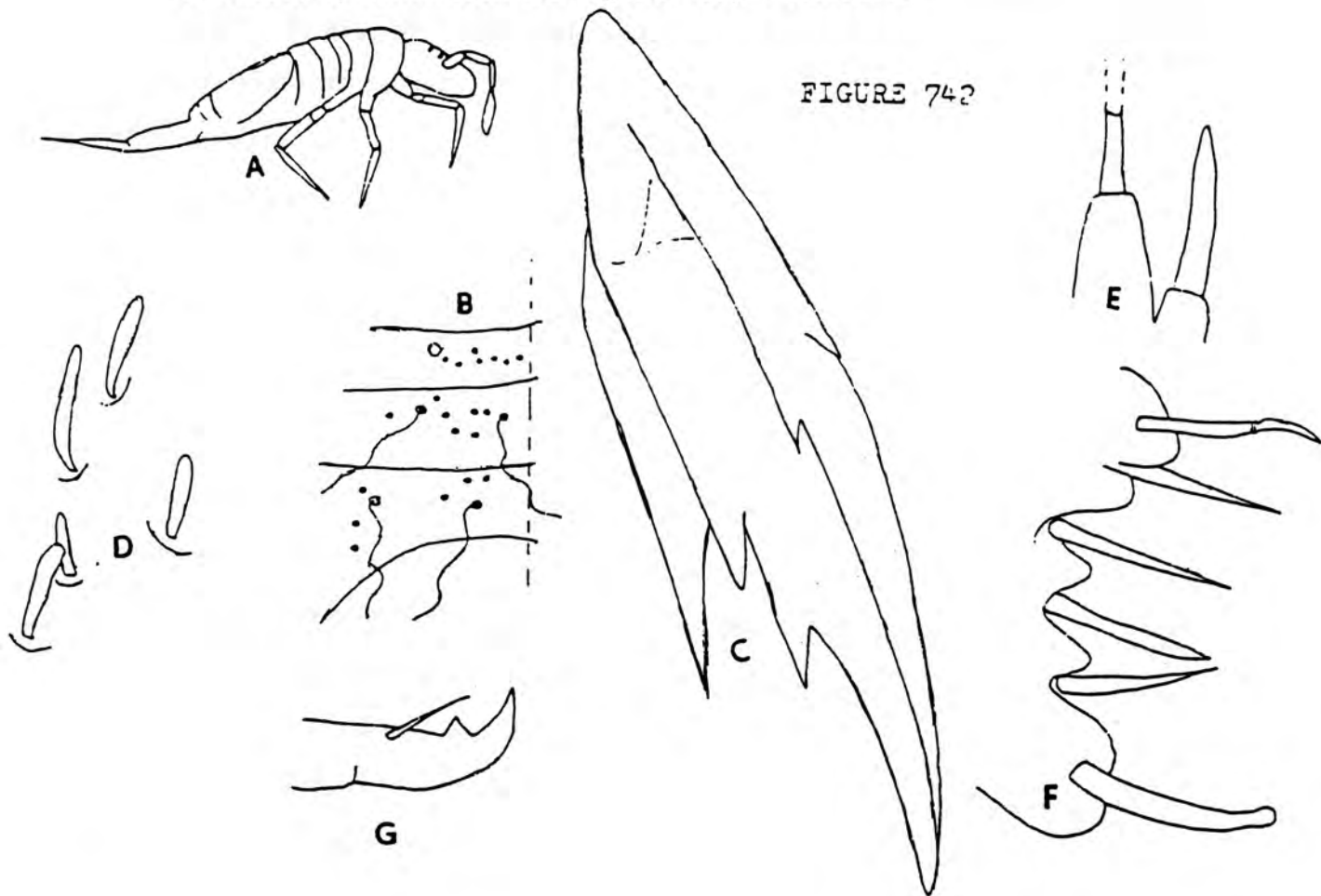
Sinella (Sinella) binocolata

- A) Habitus, specimen from Santa Clara Co., California. FIGURE 742
- B) Dorsal macrochaetae and bothriotracha of left side, first 3 abdominal segments; seta represented by open circle may be absent.
- C) Hind unguis, specimen from Ventura Co., California.
- D) Apical sense organs of specimens from various California counties.

California.

F) Male genital plate, specimen from Santa Rosa Island.

G) Mucro, specimen from Los Angeles Co., California.



Localities: California - Calaveras Co. (cave), Fresno Co., Los Angeles Co., San Luis Obispo Co., San Mateo Co. (type), Santa Clara Co., Santa Rosa Is., Shasta Co., Ventura Co.

Sinella (Coecobrya) tenebricosa Folsom 1902

Fig. 743

Ref.: Psyche, Camb. 9:365

Syn.: Sinella caeca of Christiansen and Bellinger, 1980, 1992, and Christiansen and Reddell, 1986; not caeca Schött 1896.

#### Description

Color: white without trace of pigment. Fourth antennal segment .65 to .90 times as long as cephalic diagonal (generally .65 to .75), with a clear peglike subapical organ but without vestige of apical bulb. External differentiated seta of labial appendage exceeding same papilla by 1/8 to 1/4 of its length. All labial triangle setae smooth;  $m_2$  and  $r$  smaller than others and sometimes absent. Some inner tibiotarsal setae very finely striate, appearing smooth at low magnifications. Tenent hair acuminate to strongly clavate. Unguis with 1 basal tooth much larger than others. Mucro unidentate. Maximum length 2.0 mm.

#### Remarks

Chen and Christiansen (1997) have offered a good deal of evidence to support the hypothesis that the species generally identified as Sinella (Coecobrya) caeca is in fact tenebricosa and not Schött's caeca. A detailed description of the species is available in that work. While some recent collections from California place doubt in the sharp distinction seen in this study, it still is clear that there is one apparent ~~tramp~~ species and that it is quite constant in characteristics and does not match the original description and figures of Sinella caeca. Thus, we maintain the name tenebricosa for the specimens we have found throughout most of North American (and much of the rest of the world) and leave the question of the true identity of Sinella caeca to be resolved by further study.

Localities: Found throughout the United States and Southern Canada, primarily in caves and protected areas such as greenhouses.

#### FIGURE 743

Sinella (Coecobrya) tenebricosa

- A) Habitus, after Gisin.
- B) Dorsal macrochaetae and bothriotracha, left half of third thoracic through third abdominal segments, specimen from Iowa culture.
- C) Hind foot complex, after Goto, 1953.
- D) Differentiated seta of labial appendage, specimen from Iowa.
- E) "Smooth" and ciliated large setae from inner tibiotarsus, specimen from Missouri greenhouse.
- F) Male genital plate, specimen from Iowa greenhouse.
- G) Mucro, after Goto, 1953.



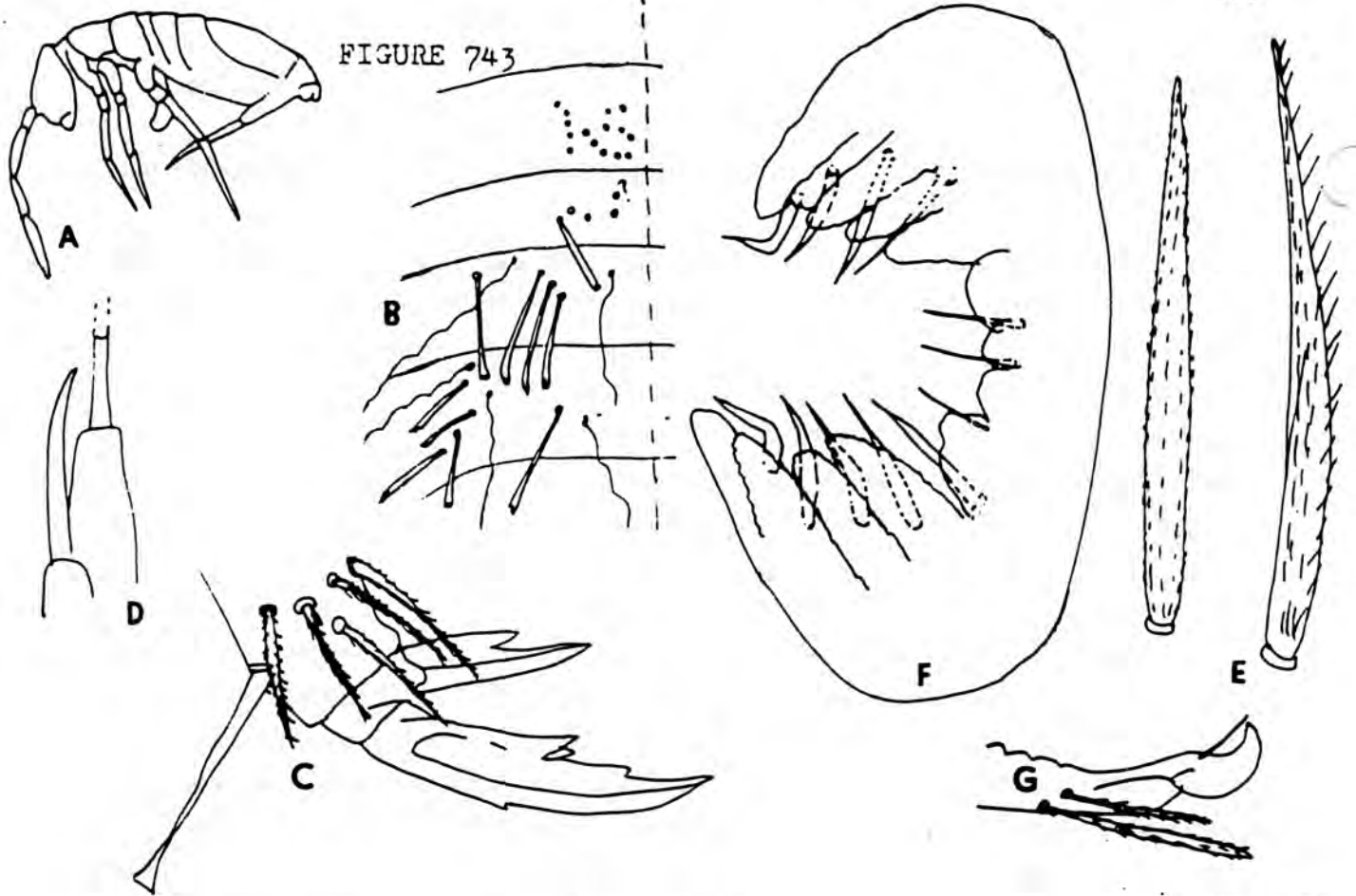


FIGURE 743

Fig. 744

Sinella (Sinella) cavernarum (Packard), 1888

Refs.: Mem. natn. Acad. Sci. 4: 15 (Degeeria); Christiansen, 1960a.

Syn.: lucifuga Folsom, 1902, Psyche, Camb. 9: 365 (Entomobrya).  
Description

Color: usually white, but occasionally with a scattering of reddish pigment granules. Facies as in S. avita. Fourth antennal segment  $1/2$  to  $2/3$  as long as cephalic diagonal, without apical bulb; subapical organ varying from peglike to lamellate. External differentiated seta of labial appendage with apex more or less on a level with apex of same papilla. All labial triangle setae smooth;  $m_2$  and  $r$  about  $1/2$  as long as longest setae. Inner tibiotarsal setae with ciliations which are smaller on heavier setae. Tenent hair usually acuminate but occasionally clavate. Unguis with median tooth occasionally well developed but usually merely the end of a short lamella. Unguiculus acuminate with outer margin usually ciliate or serrate. Ventral tube with 18 - 22 anterior, 9+9 (usually) to 11+11 distal lateral, and 22 - 28 posterior setae. Mucro with apical tooth 2.5 - 3 times as long as anteapical. Maximum length 2.5 mm.

This widespread species shows considerable variation in unguis structure. The presence of a supplementary  $m_1$  seta below the normal one is also common. The relationship of S. cavernarum, S. alata, and S. avita is still not clear; more study may show that the 3 should be united, or that cavernarum should be split into several taxa. This is primarily a cave species, but there are 2 surface records and Folsom's record of lucifuga from graves. The single Illinois surface specimen, and some Missouri cave specimens, apparently have third abdominal segment chaetotaxy like that of S. barri.

Cave localities: Illinois - Hardin Co., Saline Co., Union Co.; Indiana - Clark Co., Crawford Co. (type), Greene Co., Jennings Co., Monroe Co. (?), Washington Co., Wyandotte Co. (?); Kentucky - Barren Co., Breckenridge Co., Carter Co., Christian Co., Crittenden Co., Hardin Co., Hart Co., Henry Co., Larue Co., Livingston Co.; Maryland - Alleghany Co., Garret Co.; Missouri - Franklin Co., Jefferson Co., Washington Co.; Pennsylvania - Huntingdon Co.; Tennessee - Hardin Co., Montgomery Co., Robertson Co.

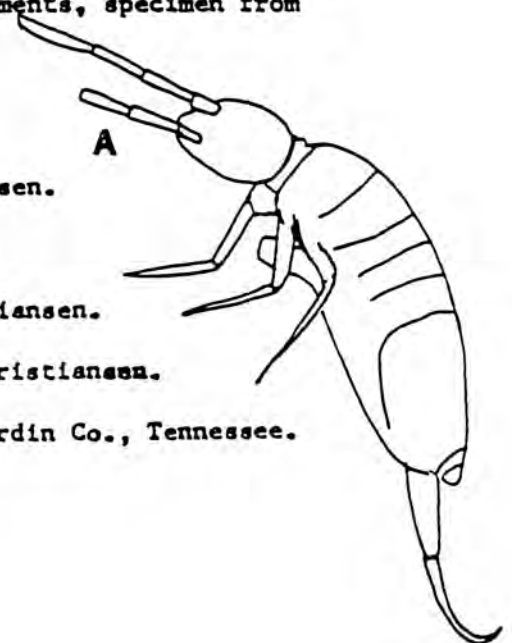
Surface localities: Illinois - Lee Co.; Indiana - Wayne Co.; Kentucky - Jessamine Co.; Pennsylvania - Centre Co.; Washington D.C.

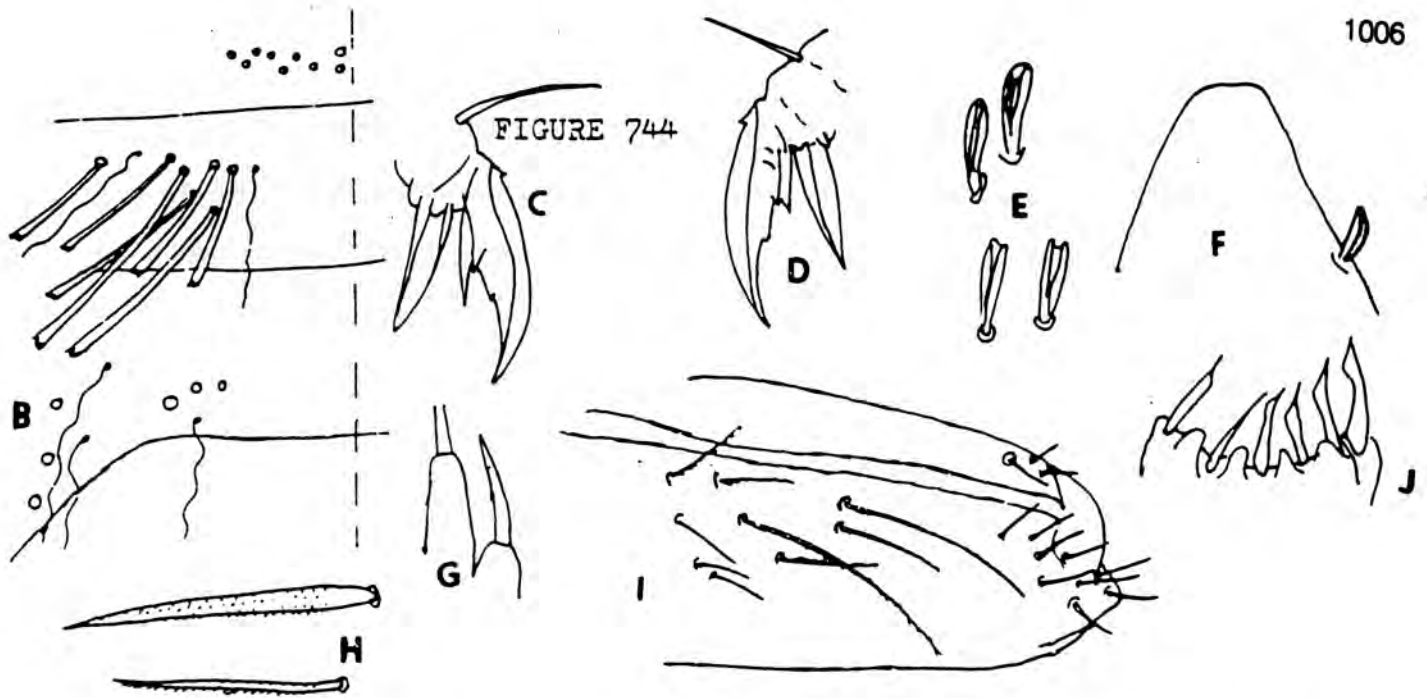
Additional record: Virginia (Bonet, 1934).

Sinella (Sinella) cavernarum

FIGURE 744

- A) Habitus, specimen from cave, Crawford Co., Indiana.  
 B) Dorsal chaetotaxy, left half of first 3 abdominal segments, specimen from cave, Livingston Co., Kentucky.  
 C) & D) Hind foot complexes, after Christiansen.  
 E) Third antennal segment apical organs, after Christiansen.  
 F) Apex of fourth antennal segment, after Christiansen.  
 G) Differentiated seta of labial appendage, after Christiansen.  
 H) "Smooth" and normal inner tibiotarsal setae, after Christiansen.  
 I) Anterior face of ventral tube, specimen from cave, Hardin Co., Tennessee.  
 J) Male genital plate, after Christiansen.





Sinella (Sinella) curviseta Brook, 1882

Fig. 745

Ref.: J. Linn. Soc. Zool. 16:544; Delamare, 1950.

#### Description

Color: white with pigment limited to eyes, to reddish brown on tergites and head; body usually with a scattering of reddish pigment granules. Eyes generally on separate patches. Fourth antennal segment .8 to .9 (rarely .7) times as long as cephalic diagonal; without trace of apical bulb or clearly differentiated subapical organ. Apical half of third antennal segment with many extremely minute blunt setae. External differentiated seta of labial appendage generally exceeding of apex of same papilla by 1/3 to 1/2 of its length. Labial triangle with seta  $m_2$  missing; seta R small but ciliate. Some inner tibiotarsal seta much less coarsely ciliate than others. Tenent hair generally clavate; sometimes acuminate on first pair of legs only. Unguis with apical tooth minute when present. Unguiculus acuminate. Ventral tube with 12 - 14 anterior, 7+7 to 9+9 distal lateral, and 12 - 14 posterior setae. Basal spine of mucro very long, usually attaining apex of apical tooth. Maximum length 2.0 mm.

#### Remarks

The external differentiated seta of the labial appendage shows considerable population variation and may rarely exceed the papilla for only 1/5 of its length. The labial triangle was seen clearly in only 1 population, but was

quite constant therein. The elongate basal spine is a constant and diagnostic feature in Nearctic populations; it is not shown by Brook, but Linnaniemi figures a similar spine in European material and notes that Brook's figures are inaccurate in some respects, so this is almost certainly the same as a common European species and probably the same as Brook's curviseta. The species is unlike other Nearctic forms in the chaetotaxy of the body and labial triangle and the form of the mucro; these differences, combined with its general occurrence in greenhouses and sheltered environments, make it seem likely that it is introduced.

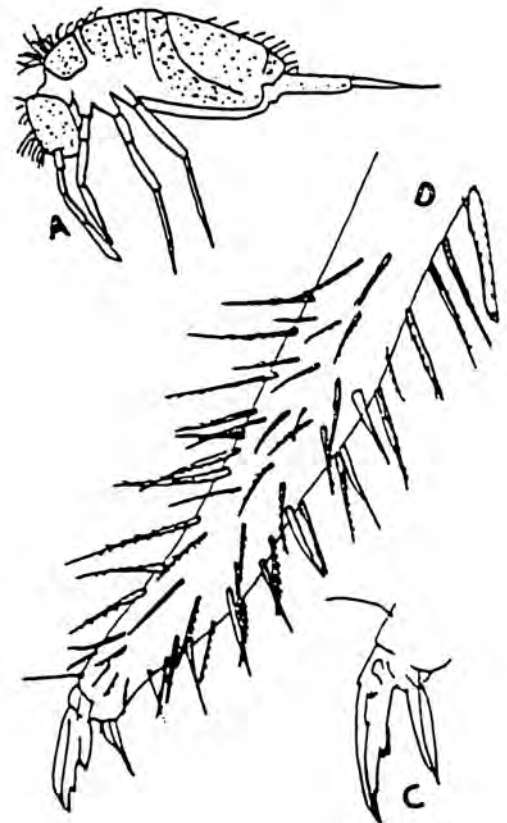
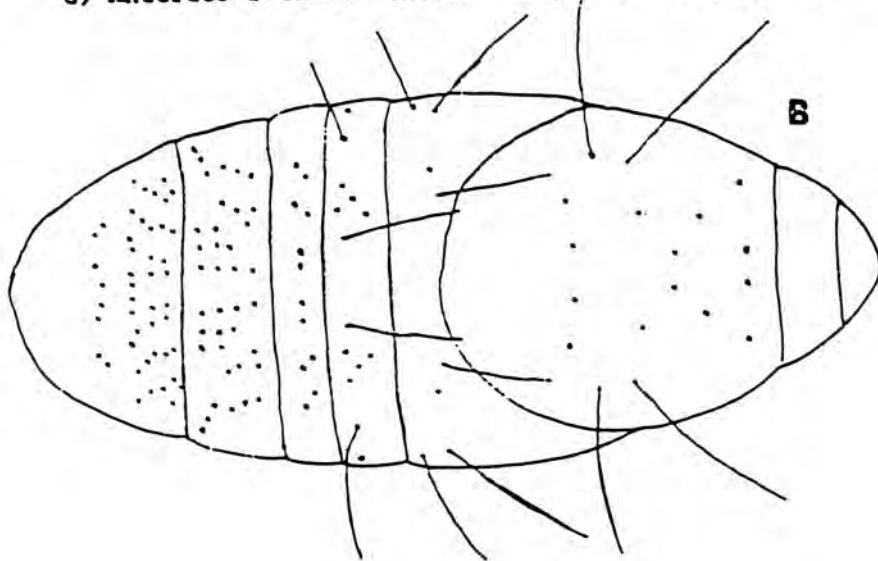
Localities: we have seen samples from greenhouses in Iowa, Kansas, New York, and Pennsylvania.

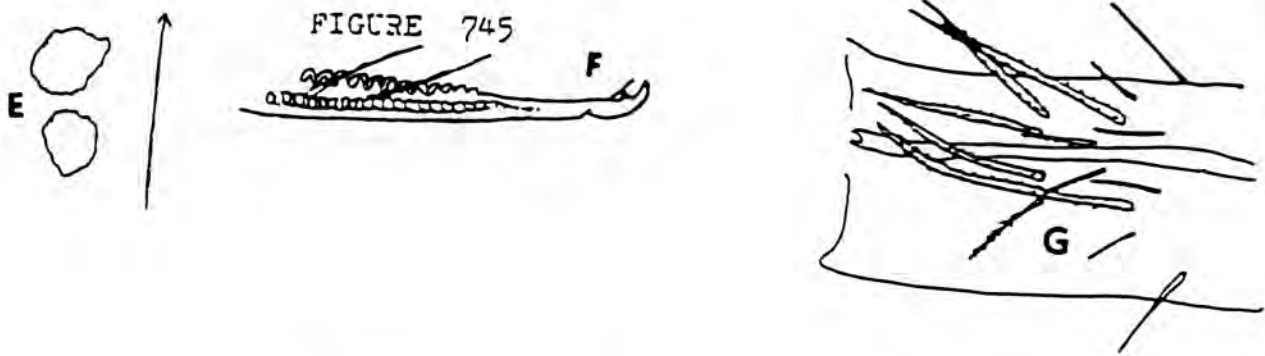
Additional records: California (Bacon, 1914b); Colorado (Wilkey, 1951); Kentucky, cave (Bonet, 1934); Utah (Wray and Knowlton, 1956a); Virginia, cave (Bonet, 1934); Washington (Mills and Rolfs, 1933).

Biology: Waldorf, 1971, 1974; Niijima, 1973; Willson, 1960.

- A) Habitus, after Del: Sinella (Sinella) curviseta  
 B) Dorsal body chaetotaxy, after Yosii, 1956a (slightly modified).  
 C) Fore foot complex, after Delamare.  
 D) Hind tibiotarsus and unguis, after Yosii, 1964.  
 E) Right eyes, after Uchida, 1954.  
 F) End of dens and mucro, after Uchida, 1954.  
 G) Anterior face of ventral tube, after Yosii, 1964.

FIGURE 745





*Sinella (Sinella) hoffmani* Wray, 1952 Fig. 746

Ref.: Bull. Brooklyn ent. Soc. 47:95; Christiansen, 1960a.

### Description

Color: white without trace or pigment. Fourth antennal segment  $3/4$  to  $9/10$  as long as cephalic diagonal; without trace of apical bulb but with subapical organ, an oval slightly expanded peg. Apex of third antennal segment with about 25 slender, poorly differentiated blunt setae ventrally. External differentiated seta of labial appendage just attaining apex of same papilla or distinctly shorter. All labial triangle setae smooth;  $m_2$  and  $r$  about  $1/2$  as long as longest seta; a short supplementary  $m_{1a}$  seta often present. Some inner tibiotarsal setae much less coarsely ciliate than others, appearing smooth under low magnification. Tenent hair acuminate to truncate. Unguis with lateral teeth absent. Unguiculus acuminate with outer edge smooth (externally "fringed", according to Wray). Ventral tube with 27-34 anterior, 7+7 to 10+10 distal lateral, and about 20 posterior setae. Apical mucronal tooth about 3 times as long as anteapical. Maximum length 3.0 mm.

### Remarks

This species is clearly derived from *S. barri*, from which it is usually distinguishable by the structure of the unguis, labial appendage, and chaetotaxy. Since there is some intergradation in all these features, the 2 might be considered geographical variants, but we believe the general level of difference justifies specific separation. The second abdominal segment chaetotaxy is variable; there may be 3 or 4  $m$  setae. One specimen from Hiner Cave Highland Co., VA has 3 inner unguis teeth and keys out to *S. cavernarum*.

Localities: Virginia - Alleghany Co. (type); widely distributed in caves of the Appalachians from Mercer Co., West Virginia, to Somerset Co., Pennsylvania. One surface collection in West Virginia. Maryland - Washington Co., Alleghany Co.

Additional record: North Carolina, surface (Wray, 1967).



- A) Dorsal chaetotaxy of second and third abdominal segments, left side, specimen from Pocahontas Co., West Virginia.
- B) & C) Hind foot complex, after Christiansen.
- D) Labial triangle setae, left side, same specimen as A.
- E) Apex of antenna, after Christiansen.
- F) Apical organs of third antennal segment, after Christiansen.
- G) Differentiated seta of labial appendage, after Christiansen.
- H) "Smooth" and normal seta of inner tibiotarsus, after Christiansen.
- I) Mucro, after Christiansen.
- J) Male genital plate, after Christiansen.

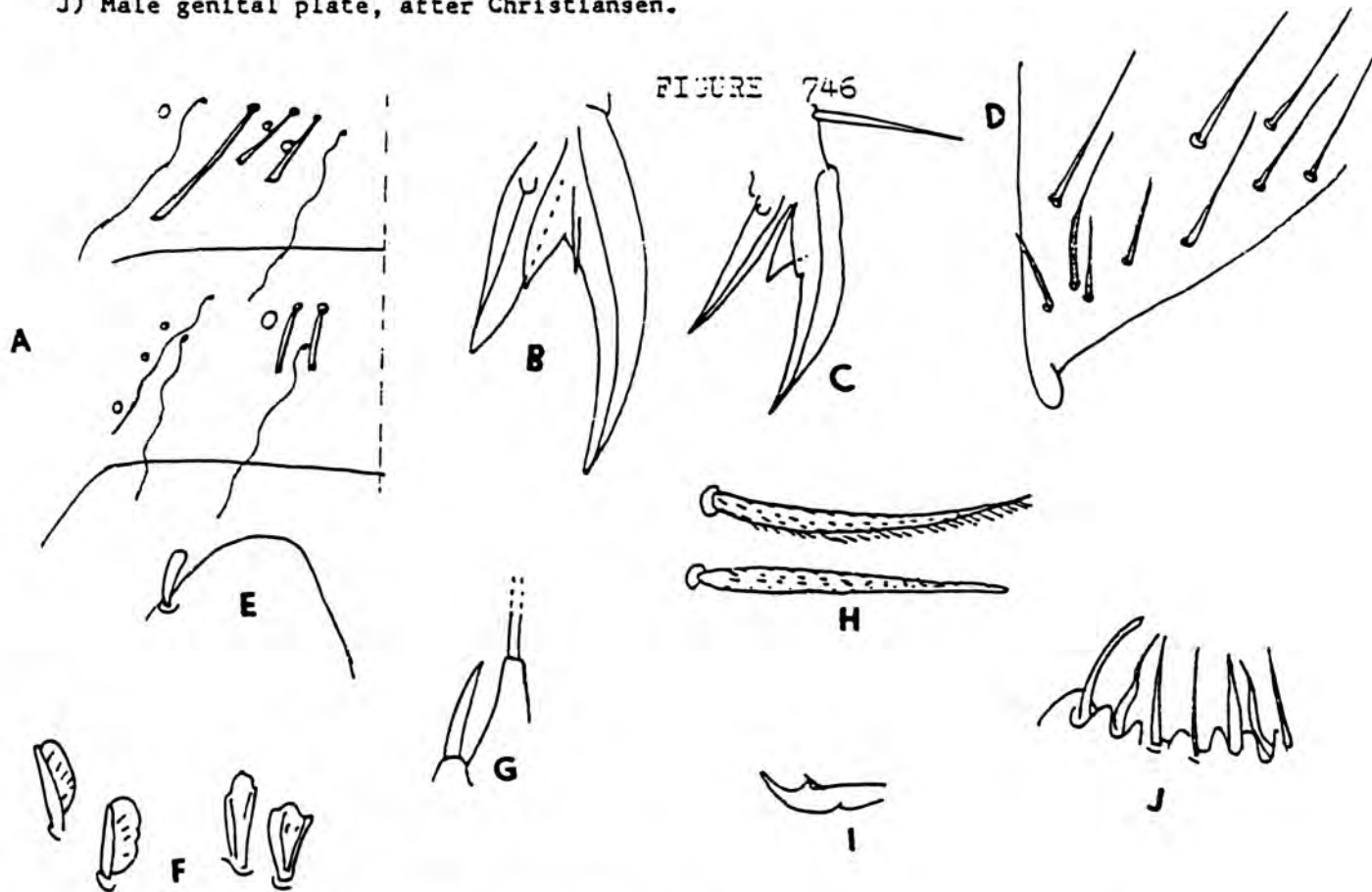


FIGURE 746

Sinella (Sinella) krekeleeri Christiansen, 1960

Fig. 747

Ref.: Ann. ent. Soc. Am. 53:490.

Description

Color: white without trace of pigment. Fourth antennal segment usually 1.3 - 2.2 times as long as cephalic diagonal, without apical bulb, with a well developed single or (rarely) forked pin seta and a subapical organ varying from a simple peg to an oval knob. Apex of third antennal segment with about 8

slender blunt setae ventrally. Second antennal segment generally equal to or slightly shorter than cephalic diagonal. External differentiated seta of labial appendage barely exceeding apex of same papilla. All labial triangle setae smooth;  $m_2$  and  $r$  variable in position and  $1/2$  to  $2/3$  as long as longest seta; a supplementary  $m_1$  seta occasionally present below the normal one. Some inner tibiotarsal setae clearly less coarsely ciliate than others. Tenent hairs short and acuminate. Unguis with small basal and lateral teeth. Unguiculus more or less swollen basally. Ventral tube extremely variable in chaetotaxy. Maximum length 4.0 mm.

Remarks

This species is superficially similar to agna, but can easily be distinguished by the chaetotaxy. The ventral tube setae vary from a condition similar to cavernarum in small specimens to one like basidens in large ones; S. krekeri resembles the latter species in other respects also (see remarks under basidens). This species is limited to caves of east central Kentucky; earlier records from other localities were in error.

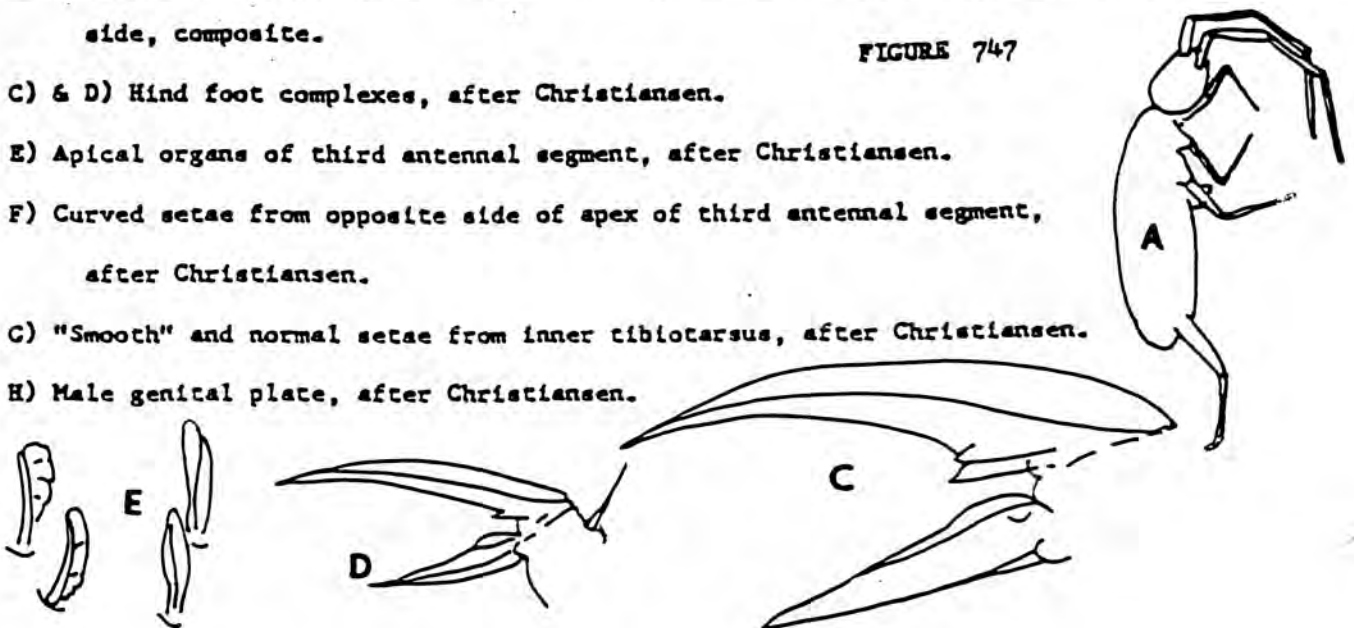
Localities: Kentucky - Jackson Co. (type), Lee Co., Powell Co., Rockcastle Co. Known only from caves.

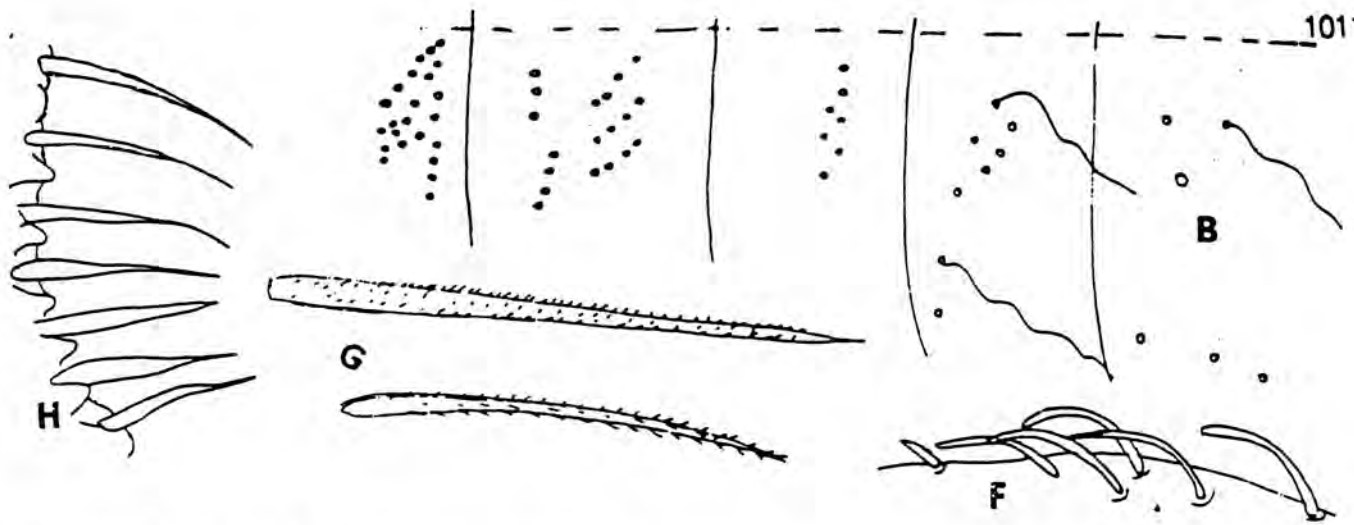
Biology: Christiansen, 1970.

Sinella (Sinella) krekeri

- A) Habitus, after Christiansen.
- B) Dorsal chaetotaxy, second thoracic through third abdominal segments, left side, composite.
- C) & D) Hind foot complexes, after Christiansen.
- E) Apical organs of third antennal segment, after Christiansen.
- F) Curved setae from opposite side of apex of third antennal segment, after Christiansen.
- G) "Smooth" and normal setae from inner tibiotarsus, after Christiansen.
- H) Male genital plate, after Christiansen.

FIGURE 747





Sinella (Sinella) quadrioculata Mills, 1935

Fig. 748

Ref.: Bull. Brooklyn ent. Soc. 30:137.

Description

Color: background white or yellowish; blue pigment limited to eyes or (more commonly) scattered over body. Eyes contiguous or nearly so. Fourth antennal segment  $2/3$  to  $3/4$  as long as cephalic diagonal; apex with vestige of retractile bulb, generally in the form of a low knob; no clear subapical organ. Sensilla of third antennal segment sense organ peglike. External differentiated seta of labial appendage exceeding apex of same papilla by  $1/4$  to  $1/2$  of its length. All labial triangle setae smooth;  $m_2$  and  $r$  about half as long as longest seta. Some inner tibiotarsal setae very finely ciliate, contrasting sharply with more coarsely ciliate ordinary setae. Tenent hair very long and strongly clavate. Unguis with subequal inner teeth. Unguiculus acuminate. Ventral tube with about 8+8 distal lateral setae. Mucro with apical tooth about twice as long as ante-apical. Maximum length 2.0 mm.

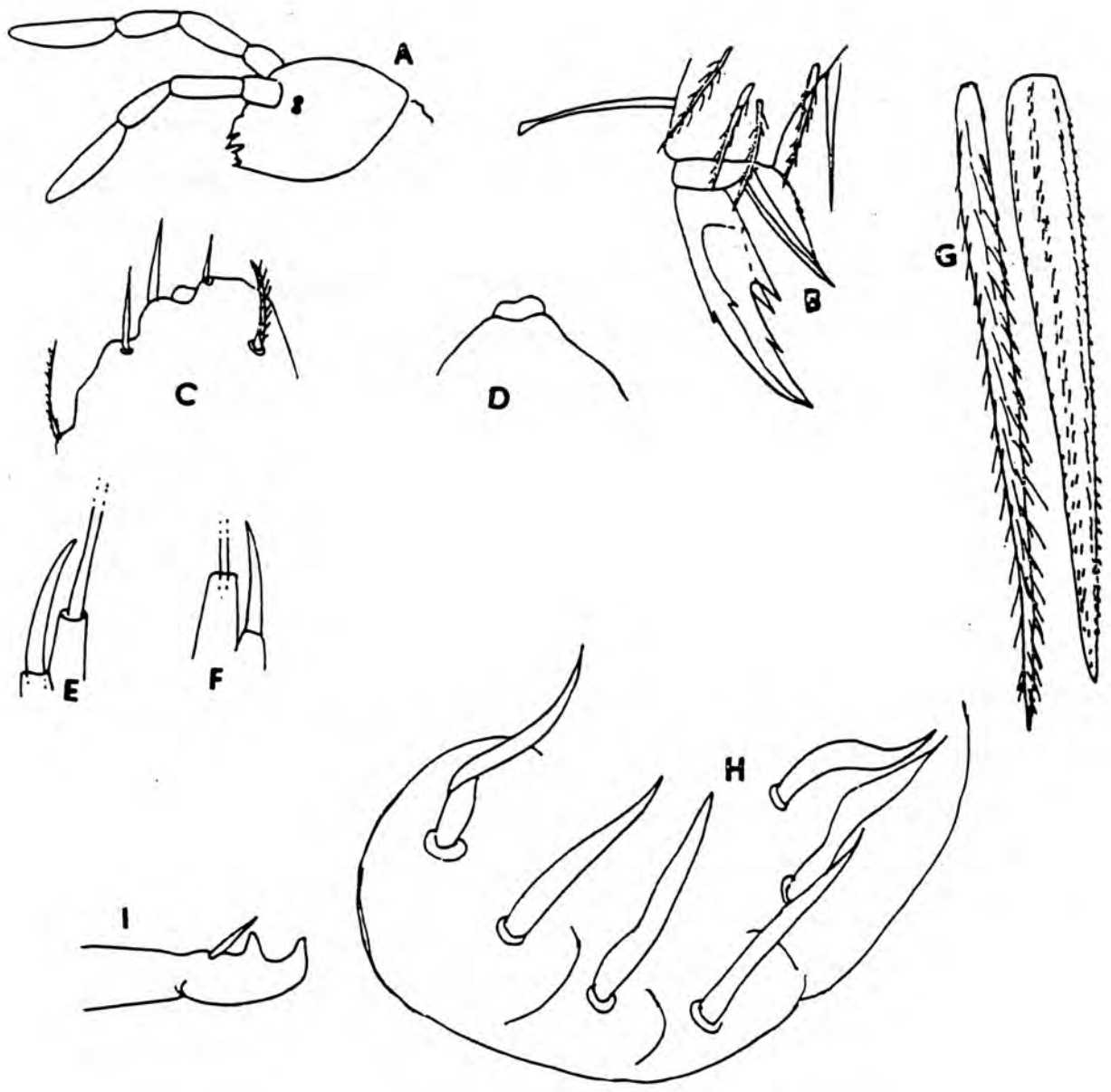
Remarks

Seta  $A_2$  of the third abdominal segment occasionally appeared to be absent, but only on specimens with the chaetotaxy obscure. The eyes are quite variable in position and number; in 1 specimen the second eye was below the first on 1 side and behind the first on the other. The number may vary from 1 to 3 on each side, but none were seen with 1+1 eyes, and at least some, and generally all, members of each population studied had 2+2; however, the approach to S. binocularata in this feature and others suggests that the 2 may be part of the same taxon (see discussion under S. binocularata). A single specimen had labial triangle seta  $M_2$  ciliate on 1 side.

Localities: California - Calaveras Co. (cave), Los Angeles Co., San Luis Obispo Co.; Washington - Tampico (type), Yakima Co.

- A) Head seen from side, after Mills
- B) Hind foot complex, after Mills.
- C) & D) Antennal apices, type specimens.
- E) & F) Differentiated setae of labial appendages, type specimens.
- G) "Smooth" and normal setae of inner tibia-tarsus, specimen from Los Angeles Co., California.
- H) Left half of male genital plate, same specimen.
- I) Mucro, type specimen.

FIGURE 748



***Sinella (Sinella) recens*** n. sp.

Fig. 748.1

**Description**

Color: white except for dark eye spots and a scattering of blue pigment granules, most commonly present on the dorsum of the head and the antennae. Eyes 1+1 - 3 +3, in the latter case on two separate dark patches. Maximum length 1.74 mm. Antennae 1.82 - 2.0  $\times$  cephalic diagonal. Ant. III organ with seta 1 a curved blunt slender rod = 5 micra; setae 2 & 3 oval, slightly expanded; setae 4 & 5 curved, slender, blunt, similar to 1 with 5 slightly shorter than 4; setae 6 & 7 slender and acuminate, with 7 longer than 6 and both distinctly longer than 4; seta 8 longer than these and slightly thicker; seta 9 = 11 micra, cylindrical, curved and blunt. External differentiated seta of labial appendage distinctly thicker than other setae, exceeding apex of same papilla by .5 -.55 length. Two forms of labial triangle. The first (seen only in males) has seta r of labial triangle ciliate and = 1/2 as long as M<sub>1</sub> and no M<sub>2</sub>. The second (found in all females) has M<sub>2</sub> and r = 1/2 as long as M<sub>1</sub>. In both types all setae except r in type 1 are "striate" (i.e. with closely appressed ciliations). Mental setae X<sub>3</sub>, X, H<sub>2</sub> H<sub>1</sub> and I<sub>1</sub> smooth in 2 females (form 1), ciliate in all others (form 2). Fourth abdominal segment with 9 to 11 lateral macrochaetae per side. Trochanteral organ with 5-8 setae in arms, 1-4 internal setae and 1-2 external setae. Inner tibiotarsal setae all similarly ciliate; hind tibiotarsus with two inner acuminate setae larger but otherwise undifferentiated from the other setae, at about 1/4 and somewhat more than 1/3 of its length. Four clear inner unguual teeth, none very large. The basal pair similar and median unpaired tooth slightly larger to slightly smaller than these. Unguiculus acuminate with finely serrate outer margin. Tenent hair broad and strongly clavate. Ventral tube with 3-4 macrochaetae, and 6-8 meso- and microchaetae per side on anterior face, all ciliate; distolateral patch with 6 smooth setae. Manubrial plaque with 2 inner and 1-2 outer setae. Uncrenulate dens 6 - 7 (4) X as long as mucro. Basal mucronal spine just reaching median tooth.

**Locality**

**Types:** Holotype 1♀, 3♂ and 6♀ mounted paratypes and 21 alcoholic paratypes, California: Santa Cruz Island, mixed pine forest, leaf litter, August 17 1985 Blaine Hébert coll. Locality no. 6618. Known only from type locality.

**Derivatio nominis:** From the Latin *recens* = new.

**Remarks**

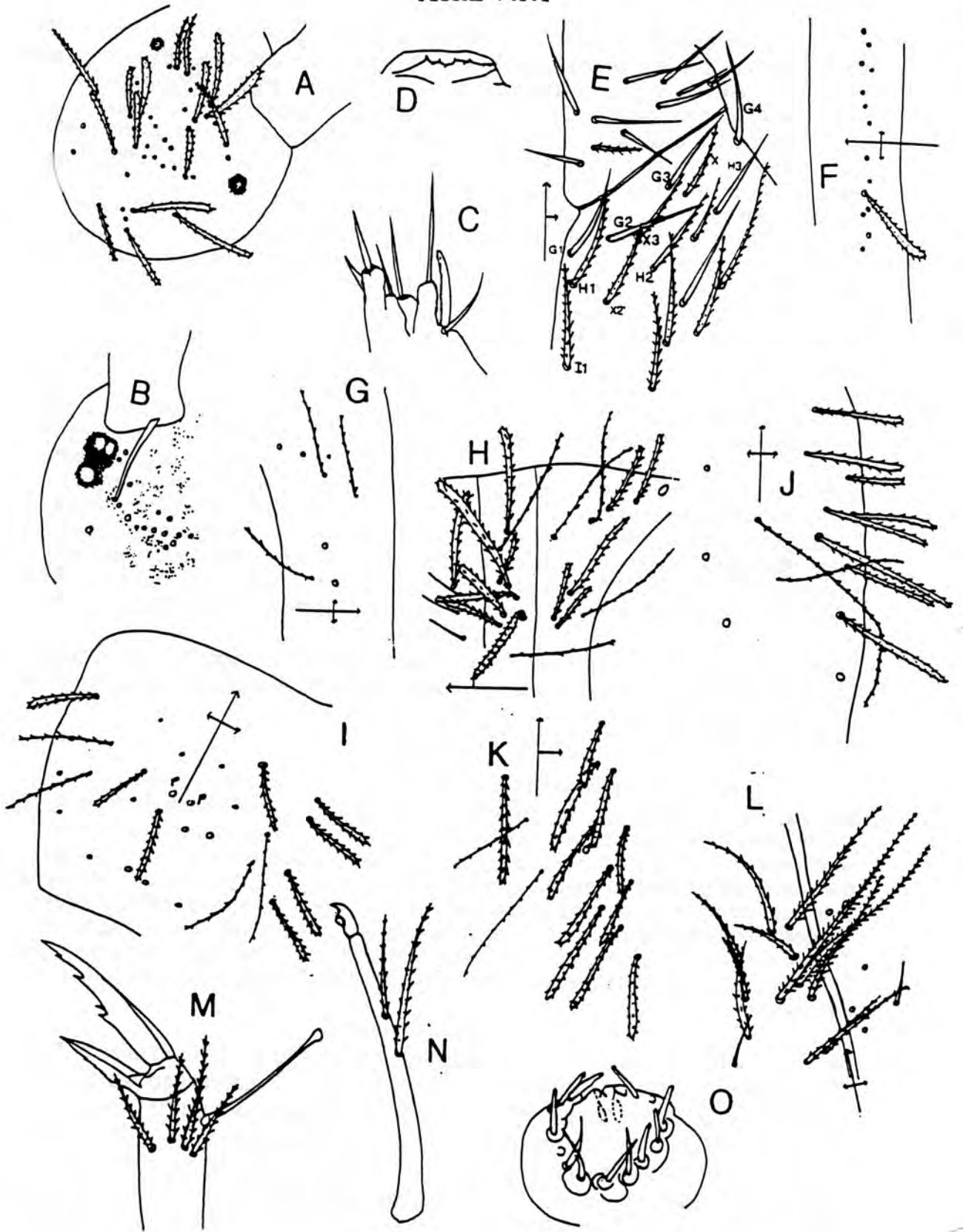
The presence of a large 4th inner unguual tooth distinguishes *S. recens* from *S. barri*, *curviseta*, and *quadrioculata*. It is distinguished from the Chilean *S. hexophthalma* by the clavate tenent hair and more basal position of the basal unguual teeth. This species is very closely related to *S. tecta*. It is clearly differentiated from that species by the lack of the prolonged median unpaired unguual tooth, the presence of a normal 3rd antennal segment sense organ (see remarks for *S. tecta*), the lack of differentiated "smooth" inner tibiotarsal setae, and chaetotaxy features as well as the smaller size. The eyes have poorly developed corneae, so that cleared specimens appear eyeless. This species is remarkable in the chaetotaxy polymorphism and apparent sexual dimorphism.

**Legend to figures**

All figures of type specimens. A) Cephalic chaetotaxy and eyes, ♂; B) eyes of another ♂ specimen; C) Differentiated seta of labial appendage; D) Labral papillae; E) Mental chaetotaxy type 2; F) Macrochaetae, of 1st abdominal segment ♀; G) Dorsal chaetotaxy, left side 3rd abdominal segment ♀; H) Dorsal chaetotaxy, right side 2nd and 3rd abdominal segments of ♂; I) Dorsal median chaetotaxy, 4th abdominal segment ♂; J) & K) lateral 4th abdominal chaetotaxy, different specimens; L) Anterior face ventral tube; M) Fore foot complex; N) End of dens and mucro; O) ♂ genital plate.



FIGURE 748.1



Ref.: Proc. Calif. Acad. Sci. (2)6:180 (Entomobrya).

Description

Color: background yellowish, usually with pale gray-blue pigment scattered uniformly over body except for anterior segmental margins and scattered pale spots; sometimes white except for eye patches. Eyes usually on a common patch. Fourth antennal segment  $2/3$  to  $3/4$  as long as cephalic diagonal, with vestige of apical retractile papilla as a mass imbedded in the tip or a small apical knob. Sensilla of third antennal segment apical organ peglike. External differentiated seta of labial appendage exceeding apex of same papilla by  $1/7$  to  $1/3$  of its length. Labial triangle with setae  $M_2$  and R ciliate or absent, and variable in position. Tibiotarsus with some inner setae strikingly less coarsely ciliate than most. Tenent hair usually clavate, rarely acuminate. Unguis with inner teeth all subequal or the apical tooth somewhat smaller than others. Unguiculus acuminate. Mucro with apical tooth  $1\ 1/2$  to 2 times as long as antepical. Maximum length 2.0 mm.

Remarks

This species varies more than any other in the labial setae. The eyes are quite constant in number in the samples we examined, but they are sometimes on 2 patches per side instead of 1. The labial triangle setae were seen on only a few specimens, but in all these  $M_2$  and R were ciliate if present. One population from Hollister, California had a supplementary M seta on the second abdominal segment, not seen in any other member of the genus. The Oregon population had a longer tenent hair and lacked an apical antennal bulb.

Localities: California - Calaveras Co. (cave), Contra Costa Co. (type), Fresno Co., San Antonio Canyon, San Benito Co.; Oregon - Malheur Co.; Washington - Pierce Co., Yakima Co.

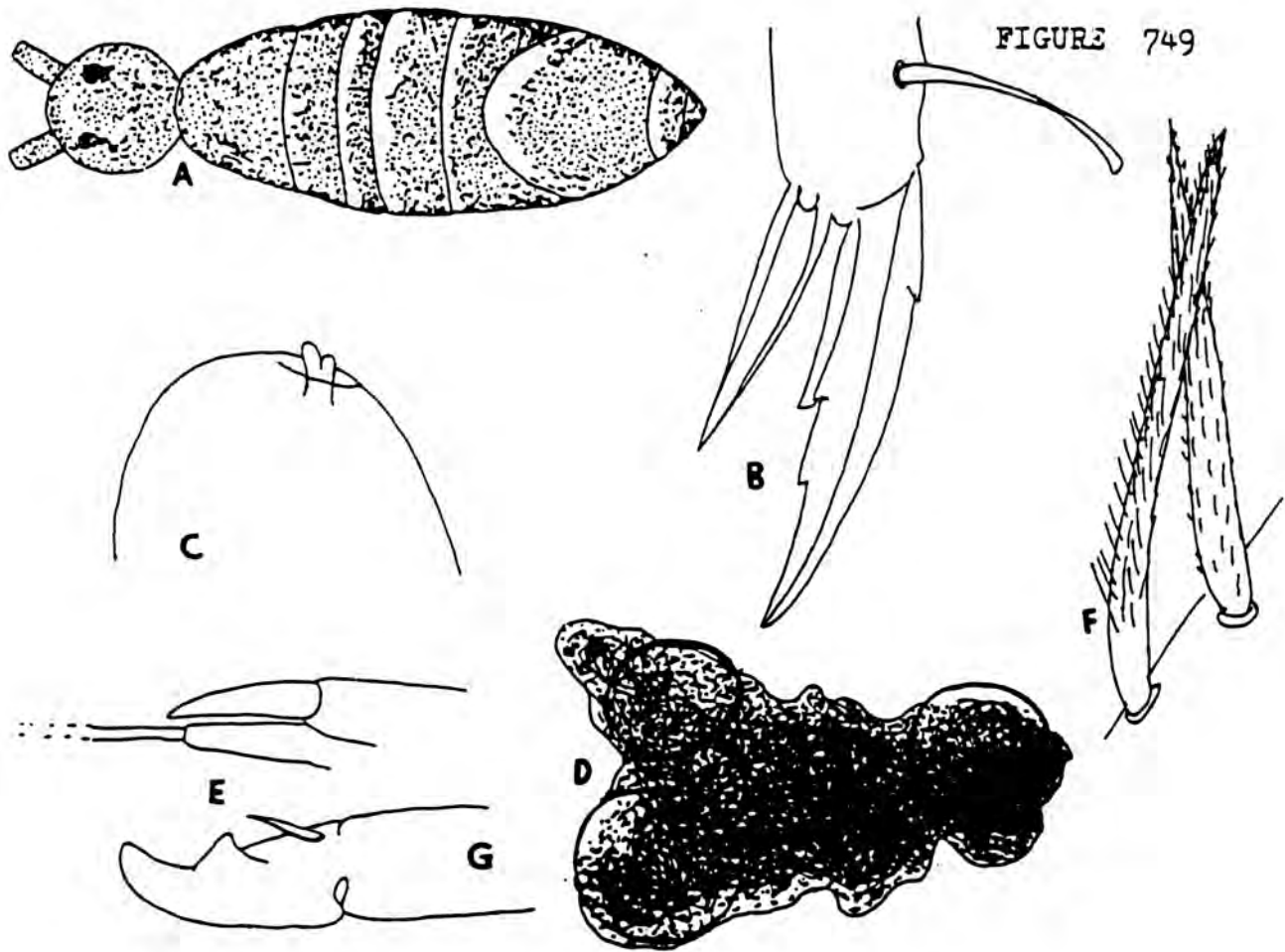
Sinella (Sinella) sexoculata

- A) Schematic pattern, specimen from San Antonio Canyon, California.
- B) Hind foot complex, specimen from Fresno Co., California. FIGURE 749
- C) Apex of antenna, specimen identified as sexoculata by Folsom, locality unknown.
- D) Right eyepatch, same specimen.

E) Differentiated seta or labial appendage, same specimen.

F) "Smooth" and normal inner setae of tibiotarsus, same specimen.

G) Mucro, same specimen.



*Sinella (Sinella) tecta*, Christiansen & Bellinger, 1980

Fig. 750

### Description

Color: white without pigment except for eye when present. Fourth antennal segment .9 - 1.2 times as long as cephalic diagonal, without apical bulb or sub apical pit but with a forked apical pin seta. Apical organ of third antennal segment with 3 weakly paddle-shaped setae. External differentiated seta of labial appendage thicker than normal setae and exceeding apex of same papilla for about 1/3 of its length. Labial triangle with setae  $M_2$  and R well developed and ciliate. Some inner tibiotarsal setae finely striate, in sharp contrast to normal setae. Tenent hair heavy and strongly clavate. Basal unguis small; distal tooth elongate, with apical filament generally reaching apex of unguis. Unguiculus acuminate. Ventral tube with 10+10 - 14+14 distal setae. Apical mucronal tooth about twice as long as subapical tooth. Maximum length 2.2 mm.

## Remarks

Typical specimens of this species are easily recognized by unguis structure. Specimens from the type locality are eyeless, but those from other caves in the area have 1+1 - 3+3 eyes; occasional specimens of these lack the filament of the apical unguis tooth. This species is generally recognized by the elongate apical unpaired inner unguis tooth. Specimens from the type locality lack eyes but those from others have 1-3 eyes per side. A single specimen from Secret Cave lacks an apical unguis tooth and may represent a different species. The apical setae of the third antennal segment is unique and unlike any other species we have ever observed (Fig. D). It is so unusual that we are unable to homologize it with the normal seta types seen both in *Sinella* and *Pseudosinella*.

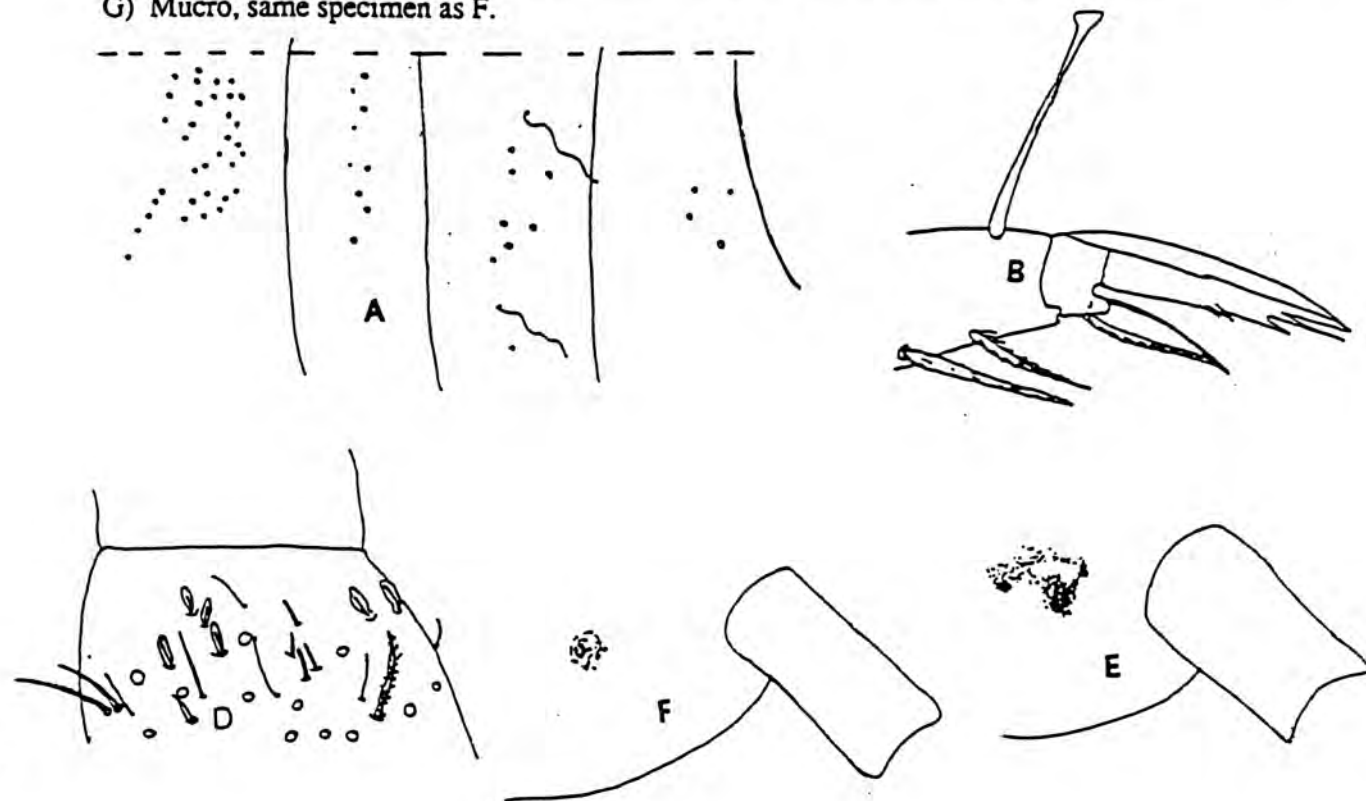
Type locality: Lost Piton Cave, 4 miles SSE of Angels Camp, Calaveras Co., California, 6 May 1977 (A. Grubbs).

Additional localities: California - other caves in Calaveras Co.

FIGURE 750

*Sinella* (*Sinella*) *recta*

- A) Dorsal chaetotaxy of left side of second thoracic through third abdominal segments, type specimen.  
 B) Hind foot complex, type specimen.  
 C) Apex of antenna, type specimen.  
 D) Apical setae of third antennal segment, specimen from Carlos cave.  
 E) & F) Eyes of specimens from two different caves from same county as type specimen.  
 G) Mucro, same specimen as F.



Genus Americabrya Mari Mutt & Palacios-Vargas, 1987

Type species: Americabrya arida (Christiansen & Bellinger, 1981)

We place here all new world entomobryids with the general characteristics of Entomobrya but with narrow, spindle-shaped scales dorsally among the common setae. In our species, these scales are very characteristic in form, with 3-4 longitudinal lamellae ending in sharp projections in the apical 1/5 to 1/3 of the scale.

There is a single Nearctic species: A. arida.

Americabrya arida Christiansen and Bellinger, 1981

Fig. 751

#### Description

Color: ground yellowish; pigment purple, forming transverse bands on the second thoracic and third abdominal segments, an irregular transverse marking on the fourth abdominal segments, diagonal stripes on the fifth and sixth abdominal segments, anterior marginal lines, and a median dorsal line on the third thoracic through third abdominal segments; head with an interantennal band and lateral shading; antennae and legs purple. Head roughly circular. Body oval, circular in cross section. Apical antennal bulb unlobed. Labial papillae rectangular, sharply separated, and coarsely bi- or trisetaceous. External differentiated seta of labial appendage thicker than normal setae and not attaining apex of same papilla. Foot as in Entomobrya; unguiculus externally ciliate. Mucronal teeth subequal. Male genital plate not clearly seen, but with basal setae almost as broad as others; lateral setae slightly larger than anterior setae; all setae straight or weakly curved. Body setae of type 1 expanded for basal 4/5, apically weakly bent and blunt. Setae of type 5 coarsely multilaterally ciliate for apical 7/8 of length. Maximum length 2.1 mm.

#### Remarks

This species resembles E. (Entomobrya) assuta, but differs in the presence of scales; superficially, it may be distinguished by the presence of a middorsal line of pigment.

Type locality: Rustlers Park, Chirichua Mts., Grant Co., Arizona, in bush foliage, 6 August 1958 (K. Christiansen).

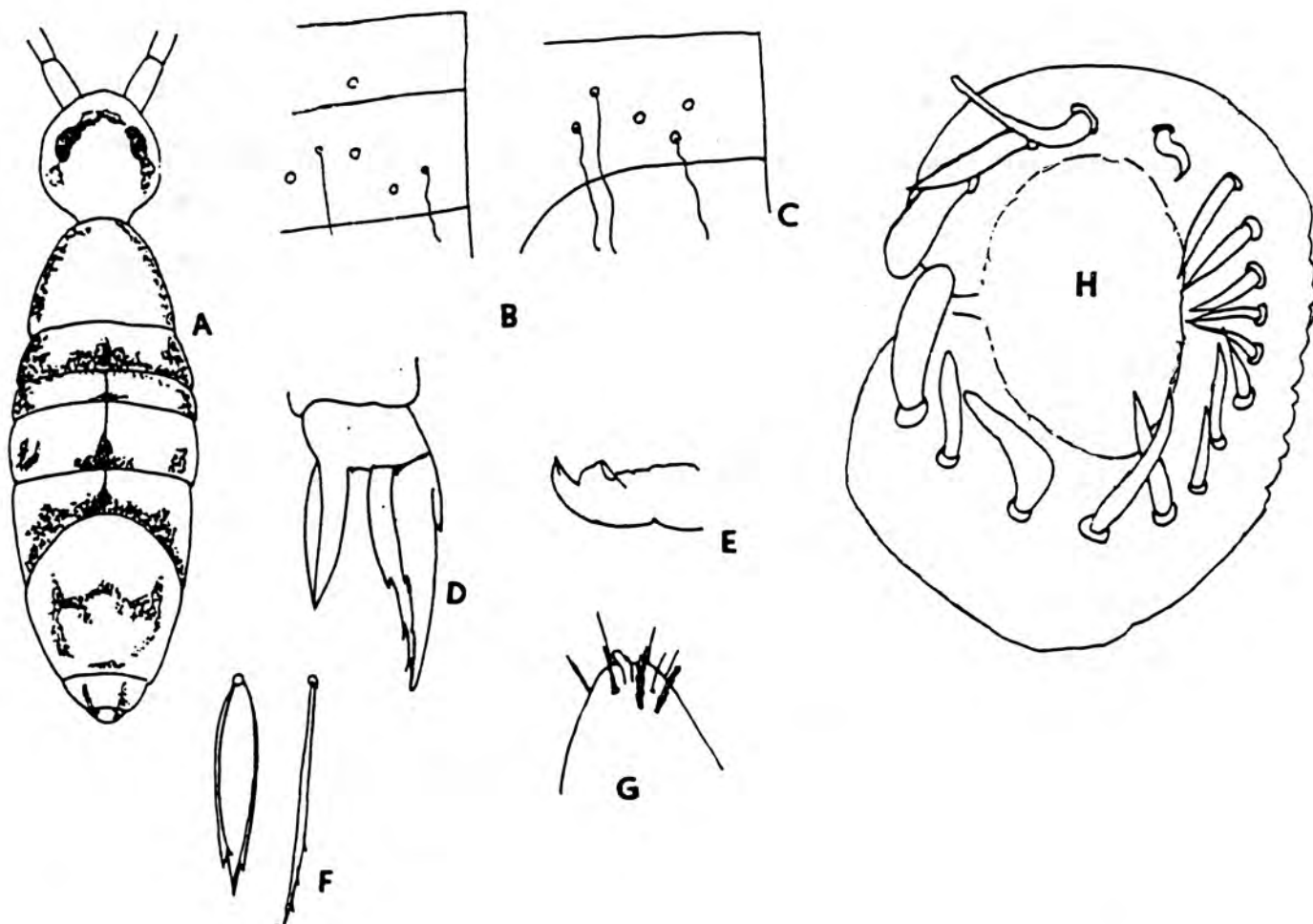
Additional localities: Arizona - Cochise Co.; New Mexico - Los Alamos Co.; Texas - Webb Co.



FIGURE 751

Americabrya arida

- A) Pattern, type specimen.  
 B) Chaetotaxy of first 2 abdominal segments, type specimen.  
 C) Chaetotaxy of third abdominal segment, type specimen.  
 D) Foot complex, type specimen.  
 E) Mucro, type specimen.  
 F) Scale and body seta, type specimen.  
 G) Apex of antennae, type specimen.  
 H) Male genital plate, specimen from Los Alamos Co., New Mexico.



Type species: nigromaculata Lubbock, 1873

We include in this genus all the Nearctic species of Entomobryinae having a bidentate mucro, pointed, strongly striate body scales, and no dental scales. Nearctic species have a well-developed basal spine on the mucro. The foot complex resemble that of Entomobrya. Many of the body setae are similar to short bothriotrichia in shape, and this makes the recognition of the true bothriotrichia difficult.

There are two Nearctic species: 1) buski, 2) nigromaculata.

Key to Nearctic species

- \* 1 ) Body without sharply defined pattern; posterior macrochaetae of second thoracic segment 9+9 ----- W. buski
- \* 1') Body with sharply defined pattern (sometimes reduced to 2 spots on the fourth abdominal segment); posterior macrochaetae of second thoracic segment 7+7 ----- W. nigromaculata

Not included in key:

- americanus Marlatt, 1896 (Lepidocyrtus) = nigromaculata ?
- distincta Maynard, 1951 = buski
- erudita Nicolet, 1842 (Degeeria) record by Wahlgren, 1907, indeterminate
- mimica Harvey, 1894 = nigromaculata
- platani Nicolet, 1842 (Degeeria) extralimital
- pruni Nicolet, 1842 (Degeeria) indeterminate; American records are probably buski

Willowsia buski (Lubbock), 1870

Fig. 752

Ref.: Trans. Linn. Soc. Lond. 27:280 (Seira).

Syn.: ? pruni Nicolet, 1842, Neue Denkschr. allg. schweiz. Ges. ges. Naturw. 6(3):73 (Degeeria) ?; var. "distincta" Maynard, 1951, Collembola of New York: 166.

Color: head yellow to orange except for eyepatches and interantennal band; body purplish blue (rarely yellow), sometimes with irregular pale bands as the anterior margins of the abdominal segments and/or slightly darker bands along the posterior segmental margins. Fourth antennal segment with an obscure, often deeply retracted, unlobed apical bulb. Maximum length 1.5 mm.

## Remarks

This species is most common in man-made structures, but is occasionally recovered from ant nests or other sheltered habitats.

Localities: California - Stanislaus Co.; Connecticut - Hartford Co., New Haven Co.; Maine - Cumberland Co.; Massachusetts - Middlesex Co.; Michigan - Oakland Co.; New York - Essex Co., Saratoga Co.; Washington - Yakima Co. Ontario - London.

Additional records: Colorado (Wilkey, 1951); Illinois (Lussenhop, 1973); Iowa (Mills, 1934); Louisiana (Hepburn & Woodring, 1963); Minnesota (Guthrie, 1903); North Carolina (Wray, 1967); Utah (Wray et al, 1950); Wisconsin (Lussenhop, 1973). British Columbia (Spencer, 1948); Manitoba, Saskatchewan (Mills & Sinha, 1971); Quebec (Matthewman & Pielou, 1971).

A) Habitus, after Gisin, 1960.

Willowsia buski

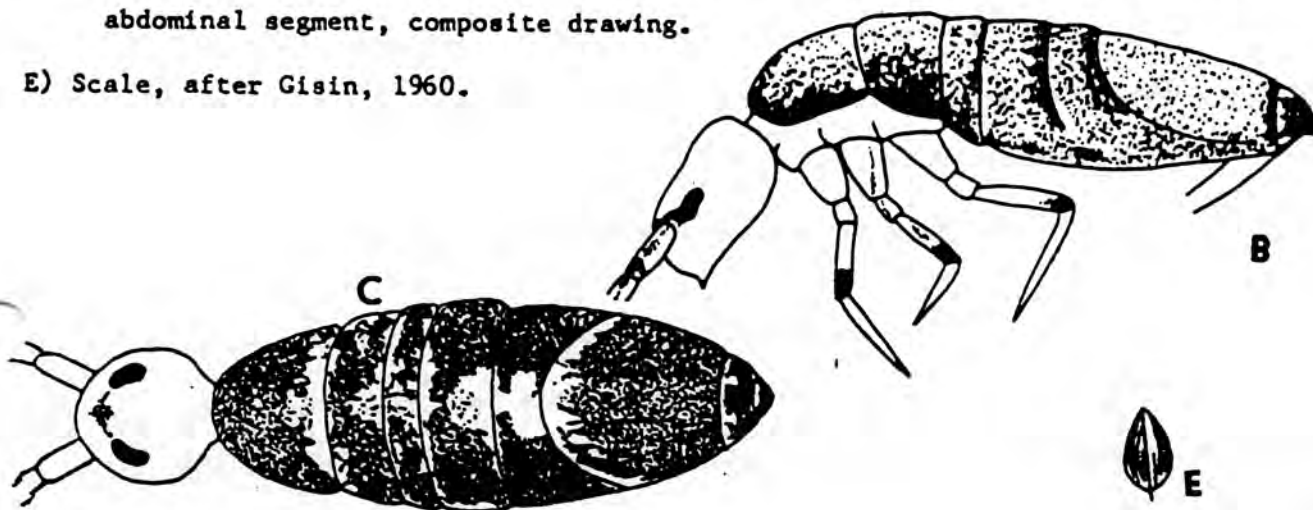
FIGURE 752

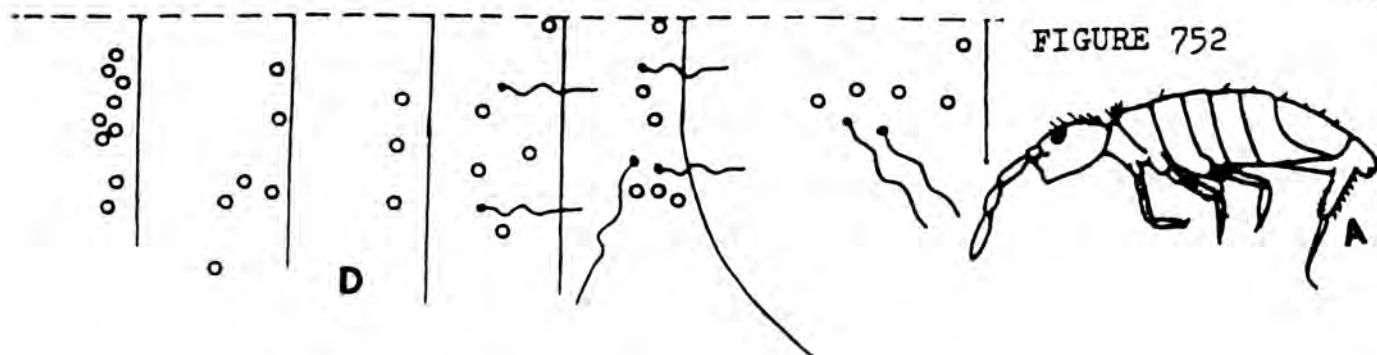
B) Diagrammatic pattern, left side, specimen from Cumberland Co., Me.

C) Diagrammatic pattern, specimen from Yakima Co., Washington.

D) Dorsal macrochaetae, posterior margin of second thoracic segment to fourth abdominal segment, composite drawing.

E) Scale, after Gisin, 1960.





Willowsia nigromaculata (Lubbock), 1873

Fig. 753

Ref.: Monograph of the Collembola & Thysanura: 146 (Seira).

Syn.: mimica Harvey, 1894, Psyche, Camb. 7:159 (Seira); platani of American authors, not Nicolet, 1842.

Description

Color: white background with blue pigment forming an interantennal band, lateral stripes on the head and body, and dorsolateral spots and/or transverse bands on some abdominal segments, as in figures; in pale forms pigment may be restricted to the eye patches and spots on the fourth abdominal segment. Fourth antennal segment with a well-developed, lobed apical bulb. Maximum length 2.0 mm.

Remarks

This form is sometimes regarded as a variety of W. platani Nicolet, which typically has broad dark bands on the second thoracic segment and some abdominal segments. We follow Gisin and Stach, 1967 in maintaining nigromaculata as a distinct species, particularly in view of the fact that we have seen no specimens, or records of specimens, as heavily marked as European platani. The chaetotaxy of the latter has not been described, and might be useful as an indication of the status of the two types. The chaetotaxy of Nearctic specimens we have examined is very consistent, except for one specimen from a Texas cave which has a different arrangement on the third abdominal segment. This species is the commonest house springtail in North America, and has also been found in shallow caves and cave entrances; because of its abundance in laboratories, it is a common contaminant in samples, and records from other habitats are therefore suspect.

Localities: Iowa - Jackson Co., Poweshiek Co., Story Co.; Louisiana - Orleans Par.; Maine - Penobscot Co.; Massachusetts - Barnstable Co., Middlesex Co.; New Hampshire - Coos Co.; New Jersey - Union Co.; Texas - Val Verde Co. (?); Vermont - Chittenden Co.; Washington. D.C.

Additional records: California (Wilkey, 1959); Colorado (Wilkey, 1951); Connecticut (Bellinger, 1954); Idaho (Wray & Knowlton, 1956); Indiana (Yosii, 1956); Louisiana (Hepburn & Woodring, 1963); Michigan (Snider, 1967); Minnesota (Guthrie, 1903); New York (Maynard, 1951); North Carolina (Wray, 1967); South Carolina (Du Rant, 1966); Tennessee (Copeland, 1960); Utah (Wray et al, 1950); Wisconsin (Lussenhop, 1973). Labrador (Hammer, 1953); Ontario (James, 1933); Quebec (Marshall, 1967).

Willowsia nigromaculata

A) Habitus, after Maynard, 1951.

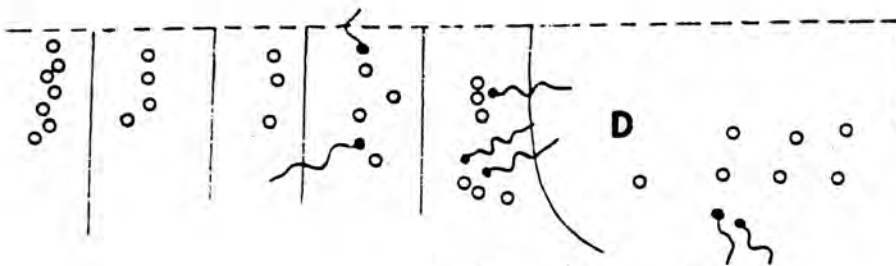
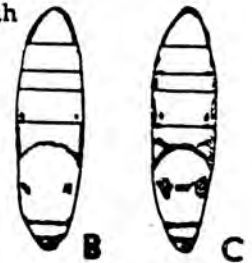
FIGURE 753



B) & C) Body patterns, after Handschin, 1926.

D) Dorsal macrochaetae, posterior margin of second segment through fourth abdominal segment, left side, specimen from Washington, D. C.

E) Body scale, specimen from Poweshiek Co., Iowa.



Seira Lubbock, 1869

Type species: Degeeria domestica Nicolet, 1842

Syn.: Sira Tullberg, 1872 (type domestica Nicolet); Pseudosira Schött, 1893 (type elegans Schött, 1893); Lepidocyrtinus Börner, 1903 (type annulicornis Börner, 1903); Drepanocyrtus Handschin, 1924 (type reichenspergeri Handschin, 1924).

We include in this genus all the Nearctic species of scaled Entomobryinae with dental scales and a unidentate mucro; these species are similar to Lepidocyrtus except for the absence of the anteapical tooth and basal spine of the mucro and a tendency for annulation of the fourth antennal segment. Nearctic species lack blunt modified setae on the dens and therefore appear to fall in



Seira s.str. as defined by Yosii, 1959

The chaetotaxy is clear and simple and allows for easy identification. The genus is well-developed in Latin America, and some or all of the Nearctic species may prove to be synonyms of more southern species when the chaetaxy of the latter has been studied.

There are 6 Nearctic species: 1) bipunctata, 2) cryptica, 3) distincta, 4) dubia, 5) knowltoni, 6) reinhardi.

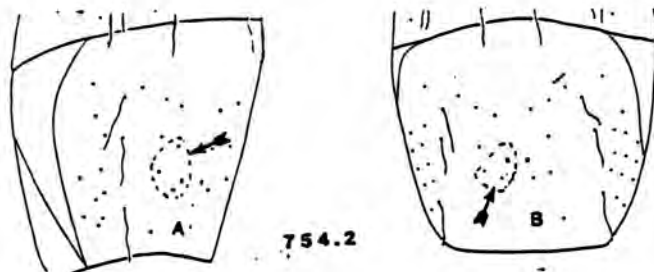
### Key to Nearctic Species of Seira

- 1) Dorsum of first abdominal segment with 2+2 to 4+4 macrochaetae in a straight line -----2  
 1') Dorsum of first abdominal segment with 5+5 or more setae not in a row -----4  
 2) Dorsum of first abdominal segment with 4+4 macrochaetae (Fig. 754.1A) ----S. bipunctata  
 2') Dorsum of first abdominal segment with 2+2 macrochaetae (Fig. 754.1B) -----3



754.1

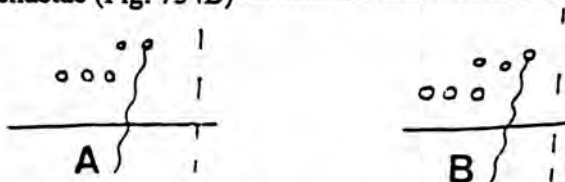
- 3) Fourth abdominal segment with 3+3 median macrochaetae (Fig. 754.2A) -----  
 -----S. cryptica Mari-Mutt 1987  
 3') Fourth abdominal segment with 2+2 median dorsal macrochaetae (Fig. 754.2B) -----  
 -----S. distincta Mari-Mutt 1986



754.2

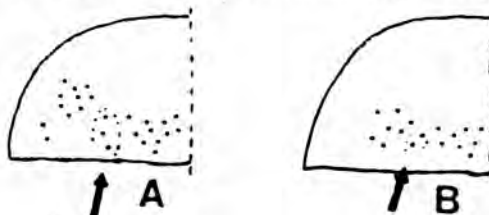
- 4) Transverse band on third abdominal segment contrastingly darker than other dorsal markings; second abdominal segment with 4+4 submedian macrochaetae (Fig. 754A) ----  
 -----S. knowltoni  
 4') Transverse band on third abdominal segment incomplete or not contrastingly darker than other dorsal markings, or without pigment; second abdominal segment with 5+5 submedian macrochaetae (Fig. 754B) -----5

754



- 5) Second thoracic segment with 2 intermediate macrochaetae (Fig. 755B) -----S. reinhardi  
 5') Second thoracic segment with 3 intermediate macrochaetae (Fig. 755A) -----S. dubia

755



<u>annulicornuta</u> Scott, 1963 ( <u>Drepanura</u> )	may belong here but unplaceable without types
<u>colorata</u> Denis, 1931 ( <u>Lepidocyrtinus</u> )	Nearctic records are probably <u>bipunctata</u>
<u>domestica</u> Nicolet, 1842 ( <u>Degeeria</u> )	Nearctic records are probably <u>bipunctata</u>
<u>incolorata</u> Wahlgren, 1906 ( <u>Lepidocyrtus</u> )	no valid Nearctic records
<u>mexicana</u> Folsom, 1898	no valid Nearctic records
<u>purpurea</u> Schött, 1891 ( <u>Sira</u> )	type lost; unplaceable; not certainly Nearctic
<u>squamoorata</u> Stscherbakow, 1898 ( <u>Mesira</u> )	no valid Nearctic records
<u>steinmetzi</u> Wray, 1953 ( <u>Drepanocyrtus</u> )	unplaceable without types

Seira bipunctata (Packard), 1873,

Fig. 756

Ref.: Rep. Peabody Acad. Sci. 5:37 (Lepidocyrtus).

#### Description

Color: purple or blue pigment variously distributed (see figures) on white background, but generally in patches along lateral margins of segments. Fourth antennal segment with bilobed apical bulb; without clear annulations. Third antennal segment .55 to .75 as long as fourth. First 2 antennal segments and basal half of third scaled. Longest inner tibiotarsal setae of hind leg about twice as long as inner edge of unguis. Unguis with median inner tooth slightly longer than apical tooth. Ventral tube with 12+12 to 15+15 distal setae. Body scales moderately ciliate and hyaline to brownish yellow. Maximum length 2.5 mm.

#### Remarks

Most of the Florida and California specimens differ from the others in having 2+2 or 3+3 macrochaetae on the first abdominal segment. The pigmentation also varies greatly from 1 locality to another. The overall similarity of these forms is sufficient that we feel it best to place them all in one taxon. This is probably the form identified by Maynard as domestica f. "colorata", and may be the same as packardi Schött or mexicana Folsom; however, the pattern described as typical for these species was not seen on any of the samples we examined.

Localities: California - Merced Co., Sacramento Co., Tehama Co.; Florida - Dade Co., Monroe Co.; Louisiana - Ouachita Par.; Nebraska - Thomas Co.; New Mexico - Eddy Co. (cave); Texas - McLennan Co. (type).

A) - C) Diagrammatic representations of patterns.

A) Type specimen.

B) Specimen from Monroe Co., Florida.

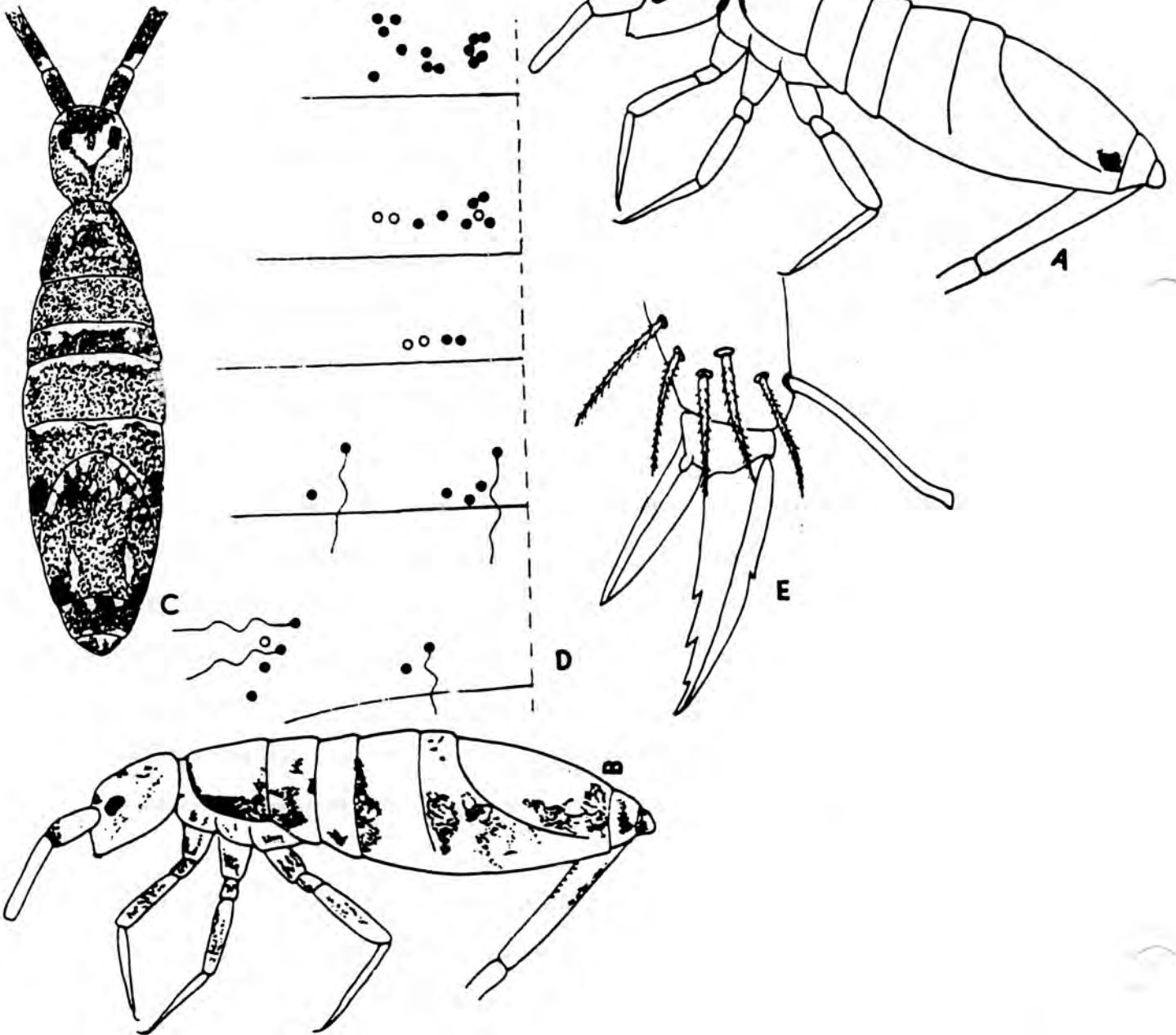
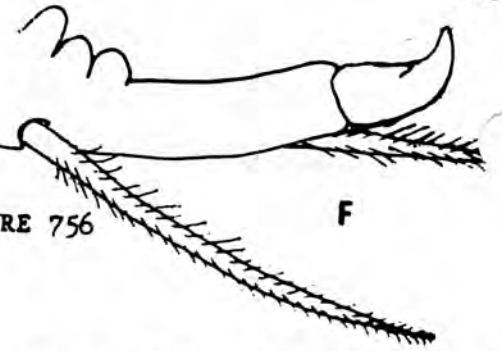
C) Specimen from Thomas Co., Nebraska.

D) Dorsal macrochaetae, posterior margin of second thoracic through third abdominal segment, left side (hollow circles represent setae sometimes absent).

E) Hind foot complex, specimen from Monroe Co., Florida.

F) Mucro, same specimen.

FIGURE 756



### Description

Color: white, with blue pigment forming broad transverse bands, especially on abdominal segments 1-3 and the posterior 3/4 of abdominal segment 4; pigment sometimes reduced on anterior abdominal segments to spots associated with bothriotracha; lateral edges of thoracic tergites, leg bases, and ventral tube usually blue. Fourth antennal segment with a bilobed apical bulb and weak annulations. Third antennal segment .7-.8 length of fourth. First 3 antennal segments and base of fourth scaled. Eyes A, B, and C distinctly larger than others. Tibiotarsal setae very long; longest inner setae of hind legs over twice as long as inner edge of unguis. Apical and median unguis teeth subequal in length. Unguiculus with or without minute outer basal tooth. Ventral tube with 25+25 - 30+30 distal setae. Scales finely to heavily ciliate and hyaline to pale brown in color. Maximum length 3.5 mm.

### Remarks

This species appears to be quite variable in the extent and distribution of pigment. Some specimens resemble S. frater (Bonet), 1934, but a single specimen of that species which we examined lacked the elongate unguis teeth of dubia. Both S. frater and S. reinhardi (which usually lacks body pigment) differ in chaetotaxy from this species. Types of S. mexicana which we have seen have a somewhat similar chaetotaxy, so far as it can be seen, but S. mexicana appears to differ in having more uniform pigmentation and relatively shorter appendages; the tibiotarsal setae of 1 type specimen were much shorter than in dubia. More recent collections from caves in New Mexico and Texas show considerable variation in the numbers of macrochaetae of the thorax and abdominal segment 1. The posterior macrochaetae of thoracic segment 2 vary from 23-28, the segment 3 from 15-17, and abdominal segment 1 from 8-10 per side.

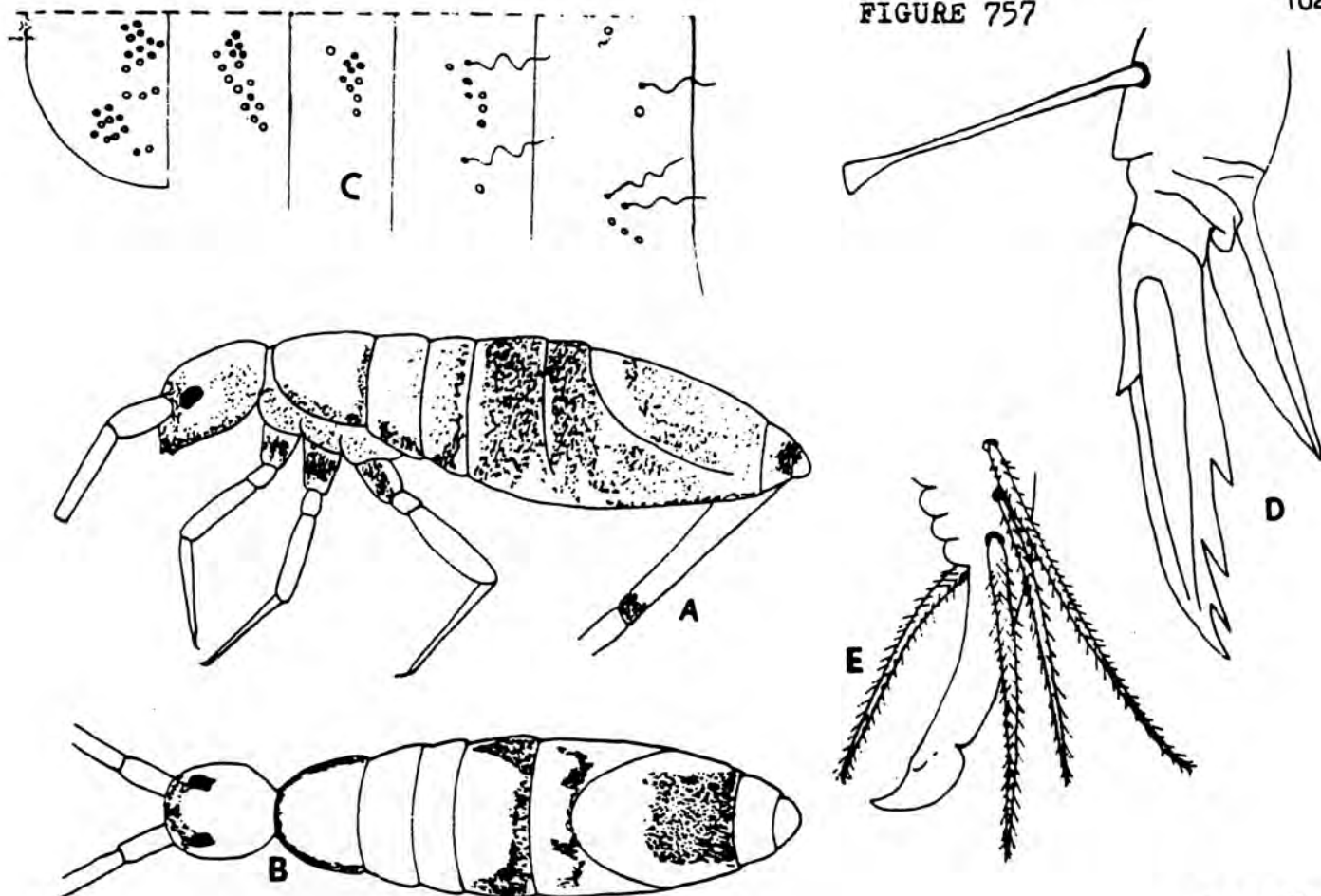
Type locality: New Cave, 5 miles south of state line, Culbertson Co., Texas, 28 June 1967 (J. Reddell).

Additional localities: Arizona - Cochise Co., Santa Cruz Co.; New Mexico - Roosevelt Co., Santa Fe Co.

### FIGURE 757

#### Seira dubia

- A) & B) Diagrammatic representations of patterns, type specimens.
- C) Dorsal macrochaetae, second thoracic segment through third abdominal segment, left side, type specimen.
- D) Hind foot complex, type specimen
- E) Mucro, type specimen.



Seira knowltoni (Wray), 1953,

Fig. 758

Ref.: Nature Notes, Raleigh 1:5 (Drepanocyrtus).

#### Description

Color: purplish blue pigment on yellow to orange background, in the form of irregular transverse bands, broader on the posterior segments and most conspicuous on the third abdominal segment; dorsum of head pale; antennal bases sometimes connected by a short, heavy dark band. Fourth antennal segment with a clear, unlobed apical retractile bulb. Third antennal segment .65 - .7 as long as fourth. First antennal segment and basal quarter of second scaled. Anterior 2 eyes larger than others. Tibiotarsal setae not particularly long; longest inner setae of hind legs 1.5 - 1.8 times as long as inner edge of unguis. Median ungual tooth longer than others. Unguiculus with minute outer basal tooth and extremely minute external serrations. Ventral tube with 10+10 - 13+13 distal setae. Body scales heavily ciliate and brownish in color. Maximum length 2.2 mm.



This species may ordinarily be recognized by the strongly contrasting band on the third abdominal segment. It most resembles S. dubia, but differs consistently in chaetotaxy and many other features.

Localities: Arizona - Gila Co., Pima Co.; California - Glenn Co., Kern Co., Los Angeles Co., Sacramento Co., Santa Cruz Co., Solano Co., Stanislaus Co.; Colorado - Fremont Co.; Utah - Kaw Co. (type), Utah Co.

A) Pattern, specimen from Pima Co., Arizona. Seira knowltoni

B) Pattern, specimen from Gila Co., Arizona. FIGURE 758

C) Pattern, specimen from Utah Co., Utah.

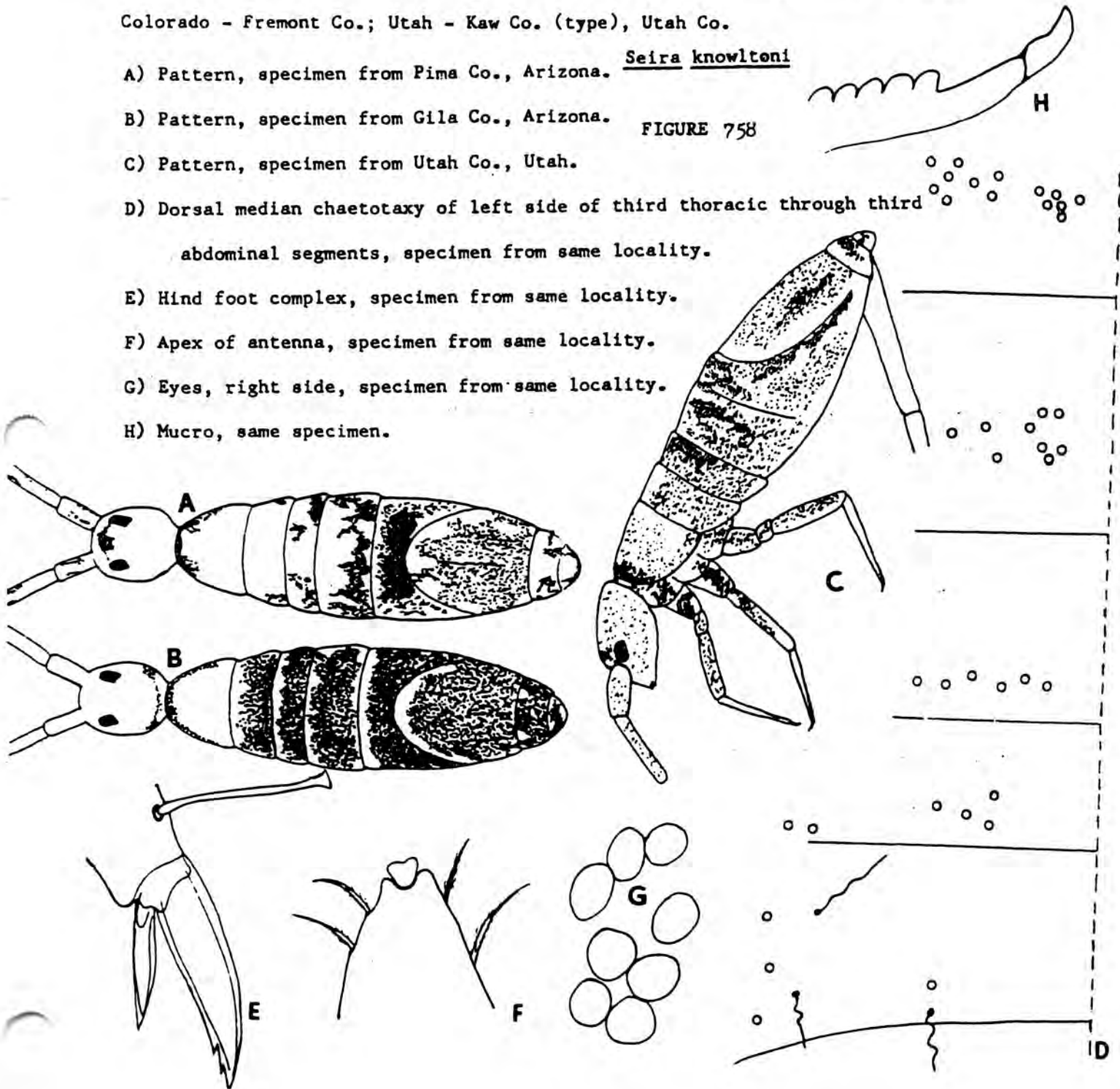
D) Dorsal median chaetotaxy of left side of third thoracic through third abdominal segments, specimen from same locality.

E) Hind foot complex, specimen from same locality.

F) Apex of antenna, specimen from same locality.

G) Eyes, right side, specimen from same locality.

H) Mucro, same specimen.



Ref.: Am. Mus. Novit. 464:9 (Drepanocyrtus).

Description

Color: body entirely white except for small pigment streaks at the antennal bases and the dark eye patches; antennae purplish distally. Third antennal segment about 3/4 as long as fourth. Eyes A, B, and sometimes D larger than others. Tibiotarsus with longest inner setae about twice as long as inner edge of unguis. Unguiculus without outer basal tooth. Ventral tube with about 15+15 distal lateral setae. The few scales seen were hyaline and finely striate.

Remarks

A single type specimen of this species was seen. The chaetotaxy is intermediate between that of knowltoni and dubia, but is sufficiently different to justify specific separation. Among the specimens from New Mexico are a few showing a faint wash of blue pigment, slightly more concentrated on the posterior half of the fourth abdominal segment.

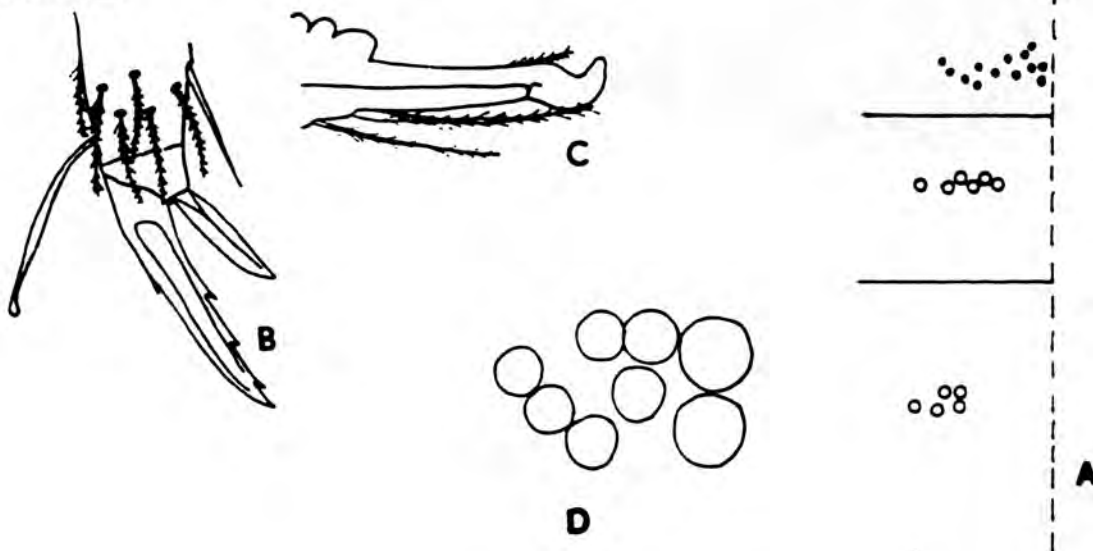
Localities: New Mexico - Eddy Co. (cave); Texas - Grimes Co. (type).

Seira reinhardi

FIGURE 759

- A) Dorsal macrochaetae, second thoracic segment through second abdominal segment, left side, type specimen.
- B) Mid foot complex, after Mills.
- C) Mucro, after Mills.
- D) Right eyepatch, after Mills.

Figure 759



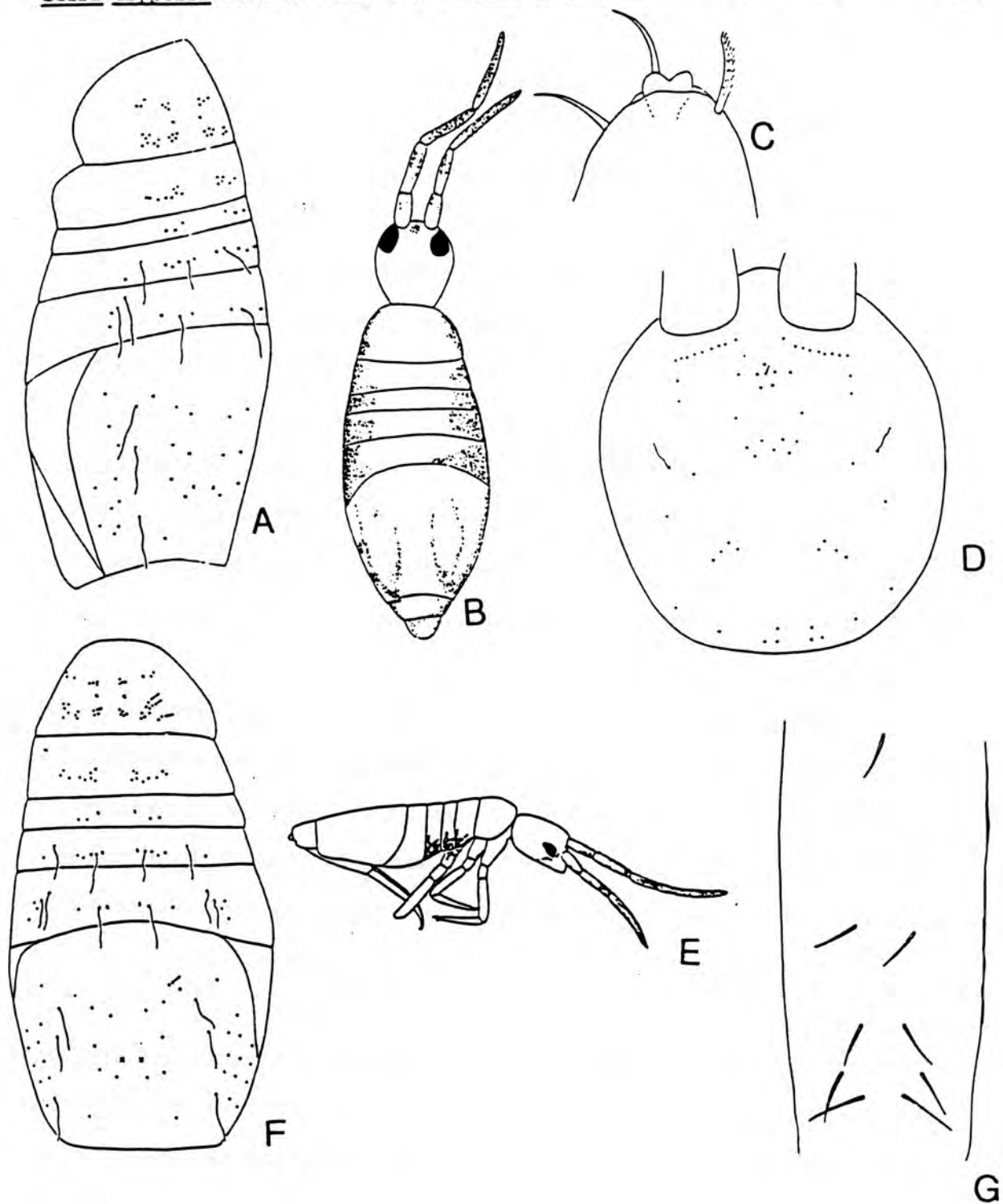


Figure 759.1

*S. cryptica*. A) Body chaetotaxy; B) Habitus; C) Apex of antenna; D) Cephalic chaetotaxy. *S. distincta*. E) Habitus; F) Body chaetotaxy; G) Ventral manubrial chaetotaxy. After Mari Mutt 1987 & 1986.

Genus Lepidocyrtus Bourlet, 1839

Type species: L. curvicollis Bourlet, 1839.

We place here all the Nearctic Entomobryinae having scales on the body and dens, a bidentate mucro, and 8+8 eyes. All Nearctic species have an acuminate unguiculus and a clavate tenent hair (apically flattened and appearing acuminate in some views).

Since the revisional work of Gisin, determinations in this genus are most safely made on the basis of chaetotaxy. Unfortunately, the useful characters are difficult to make out even on fresh specimens and may be quite invisible on type specimens or preparations made from old alcoholic material; and most descriptions of American species do not mention chaetotaxy at all. For these reasons there are many names which we cannot place at present, or can only associate tentatively with specimens. In this group particularly, if several specimens are available, 1 or more should be cleared and bleached in KOH for study of eye shape and chaetotaxy. Most features are seen best in dorsoventral mounts.

Of the characters used by Gisin, we have employed the inner setae of the labial triangle, the chaetotaxy of the second abdominal segment, and the dorsal macrochaetae (see Fig. 780A in the genus Pseudosinella and Fig 763 in the key to species). Snider (1963a) analyzed certain features of the abdominal chaetotaxy, but of these we have found only the lateral complex of the third abdominal segment to be readily usable (Fig. 760C; setal lettering slightly modified from Snider).

Other useful characters are the presence or absence of a retractile papilla on the antennal apex and of a projecting tubercle on the inner dorsal base of the dens; the shape and arrangement of the eyes; the setal row at the extreme posterior end of the fourth abdominal segment; the shape of the mesothorax; and the color and pattern. The last 2 characters, the setae, and at least the dorsal cephalic chaetotaxy, show growth changes, and only fully adult specimens can be relied on to show the typical conditions.

Other characters which we have noted should not be relied on too heavily, because of difficulty of observation (labral papillae, Fig. 760A, B) or apparent variation resulting from the angle of viewing (ungual teeth and the serration of 1 outer unguicular lamella). Anyone trying to

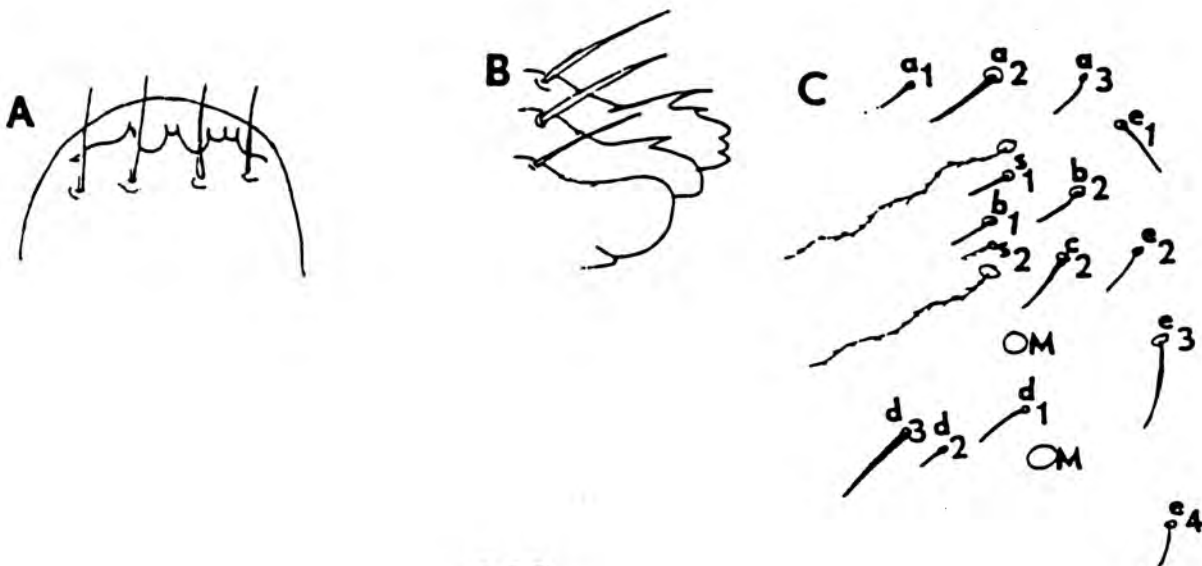
identify members of this genus might well consider not only the characters in our table and key, but the additional characters used in Pseudosinella, which is certainly a polyphyletic analysis of the combined genera.

Not counting a number of probable species represented in our collections by material too scanty or poor for description, we recognize at present 18 Nearctic species: 1) beaucatcheri, 2) cinereus, 3) curvicollis, 4) cyaneus, 5) dubius, 6) fermandi, 7) fimicolus, 8) finus, 9) floridensis, 10) helenae, 11) hirtus, 12) lanuginosus, 13) lignorum, 14) neofasciatus, 15) pallidus, 16) paradoxus, 17) unifasciatus, 18) violaceus.

FIGURE 760

Characters in Lepidocyrtus

- A) Composite of four types of labral papillae, seen from above.
- B) Composite of three types of labral papillae, seen from the side.
- C) Outer setal complex of right side of third abdominal segment; M = macrochaetal base.



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TABLE XXXV  
Characteristics of Nearctic Species of Lepidocyrtus

Species	Scales			Femur	Labial Seta <sup>1</sup>	Head				Abdomen IV				Apical Antennal Bulb	Meso-thoracic "Hood"	Basal Dental Tubercle	Eye C/H	Predominant Color	
	I+II	III	IV			R <sub>1</sub>	R <sub>2</sub>	S	T	P <sub>1</sub>	M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>						Post.
<u>beaucatcheri</u>	-	-	-	-	<u>MMrE</u>	+	-	-	-	+	-	+	+	8?	+	-	-	2.0-2.5	blue unique
<u>cinereus</u>	-	-	-	-	<u>MMoE</u>	+	+	-	-	+	-	+	+	-	-	-	-	<1	blue uniform
<u>curvicollis</u>	+	+	±	+	<u>mMrE</u>	-	-	-	-	+	+	+	+	30±	-	+	small	1.2-1.5	white uniform
<u>cyaneus</u>	-	-	-	-	<u>MrE</u>	+	+	+	+	+	-	+	+	-	-	-	-	1.1-1.6	blue uniform
<u>dubius</u>	-	-	-	-	<u>MMoE</u>	+	+	-	-	+	-	+	+	-	-	-	-	1.4-1.7	banded pale blue
<u>fernandi</u>	-	-	-	-	<u>MrE</u>	+	+	+	+	+	-	+	+	-	-	-	+	1.2-1.4	white
<u>fimicolus</u>	-	-	-	-	<u>MMvgE</u>	+	-	-	+	+	-	+	+	8	-	-	-	1.0-1.1	blue
<u>finus</u>	-	-	-	-	<u>MMoE</u>	-?	-?	-	-	-	-	+	+	16-24	+	+	+	1.1-1.3	white spotted-banded
<u>floridensis</u>	-	-	-	-	<u>MoE</u>	-	-	-	-	-	-	+	+	12+	-	-	+	1.0	white banded
<u>helenae</u>	-	-	-	-	<u>MrE</u>	+	-	-	+	+	-	+	+	4	+	±	-	2.0	blue to white banded
<u>hirtus</u>	+	-	-	+	<u>MMrE</u>	+	+	+	+	+	+	+	+	8-12?	-	+	-	1.25-2.0	white uniform
<u>lanuginosus</u>	-	-	-	-	<u>MrE</u>	+	+	+	+	+	-	+	+	-	-	±	-	1.0±	white uniform
<u>lignorum</u>	+	-	-	+	<u>MMrE</u>	+	+	-	-	+	+	+	+	15±	-	+	-	1.2-1.33	white uniform or with abdominal spots
<u>neofasciatus</u>	+	-	-	+	<u>MMrE</u>	+?	+?	-	-	+	+	+	+	?	?	+	-	1.33-2.0	blue banded
<u>pallidus</u>	-	-	-	-	<u>MMoE</u>	+	-	-	+	+	-	+	+	8	-	-	2.0	2.0	blue uniform
<u>paradoxus</u>	+	+	-	+	<u>mMrE</u>	+	-	-	-	+	+	+	+	16-22	-	++	-	1.4-1.7	blue uniform
<u>unifasciatus</u>	+	-	-	+	<u>MMrE</u>	+	+	-	-	+	+	+	+	10-14	-	+	-	1.3-1.5	white banded
<u>violaceus</u>	+	-	-	+	<u>MMrE</u>	+	-?	-	-	+	+	+	+	10	-	-	-	1.33-1.6	blue uniform
sp. J	-	-	-	-	<u>MMrE</u>	+	-	-	-	-	+	+	+	4?	-	-	+	≈	white
California sp. K North	-	-	-	-	<u>MMoE</u>	+	+	+	-	+	-	+	+	10	-	-	-	≈	pale blue
California sp. L New Mexico	-	-	-	-	<u>MoE</u>	+	+	+	+	+	-	+	+	-	+	-	+	1.2	banded blue

<sup>1</sup> Capital = large seta, lower case = small seta, o = rudimentary seta; underscored setae ciliate, other smooth.

identify members of this genus might well consider not only the characters in our table and key, but the additional characters used in Pseudosinella, which is certainly a polyphyletic analysis of the combined genera.

Not counting a number of probable species represented in our collections by material too scanty or poor for description, we recognize at present 18 Nearctic species: 1) beaucatcheri, 2) cinereus, 3) curvicollis, 4) cyaneus, 5) dubius, 6) fernandi, 7) fimicolus, 8) finus, 9) floridensis, 10) helenae, 11) hirtus, 12) lanuginosus, 13) lignorum, 14) neofasciatus, 15) pallidus, 16) paradoxus, 17) unifasciatus, 18) violaceus.

FIGURE 760

Characters in Lepidocyrtus

- A) Composite of four types of labral papillae, seen from above.
- B) Composite of three types of labral papillae, seen from the side.
- C) Outer setal complex of right side of third abdominal segment; M = macrochaetal base.

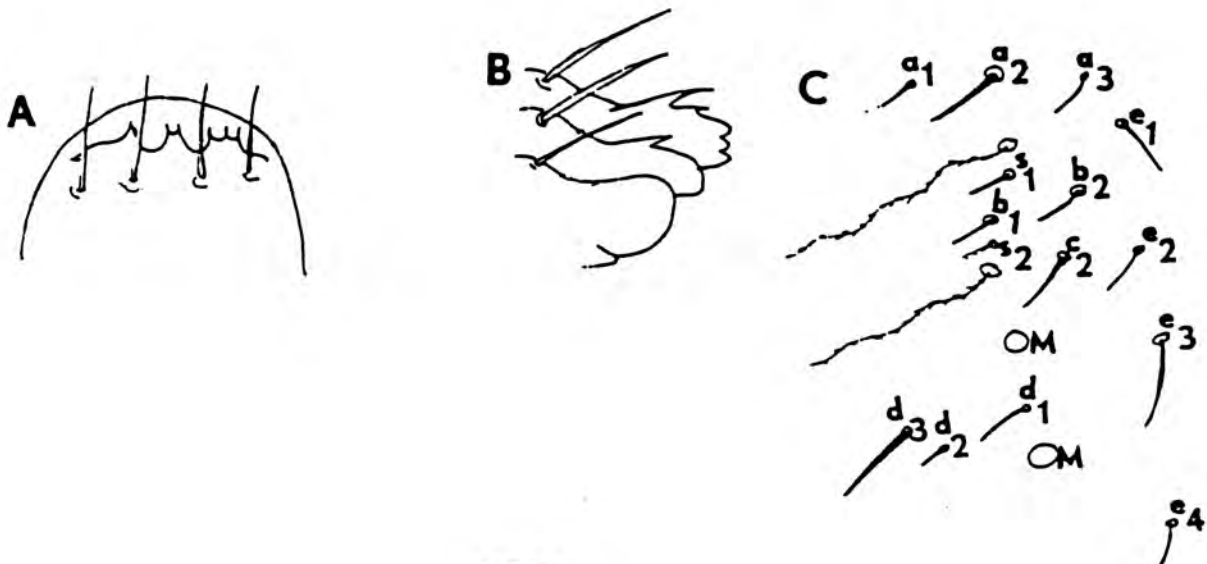


TABLE XXXV  
Characteristics of Nearctic Species of *Lepidocyrtus*

Species	Scales			Femur	Labial Seta <sup>1</sup>	Head				Abdomen IV				Apical Antennal Bulb	Meso-thoracic "Hood"	Basal Dental Tubercle	Eye C/H	Predominant Color	
	I+II	III	IV			R <sub>1</sub>	R <sub>2</sub>	S	T	P <sub>1</sub>	M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>						Post.
<i>beaucatcheri</i>	-	-	-	-	<u>MMrE</u>	+	-	-	-	+	-	+	+	8?	+	-	-	2.0-2.5	blue unique
<i>cinereus</i>	-	-	-	-	<u>MMoE</u>	+	+	-	-	+	-	+	+	-	-	-	-	<1	blue uniform
<i>curvicollis</i>	+	+	±	+	<u>mMrE</u>	-	-	-	-	+	+	+	+	30±	-	+	small	1.2-1.5	white uniform
<i>cyaneus</i>	-	-	-	-	<u>MrE</u>	+	+	+	+	+	-	+	+	-	-	-	-	1.1-1.6	blue uniform
<i>dubius</i>	-	-	-	-	<u>MMoE</u>	+	+	-	-	+	-	+	+	-	-	-	-	1.4-1.7	banded pale blue
<i>fernandi</i>	-	-	-	-	<u>MrE</u>	+	+	+	+	+	-	+	+	-	-	-	+	1.2-1.4	white
<i>fimicolus</i>	-	-	-	-	<u>MMvgE</u>	+	-	-	+	+	-	+	+	8	-	-	-	1.0-1.1	blue
<i>finus</i>	-	-	-	-	<u>MMoE</u>	-?	-?	-	-	-	-	+	+	16-24	+	+	+	1.1-1.3	white spotted-banded
<i>floridensis</i>	-	-	-	-	<u>MoE</u>	-	-	-	-	-	-	+	+	12+	-	-	+	1.0	white banded
<i>helenae</i>	-	-	-	-	<u>MrE</u>	+	-	-	+	+	-	+	+	4	+	±	-	2.0	blue to white banded
<i>hirtus</i>	+	-	-	+	<u>MMrE</u>	+	+	+	+	+	+	+	+	8-12?	-	+	-	1.25-2.0	white uniform
<i>lanuginosus</i>	-	-	-	-	<u>MrE</u>	+	+	+	+	+	-	+	+	-	-	±	-	1.0±	white uniform
<i>lignorum</i>	+	-	-	+	<u>MMrE</u>	+	+	-	-	+	+	+	+	15±	-	+	-	1.2-1.33	white uniform or with abdominal spots
<i>neofasciatus</i>	+	-	-	+	<u>MMrE</u>	+?	+?	-	-	+	+	+	+	?	?	+	-	1.33-2.0	blue banded
<i>pallidus</i>	-	-	-	-	<u>MMoE</u>	+	-	-	+	+	-	+	+	8	-	-	2.0	2.0	blue uniform
<i>paradoxus</i>	+	+	-	+	<u>mMrE</u>	+	-	-	-	+	+	+	+	16-22	-	++	-	1.4-1.7	blue uniform
<i>unifasciatus</i>	+	-	-	+	<u>MMrE</u>	+	+	-	-	+	+	+	+	10-14	-	+	-	1.3-1.5	white banded
<i>violaceus</i>	+	-	-	+	<u>MMrE</u>	+	-?	-	-	+	+	+	+	10	-	-	-	1.33-1.6	blue uniform
sp. J	-	-	-	-	<u>MMrE</u>	+	-	-	-	-	+	+	+	4?	-	-	+	≈	white
California sp. K North	-	-	-	-	<u>MMoE</u>	+	+	+	-	+	-	+	+	10	-	-	-	≈	pale blue
California sp. L New Mexico	-	-	-	-	<u>MoE</u>	+	+	+	+	+	-	+	+	-	+	-	+	1.2	banded blue

<sup>1</sup> Capital = large seta, lower case = small seta, o = rudimentary seta; underscored setae ciliate, other smooth.

Key to the Nearctic Species of *Lepidocyrtus*

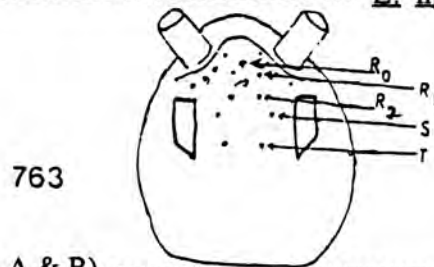
- 1) First two antennal segments scaled; legs scaled beyond coxae<sup>1</sup>-----2
- 1') Antennae and legs without scales ----- 8
- 2) Mesothorax dark blue ----- 3
- 2') Mesothorax white ----- 4
- \*3) Mesothorax strongly projecting over head (Fig 761A) ----- *L. paradoxus*
- \*3') Mesothorax not projecting (fig. 761B) ----- *L. violaceus*



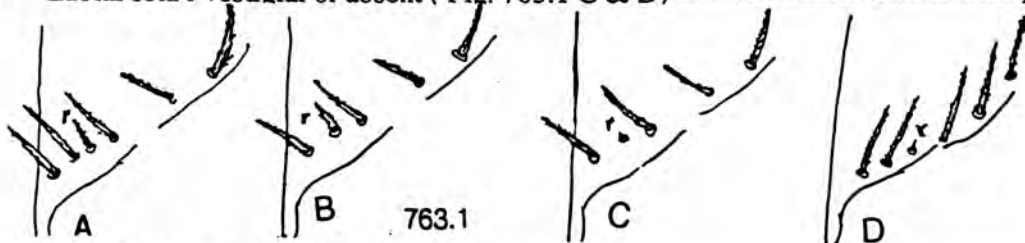
- \*\*4) Third abdominal segment heavily pigmented ----- *L. neofasciatus*
- 4') Third abdominal segment with at most lateral patches of pigment ----- 5
- \*\*5) Fourth abdominal segment with median transverse blue band ----- *L. unifasciatus*
- 5') Fourth abdominal segment with, at most lateral patches of pigment ----- 6
- \*6) Labial triangle setae M<sub>2</sub> and E smooth (fig. 762A) ----- *L. curvicollis*
- 6') Labial triangle setae M<sub>2</sub> and E ciliate (fig. 762B) ----- 7



- \*\*7) Cephalic macrochaetae S & T present (Fig. 763) ----- *L. hirtus*
- \*7') Cephalic macrochaetae S & T absent ----- *L. lignorum*

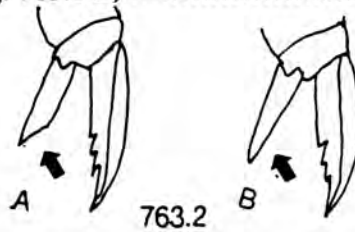


- 8) Labial seta r well developed (Fig. 763.1 A & B) ----- 9
- 8') Labial seta r vestigial or absent ( Fig. 763.1 C & D) ----- 14



- 9) Two M setae present (Fig. 763.1 A)..... 10
- 9') One M seta (Fig. 763.1 B)..... 11

- \*10) Unguiculus truncate ( Fig. 763.2 A).....L. sp. J  
 \*10') Unguiculus acuminate ( Fig. 763.2 B) ..... L. beaucatcheri



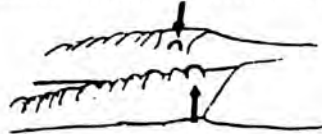
- \*\*\*11) With apical antennal bulb ( Fig. 763.3) ..... L. helenae  
 11') Without apical antennal bulb..... 12



- \*12) Body well pigmented ..... L. cyaneus  
 12') Body white or pale yellow ..... 13

- \*\*13) With small basal dental tubercle, seen from above( Fig. 764).....L. fernandi  
 \*13') Without dental tubercle ..... L. lanuginosus

764

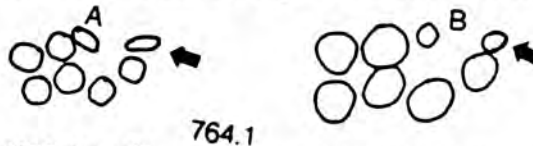


- \*\*14) With 1 labial M setae (Fig. 763.1 C) ..... L. floridensis  
 14'') With 2 labial M setae (Fig. 763.1D) ..... 15

- \*\*15) With dental tubercle ( Fig. 764) ..... L. finus  
 15') Without dental tubercle ..... 16

- \*16) Cephalic macrochaeta T absent ( Fig. 763) ..... 17  
 16) Cephalic macrochaeta T present ( Fig. 763) ..... 18  
 936

- \*\*17) Eye G elliptical and about as long as eye F ( Fig.764.1 A) ..... L. cinereus  
 \*\*17) Eye G round and much smaller than F ( Fig. 764.1B)..... L. dubius

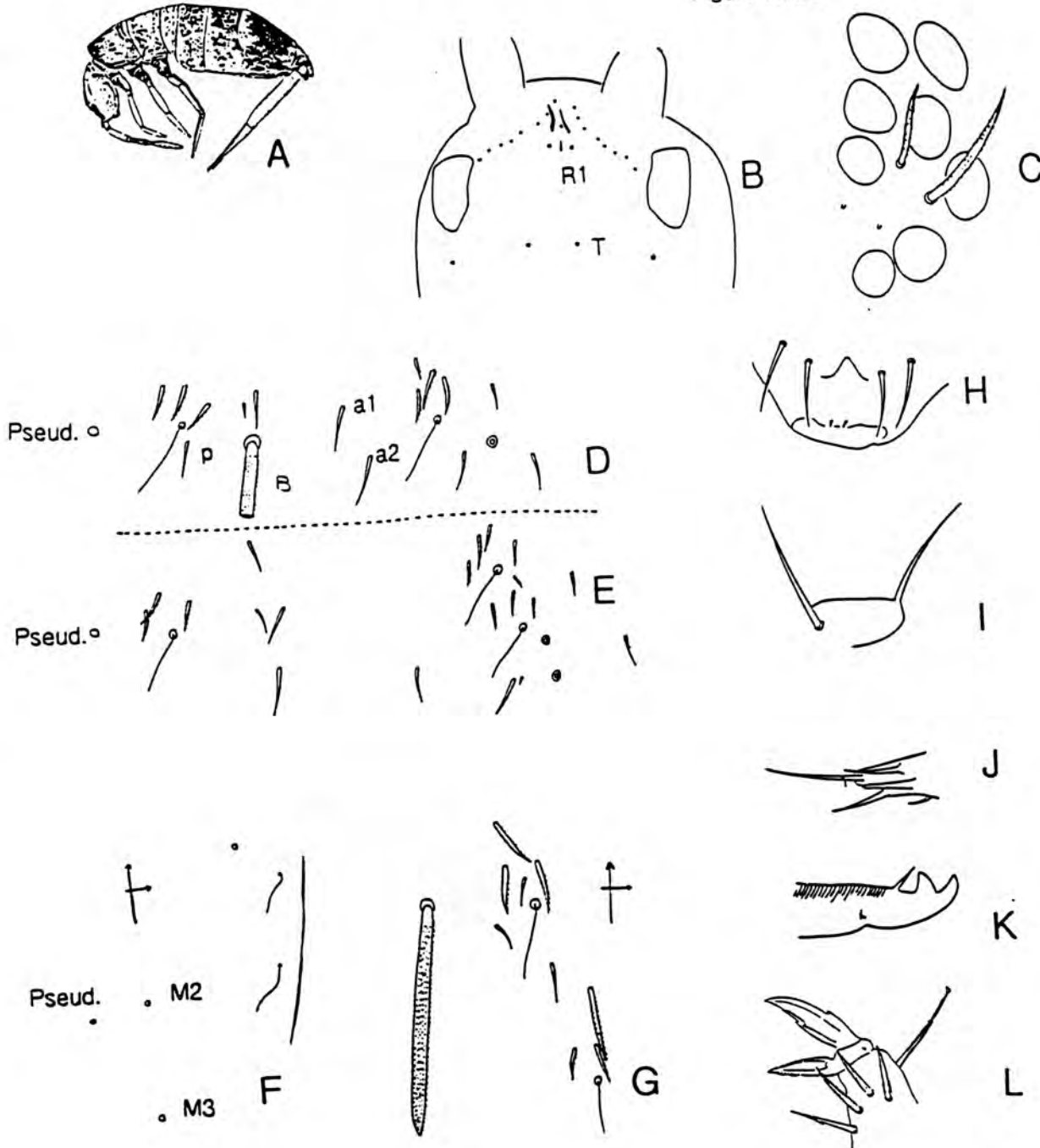


- \*18) Eye C much larger (2X) than H ..... L. pallidus group  
 \*18') Eye C only slightly (< 1.3) larger than H ..... L. fimicolus Mari Mutt 1988

<sup>1</sup> These scales are easily detached, but some normally remain in position on these appendages. They are most easily recognized in plain view on the legs, and in profile (by their much greater depth than setae when focusing) on the antennae.



Figure 764.2



*L. fimicolus*. A) Habitus; B) Cephalic chaetotaxy; C) Right eyepatch; D) Chaetotaxy of right side of second abdominal segment; E) Chaetotaxy, right side third abdominal segment; F) Dorsal macrochaetae and bothriotracha of right side, fourth abdominal segment; G) Detail of right bothriotrachal complex, fourth abdominal segment, right side; H) Apex of labrum; I) Maxillary palp from side; J) Outer papilla of labium; K) Mucro and apex of dens; L) Foot complex. After Mari Mutt, 1988.

Not included in key:

<u>achromatis</u> Maynard, 1951	unplaceable without types
<u>aenescens</u> Guthrie, 1903	unplaceable without types
<u>albicans</u> Reuter, 1895	= <u>lignorum</u> ; Nearctic records = ?
<u>albicaudatus</u> Hammer, 1953a	unplaceable without types
<u>albinos</u> Nicolet, 1842 (Cyphoderus)	<u>Cyphoderus</u> ; Nearctic records =
	<u>Pseudosinella</u>
** <u>albus</u> Packard, 1873	<u>Pseudosinella</u>
<u>alleganyensis</u> Maynard, 1951	= <u>paradoxus</u> ? unplaceable without types
<u>americanus</u> Marlatt, 1896	<u>Willowsia</u>
<u>assimilis</u> Reuter, 1892	= <u>violaceus</u> ; Nearctic records = ?
** <u>atropurpureus</u> Packard, 1888	unplaceable
<u>aurantiacus</u> Maynard, 1951	unplaceable without types
** <u>bipunctatus</u> Packard, 1873	<u>Seira</u>
<u>candidus</u> Folsom, 1902 ( <u>Pseudosinella</u> )	unplaceable without types
** <u>cephalopurpureus</u> Harvey, 1894	= <u>paradoxus</u> ?
<u>christianseni</u> Goto, 1953	= <u>paradoxus</u>
** <u>decemoculatus</u> Guthrie, 1903	<u>Pseudosinella</u>
<u>domesticus</u> Nicolet, 1842 ( <u>Degeeria</u> )	<u>Seira</u> ; not Nearctic
<u>duodecimpunctatus</u> Denis, 1931b	( <u>Pseudosinella</u> ) <u>Pseudosinella</u> ; not Nearctic
<u>finensis</u> Maynard, 1951	unplaceable without types
** <u>folsomi</u> Mills, 1931	<u>Pseudosinella</u>
<u>guthriei</u> Maynard, 1951	unplaceable without types
<u>incoloratus</u> Wahlgren, 1906	<u>Seira</u> ; not Nearctic
<u>iricolor</u> Say, 1821 ( <u>Podura</u> )	unplaceable
<u>knowltoni</u> Wray, 1953c ( <u>Drepanocyrtus</u> )	<u>Seira</u>
<u>luteus</u> Jackson, 1909	unplaceable without types
** <u>marmoratus</u> Packard, 1873	= <u>Heteromurus nitidus</u>
** <u>metallicus</u> Packard, 1873	= <u>violaceus</u> ?
** <u>mexicanus</u> Folsom, 1898 ( <u>Seira</u> )	<u>Seira</u>
** <u>millsi</u> Snider, 1967a	types unplaceable
<u>olforti</u> Wray, 1953b	= <u>beaucatcheri</u> ?

<u>purpureus</u> Lubbock, 1873	probably not Nearctic
<u>pusillus</u> Linnaeus, 1767 ( <u>Podura</u> )	unplaceable
** <u>reinhardi</u> Mills, 1931 ( <u>Drepanocyrtus</u> )	<u>Seira</u>
** <u>rolfsi</u> Mills, 1931 ( <u>Pseudosinella</u> )	<u>Pseudosinella</u>
<u>rubidus</u> Maynard, 1951	unplaceable without types
<u>sanguineus</u> Jackson, 1909	<u>Pseudosinella</u>
** <u>sexoculatus</u> Guthrie, 1903	<u>Pseudosinella</u>
<u>sexoculatus</u> Schött, 1902 ( <u>Pseudosinella</u> )	<u>Pseudosinella</u>
<u>squamoornatus</u> Stscherbakow, 1898 ( <u>Mesira</u> )	<u>Seira</u> ; not Nearctic
** <u>violentus</u> Folsom, 1924	<u>Pseudosinella</u>

Lepidocyrtus beaucatcheri (Wray), 1946

Fig. 765

Ref.: Bull. Brooklyn ent. Soc. 41:81 (Entomobrya)

Syn.: L. beaucatcheri var. olforti Wray, 1953, Bull. Brooklyn ent. Soc.

48:82 (7).

Description

Color: background yellow, with purple-blue pigment covering thorax, first 3 abdominal segments, and usually fourth abdominal segment except for its posterior margin; head with dark eyes and interantennal band, sometimes with forked pigment projection running back from this band; antennae washed with blue. Eye patches oval to trapezoidal; eye G half as large as F or smaller. Labral papillae not clearly seen but apparently strongly unisetaceous. Head circular in dorsal view. Mesothorax not enlarged. Unguis with 3 moderately large inner teeth and small lateral teeth; no external tooth seen. Unguiculus not serrate.

Maximum length 1.0 mm.

Remarks

Though specimens we have seen differ in pattern details from those described by Wray, we assign them to his species tentatively because of their general similarity of pattern, unlike that of any other Nearctic species we have seen; the distinctively small size of eye G; and the proximity of our collections to the type locality. Our specimens are old and fine details of chaetotaxy were not visible; they are female and apparently subadult (open genital slit but no genital setae). Wray's specimens appear to have been even younger. This species resembles L. millsii Snider in some respects, including

millsi. L. beaucatcheri differs from other Nearctic species except L. helenae in having an apical antennal bulb but no dental tubercle.

Localities: Great Smoky National Park; North Carolina - Buncombe Co. (type), Old Fort (type of olforti).

Additional record: South Carolina (DuRant and Fox, 1966).

A) Habitus, after Wray. Lepidocyrtus beaucatcheri

B) Habitus, specimen from Great Smoky Mountains National Park.

C) Labial triangle basal setae, right side, specimen from same locality.

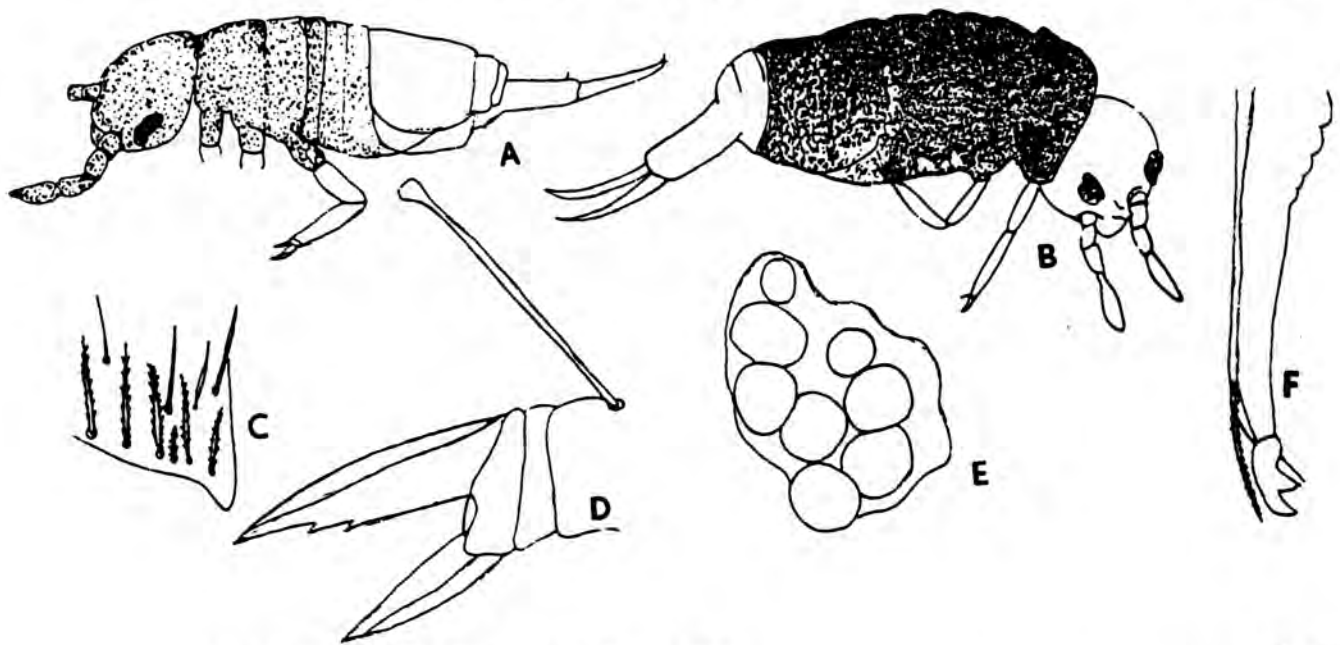
D) Hind foot complex, specimen from same locality.

E) Right eyepatch, specimen from same locality.

F) Mucro, specimen from same locality.

G) Mucro and apex of dens, after Wray.

FIGURE 765



Lepidocyrtus cinereus Folsom, 1924

Fig. 766

Refs.: Am. Mus. Novit. 108:9 (cysneus var.); Snider, 1967.

Description

Color: grayish-blue to dark purple-blue, more or less uniform except for scattered pale spots and pale legs and furcula; head not strikingly paler than body; exceptionally, white except for eyepatches, interantennal spot and wash on antennae. Eye patches elongate triangular, with eye G clearly posterior to F; eyes G & H oval with length twice width or more. Inner labral papillae strong and unisetaceous; outer papillae weak, broadly rounded. Head circular

in dorsal view. Mesothorax never strongly projecting. Unguis with 3 inner teeth and weak lateral and outer teeth; unguiculus weakly serrate externally. Maximum length 1.5 mm.

### Remarks

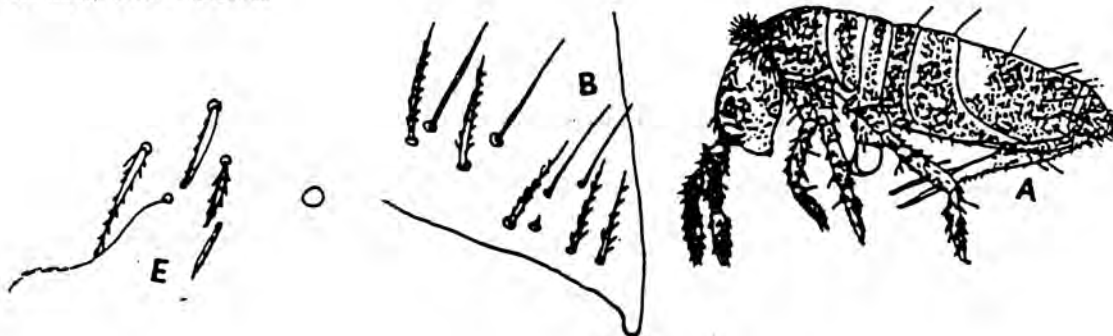
This species is superficially very similar to *L. pallidus*, but may be distinguished by cephalic chaetotaxy and the absence of posterior setae on the fourth abdominal segment. The great elongation of eyes G & H distinguishes it from all other species, though exceptional specimens of *pallidus* may approach this condition. A few specimens from Louisiana without body pigment are placed here tentatively; they are sub adult and differ otherwise only in a detail of fourth abdominal segment chaetotaxy, and both differences may be the result of immaturity. Some adult specimens from Texas caves lack any pigment except for eyepatches but are otherwise identical to typical *cinereus*.

Localities: Illinois - Champaign Co. (type), Douglas Co., Hardin Co., Henderson Co., Knox Co., Macon Co., Marshall Co., Mercer Co. Indiana - Wayne Co. Kentucky - Union Co.; Louisiana - Ouachita Par.; Mississippi - Jackson Co.; Missouri - Cole Co.  
Published records are suspect because of confusion with other species.

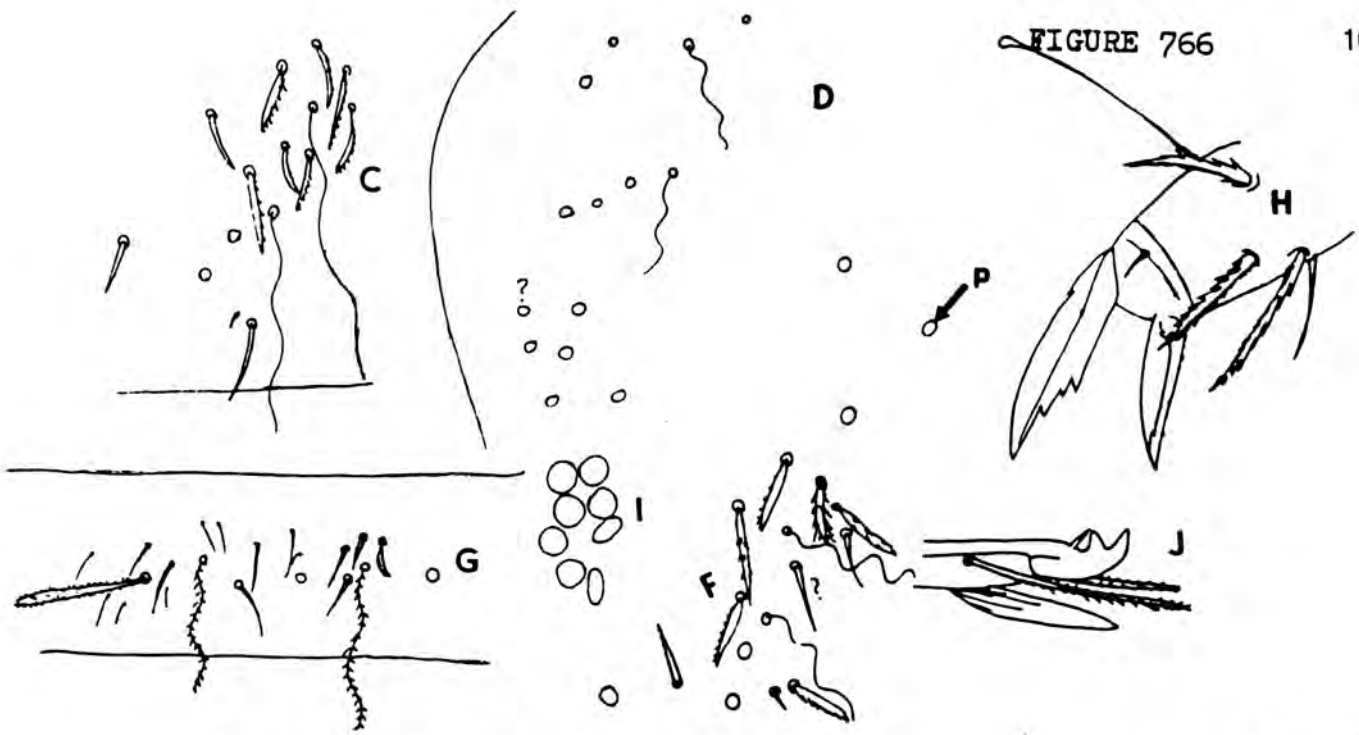
### FIGURE 766

#### *Lepidocyrtus cinereus*

- A) Habitus, after Folsom.
- B) Right half of labial triangle, specimen from Ouachita Par., Louisiana.
- C) Third abdominal segment bothriotrichal complex, left side, specimen from Lake Co., Illinois.
- D) Macrochaetae of left half of fourth abdominal segment, same specimen as B.
- E) Anterior bothriotrichal complex of fourth abdominal segment, left side, same specimen.
- F) Bothriotrichal complex of third abdominal segment, left side, same specimen.
- G) Inner setae of second abdominal segment, left side, same specimen.
- H) Hind foot complex, specimen from Williamson Co., Illinois.
- I) Left eyepatch, after Folsom.
- J) Mucro, after Folsom.





Lepidocyrtus curvicollis Bourlet, 1839Fig. 767

Refs.: Mém. Soc. Sci. Agric. Arts Lille 1:392; Yosii, 1956, 1959;

Gisin, 1960, 1963, 1964.

**Description**

**Color:** yellowish to silvery white with dark eyepatches; antennae, inter-antennal spot or band, legs, and sometimes lateral margins of abdomen washed with blue color. Eyepatches oval; eye G almost on a level with F. Labral papillae low, blunt, and nonsetaceous. Head oval in dorsal view. Mesothorax very prominent and normally displacing head downward. Unguis with 4 inner teeth (sometimes very small) and large lateral and external teeth. Unguiculus smooth or with a very minutely serrate outer margin. Maximum length 3.5 mm.

**Remarks**

Very few specimens we have seen identified as curvicollis belong to this species in the modern sense; most earlier records are probably erroneous. The unusual labial chaetotaxy is diagnostic; the large adult size, and presence of scales on the third antennal segment separate it from all our species except paradoxus. The dental tubercle has not been recorded in European curvicollis, but in this species it is low, rounded, and easily overlooked.

**Localities:** Illinois - Champaign Co., Linn Co.; New York - Monroe Co.

Published records are suspect because of confusion with lignorum and perhaps other species.

A) Macrochaetae, after Gisin.

Lepidocyrtus curvicollis

FIGURE 767

1043

B) Anterior bothriotrichal complex, fourth abdominal segment, after Snider.

C) Second abdominal segment dorsal setae, left side, specimen from Illinois.

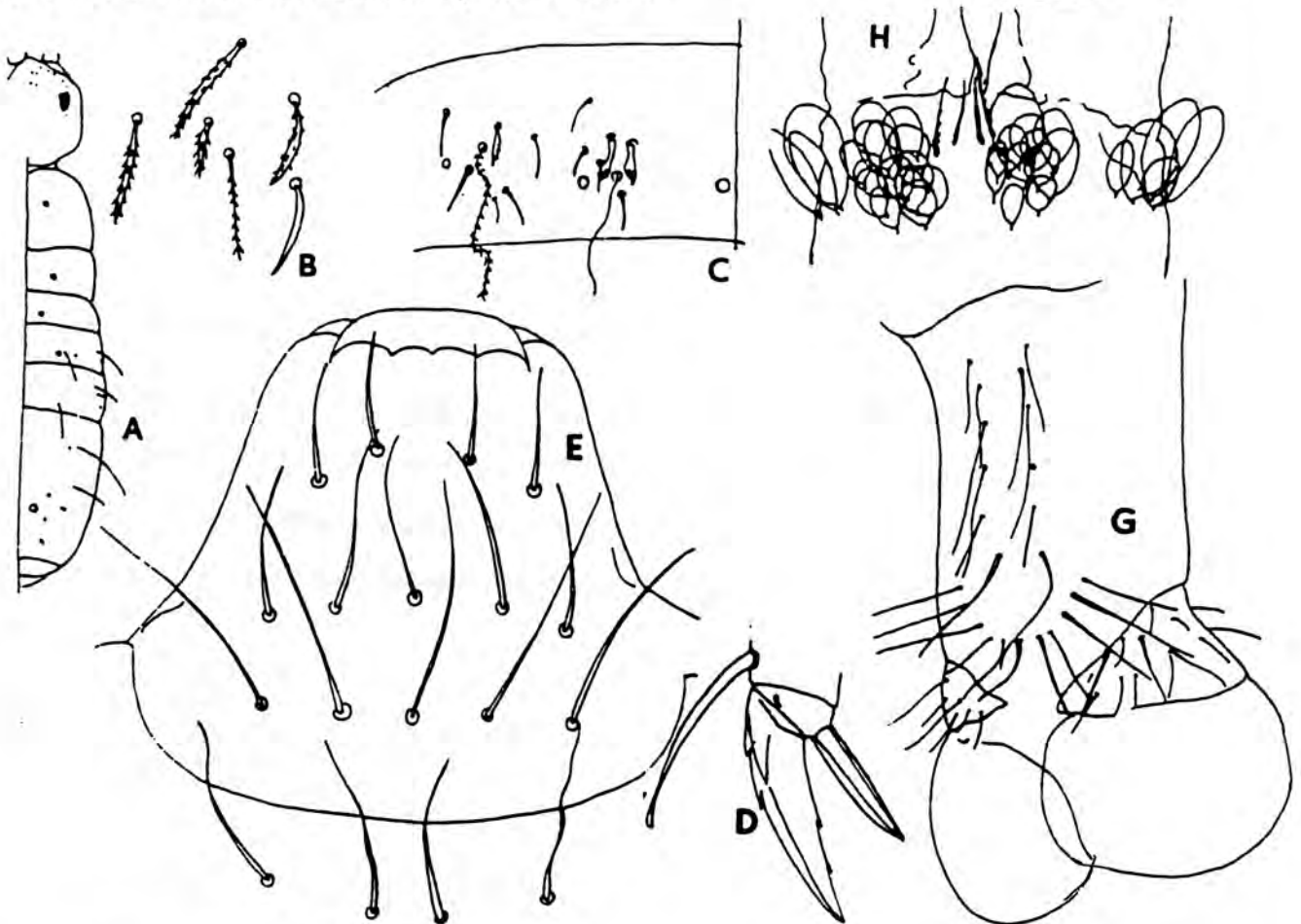
D) Fore foot complex, after Gisin.

E) Labrum, seen from above, after Szeptycki, 1967.

F) Apex of labrum, seen from side, after Szeptycki, 1967.

G) Ventral tube, after Yosii.

H) Ventral surface of manubrium, after Yosii.



Lepidocyrtus cyaneus Tullberg, 1871

Fig. 768

Refs.: Öfvers.K.VetenskAkad. Förh. 28:150; Yosii, 1959; Gisin, 1960, 1964; Snider, 1967a.

Description

Color: body dark blue to purple-blue with legs, furcula, and basal antennal segments pale; head varying from dark with a few pale spots to dorsally pale except for interantennal band and eyepatches. Eyepatches trapezoidal with eye G definitely posterior to F. Labral papillae sharply humped, with (at least sometimes) extremely minute microsetae. Head roughly circular in dorsal

view. Mesothorax not enlarged. Tenent hair strongly clavate. Unguis with 3 inner teeth and minute lateral and external teeth. Unguiculus not clearly serrate. Maximum length 1.3 mm.

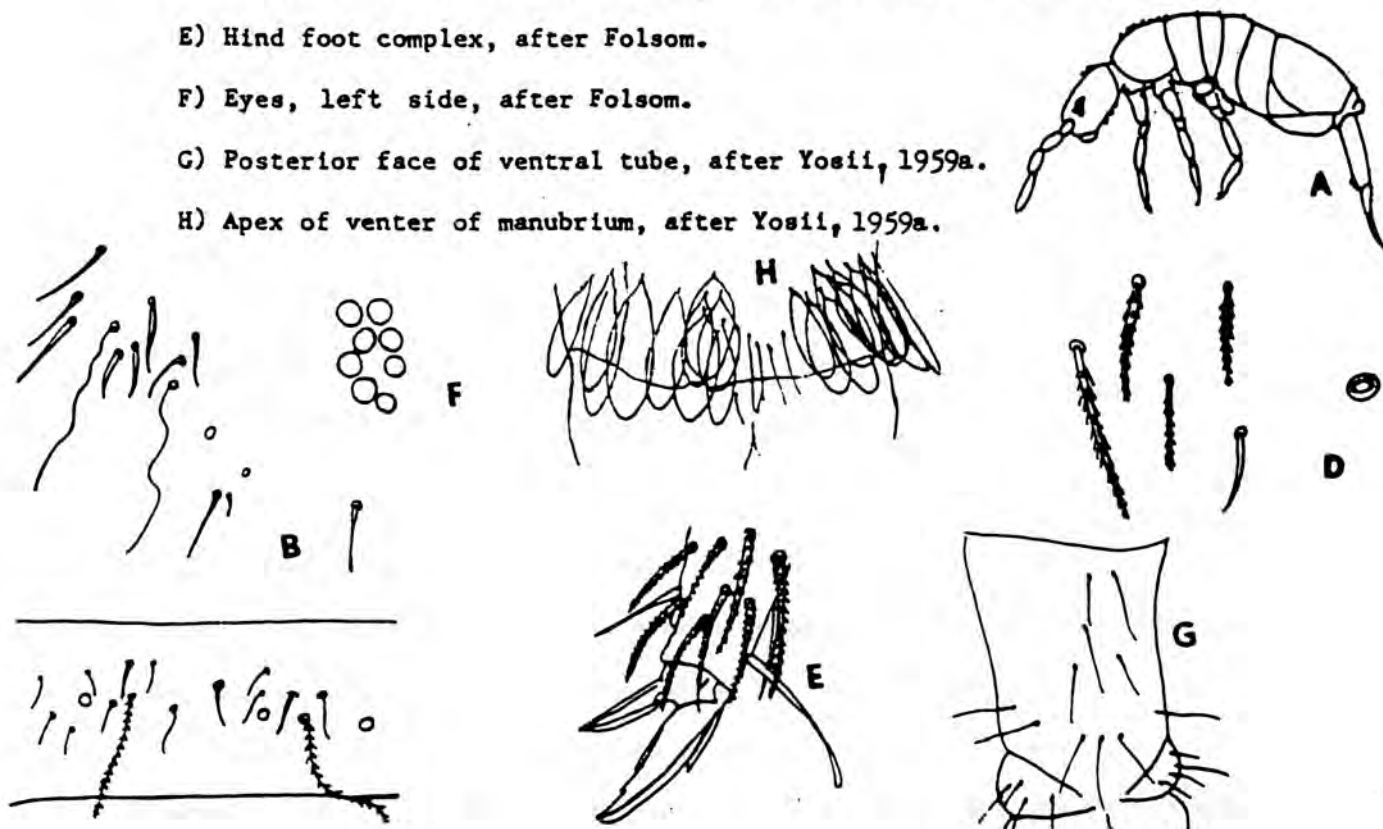
**Remarks**

Well-mounted, fresh specimens are easily identified by the combination of labial chaetotaxy, absence of antennal scales, and presence of cephalic macrochaetae S & T. Very few United States specimens we have seen identified as this species are cyaneus in Gisin's sense, and most of these are from localities near the coasts; this species may have been introduced relatively recently.

Localities: California - Contra Costa Co.; New Jersey - Mercer Co., Union Co.; New Mexico - Santa Fe Co.; Oregon - Benton Co. Nova Scotia - Halifax Co.

The numerous published records are suspect because of probable confusion with other species, especially L. pallidus.

- A) Habitus, after Gisin. Lepidocyrtus cyaneus **FIGURE 768**
- B) Outer setal complex of right side of third abdominal segment, composite with encircled setae sometimes absent; specimen from New Jersey.
- C) Second abdominal segment setae, left side, specimen from New Jersey.
- D) Anterior bothriotrichal complex, fourth abdominal segment, after Snider.
- E) Hind foot complex, after Folsom.
- F) Eyes, left side, after Folsom.
- G) Posterior face of ventral tube, after Yosii, 1959a.
- H) Apex of venter of manubrium, after Yosii, 1959a.



**Lepidocyrtus dubius** new species**Fig. 768.1****Description**

Eyes on dark irregular eyepatches. Color pale blue, except for large pale intersegmental bands, legs and furcula. Maximum length 1.37 mm. Antennae 1.32 to 1.42 times cephalic diagonal, without apical bulb. Subapical sense peg rodlike and arising from a clear pit. Lenticular organs absent. Scales absent on all antennal segments as well as legs. Prelabral setae 4-5-5-4 with posterior row weakly ciliate, others smooth. Labral intrusion in the form of a simple groove. Labial palp with differentiated seta stout, straight and not nearly reaching apex of same papilla. Maxillary palp not clearly seen. Labial triangle with r usually absent, rarely vestigial; all setae strongly ciliate. Labial ventral groove with 4 + 4 ciliate macrochaetae along margin. The second abdominal segment P seta absent. Fourth abdominal segment anterior bothriotracha complex without supplementary seta. Trochanteral organ with 6 setae in arm and 0 - 1 external and internal setae. Ventral tube with 9+9 - 12+12 setae on anterior face; distolateral patches with 8 - 9 setae, all smooth or with one ciliate; posterior face with 9 (one specimen 10) weakly ciliate setae. Posterior leg with one seta slightly thicker and larger and less gradually tapered than other inner setae, .30 to .35 distance from base to apex of tibiotarsus. Unguis with 3 clear inner teeth, distalmost .68 - .78 way from base to apex. Unguiculus lanceolate with finely serrate outer margin. Manubrial plaque with 1 inner and 2-3 outer ciliate setae. Mucro with apical and subapical teeth subequal. Basal spine apex just reaches the tip of median tooth. Ucrenulate dens 2.8 - 3.3. times as long as mucro.

**Localities**

*Holotype* ♀ and six paratype ♀♀ plus 5 alcoholic specimens Treasure cave, Bell Co., Texas, Dec. 4 1992, in litter (berlese funnel extraction) Reddell & Reyes colls. (locality no. 7552). Also found in Royalty Ridge cave, Coryell Co., Texas, March 5 1993, Reddell & Reyes Colls. (locality no. 7562).

**Derivatio nominis**

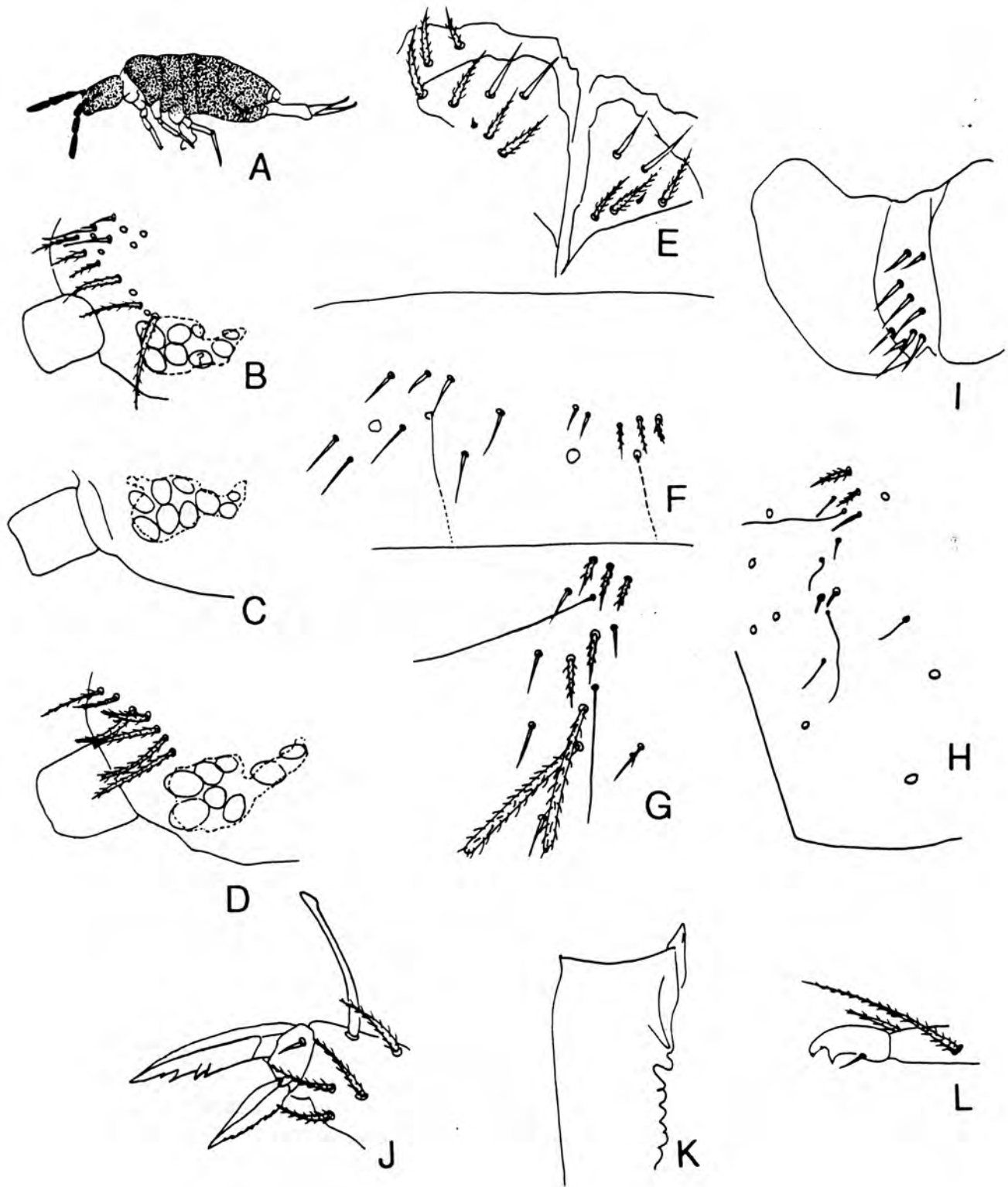
From Latin *dubius* - doubtful

**Remarks**

This species has a remarkable variation in the structure and distribution of the eyes and the eyepatch (see figures B - D). In some cases a supernumerary eye appears to be present (see figure C). In others the eye G or H is so obscure that it appears that only 7 + 7 eyes are present. This would arbitrarily place the species in *Pseudosinella* but there are some specimens where 8 eyes are clearly present. This species is similar to *L. cinereus* in many respects as well as general appearance but differs in lacking seta p on the second abdominal segment as well as the eye structure. It also differs in possessing a small dental tubercle; however, this structure is very small and truly visible only when the dentes are mounted so as to be seen from above. It can easily be overlooked.

**Legend for figures**

A) Habitus, paratype; B) Typical cephalic chaetotaxy and eye structure, pigment not shown, specimen from Coryell Co.; C) Eyepatch, paratype, pigment not shown; D) Eyepatch, another specimen from Coryell Co., pigment shown; E) Labial triangle, paratype; F) Chaetotaxy, left side 2nd abdominal segment, specimen from Coryell Co.; G) Lateral bothriotrachel complex 3rd abdominal segment, another Coryell Co. specimen; H) Chaetotaxy, left side 4th abdominal segment, same specimen; I) Distolateral patch ventral tube, paratype; J) Fore foot complex, specimen from Coryell Co.; K) Base of left dens, seen from above, specimen from Coryell Co.; L) Mucro and apex of dens, another specimen, same locality.





**Lepidocyrtus fernandi** new species**Fig. 768.2****Description**

Eyes on dark triangular to trapezoidal eyepatches. Eyes G & H vary from circular to oval. Color white except for dark eyepatches, pale blue antennae and sometimes pale blue wash on the bases of the legs. Maximum length 1.54 mm. Antennae 1.31 to 1.54 (one specimen 1.67) times cephalic diagonal, lacking apical bulb. Subapical sense peg rod-like and arising from a clear pit. Lenticular organs absent. Scales absent on all antennal segments as well as legs. Pre-labral setae 4-5-5-4 with posterior row clearly ciliate, others smooth. Labral intrusion absent. Labral papillae blunt, broad and non setaceous. Labial palp with differentiated seta stout, curved and not nearly reaching apex of same papilla. Maxillary palp with two sublobal hairs. Labial triangle with r well developed. All labial triangle setae strongly ciliate. Labial ventral groove with 4 + 4 ciliate macrochaetae along margin. The second abdominal segment P seta present. Fourth abdominal segment anterior bothriotrichal complex without supplementary seta. Trochanteral organ with 4 setae in arms and 1 external and no internal setae. Ventral tube with 6 + 6 - 8 + 8 large ciliate setae on anterior face; distolateral patches with 7 - 8 setae, 2 (3) smooth and rest ciliate; posterior face with a distal arc and 4 to 6 additional slightly ciliate setae. Posterior leg with one seta thicker than other setae and truncate; .27 - .33 distance from base to apex of tibiotarsus. Unguis with 3 clear inner teeth, distalmost one .62 - .67 way from base to apex; basal teeth similar in size. Unguiculus lanceolate. Manubrial plaque with 2 inner and 2-3 outer ciliate setae. Basal dental tubercle present but very small and only visible from dorsal view. Mucro with apical and subapical teeth subequal. Basal spine apex just reaches the tip of median tooth. Uncrenulate dens 2.6 - 2.9. times as long as mucro.

**Localities**

*Holotype* ♀ and five *paratype* ♀♀ plus 1 *paratype* ♂. Muir Forest, Huntingdon Quebec, sugar maple stand, mull, May 11 and July 17 1995, F. Therrien coll., (locality no. 9043).

**Derivatio nominis**

Named in honor of Fernand Therrien who first discovered this species.

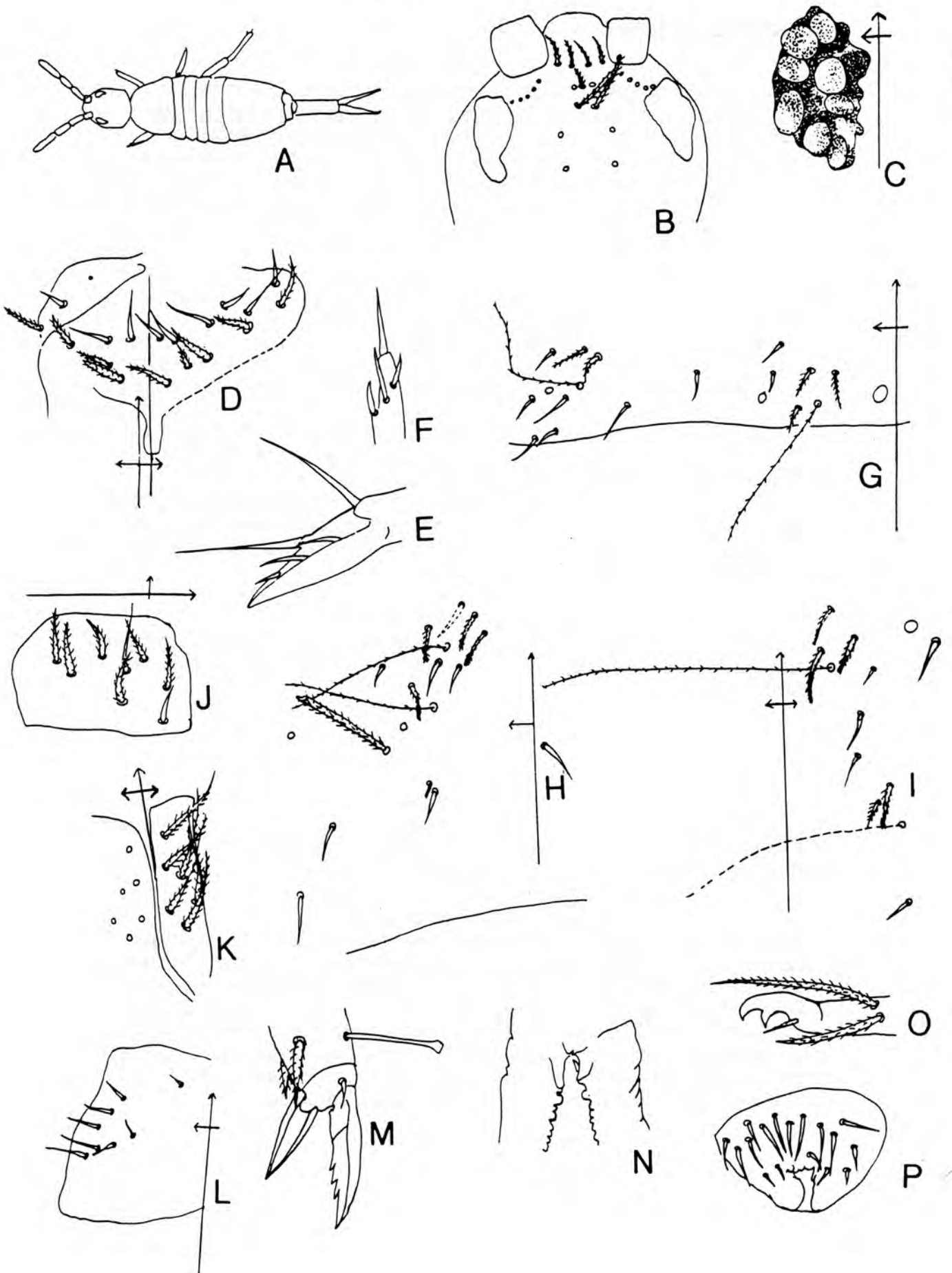
**Remarks**

This species is very similar to L. cyaneus in many respects but differs in color, the presence of a small dental tubercle, presence of a p seta on the second abdominal segment as well as other details of chaetotaxy.

**Legend for figures**

A) Habitus holotype; B) Typical cephalic chaetotaxy, holotype.; C) Eyepatch, paratype, ; D) Labial triangle, holotype; E) Maxillary palp, paratype; F) Outer labial papilla holotype; G) Chaetotaxy left side 2nd abdominal segment, paratype.; H) Lateral bothriotrichal complex, 3rd abdominal segment, paratype; I) Chaetotaxy, left side 4th abdominal segment, holotype; J) Disto lateral patch, ventral tube, paratype; K) Anterior face ventral tube, paratype; L) Trochanteral organ, paratype; M) Hind foot complex, holotype; N) Base of dentes seen from above, paratype.; O) Mucro and apex of dens, paratype; P) Male genital plate, paratype.

Figure 768.2



Lepidocyrtus finus, Christiansen & Bellinger, 1980

## Description

Color: background silvery white to yellowish; body pigment forming spots on the sides of the fourth abdominal segment, or, in darker forms, a band across this segment and lateral spots on the third abdominal segment; head with interantennal spot; antennae lightly pigmented. Eye patches trapezoidal, with eye G definitely posterior to F. Labral papillae obscure but apparently nonsetaceous. Head roughly circular in dorsal view. Mesonotum projecting forward so as to displace head ventrally. Unguis with 3 small inner teeth, the apical tooth the largest, and small outer and lateral teeth. Unguiculus very weakly serrate externally. Maximum length 1.5 mm.

## Remarks

This species resembles L. finensis Maynard in eye form, body shape, and typical pattern, but appears to be primarily southern in distribution. Since Snider, who has seen the types of finensis, shows a chaetotaxy clearly different from that of finus, and since finensis was described from New York state, we are keeping the two separate tentatively. The species is distinguished from all others by the combination of apical antennal papilla and dental tubercle, and from unifasciatus, which some specimens resemble, by the absence of antennal scales. The  $L_2$  macrochaete on the third abdominal segment is sometimes absent. The absence of  $M_3$ ,  $P_1$ , and  $P_2$  setae on the fourth abdominal segment is unique in Nearctic members of the genus. A specimen from Mexico has a clear band of pigment on the third thoracic and first abdominal segments.

Type locality: tributary of R. Styx Bayou at Hwy. 553, Ouachita Parish, Louisiana, pool in intermittent stream bed, 30 Sept. 1973 (J. Cancellare).

Additional localities: Alabama - Madison Co.; Arkansas - Chico Co.; Kansas - Douglas Co.; Louisiana - Ouachita Par. (type); Mississippi - Coahoma Co.; Texas - Cameron Co.

Lepidocyrtus finus

All figures of specimens from type locality.

A) Habitus and patterns of two types.

B) Chaetotaxy of left side of second abdominal segment.

FIGURE 769

C) Outer setal complex of right side of third abdominal segment.

D) Anterior bothriotrichal complex of left side of fourth abdominal segment.

E) Macrochaetae of left side of third and fourth abdominal segments; pseudopore solid.

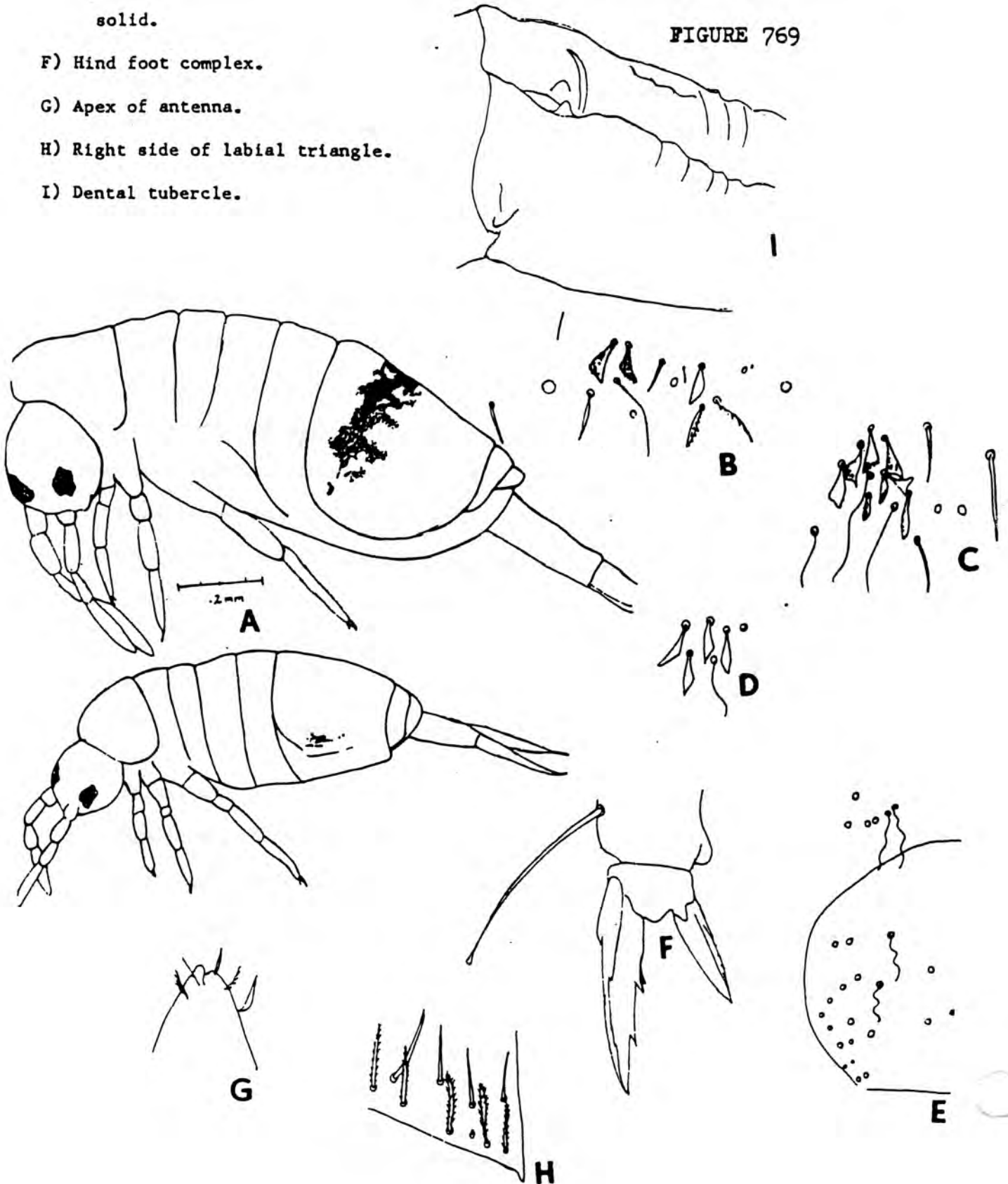
F) Hind foot complex.

G) Apex of antenna.

H) Right side of labial triangle.

I) Dental tubercle.

FIGURE 769



Ref.: Contr. Am. ent. Inst. 2:14.

Description

Color: background white; dark blue pigment laterally on thorax and first or first two abdominal segments, extending medially on third thoracic and first abdominal segments to cover up to 3/4 of posterior margins; fourth abdominal segment with a median transverse band of pigment; antennae lightly pigmented; head pale except for eyepatches and interantennal band. Eyepatches oval with eye G on a level with or anterior to F. Labral papillae obscure but apparently nonsetaceous. Head roughly circular in dorsal view. Thorax projecting slightly forward. Unguis with 4 inner teeth, the apical tooth minute and perhaps sometimes absent; outer and lateral teeth small. Unguiculus with serrate outer margin. Maximum length 1.2 mm.

Remarks

Most of the specimens we saw of this species were old type specimens which did not show the chaetotaxy clearly, so we have relied heavily on Snider's description and figures. While resembling finus in having a distinct, cylindrical dental cubercle, this species is distinguished clearly by the pattern, labial chaetotaxy, and absence of an apical antennal bulb.

Localities: Florida - Dade Co., Long Pine Key, Stock Island (types).

A) Habitus.

Lepidocyrtus floridensis

FIGURE 770

B) Pattern of another specimen. All figures after Snider.

C) Macrochaetae of right side of body; pseudopores shown as hollow circles.

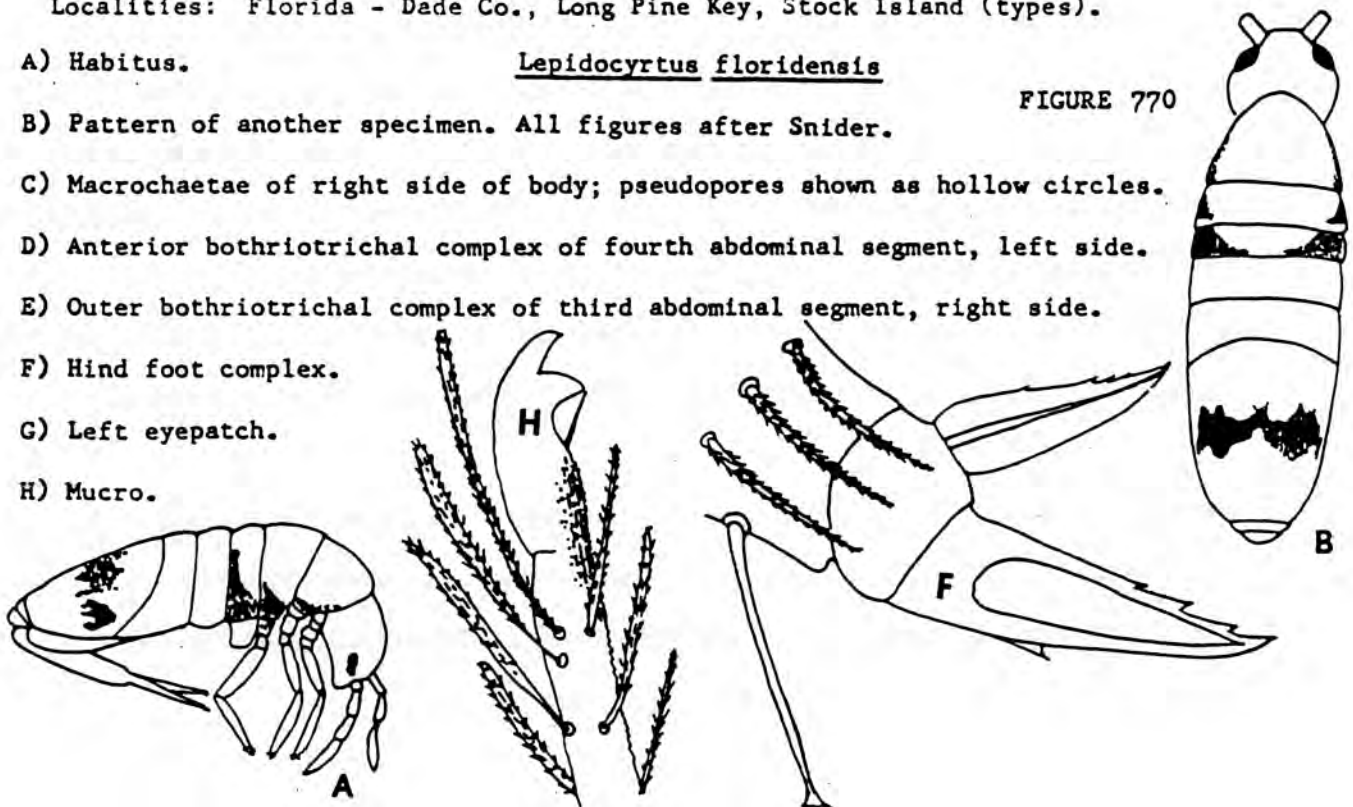
D) Anterior bothriotrichal complex of fourth abdominal segment, left side.

E) Outer bothriotrichal complex of third abdominal segment, right side.

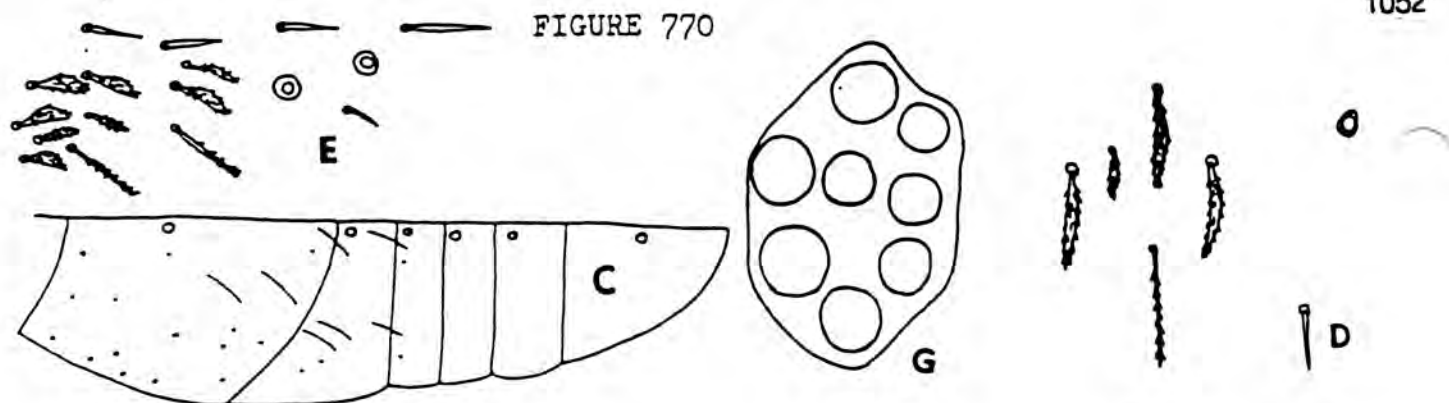
F) Hind foot complex.

G) Left eyepatch.

H) Mucro.







Lepidocyrtus helenae Snider, 1967

Fig. 771

Ref.: Contr. Am. ent. Inst. 2:37.

### Description

Color: background white to dull yellow with violet to blue pigment in the form of transverse bands covering most of each body segment back to third abdominal; fourth abdominal segment with a narrow median band, generally interrupted middorsally; at least posterior dorsal part of head pale. Eyepatches trapezoidal, with eye G behind F. Labral papillae obscure, apparently minute and nonsetaceous. Head roughly circular in dorsal view. Mesothorax not projecting strongly forward. Unguis with 3-4 inner teeth; lateral and outer teeth minute or absent. Unguiculus weakly to moderately serrate externally. Maximum length 1.0 mm.

### Remarks

Snider shows accessory microchaetae  $d_1$  and  $d_2$  of the third abdominal segment as absent, whereas they appear to be present on specimens we have identified as helenae; we could not see the chaetotaxy of this region on the type specimens. Mounted specimens, in which the strong banding tends to be obscured, may easily be mistaken for more uniformly colored species such as pallidus; however the apical antennal bulb and the presence of 4 median posterior setae on the fourth abdominal segment readily distinguishes it. This may well be the form identified by Maynard as cyaneus var. assimilis. Specimens from Texas caves entirely lack pigment except for eye patches.

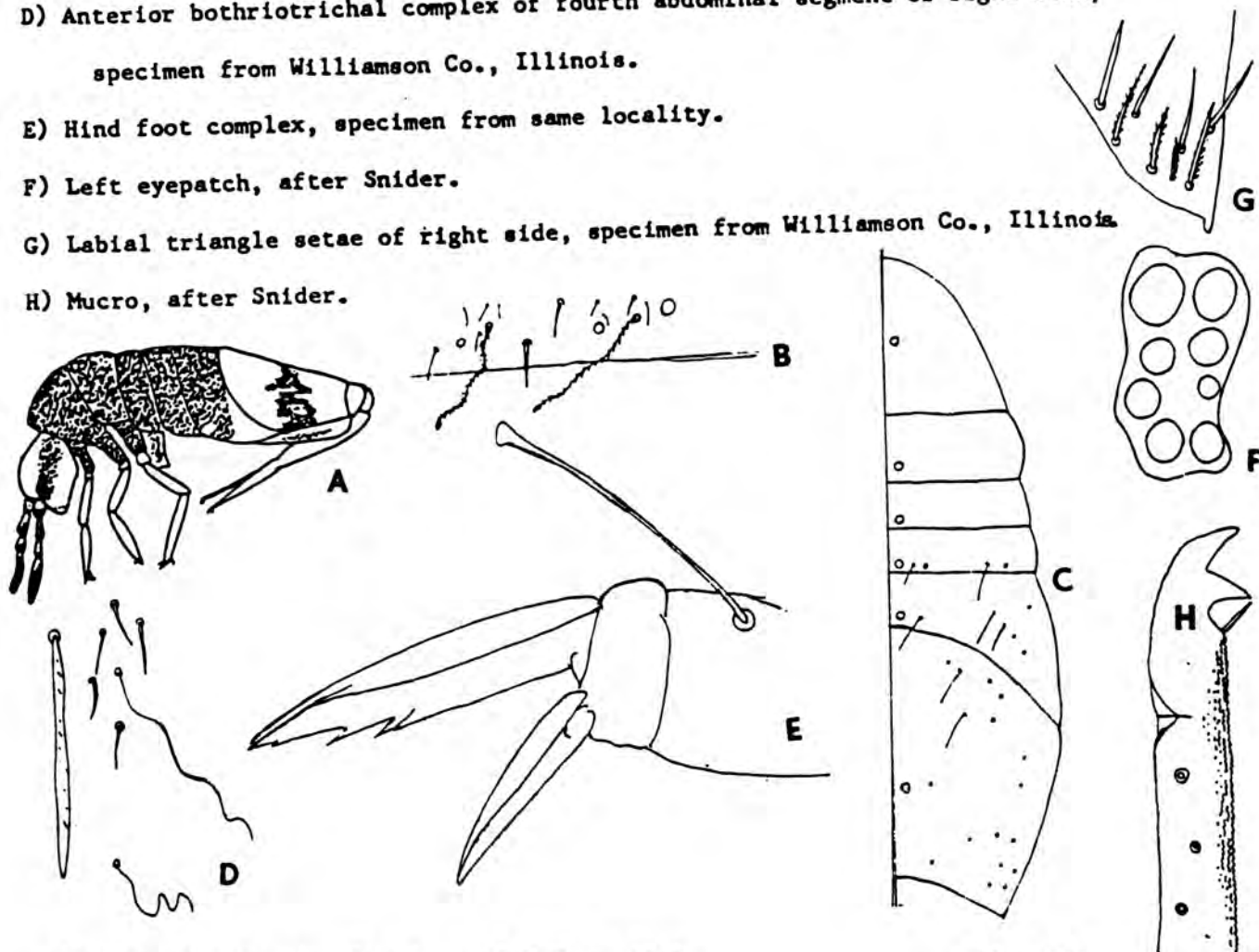
Localities: Arkansas - Boone Co.; Connecticut - Hartford Co., New Haven Co.; Illinois - Edgar Co., Putnam Co., Sokol Park, Williamson Co.; Indiana - Parke Co.; Kentucky - Adair Co. (cave), Edmonson Co.; Louisiana - Ouachita Par.; Michigan - Monroe Co. (type), Rapid City; Mississippi - Jackson Co.; Texas - Bell Co. (cave).

- A) Habitus, after Snider. Lepidocyrtus helenae  
 B) Second abdominal segment setae of left side, specimen from Williamson Co.,

Illinois.

FIGURE 771

- C) Dorsal macrochaetae, right side of body, after Snider.  
 D) Anterior bothriotrichal complex of fourth abdominal segment of right side,  
 specimen from Williamson Co., Illinois.  
 E) Hind foot complex, specimen from same locality.  
 F) Left eyepatch, after Snider.  
 G) Labial triangle setae of right side, specimen from Williamson Co., Illinois.  
 H) Mucro, after Snider.



Lepidocyrtus hirtus, Christiansen & Bellinger, 1980

Fig. 772

#### Description

Color: off-white to yellow with pigment limited to eyepatches, inter-antennal spot, and faint wash of blue on antennae. Eyepatches trapezoidal with eye G slightly to clearly posterior of eye F. Labral papillae with 2-3 (rarely 1) strong setae each. Head broadly oval in dorsal view. Mesothorax projecting strongly, pushing head into ventral position. Unguis with 3 minute inner teeth, large lateral teeth and a small outer tooth. Unguiculus with minute external serrations. Tenent hair strongly clavate. Maximum length 1.8 mm.

This species is similar to both unifasciatus and lignorum but may be distinguished from both by the presence of cephalic S and T setae. The specimens we have seen are old and details of the microchaetae are unclear; however the second abdominal segment appears to lack microseta p.

Type locality: Stone Street Park, Sioux City, Woodbury Co., Iowa, 27 May 1953 (L. Stannard). Illinois Natural History Survey, Acc. no. 49940.

Lepidocyrtus hirtus

FIGURE 772

All figures of type specimens.

A) Habitus.

B) Outer setal complex, right side of third abdominal segment; some setae unclear.

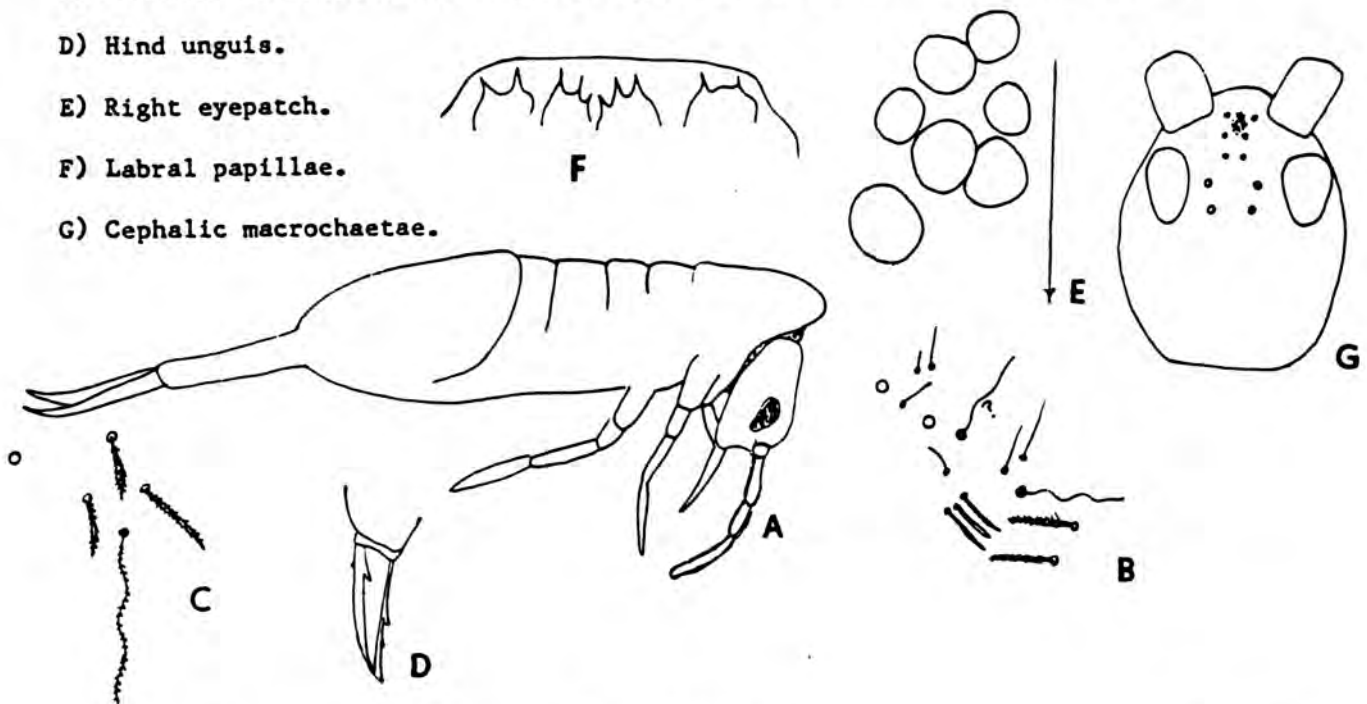
C) Anterior bothriotrichal complex, right side of fourth abdominal segment.

D) Hind unguis.

E) Right eyepatch.

F) Labral papillae.

G) Cephalic macrochaetae.



Lepidocyrtus lanuginosus (Gmelin), 1790

Fig. 773

Refs.: Systema Naturae, ed. 13:2911; Gisin, 1960, 1963, 1964, 1967; Snider, 1967.

Description

Color: white or pale yellow to brick red with dark blue pigment in eyepatches and interantennal spot; legs and antennae sometimes bluish. Eyepatches oval with eye G posterior to F. Labral papillae rounded and nonsetaceous. Head roughly circular in dorsal view. Mesothorax not projecting forward or

enlarged. Unguis with 3 small inner teeth and distinct lateral and external teeth. Unguiculus very weakly serrate externally. Maximum length 3.0 mm.

#### Remarks

Our description of this species is based on the literature and on European specimens; we have seen no Nearctic material which could be referred to lanuginosus, or in fact, any Nearctic specimens lacking body pigment, antennal scales, and mesothoracic humping, except for what are apparently immature specimens of pallidus and cinereus (which have different cephalic and labial chaetotaxy). A number of reddish Lepidocyrtus have been described from the United States, and may actually belong here.

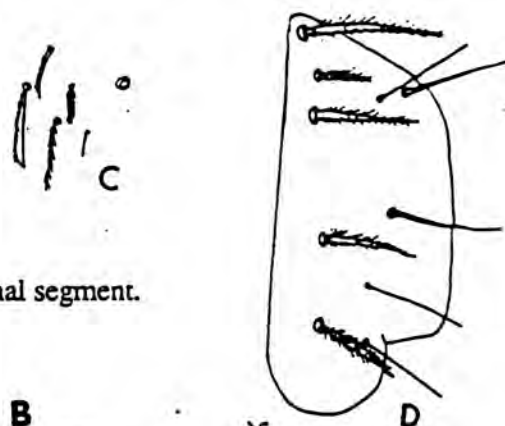
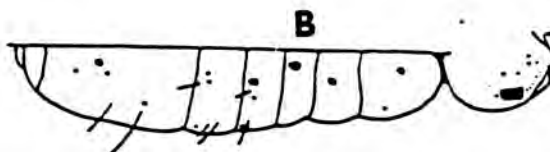
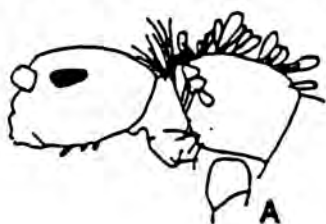
Published Nearctic records are unreliable because of confusion with other species, including L. cinereus, P. collina, etc.

FIGURE 773

#### Lepidocyrtus lanuginosus

All figures after Gisin.

- A) Habitus of anterior body.
- B) Dorsal macrochaetae of right side.
- C) Anterior bothriotrichal complex, left side of fourth abdominal segment.
- D) Labial triangle of left side.



#### Lepidocyrtus lignorum (Fabricius), 1775

Fig. 774

Refs.: Systema entomologiae: 302; Gisin, 1964, 1967; Hale 1966; Snider, 1967a; Szeptycki, 1967; Yosii, 1969.

#### Description

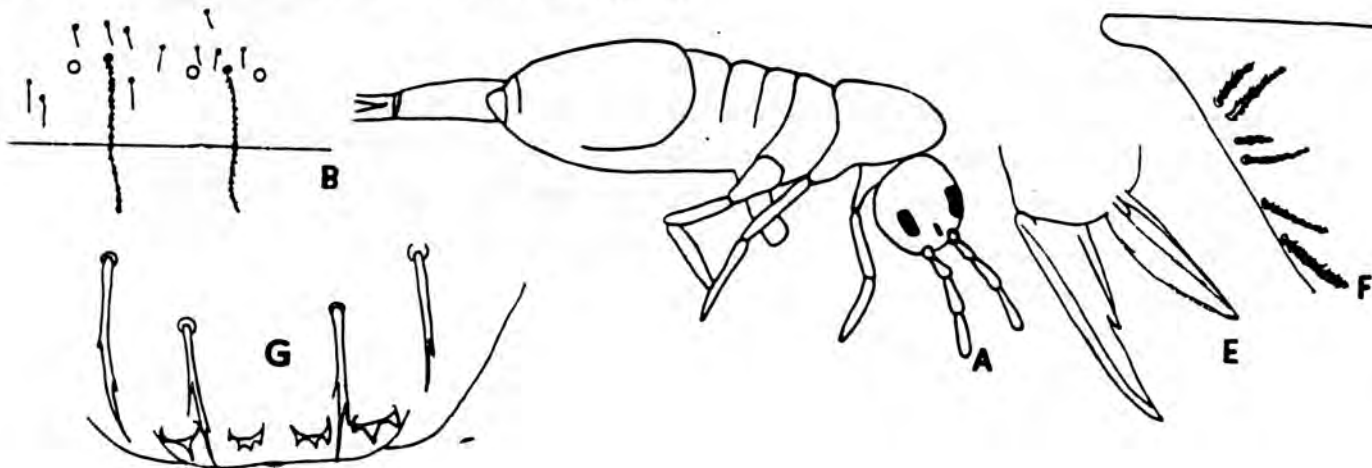
Color: yellow to white with dark pigment in the eyepatches and an interantennal spot; antennae and leg bases weakly pigmented. Rarely with lateral blue spots on fourth abdominal segment. Eyepatches oval to elliptical with eye G on a level with F or slightly posterior to it. Labral papillae multisetaceous, with 2-3 clear setae per papilla. Head oval in dorsal view. Mesothorax projecting strongly, forcing head into ventral position. Unguis with 3 small inner teeth and small outer and lateral teeth. Unguiculus with smooth or minutely serrate outer margin. Maximum length 1.6 mm.

This species is very similar in morphology to L. unifasciatus but lacks the strong pattern of that species. Our specimens fall into 2 groups, with and without the p seta on the second abdominal segment, and the first group might in fact represent patternless unifasciatus; however this seta appears to be variable in European lignorum also. Specimens from Kansas often lack seta  $d_3$  on the third abdominal segment and have slight differences in the chaetotaxy of the second abdominal segment (see figures). The relationship between all these forms need further study.

Localities: Arkansas - Polk Co.; Connecticut - New Haven Co.; Illinois - Lake Co.; Indiana - Wayne Co.; Kansas - Douglas Co.; Louisiana - Ouachita Par.; Tennessee - Marion Co.

Additional records: Michigan (Snider, 1967); West Virginia (Lippert and Butler, 1976). Lepidocyrtus lignorum

- A) Habitus, specimen from Douglas Co., Kansas.
- B) Second abdominal segment setae of left side, specimen from Ouachita Par., Louisiana.
- C) Second abdominal segment setae of left side, specimen from same locality as A.
- D) Outer setal complex of left side of third abdominal segment, specimen from same locality as B.
- E) Hind foot complex, specimen from same locality as A.
- F) Labial triangle setae, basal, left side, same locality as B.
- G) Labrum, seen from above, after Szeptycki.





Refs.: Bull. Brooklyn ent. Soc. 43:44 (as unifasciatus var.); Snider, 1967a.

Description

Color: background yellow with dark blue pigment in transverse bands, one covering the second and most of the third abdominal segment, one across the middle of the fourth and one on the fifth abdominal segment; sometimes with scattered pigment on posterior margin of first abdominal segment; eyepatches and interantennal spot dark; antennae and posterior femora suffused with pigment. Eyepatches oval to trapezoidal with eye G slightly behind F. Labral papillae unclear but apparently unisetaceous or bisetaceous. Head oval in dorsal view. Mesothorax projecting prominently, pushing head into ventral position. Unguis with 3 small inner teeth and large lateral and external teeth. Maximum length 1.5 mm.

Remarks

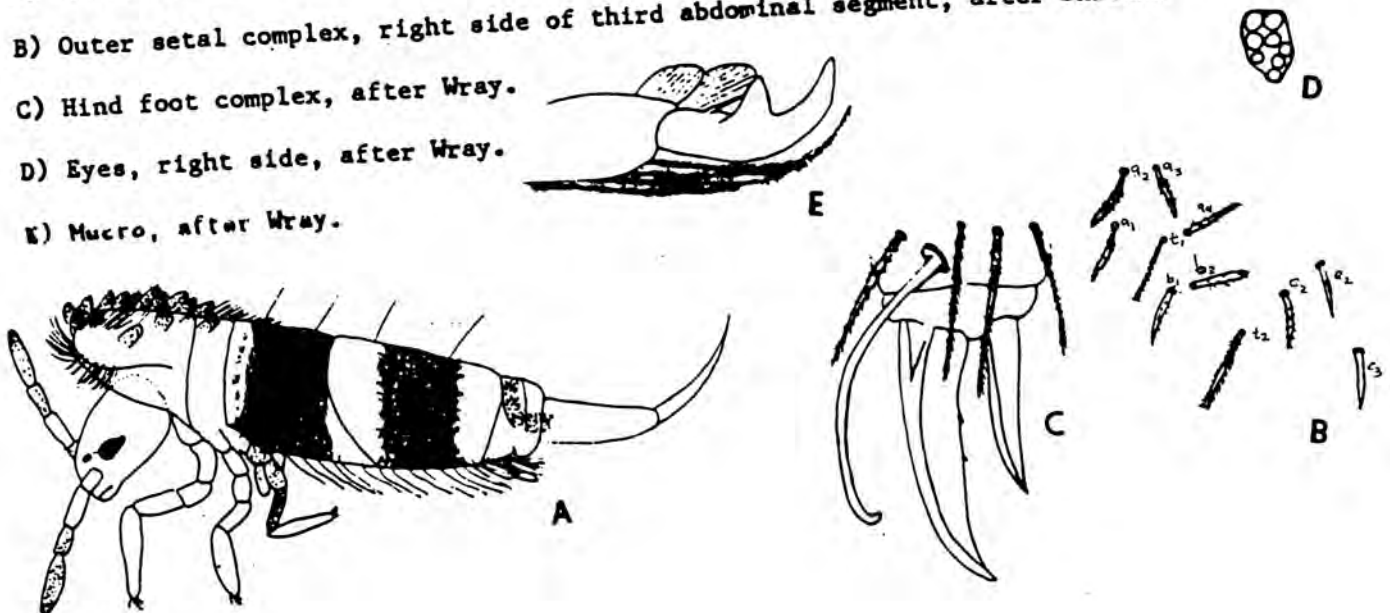
The specimens we have seen were all in poor condition and did not show the details of chaetotaxy; the morphological features which were visible were not different from those of unifasciatus, of which this may be a local variant. However Snider figures the third abdominal segment chaetotaxy as very different, and this combined with the different pattern leads us to keep the two species separate until fresh topotypical material of neofasciatus can be studied.

Localities: North Carolina - Erwin (type), New Hanover Co.

FIGURE 775

Lepidocyrtus neofasciatus

- A) Habitus, after Wray.
- B) Outer setal complex, right side of third abdominal segment, after Snider.
- C) Hind foot complex, after Wray.
- D) Eyes, right side, after Wray.
- E) Mucro, after Wray.



Lepidocyrtus pallidus Reuter, 1892

Fig. 776

Refs.: Meddn. Soc. Fauna Flora fenn. 17:24; Gisin, 1965, 1967; Snider, 1967a; Hüther, 1971.

Reexamination of the material we had previously identified as pallidus has led us to conclude that none of the specimens we had identified as pallidus are in fact that species. All lack cephalic macrochaetae R<sub>2</sub> characteristic of that species. Some of the specimens are almost certainly the same as Mari Mutt's L. firmicolus but there is much variation in pigment, the shape of eye G and whether seta r is vestigial or absent. A detailed analysis would be required to determine how many taxa are involved. Whether or not true pallidus occurs in North America remains in doubt. Specimens which key out here belong to a cluster of species.

Localities: Arkansas - El Dorado Co.; California - Alameda Co., Contra Costa Co.; Connecticut - Litchfield Co., New Haven Co.; Florida - Dade Co.; Illinois - Alexander Co., Champaign Co., Douglas Co., Lake Co., La Salle Co., McLean Co.; Indiana - Parke Co., Pulaski Co., Union Co., Wayne Co.; Iowa - Poweshiek Co.; Louisiana - Ouachita Par.; Missouri - Iron Co., Pulaski Co.; New Jersey - Somerset - Co., Union Co.; Pennsylvania - Housertontown; Texas - Denton Co. Published records are unreliable because of possible confusion with other species, especially L. cinereus.

Lepidocyrtus pallidus

- A) Habitus, specimen from greenhouse.  
 B) Macrochaetae of dorsum, after Gisin.  
 C) Setae, left half of dorsum of second abdominal segment, after Gisin.  
 D) Outer setal complex of third abdominal segment, right side, specimen from greenhouse.

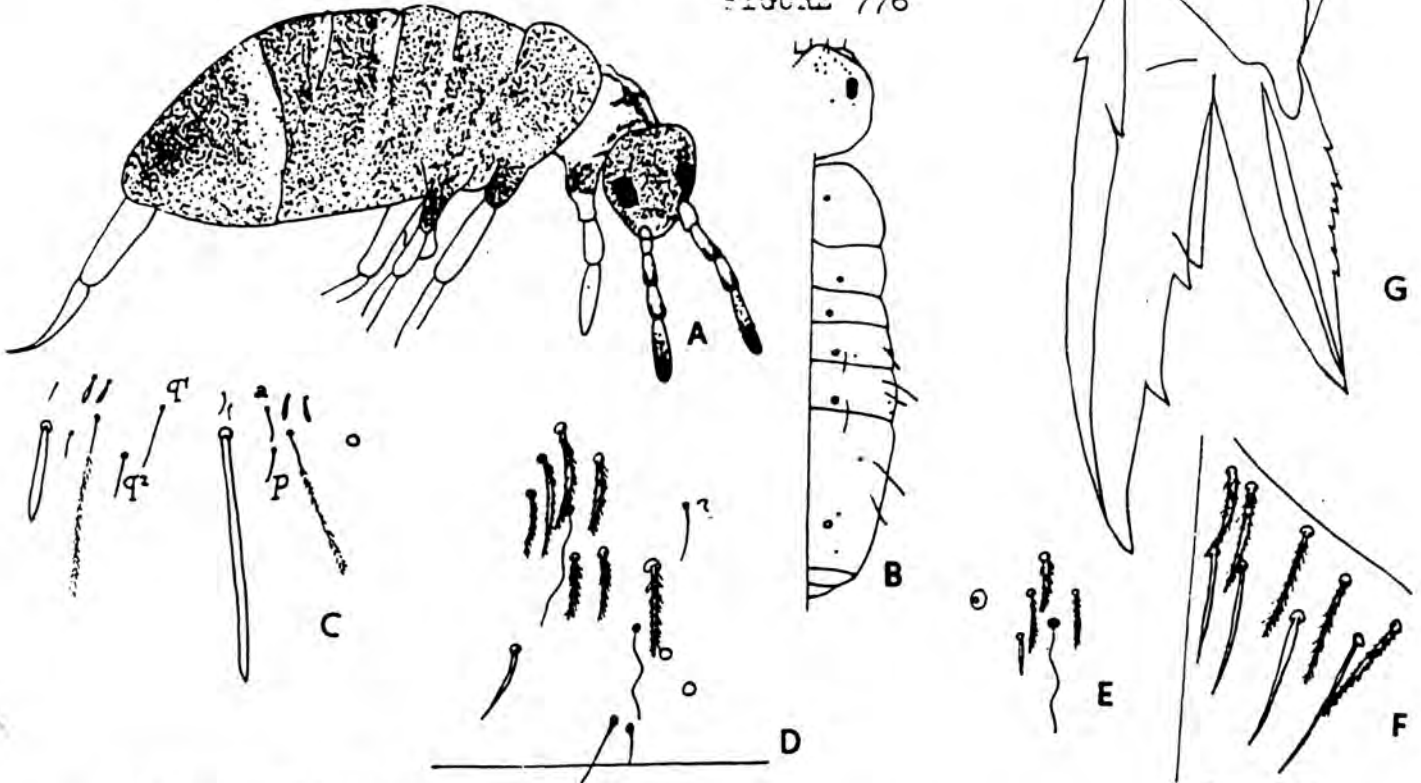
FIGURE 776

E) Anterior bothriotrichal complex, right side of fourth abdominal segment, specimen from Illinois.

F) Labial triangle setae, left side, specimen from greenhouse.

G) Hind foot complex, same specimen.

FIGURE 776



Lepidocyrtus paradoxus Uzel, 1891

Fig. 777

Refs.: Sber. K. böhm. Ges. Wiss., math.-naturw.Kl. 2:50; Gisin, 1960, 1964; Snider, 1967 Stach, 1967; Szeptycki, 1967.

Syn.: Paidium cucullatum Koch, 1840?, Naturhistorische Topographie von Regensburg 3:356; cephalopurpureus Harvey, 1894, Ent. News 5:324, .; christianseni Goto, 1953, Ann. Mag. nat. Hist. (12)5:30.

Description

Color: deep blue with scattered spots, basal antennal segment, legs, and furcula pale; head sometimes with V-shaped dorsal dark markings and irregular lateral patches on pale background. Eyepatches oval with eye G on a level with F in mature specimens. Labral papillae broad, low, and weakly unisetaceous. Head elliptical in dorsal view. Mesothorax strongly enlarged and produced, displacing head into markedly ventral position. Unguis with 3 small inner teeth, very large lateral teeth, and small external tooth. Unguiculus weakly serrate externally. Maximum length 3.0 mm.

## Remarks

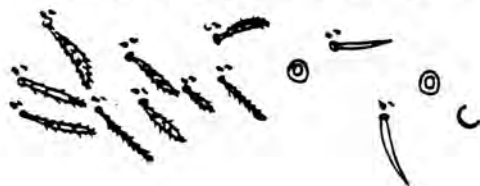
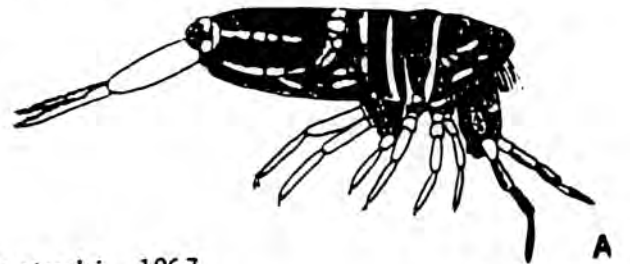
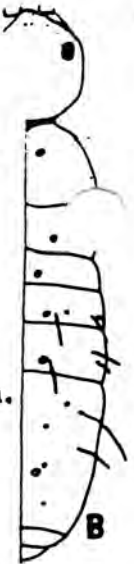
The Nearctic specimens have labial seta  $M_1$  slightly larger than in Gisin's figures, but on the whole they agree well with the descriptions and figures of the European species. The dark color and projecting mesonotum distinguishes this species from all other Nearctic forms and permits immediate recognition of adults. Juveniles from Indiana have eye G posterior to F and lack labial triangle seta  $M_1$ . Such young specimens might be confused with L. violaceus, but differ also in having the third antennal segment scaled. We have seen a type of L. cephalopurpureus, and it agrees with paradoxus in all morphological features; the peculiar coloration (pale metathorax and abdomen) seen by Harvey in some specimens has not been seen since and may be a rare aberration. Localities: Connecticut - Litchfield Co., New Haven Co.; Delaware - New Castle Co.; Indiana - Dubois Co., Union Co., Wayne Co., Wells Co.; Maine - Orono (type of L. cephalopurpureus); Vermont - Chittenden Co., Windsor Co.; Virginia - Alexandria Co.

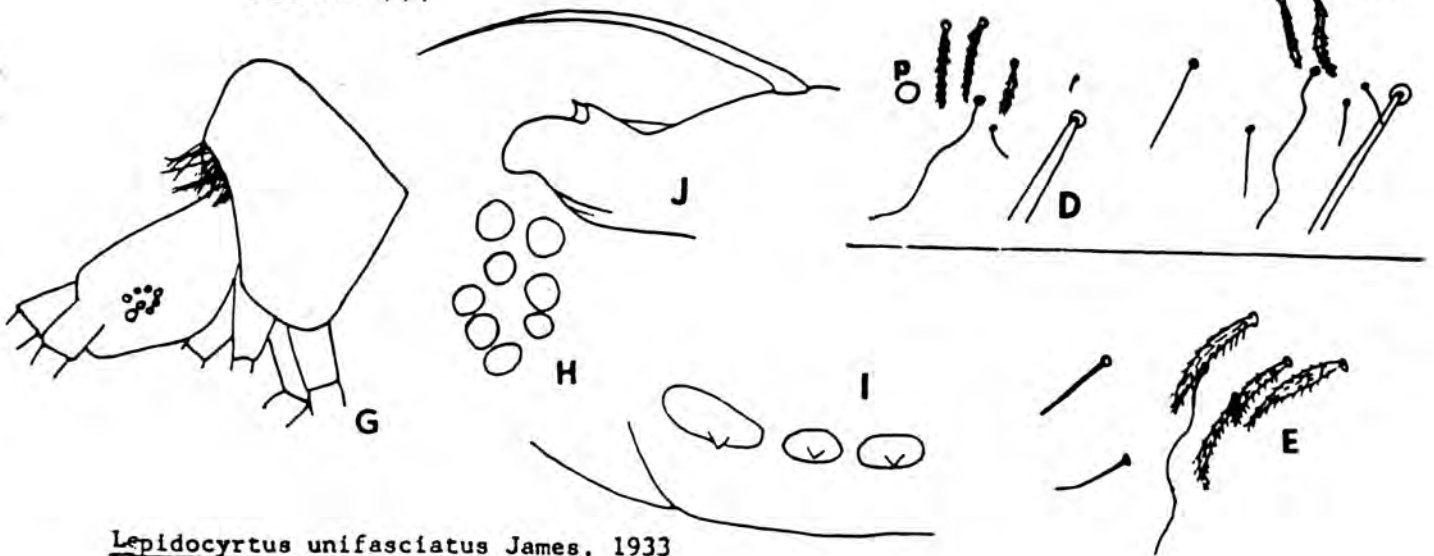
Additional records: Maryland (Ostdiek, 1961, as christianseni); Massachusetts (type of christianseni); Michigan (Snider, 1964); West Virginia (Lippert and Butler, 1976).

Lepidocyrtus paradoxus

FIGURE 777

- A) Habitus, after Snider.
- B) Dorsal macrochaetae of right side; circles represent pseudopores; after Gisin.
- C) Outer setal complex of right side of third abdominal segment, after Snider.
- D) Setae of right side of second abdominal segment, specimen from Wayne Co., Indiana.
- E) Anterior bothriotrachelal complex of left side of fourth abdominal segment, specimen from same locality.
- F) Hind foot complex, same specimen.
- G) Head and mesothorax, after Goto.
- H) Eyes of left side of head, after Goto.
- I) - J) Labrum, top and side view, after Szeptycki, 1967.





Lepidocyrtus unifasciatus James, 1933

Refs.: Trans. R. Can. Inst. 19:107; Snider, 1967a.

Description

Fig. 778

Color: background yellow to off-white; dark blue to purplish pigment in eyes, interantennal spot, and a transverse band across the middle of the fourth abdominal segment; antennae washed with pigment. Eyepatches oval to trapezoidal with eye G slightly posterior to F. Labral papillae bisetaceous or trisetaceous, often difficult to see. Head broadly oval in dorsal view. Mesothorax enlarged, pushing head into ventral position. Unguis with 3 small inner teeth and moderate to large lateral and external teeth. Unguiculus with smooth outer margin. Maximum length 1.5 mm.

Remarks

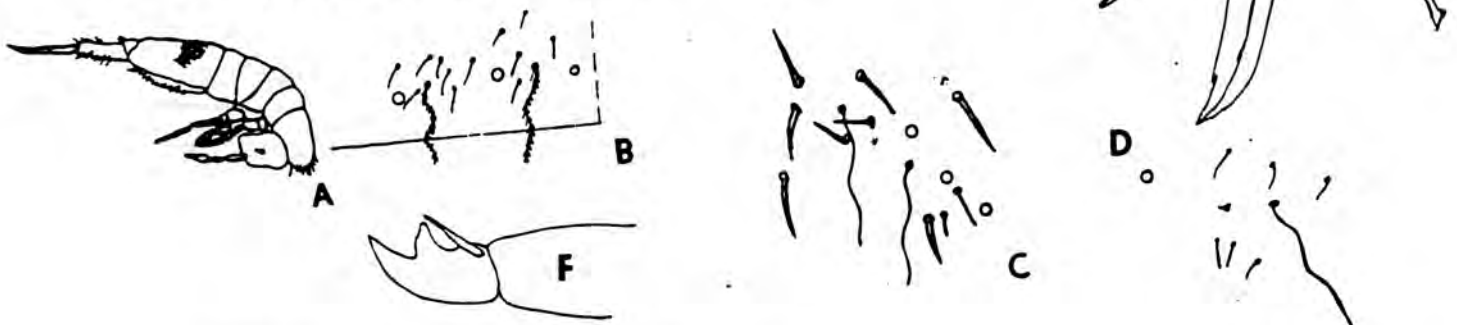
As defined the species is easily recognized by its pattern; only some specimens of finus, without appendage scales and with other morphological differences, are similar. See, however, the remarks under L. lignorum and neofasciatus.

Localities: Arkansas - Boone Co.; Indiana - Parke Co., Wayne Co.; Kentucky - Bath Co., Fayette Co.; Maryland - Green Ridge Mt.; Tennessee - Marion Co. Ontario - Kent Co. (type).

Additional records: Kentucky (Lesshafft, 1977); Michigan (Snider, 1967); New York (Maynard, 1951); North Carolina (Brimley, 1938); Oklahoma (Fenton and Howell, 1957); South Carolina (DuRant and Fox, 1966); West Virginia (Lippert and Butler, 1976).



- A) Habitus, after Maynard.
- B) Setae of dorsum of left half of second abdominal segment, specimen from Boone Co., Arkansas.
- C) Outer setae complex of third abdominal segment, right side, composite; arrows show alternate positions of setae.
- D) Anterior bothriotrichal complex of fourth abdominal segment of right side, specimen from Wayne Co., Indiana.
- E) Hind foot complex, specimen from Fayette Co., Kentucky.
- F) Mucro, specimen from same locality.



Lepidocyrtus violaceus Fourcroy, 1785

Fig. 779

Refs.: Entomologia parisiensis; 525; Gisin, 1964, 1965; Snider, 1967a; Szeptycki, 1967

Syn.: metallicus Packard, 1873? Rep. Peabody Acad. Sci. 5:36

#### Description

Color: body deep to (rarely) pale blue with scattered pale spots and (rarely) pale intersegmental bands; head with dorsal pattern in the form of a backward pointing V or arrow-shaped mark, and pale spots on cheeks and posterior margin; legs and furcula usually pale. Eyepatches trapezoidal to triangular with eye G definitely posterior to F. Labral papillae strongly unisetaceous (rarely bisetaceous). Head oval in dorsal view. Mesothorax not projecting or strikingly developed. Tenent hair strongly clavate. Unguis with 3 small inner teeth and small lateral and external teeth. Unguiculus with outer margin smooth or very finely serrate. Maximum length 1.5 mm.

It is not certain that Nearctic populations are conspecific with European violaceus; specimens have the labral papillae unisetaceous or (rarely) bisetaceous, whereas Szeptycki shows 1-3 setae per papilla for the European form. The general similarity is sufficient to justify combining them for the moment. The abdominal chaetotaxy was seen on very few specimens, and observed variation makes it possible that there are two Nearctic taxa combined here. We have seen the types of L. metallicus Packard, and although little fine detail can be seen it is very probable that they are violaceus in our sense.

Localities: California - San Mateo Co.; Colorado - Boulder Co.; Connecticut - Hartford Co.; Illinois - Ogle Co.; Indiana - Wells Co.; Maine - Knox Co.; Massachusetts - Middlesex Co.; Michigan - Alger Co.; Utah - Blacksmith Fork Canyon, Cache Co., Water Canyon Nova Scotia - Halifax Co., Picton Co.

Additional records: Kentucky (Lesshaft, 1977); New York (Maynard, 1951).

Northwest Territories (Hammer, 1953a). Lepidocyrtus violaceus

A) Chaetotaxy of left side of second abdominal segment, specimen from Wells Co., Indiana.

FIGURE 779

B) Chaetotaxy of left side of third abdominal segment, specimen from Wells Co., Indiana.

C) Head, specimen from Utah.

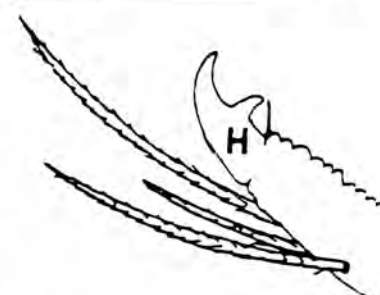
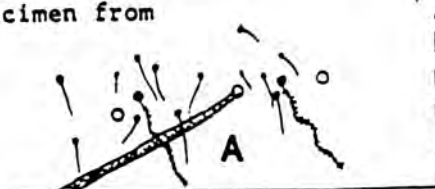
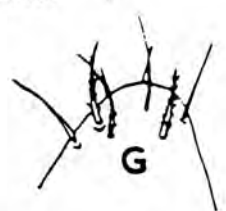
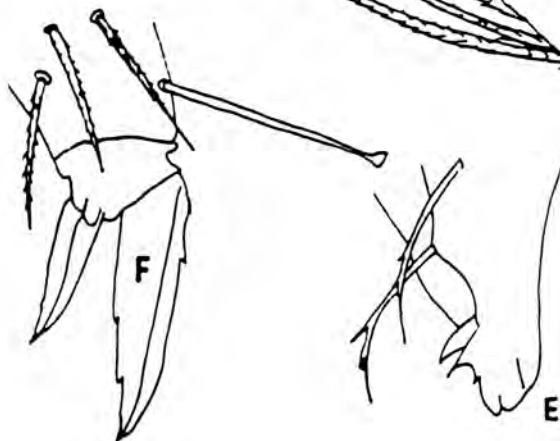
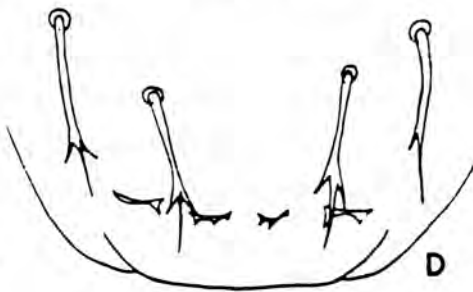
D) Labral papillae, front view, after Szeptycki, 1967.

E) Labral papillae, side view, after Szeptycki, 1967

F) Fore foot complex, specimen from San Mateo Co., California.

G) Apex of antenna, same specimen.

H) Mucro and apex of dens, same specimen.



Genus Pseudosinella Schäffer, 1897

Type species: Tullbergia immaculata Lie-Pettersen, 1897

Syn.: Troglosinella Delmare, 1949, type species: T. hirsuta Delmare, 1949

We include in this genus all the scaled Entomobryinae having a bidentate mucro and fewer than 8+8 eyes. All species also have dental scales and reduced dorsal macrochaetae. The scales are apically rounded and are relatively thin and weakly sculptured. The antennae are four-segmented but vary greatly in length; they lack scales in all Nearctic species; in many species the inner sensillae in the sense organ of the third segment are modified from the usual rodlike form (as noted in the species descriptions). The fourth abdominal segment mid-dorsally is at least 2 1/2 times as long as the third. Except where noted, the mucro has subequal teeth and a basal spine which extends approximately to the apex of the antepical tooth.

#### Remarks

The separation of this genus from Lepidocyrtus is entirely arbitrary, although most of the cavernicole species are quite different in appearance from members of that genus.

Certain features of the chaetotaxy are critical in the classification of Pseudosinella. The lettering system developed by Gisin and Gama for these features is illustrated here. Figures 780A and 780F show the dorsal macrochaetae, bothriotricha and pseudospores; the latter may be distinguished from sockets of macrochaetae by position and by their thinner margins. The presence or absence of mid-cephalic macrochaetae  $R_0$ ,  $R_1$ ,  $R_2$ ,  $R_3$ , S and T (Fig. 780F) and the arrangement of the macrochaetae on the fourth abdominal segment are particularly important; in many Nearctic species they are 0+3 in parallel lines (see P. hirsuta, Fig. G-J) instead of 1+2 as shown in Figure 780A.

Figures 780B and 780C show the 2 bothriotricha on the second abdominal segment (midline to left) and certain associated setae. The setae a, b, and  $q_1$  (in Nearctic species) may be macrochaetae (indicated by capital letters) or microchaetae (indicated by lower case letters); p may be absent (-); B is always a macrochaeta except in P. rolfsi.

Figure 780D shows the accessory setae associated with the anterior bothriotrix on the fourth abdominal segment; the seta s may be present or absent.

Figure 780E shows the setae of the labial triangle. Large setae are represented by capital letters, small setae by lower case letters. Ciliate setae are underscored while smooth setae are not. There are normally 2 medial (M) setae although there may be only 1 as in P. octopunctata, or in some species there may be supplementary setae ( $M_{1r}$ ,  $M_{2r}$ ) slightly below the level of the normal M setae. The r setae, immediately lateral to the M setae, are generally smaller than the other setae and

may be totally reduced to a socket and rudimentary seta (o). The two lateralmost setae ( $L_1$ ,  $L_2$ ) are often omitted from some figures of the labial triangle of individual species.

A computer global database for Pseudosinella, using the Delta program was developed by the authors and M.M. DaGama in 1990. Anyone working with this genus should use this program if at all possible. Identification of species is far easier and more accurate using the this program than using the present work. This program can be contacted through INTERNET (TELNET). Contact the Grinnell College system at AC.GRIN.EDU. When you have contacted the system, type BUGS and when it asks for the password, use DELTA. Information can then be obtained from the program itself. Forty characteristics are used in the program including some, such as the manubrial plaque, not used in the present work. Illustrations of these features can be found in the original paper: Computer Assisted Identifications of Pseudosinella (Collembola Entomobryidae). Rev. Ecologie et Biologie du Sol, 1990 27(2):231:246. Copies of this paper may be obtained from the senior author.

This genus is clearly polyphyletic and is in great need of a re-analysis. The database mentioned above could be used for such an analysis; however, a more complete knowledge of the genus Lepidocyrtus would be required. M.M. DaGama has initiated such a study for many European species in 1984, but given the localized nature of most Pseudosinella species it is highly probable that different lineages of Lepidocyrtus are ancestral to Pseudosinella forms in different regions. Only 5 of the 33 North American Pseudosinella have been recorded elsewhere. P. aera and P. violenta have been recorded from Central America and P. alba, P. octopunctata, and P. sexoculata are widespread. More detailed analysis of the last 3 species may show several more regional species to be involved.

There are 33 determinable Nearctic species: 1) aera, 2) alba, 3) argentea, 4) bona, 5) certa, 6) christianseni, 7) collina, 8) dubia, 9) erehwon, 10) espana, 11) espanita, 12) extra, 13) flatua, 14) folsomi, 15) fonsa, 16) georgia, 17) gisini, 18) granda, 19) hirsuta, 20) nata, 21) octopunctata, 22) ops, 23) orba, 24) pecki, 25) rolfsi, 26) sera, 27) sanguinea, 28) sexoculata, 29) spinosa, 30) testa, 31) vespera, 32) violenta, 33) vita.



Features of chaetotaxy in Pseudosinella and Lepidocyrtus.

FIGURE 780

- A) Dorsal bothriotricha, medial macrochaetae, and pseudopores.
- B) Chaetotaxy of second abdominal segment, left side, after Gisin.
- C) Chaetotaxy of second abdominal segment, as exemplified by Pseudosinella violenta, left side.
- D) Anterior bothriothrix of fourth abdominal segment, with associated microsetae, right side.
- E) Chaetotaxy of labial triangle, left side.
- F) Cephalic chaetotaxy.

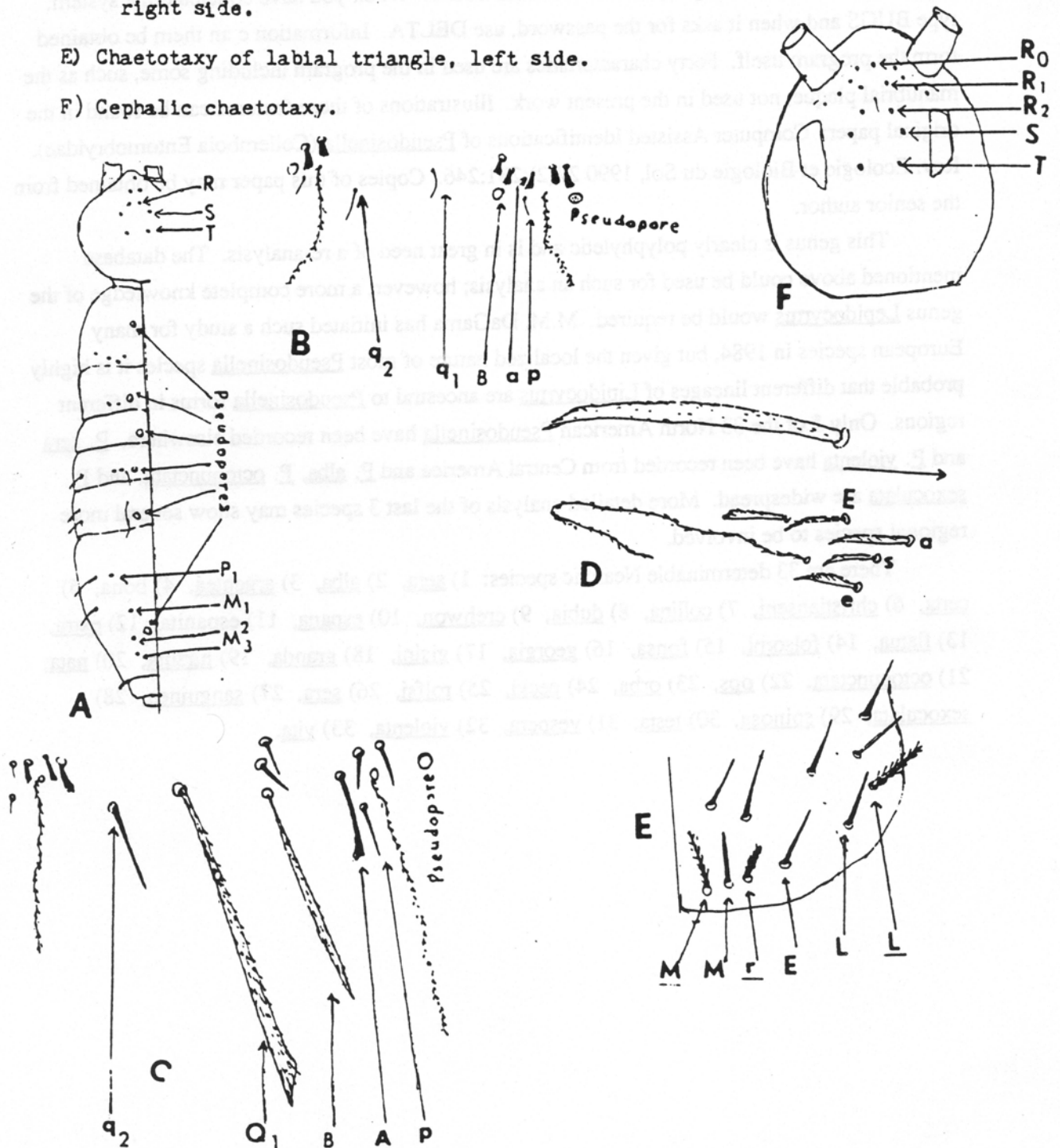




Table XXXVI Described species of *Pseudosinella*  
 \* Surface species, \*\* troglophile species .Remainder found only in caves.

species	eyes	R0	R1	R2	R3	S	T	Labial triangle setae <sup>4</sup>	macrochaetae thoracic segments		macrochaetae 4th abdomen			Tenent Hair	unguicular tooth	setae per side along cephalic ventral groove C = ciliate S = smooth				
									II	III	Abd.II	chaelotaxy 5	p				m			
aera	2+2(3)(4)	+	+	-	-	-	-	M <sub>1</sub> M <sub>2</sub> (M <sub>2</sub> r)(o)E(E)L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl	-	0s 4c
alba**	2+2	+	+	+	-	+	-	M <sub>1</sub> M <sub>2</sub> o E(E) L <sub>1</sub> (L <sub>1</sub> ) L <sub>2</sub> (L <sub>2</sub> )	1	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	1	2	ac-cl	-	0s 4c
argentea**	0	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> o.vg E L <sub>1</sub> L <sub>2</sub> <sup>1</sup>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl(tr)	-	0s 4c
bona	1+1 2+2	2	+	+	-	-	-	M <sub>1</sub> (M <sub>1</sub> )M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	0s 4c
certa	0	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	1?	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	+	?
christianseni	0	+	+	+	-	-	-	m <sub>1s</sub> M <sub>1</sub> (m <sub>2s</sub> )M <sub>2</sub> r(r)E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	-	q <sub>2</sub>	0	4(3)	ac	-	6-8s 0c
collina*	6+6	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl	-	0s 4c
dubia	5+5(6+6)	+	+	+	-	-	-	m <sub>1s</sub> (M <sub>1</sub> )(m <sub>2s</sub> )M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	-	q <sub>2</sub>	0	3	cl	+	3s 1c
erehwon	0	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	2	1	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl-ac	-	0s 4c
espana	0	+	+	+	-	+	.2	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	2,3	1	p	a	B	Q <sub>1</sub>	q <sub>2</sub>	1	2	ac	+	2s 4c, 3s 2c
espanita	0	+	+	+	-	+	+	M <sub>1</sub> M <sub>2</sub> vg E L <sub>1</sub> L <sub>2</sub>	3	2	p	a	B	q <sub>1</sub>	q <sub>2</sub>	1	2	ac	+	0s 6-8c
extra	0	+	+	+	+	-	-	M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	2	1	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	0s 4c
flatus	0	+	+	+	-	-	-	m <sub>1</sub> (M <sub>1</sub> , M <sub>1</sub> , m <sub>1</sub> ) M <sub>2</sub> (M <sub>2</sub> ) r E(E) L <sub>1</sub> (L <sub>1</sub> ) L <sub>2</sub> (L <sub>2</sub> )	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	3s 1c,(4c)
folsomi**	0	+	+	-	-	-	-	M <sub>1s</sub> M <sub>1</sub> (M <sub>2s</sub> )M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	0	0	p	A	B	Q <sub>1</sub>	q <sub>2</sub>	1	2	cl	-	4s 0c
fonsa	3-4 (2?)	+	+	+	-	-	-	(M <sub>1s</sub> )M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl	-	0s 3-4c
georgia	5+5- 6+6	+	+	+	-	-	-	M <sub>1</sub> (m <sub>1</sub> s) M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl	-	0s 4c
gisini	0- 2+2(3)	+	+	+	-	-	-	see p # 981A	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl-ac	-	see page 981A
granda	0	2	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> o.vg E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	0s 4c
hirsuta	0(1, 2)	+	+	+	-	-	-	(M <sub>1s</sub> ) M <sub>1</sub> (M <sub>2s</sub> ) M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p±	a	B	-	q <sub>2</sub>	0	3(4)	ac(tr)	-	4s 0c(5-7s 0c, 4-6s 1c)
nata	0	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	?	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl	-	?
octopunctata*	4+4(5+5)	+	+	+	-	+	+	M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	1	0	p	A	B	Q <sub>1</sub>	q <sub>2</sub>	1	2	cl	-	0s 4c
ops	3+3	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> (M <sub>2</sub> )r E (E)L <sub>1</sub> L <sub>2</sub>	0	0	p	-	B	q <sub>1</sub>	-	0	2	cl	-	0s 4c
orba <sup>7</sup>	0 (1 vest.)	+	+	+	+	+	+	(M <sub>1s</sub> )M <sub>1</sub> (M <sub>1</sub> )(M <sub>2s</sub> )M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	3,2	3(1)	-	a	B	q <sub>1</sub>	q <sub>2</sub>	(0)1	2	ac	-	2s 4c, 1s 5c
pecki	0	+	+	+	-	-	-	m <sub>1</sub> (M <sub>1</sub> )M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	3-4s 0c
rolfsi <sup>8</sup>	0	+	-	-	-	-	-	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	Q <sub>1</sub>	q <sub>2</sub>	0	1(2)	cl	+	4s 0c
sera	0	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	0	0	-	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	cl	+	?
sanguinea <sup>3+</sup>	1+1	?	?	?	?	?	?	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub>	?	?	p	-?	B	Q <sub>1</sub>	q <sub>2</sub>	0	1	ac	?	?
sexoculata	3+3	+	+	+	-	-	+	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	Q <sub>1</sub>	q <sub>2</sub>	1	2	cl	-	0s 4c. 1s 3c
spinosa	0	+	-	-	-	-	-	(M <sub>1s</sub> )M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	-	q <sub>2</sub>	0	3	ac	-	7-10s 0c
testa	3+3	+	+	+	-	-	-	M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	0	0	-	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	?
vespera	0	+	+	+	+	-	-	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	3	2	-	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	0s 4c
violenta <sup>8**</sup>	0	+	-	-	-	-	-	M <sub>1</sub> M <sub>2</sub> o E L <sub>1</sub> L <sub>2</sub>	0	0	p	A	B	Q <sub>1</sub>	q <sub>2</sub>	0	2	cl(tr)	+	4(5)s 0c
vita	0	+	+	+	-	+	+	M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	4	3	p	A	B	Q <sub>1</sub>	q <sub>2</sub>	1	2	ac(tr)	-	0s 4c

Table XXXVI continued  
 Characteristics of undescribed Nearctic species of Pseudosinella

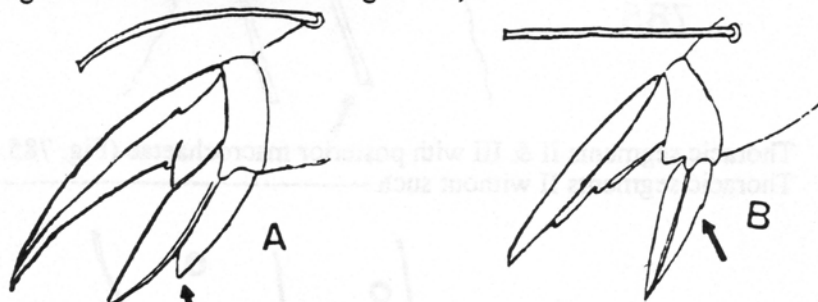
species locality	eyes	R0	R1	R2	R3	S	T	Labial triangle setae <sup>4</sup>	macrochaetae thoracic segments		Abd. II chaetotaxy <sup>5</sup>					Tenent hair 6	unguicular tooth	macrochaetae along each side ventral groove on head. s = smooth c = ciliate.		
									II	III	p	a	B	q1	q2				p	m
A Virginia	1 vg	+	+	-	-	-	-	M <sub>1</sub> (M <sub>1</sub> ) M <sub>2</sub> I E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	-	0	2	ac	-	0s 4c
BB* Louisiana	7+7	+	+	+	-	-	-	(m1) M <sub>2</sub> 0 E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	1	2	cl	-	0s 4c
C* Louisiana	3+3	+	+	-	-	-	-	M <sub>1</sub> M <sub>2</sub> 0 E L <sub>1</sub> L <sub>2</sub>	0	0	+	a	B	q <sub>1</sub>	q <sub>2</sub>	0	2	ac	-	0s 4c
AB Oklahoma	0	?	?	?	?	-	-	M <sub>1</sub> M <sub>2</sub> I E L <sub>1</sub> L <sub>2</sub>	0	0	p	a	B	q <sub>1</sub>	q <sub>2</sub>	0	3	ac	-	0s 4c
AC Tennessee	3+3	+	+	+	-	-	-	M <sub>1s</sub> M <sub>1</sub> M <sub>2</sub> I E L <sub>1</sub> L <sub>2</sub>	0	0	?	?	?	?	?	0	2	ac	-	1s 3c
AD Texas	0	+	+	+	-	+	+	M <sub>1</sub> M <sub>2</sub> 0 E L <sub>1</sub> L <sub>2</sub>	1	0	-?	a	B	q <sub>1</sub>	-?	1	2	cl	-	0s 4c
AF Virginia	0	+	+	+	+	+	-	M <sub>1</sub> M <sub>2</sub> L E L <sub>1</sub> L <sub>2</sub>	3	2	?	?	B	?	?	0	2	ac	-	0s 4c

<sup>1</sup>P. argentea shows 5 variants in the labial chaetotaxy; however, most of these occur in Arkansas caves. In other localities 85% of all specimens show normal chaetotaxy given. In Arkansas caves only 62% of the specimens show the normal chaetotaxy. <sup>2</sup>Seta we formerly interpreted as T is better considered seta S. <sup>3</sup>The features given here are questionable. They are based partly on Jackson's description and partly on one specimen labeled "type", probably by Jackson. <sup>4</sup>Upper case = large seta, lower case = small seta, o = rudimentary or absent seta; underscored = ciliate setae, others smooth; s = supplementary seta. <sup>5</sup>Upper case = macrochaeta. <sup>6</sup>cl = clavate, ac = acuminate, tr = truncate. <sup>7</sup>Mature males from some localities may be different. <sup>8</sup>rolfsi - violenta hybrids have violenta chaetotaxy

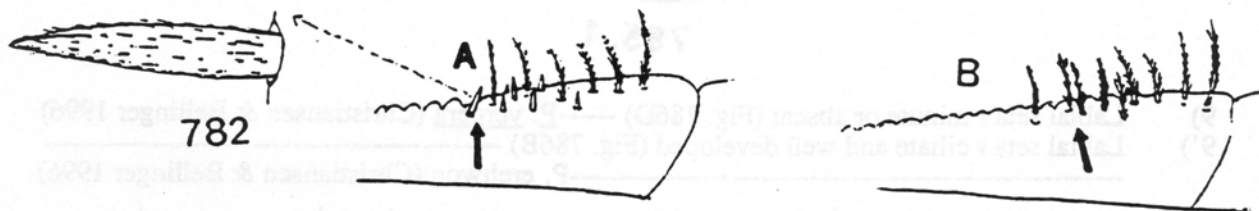
Key to Nearctic Species of *Pseudosinella*

- 1) Eyeless -----2  
 1') With eyes -----22  
 2) With a strong outer tooth on unguiculus (Fig. 781A) -----17  
 2') Outer tooth of unguiculus minute or absent Fig. 781B) -----3

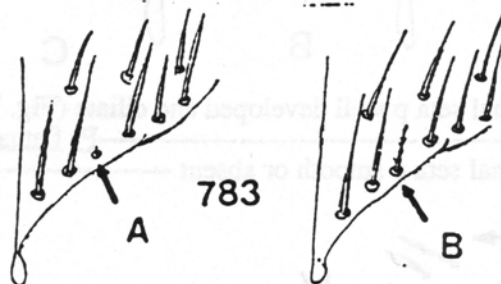
781



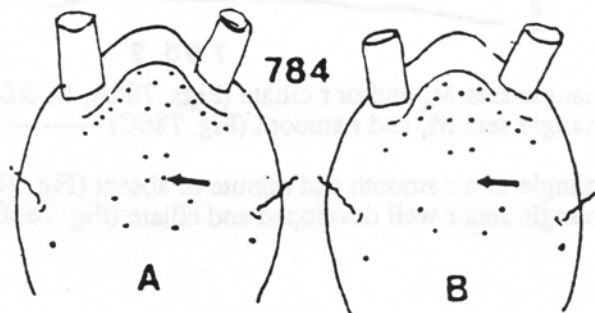
- 3) Dens with spine-like setae dorsally (Fig. 782A) -----*P. spinosa*  
 3') Dens without spine-like setae (Fig. 782B) -----4



- 4) Fourth antennal segment at least twice as long as cephalic diagonal -----*P. christianseni*  
 4') Fourth antennal segment less than twice as long as cephalic diagonal -----5  
 5) Dorsal cephalic setae S & T present (Fig. 780F) -----6  
 5') Dorsal cephalic setae S & T absent (Fig. 784B) -----7



- 6) Labial triangle with r seta rudimentary or absent (Fig. 784A); dorsal cephalic seta R3 present (Fig. 784A) -----*P. orba*  
 6') Labial triangle with r seta well developed and ciliate (Fig. 783B); dorsal cephalic seta R3 absent (Fig. 784B) -----*P. vita*





- 7) Second abdominal segment seta Q1 a macrochaeta (Fig. 785) ----- *P. folsomi*
- 7') Second abdominal set q1 a macrochaeta or absent ----- 8

785

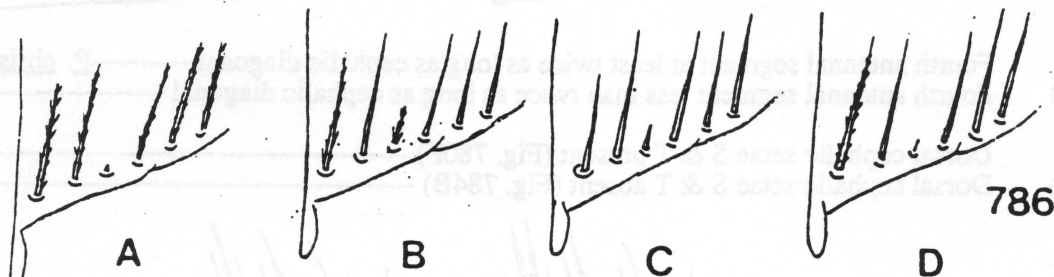


- 8) Thoracic segments II & III with posterior macrochaetae (Fig. 785.1) ----- 9
- 8') Thoracic segments II without such ----- 10



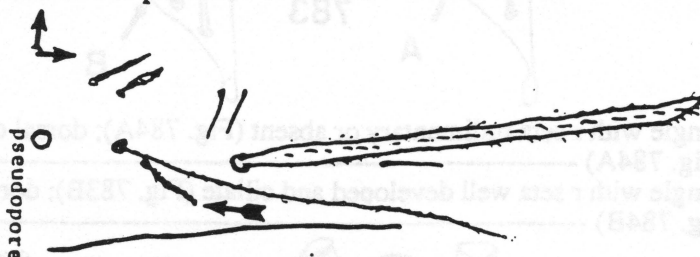
785.1

- 9) Labial seta r minute or absent (Fig. 786D) ----- *P. verpera* (Christiansen & Bellinger 1996)
- 9') Labial seta r ciliate and well developed (Fig. 786B) ----- *P. erehwon* (Christiansen & Bellinger 1996)



786

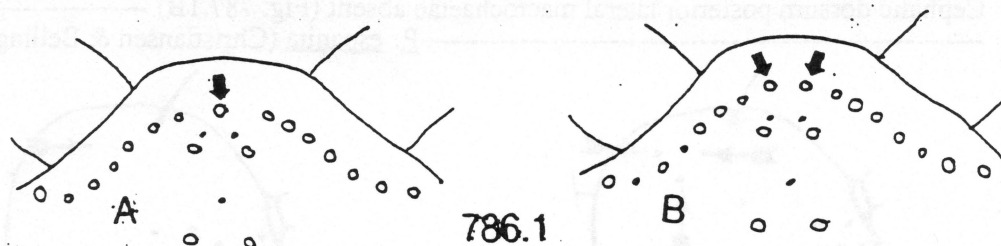
- 10) Second abdominal seta p well developed and ciliate (Fig. 785.2) ----- *P. flavus* (Christiansen & Bellinger 1996)
- 10') Second abdominal seta p smooth or absent ----- 11



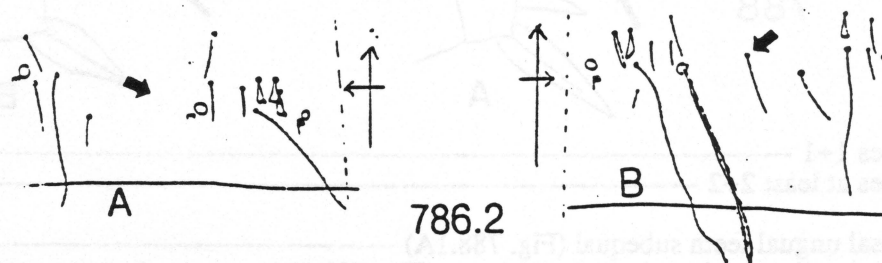
785.2

- 11) Labial triangle seta M<sub>1</sub> and/or r ciliate (Figs. 786A, B, &D) ----- 12
- 11') Labial triangle seta M<sub>1</sub> and r smooth (Fig. 786C) ----- 16
- 12) Labial triangle seta r smooth and minute or absent (Fig. 786A) ----- 13
- 12') Labial triangle seta r well developed and ciliate (Fig. 786B) ----- 14

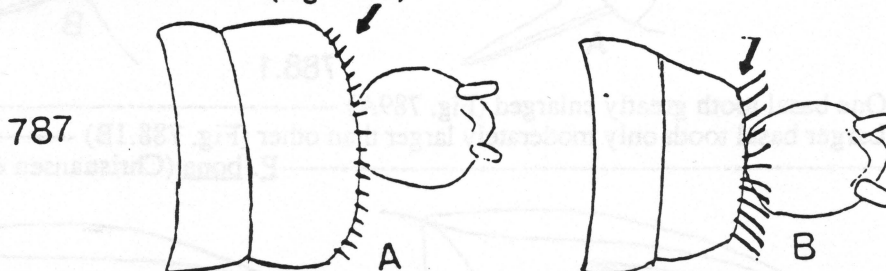
- 13) One R0 seta (Fig. 786.1A) ----- *P. argentea*<sup>1</sup>  
 13') Two R0 setae (Fig. 786.1B) ----- *P. granda*



- 14) Some pigment almost always present, at least on head, labial seta r vestigial -----  
 ----- *P. gisini carolina*. (Christiansen & Bellinger 1996)  
 14') Pigment entirely lacking, labial seta r ciliate ----- 15  
 15) Antennae more than 2 times as long as cephalic diagonal ----- *P. pecki*  
 15') Antennae less than 1.7 times as long as cephalic diagonal -----  
 ----- *P. extra* (Christiansen & Bellinger 1996)  
 16) Second abdominal segment  $q_1$  absent (Fig. 786.2A) ----- *P. hirsuta*  
 16') Second abdominal segment  $q_1$  present (Fig. 786.2B) ----- *P. nata*



- 17) All labial triangle setae smooth (Fig. 786C) ----- 18  
 17') Some labial triangle setae ciliate (Fig. 786A & D) ----- 19  
 18) Macrochaetae of 2nd thoracic segment "collar" short and acuminate, mesothoracic tergum wider than metathoracic (Fig. 787A) ----- *P. rolfsi*  
 18') Macrochaetae of 2nd thoracic segment "collar" long and clavate, mesothoracic tergum narrower than metathoracic (Fig. 787B) ----- *P. violenta*

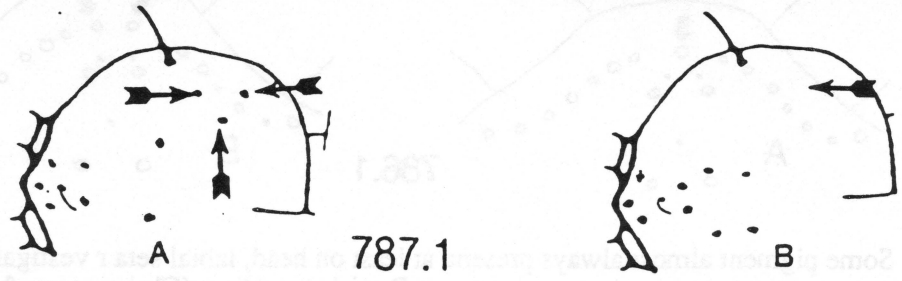


- 19) Only  $M_1$  seta of labial triangle ciliate (Fig. 786D) ----- 20  
 19') All labial triangle seta ciliate (Fig. 786A) ----- 21

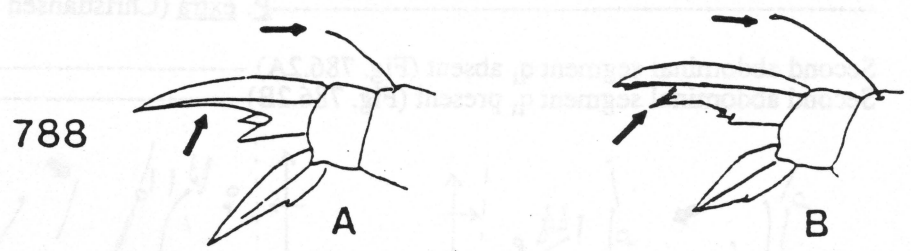
<sup>1</sup> 95% of specimens of *argentea* will key out here, but there is much variation in this species (see Footnote on Table 36).



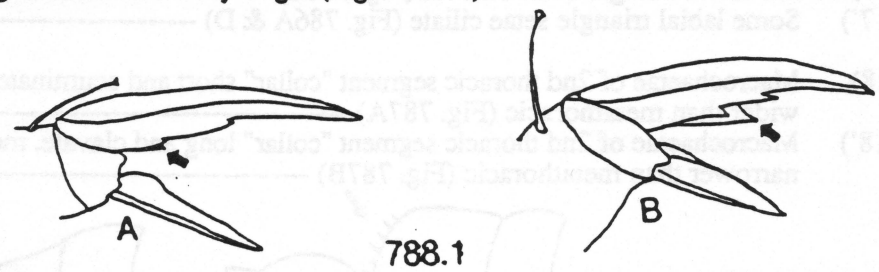
- 20) Cephalic dorsum with posterior lateral cephalic macrochaetae present (Fig. 787.1A) -----  
 -----P. espana  
 20') Cephalic dorsum posterior lateral macrochaetae absent (Fig. 787.1B) -----  
 -----P. espanita (Christiansen & Bellinger 1996)



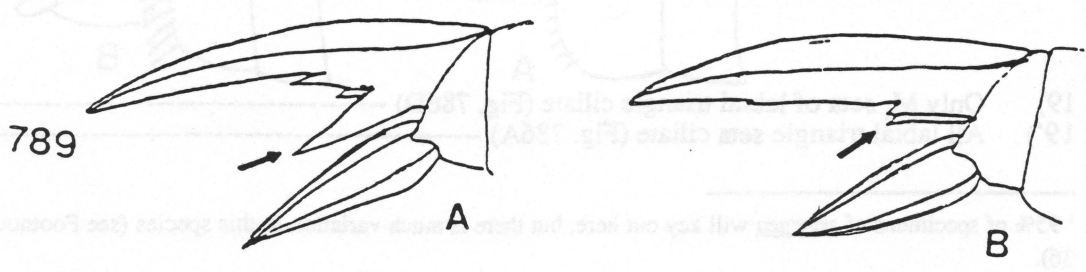
- 21) Tenent hair shorter than unguiculus, unguis with only a pair of basal teeth (Fig. 788A) -----  
 -----P. certa  
 21') Tenent hair subequal to or longer than unguiculus; unguis with paired basal and unpaired inner tooth (Fig. 788B) -----  
 -----P. sera



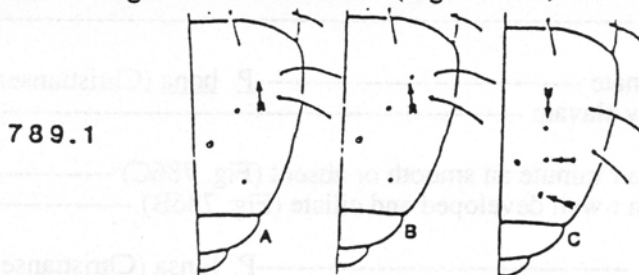
- 22) Eyes 1+1 -----23  
 22') Eyes at least 2+2 -----27  
 23) Basal ungual teeth subequal (Fig. 788.1A) -----25  
 23') One basal ungual tooth distinctly larger (Fig. 788.1B) -----24



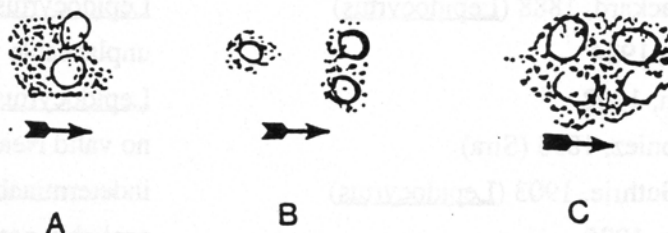
- 24) One basal tooth greatly enlarged (Fig. 789A) -----P. orba  
 24') Larger basal tooth only moderately larger than other (Fig. 788.1B) -----  
 -----P. bona (Christiansen & Bellinger 1996)



- 25) Small (less than 1 mm) surface species ----- *P. sanguinea*  
 25') Large (more than 2 mm) cave species ----- 26
- 26) Fourth abdominal segment with 2 M setae (Fig. 789.1A) ----- *P. gisini*  
 26') Fourth abdominal segment with 3 M setae (Fig. 789.1B) ----- *P. hirsuta*

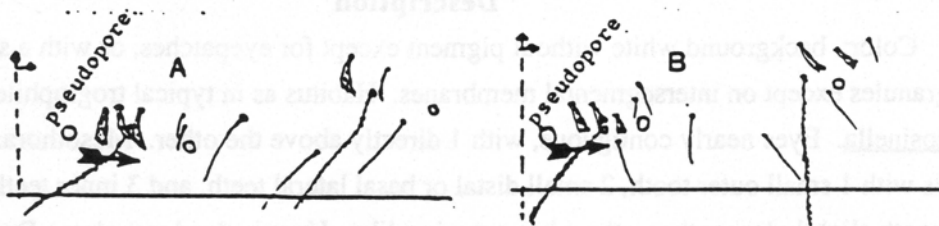


- 27) Fourth abdominal segment with macrochaetae  $P_1$  present (Fig. 789.1A) ----- 28  
 27') Fourth abdominal segment lacking macrochaetae  $P_1$  (Fig. 789.1B) ----- 30
- 28) Eyes 2+2 (Fig. 789.2A) ----- *P. alba*  
 28') Eyes 3+3 or more (Fig. 789.2B or C) ----- 29



789.2

- 29) Eyes 3+3 (Fig. 789.2B) ----- *P. sexoculata*  
 29') Eyes 4+4 (Fig. 789.2C) ----- *P. octopunctata*
- 30) Fourth abdominal segment with 3+3 or more median macrochaetae (Fig. 789.1C) ----- 31  
 30') Fourth abdominal segment with 2+2 median macrochaetae (Fig. 789.1B) ----- 32
- 31) With at least 5 eyes per side ----- *P. dubia*  
 31') With no more than 2 eyes per side ----- *P. hirsuta*
- 32) Second abdominal segment p seta absent (Fig. 789.3A) ----- *P. testa*  
 32') Second abdominal segment p seta present (Fig. 789.3B) ----- 33



789.3

- 33) Labial triangle seta  $M_2$  smooth (Fig. 786B or C) ----- 34  
 33') Labial triangle seta  $M_2$  ciliate (Fig. 786A) ----- 37

- 34) Basal ungual teeth subequal (Fig. 788.1A) -----35  
 34) One basal ungual tooth distinctly larger (Fig. 788.1B) -----36
- 35) Eyes 3+3 or fewer -----P. gisini  
 35') Eyes 5+5 or more -----P. georgia
- 36) Tenent hair acuminate -----P. bona (Christiansen & Bellinger 1996)  
 36') Tenent hair weakly clavate -----P. ops
- 37) Labial triangle seta r minute and smooth or absent (Fig. 786C) -----P. aera  
 37') Labial triangle seta r well developed and ciliate (Fig. 786B) -----38
- 38) 4+4 or fewer eyes -----P. fonsa (Christiansen & Bellinger 1996)  
 38') 6+6 eyes -----P. collina

Not included in key:

- |  |   |
|--|---|
| ** <u>atropurpurea</u> Packard, 1888 ( <u>Lepidocyrtus</u> ) | <u>Lepidocyrtus</u>   |
| <u>attenuata</u> Bonet, 1934                                 | unplaceable without types   |
| <u>candida</u> Folsom, 1902                                  | <u>Lepidocyrtus</u>   |
| <u>cavernarum</u> Moniez, 1893 (Sira)                        | no valid Nearctic records   |
| ** <u>decemoculata</u> Guthrie, 1903 ( <u>Lepidocyrtus</u> ) | indeterminable from types   |
| <u>decipiens</u> Denis, 1925                                 | probably not Nearctic; <u>decipiens</u> of Bonet, 1934, unplaceable without specimens |
| <u>duodecimocellata</u> Handschin, 1928a                     | Nearctic records are probably <u>collina</u>  |
| <u>duodecimpunctata</u> Denis, 1931b                         | Nearctic records are probably <u>collina</u>  |
| <u>folsomi</u> Denis, 1931                                   | = <u>violenta</u>   |
| <u>petterseni</u> Borner, 1901                               | Nearctic records are <u>violenta</u>  |

Pseudosinella aera, Christiansen & Bellinger, 1980

Fig. 791

### Description

Color: background white without pigment except for eyepatches, or with a scattering of blue granules except on intersegmental membranes. Habitus as in typical troglophile Pseudosinella. Eyes nearly contiguous, with 1 directly above the other. Mesothorax not enlarged. Unguis with 1 small outer tooth, 2 small distal or basal lateral teeth, and 3 inner teeth; basalmost inner tooth slightly larger than others but not wing-like. Unguiculus lanceolate. Dentes without spines. Mucro normal. Anterior macrochaetae of "collar" of mesothorax of short type 1 setae. Maximum length 2.5 mm.

### Remarks

In many respects, this species resembles *P. alba*, but it may readily be distinguished by the abdominal chaetotaxy (see Table XXXVI) as well as by the habitus and the unguis. It is known primarily from caves, but also occurs rarely in surface habitats. The Missouri specimens have larger eyes and more pigment than the others, and may represent a different species. Some specimens from Montgomery Co., Tenn. have labial setae smooth rather than ciliate as usual. *P. aera* shows some similarity to *P. argentea*, and it may be an eyed form of the species.

Type locality: Cumberland Caverns, McMinnville, Warren Co., Tenn.

Additional localities: Alabama - St. Claire, Co.; Illinois - Gallatin Co. (cave), Johnson Co. (cave); Kentucky - Henry Co. (cave), Wolfe Co.; Louisiana - Ouachita Par.; Missouri - Dade Co. (cave (?), Newton Co. (cave); Tennessee - Coffee Co. (cave), Decatur Co. (cave), Franklin Co. (cave), Montgomery Co. (cave), Roberts Co. (cave), Wilson Co.; Texas - Williamson Co. (cave); Virginia - Shenandoah Co. (cave).

### FIGURE 791

#### *Pseudosinella aera*

- A) Habitus, type specimen.
- B) Chaetotaxy of dorsum of left side of second abdominal segment, specimen from Virginia cave.
- C) Hind foot complex, specimen from Coffee Co., Tennessee.
- D) Hind unguis, type specimen.
- E) Right eyepatch, type specimen.
- F) Labial triangle setae of right side, type specimen.
- G) Mucro and apex of dens, specimen from Coffee Co., Tennessee.

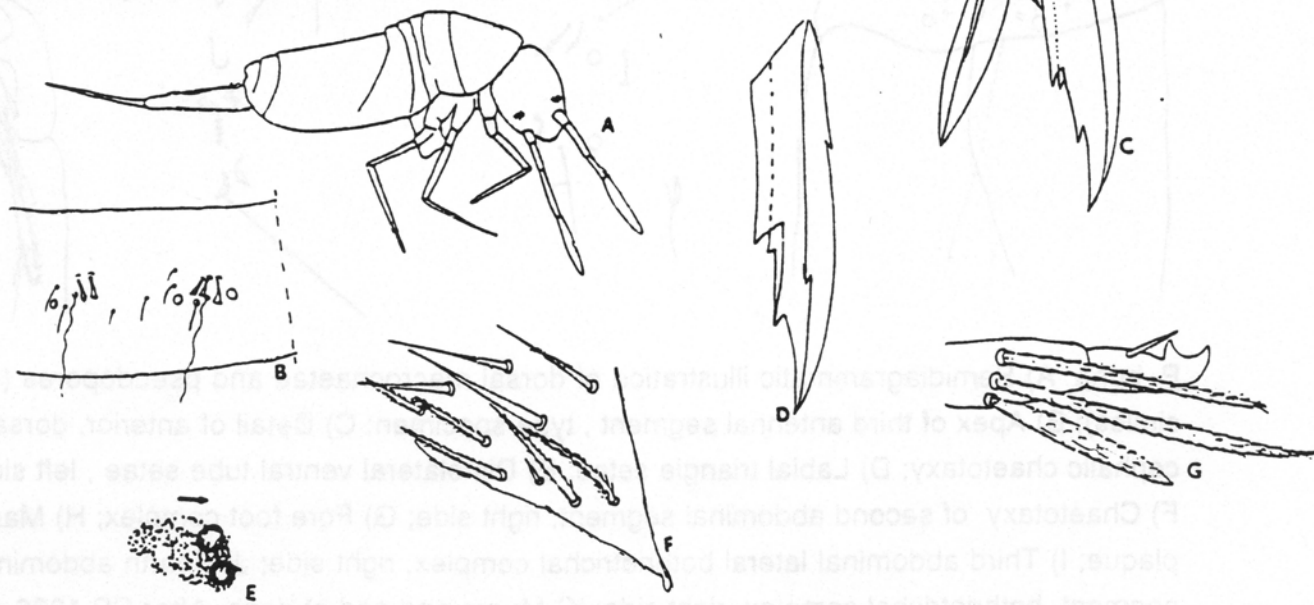
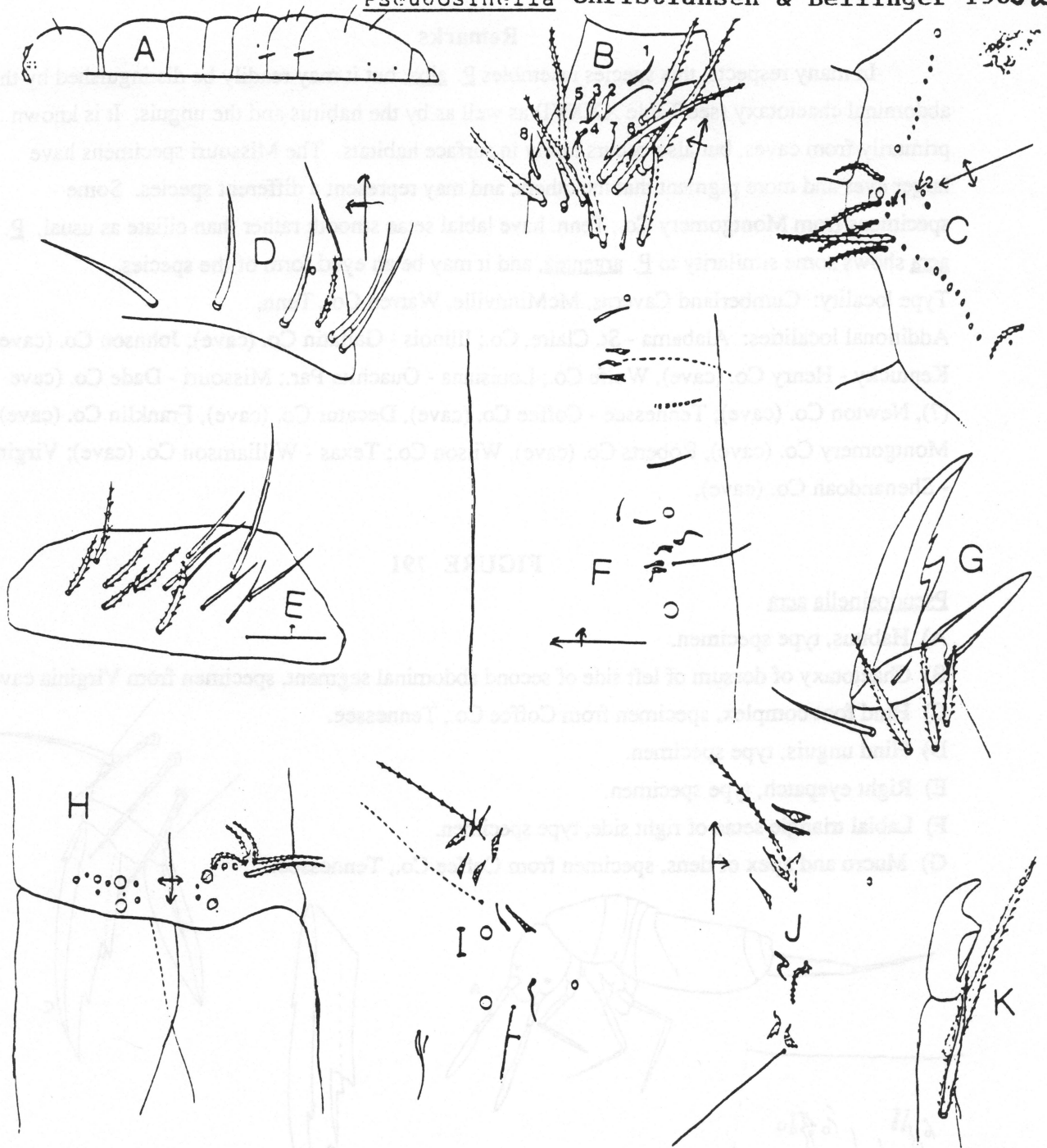




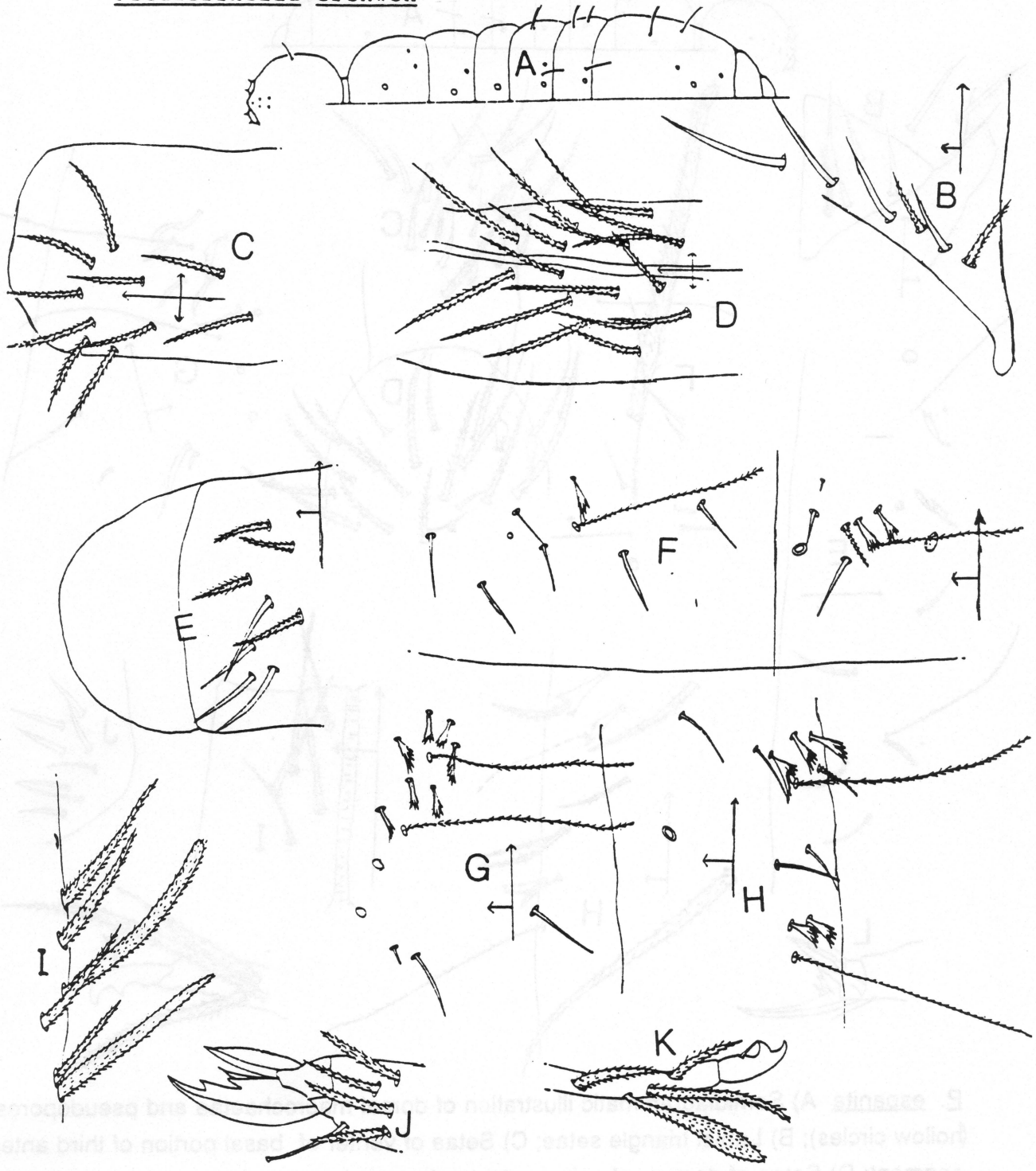
Figure 791.1

*Pseudosinella* Christiansen & Bellinger 1986a

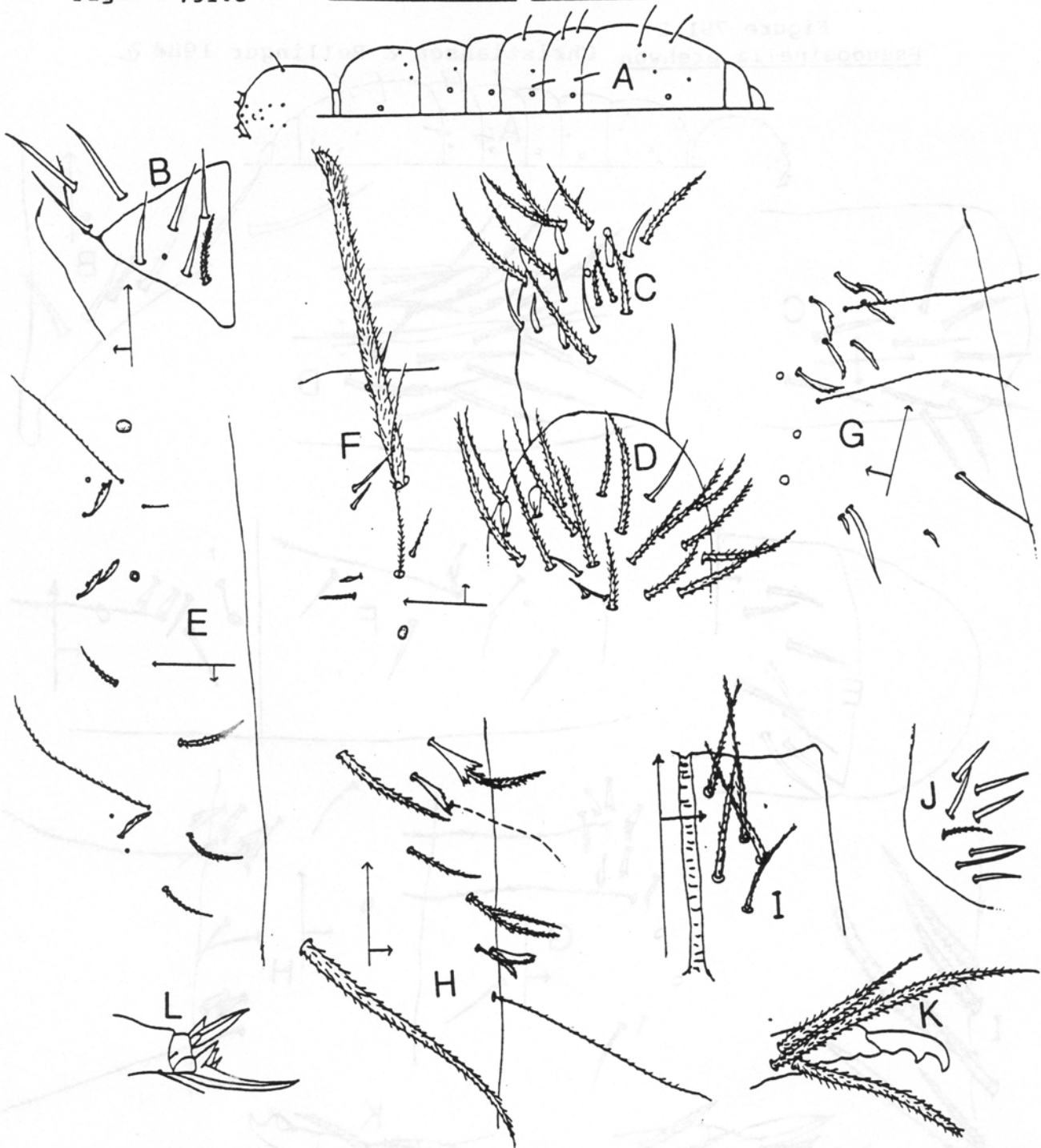
*P. bona* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores ( hollow circles); B) Apex of third antennal segment , type specimen; C) Detail of anterior, dorsal cephalic chaetotaxy; D) Labial triangle setae; E) Distolateral ventral tube setae , left side; F) Chaetotaxy of second abdominal segment, right side; G) Fore foot complex; H) Manubrial plaque; I) Third abdominal lateral bothriotrichal complex, right side; J) Fourth abdominal segment bothriotrichal complex, right side; K) Muicro and end of dens. After CB 1996



Figure 791.2  
*Pseudosinella erehwon* Christiansen & Bellinger 1986 ♀

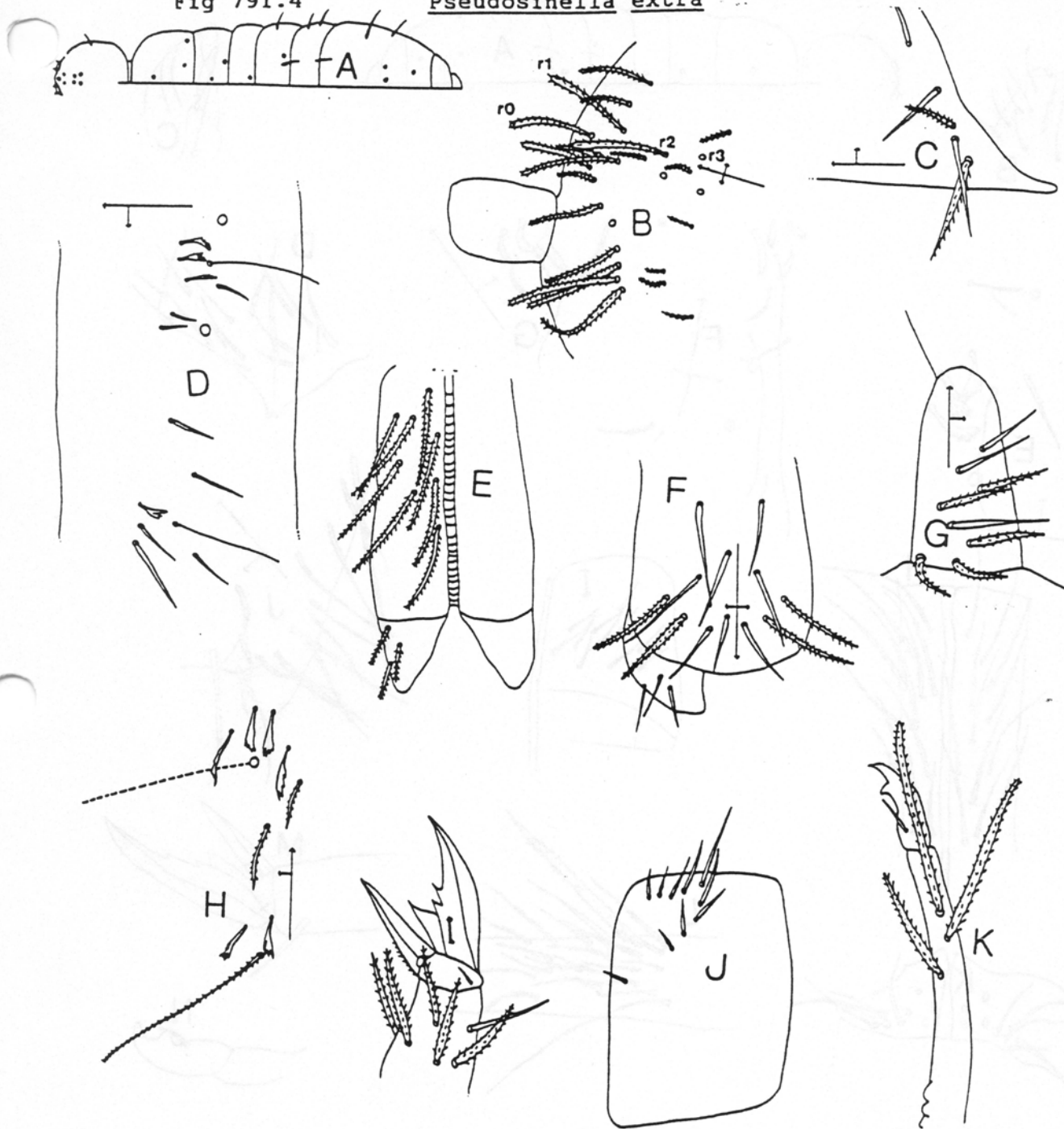


*P. erehwon* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); B) Setae of labial triangle, right side. C) Posterior face of ventral tube; D) Anterior face ventral tube; E) Right distolateral patch of ventral tube; F) Second abdominal segment chaetotaxy, left side; G) Outer bothriotrichal complex third abdominal segment, left side; H) Bothriotrichal complex fourth abdominal segment left side; I) Outstanding seta and neighboring setae of hind tibiotarsus; J) Hind foot complex K) Mucro and distal end of dens. After CB 1996



*P. espanita* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); B) Labial triangle setae; C) Setae of venter of basal portion of third antenna segment; D) Setae of dorsum of apical portion of second antennal segment same specimen, but other antenna; E) Second abdominal segment chaetotaxy of left side; F) Detail of inner setae of second abdominal segment of different specimen; G) Third abdominal segment left side, outer bothriotrichal complex; H) Lateral bothriotrichal complex, fourth abdominal segment, right side; I) Left side of anterior face of ventral tube; J) Distolateral setae of ventral tube; K) Mucro and apex of dens; L) Fore foot complex.

Fig 791.4

Pseudosinella extra

*P. extra* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); B) Detail of anterior dorsal cephalic chaetotaxy of left side; C) Labial triangle setae; D) Lateral chaetotaxy of second abdominal segment, left side; E) Ventral tube, anterior face; F) Posterior face of ventral tube; G) Ventral tube, left side, distolateral patch; H) Fourth abdominal segment bothriotrichal complex, left side; I) Fore foot complex; J) Trochanteral organ. K) Mucro and end of dens. After CB 1996.

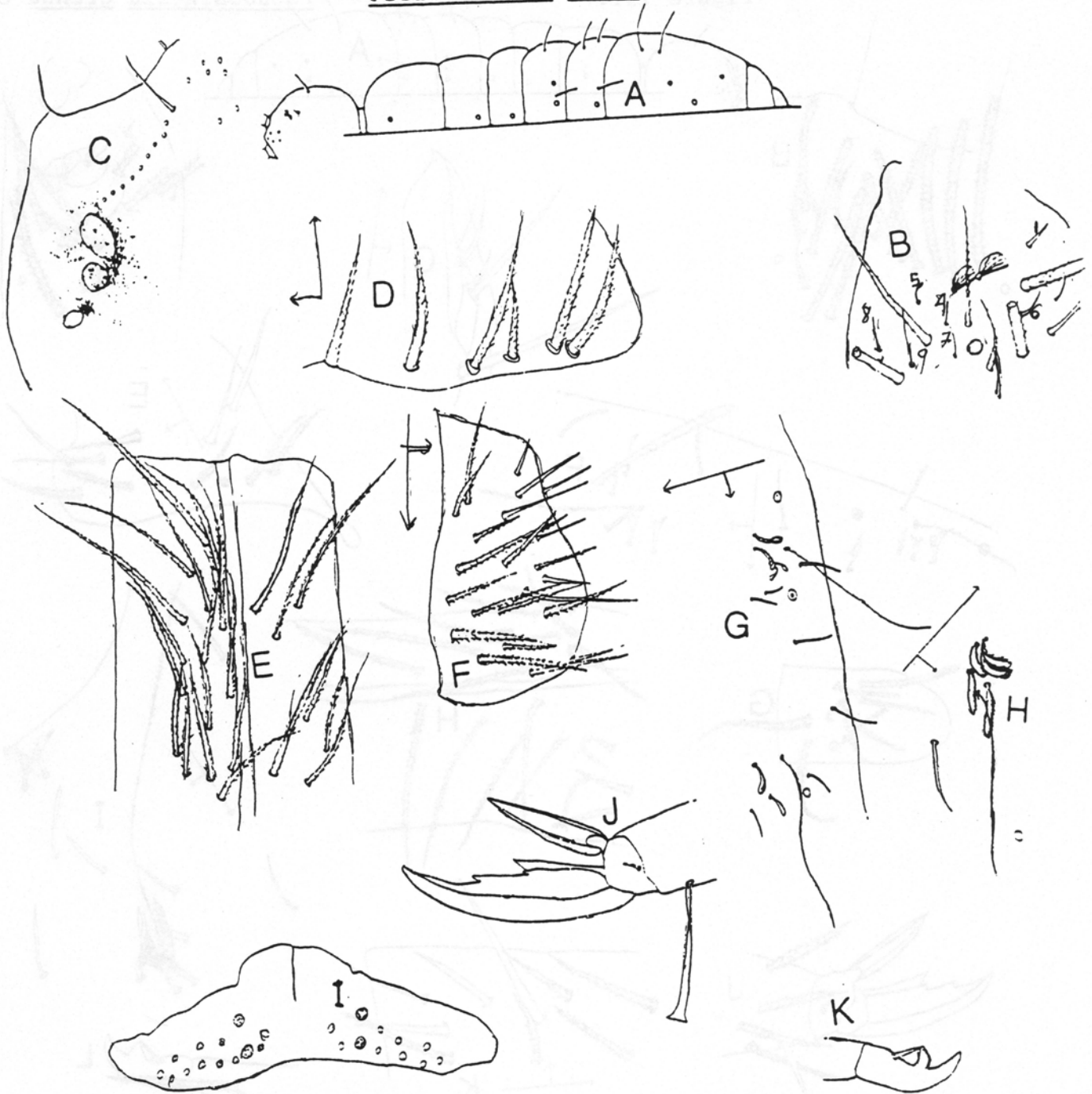
Figure 791.5  
*Pseudosinella flatua* C. & B. 1986a



*P. flatua* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores ( hollow circles) B) Apex of fourth antennal segment; C) Labial palp; D) Labial triangle setae; E) Inner bothriotrichal complex of second abdominal segment, left side; F) Third abdominal segment, left side, outer bothriotrichal complex; G) Fourth abdominal segment left side, anterior bothriotrichal complex; H) Ventral tube, anterior face; I) Ventral tube, right side, distolateral patch; J) Posterior face of ventral tube; K) Manubrial plaque; L) Median portion of hind tibiotarsus showing differentiated seta; M) Fore foot complex; N) Mucro and end of dens. Aft. CB 1996.

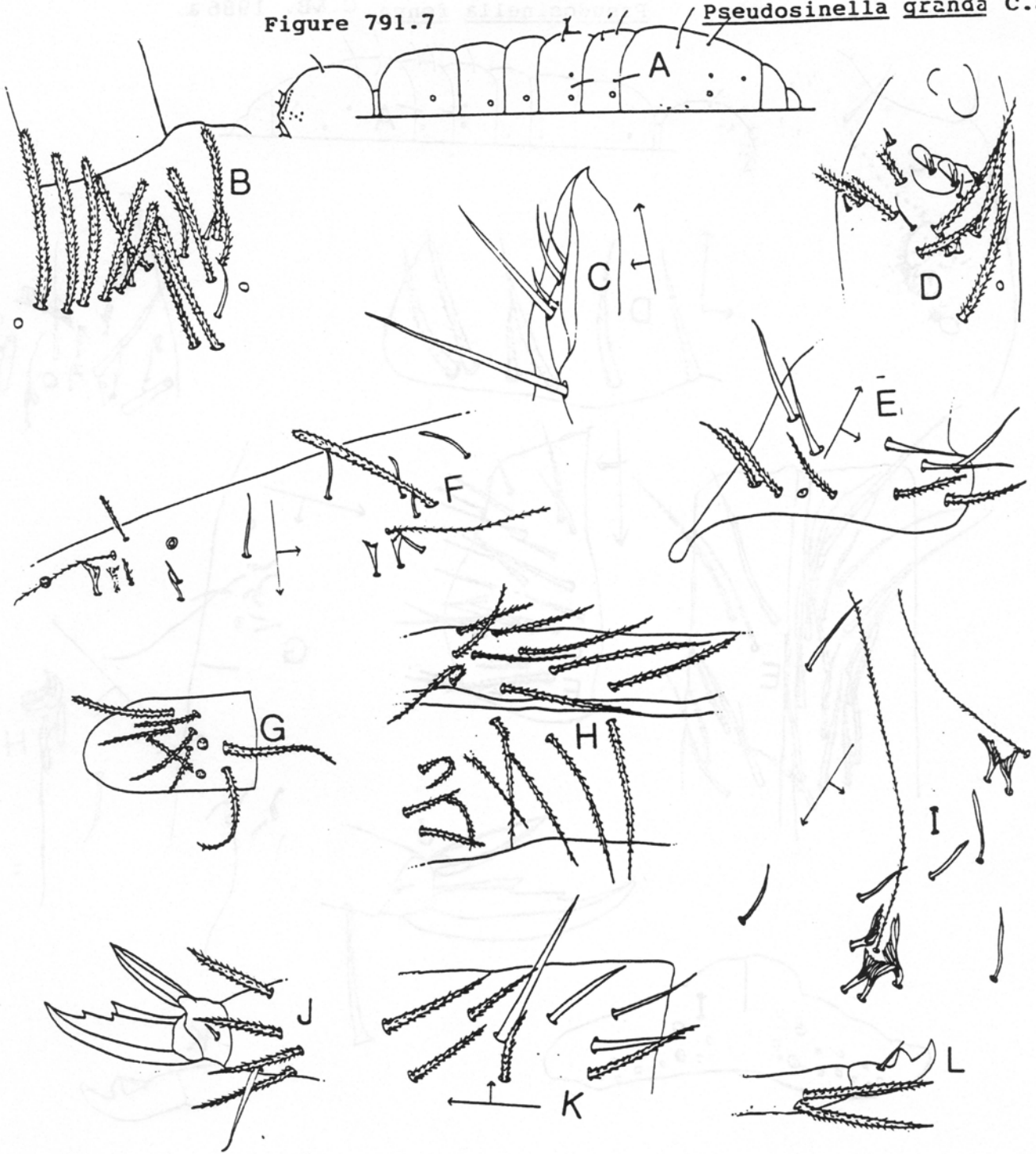


Figure 791.6  
*Pseudosinella fonsa* C.&B. 1986a

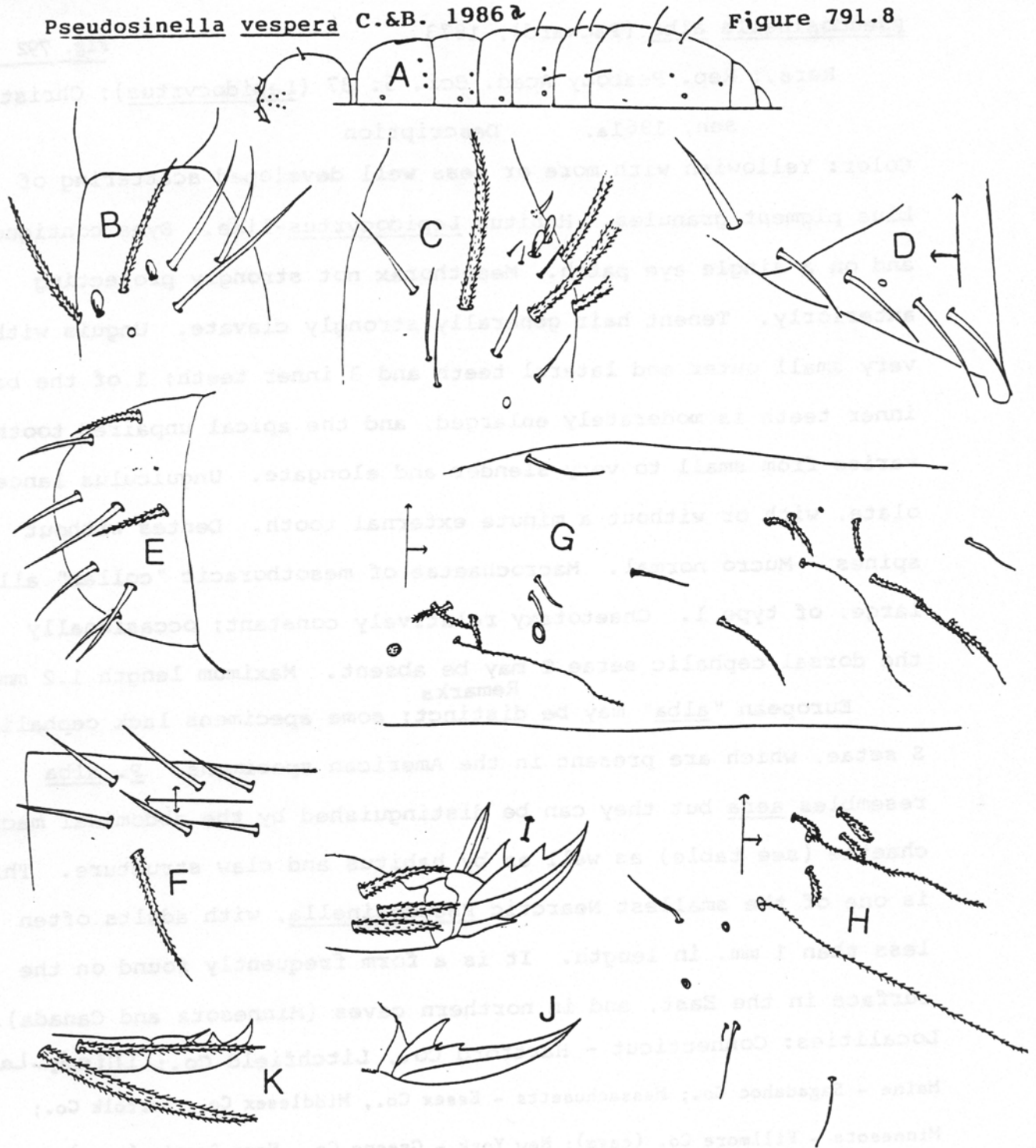


*P. fonsa* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); B) Apical organ of right third antennal segment, seen from side; C) Left eye patch; D) Basal labial triangle setae of right side; E) Anterior face of ventral tube; F) Left distolateral patch of ventral tube. G) Second abdominal segment chaetotaxy of left side; H) Anterior bothriotrichal complex of fourth abdominal segment; I) Manubrial plaque; J) Hind foot complex; K) Mucro and apex of dens. After CB 1996.



Figure 791.7 *Pseudosinella granda* C. & B. 1986a

*P. granda* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); B) Macrochaetae at base of left antenna and R setae of cephalic dorsum; C) Maxillary palp, left side; D) Apical setae of third antennal segment, right side, seen from side; E) Labial triangle setae, left side seen from below; F) Second abdominal segment chaetotaxy, left side seta shown by dotted lines present in other specimens; G) Manubrial plaque, right side; H) Ventral tube setae, anterior face, seen from an angle; I) Bothriotrichal complex of fourth abdominal segment left side; J) Hind foot complex; K) Ventral tube, distolateral patch, left side; L) Mucro and apex of dens. After CB 1996



*P. vespera* A) Semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); B) Apical region of second antennal segment, type specimen; C) Apical setae of third antennal segment, right side seen from above; D) Labial triangle setae, right side; E) Ventral tube setae, distolateral patch right side; F) Ventral tube, posterior face, seen from a posterior angle; G) Dorsal chaetotaxy, second abdominal segment, right side; H) Outer bothriotrichal complex, third abdominal segment; I) Hind foot complex; J) Hind unguis; K) Apex of dens and mucro. After CB 1996

pseudosinella alba (Packard), 1873

Fig. 792

Refs.: Rep. Peabody Acad. Sci. 5: 37 (Lepidocyrtus); Christian-  
sen, 1961a. Description

Color: Yellowish with more or less well developed scattering of blue pigment granules. Habitus Lepidocyrtus-like. Eyes contiguous and on a single eye patch. Mesothorax not strongly projecting anteriorly. Tenent hair generally strongly clavate. Unguis with very small outer and lateral teeth and 3 inner teeth; 1 of the basal inner teeth is moderately enlarged, and the apical unpaired tooth varies from small to very slender and elongate. Unguiculus lanceolate, with or without a minute external tooth. Dentes without spines. Mucro normal. Macrochaetae of mesothoracic "collar" all large, of type 1. Chaetotaxy relatively constant; occasionally the dorsal cephalic setae T may be absent. Maximum length 1.2 mm.

Remarks

European "alba" may be distinct; some specimens lack cephalic S setae, which are present in the American specimens. P. alba resembles aera but they can be distinguished by the abdominal macrochaetae (see table) as well as by habitus and claw structure. This is one of the smallest Nearctic Pseudosinella, with adults often less than 1 mm. in length. It is a form frequently found on the surface in the East, and in northern caves (Minnesota and Canada).  
Localities: Connecticut - Hartford Co., Litchfield Co.; Illinois - Lake Co.; Maine - Sagadahoc Co.; Massachusetts - Essex Co., Middlesex Co., Norfolk Co.; Minnesota - Fillmore Co. (cave); New York - Greene Co. Nova Scotia (cave); Ontario - Prescott.  
Additional records: California (Wilkey, 1959); Idaho (Wray & Knowlton, 1956); Kentucky (Lesshafft, 1977); North Carolina (Pearse, 1946); Pennsylvania (Thomas, 1929); South Carolina (DuRant & Fox, 1966); Tennessee (Packard, 1873); Utah (Wray & Knowlton) 1961); Washington (Mills & Rolfs, 1933). Quebec (Marshall, 1967).

Biology: Sharma & Kevan, 1963.





$m_2$  and rarely  $e$  smooth. The Connecticut specimens also sometimes have the tenent hair acuminate. A recent detailed study of Arkansas cave forms indicates that one group of cave populations has become clearly separated from the remainder. Further analysis will be required to determine the best taxonomic treatment of this group. Pending the completion of this analysis we are maintaining the name argentea for this whole complex. Re-examination of some specimens identified as argentea makes it seem possible that newly described P. granda is part of this species complex.

Localities: Washington, D.C. (type) from grave; surface records: Connecticut - New Haven Co.; Illinois - Champaign Co., Clark Co., Eddyville, Edgar Co., Johnson Co., Karber's Ridge; Indiana - Wayne Co.; Louisiana - Ouachita Par.; Missouri - Iron Co.; Pennsylvania - Centre Co., Huntingdon Co.; records from caves: Arkansas - Boone Co., Clay Co., Newton Co., Randolph Co., Searcy Co., Stone Co., Washington Co.; Illinois - Hardin Co., Monroe Co.; Kentucky - Edmondson Co.; Missouri - Boone Co., Jefferson Co., Perry Co., Ripley Co., Shannon Co., Taney Co.; Tennessee - Burgess Co., White Co.; Virginia - Augusta Co.

Additional records: Georgia (Christiansen, 1961a); Kentucky (Lesshafft, 1977); West Virginia (Lippert and Butler, 1976).

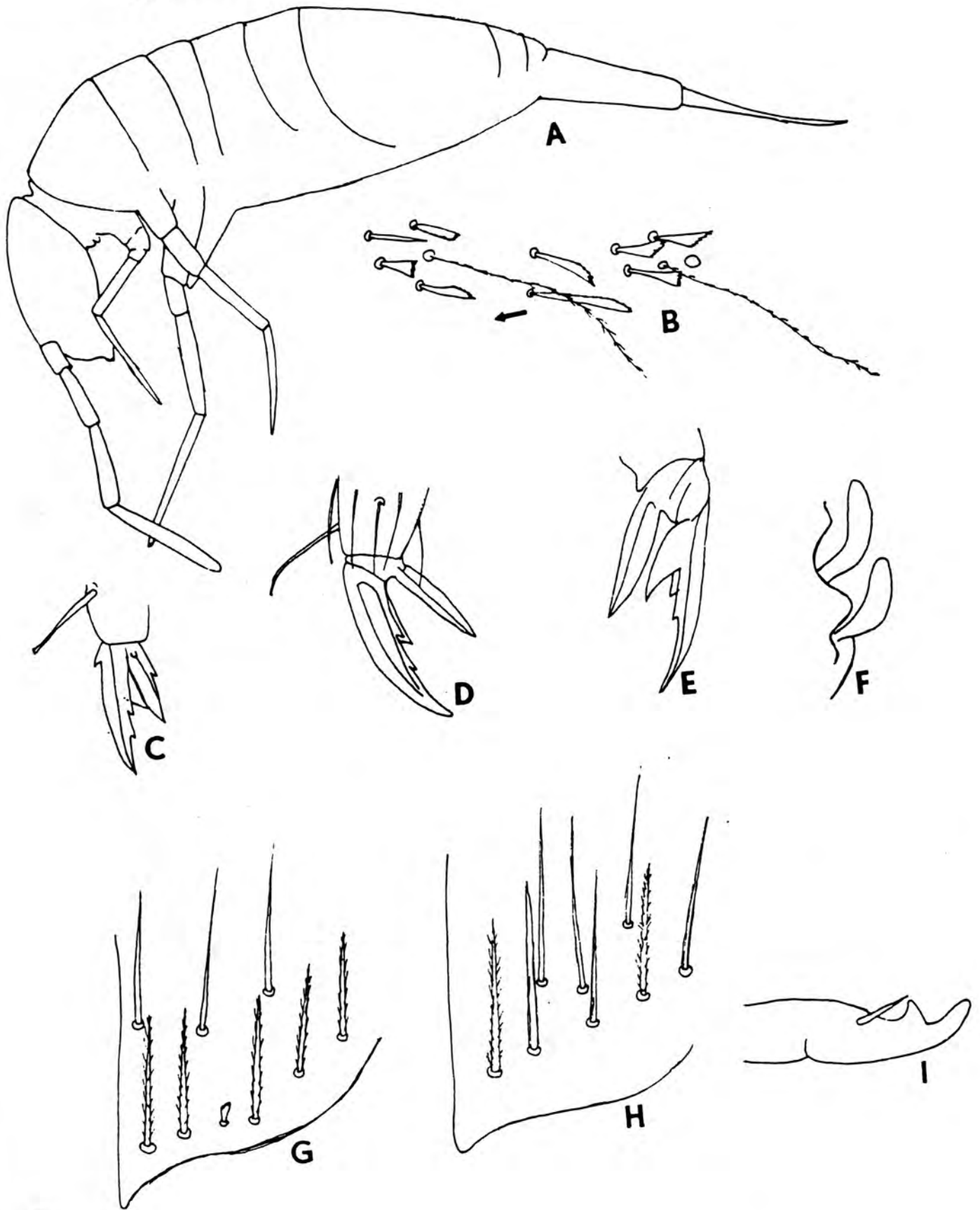
### FIGURE 793

#### Pseudosinella argentea

- A) Habitus, specimen from Arkansas cave.
- B) Fourth abdominal segment bothriotricha complex, right side, specimen from Arkansas cave.
- C) Hind foot complex, specimen from Missouri cave.
- D) Hind foot complex, after Folsom.
- E) Fore foot complex, type specimen.
- F) Apical sense organ of third antennal segment, specimen from Missouri cave.
- G) Labial triangle of left side, specimen from Arkansas cave.
- H) Labial triangle of left side, specimen from Kentucky cave.
- I) Mucro, specimen from Kentucky cave.



FIGURE 793



Color: white. Apical sense organ of third antennal segment with inner sensillae apically flattened. Tenent hairs short and slender. Unguis with clear lateral teeth and 2 large basal inner teeth, the posterior tooth being wing-like and much larger than the other. Unguiculus lanceolate with clear enlarged external tooth. Dentes without spines. Mucro elongate with basal spine clearly exceeding apex of antepical tooth. Macrochaetae of "collar" (largely?) of short acuminate ciliate setae. Maximum length 1.2 mm.

Remarks

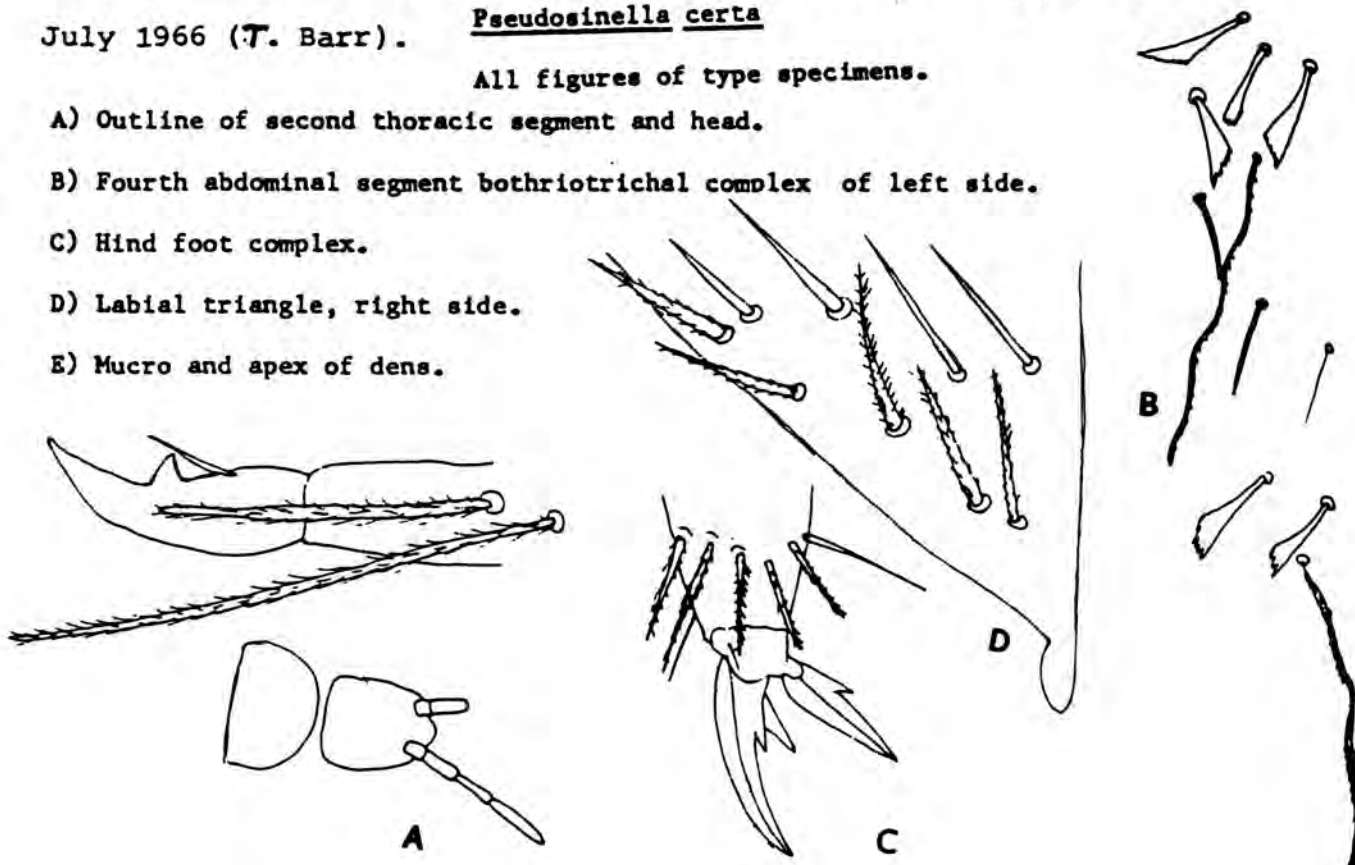
This species has been taken from only 1 cave in West Virginia. It superficially resembles P. espana, but differs strikingly in chaetotaxy and the presence of a mucronal spine. It also resembles P. rolfsi in many respects, but its chaetotaxy and unguis structure are different. This may be the form described by Bonet, 1934, as P. petterseni var. attenuata, but the unguis and unguiculus are not like his illustrations.

Type locality: Stillhouse Cave, Randolph Co., West Virginia, 29

July 1966 (T. Barr). Pseudosinella certa

All figures of type specimens.

- A) Outline of second thoracic segment and head.
- B) Fourth abdominal segment bothriotrichal complex of left side.
- C) Hind foot complex.
- D) Labial triangle, right side.
- E) Mucro and apex of dens.



Refs.: Psyche, Camb. 67: 24 (P. boneti); Bull. R. Soc. N.Z.

7: 493

Syn.: P. boneti Christiansen, 1961a, nec Bagnall, 1941

Description

Color: white without trace of pigment. Fourth antennal segment more than twice as long as cephalic diagonal. Sense organ of third antennal segment with curved inner sensillae having more or less clear blade-like lateral expansions. Eyes completely absent. Mesothorax greatly expanded, pushing head into hypognathous position. Tenent hair short and acuminate. Unguis unusually long and slender, without outer tooth, with lateral teeth and a pair of small basal inner teeth and sometimes with an additional median inner tooth. Unguiculus slender and lanceolate, without outer tooth (except in 1 Tennessee population) and with or without a basal inner swelling. Dens without spines. Mucro generally normal with apical tooth about  $1\frac{1}{2}$  times as long as anteapical; specimens from White Co., Tennessee have the 2 teeth displaced apically as in P. spinosa. Maximum length 4 mm.

Remarks

We use this name to include all the highly evolved troglobitic derivatives of P. hirsuta. The form has probably evolved at least 3 times independently and the morphological similarity is probably the result of convergence. The derivation of this morphospecies from different stocks of P. hirsuta leads to considerable variation in unguis structure and chaetotaxy (see table XXXVII) as well as intergradation with hirsuta. The elongate antennae, narrow unguis, and strongly humped mesothorax make the species easy to distinguish from its congeners; we feel it best at present to treat it as a single taxon, even though the individual populations are actually or potentially separable. Known only from caves.

Population variation in Pseudosinella christianseni

(See figures indicated for structures characteristic of each population)

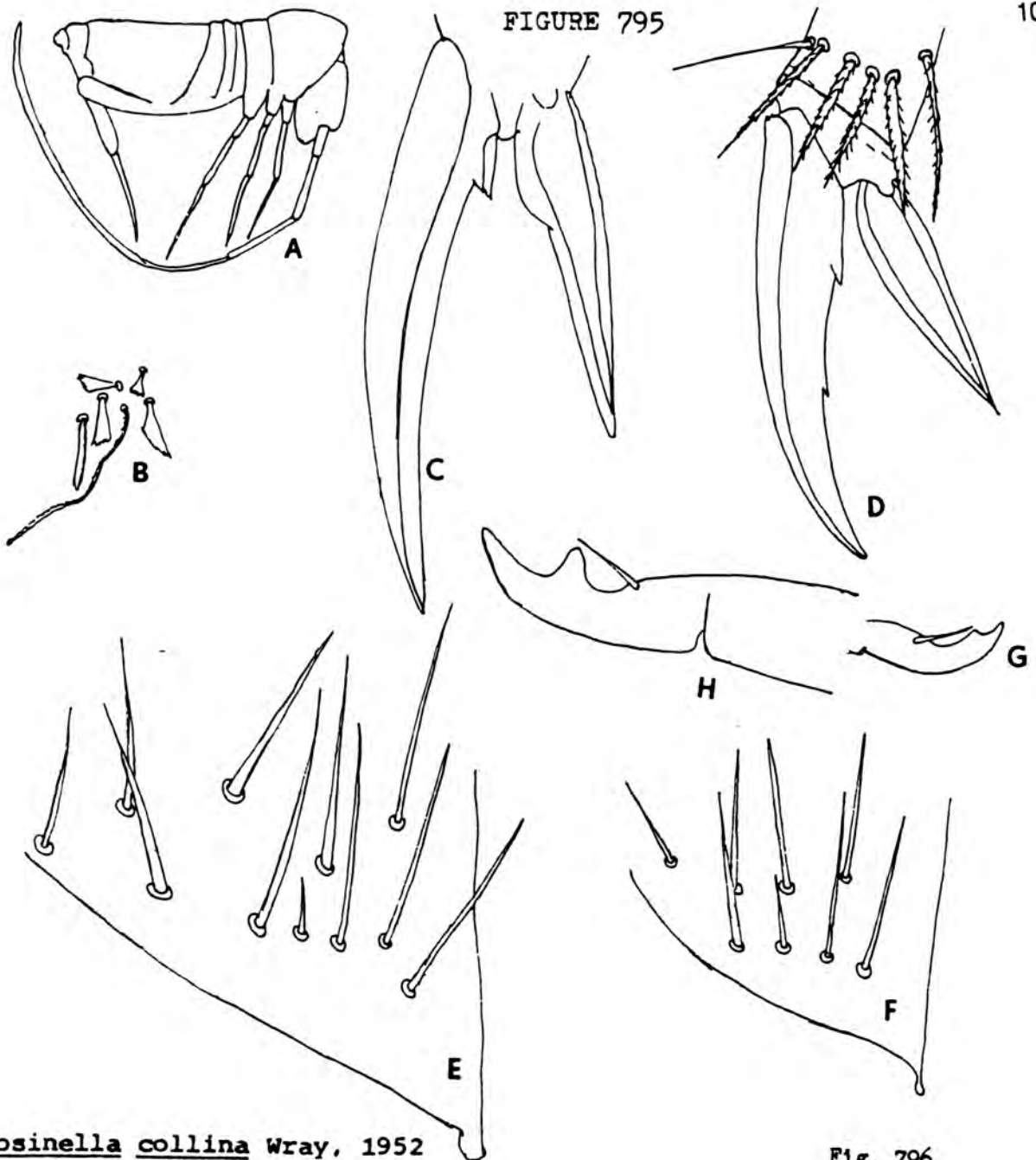
Locality	Labial Chaetotaxy	Fourth Abdominal Segment Macrochaetae	Unguis	Unguiculus	Mucro
White Co., Tennessee	795F	801C-D	795C	795C	795G
Pulaski Co., Kentucky	795E	801E	795D	795C	795H
Grundy Co., Tennessee	795F	801E	795D	795C	795H
Dekalb Co., Alabama	795E (rarely 801J)	801E (rarely 801E-F)	795D	795D	795H
Morgan Co., Alabama	801J	801F	795C or D	795C or D	795H
Dade Co., Georgia	801J	801C-F	795D	795D	795H

Localities (in addition to those in table): Tennessee - Blount Co., Grundy Co., White Co. (type).

Pseudosinella christianseni

## FIGURE 795

- A) Habitus, type specimen.
- B) Anterior bothriotrichal complex of fourth abdominal segment, specimen from Dekalb Co., Alabama.
- C) Hind unguis and unguiculus, type specimen.
- D) Hind foot complex, same locality as B.
- E) Labial triangle, right side, same specimen, type C
- F) Labial triangle, right side, specimen from White Co., Tennessee. type F
- G) Mucro, type specimen.
- H) Mucro, specimen from Dekalb Co., Alabama.



*Pseudosinella collina* Wray, 1952

Fig. 796

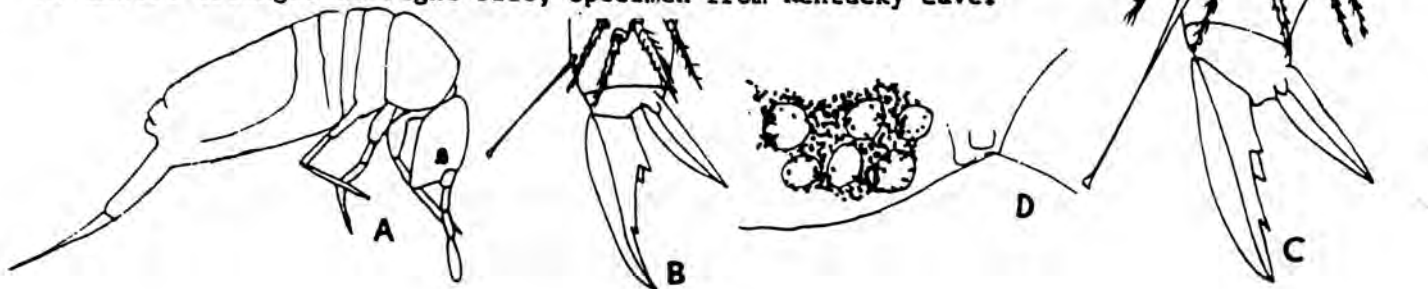
Ref.: Bull. Brooklyn ent. Soc. 47: 95 Description

Color: variable, ranging from white with blue pigment on head, antennae, and legs, to medium blue on all parts of body except for venter and intersegmental membranes. Eyes on a single pair of eye patches. Tenent hair weakly to strongly clavate. Unguis without outer teeth but with 3 inner teeth, all relatively small. Unguiculus acuminate. Dens without spines. Mucro normal. Macrochaetae of "collar" dorsally of acuminate type 1 setae; lateral macrochaetae elongate and fusiform. Maximum length 1.6 mm.



The application of this name remains in doubt until Wray's types have been examined. The specimens we have seen generally agree with Wray's description and figures; however, Wray describes the tenent hair as not knobbed, while his illustration shows it as clearly clavate. Most specimens earlier identified as P. duodecimocellata Handschin, 1928, and P. duodecimpunctata Denis, 1931b are probably this species, which differs from both by the presence of only 2+2 inner macrochaetae on the fourth abdominal segment. P. collina is very similar to aera but the eye number and minor features of labial chaetotaxy appear to differ consistently. There is some variation among the populations we have assigned to this species in claw structure and details of chaetotaxy, and further study may show that a species complex is involved. Localities: Alabama - Blount Co. (cave), Calhoun Co. (cave); Illinois - Alexander Co., Calhoun Co., Johnson Co., Madison Co. (type), Saline Co., Dubois, Marysville; Indiana - Grant Co., Park Co.; Kentucky - Carter Co. (cave), Christian Co. (cave); Louisiana - Ouachita Par.; Pennsylvania - Centre Co.; Tennessee - Blount Co. (cave), Carter Co. (cave), Montgomery Co. (cave), Sullivan Co. (cave); Virginia - Rockingham Co.

- A) Habitus, specimen from Virginia. Pseudosinella collina  
 B) Hind foot complex, same specimen. FIGURE 796  
 C) Hind foot complex, specimen from Alabama cave.  
 D) Right eyepatch, same specimen as A.  
 E) Labial triangle of right side, specimen from Kentucky cave.



Refs: Psyche, Camb. 67: 9

Description

Color: white with an overall scattering of blue pigment, particularly dark on dorsum of head where it may form a diamond-shaped mark. Inner sensillae of third antennal segment sense organ slightly flattened and irregular. Eyes on an elongate irregular eye patch. Mesothorax clearly but moderately expanded anteriorly. Tenent hair moderately to weakly clavate. Unguis without outer tooth; with small lateral teeth and 3 small inner teeth. Uncuiculus lanceolate, with a small, more or less clear outer tooth. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of moderately long acuminate to truncate type 1 setae. Maximum length 3.0 mm.

Remarks

This species is closer to the putative ancestor of the hirsuta group than any other. The species shows some variation in eye structure, and a good deal of variation in labial chaetotaxy, especially in the presence or absence of 2 small ciliated setae ( $M_{1a}$  and  $M_{2a}$ ). It is known only from 4 caves, all in 1 county.

Locality: Arkansas - Washington Co. (type).

Pseudosinella dubia

FIGURE 797

A) Habitus.

All specimens from caves of Washington Co., Arkansas.

B) Chaetotaxy of left side of second abdominal segment.

C) Anterior bothriotrachel complex of fourth abdominal segment.

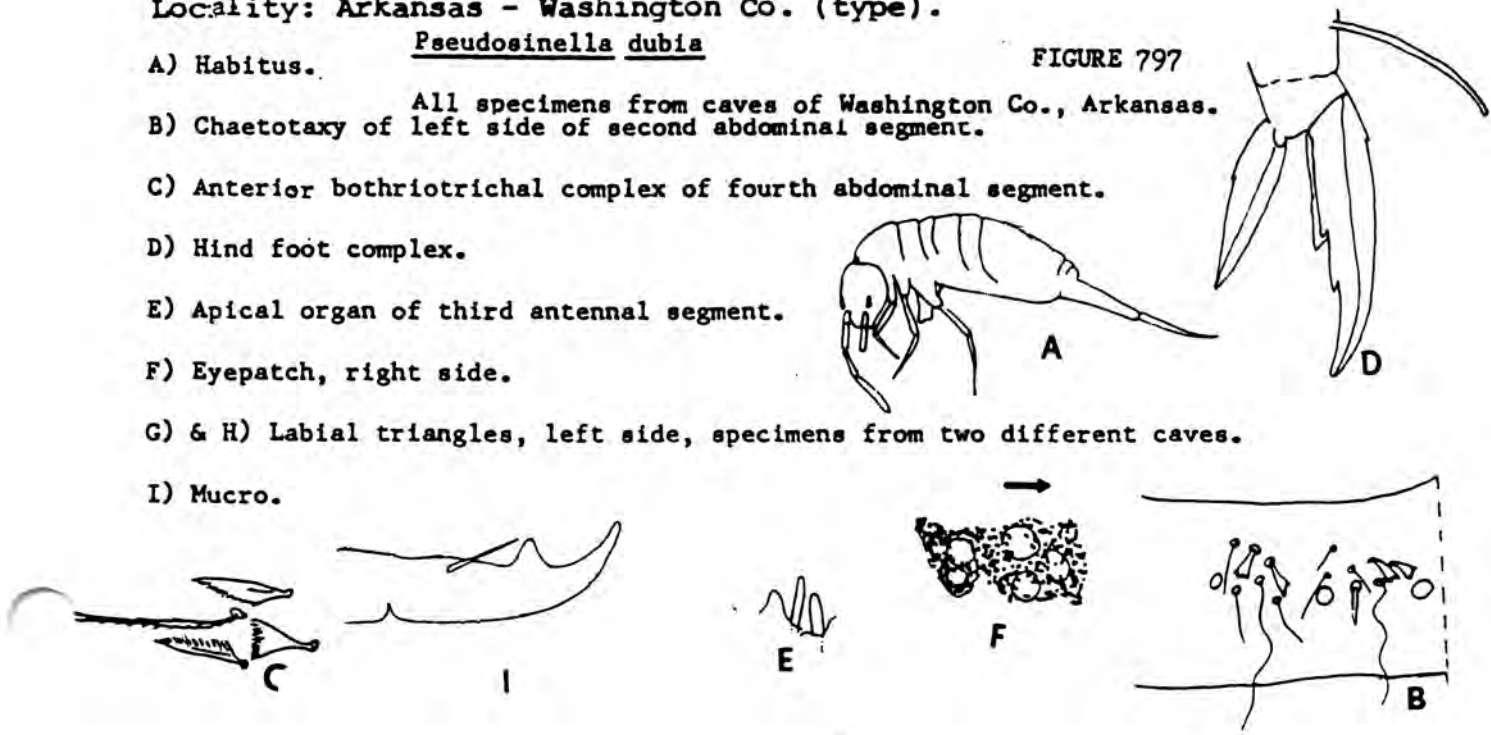
D) Hind foot complex.

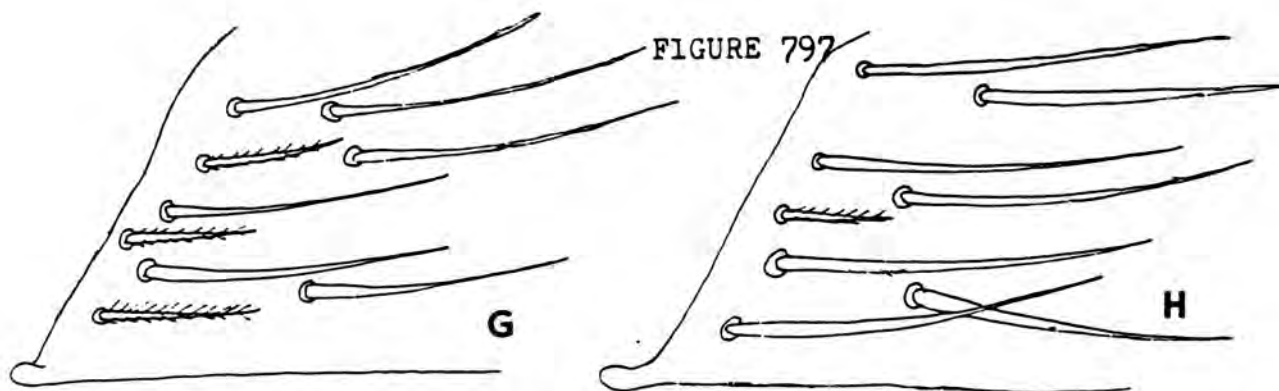
E) Apical organ of third antennal segment.

F) Eyepatch, right side.

G) & H) Labial triangles, left side, specimens from two different caves.

I) Mucro.





Pseudosinella espana Christiansen, 1961

Fig. 798

Ref.: Psyche, Camb. 67: 19

#### Description

Color: white without trace of pigment. Inner sensillae of third antennal segment sense organ flattened and paddle-shaped. Eyes completely absent. Second thoracic segment not strikingly enlarged. Tenent hair small and slender. Unguis with a small outer tooth (?) and 2 large, basal inner teeth, one much larger than the other. Unguiculus with a strong, sometimes wing-like outer tooth. Dens without spines. Mucro elongate, with or without basal spine. Head with 2+2 or 3+3 macrochaetae posterior to the T macrochaetae. Macrochaetae of mesothoracic "collar" of long type 1 setae. Maximum length 1.1 mm.

#### Remarks

The basal mucronal spine was lacking in most specimens from Stone Co., but present on specimens from Newton Co. except for 1 mucro of 1 specimen. The species is known with certainty only from caves in Missouri, and is probably troglobitic. Single specimens from Kentucky and Tennessee, lacking mucronal spines, are intermediate in cephalic and abdominal chaetotaxy between espana and certa.

Localities: Kentucky - Edmondson Co. (?); Missouri - Newton Co., Stone Co. (type); Tennessee - Montgomery Co. (?).

- A) Habitus, after Christiansen.
- B) Hind unguis and unguiculus, after Christiansen.
- C) Base of unguis and unguiculus, hind foot, after Christiansen.
- D) Apical organ of third antennal segment, after Christiansen.
- E) Mucro, after Christiansen.
- F) Dorsal cephalic chaetotaxy, specimen from Newton Co., Missouri.
- G) Labial triangle setae, right side, type specimen.

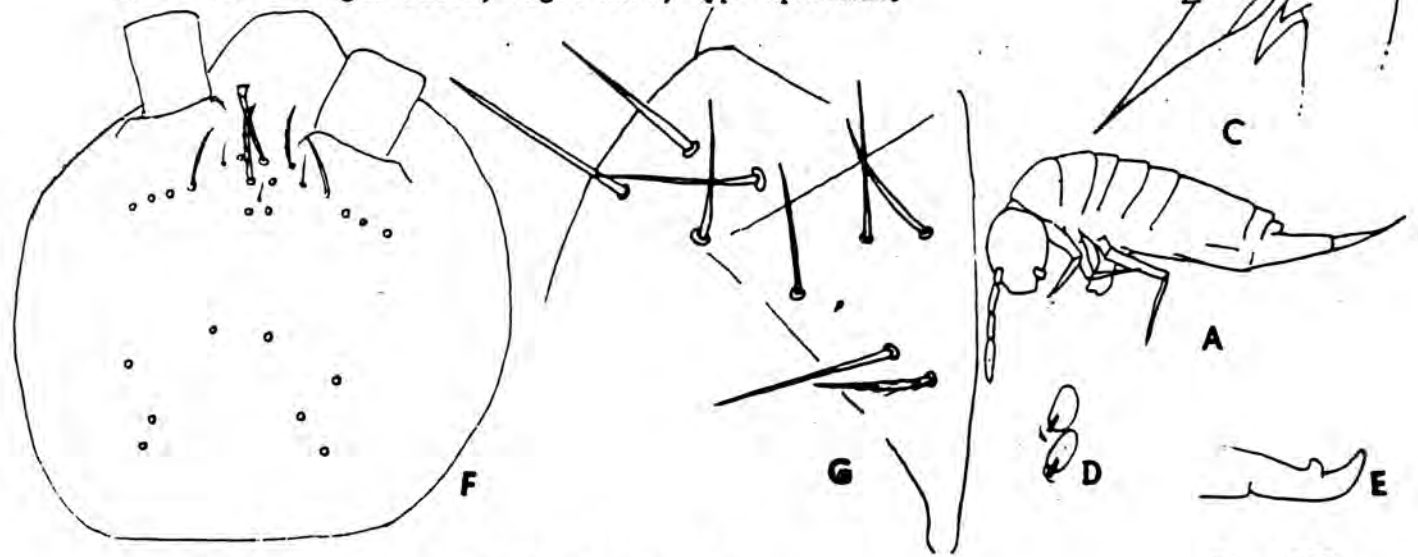


Fig. 799

Pseudosinella folsomi (Mills) 1931

Ref.: Am. Mus. Novit. 464: 10 (Lepidocyrtus)  
Description

Color: white or (in alcohol) pinkish, without pigment. Mesothorax not enlarged. Unguis with a small outer tooth and small, subequal inner teeth. Unguiculus lanceolate. Dentes without spines. Mucro normal. Macrochaetae of mesothoracic "collar" moderately long, truncate type 1 setae. Maximum length 2.5 mm.

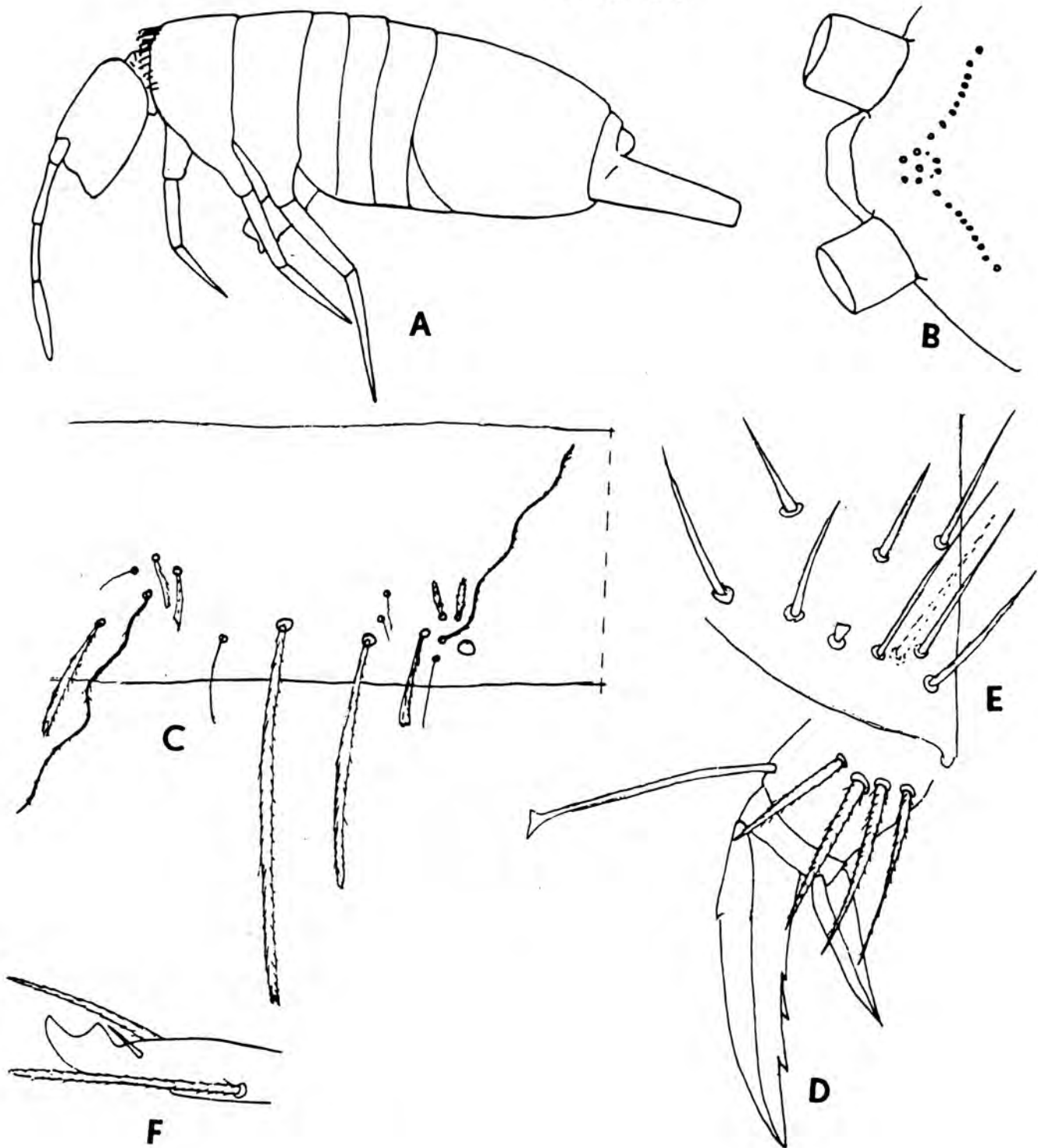
Remarks

The chaetotaxy of this species shares some features with the hirsuta-dubia group (e.g. supplementary M setae of labium) and the affinities of the species are probably with that group. The distinctive chaetotaxy, particularly of the second abdominal segment, makes it easy to recognize.

Localities: Arkansas - Carroll Co., Saline Co., Union Co.; Louisiana - Ouachita Par.; Texas - Brazos Co. (type).

- A) Habitus, type specimen. Pseudosinella folsomí
- B) Anterior cephalic chaetotaxy, specimen from Carroll Co., Arkansas.
- C) Dorsal chaetotaxy of second abdominal segment, left side, same specimen.
- D) Hind foot complex, type specimen.
- E) Labial triangle, left side, type specimens; dotted seta rarely present.
- F) Mucro, type specimen.

FIGURE 799





**Pseudosinella georgia** new species.

**Fig. 799.1**

### Description

Eyes 5-6 per side on dark eye patches. Pigment of scattered blue granules over head and body. Maximum length excluding appendages 2.5 mm. Antennae 1.51 - 1.92 times cephalic diagonal, without apical bulb. Average antennal segment ratios as: 1-2.5-2.7-3.7. Subapical sense organ of antenna a stout rod with a small apical spherical knob. Lenticular organs weakly developed between second and third antennal segments or absent. Third antennal apical sense organ as shown in figure D. Seta 9 not seen in any specimen. Second antennal segment with 2 ( and in one specimen 3) apical enlarged peg - like setae ( see fig. E). Pre - labral setae 4-5-5-4, all smooth. Labial palp with three sublobal hairs. Labial ventral groove with 4 + 4 ciliate macrochaetae along margin. Second abdominal segment P seta present. The fourth abdominal segment anterior bothriotrachel complex with supplementary seta. Ventral tube with 16 to 19 large to moderate ciliated setae per side on anterior face; distolateral patches with 9-12 setae, 3-4 smooth, others ciliate; posterior face with 20 - 29 ciliate setae. Posterior leg with one acuminate seta, longer and heavier than others, .25 - .30 from base. Trochanteral organ in adults or subadults with 9-12 setae in arms, 16 - 20 internal setae and 6-8 external setae. Unguis long and slender with 3 very small but clear inner teeth, distalmost .56 - .68 from base. Unguiculus acuminate and smooth. Manubrial plaque with 2 inner and 5 outer ciliate setae. Mucro with subapical tooth between 1/2 and 2/3 as long as apical and with basal spine whose apex just reaches the tip of median tooth.

### Localities

*Holotype* ♀ and two paratype ♀♀, Pigeon cave , Walker Co. Georgia, July 16 1995, Buhlman et al coll. (Locality no. 7901). and 2 ♀♀ paratypes as above, Nash waterfall pit, July 16 1995 (locality no. 7900) and 1 paratype ♀ Ellison's cave, July 29 1995, (locality no. 7897). Both these caves are on Pigeon mountain. The species was also found in Frick's cave , Walker Co. Georgia, Sept. 16 1995, Buhlman et al coll. (locality no. 7903).

### Derivatio nominis

Named after the type locality state.

### Remarks

This remarkable species is probably close to the ancestral form of Pseudosinella gisini. It resembles P. dubia in eye number but differs in almost all other respects. P. georgia is only slightly troglomorphic but its peculiar ungual structure is shared by only a handful of highly troglomorphic species.

### Legend for figures

Locality numbers given after all figures. A) Right eyepatch, 7900; B) Same, 7903; C) Apex 4th antennal segment, 7900; D) Apical organ , antennal segment 3, 7901; E) Apex of dorsum second antennal segment, 7900, encircled seta not seen in specimens from other localities; F) Right side labial triangle setae, 7901, encircled seta seen only in 7900; G) Second abdominal chaetotaxy, 7901; H) Lateral setal complex, third abdominal segment , left side , same specimen; I) Anterior 4th abdominal bothriotrachel complex, right side, 7900; J) Anterior face ventral tube, 7901; K) Distolateral patch, ventral tube, 7901; L) Hind foot complex, 7901; M) End of dens and mucro, 7901.

FIGURE 799.1



## Pseudosinella gisini

This species was divided by us into 3 subspecies (Christiansen & Bellinger 1996).

### **Pseudosinella gisini gisini**

see previous page descriptions and figures. This form is abundant in the caves of Pocahontas, Greenbrier and Monroe counties West Virginia. It also has one questionable record from Mercer county. Pseudosinella gisini gisini has a very unusual structure of the third antennal segment apical setae. This is the existence of a supplementary seta which we call seta 7a ( see C. & B. 1996 figure 73). All subspecies of *P. gisini* share an unusually long seta 1. The gisini gisini specimens vary in the labial ventral groove chaetotaxy from all smooth to one pair smooth and the others ciliate; however the majority have the 3 anterior setae smooth and the other pair ciliate.

### **Pseudosinella gisini virginia**

Maximum length 2 mm. Body and appendages white . Blue pigment limited to region of eyes , and a scattering of granules over remainder of dorsum of head. Eyes generally 2 + 2 but a few specimens have these very obscure and may have only 1 + 1 eye. One specimen has a distinctly darker pigmentation on the anterior half of the dorsum of the head. Tenent hair occasionally acuminate but generally weakly truncate. Unguiculus occasionally with a very slight inner swelling on one pair of legs but generally without such. Ventral tube features as shown table XXXVIB. Other features as in P. gisini gisini.

Locality: Virginia, Lee Co. cave.

### **Pseudosinella gisini carolina**

Maximum length 3 mm. Pigment varying from completely lacking or blue, limited to eye regions to dark around eyes and with a wash of granules over the remainder of the dorsum of the head and body. Eyes 1+1 to lacking. Tenent hairs generally acuminate but occasionally truncate or weakly clavate. Unguiculus with or without a slight basal swelling. Ventral tube chaetotaxy as shown in table XXXVIB. Other features as in P. gisini gisini

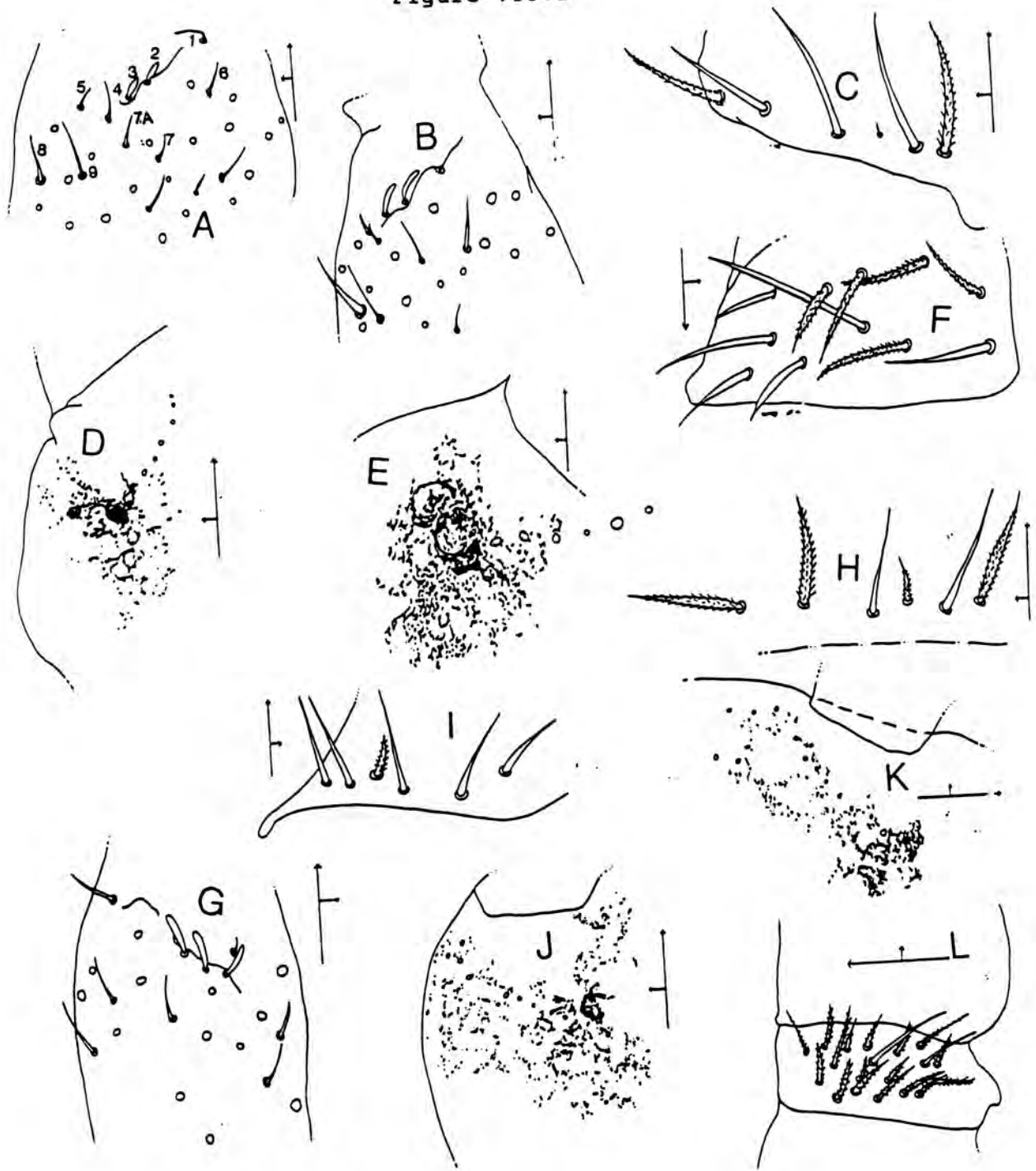
Localities: . North Carolina, Rutherford Co. caves

Table XXXVI B

Distinguishing characteristics of subspecies of Pseudosinella gisini

subspecies	Labial triangle setae	eyes per side	3rd antennal segment seta 7a	macrochaetae on each side anterior labial	unguiculus basal swelling	ventral tube anterior face distal row setae	disto lateral ventral tube setae per side	disto lateral smooth setae per side
gisini	M <sub>1</sub> M <sub>2</sub> [E L <sub>1</sub> L <sub>2</sub> M <sub>1</sub> M <sub>2</sub> r E L <sub>1</sub> L <sub>2</sub>	2-3	+	4s - 1s+3c	(±)+	2(3)	13-24	2-5
virginia	M <sub>1</sub> M <sub>2</sub> vg E L <sub>1</sub> L <sub>2</sub>	(1?)2	-	4c	(±)-	1	10-11	4-6
carolina	M <sub>1</sub> M <sub>2</sub> [E L <sub>1</sub> L <sub>2</sub> M <sub>1</sub> M <sub>2</sub> [E L <sub>1</sub> L <sub>2</sub>	0-1	-	4c	+,-	2,3	19-24	2-3

Figure 799.2



*P. gisini* A) Apical setae of apex of third segment of *gisini gisini*. Large setae with only bases shown. Figures B-E of *gisini virginia*; B) apical third antennal setae as in Figure A; C) Labial triangle setae, right side. D) & E) eyepatches, left side in two different specimens; F). Setae of distolateral patch of ventral tube. Figures G-K of *gisini carolina*. G) apical setae of third antennal segment, as in Figure A; H) & I) Labial triangle setae of two specimens from the same cave; J) & K) eyepatch regions of same two specimens; L) Setae of distolateral patch of ventral tube. After CB 1996

Ref.: Psyche, Camb. 67: 14

Description

Color: pale blue with pigment scattered over tergites and dorsum of head; rarely white. Inner sensillae of third antennal segment sense organ flattened and oval. Eyes almost contiguous, on irregular eye patches. Unguis with extremely minute lateral teeth, 1 pair of small inner basal teeth, and rarely with a small median unpaired tooth. Unguiculus with clear inner basal swelling. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of short pointed type 1 setae. Maximum length 3 mm.

Remarks

This species resembles aera in some respects, but can readily be distinguished by its longer antennae and by the smooth labial setae  $m_2$  and e. P. gisini varies considerably in pigment, ungual structure, and labial chaetotaxy. It appears to be a very limited troglobite, and is known only from caves of West Virginia. The specimens from Mercer Co. show a number of differences from the others, and may represent a distinct taxon.

Localities: West Virginia - Greenbrier Co. (type), Mercer Co. (?), Monroe Co., Pocahontas Co.

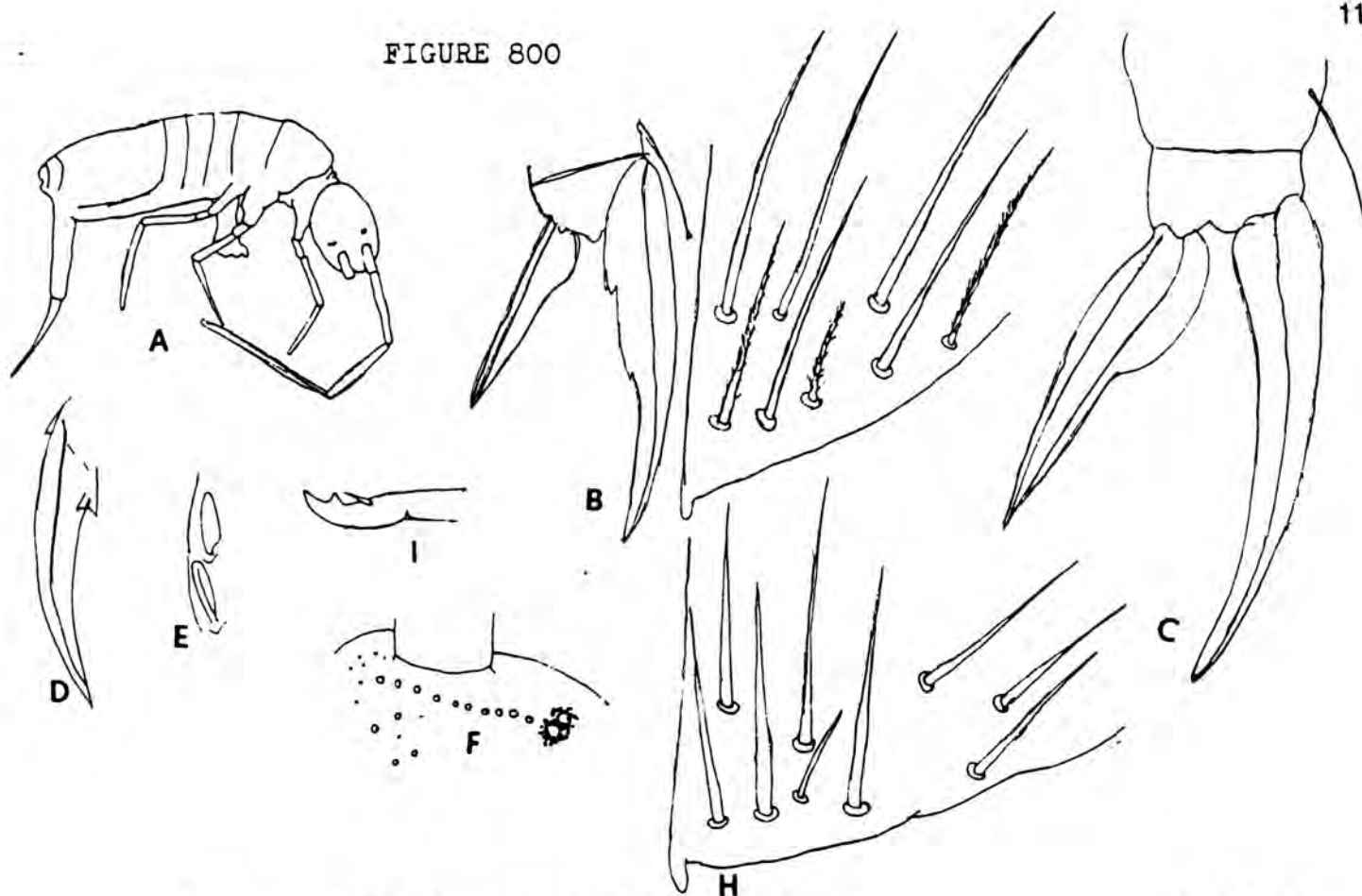
Pseudosinella gisini

FIGURE 800

- A) Habitus, specimen from Greenbrier Co., West Virginia.
- B) Hind foot complex, type specimen.
- C) Hind foot complex, specimen from Monroe Co., West Virginia.
- D) Hind unguis, specimen from Greenbrier Co., West Virginia.
- E) Apical organ of third antennal segment, same specimen.
- F) Eyes of right side, type specimen.
- G) Labial triangle of left side, specimen from Monroe Co., West Virginia.
- H) Labial triangle of left side, specimen from Greenbrier Co., West Virginia.
- I) Mucro, same specimen.



FIGURE 800



Pseudosinella hirsuta (Delamare), 1949

Fig. 801

Refs.: Notes biospéol. 4: 121 (Troglosinella); Christiansen, 1961a.

#### Description

Color: white, rarely with thorax and head medium blue. Fourth antennal segment annulate, twice as long as cephalic diagonal or less. Inner sensillae of third antennal segment sense organ always somewhat curved and expanded. Eyes usually absent; rarely 1+1 or 2+2, without corneas. Unguis with no external tooth, with very small lateral teeth and 2-3 small inner teeth. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of very short acuminate type 1 setae. Maximum length 3.5 mm.

#### Remarks

An extensive study of the geographic variation in this species has been published (Christiansen and Culver, 1968), and those interested are referred to that article. Since then, the range of the species has been extended to northwestern Georgia (Polk Co.). In addition, a single surface collection substantiates the idea that

the species occasionally moves above ground. The separation of the most highly evolved hirsuta as P. christianseni is convenient on morphological grounds but completely arbitrary.

Distribution: caves of central Kentucky, Tennessee, extreme eastern Virginia, northern Alabama, and northwestern Georgia. One surface record, from Campbell Co., Tennessee.

Biology: Christiansen, 1970.

A) Habitus, topotype. Pseudosinella hirsuta

B) Chaetotaxy of left half of dorsum of second abdominal segment, specimen from Coffee Co., Tennessee; base of macrochaetae = m, pseudopore = p.

C) Dorsal chaetotaxy of fourth abdominal segment of left side, specimen from Metcalfe Co., Kentucky; hollow circle - pseudopore.

D) - F) Variations in the position and number of inner macrochaetae and pseudopores.

G) Hind unguis and unguiculus of most promative form.

H) Hind unguis and unguiculus of most advanced form. FIGURE 801

I) Labial triangle of left side, specimen from Barren Co., Kentucky.

J) Labial triangle of left side, specimen from Wilson Co., Tennessee.

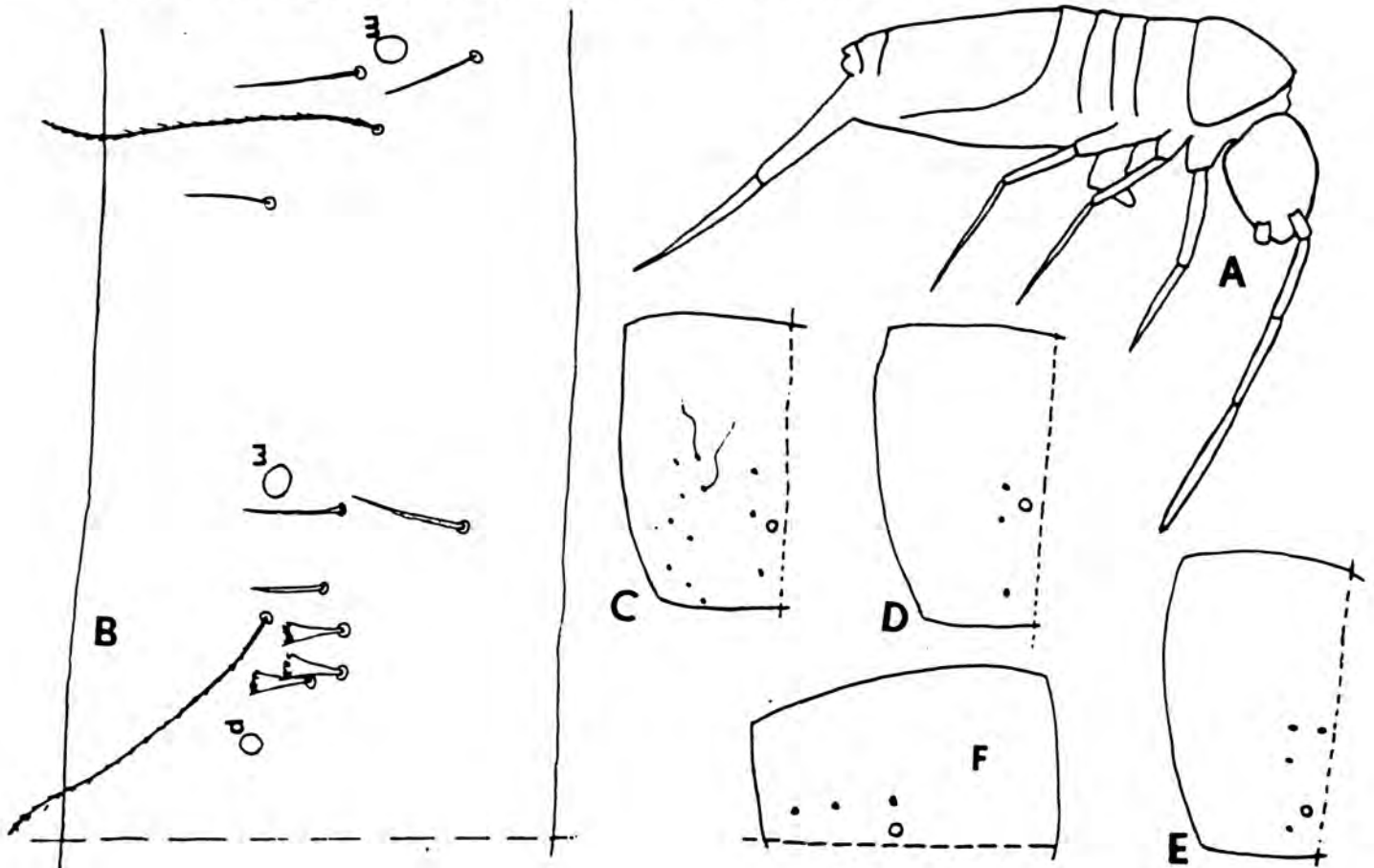
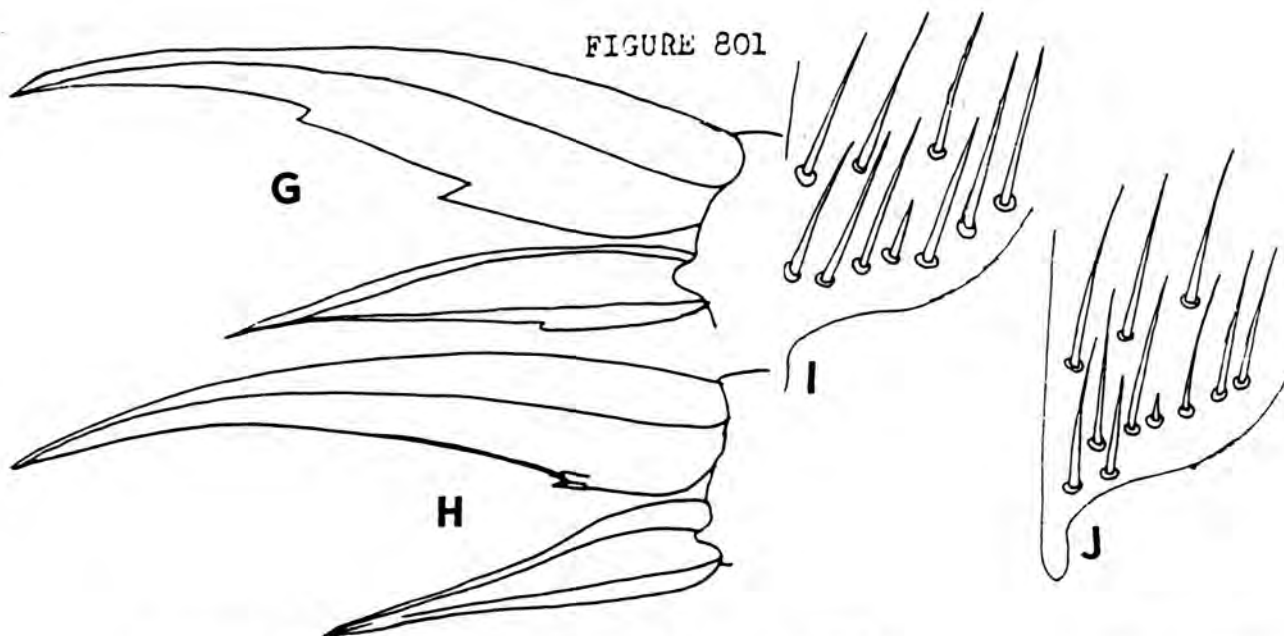


FIGURE 801



Pseudosinella nata Christiansen & Bellinger, 1980  
Description

Fig. 802

Color: white, washed with pale blue pigment. Habitus as in P. argentea. Unguis with small external and basal lateral teeth; 4 inner teeth, all small or with the most basal tooth slightly larger than the others. Unguiculus lanceolate. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of long type 1 setae. Maximum length 2.2 mm.

Remarks

This form is closely related to P. argentea and may be a local variant; however, we believe that the strikingly different chaetotaxy of the labium and second abdominal segment, and the absence of intergrades, justify maintaining it as a separate species.

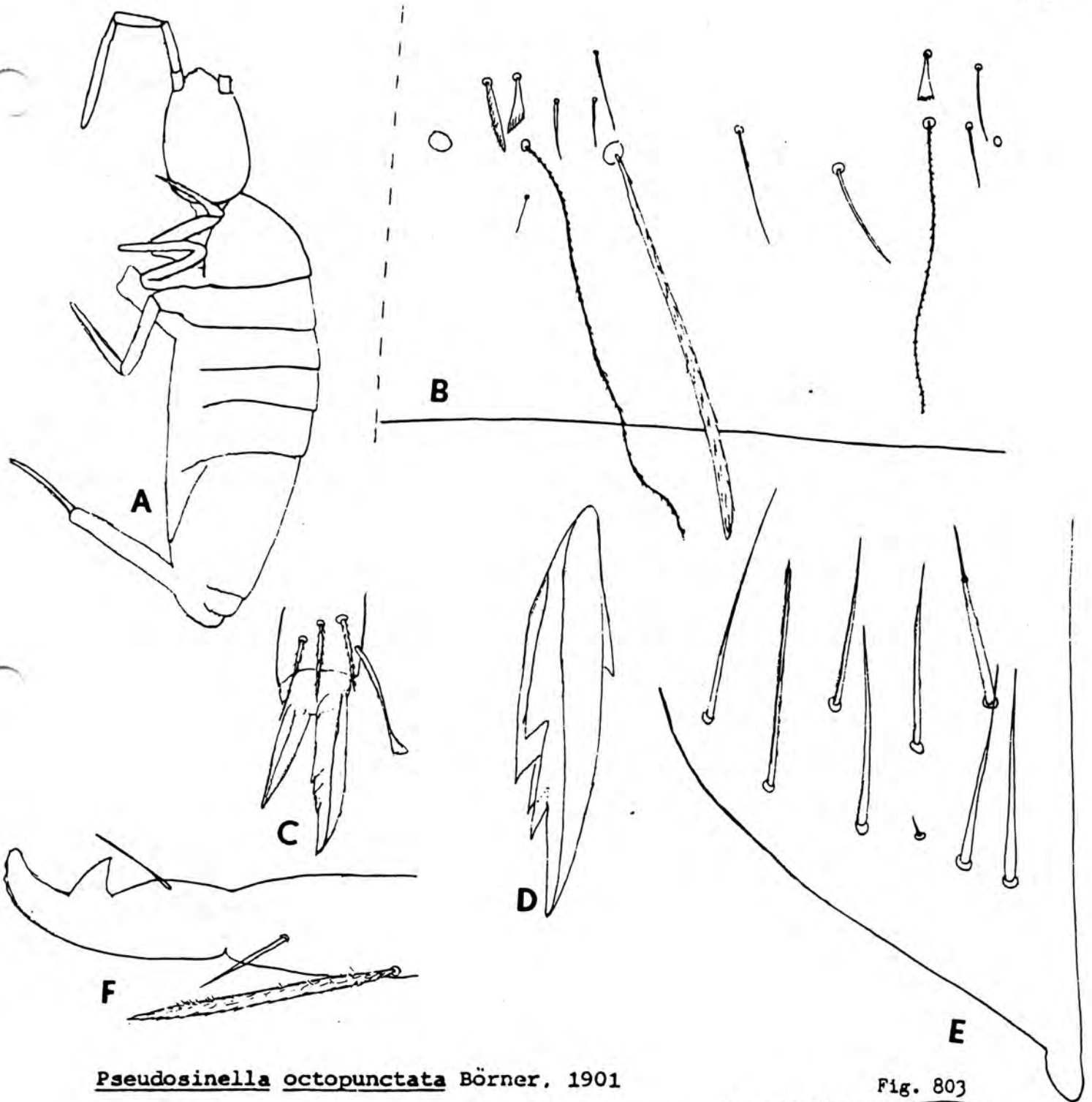
Type locality: Crystal Cave, Jefferson Co., Alabama, 23 July 1965 (S. Peck).

Pseudosinella nata

FIGURE 802

All figures of type specimens.

- A) Habitus.
- B) Dorsal chaetotaxy of right side of second abdominal segment.
- C) Hind foot complex.
- D) Mid unguis seen at an angle, showing four inner teeth.
- E) Labial triangle of right side.
- F) Mucro and apex of dens.



*Pseudosinella octopunctata* Börner, 1901

Fig. 803

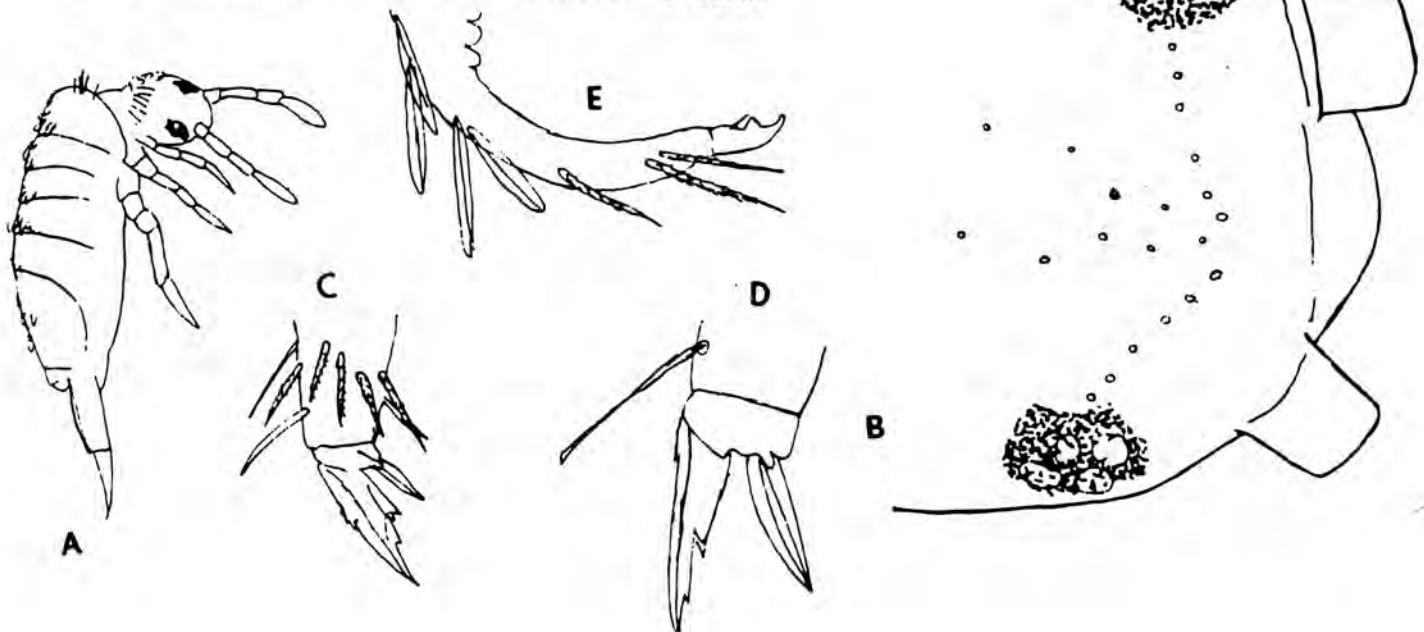
Refs.: Zool. Anz. 24: 705; Gisin, 1967. **Description**  
 Color: white, with blue pigment either on antennae and in specks on head, or scattered over body. Eyes on dark solid eye patches. Unguis with small outer and lateral teeth and 3 inner teeth, all about equal in size. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of long clavate type 1 setae. Maximum length 1.6 mm.

The cephalic chaetotaxy is generally R-1-1, but in the California material is sometimes R-0-1, and there is some variation in labial chaetotaxy in California specimens. In other respects Nearctic specimens agree well with Gisin's redescription of this species. Gisin's figure of the eye patch, however, is sufficiently different from Börner's that we are not sure his species and Börner's are the same. Hammer's record from Mt. Robson, Canada, of a form with only 2 very large inner unguis teeth, may represent a different species.

Localities: California - Butte Co., Fresno Co., Merced Co., San Joaquin Co.; Louisiana - Ouachita Par.; Missouri - Stone Co. (cave); Utah - Utan Co.

Additional records: Colorado (Wilkey, 1951); Idaho (Wray and Knowlton, 1956); Iowa (Mills, 1934); North Carolina (Pearse, 1946); Washington (Mills and Rolfs, 1933).

- A) Habitus, after Handschin, 1926 Pseudosinella octopunctata  
 B) Cephalic chaetotaxy and eyes, specimen from Missouri cave.  
 C) Foot complex, after Handschin, 1926c.  
 D) Hind foot complex, specimen from California.  
 E) Mucro and end of dens, after Handschin, 1926c





**Pseudosinella ops** new species.

Fig. 803.1

**Description**

Eyes 3 per side on one or two unclearly demarcated eye patches. Anterior two eyes very close together. Pigment of scattered blue granules over head and sometimes body. Maximum length excluding appendages 2.2 mm. Antennae 1.44 - 1.58 times cephalic diagonal, without apical bulb. Average antennal segment ratios as: 1 - 2.35 - 1.8 - 3.02. Subapical sense organ of antenna a stout rod with a small apical spherical knob. Lenticular organs weakly to strongly developed between second and third antennal segment. Third antennal apical sense organ as shown in figure C), with unusual supplementary setae between seta 6 & 1 and 7 & 2; ventral surface with a number of subapical stout short sharply tapered ciliate setae; both dorsal and ventral surface and dorsal surface of second segment with numerous short, slender, cylindrical, blunt setae. Pre-labral setae 4-5-5-4, posterior row ciliate and others smooth. Labial palp with three sublobal hairs. Labial ventral groove with 4 + 4 ciliate macrochaetae along margin, posteriormost much longer than others. Second abdominal segment with very large p seta and only one ciliate small q seta. The fourth abdominal segment anterior bothriotrachelal complex with supplementary seta. Ventral tube with 14 to 16 large to moderate ciliated setae per side on anterior face; distolateral patches with 9-11 setae, 3-4 smooth, others very finely ciliate; posterior face with 23 - 25 setae, distalmost ones ciliate, others smooth or "striate". Posterior leg with one acuminate seta, longer and heavier than others, .26 - .38 from base. Trochanteral organ in adults or subadults with 8 setae in dorsal arm, 9-10 in ventral arm, 12 - 14 internal setae and 7-8 external setae. Unguis with 3 strong inner teeth, one much larger than others, distalmost .50 - .60 from base. Unguiculus acuminate and smooth without tooth or clear serrations. Manubrial plaque with 2 inner and 6 - 8 outer ciliate setae. Mucro with basal spine whose apex just reaches or barely exceeds the tip of median tooth. Uncrenulate dens 2.5 - 2.7 times as long as mucro.

**Localities**

*Holotype* ♀ and four paratype ♀♀, Herrons Echo Hall cave, Scott Co. Virginia, August 8 1995, D. Hubbard coll. (Locality no. 7859). Also found in Adam's cave, Montgomery Co. Virginia, Nov. 22. 1995, (locality no. 7911) & Buffalo Hollow Hill cave, Russell Co. Virginia, July 11 1997, (Locality no. 9118) D. Hubbard coll. .

**Derivatio nominis**

From the Latin ops - might or power.

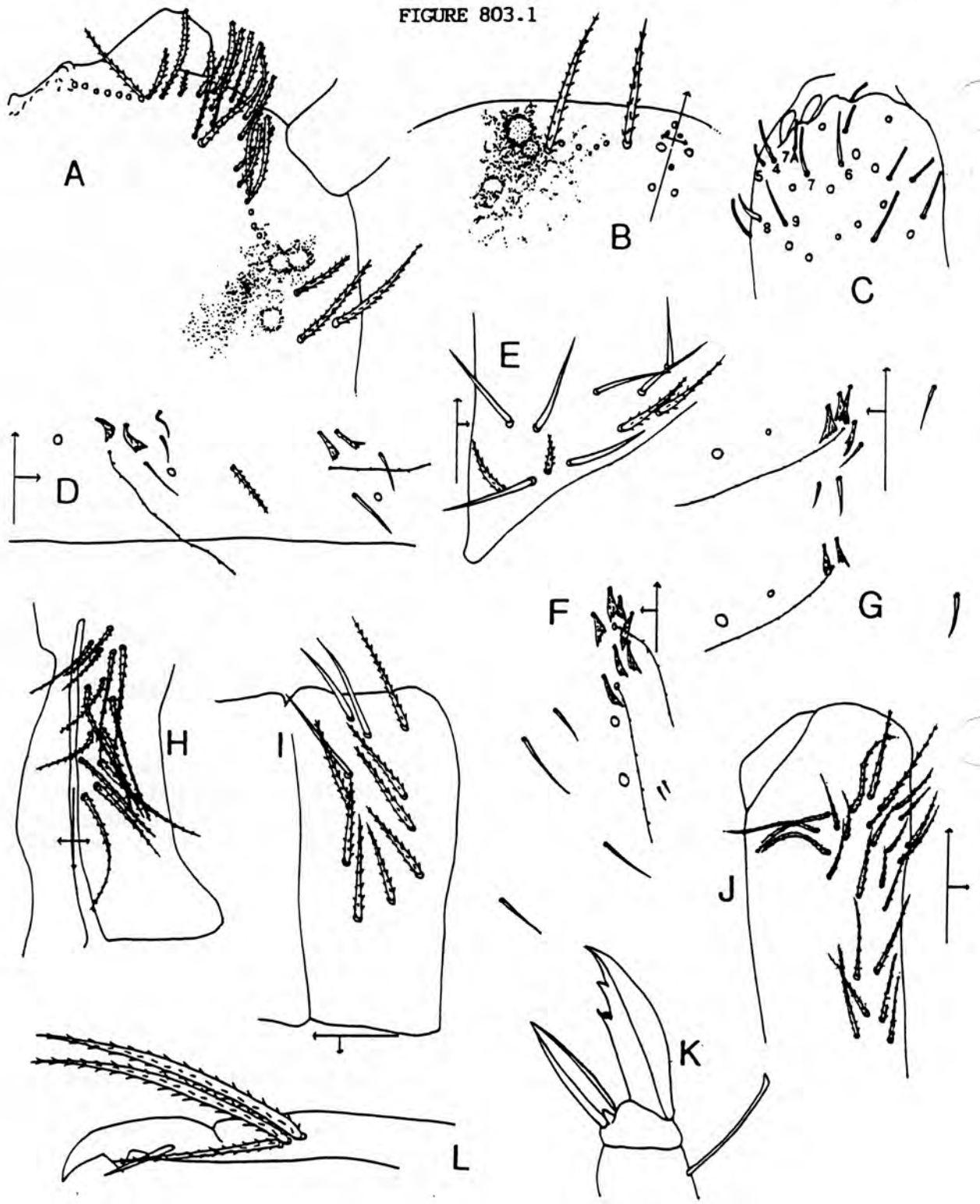
**Remarks**

This species is so superficially similar to the neighboring species, *Pseudosinella sexoculata*, that we at first tried to fit them onto the same procrustean bed since it seemed highly unlikely that two 3 + 3 eyed species would turn up in this region. The differences in dorsal cephalic and second abdominal chaetotaxy, as well as labial triangle structure forced us to accept them as two separate species. The labial triangle structure is variable but the rarer condition was seen in only one of the five specimens. The single specimen from Montgomery county is questionable as it is immature and the antennal, second and third abdominal chaetotaxy cannot be seen.

**Legend for figures**

All figures of type specimens. A) Anterior dorsal surface of head. B) Left eyepatch, another specimen; C) Apex, third antennal segment; D) Second abdominal chaetotaxy; E) Left side labial triangle setae; F) Lateral seta complex, third abdominal segment, left side; G) Fourth abdominal segment lateral bothriotrachelal complex, left side; H) Anterior face ventral tube, left side; I) Disto lateral patch, ventral tube, another specimen; J) Posterior face ventral tube; another specimen; K) Hind foot complex, plan view; L) End of dens and mucro.

FIGURE 803.1



Pseudosinella orba Christiansen, 1961

Fig. 804

Ref.: Psyche Camb. 7:20.

### Description

Color: white, without eyes (rarely with trace of pigment and 1 pair of vestigial eyes). Labial seta r minute. Mesothorax not strikingly enlarged. Tenent hair short and slender. Unguis without outer tooth, with small lateral teeth and 3 adjacent inner teeth, one of which is enlarged and acuminate. Unguiculus lanceolate, with or without a minute outer tooth. Dens without spines. Mucro with apical tooth about 3 times as long as antepical. Macrochaetae of mesothoracic "collar" are long clavate type 1 setae. Maximum length 2 mm.

### Remarks

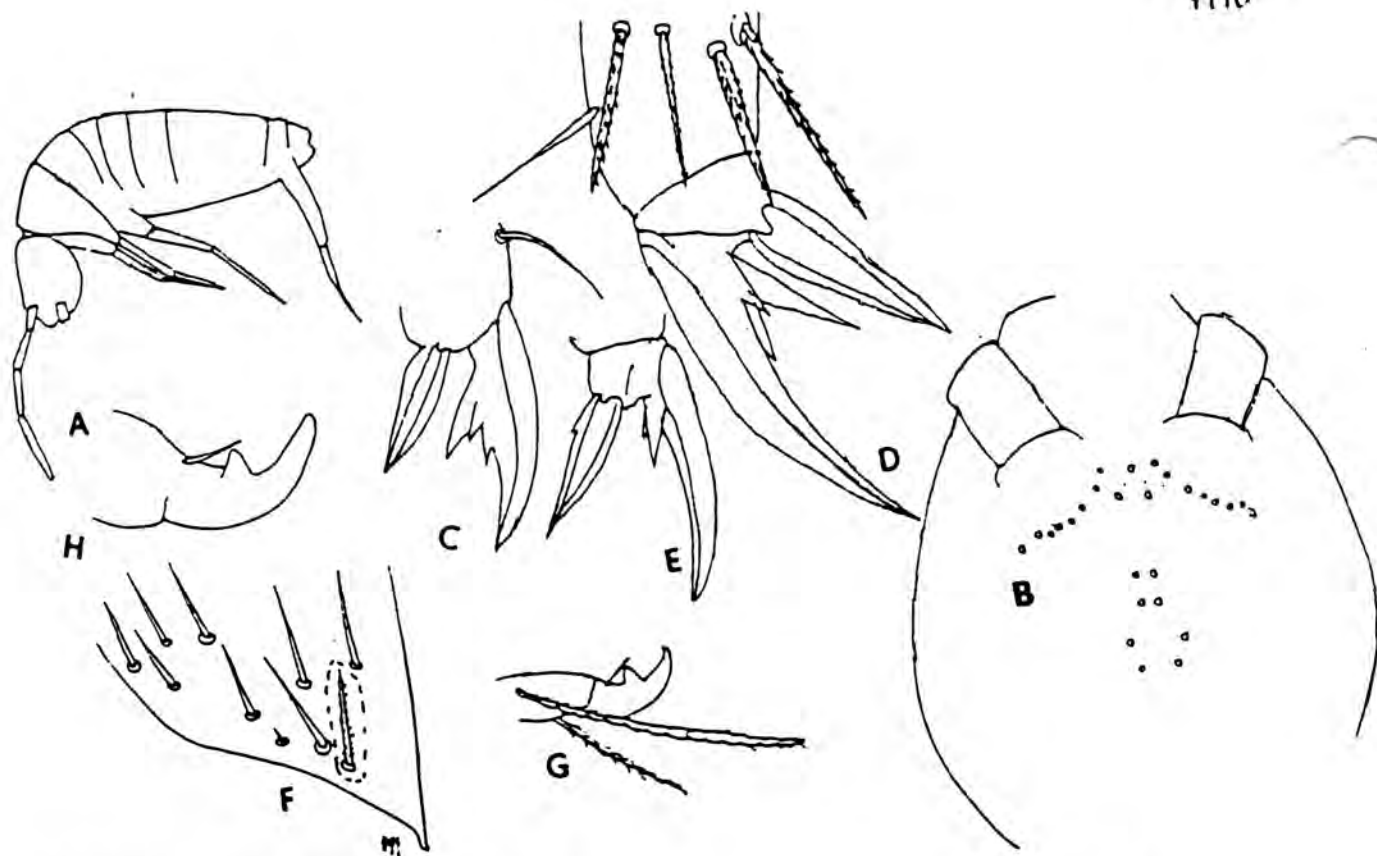
This species shows some geographic variation. Specimens from Giles, Russell and Tazewell Counties, and some specimens from Smythe Co., in Virginia, have labial seta M ciliate, whereas this is smooth in specimens from other localities. The fourth abdominal segment inner macrochaetae are 0+2 in these counties and 1+2 elsewhere. Intermediate conditions in specimens from Buchanan Saltpeter Cave in Smythe Co. lead us to consider the 2 forms as synonyms pending further study. A single specimen from Macdowell Co., North Carolina, lacks cephalic seta T and has 2 macrochaetae on thoracic segment 3. A single adult male from a cave in Mercer Co., West Virginia, shows even more striking peculiarities, having pale pigment and 1+1 vestigial eyes, as well as lacking cephalic S and T setae. Since other individuals seen from this cave are females or immature, it is uncertain whether this is an abnormality or a case of local sexual dimorphism. The species is known only from caves.

Localities: Tennessee - Sullivan Co. (type); Virginia - Bland Co., Giles Co., Russell Co., Smythe Co., Tazewell Co.; West Virginia - Mercer Co.

### FIGURE 804

Pseudosinella orba (Figure on next page)

- A) Habitus, type specimen.
- B) Cephalic chaetotaxy, type specimen.
- C) Hind unguis and unguiculus, type specimen.
- D) Hind foot complex, specimen from Mercer Co., West Virginia.
- E) Hind foot complex, specimen from Smythe Co., Virginia.
- F) Typical labial chaetotaxy, right side; encircled setae often smooth.
- G) Mucro and apex of dens, specimen from Smythe Co., Virginia.
- H) Mucro, type specimen.



*Pseudosinella pecki*, Christiansen & Bellinger, 1980

Fig. 805

### Description

Color: white without trace of pigment. Inner sensillae of third antennal segment sense organ irregularly expanded and flattened apically. Lenticular apical organs of antennae prominent. No trace of eyes. Tenent hair apically curved. Unguis with 1 (?) lateral and 3 inner teeth, the basalmost tooth slightly to clearly larger than the others. Unguiculus lanceolate. Dens without spines. Mucro with apical tooth about twice as long as anteapical tooth. Macrochaetae of mesothoracic "collar" relatively short type 1 setae. Maximum length 3.0 mm.

### Remarks

This species is probably a troglotic derivative of *P. argentea*. While the Georgia specimens superficially resemble the latter species, the Florida populations look like *P. hirsuta*. The labial chaetotaxy readily distinguishes *pecki* from both *argentea* and *hirsuta*. The seta p of the second abdominal segment is sometimes absent. A few of the Alabama specimens have labial M<sub>1</sub> smooth.

Type locality: Miller's Cave, Caverns State Park, Jackson Co., Florida, 28 December 1965 (S. Peck).

Additional localities (all from caves): Alabama - Jackson Co.; Georgia - Decatur Co., Randolph Co., Stewart Co.

FIGURE 805

*Pseudosinella pecki*

A) Habitus, type specimen.

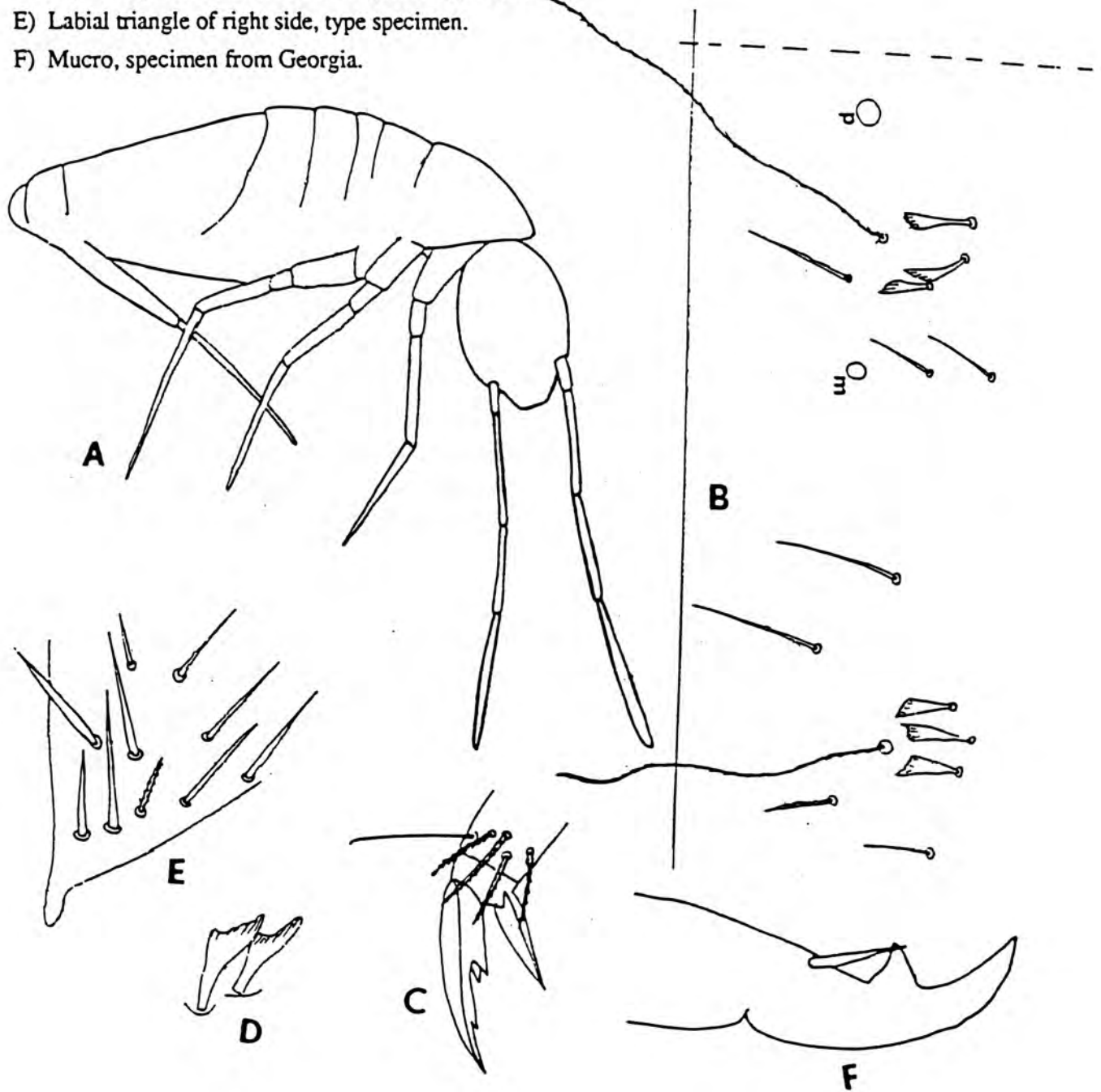
B) Dorsal chaetotaxy of right side of second abdominal segment, specimen from Jackson C., Florida; p = pseudopore, m = base of macrochaetae.

C) Hind foot complex, type specimen.

D) Apical organ of third antennal segment, type specimen.

E) Labial triangle of right side, type specimen.

F) Mucro, specimen from Georgia.





Pseudosinella rolfsi Mills, 1932

Fig. 806

Ref.: Iowa St. Coll. J. Sci. 6:272

### Description

Color: white without trace of pigment. Apical organ of third antennal segment with inner sensillae conical and peg-like. Mesothorax peculiarly expanded laterally to form a cape-like structure over the prothorax, but not expanded anteriorly. Unguis with outer tooth, with or without small lateral teeth, and with 3 inner teeth, 1 of which is enlarged and wing-like. Unguiculus with clear outer wing-like tooth. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of short acuminate type 1 setae. Maximum length 2.0 mm.

### Remarks

This species furnishes an intriguing object for future research. In Iowa, and in all specimens we have seen from Illinois and Massachusetts, we find the unique abdominal chaetotaxy shown in the tables and figures, as well as the expanded mesothorax and short, acuminate mesothoracic macrochaetae. All these features, as well as the much more placid behavior of the animals serve to separate it easily from P. violenta. In Texas, and the specimens we have seen from New Mexico and 1 Pennsylvania locality, the abdominal chaetotaxy varies but is generally similar to that found in P. violenta. The foot complex is relatively constant and always of the form shown in the figure, in contrast to the high variability of this feature in violenta. It is possible that the 2 species hybridize in only part of their overlapping range. P. rolfsi is not generally found in caves. A single specimen from a cave from Metcalfe Co., Kentucky is unusual in having a mucro resembling that of P. espana.

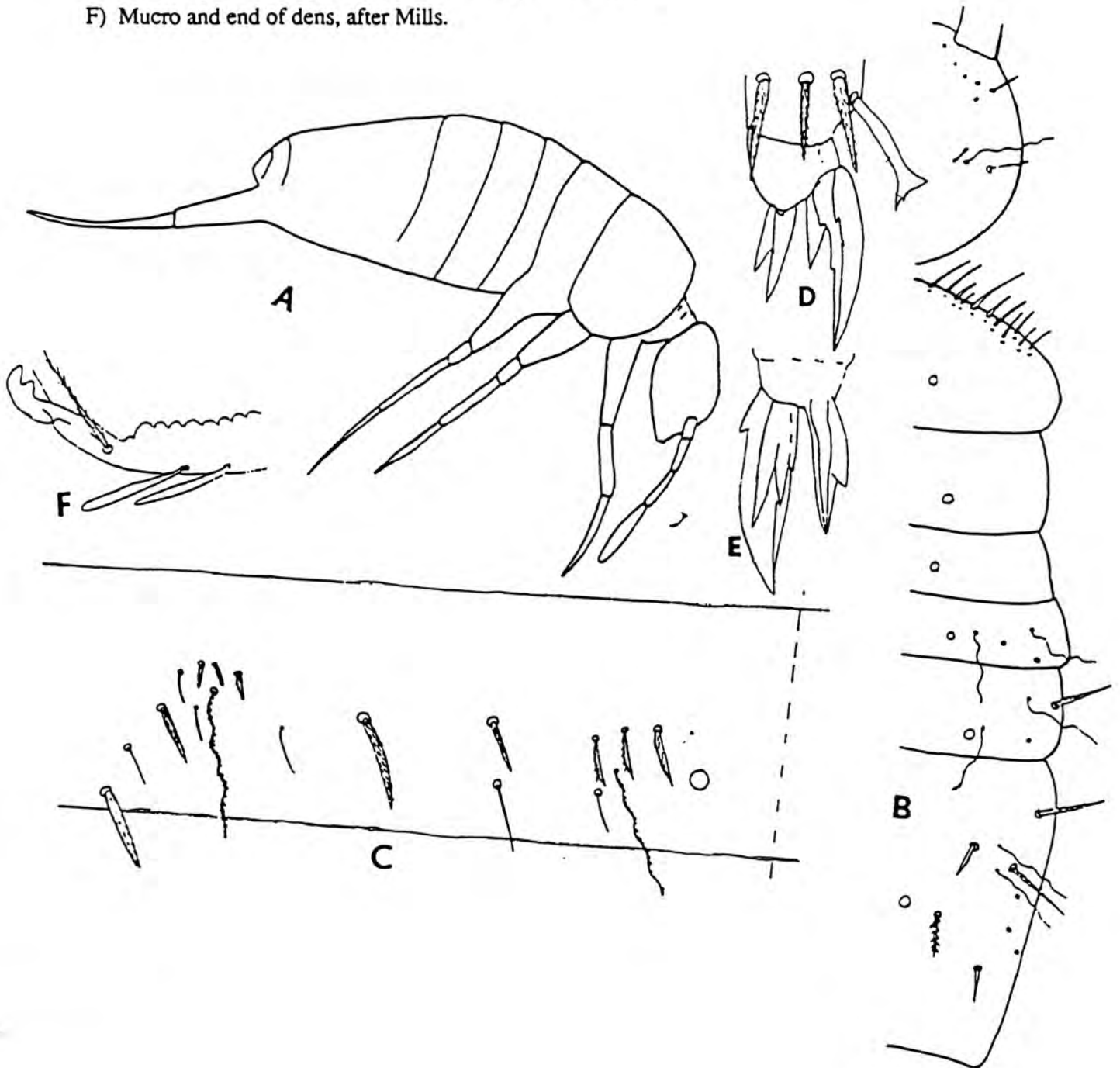
Localities: Arizona; Connecticut - New Haven Co.; Florida - Highlands Co.; Illinois - Winnebago Co.; Iowa - many areas; Louisiana - Jefferson Parish; Massachusetts - Essex Co., Middlesex Co.; New Mexico - Emory Pass, Kingston; Ohio - Delaware Co.; Pennsylvania - Huntingdon Co., Susquehanna Co.; Texas - many localities, eastern 2/3 of state; Utah - San Pete Co.; Wisconsin - Sauk Co.

Additional records: California (Wilkey, 1959); Colorado (Wilkey, 1951); Michigan (Snider, 1967); New York (Maynard, 1951); North Carolina (Brimley, 1938); Utah (Wray and Knowlton, 1953); Washington (Mills and Rolfs, 1933).

FIGURE 806

*Pseudosinella rolfsi*

- A) Habitus, specimen from Iowa.  
 B) Dorsal pseudopores (circles) and macrochaetae of right side, specimen from Ohio.  
 C) Chaetotaxy of left half of dorsum of second abdominal segment, specimen from Iowa.  
 D) Hind foot complex, after Mills.  
 E) Hind unguis and unguiculus, seen from angle, after Mills.  
 F) Mucro and end of dens, after Mills.



**Description**

Color: white without trace of pigment. Mesothorax not projecting forward, but projecting laterally as in *P. rolfsi*. Tenent hair long and slender but clearly clavate. Unguis with lateral but no external teeth and with 3 internal teeth, the apical one being the largest. Unguiculus with a large, clear external tooth. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" long and clavate or truncate type 1 setae. Maximum length 1.2 mm.

**Remarks**

This species may be part of the variation of the *rolfsi-violenta* group; however, the very different labial chaetotaxy and ungual structure make us feel it better to keep it as a separate species.

Type locality: Gray Herbarium, Cambridge, Massachusetts, 28 October 1948, in spruce needles (K. Christiansen).

Additional localities: New Jersey - Middlesex Co., Somerset Co.; North Carolina - Orange Co.; Pennsylvania - Breezewood.

**FIGURE 807*****Pseudosinella sera***

All figures of type specimens.

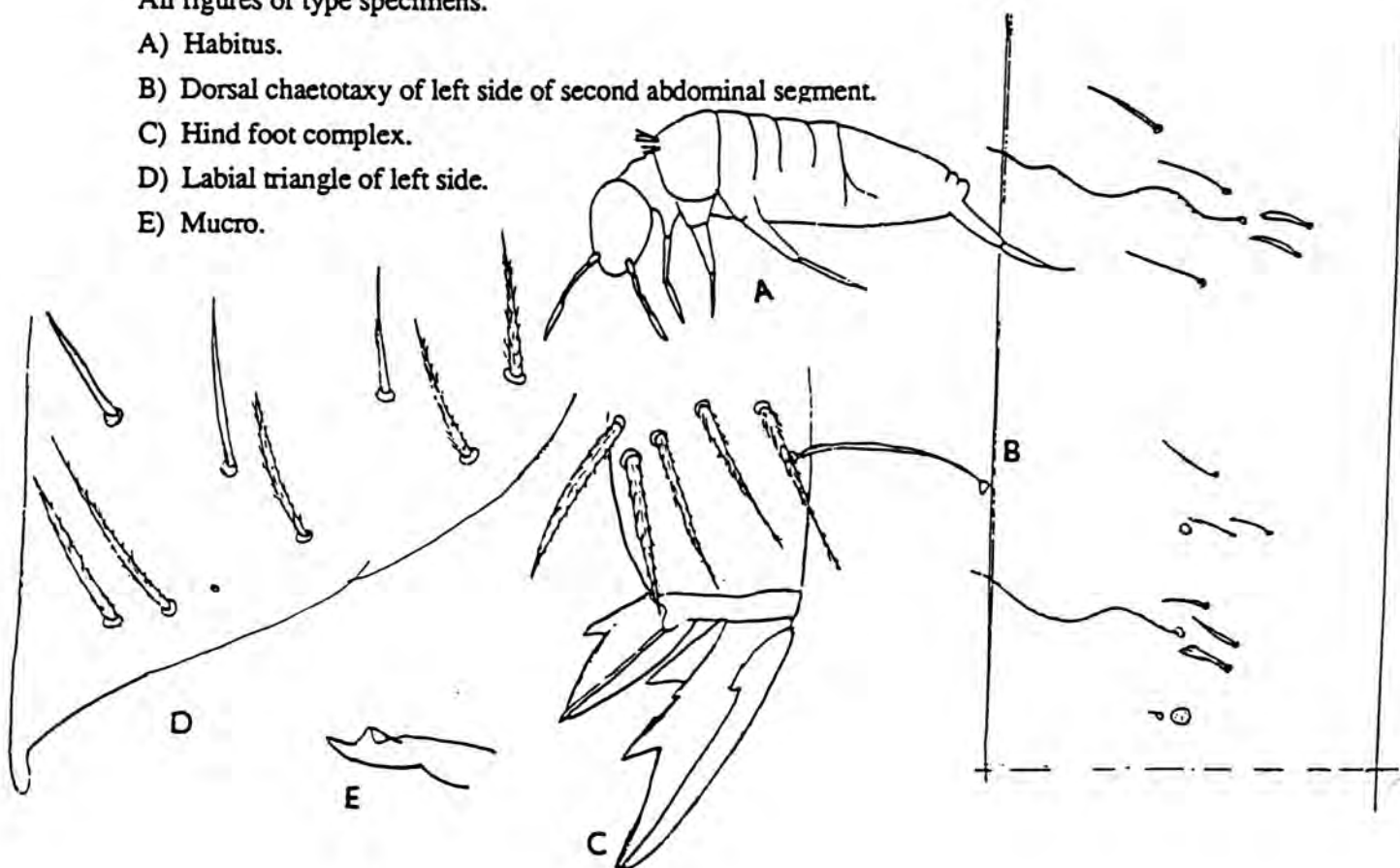
A) Habitus.

B) Dorsal chaetotaxy of left side of second abdominal segment.

C) Hind foot complex.

D) Labial triangle of left side.

E) Mucro.



Pseudosinella sexoculata Schött, 1902

Fig. 808

Refs.: Bih. K. svenska Vetensk. Akad. Handl. 28(4(2)):34; Christiansen, 1961a;  
Gisin and Gama, 1972.

Syn.: Entomobrya (Sinella) aglis Harvey, 1900, Ent. News 11:549 (?)

#### Description

Color: background dull yellow; pigment limited to eye patches, or body speckled with red. Inner sensillae of third antennal segment sense organ are oval, basally constricted pegs. Two eyes in front and 1 behind on separate pigment patches. Tenent hair clearly clavate. Unguis with lateral but without outer tooth; with 3 moderately large inner teeth. Unguiculus without clear outer tooth, but often with outer edge serrate. Dens without spines. Mucro normal. Mesothoracic "collar" of long, clavate type 1 macrochaetae. Maximum length 1.7 mm.

#### Remarks

Our specimens agree well with notes by Gisin upon European specimens. Those from California and New Mexico are quite uniform. The single specimen from Iowa differs in having much more reduced eyes. All are unique among Nearctic species with 3+3 eyes in having 1+2 inner macrochaetae on the fourth abdominal segment. According to Mills, Lepidocyrtus sexoculatus Guthrie, 1903 is a synonym of this species. One of the types of Harvey's aglis is a Pseudosinella, probably this species but not certainly determinable; we do not wish to resurrect this name without better evidence. Specimens from Virginia caves agree well with description and the specimens from New Mexico. A more thorough examination may show several species involved.

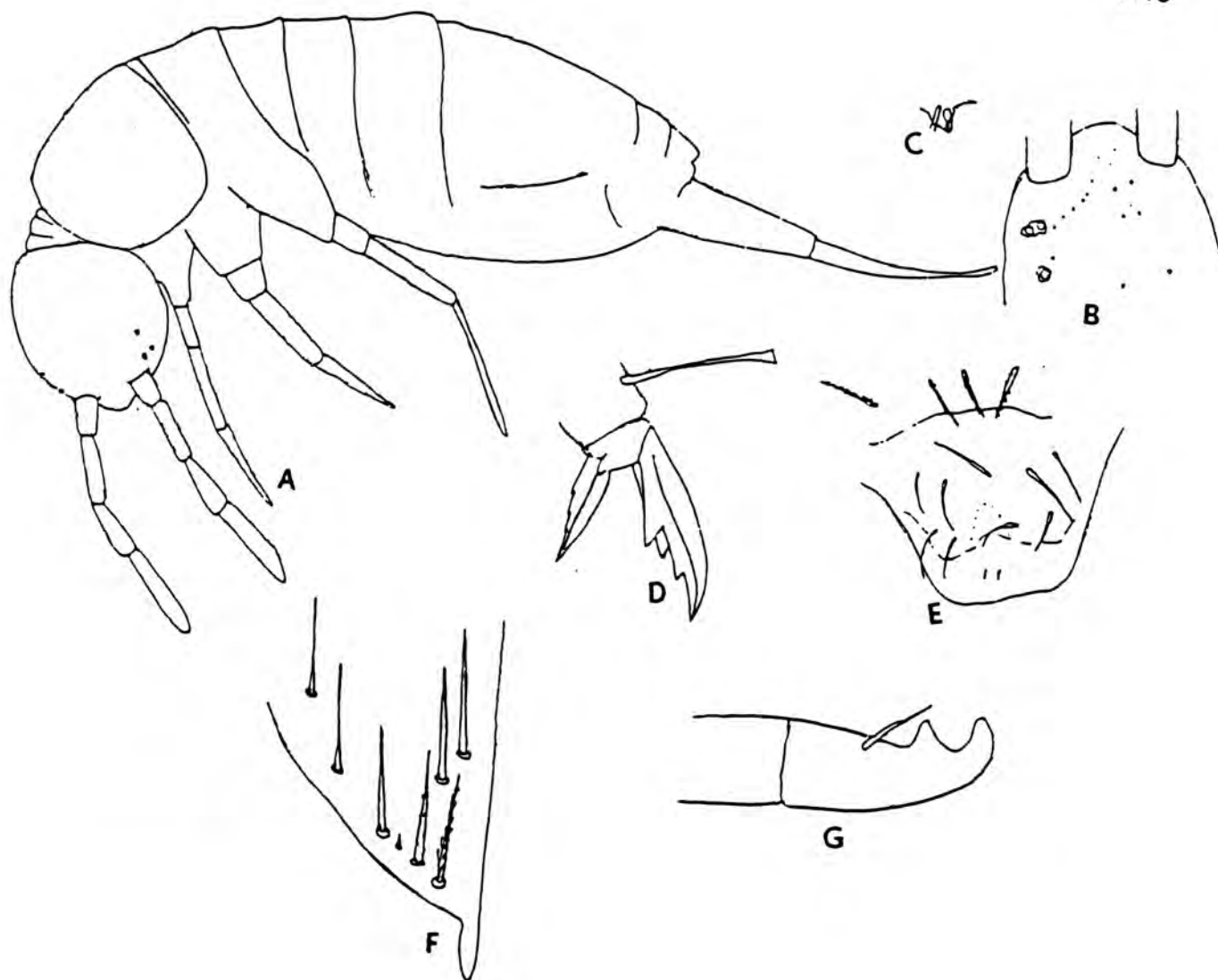
Localities: California - Alameda Co., Contra Costa Co., Los Angeles Co., Madera Co., Yolo Co.; Iowa - Dubuque Co. (cave) (?); New Mexico - Eddy Co. (cave); Virginia - Washington Co. (cave).

Additional records: Idaho (Yosii, 1963); Kentucky (Bonet, 1934); Michigan (Snider, 1967); New York (Maynard, 1951); North Carolina (Wray, 1963); South Carolina (DuRant and Fox, 1966); Utah (Wray and Knowlton, 1961); Washington (Mills and Rolfs, 1933).

#### FIGURE 808

Pseudosinella sexoculata (Figures on next page)

- A) Habitus, specimen from cave in Eddy Co., New Mexico.
- B) Cephalic macrochaetae and eyes, specimen from same New Mexico cave.
- C) Apical organ of third antennal segment, same specimen.
- D) Hind foot complex, same specimen.
- E) Labrum, after Yosii, 1963.
- F) Labial triangle of right side, same specimen.
- G) Mucro, same specimen.



*Pseudosinella spinosa* (Delamare), 1949

Fig. 809

Refs.: Notes biospéol. 4:122 (*Troglosinella*); Christiansen, 1961a.

#### Description

Color: white without trace of pigment except for occasional reddish flecks. Inner sensillae of third antennal segment sense organ basally constricted, fusiform, and flattened. Mesothorax greatly expanded anteriorly. Unguis elongate, without external teeth but with 3 small inner teeth. Unguiculus lanceolate, with a weakly developed basal inner swelling. Dens with several rows of spine-like, ciliated or striate setae dorsally on basal 2/3. Mucro with anteapical tooth distally displaced. Macrochaetae of mesothoracic "collar" short acuminate type I setae. Maximum length 4.5 mm.



Remarks

This is the largest Nearctic Pseudosinella. The dental spines distinguish it from all of its congeners.

1117

Localities (all from caves): Alabama - Jackson Co., Madison Co. (type), Shelby Co.; Georgia - Dade Co.; Tennessee - DeKalb Co., Franklin Co., Grundy Co., Lincoln Co., Putnam Co., Sumner Co., Warren Co., White Co.

Pseudosinella spinosa

A) Habitus, specimen from Grundy Co., Tennessee.

B) Fore unguis and unguiculus, after Delamare.

C) Hind foot complex, after Delamare.

D) Outer view of hind unguis.

E) Subapical sensory setae of fourth antennal segment, specimen from Putnam Co., Tennessee.

F) Subapical organ of third antennal segment, specimen from Grundy Co., Tennessee.

G) Labial triangle of right side, specimen from Jackson Co., Alabama.

H) Base of dens showing spines, after Delamare.

I) Enlarged spines; left, type specimen; right, specimen from Jackson Co. Alabama.

J) Mucro and apex of dens, after Delamare.

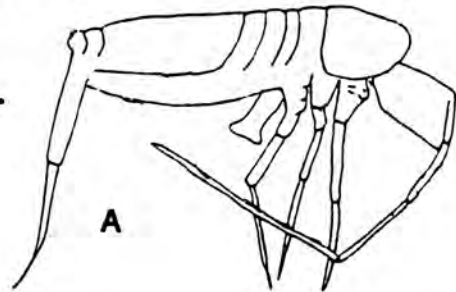
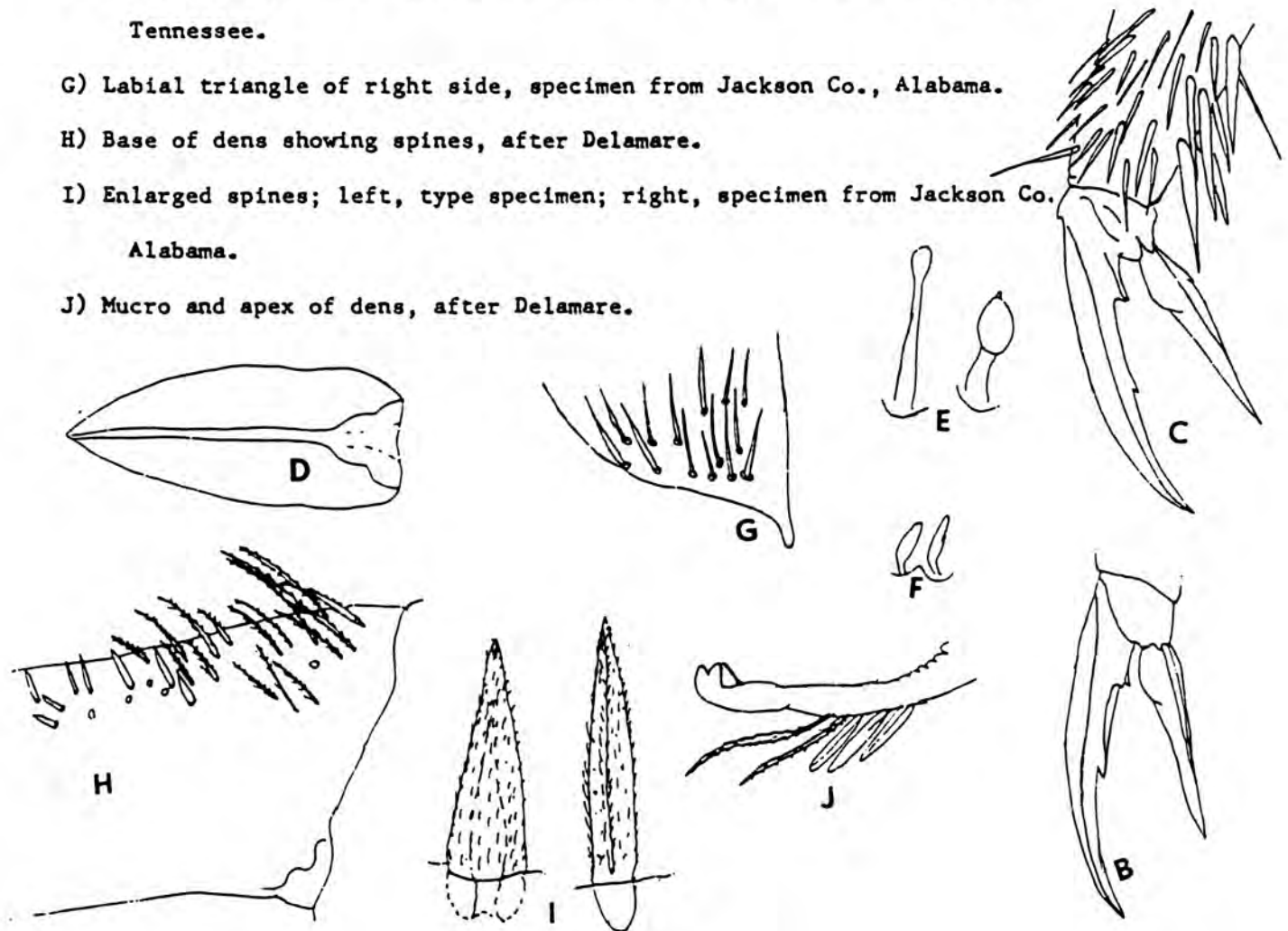


FIGURE 809



Pseudosinella testa, Christiansen & Bellinger, 1980

Description

Color: pale blue, with eyes on irregular darker eye patches; these enclose all 3 eyes, but the anterior 2 and posterior 1 are on still darker areas. Tenent hair long and slender. Unguis with small basal outer and lateral teeth and 3 small inner teeth. Unguiculus lanceolate. Dens without spines. Mucro normal, with basal spine definitely surpassing antepical tooth. Maximum length 2.3 mm.

Remarks

Superficially this species resembles P. sexoculata and P. fallax Börner, 1903, but it is readily distinguished by the abdominal chaetotaxy and labial triangle setae. The eye number may vary, as it is unclear on 1 specimen.

Type locality: Neely Farm Cave, Mercer Co., West Virginia, 31 May 1969 (Hedges & Baroody).

Pseudosinella testa

A) Habitus.

FIGURE 810

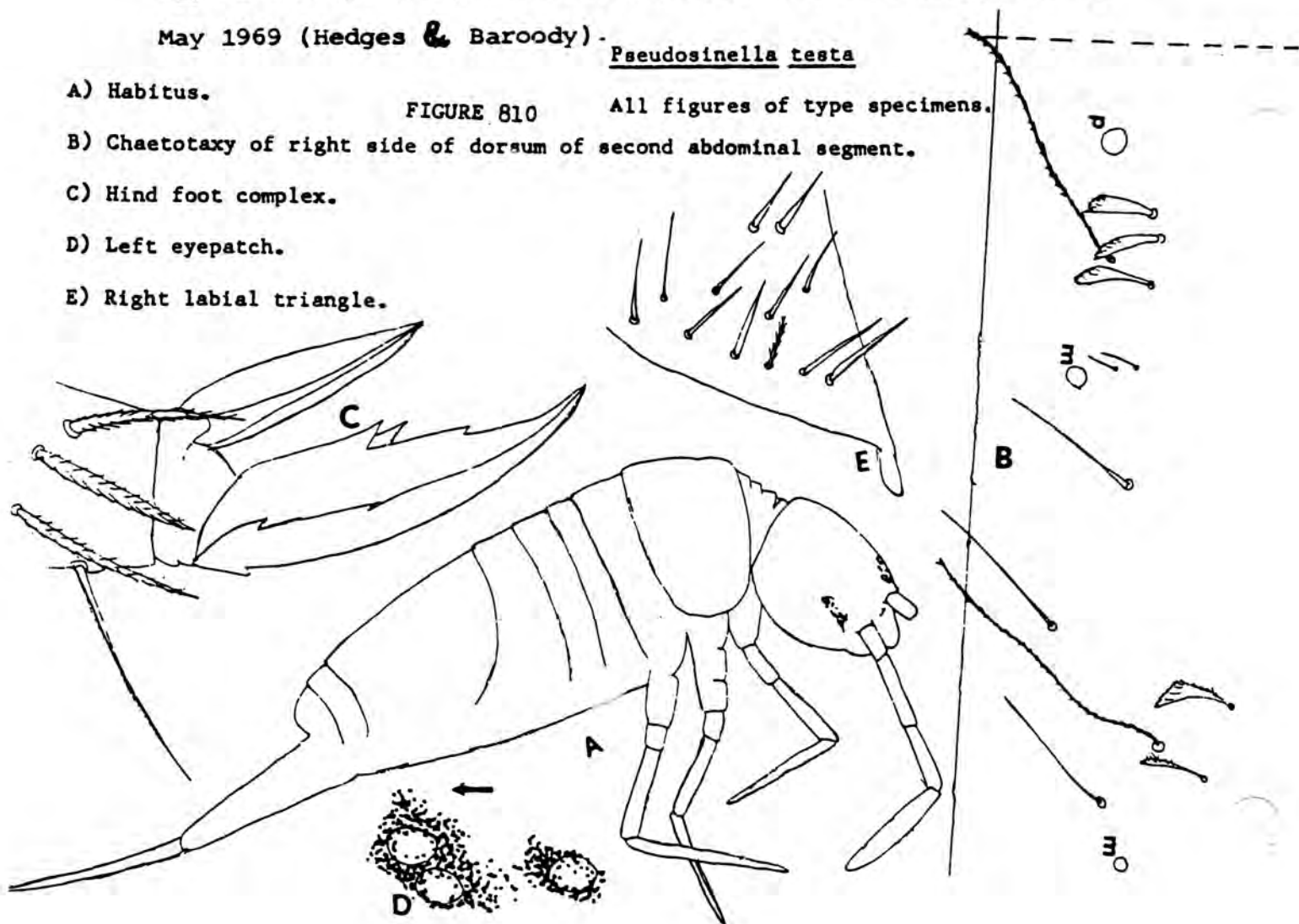
All figures of type specimens.

B) Chaetotaxy of right side of dorsum of second abdominal segment.

C) Hind foot complex.

D) Left eyepatch.

E) Right labial triangle.



Refs.: Am. Mus. Novit. 108: 10 (Lepidocyrtus); Christiansen, 1961a.

Syns.: folsomi Denis, 1931, Mitt. zool. Mus. Hamburg 44: 126, petterseni of American authors, not of Börner.

Description

Color: white without trace of pigment. Mesothorax not expanded or humped. Tenent hair usually clavate but sometimes elongate and acuminate. Unguis variable, but with outer tooth and 3 (rarely 2) inner teeth. Unguiculus with clear outer tooth, sometimes expanded and wing-like. Dens without spines. Mucro normal. Macrochaetae of mesothoracic "collar" of clavate type 1 setae. Maximum length; cave forms 2.1 mm.; surface forms 1.6 mm.

Remarks

The geographic variation of this species has been discussed in detail elsewhere (Christiansen and Culver, 1969). In addition to the types of variation mentioned there, specimens from South Carolina have the mesothoracic setae shorter than normal, making them similar in this respect to P. rolfsi. These 2 species show considerable intergradation in Texas and New Mexico, but generally they are readily distinguished by the chaetotaxy of the second and fourth abdominal segments, the mesothoracic "collar" setae, and the shape of the mesothorax. On the other hand, P. folsomi Denis appears to be separable from violenta solely on the basis of the ungual structure. Since this feature shows variation and clear intergradation, we believe it best to consider folsomi a synonym of violenta.

According to Mills, Cyphoderus albinos of Guthrie is this species, and specimens from Iowa and Massachusetts identified by Guthrie are in fact the "folsom<sup>r</sup>" form of violenta, but Guthrie's figure of the foot suggests rather P. argentea.

Two specimens from Florida lack seta B on the second abdominal segment and may represent a separate species.

Localities: surface; Arkansas, California, Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, New Jersey, New Mexico, North Carolina, South Carolina, Texas; caves; New Mexico, Texas.

Additional records: Kentucky (Lesshafft, 1977); Maryland (Ostdiek, 1961, as petterseni) Michigan (Snider, 1967); Missouri (Bueker, 1939); New York (Folsom, 1924); Oklahoma (Fenton and Howell, 1957); Tennessee (Copeland, 1960); Utah (Wray et al., 1950); Washington (Mills and Rolfs, 1933). Nova Scotia (Fox, 1967, as

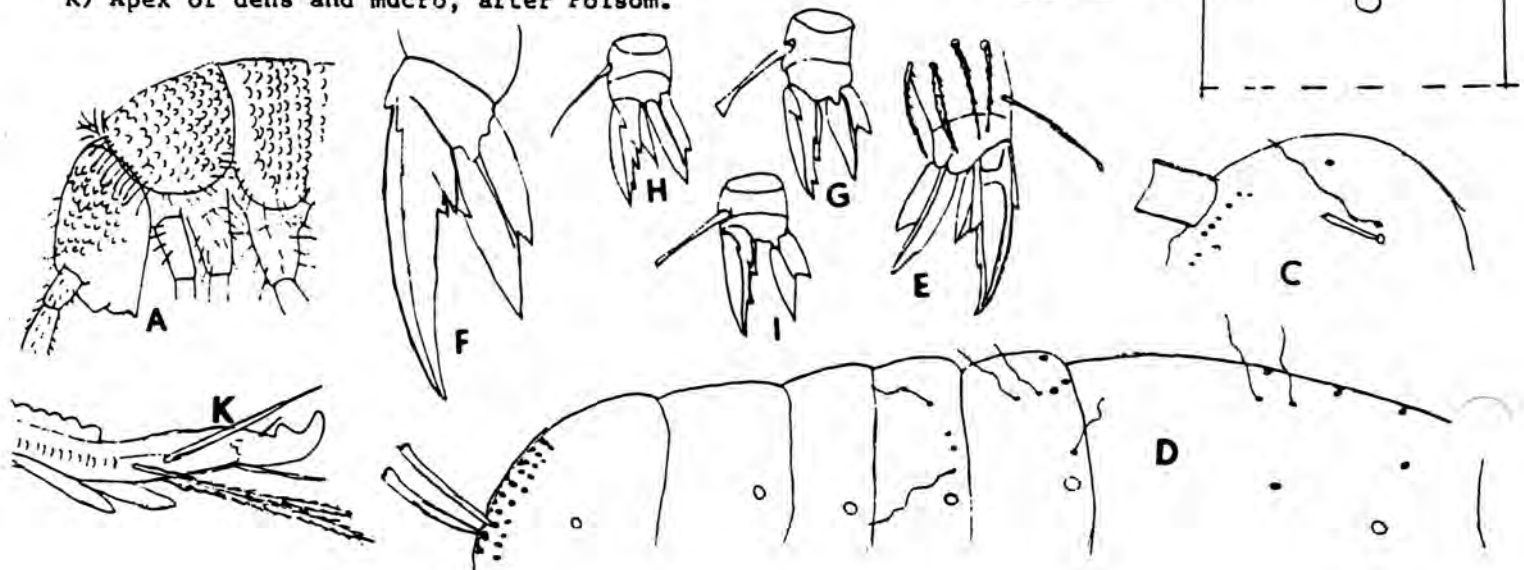
petterseni); Ontario (James, 1933); Quebec (Sharma and Kevan, 1963, as petterseni)

Biology: Davis and Harris, 1936; Sharma and Kevan, 1963 (as petterseni); Christiansen, 1970.

Pseudosinella violenta

- A) Anterior body, after Folsom.  
 B) Dorsal chaetotaxy of left side of second abdominal segment, specimen from Iowa.  
 C) Cephalic chaetotaxy of right side, composite.  
 D) Macrochaetae and bothriotricha of right side of trunk, composite.  
 E) Hind foot complex, after Folsom.  
 F) Unguis and unguiculus of folsomi, after Denis.  
 G) - I) Variations in foot complex structure in species.  
 J) Apical organ of third antennal segment, specimen from Texas.  
 K) Apex of dens and mucro, after Folsom.

FIGURE 811





Color: white, rarely with a faint bluish tinge. Inner sensillae of third antennal segment sense organ more or less flattened, somewhat paddle-shaped, and striate or ~~striate~~ <sup>ciliate</sup>; apex of second antennal segment with a single, somewhat smaller, similar sensilla. Mesothorax not enlarged. Tenent hair moderately long. Unguis with small lateral and outer teeth and 3 large inner teeth; basal tooth slightly larger than others. Unguiculus lanceolate. Dens without spines. Mucro with apical tooth about 1.5 times as long as anteapical. Maximum length 1.7 mm.

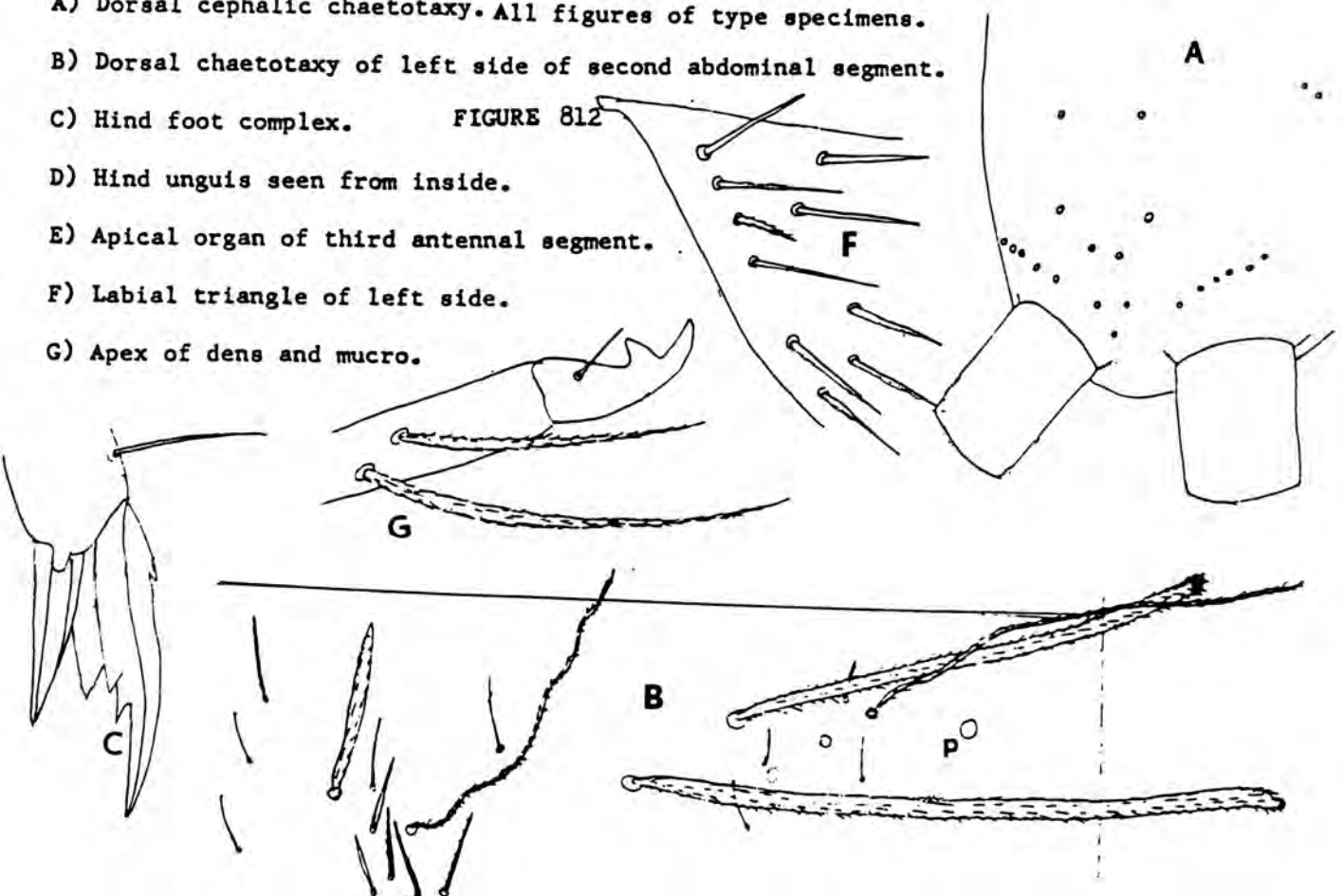
## Remarks

The intersegmental membranes between the third and fourth antennal segments show peculiar knobs. This species is near P. orba, but differs in some features of chaetotaxy.

Type locality: Fort Stanton Cave, Lincoln Co., New Mexico (N. Weibourn).

Pseudosinella vita

- A) Dorsal cephalic chaetotaxy. All figures of type specimens.  
 B) Dorsal chaetotaxy of left side of second abdominal segment.  
 C) Hind foot complex.  
 D) Hind unguis seen from inside.  
 E) Apical organ of third antennal segment.  
 F) Labial triangle of left side.  
 G) Apex of dens and mucro.





Type species: H. margaritarius Wankel, 1860

Syn.: Heteromurodes Absolon, 1901 (type species quadrioculata).

This genus includes the only Nearctic Entomobryinae with scales, fewer than 6+6 eyes, a bidentate mucro with a basal spine, and the fourth abdominal segment less than twice as long as the third. The antennae have clear evidence of whorling on the fourth segment, and a striking basal subsegment of the first segment. The genus shows some resemblance to Orchesella, but judging from its chaetotaxy is clearly more closely related to Pseudosinella. There is a single named Nearctic species, H. nitidus. a second, probably undescribed, has been found in collections from California.

Heteromurus nitidus (Templeton), 1835

Fig. 813

Refs.: Trans. ent. Soc. Lond. 1:94 (Podura); Maynard, 1951; Gisin, 1960.

Syn.: americana Harvey, 1892, Ent. News 3:57 (Templetonia); quadrioculata Schött, 1896, Proc. Calif. Acad. Sci. (2)6:183 (Templetonia);

f. quadriocellata Kseneman of Maynard, 1951.

#### Description

Color: white to reddish brown with scattered pigment granules. Antennae without retractile apical bulb. Eyes usually 1+1 on small reddish spots, but sometimes absent, unpigmented, or 2+2. Labral papillae obscure, low, rounded and apparently non-setaceous. External differentiated seta of labial appendage exceeding apex of same papilla for about 1/3 of length. Macrochaetae of type 1 typical, apically truncate. Scales broadly oval and coarsely ciliate. Maximum length 2.5 mm.

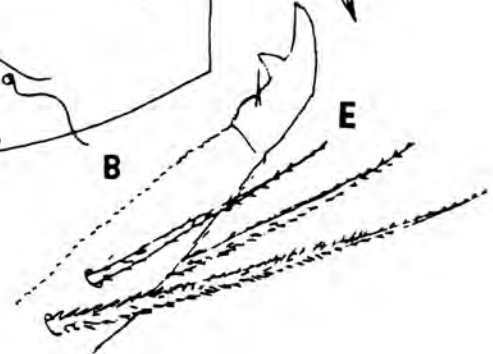
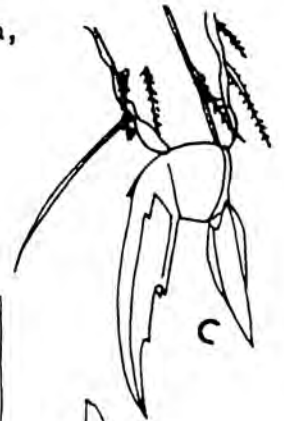
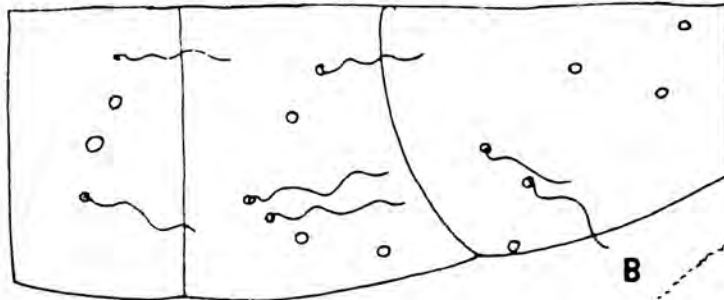
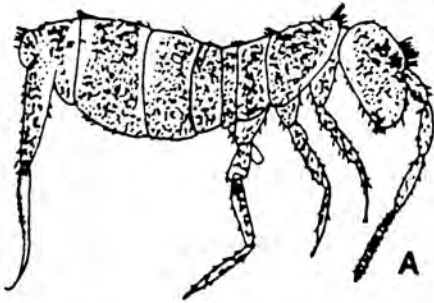
#### Remarks

This species is probably introduced, but appears to have been locally successful in caves.

Localities: Iowa - Dubuque Co. (cave); Maine - York Co.; New York - Columbia Co. (cave), Jefferson Co. (cave). Canada - Nova Scotia - (cave).  
Additional records: Louisiana (Hepburn & Woodring, 1963). Ontario (James, 1933).

Biology: Christiansen, 1970.

- A) Habitus, after Salmon, 1942 (Propemesira duoculata).      FIGURE 813  
B) Chaetotaxy of left half abdominal segments, of second through fourth, specimen from Nova Scotia.  
C) Fore foot complex, after Mills, 1934.  
D) Apical organ of third antennal segment, after Salmon.  
E) Mucro, after Salmon.



Family Cyphoderidae

Members of this family may be distinguished from other Entomobryids by the combined absence of ocelli, dental crenulations, and dental spines. Cyphoderinae are facultative or obligatory commensals of social insects; some tropical forms, including several known from Mexico, are highly modified for this existence in leg or mouthpart structure. Only one genus has been recorded from the Nearctic region.

Genus Cyphoderus Nicolet, 1842

Type species: C. albinus Nicolet, 1842

This genus includes the only Nearctic entomobryid with large fringed scales on the dens, an elongate mucro, and the fourth abdominal segment more than 2 1/2 times as long as the third. Eyes and pigment are lacking; the unguis and unguiculus both have enlarged wing-like teeth. Superficially members of this genus resemble some species of Pseudosinella. There is one Nearctic species, C. similis.

Cyphoderus similis Folsom, 1927

Fig. 814

Refs.: Proc. U.S. natn. Mus. 72:72(6):12; Cassagnau, 1963.

Syn.: assimilis Börner of Christiansen, 1950.

## Description

Color: white without trace of pigment. Apex of fourth antennal segment without apical bulb or pin seta. Internal surface of tibiotarsus with a single "smooth" seta, all others being similarly ciliate. Tenent hair broadly clavate. Unguis with 4 inner teeth, 1 basal tooth being greatly enlarged. Unguiculus with very large external tooth. Dens 2 to 2.8 times as long as mucro; enlarged inner apical dental scale slightly shorter than mucro to 1.7 times as long. Mucro unidentate or with a well-developed, lamellate anteapical tooth. Body scales broadly oval to apically truncate, very thin and hyaline, and finely striate. Maximum length 1.5 mm.

## Remarks

The synonymy of the group of species including C. javanus Börner, assimilis, and similis is very complex (see Christiansen, 1958, and Cassagnau, 1963).

Rather than attempting to re-evaluate this tropical group on the basis of limited Nearctic material, we are following the usage of Cassagnau. The

Massachusetts specimens belong to the typical form, but those from New Jersey are the "inermis" type described by Cassagnau. The species is usually found

only in association with ants.

Localities: California - Plumas Co.; Massachusetts - Essex Co., Middlesex Co.; New Jersey.

Additional records: Iowa (Mills, 1934); Louisiana (Hepburn & Woodring, 1963).

A) Hind foot complex, after Folsom.

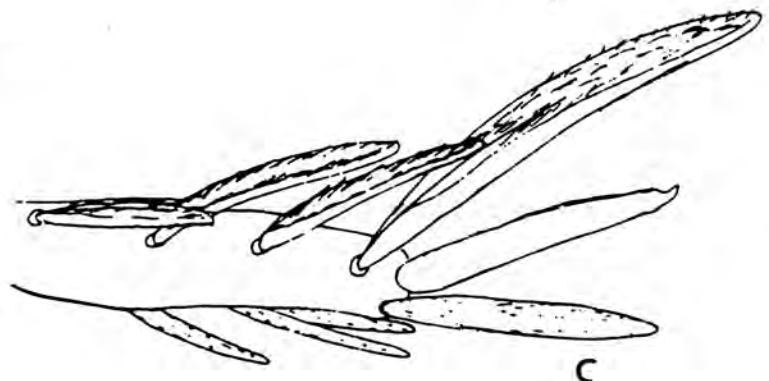
Cyphoderus similis

B) Mucro, after Folsom.

FIGURE 814

C) Mucro and dens, inner scales only shown, specimen from New Jersey.

D) Mucro and dens, after Folsom.



Members of this family may be distinguished from other entomobryids by the straight, unringed dentes, without spines but with a dorsal, terminal bladder-like projection. The mucro is generally blunt, bidentate or tridentate, and quite different in shape from that of the Entomobryinae. The fourth abdominal segment is greatly elongate, and the number and distribution (2-3-3) of bothriotrichia is distinctive. In other respects members of this family generally resemble the Entomobryinae. Only one genus has been recorded from our region.

Salina MacGillivray, 1894

Type species: Salina banksi MacGillivray, 1894

Syn.: Cremastocephalus Schött, 1896 (type species C. trilobatus Schött, 1896).

This is a genus of scaleless Paronellinae, epigeic in habitat, with greatly elongate appendages; the antennae generally equal or exceed the body in length. 8+8 eyes are present, with A & B notably large and G & H generally smaller than the others. The unguis has 4 (2+1+1) inner teeth. The vestiture generally resembles that of Entomobrya; the tenent hair is apically flattened and expanded and finely multilaterally ciliate.

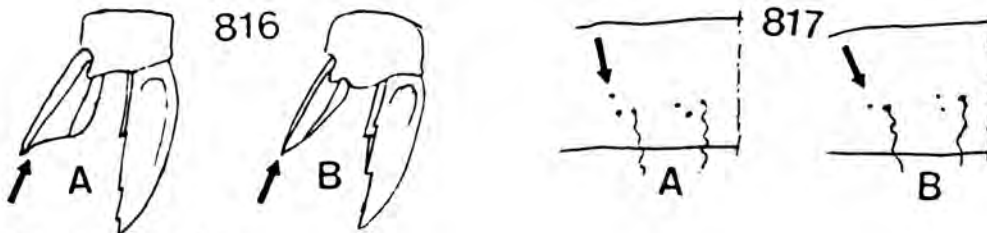
Useful characters for species separation are found in the unguiculus and mucro, and the chaetotaxy; the latter character appears to be most constant on the second abdominal segment, and we have made use of this segment and the 2 anterior to it, since variation on other body regions makes analysis more difficult. Well-pigmented specimens may show distinctive patterns, but some pattern elements, such as the dorsal yellow stripes described by Pedigo in S. banksi, can evidently only be seen in fresh material; also, the pattern is commonly reduced in some members of all species, and this character therefore is unreliable.

We recognize 3 Nearctic species: 1) banksi, 2) beta, 3) mulcahyae. Wray also records S. wolcotti Folsom, described from Puerto Rico; this is a very likely occurrence, but until the species is redescribed it is not possible to place it in our system.

- \*\* 1 ) Mucro elongate with 2 sharp apical teeth (Fig. 815A ) ----- S. beta  
 1' ) Mucro short and broad, with 2-3 blunt teeth (Fig. 815B ) ----- 2



- \*\* 2 ) Unguiculus obliquely truncate (Fig. 816A ); 3+3 macrochaetae on second abdominal segment (Fig. 817B ) ----- S. banksi  
 \*\* 2' ) Unguiculus lanceolate (Fig. 816B ); 4+4 macrochaetae on second abdominal segment (Fig. 817A ) ----- S. mulcahyae



Omitted from key:

\*\* decorata Mills, 1932

= banksi

trilobata (Schött, 1896)

no Nearctic records

wolcottii Folsom, 1927

position uncertain, record unverified

Salina banksi MacGillivray, 1894

Fig. 818

Refs.: Can. Ent. 26:107; Pedigo, 1968.

Syn. (?): S. decorata Mills, 1932, Iowa St. Coll. J. Sci. 6:273.

#### Description

Color: background white to gray, olive, or yellowish; blue pigment forming lateral stripes from eyespots to end of thorax and more irregularly on abdomen; well-pigmented specimens with additional dorsolateral spots and/or stripes; pigment forming distinct apical bands on antennal segment and indistinct bands on some leg segments; legs and ventral surface with scattered black spots, which form an outline for the manubrial recess. Last 2 antennal joints weakly ringed. Unguiculus obliquely truncate with distinct inner corner tooth. Dens and mucro about 1.3 times as long as manubrium. Dental lobe oval, rounded or bluntly pointed. Mucro short and broad, with 3 blunt teeth. Maximum length 2.0 mm.



The description is based mainly on a series of specimens from Louisiana.

The number of dorsal macrochaetae is constant on the second abdominal segment; the first occasionally has 3+3, and the third thoracic segment may rarely have less than 6+6.

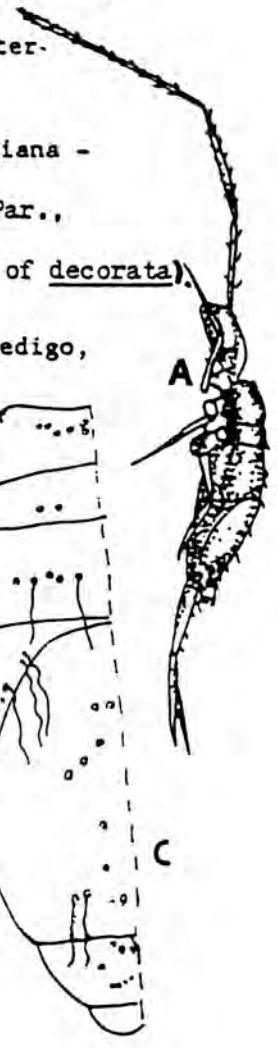
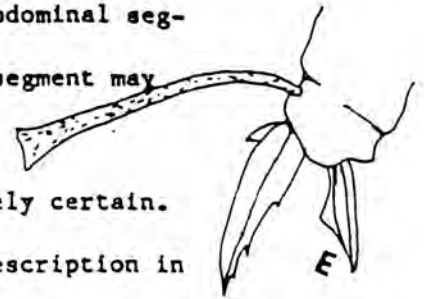
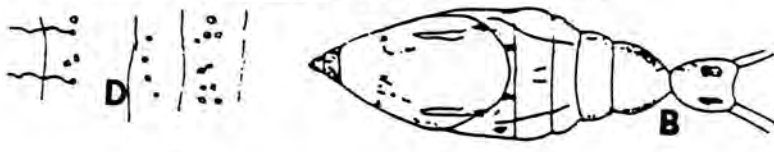
The proper application of the name banksi is not absolutely certain. The one type specimen we have seen does not differ from our description in visible characters, but shows almost none of the chaetotaxy. Florida material should be examined to determine if there is another species. Our one type specimen of decorata has the same chaetotaxy as the Louisiana material; the latter is extremely variable in pattern, including specimens with complex markings as in decorata and others with blue pigment restricted to lateral stripes as in the description of banksi; separation of these species is impractical with the material available. One slide from Illinois has specimens with a different chaetotaxy and a greenish ground color, but otherwise similar; they may represent a different species, but one Iowa specimen has an intermediate chaetotaxy.

Localities: "Florida" (type); Illinois - Clarco (?), Dixon Springs; Indiana - Dubois Co., Warrick Co.; Iowa - Washington Co.; Louisiana - Jefferson Par., Ouachita Par.; South Carolina - Parlington Co.; Texas - Tyler Co. (type of decorata).

Additional records: Alabama (Wilson, 1950, decorata); Iowa (O'Neill & Pedigo, 1969); Maryland (Ostdiek, 1961, decorata); North Carolina (Brimley, 1947

decorata). Salina banksi

- A) Habitus, after Pedigo. FIGURE 818  
 B) Pattern, specimen from Louisiana.  
 C) Chaetotaxy, specimen from Louisiana.  
 D) Abberant chaetotaxy, specimen from Illinois.  
 E) Foot complex, specimen from Louisiana.  
 F) Mucro and end of dens, specimen from Louisiana.  
 G) Pattern of decorata type, after Mills.



Description

Color: background yellowish with blue pigment forming diffuse lateral stripes, and a transverse band on the second and third abdominal segments;

body with conspicuous ventral spots; pigment also forms apical bands on antennal segments and scattered markings on legs. Last 2 antennal segments weakly ringed. Unguiculus obliquely truncate, with distinct inner angle. Dens and mucro subequal in length to manubrium. Dental lobe elongate oval. Mucro narrow and upturned, with 2 large terminate teeth and a small dorsal tooth. Maximum length 1.5 mm.

Remarks

We have seen very few specimens of this species, but the relatively short dens, the distinctive shape of the mucro, and the presence of only 2+2 macrochaetae on the second abdominal segment distinguish it clearly from our other species. A similar mucro, but apparently without the dorsal tooth, is found in S. bidentata Handschin, 1927, from Costa Rica, and in some specimens of S. wolcottii; the relationships of these forms cannot be determined until material can be studied.

Type locality: Modesto, Stanislaus Co., California, 10 January 1961, on lawn (H. Sinclair).

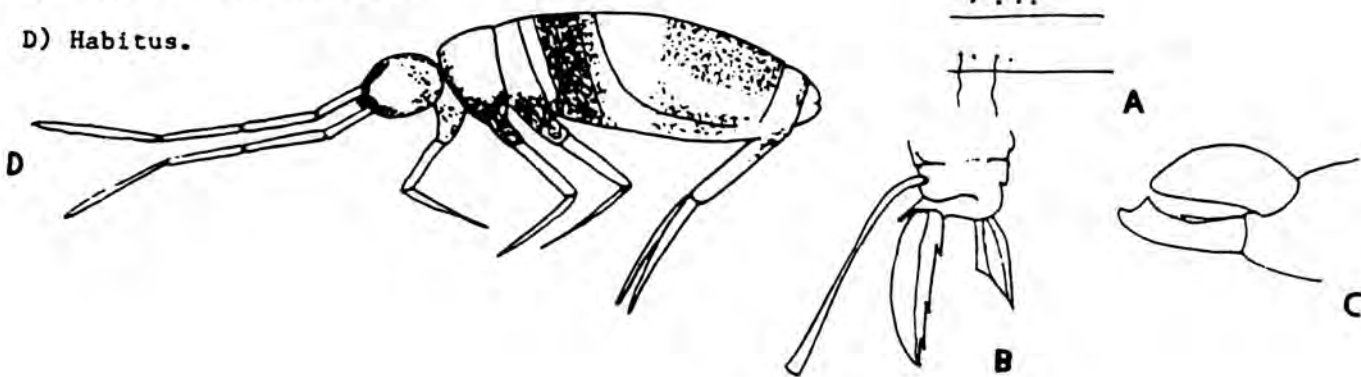
Additional locality: Texas - Cameron Co.

Salina beta

FIGURE 819

All figures of types.

- A) Chaetotaxy of third thoracic and first two abdominal segments, right side.
- B) Fore foot complex.
- C) Mucro and end of dens.
- D) Habitus.



Color: background pale, with blue to purple pigment forming lateral and sometimes dorsolateral stripes; appendages weakly pigmented and ventral spotting absent in most specimens. Last 2 antennal segments weakly ringed. Unguiculus lanceolate, with inner angle hardly indicated. Dens and mucro about 1.3 times as long as manubrium. Dental lobe oval and rounded to bluntly pointed. Mucro short and broad, with 3 blunt teeth. Maximum length 3 mm.

Remarks

Well-pigmented individuals may be recognized by the characteristic pattern, especially on the fourth abdominal segment; pale specimens differ from our other species in the fainter markings of the appendages, especially the apical antennal bands, and the general absence of ventral spotting. Dorsal macrochaetae are much more numerous than in the other species; adults have more than 20 per side on the third thoracic and more than 15 per side on the first abdominal segment.

Type locality: Pinewoods, near west base of Emory Pass, Sierra Co., New Mexico, damp stream bed, 2 July 1955 (K. Christiansen).

Additional localities: Arizona - Cochise Co., Pima Co., Santa Cruz Co.

Salina mulcahyae

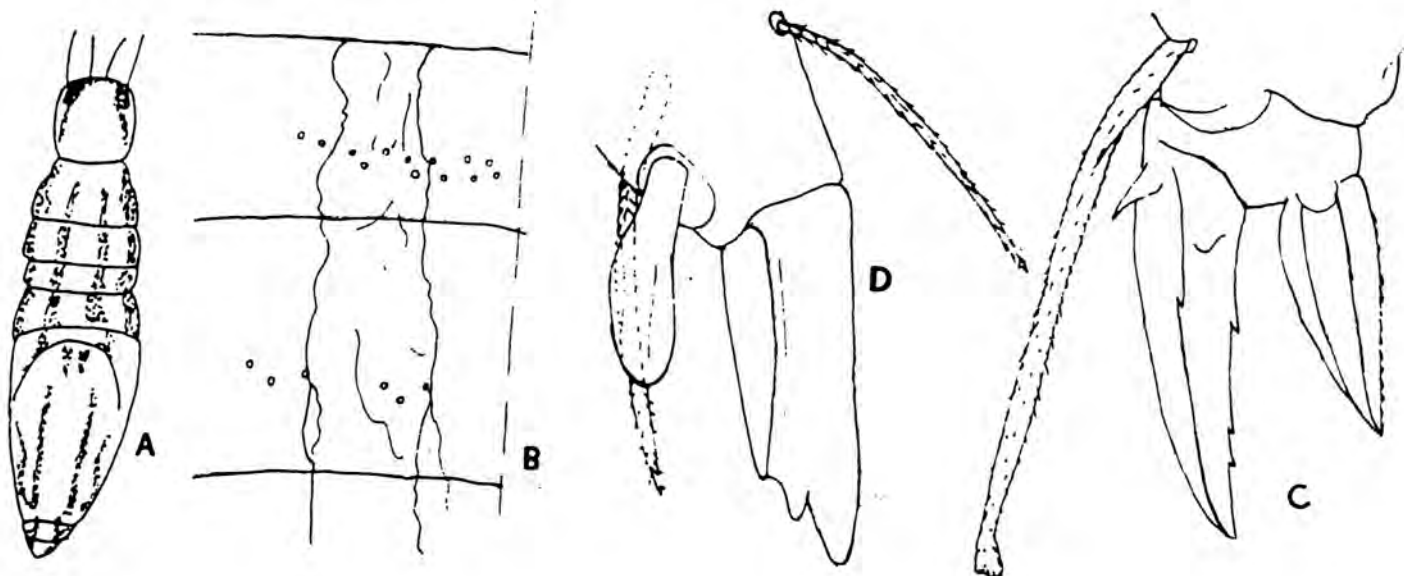
A) Dorsal pattern, specimen from New Mexico.

FIGURE 820

B) Chaetotaxy, first and second abdominal segments, left side, specimen from Arizona.

C) Mid foot complex, specimen from New Mexico.

D) Mucro and end of dens, specimen from New Mexico.



Members of this family have hyaline scales and multilaterally ciliate setae, a P.A.O. (in most Nearctic species), a subsegmented dens with dorsal dentate spines, and an elongate mucro with dorsal teeth and wavy lamellae and either ciliate setae or an enormous scale attached externally. The furcula is densely scaled ventrally and has both simple and ciliate setae dorsally; the tenaculum is quadridentate; tenent hairs are short and acuminate; and all Nearctic species have a row of blunt setae dorsally on the fourth antennal segment.

Oncopodurids have many striking features, but few Collembola are so difficult to study. All species appear to be extremely fragile, tending to lose not only antennal segments and clothing but also dental spines and even mucrones, and the thin-walled P.A.O. and antennal sense organs are often invisible in mounted specimens because of clearing or shrivelling. Members of the family are unmistakable, but specific determination may be difficult unless freshly mounted specimens are available.

There are 2 Nearctic genera, which may be distinguished as follows:

- 1 ) Eyes absent; pigment at most in scattered flecks; antennal apex without spatulate seta ----- genus Oncopodura
- 1') Eyes present; adults pigmented; antennal apex with large spatulate seta -  
----- genus Harlomillsia

Genus Harlomillsia Bonet, 1944

Type species: Oncopodura oculata Mills, 1937

Syn.: Millsia Bonet, 1943, nec Womersley, 1942.

This genus includes oncopodurids with eyes and pigment, with a spatulate apical antennal seta and 2 ciliate mucronal setae, and with a deeply lobed, asymmetrical P.A.O. There is a single known species.

Harlomillsia oculata (Mills), 1937

Fig. 821

Refs.: Can. Ent. 69:67 (Oncopodura); Bonet, 1943 (Millsia); Szeptycki, 1977.

Description

Color: blue-gray with pale V mark on vertex and white dentes; juveniles white except for eye spots. Fourth antennal segment with very large apical spatulate seta and 2-3 (?) blunt setae. Apical sense rod or rods of third segment hidden by integumentary fold. Eyes 4+4. P.A.O. with 5-7 elongate lobes in characteristic asymmetrical arrangement. Second tibiotarsus without spatulate seta. Pretarsus with conical papilla on anterior face. Unguis and unguiculus untoothed. Basal dental subsegment with inner row of 4 dentate spines; distal subsegment with inner and outer rows of weakly dentate spines. Mucro quinquedentate. Maximum length .6 mm.

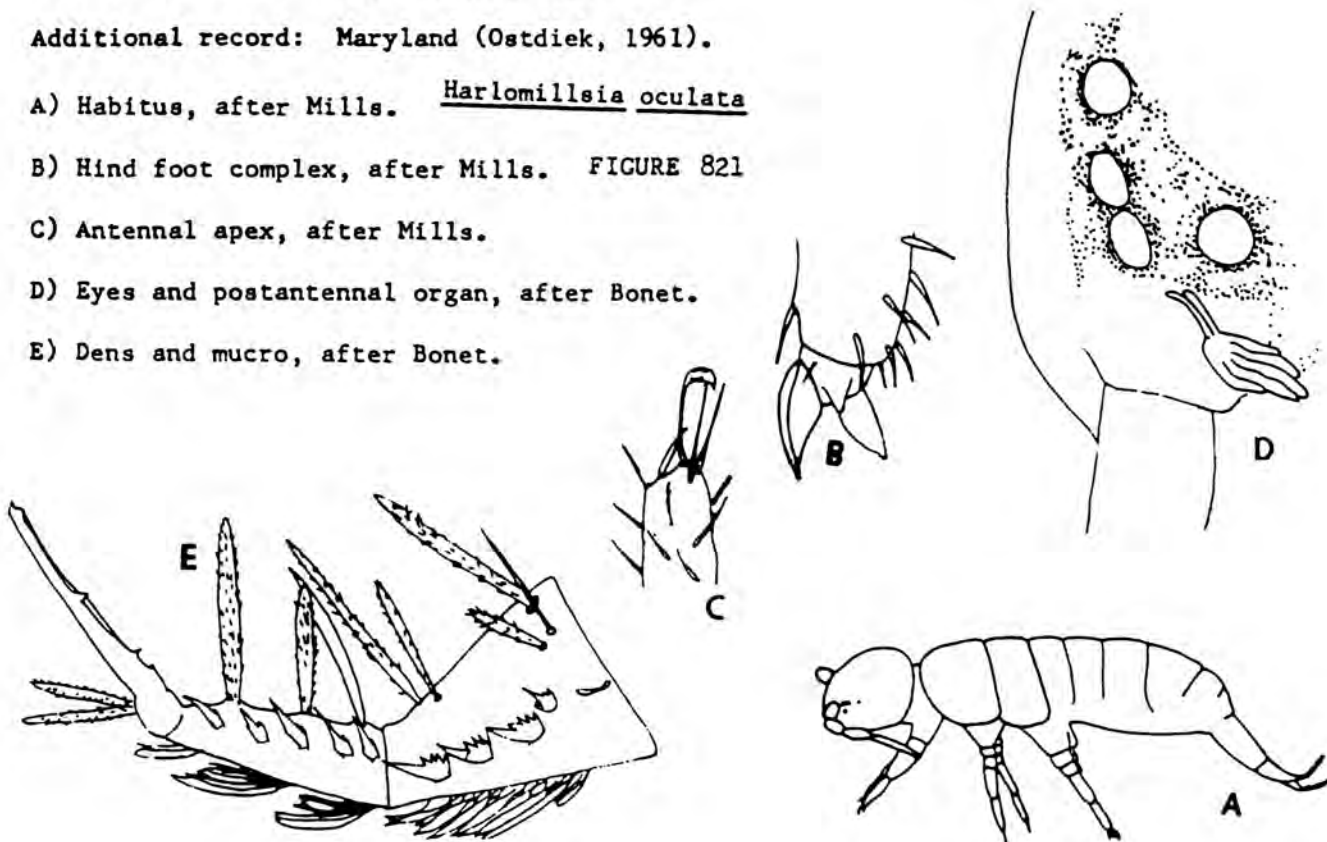
Remarks

This species should be readily recognizable, but some features, such as the unique P.A.O., are extremely difficult to see in most specimens. The single example from Tennessee lacks all trace of eyes and pigment, but this may be the result of clearing. In alcohol H. oculata is easily mistaken for a small isotomid; it is obviously widely distributed, but has probably been overlooked.

Localities: Florida - Jackson Co. (type); Georgia - Sublinga, Chattahoochee National Forest; North Carolina - Graham Co., Watauga Co.; Oregon - Benton Co.; Tennessee - Great Smoky National Park.

Additional record: Maryland (Ostdiek, 1961).

- A) Habitus, after Mills. Harlomillsia oculata  
B) Hind foot complex, after Mills. FIGURE 821  
C) Antennal apex, after Mills.  
D) Eyes and postantennal organ, after Bonet.  
E) Dens and mucro, after Bonet.

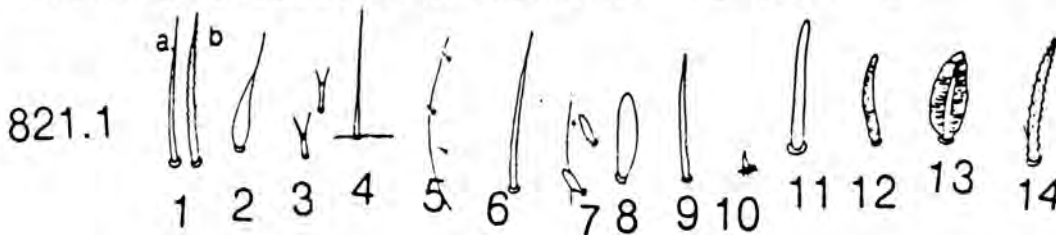




**Genus Oncopodura Carl and Lebedinsky, 1905**

Type species: O. hamata Carl and Lebedinsky, 1905

This genus includes all the white eyeless oncopodurids. These lack spatulate antennal setae. The genus has been reviewed by a number of authors, most recently by Szeptycki 1977 and Deharveng 1988. We also (1996) reviewed the Nearctic cave species of the genus. Among the useful features uncovered by these works we find the antennal seta types particularly useful. Figure 821.1 A, shown below, indicates the variety of these setae seen in the genus. There are 11 described species as well as two in our collections which have inadequate samples to merit description: 1) alpa; 2) cruciata; 3) fenestra; 4) frankeae; 5) hoffi; 6) hubbardi; 7) lowae; 8) mala; 9) subhoffi; 10) tunica; 11) yosiana.



**Key to described Nearctic species of Oncopodura**

- 1) Unguis with elongate filiform lateral tooth ( Fig. 822A)..... 2
- 1') Unguis with small lateral tooth (Fig. 822B) ..... 5

822



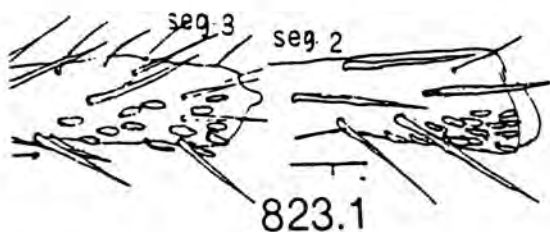
- \*\*2) Clear lobed P.A.O. present (Fig. 823).....O. hubbardi C. & B. 1996
- 2') P.A.O. absent..... 3

823

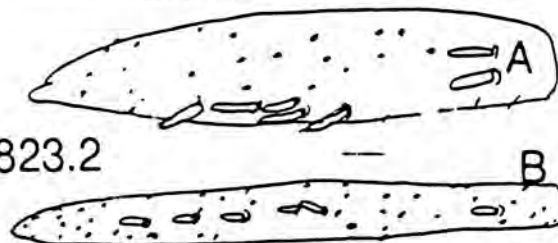


- \*\*3) Apex of 2nd & 3rd antennal segments with many blunt setae (Fig. 823.1)..... 4
- 3') Apex of 2nd and 3rd antennal segments with 3 or fewer blunt setae....  
.....O. alpa

- \*\*4) Fourth antennal segment with 7-8 type 7 or 8 setae ( Fig. 823.2 A).....  
.....O. frankeae
- \*\*4') Fourth antennal segment with 6 type 7 or 8 setae (Fig. 823.2 B) .....  
.....O. fenestra C. & B. 1996



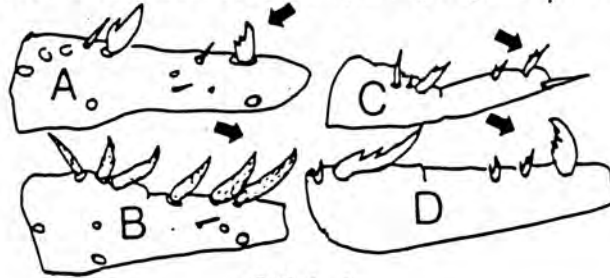
823.2



- \*\*5) Unguis with tunica (Fig. 824).....Q. tunica
- 5') Unguis without tunica..... 5



- 5) With only 1 distal inner swollen spine( Fig. 824.1A) ..... 6
- 5') With at least two inner distal swollen spines( Figs. 824.1 B, C & D) .... 7



824.1

- \*\*6) All tibiotarsal setae "smooth" ( fig. 825A), Midwestern species.....Q. iowae
- \*\*6') Anterior or dorsal tibiotarsal setae clearly ciliate (Fig. 825B) contrasting with "smooth" distal ventral or posterior setae, West Coast species .....Q. mala C. & B. 1996

825



- \*7) Swollen dental spines ciliate (Fig. 824.1 B) .....Q. yosiiana
- 7') Some swollen dental spines dentate (Fig. 824.1C & D) ..... 8
- \*8) Inner, distal, serrate dental spines 2(Fig. 824.1 C).....Q. cruciata
- \*\*8') Inner, distal, serrate dental spines 3 (Fig. 824.1 D)..... 9
- \*\*9) With only two type 7, 8, or 13 type setae on second antennal segment, western species ( Fig. 826 A, ).....Q. subhoffi
- \*\*9') With four - five type 7, 8 or 13 setae on second antennal segment, midwestern species ( Fig. 826B ) .....Q. hoffi

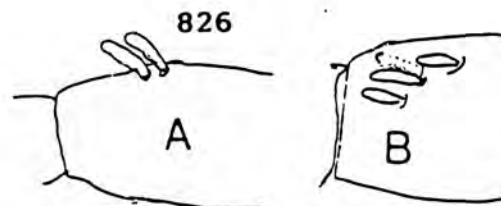


Table XXXVIII  
 Characteristics of U.S. *Oncopodura* species

species	Habitats	Localities	swollen curved inner dental spines	inner spine shape	swollen curved outer dental spines	outer spine shape	P.A.O. lobes	lateral lamella unguis	no. setae types 7 & 8 on 2nd antennal seg.	No. setae types 7, 8 & 13 on third antennal segment	No. setae types 7 & 8 on fourth antennal segment	scale on mucro	median long setae of abdominal segment 5 / length of segment	no. mucronal teeth
alpa	epigeic	New Hampshire	2	D,S,C	1	D <sup>1</sup>	-	+	2	1?	5	-	.85	4-5
cruciata	cave	Montana	3	D	1	D	4	-	5	3	5	-	.3	4
sp. E	cave	Wyoming Montana	2	S-D	1	S-D	5-6	-	3	3	5	+	.35	4
F	epigeic	Illinois	4	S	1	S	4small	-	?	?	?	+	?	4
fenestra	cave	Texas	3	D	1	D	0	+	12-15	9-14	6	+	.4-.5	4
frankeae	cave	New Mexico	2	D	1	SR	0	+	11-13	11-12	7-8	+	?	4
hoffi	cave	Missouri	5	D	1	SR	3(4)	-	5	4-5	5	+	.33-.38	4
hubbardi	cave	Virginia	1	D	1	D	5-6	+	3(2?)	2	5	+	.37	4
iowae	cave	Iowa, Illinois, Missouri	2	D	1	D	4	-	3	1	4	+	≈.3	4
mala	CAVE + EPIGEIC	Oregon + California(?)	2	D	1	D	1-4?	-	2	3	4	+	≈.3	4
subhoffi	cave	Colorado	5	D	1	SR	4	-	4-5	2	4-5	+	.36-.42	4+
tunica	cave	California	2	D	1	D	5	-	2	0	10	+	≈.45	4
yosiiana**	epigeic	California & Asia	6	C	1	C	1-0	-	1	3	4	+	.22-.25	4

\* D = dentate, S = smooth, C = ciliate, D = dentate, SR = serrate. <sup>1</sup>with a small single tooth. \*\* The identity of the California specimens with *yosiiana* remains in doubt. We have specimens from five California localities but none of the specimens is complete. There are some minor differences between our specimens and *yosiiana* in the shape of the setae on the fifth abdominal segment and some features cannot be seen on the California material.

Oncopodura alpa, Christiansen & Bellinger, 1980

Fig. 227

Description

Appendages greatly elongate. Fourth antennal segment with rounded apex and a row of 4 long, stalked blunt setae in distal half; 1 smaller blunt seta basally. Second segment with at least 2 and third segment with at least 1 blunt seta apically. All antennal setae smooth; dorsal setae of first 3 segments notably thickened. P.A.O. not seen. All tibiotalarsal setae smooth; second tibiotalarsus with dorsal spatulate seta. Unguis elongate, especially on first foot, with a lateral needle-like basal projection which extends to beyond half its length. Unguiculus untoothed, much shorter than inner unguis on first foot but subequal on third. Basal dental segment without (?) spines; distal segment with 1 subapical and 2 apical spines, the inner (?) apical spine coarsely toothed on its anterior basal surface. Mucro longer than dens, with 5 teeth. Maximum length 1.9 mm.

Remarks

In contrast to other Nearctic species, this form has the elongate habitus of a cave Pseudosinella rather than a compact isotomid-like shape. The lateral unguis teeth distinguish it at once from most other species; in this respect it resembles O. prietoi, but the latter species, in addition to its more normal proportions, has denticulate spines on the basal dental subsegment. Only 2 specimens have been seen; their peculiar characteristics may be associated with the habitat, which is most unusual for an oncopodurid.

Type locality: Mt. Washington, 5000', Coos Co., New Hampshire, moss and lichens.

All figures of type specimens.

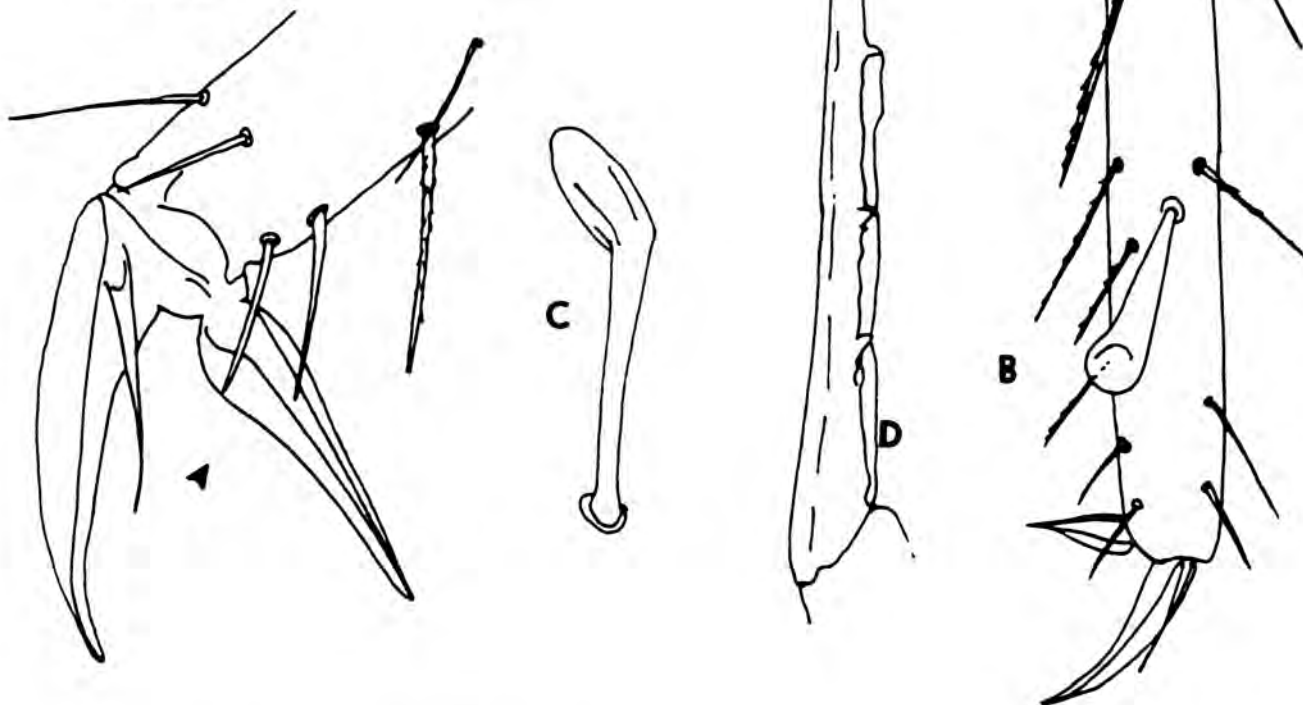
A) Hind foot complex.

FIGURE 827

B) Mid tibiotalarsus and foot.

C) Spatulate seta of mid tibiotalarsus.

D) Mucro.



Oncopodura cruciata Bonet, 1943

Fig. 828

Ref.: An. Esc. nac. Cienc. biol., Méx. 3:141.

Description

Fourth antennal segment with rounded apex and dorsal row of 5 blunt setae, the basalmost smaller than others. Third segment with 2 striate sense rods, 1 smooth, swollen, blunt seta, and 1 cylindrical blunt seta apically. Second segment with 1 striate sense rod and 5 thin-walled, pointed sensillae apically. P.A.O. with 4 peripheral lobes. Tibiotarsal setae ciliate except for apical ring and distal ventral setae. Unguis with small basal lateral tooth, without inner tooth. Unguiculus lanceolate, subequal in length to inner unguis. Second tibiotalarsus with dorsal spatulate seta. Basal dental subsegment with 3 inner spines, the distalmost dentate; distal subsegment with 1 outer and 2 inner dentate spines. Mucro subequal in length to dens, with 4 distal teeth and 2 small, basal triangular teeth. Maximum length 1.2 mm.



The ciliate tibiotarsal setae and form of the P.A.O. are diagnostic. The California specimens differ from Bonet's description in having the P.A.O. lobes very short and obscure, and in the conspicuously crenulate dorsal crest of the mucro, but appear otherwise similar; we prefer not to separate them at the moment.

Localities:

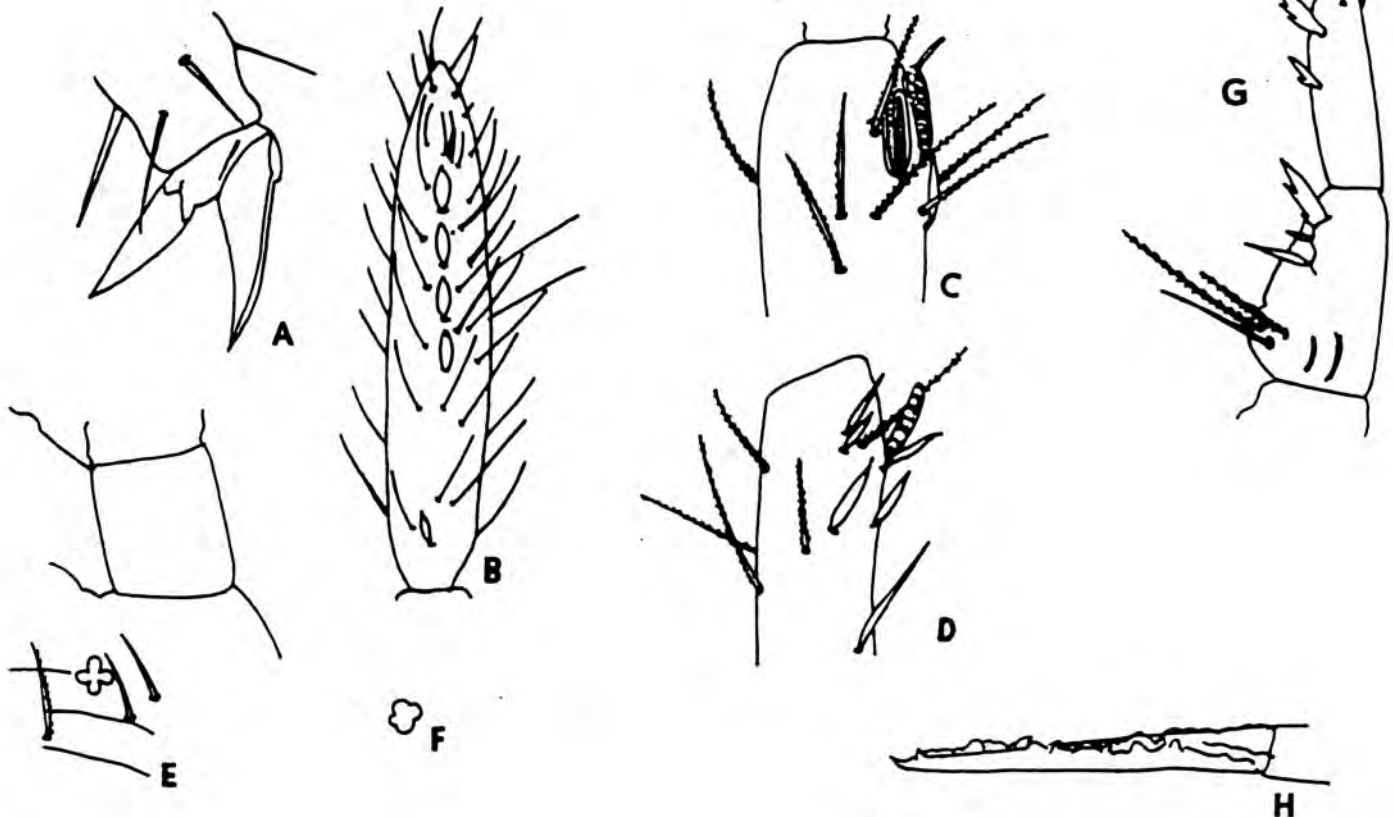
Montana - Gallatin Co.

(cave) (type).

Oncopodura cruciata

FIGURE 828

- A) Hind foot complex, after Bonet.  
 B) Fourth antennal segment, dorsal view, after Bonet.  
 C) Third antennal segment apical sense organ, after Bonet.  
 D) Second antennal segment apical sense organ, after Bonet.  
 E) Postantennal organ area, after Bonet.  
 F) Postantennal organ, specimen from California.  
 G) Dens and mucro, inner view, after Bonet.  
 H) Mucro, oblique dorsal view, specimen from California.



Description

Fourth antennal segment with apical cone, a row of 4 large blunt setae in distal 2/3, and another, smaller blunt seta near base. Third segment with 2 large striate rods and 3 (4?) other smooth blunt setae at apex. Second segment with 1 apical striate rod and 2 apical and 2 subapical blunt setae. P.A.O. usually trilobed, rarely 4-lobed. Tibiotarsal setae coarsely ciliate except for apical circlet and distal ventral setae. Second tibiotarsus with dorsal spatulate seta. Unguis with small lateral tooth and no inner tooth; unguiculus with inner and outer basal projections. Basal dental subsegment with 1 simple and 2 dentate inner spines, increasing in size distally; distal subsegment with several intermediate inner dentate spines and a pair of large apical spines, the inner spine coarsely toothed and the outer spine with many small denticulations on all sides. Mucro subequal in length to dens, quadri-dentate. Maximum length 1.6 mm.

Remarks

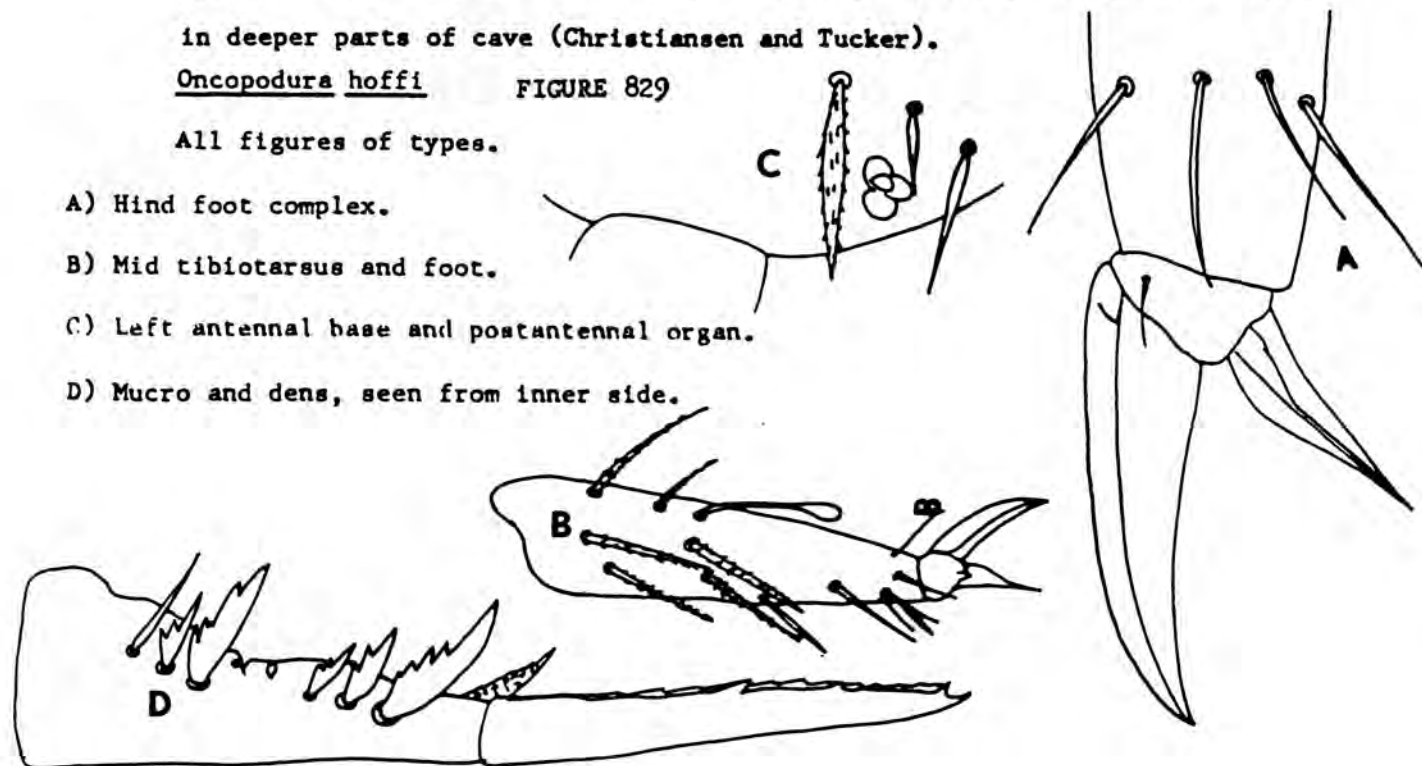
This species resembles O. cruciata in having the tibiotarsal setae ciliate, but differs in the typical form of the P.A.O. and apical dental spines. The first character distinguishes it at once from O. iowae, which also occurs in caves in Missouri. Further study may show that hoffi is a geographic variant of cruciata.  
 Type locality: Berome Moore cave, Perry Co., Missouri, widely distributed in deeper parts of cave (Christiansen and Tucker).

Oncopodura hoffi

FIGURE 829

All figures of types.

- A) Hind foot complex.
- B) Mid tibiotarsus and foot.
- C) Left antennal base and postantennal organ.
- D) Mucro and dens, seen from inner side.



Ref.: Bull. natn. speleol. Soc. 23:63. Description

Fourth antennal segment without apical modification, with a dorsal row of 4 large blunt setae. Third segment apically with 2 unstriated rods and 1 acuminate and 1 blunt guard seta. Second segment with 1 apical blunt seta. P.A.O. with 4 weakly projecting peripheral lobes. Tibiotarsal setae "smooth"; second tibiotarsus with outer spatulate seta. Unguis with strong lateral and minute or no internal tooth. Unguiculus lanceolate, with inner and outer basal projections. Ventral tube with 4+4 distal setae. Basal dental subsegment with 2 spines, 1 simple and 1 dentate, inwardly; distal subsegment with inner and outer apical spines, the inner one dentate, the outer larger and dentate or not. Macro slightly longer than dens, quadridentate. Maximum length 1.1 mm.

Remarks

This species differs from other Nearctic species in the large basal unguicular tooth, the presence of only 2 large spines in the distal dental subsegment, and the absence of the small basal blunt seta on the fourth antennal segment; the smooth tibiotarsal setae will distinguish it from other species except for the very different O. alpa. All populations examined appeared to be uniform, so far as the critical characters could be observed, except for those from the Devil's Icebox Cave, Missouri. 1 specimen from this locality had 6 elongate P.A.O. lobes and small, oddly shaped fourth antennal segment blunt setae, and lacked the large unguis tooth; the 2 others seen had a similar 5- or 6-lobed P.A.O. but resembled O. iowae in the other characters mentioned, while 1 had additional unusual characters. Further material will be required to determine the status of this population.

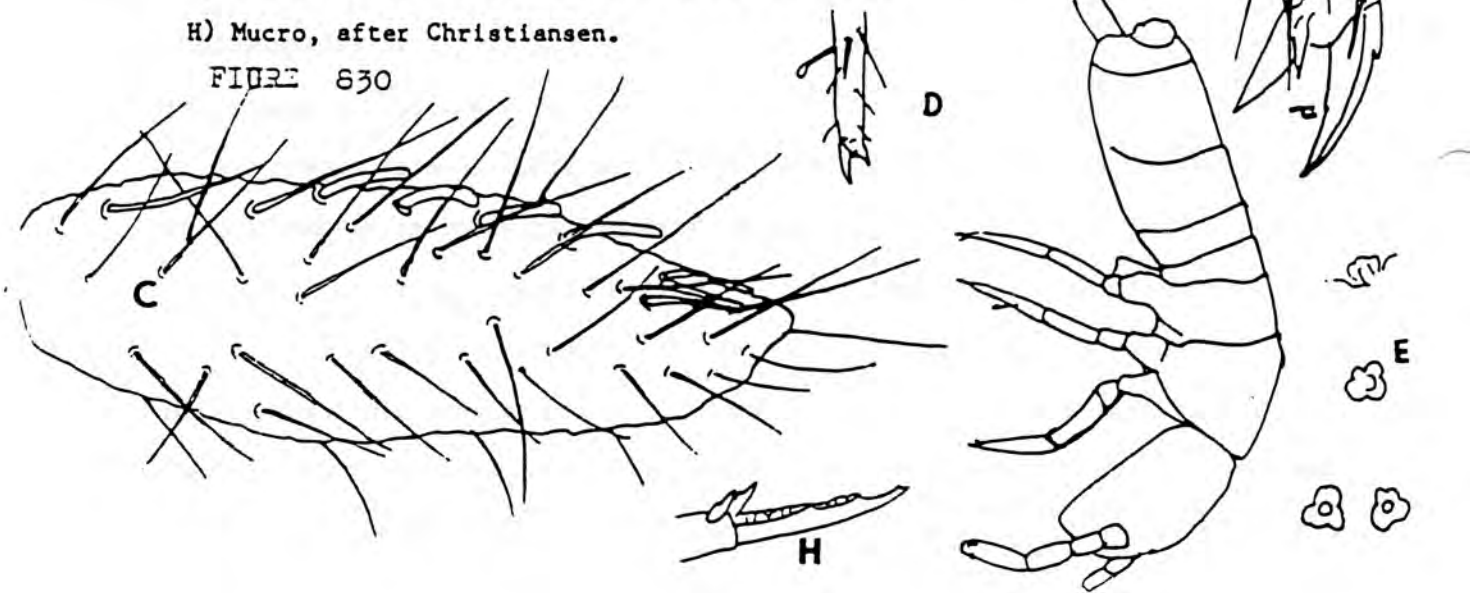
Localities:

Illinois - Monroe Co. (cave);  
Iowa - Dubuque Co. (cave), Jackson Co. (cave) (type); Missouri - Boone Co. (cave),  
Camden Co. (cave), Newton Co. (cave), Pulaski Co. (cave)

Oncopodura lowae FIGURE 830

- A) Habitus, specimen from type locality.  
 B) Hind foot complex, same specimen.  
 C) Fourth antennal segment, same specimen.  
 D) Mid unguis, after Christiansen.  
 E) Postantennal organs, after Christiansen.  
 F) Dens, dorsal view, after Christiansen.  
 G) Dental spines, lateral view, after Christiansen.  
 H) Mucro, after Christiansen.

FIGURE 830



Oncopodura tunica,

Christiansen &amp; Bellinger, 1980

Fig. 831

## Description

Fourth antennal segment with apical cone, 9 large blunt setae on the distal half, one smaller blunt seta near the base. Apical organ of third segment with two large, elliptical, smooth sense rods. Third and second segments with numerous thick ciliate, acuminate setae but without blunt setae. P.A.O. five-lobed. Tibiotarsal setae extremely finely ciliate or striate except for circlet of smooth setae at apex. Second tibiotarsus with well-developed spatulate seta. Unguis with very small lateral teeth but no inner tooth, and with a well-developed tunica. Dentes with basal subsegment having one small and one large dentate spine; distal subsegment with 2 small and one large dentate spines on inner edge and one large distal dentate spine on outer edge. Mucro subequal to dens in length, with 4 teeth, 2 crenulate lamellae, and a long scale arising at about 1/5 of length from base to apex. Maximum length 1.8 mm.

## Remarks

This remarkable species may readily be separated from all congeners by the presence of a strong tunica on the unguis.

Type locality: McLean's Cave, 7 miles east of Angels Camp, Tuolumne Co., California, 12 May 1977 (A. Grubbs).



California, 12 May 1977 (A. Grubbs).

Oncopodura tunica FIGURE 831

A) Fore foot complex, seen from angle.

B) Hind foot complex, seen from side.

C) Enlarged seta from mid tibiotalarsus.

D) Third and fourth antennal segments.

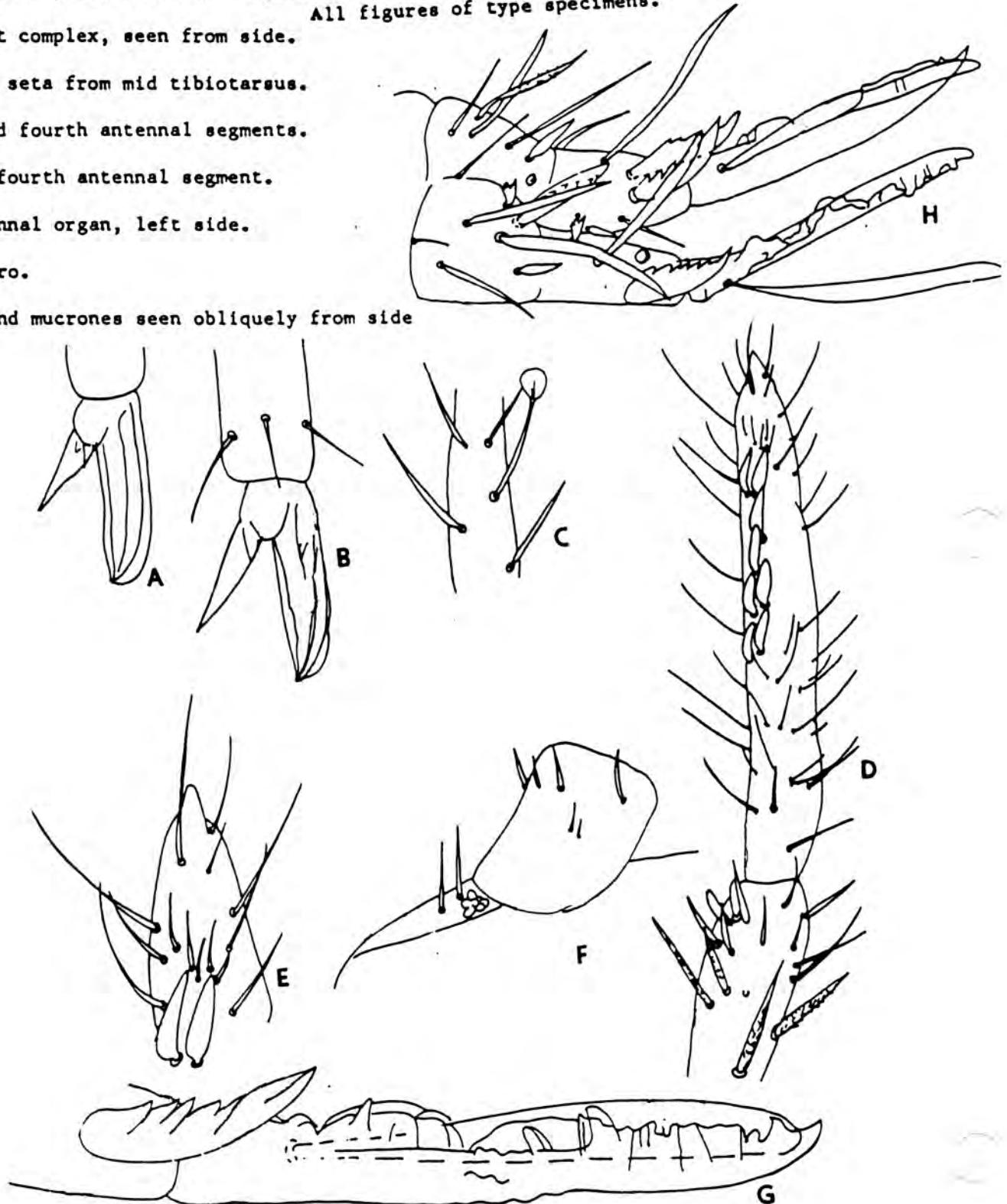
E) Apex of fourth antennal segment.

F) Postantennal organ, left side.

G) Left mucro.

H) Dentes and mucrones seen obliquely from side

All figures of type specimens.



Oncopodura frankeae new species

FIG. 832

**Description**

Habitus typical of genus. Without pigment or eyes. Maximum length 1.54 mm. Antennae 1.31 - 1.35 as long as cephalic diagonal. Fourth antennal segment without apical bulb but with apical conical projection; subapical trio clearly distinguished, with two type 9 setae and one basal type 10 seta; six distal and one or two basal type 8 setae. 3rd antennal segment with two type 13 setae and 11 -12 type 8 setae; second antennal segment with 11-13 type 8 setae and a number of dorsal type 2 setae. Remaining antennal setae of type 1a. PAO absent. Outer pretarsal seta 1/8 to 1/10 as long as inner unguis. Unguis moderately broad without inner tooth and with a prominent external lamina. Unguiculus very broad, .74 -.82 times as long as inner unguis and lanceolate. Apically expanded seta of mid tibiotarsus clavate, other setae of tibiotarsi acuminate and finely ciliate. Tenent hair slender and acuminate. Ventral tube with 4 + 4 type 1a setae and without prominent papillae. Tenaculum with 4 teeth and a single type 2 seta. Manubrium not seen intact on any specimen but with 10 + 10 mesochaetae, at least two of which are clearly ciliate and slightly expanded, and the remainder acuminate and smooth or very finely ciliate. There are 3 + 3 lateral microsetae, the basal pair and 4 distal ones which are expanded and serrate. Dens not seen intact in any specimen but as shown in figures G) & H). Mucro with strong median lamella, large basal scale and 4 dorsal teeth. Fourth abdominal segment not clearly seen with setae intact. Sixth abdominal segment with three rows of macrochaetae or mesochaetae, seen only as bases. The anterior (largest row) of four setae, the median of three and the posterior of four. Between the anterior rows is a row of four microsetae.

**Localities**

**Types** Holotype ♀ and paratype ♂ :New Mexico, Lincoln County, Fort Stanton cave, October 17th 1974, W.C. Wellbourn coll. Locality No. 3485.

Also taken from Sierra County, Black Range Mts. Robinsons cave, January 31 1977, W.C. Wellbourn coll. Locality No. 4255 and in the type locality, hellhole # 2, on guano, August 6 1994 Pape coll. Locality No. 9006.

**Derivatio nominis**

Named after Valerie Franke McKee of Grinnell College whose long and hard work and full cooperation have been essential to our joint research for many years.

**Remarks**

This species is one of a series of related forms found in Mexico and the U.S. southwest, lacking a PAO and having a well developed unguis lamina. It differs from all (*O. dura*, *fenestra*, *prietoj* and *susanae*) in the larger number of type 8 setae (8 as opposed to 5 or 6) on the fourth antennal segment. We have not seen an intact dens but it probably also differs from all save *O. susanna* in having only two inner large serrate dental spines. This is the species we identified as *O. prietoj* in our first edition. Examination of additional material makes it clear it is not the same species.

**Legend for figures**

A) Fourth antennal segment, holotype; B) Antennal apex, paratype; C) Dorsum of 3rd and 2nd antennal segments, same; D) Right side 4th abdominal segment, holotype; E) Fifth abdominal segment, holotype; F) Sixth abdominal segment, same; G) Mucro and dens, same; H) Dens, specimen from Sierra Co., I) Mid tibiotarsus, holotype. J) Fore foot complex, paratype.

Figure 832

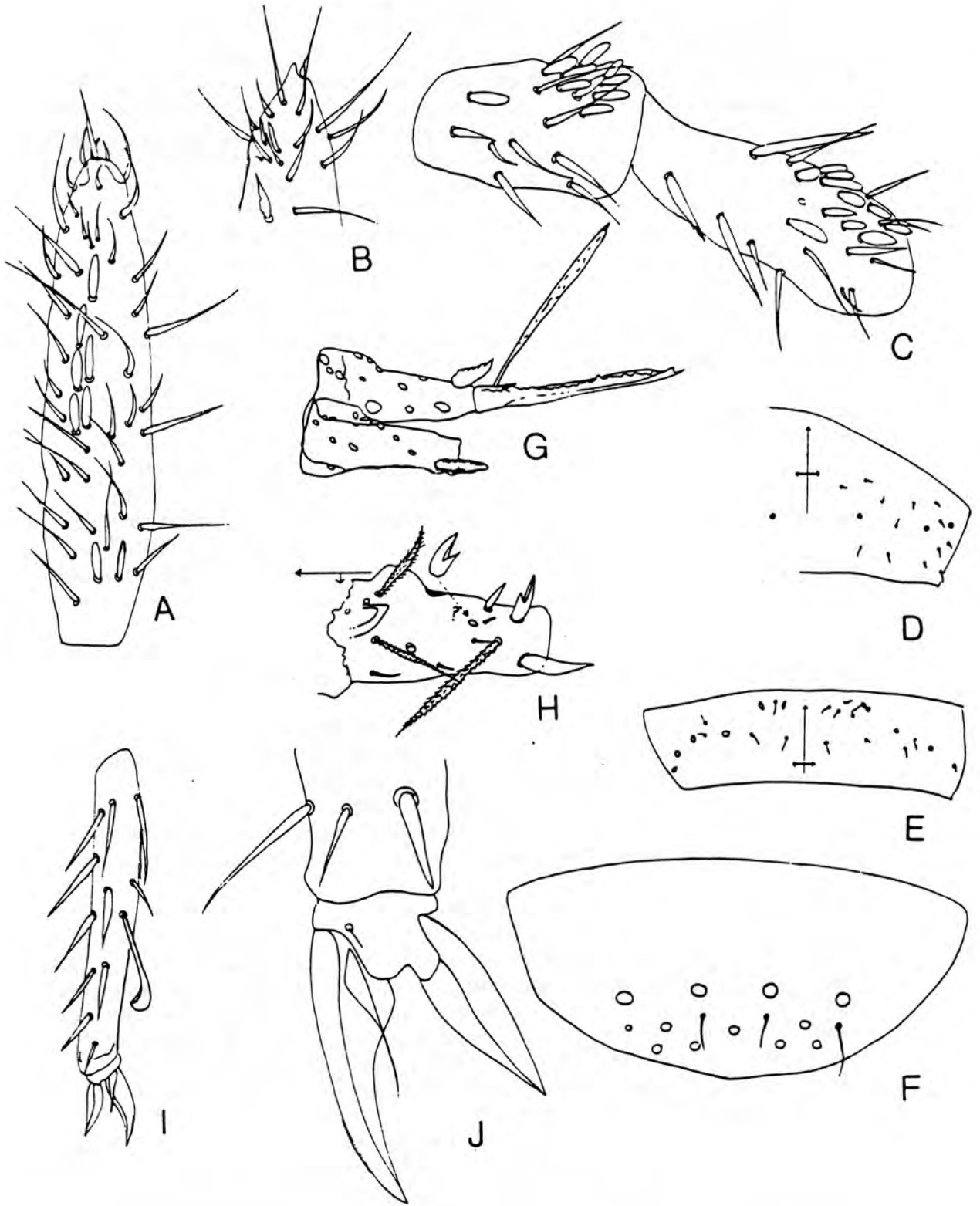
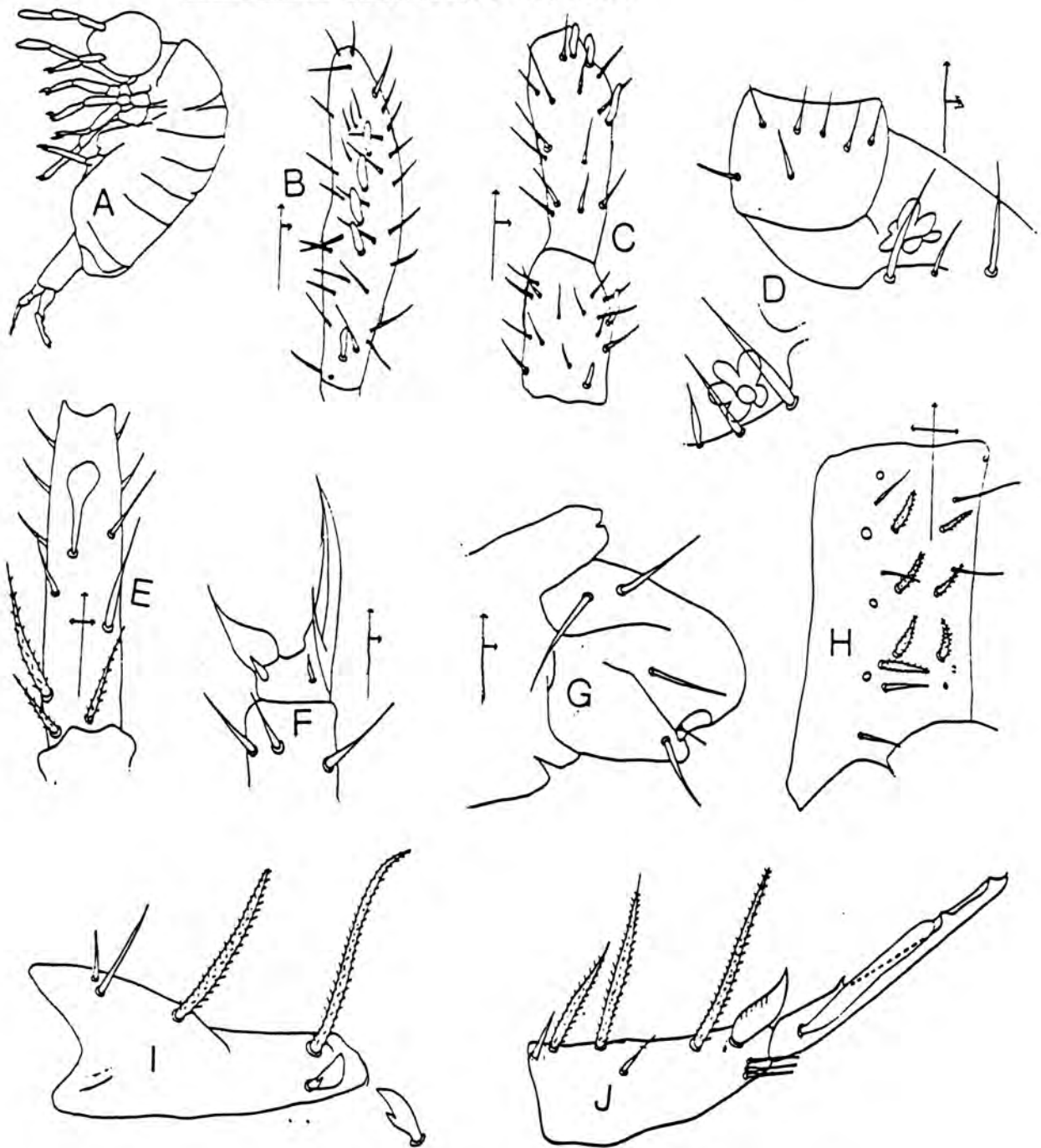


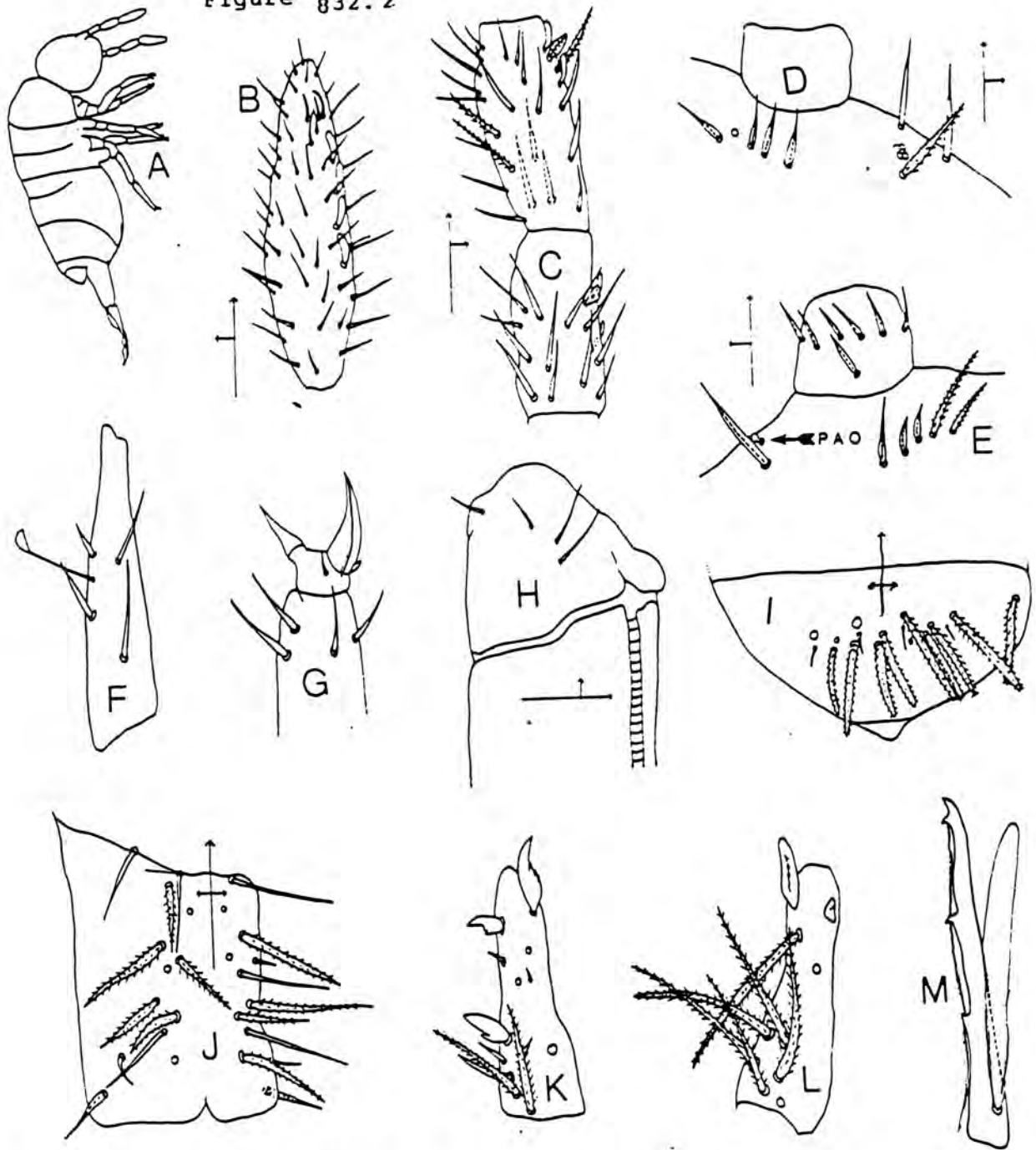
Figure 832.1  
*Oncopodura hubbardi* C. & B., 1996a



*O. hubbardi* A) Habitus; B) Dorsal surface of fourth antennal segment; C) Dorsal surface of second and third antennal segments, same specimen; D) PAO of two specimens; E) Inner face of mid tibiotarsus; F) Fore foot complex, seen from side; G) Ventral tube; H) Dorsal surface of manubrium; I) Inner face of left dens; J) distal spine from different angle; K) Outer face of left dens. After C. & B., 1996a

*Oncopodura mala* C. & B., 1996a

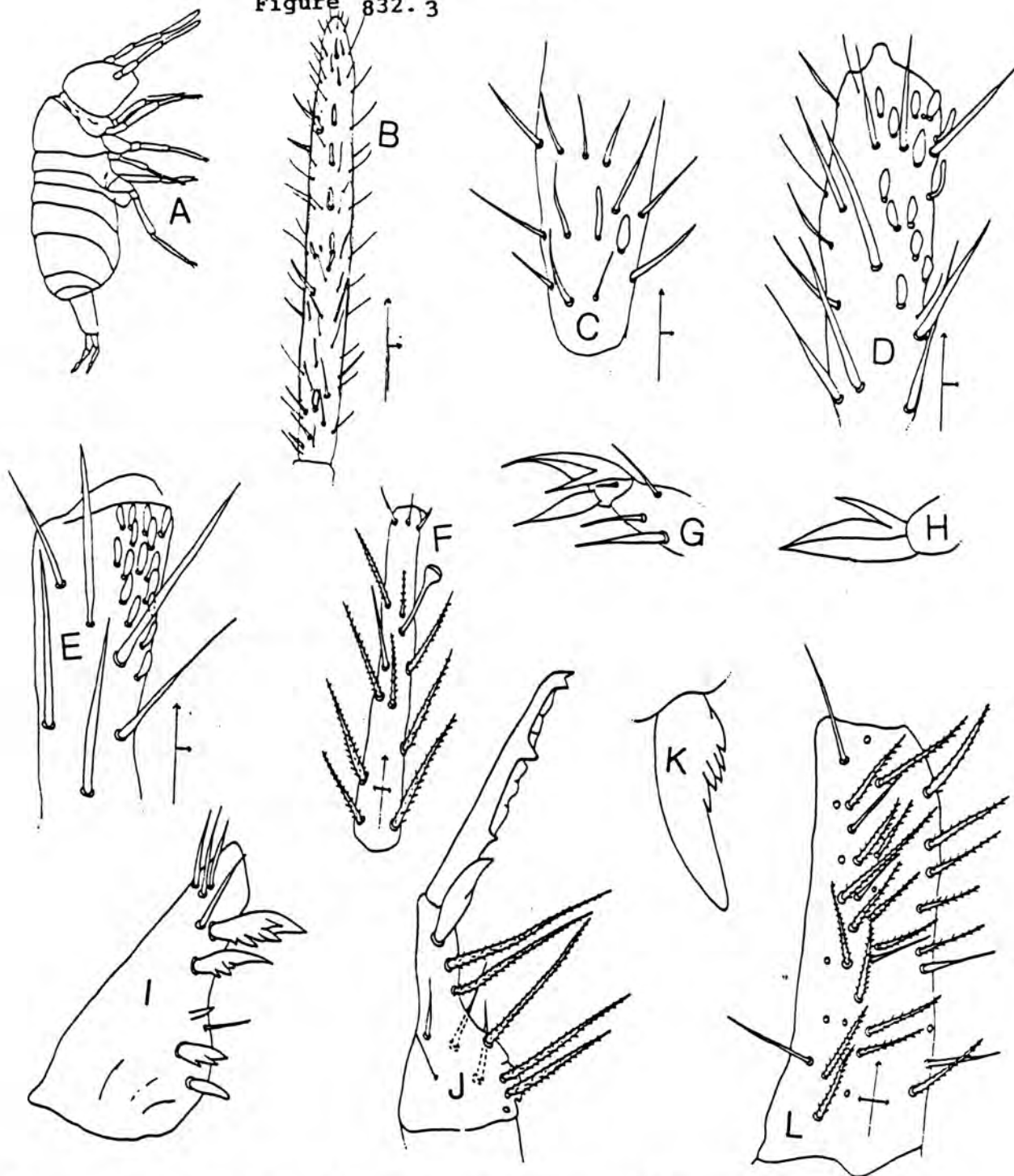
Figure 832.2



*O. mala* A) Habitus; B) Right fourth antennal segment ; C) Third and second antennal segments, same antenna; D) Right P.A.O. and antenna base ; E) Left PAO and antenna base; F) Differentiated seta of mid tibiotarsus, type specimen; G) Hind foot complex; H) Ventral tube seen from side; I) Chaetotaxy of 6th abdominal segment; J) Dorsal surface of manubrium; K) Left dens ; L) Right dens, same specimen; M) Mucro. After C. & B., 1996a



Figure 832.3



O. fenestra A) Habitus; B) Right fourth antennal segment ; C) Base of fourth antennal segment; D) Apex of third antennal segment ; E) Apex of second antennal segment ; F) Outer face of mid tibiotarsus, ; G) Hind foot complex from side; H) Mid unguis inner view, same specimen; I) Inner face, right dens; J) outer face, right dens and mucro, same specimen. K) Enlarged view of distal outer spine; L) Dorsum of manubrium , type specimen. After C. & B., 1996a

**Oncopodura subhoffii new species**

FIG. 832.. 4

**Description**

Habitus typical of genus but with suture between abdominal segments 3 and 4 obscure. Without pigment or eyes. Maximum length 1.64 mm. Antennae .1.16 - 1.21 times as long as cephalic diagonal. Fourth antennal segment without apical bulb but with apical humped projection; subapical trio clearly distinguished, with one strongly apically recurved and slightly clavate seta, four distal type 8 setae and one basal seta intermediate between type 8 and 2. Third antennal segment with one type 13 seta, extremely membranous and difficult to see. There is an additional seta intermediate between type 8 and 2 and 4 - 5 such setae on the second antennal segment. Remaining antennal setae of type 1a. PAO with 4 small clear lobes. . Outer pretarsal seta .16 to .32 as long as inner unguis. Unguis moderately broad without inner tooth and with a peculiar basal, external swelling. Unguiculus broad, .64 -.78 times as long as inner unguis and lanceolate. Apically expanded seta of mid tibiotarsus spoon shaped; other setae of tibiotarsi acuminate and finely ciliate. Tenent hair slender and acuminate. Ventral tube with 4 + 4 type 1a setae and with a weakly developed pair of papillae. Tenaculum with 4 teeth and a single very thick type 2 seta. Manubrium with 12+ 12 mesochaetae, 4 + 4 smooth, and 8 + 8 clearly ciliate. In addition there are a pair of acuminate macrochaetae at the center of the junction with the dens and 3 + 3 lateral microsetae. Dens with inner face with 5 swollen inner spines, one large distal and one basal dentate spine and three additional small dentate spines. Outer face with one large distal smooth or basally weakly dentate spine and one small basal spine. Mucro with 4 teeth and basal scale, sometimes with a minute toothlet between apical and subapical teeth. Fourth abdominal segment with all setae of type 1a. Sixth abdominal segment with three rows of macrochaetae or mesochaetae; the anterior (largest row) of four macrochaetae, the median of three mesosetae and the posterior of five macrochaetae. Between the anterior rows is a row of four microsetae.

**Localities**

**Types** Holotype ♀ and 3 paratype ♀♀ and 1 alcoholic paratype, Colorado, Freemont county, Marble Cave, August 7 1996, on old wood, near entrance, D. Hubbard coll. Locality no. 7995.

Also taken from: as above, Fly cave, near dead fly. Locality no. 7989 and Garfield county Groaning cave, August 10 1996, Hubbard coll, Locality no. 7991.

**Derivatio nominis:** from the closely related Q. hoffi.

**Remarks**

This species is very similar to the eastern Missouri cave Q. hoffi; however the antennal chaetotaxy is different and in addition the basal swelling on the unguis are far greater in subhoffi than hoffi. In addition while subhoffi has four clear PAO lobes only one specimen of hoffi showed this feature. The mucro is the same in the two species except for subhoffi's minute subapical toothlet. The occurrence of these forms, without any similar forms in the enormous cave collections in intervening Missouri and Arkansas regions, poses an interesting biogeographic puzzle.

**Legend to figures**

A) Habitus, specimen from Fly cave; B) 4th antennal segment, same specimen; C) Apex of 3rd antennal segment, paratype; D) PAO and antennal base, specimen from Fly cave; E) Ventral tube, holotype; F) Right side, 5th abdominal segment, specimen from Fly cave; G) Apex of mid leg, same specimen; H) Hind foot complex, plan view, paratype; I) Outer view unguis same specimen; J) Composite dens, type specimen; K) Outer chaetotaxy & L) mucro, specimen from Fly cave.

Oncopodura subhoffi

Figure 832.4

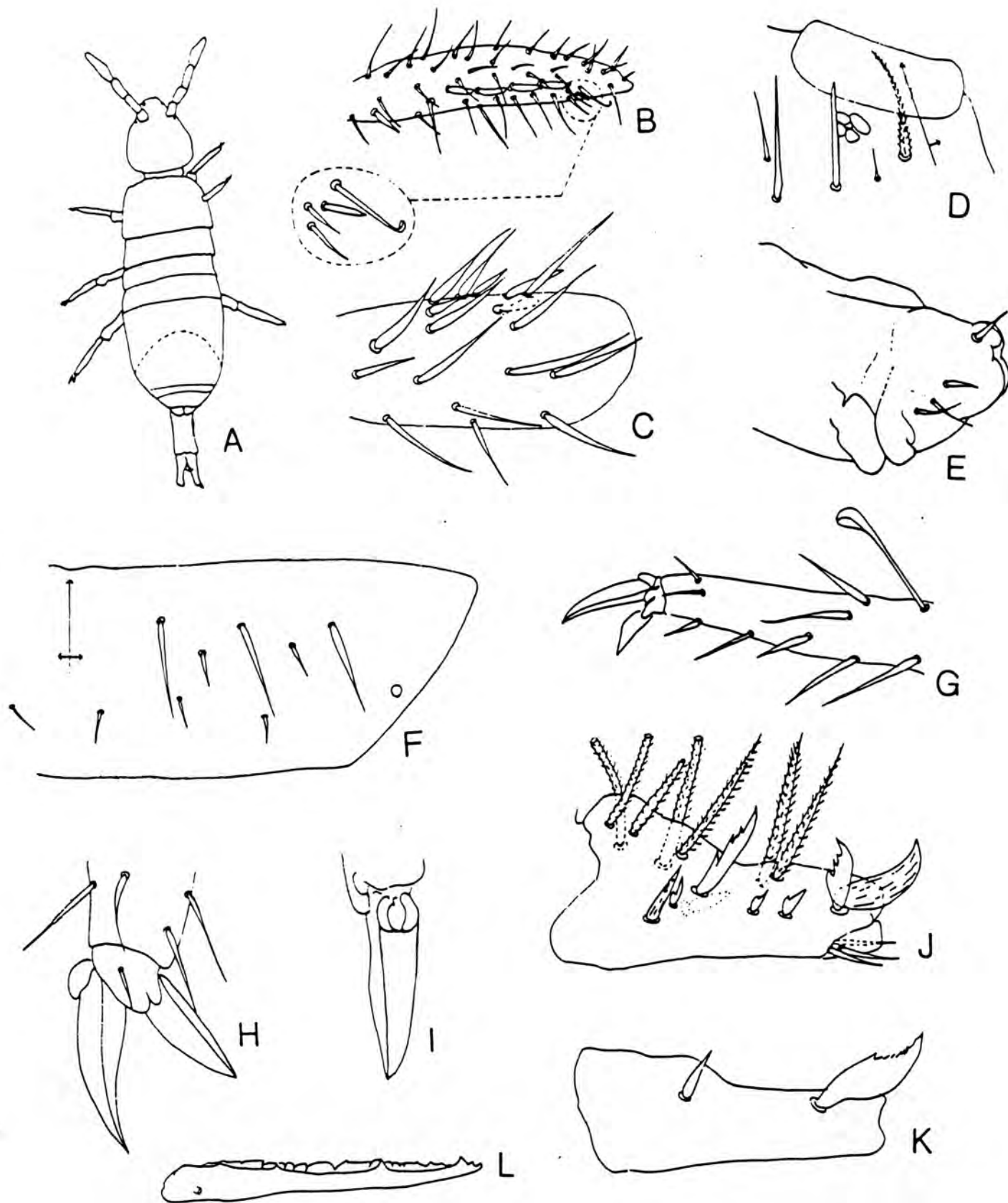
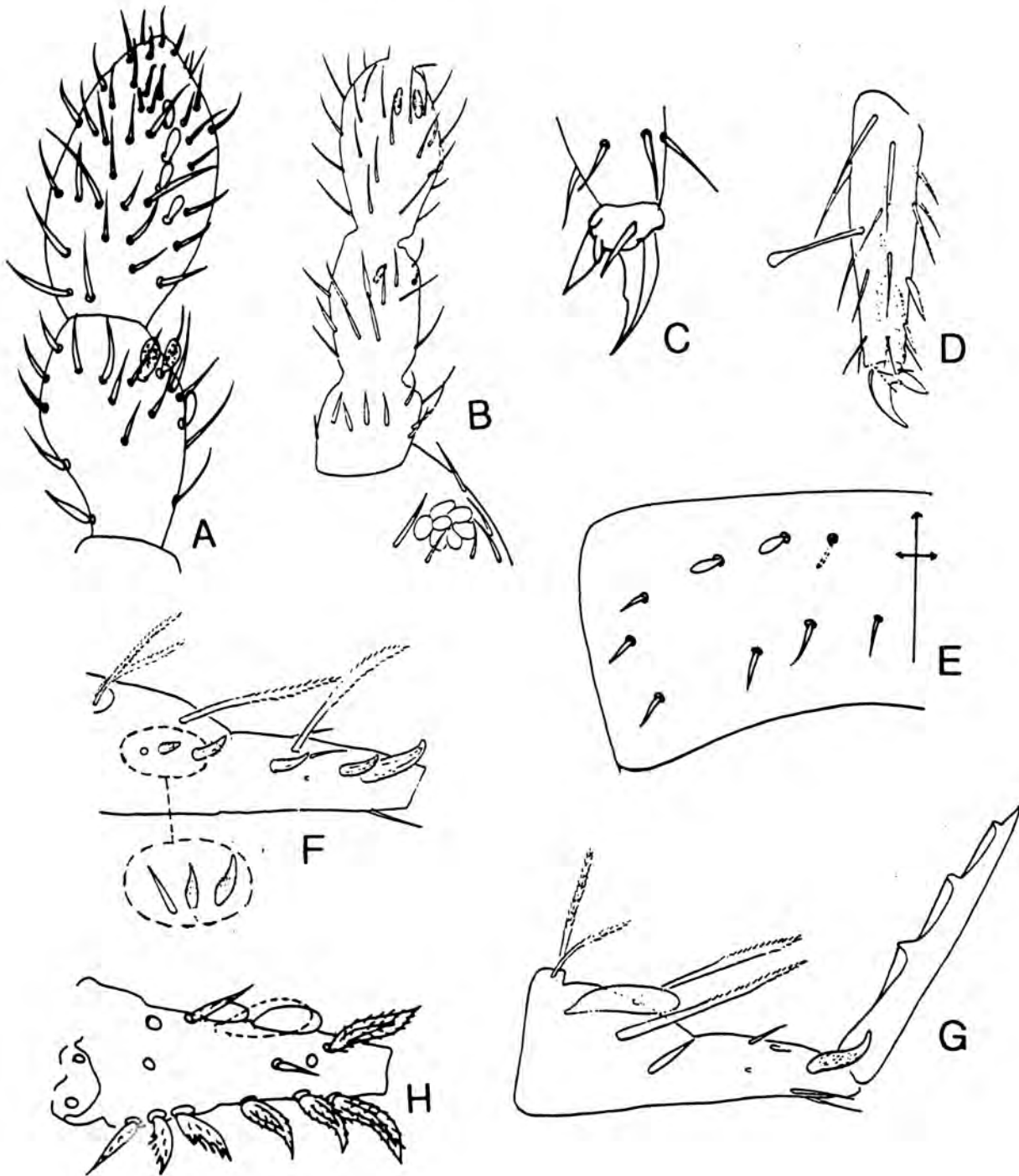


Figure 832.5



O. yosiana. A) Last 2 antennal segments; B) PAO & first 3 antennal segments; C) Fore foot complex; D) Mid tibiotarsus and foot complex; E) Left side fifth abdominal segment; F) Inner view of dens; G) Outer view of dens and mucro; H) dorsal view of dens. Figures A, C, E and H specimen from Ventura Co. California. Figures B, D, F & G after Szeptycki 1977.

Members of this family have coarsely ribbed scales and multilaterally ciliate setae, a weakly subsegmented dens with dorsal spines on the basal portion only, and the fourth abdominal segment shorter than or subequal to the third. The unguis has a single ventral lamella; the tenaculum is quadridentate. All Nearctic members of the family may be placed in a single genus.

Genus Tomocerus Nicolet, 1842

Type species: Macrotoma minor Lubbock, 1862

Adult and subadult individuals belonging to this genus have unusual antennal structure (see Fig. 840A ), with the last 2 segments unusually flexible and whorled and the fourth segment much shorter than the third; the mucro is elongate and hairy, with a variable number of dorsal teeth. Eyes vary in number from 6+6 to none; a postantennal organ may be present in 1 species only. The number of macrochaetae is small.

Among Nearctic genera, Tomocerus most closely resembles Cyphoderus, Oncopodura, and Harlomillsia; the distinctive antennae and hairy mucro sets it off from all of these. Early juvenile stages of some species, at least, have postantennal organs and lack the distinctive features of the genus; they have often been misidentified as isotomids ("Architomocerura"). In the present state of our knowledge such individuals can be identified only if associated with later stages showing typical characteristics.

We follow Gisin in placing all Nearctic tomocerines in 1 genus. Tomocerus has been subdivided by various authors, and we recognize some of these divisions as subgenera, following Yosii in placement of species though not in rank of categories. Species characters and classification are more fully treated in recent revisions by Christiansen, 1965, and Yosii, 1967 and 1970. The subgeneric classification is outlined below; for convenience the species are treated in a single key and table.



TABLE XXXVIII

Characteristics of Nearctic Species of Tomocerus

Species	Eyes per Side	Tenent Hairs	Lateral Manubrial Spines	Dorsal Manubrial Spines	Laterobasal Dental Spinelike Setae	Dental Spine Formula - Normal Range
<u>bidentatus</u>	6 (2 may be vestigial)	A	+	-*	-	2-6/ <u>1-4</u> , <u>1</u> , <u>1-2</u> , <u>1</u> , <u>3</u> , <u>1</u>
<u>brevimucronatus</u>	6	A-C (weak)	+	-	+	4-7, <u>1-2</u> / <u>3-4</u> , <u>1</u> , <u>3-6</u> , <u>1</u>
<u>californicus</u>	0-2	A	+	-	+	1-8/ <u>2-3</u> , <u>1</u> , <u>2-3</u> , <u>1</u> (exceptionally 1)
<u>celsus</u>	6	A (at least some feet)	+	-	-	0-3, <u>0-2</u> / <u>5-9</u> , <u>0-1</u>
<u>curtus</u>	6	C (weak)	-	-	-	3-5, <u>1</u> , <u>4-6</u> , <u>1</u> or 2-5, <u>1</u> / <u>2-4</u> , <u>1</u> , <u>1</u> , <u>1</u>
<u>dubius</u>	6	C	+	-	-	0-2, <u>1</u> / <u>4-5</u> , <u>2</u>
<u>elongatus</u>	6	C	+	+	-	<u>1-3</u> / <u>4-6</u> , <u>2</u>
<u>flavescens</u>	6	C	+	-	-	varied
<u>grahami</u>	0-1	C (weak)	-	-	+	2-4, <u>1-2</u> / <u>2</u> , <u>1</u> , <u>1-3</u> , <u>1</u> , <u>2</u> , <u>1</u>
<u>lamelliferus</u>	6	C (weak)	-	-	-	3, <u>1</u> / <u>1-2</u> , <u>1</u> , <u>2-4</u> , <u>1</u>
<u>minor</u>	6	C	+	+	-	4-6/ <u>2-5</u> , <u>1</u> , <u>1-2</u> , <u>1</u>
<u>missus</u>	0	A	-	+	-	irregular
<u>reductus</u>	3	A-C (weak)	-	-	+	3-5/ <u>2-3</u> , <u>1</u>
<u>teres</u>	6 (4 are vestigial)	A-C (weak)	+	-*	-	4/ <u>1</u> , <u>1</u> , <u>1</u>
<u>vulgaris</u>	6	C	+	+	-	3-5, <u>1</u> / <u>2-4</u> , <u>1</u> , <u>1-2</u> , <u>1</u>
<u>wilkeyi</u>	6	C	-	-*	+	3-8, <u>2-4</u> / <u>0-3</u> , <u>1</u> , <u>1-3</u> , <u>1</u> , <u>2-4</u> , <u>1</u>

A=acuminate  
C=clavate

\*Large dorsal setae not spinelike

/=limit of basal subsegment  
Conspicuously larger setae are underlined

There 16 Nearctic species of Tomocerus s.l. in 6 subgenera

Subgenus Lethemurus Yosii, 1970 Type species Tomocerus (Tritomurus) missus Mills, 1949

This subgenus is characterized by a lack of large spine like setae on the base of the dens, absence of eyes and a very well developed trochanteral organ, with 4-12 setae on the trochanter and 10 -20 on the base of the femur. There is a single (?) Nearctic species :  
T. (L.) missus.

Subgenus Pogonognathellus Paclt , 1944 Type species: Podura plumbea Linnaeus, 1758  
Syn.: Architomocerura Denis, 1931 (type species: A. crassicauda Denis, 1931); Maynardia Yosii, 1956 (type species Tomocerus elongatus Maynard, 1951); Pogonognathus Börner, 1908, nec Agassiz, 1846 (type species: P. plumbea).

This subgenus is distinguished by the pair of inner basal dental swollen spines, the lack of large outer dental basal spine like setae and a single dorsal mucronal lamella. The trochanteral organ has only a single seta on the trochanter and one on the base of the femur. There are 5 Nearctic species: 1) I. (P.) bidentatus, 2) I. (P.) celsus, 3) I. (P.) dubius, 4) I. (P.) elongatus, and 5) I. (P.) flavescens.

Subgenus Plutomurus Yosii 1956 Type species Tritomurus riugadoensis Yosii, 1939

This subgenus is characterized by the presence of large spine like setae at the outer base of the dens, well developed trochanteral organ with many setae on base of femur as well as trochanter, few ( 4 or fewer) intermediate mucronal teeth and only a single small basal mucronal lamella. There are 4 Nearctic species: 1) I. (P.) brevimucronatus, 2) I. (P.) californicus, 3)

4) I. (P.) grahami and 5) I. (P.) wilkeyi.

Subgenus Tomocerina Yosii 1955 Type species Tomocerus minutus Tullberg, 1876

This subgenus is characterized by two basal mucronal teeth and a lamella on the subapical tooth or running from the subapical to the basal tooth. The basal teeth lack any toothlet and there are no large spine like setae on the outer base of the dentes. The The trochanteral organ has only a single seta on the trochanter and one on the base of the femur. The intermediate mucronal teeth are small and few ( 0- 4). There are 3 Nearctic species: 1) I. (I.) curtus, 2) I. (I.) lamelliferus, and 3) I. (I.) teres.

Subgenus Tomocerus s. str.

This subgenus is characterized by a lack of spine like outer dental large setae, and a toothlet on the outer basal mucronal tooth. The trochanteral organ has only a single seta on the trochanter and one on the base of the femur. They lack inner basal swollen dental scales. This is the only subgenus lacking endemic Nearctic species. There are 2 Nearctic species: 1) I. s.s. minor and 2) I. s.s. vulgaris.

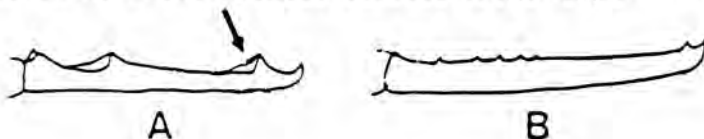
Subgenus Tomolonus Mills, 1949 Type species Tomolonus reductus Mills, 1949

This monospecific genus is characterized by 3 + 3 eyes, the presence of basal, dental, external spine like setae. The "trochanteral" organ is limited to the base of the femur and has 4 -5 setae. The mucro has a well developed subapical lamella and a very elongate apical tooth. Small specimens have a well developed PAO. There is a single species.

Key to Nearctic Species of Tomocerus

- 1 ) Eyes reduced, 2+2 or fewer, weakly pigmented when present ----- 2  
1') Eyes clear, 3+3 or more on clear eye patches ----- 4  
\*\* 2 ) Median tooth of mucro with small lamella (Fig. 833A) ----- I. missus  
\*\* 2') Median tooth of mucro without lamella (Fig. 833B) ----- 3

833



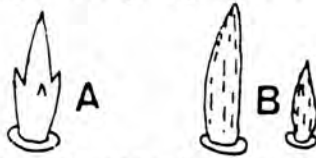
\*\* 3 ) 3-6 intermediate mucronal teeth ----- T. californicus 1154

\*\* 3') At most 2 intermediate mucronal teeth ----- T. grahmi

\* 4 ) Dental spines toothed (Fig. 834A) ----- T. minor

4') Dental spines simple (Fig. 834B) ----- 5

834



5 ) Dentes with a pair of spine-like scales at inner base (Fig. 835) ----- 12

5') Dentes without spine-like scales at inner base ----- 6

835



6 ) Mucro with prominent lamella visible in side view running from basal to subapical tooth (Fig. 836) ----- 7

6') Mucro without such a lamella ----- 8

836



\*\* 7 ) Mucro with intermediate teeth ----- T. lamelliferus

\*\* 7') Mucro without intermediate teeth ----- T. teres

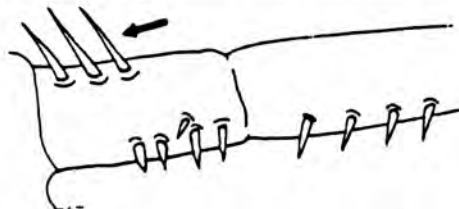
8 ) Tenent hair pointed ----- T. reductus<sup>1</sup>

8') Tenent hair clavate ----- 9

9 ) Outer base of dentes with prominent spine-like setae (Fig. 837) ----- 10

9') Such setae lacking ----- 11

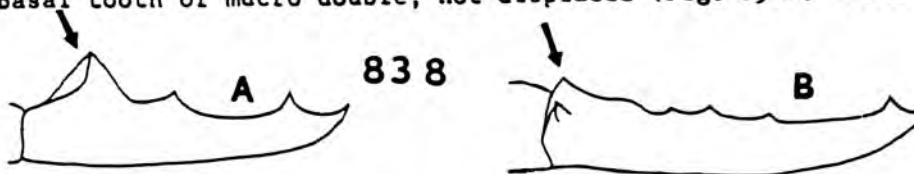
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\*\* 10 ) Basal tooth of mucro single and displaced toward apex (Fig. 838A) -----

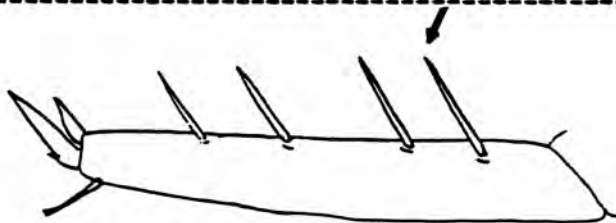
----- T. brevimucronatus

\*\* 10') Basal tooth of mucro double, not displaced (Fig. 838B) ----- T. wilkeyi



- \*\* 11 ) Adults with 1-3 intermediate mucronal teeth; pigment strong and irregular;  
small species ----- T. *curtus*
- \* 11') Adults with 4-8 intermediate mucronal teeth; pigment weak and uniformly  
distributed if present ----- T. *vulgaris*
- \*\* 12 ) Several strikingly larger spines in middle of dental spine series -----  
----- T. *bidentatus*
- 12') Strikingly larger spines only at beginning and end of dental spine series  
----- 13
- \*\* 13 ) At least 1 pair of tenent hairs pointed ----- T. *celsus*
- 13') All tenent hairs clavate ----- 14
- \*\* 14 ) Inner unguis teeth 2 (very rarely 3 ); pigment, when present, patchy,  
with well-developed triangular dark spot between eyes ----- T. *dubius*
- 14') Inner unguis teeth 3 or more (very rarely 2); pigment when present not  
patchy; no triangular spot between eyes ----- 14
- \* 15 ) Inner margin of anterior tibiotarsus with 4 large spine-like setae  
(Fig. 839 ) ----- T. *elongatus*
- \* 15') Inner margin of anterior tibiotarsus without large spine-like setae -----  
----- T. *flavescens*

839



1 Very rare specimens of T. *californicus* may key out here, but in our collections they are always accompanied by individuals with less than 3 eyes per side.

Not included in key:

- |  |                     |
|--|---------------------|
| ** <u>albus</u> Packard, 1877              | = <u>flavescens</u> |
| <u>americanus</u> Schött, 1896             | = <u>flavescens</u> |
| <u>arcticus</u> Schött, 1893               | = <u>flavescens</u> |
| <u>bicolor</u> Say, 1821 ( <u>Podura</u> ) | indeterminable      |

<u>crassicauda</u> Denis, 1931 ( <u>Architomocerura</u> )	= <u>flavescens?</u> juvenile
<u>henroti</u> Delamare, 1949 ( <u>Tritomurus</u> )	= <u>bidentatus</u>
<u>iricolor</u> Say, 1821 ( <u>Podura</u> )	indeterminable
<u>jeanneli</u> Bonet, 1934	= <u>bidentatus</u>
<u>longicornis</u> Müller, 1776 ( <u>Podura</u> )	no valid Nearctic records
<u>minutus</u> Tullberg, 1876	no valid Nearctic records
<u>niger</u> Bourlet, 1839	indeterminable; Nearctic records= <u>flavescens</u>
<u>nigritus</u> Maynard, 1951	indeterminable without types
<u>oregonensis</u> Denis, 1929 ( <u>Tritomurus</u> )	= <u>californicus</u>
<u>pallidus</u> Packard, 1888	= <u>flavescens</u>
** <u>separatus</u> Folsom, 1913	= <u>flavescens</u>
<u>tridentifera</u> Tullberg, 1872 ( <u>Macrotoma</u> )	= <u>minor</u>

Tomocerus (Pogonognathellus) bidentatus Folsom, 1913

Fig. 840

Refs.: Proc. U.S. natn. Mus. 46:463; Christiansen, 1965.

Syn.: jeanneli Bonet, 1934, Archs Zool. exp. gén. 76:363; henroti Delamare, 1949 (Tritomurus), Notes biospéol. 4:117.

Description

Color: in alcohol, pale yellowish white to speckled gray with intersegmental membranes white; antennae purple to blue. Eye patches dark and trapezoidal. Corneas of eyes not always clear. 1-2 spine-like setae on inner surface of third pair of tibiotalpi only. Dens with clear inner, basal scale-like spine. Dental spines smooth to finely striate; terminal dental spine considerable longer than others. Bothriotrichia without, and macrochaetae with 0-5 microsetae around base. Maximum length 5 mm.

Remarks

Some specimens have weakly clavate tenent hairs on some feet. The typical number of inner unguis teeth is 2, but rarely 3 or even 4 occur. There is some variation in chaetotaxy. Most specimens may be recognized at once by the peculiar macro. This species appears to be primarily a cave form of the eastern half of the country; the 2 California records are doubtful.

Localities, surface: Alabama - Dekalb Co.; Connecticut - New Haven Co.; Illinois - Gallatin Co., Johnson Co.; Maryland - Green Ridge Mts.; North



Carolina - Orange Co., Rich Mt.; Tennessee - Johnson Co., Warren Co.; West Virginia - Mt. Storm; Washington, D.C.

Localities, cave: Alabama - Colbert Co., Dekalb Co., Madison Co., Marshall Co.; California - Mariposa Co.; Indiana - Clarke Co., Harrison Co., Jennings Co.; Illinois - Union Co.; Iowa - Linn Co.; Kentucky - Adair Co., Allen Co., Barren Co., Edmonson Co., Hart Co., Powell Co., Pulaski Co., Warren Co.;

Maryland - Alleghany Co., Washington Co.; Ohio - Adams Co.; Tennessee - Dickson Co., Hawkins Co., Montgomery Co., Sullivan Co., White Co.; Virginia - Augusta Co., Highland Co., Lee Co., Page Co., Rockingham Co., Scott Co., Shenandoah Co., Smyth Co., Tazewell Co., Washington Co., Wythe Co.; West Virginia - Grant Co., Mercer Co., Monroe Co., Pendleton Co., Randolph Co., Tucker Co.

Additional records: New York (Gilmore & Raffensperger, 1970); Washington

(Mills & Rolfs, 1933). Tomocerus (Pogonognathellus) bidentatus

A) Habitus.

All figures after Christiansen.

B) Chaetotaxy of left half of body.

C) Hind foot complex.

D) Hind unguis.

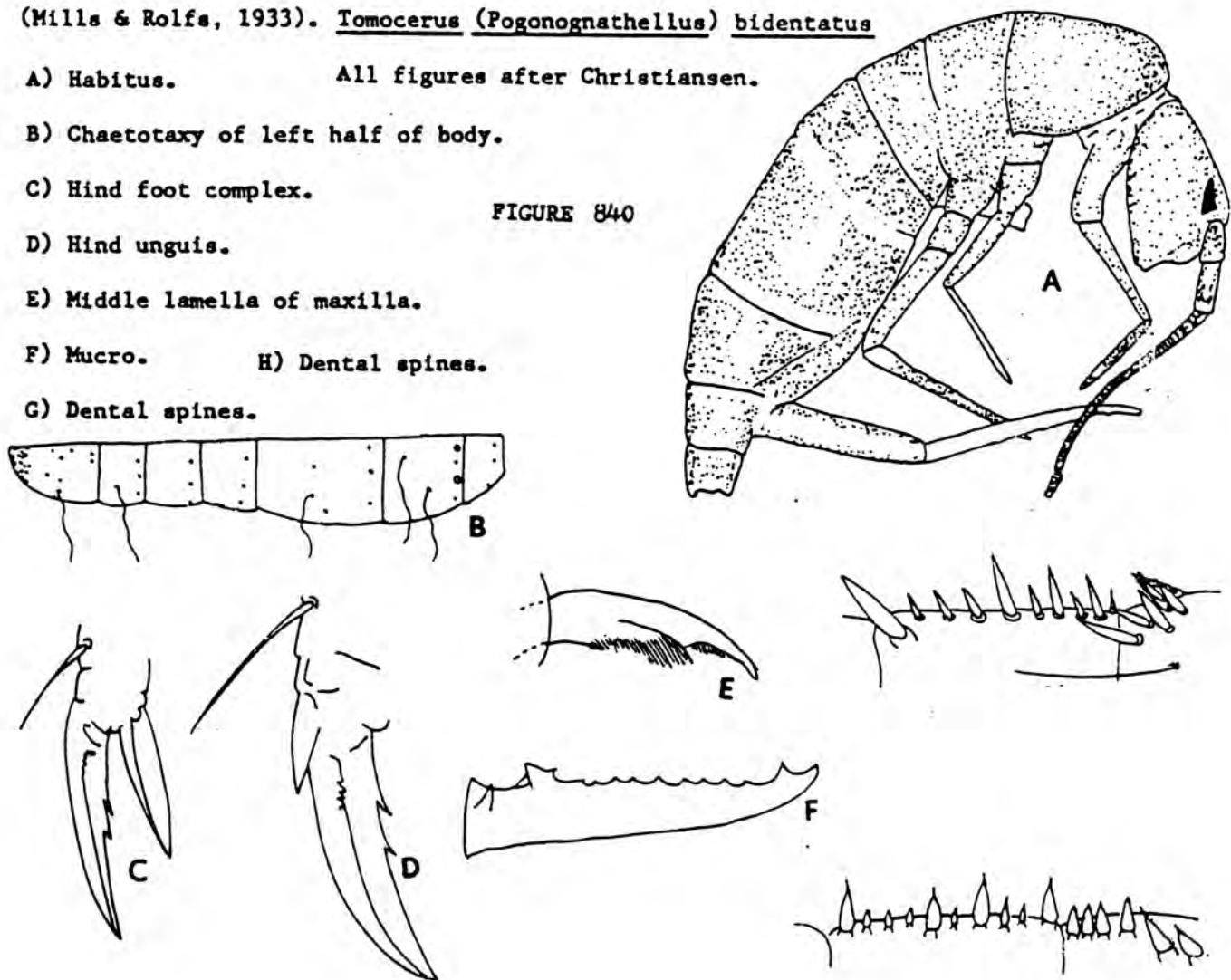
E) Middle lamella of maxilla.

F) Mucro.

H) Dental spines.

G) Dental spines.

FIGURE 840



Refs.: Boll. Lab. Zool. gen. agr. Portici 22:176; Christiansen, 1965;

Yosii, 1967.

Description

Color: in alcohol, white to grayish brown with strikingly darker eye patches; antennae blue. Eye patches triangular, with all 6 eyes clear. Third pair of legs only with 1 enlarged spine-like seta on tibiotalarsus. 3 enlarged spine-like setae on outer lateral base of dens. Without inner enlarged dental scale. Dental spines coarsely striate. Bothriotrichia with 0-6 and macrochaetae with 2-4 microsetae around base. Maximum length 3.5 mm.

Remarks

Typical specimens are readily distinguished from other Nearctic species both by the mucronal structure and by the unidentate unguis. Additional, distal unguis teeth are found in some specimens, but they are always much smaller than the basal tooth. The basal mucronal tooth in a few specimens is nearer the base than shown in the figure. The dental spination is quite variable, with some forms having an additional large spine; the basal series often increases in size gradually, making it difficult to distinguish large and small spines.

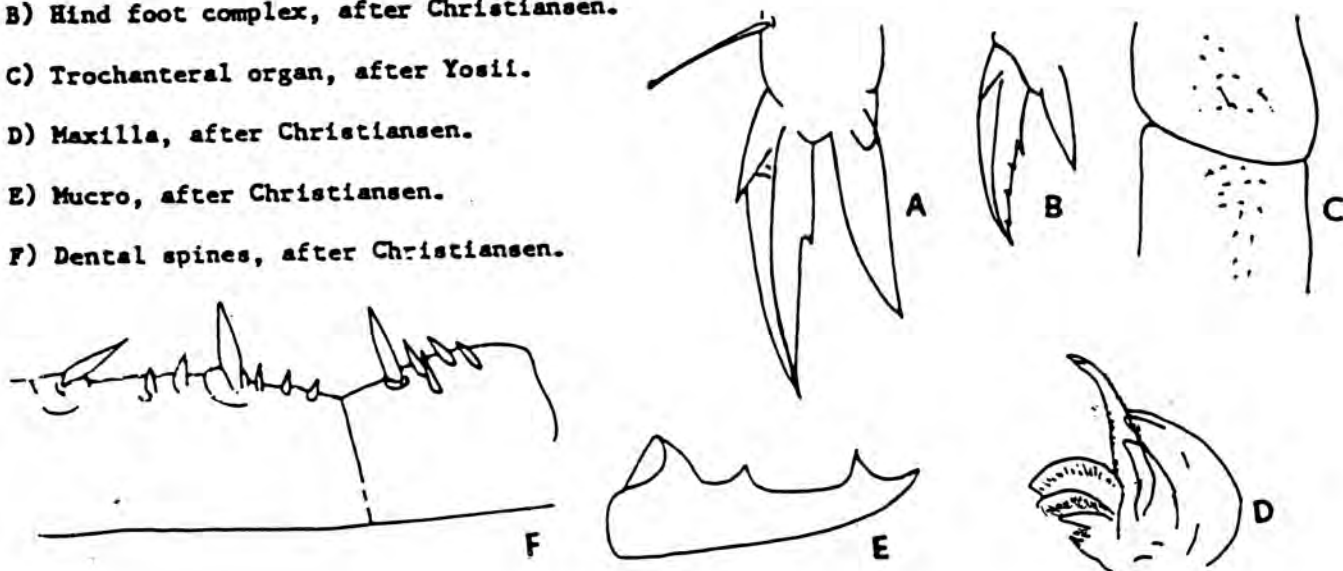
Localities: California - Alameda Co.; Oregon - Benton Co., Josephine Co.

(type), Lincoln Co.; Washington - King Co.

Tomocerus (Plutomurus) brevimucronatus

FIGURE 841

- A) Hind foot complex, after Christiansen.
- B) Hind foot complex, after Christiansen.
- C) Trochanteral organ, after Yosii.
- D) Maxilla, after Christiansen.
- E) Mucro, after Christiansen.
- F) Dental spines, after Christiansen.



Refs.: Proc. U.S. natn. Mus. 46:469; (Tritomurus); Christiansen, 1965, Yosii, 1967.

Syn.: oregonensis Denis, 1929 (Tritomurus), Boll. Lab. Zool. gen. agr.

Portici 22:178.

Description

Color: in alcohol, background white, usually with a scattering of faint gray pigment in granules over tergites and leg bases; head with prominent dark triangular patch between antennal bases. Third pair of legs only with 1-2 spine-like setae on tibiotarsus. Outer dental spines 2+2. Inner enlarged dental scale absent. Dental spines very finely striate. Bothriotrichia with a semicircle of 5-9 microchaetae around anterior basal margin; macrochaetae usually without microsetae but occasionally with 1-5. Maximum length 3.5 mm.

Remarks

This is the commonest Pacific coast cave species. It varies greatly in antennal length, foot structure, and dental chaetotaxy. Most populations lack eyes, but some individuals from Potter Creek Cave, California, have 1+1, and those from Empire Cave, California have 2+2 (3+3 in 1 specimen).

Localities: California - Marin Co., Mendocino Co. (cave), Santa Clara Co. (type), Shasta Co. (cave), Tulare Co.; Oregon - Josephine Co. (cave), Lincoln Co.

Tomocerus (Plutomurus) californicus

A) Habitus, after Christiansen.

B) Chaetotaxy of left half of body, after Christiansen.

C) Hind foot complex, after Folsom. FIGURE 842

D) Hind foot complex, after Christiansen.

E) Hind foot complex, after Christiansen

F) Hind unguis, after Christiansen.

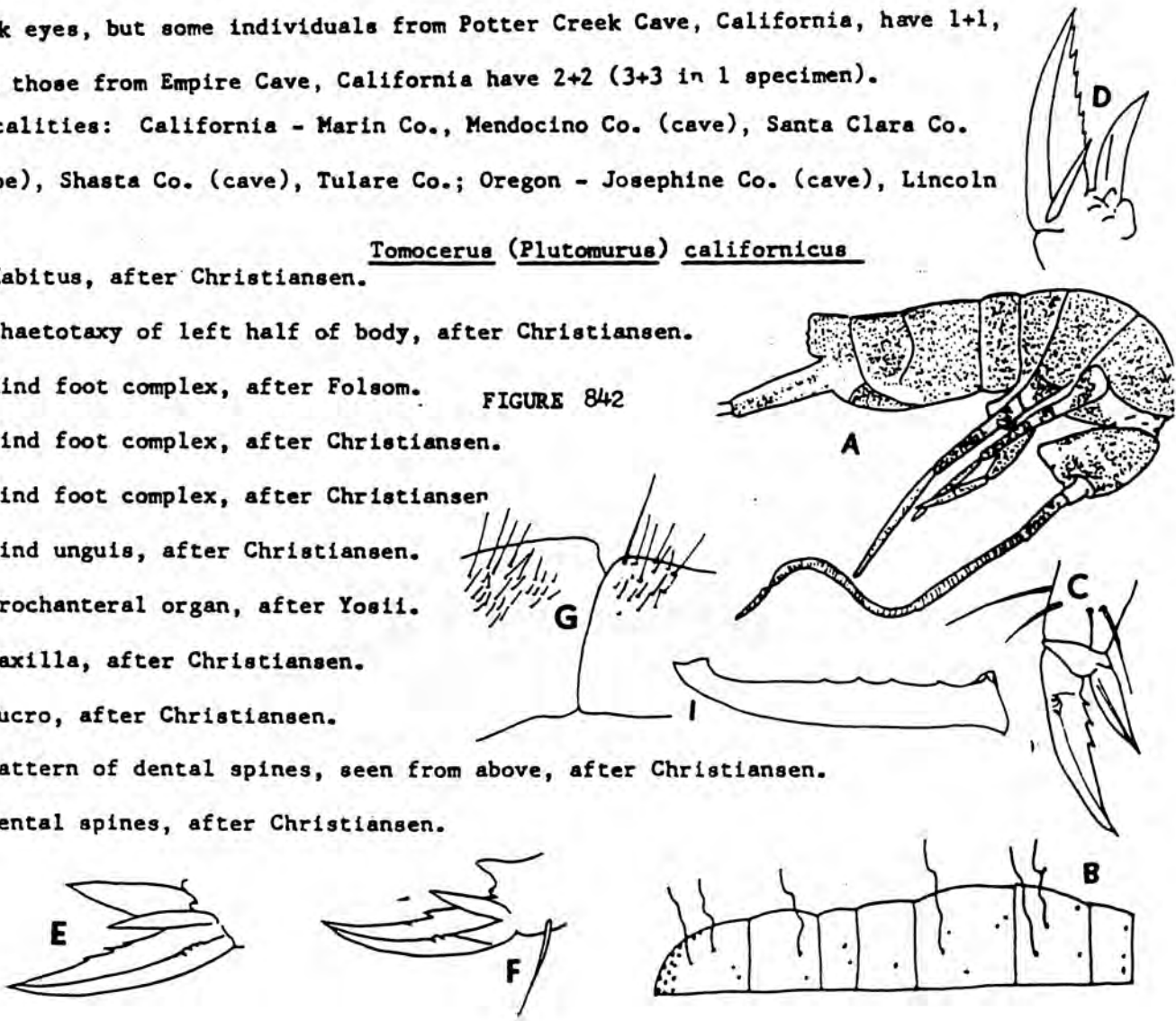
G) Trochanteral organ, after Yosii.

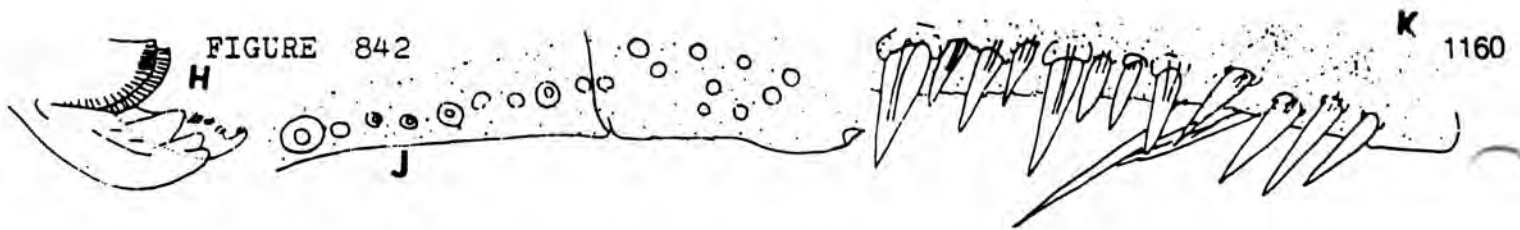
H) Maxilla, after Christiansen.

I) Mucro, after Christiansen.

J) Pattern of dental spines, seen from above, after Christiansen.

K) Dental spines, after Christiansen.





Tomocerus (Pogonognathellus) celsus Christiansen, 1965

Fig. 843

Refs.: Revue Ecol. Biol. Sol 1:670; Yosii, 1967.

Description

Color: in alcohol, with granular, non-uniform bluish black pigment over tergites and head, leaving frequent pale or pigmentless areas; intersegmental membranes and leg bases white; head with clear trapezoidal eye patches and a dark triangular patch between eyes. Third pair of legs only with 2 poorly differentiated enlarged setae on tibiotarsus. Dens with inner enlarged spine-like scales. Dental spines finely striate. Bothriotrichia without, macrochaetae with 1-3 microsetae at base. Maximum length 4.0 mm.

Remarks

This species is close to T. flavescens, but definitely separable, differing not only in the key feature of pointed tenent hairs but in the poorly differentiated enlarged tibiotarsal setae and the clear head pattern; the mucronal type is normally distinct, but some young eastern cave specimens of flavescens have this type of mucro. This is primarily a cave form.

Localities: Arizona - Cochise Co.; California - Amador Co. (cave), Calaveras Co. (type),

El Dorado Co. (cave), Mariposa Co. (cave), Tulare Co.; Oregon - Lincoln Co.

Additional record: North Carolina (Knight & Read, 1969) (?).

Tomocerus (Pogonognathellus) celsus

A) Habitus. All figures after Christiansen.

B) Chaetotaxy of first four abdominal segments of left side.

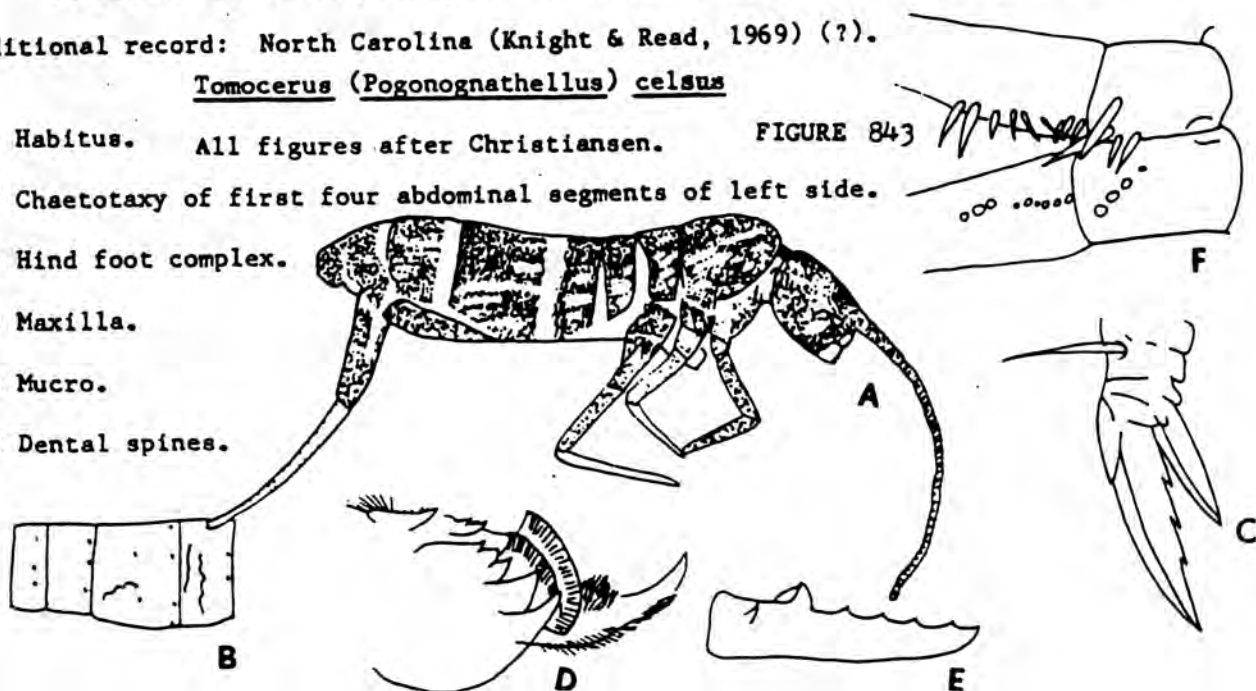
C) Hind foot complex.

D) Maxilla.

E) Mucro.

F) Dental spines.

FIGURE 843





Refs.: Revue Ecol. Biol. Sol 1:647; Yosii, 1967.

Description

Color: background white, with abundant dark blue pigment in granules covering tergites and dorsum of head; eye patches well-developed and triangular, with a triangular dark patch covering space between them. Third pair of legs only with 1 prominent spine-like seta on internal surface of tibio-tarsus. Dens without inner spine-like scales or outer spine-like setae. Bothriotrichia without microsetae; macrochaetae with at most 1 microseta at base. Maximum length 3.0 mm.

Remarks

This is one of the smaller species of the genus; it can be confused with young specimens of T. vulgaris, but generally can be recognized by the smaller number of unguis teeth as well as the presence of adult characteristics. It is primarily a high altitude form; all our collections are from between 7,000 and 13,000 feet elevation. The only known cave population includes specimens larger than any others (3 vs. 2 mm.), and with pigment abundant to absent.

Localities: Colorado - Huerfano Co., Mineral Co., Ouray Co. (type); New Mexico - Los Alamos Co., Rio Arriba Co., Santa Fe Co. (including cave record), Taos Co., Valencia Co. Tomocerus (Tomocerina) curtus

A) Habitus.

All figures after Christiansen.

B) Chaetotaxy of left side of third and fourth abdominal segment.

C) Hind foot complex. FIGURE 844

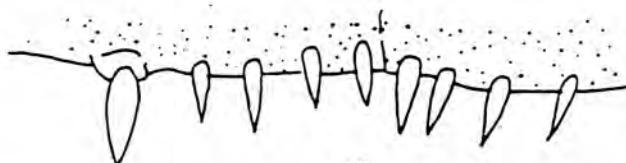
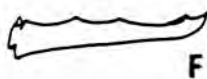
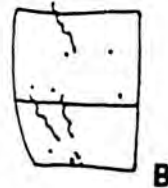
D) Maxilla.

E) Mucro.

F) Mucro.

G) Dental spines.

H) Dental spine pattern.



G

H



Refs.: Revue Ecol. Biol. Sol 1:671; Yosii, 1967.

Description

Color: in alcohol, background white with a scattering of bluish black pigment granules over tergites; eye patches well-developed and triangular, with a roughly triangular bluish patch between them. Hind tibiotalarsus only with 1 prominent spine-like seta on inner surface. Dens with inner spine-like scale unusually prominent. Dental spines very finely striate. Bothriotrichia without microsetae, macrochaetae with 1-4 around base. Maximum length 3.5 mm.

Remarks

This species is clearly close to T. flavescens. Because of the variability of flavescens, no single characteristic will separate all forms of the 2 species. Differences are summarized in the following table:

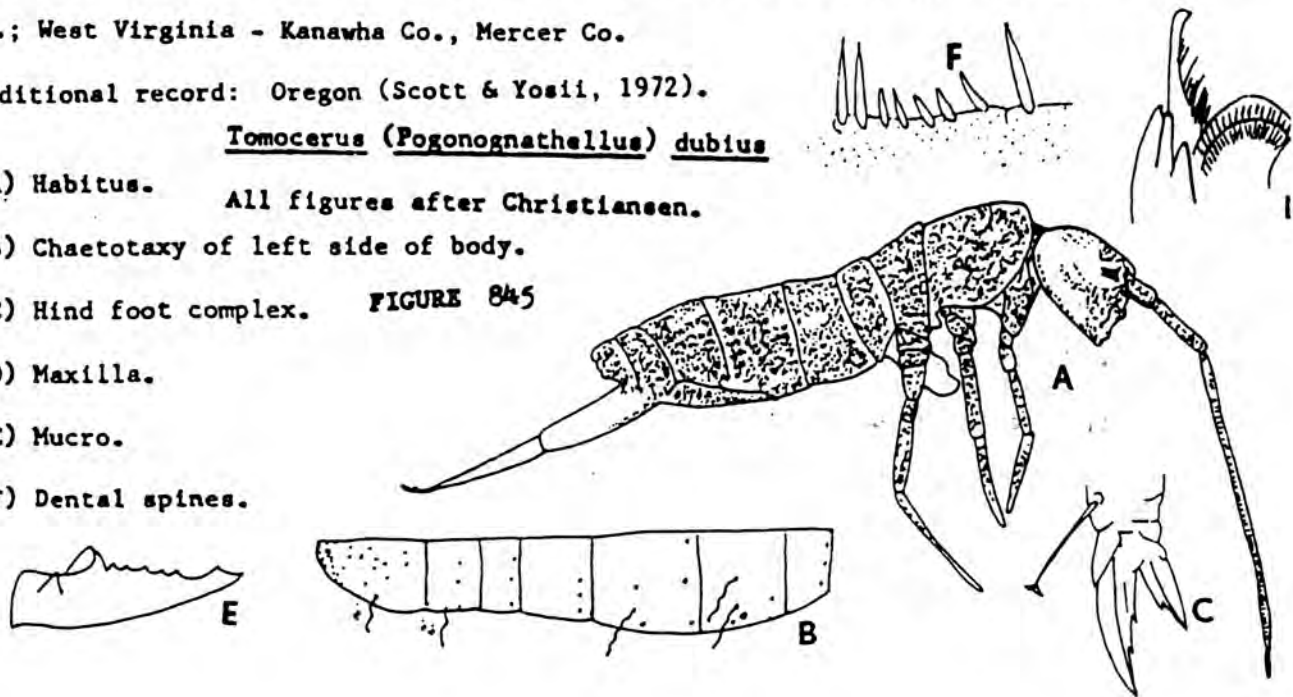
<u>T. dubius</u>	<u>T. flavescens</u>
Usually 2 inner unguis teeth.	Inner unguis teeth rarely 2 in Nearctic material.
Base to basal mucronal tooth more than 1/4 length of mucro.	Base to basal mucronal tooth rarely as great as 1/4 length of mucro.
Lateral mucronal tooth less than 1/2 as large as basal tooth.	Lateral mucronal tooth more than 1/2 as large as basal tooth.
Macrochaeta present in anterior row of fourth abdominal segment.	Macrochaeta sometimes absent in anterior row of fourth abdominal segment.
Pigment patchy when present.	Pigment relatively uniform when present.
We have seen no specimens of <u>flavescens</u> with the combination of 2 unguis teeth and the <u>dubius</u> type of mucro.	

Localities: Alabama - Jackson Co. (cave), Dekalb Co. (cave); California - Alameda Co., Marin Co.; Florida - Alachua Co. (cave); Illinois - Bell Smith Springs, Champaign Co.; Kentucky - Barren Co. (cave), Bath Co., Crail Hope, Edmonson Co., Johnson Co. (cave), Rockcastle Co. (cave); Mississippi - Harrison Co., Yokena; North Carolina - Graham Co., Swain Co.; Tennessee -

Additional record: Oregon (Scott & Yosii, 1972).

Tomocerus (Pogonognathellus) dubius

- A) Habitus. All figures after Christiansen.  
B) Chaetotaxy of left side of body.  
C) Hind foot complex. FIGURE 845  
D) Maxilla.  
E) Mucro.  
F) Dental spines.



Tomocerus (Pogonognathellus) elongatus Maynard, 1951

Fig. 846

Refs.: Collembola of New York 126; Christiansen, 1965; Yosii, 1967.

Description

Color: background white to dark blue, with pale areas usually on anterior portions of the third and fourth abdominal segments, dorsum of mesothorax, and in patches on dorsum of head; scales dark. Antennae blue, usually longer than body. Eyes on trapezoidal eye patch. Tibiotarsi each with 3-6 (usually 4) large spine-like setae on the internal surface. External spine-like dental setae absent. Inner basal dental spine-like scale large and generally medially constricted, appearing fiddle-shaped. Bothriotrichia with 0-1, macrochaetae with 0-4 basal microsetae. Maximum length 6.0 mm.

Remarks

This species resembles T. longicornis (Müller) of Europe, but the latter does not have the dental scales medially constricted, and has the apex of the unguiculus acuminate, nearly reaching the ungual apex, and minor differences in dental chaetotaxy and leg setae. Maynard's types have not been seen, and it is not certain that the form described here is his species.

Localities: Alaska - Chistochina; Colorado - Cochetopa Pass; Illinois - Adams Co., Champaign Co., Effingham Co., Randolph Co., Union Co.; Iowa - Story Co.; Kentucky - Edmonson Co.; Maine - Penobscot Co., Sagadahoc Co.; New Hampshire - Pine Mt.; New Jersey - Sussex Co.; New York - Orange Co., Steuben Co., Tompkins Co.; North Carolina - Burke Co., Watauga Co.; Ohio - Warren Co.; Pennsylvania - Centre Co., Colesain, Elk Co., Lycoming Co., Presque Isle, Venango Co.; Virginia - Dead Run; West Virginia - Lost River State Park; Wyoming - Teton Co.

Additional record: Indiana (Pedigo, 1970).

A) Habitus, after Maynard. Tomocerus (Pogonognathellus) elongatus

FIGURE 846

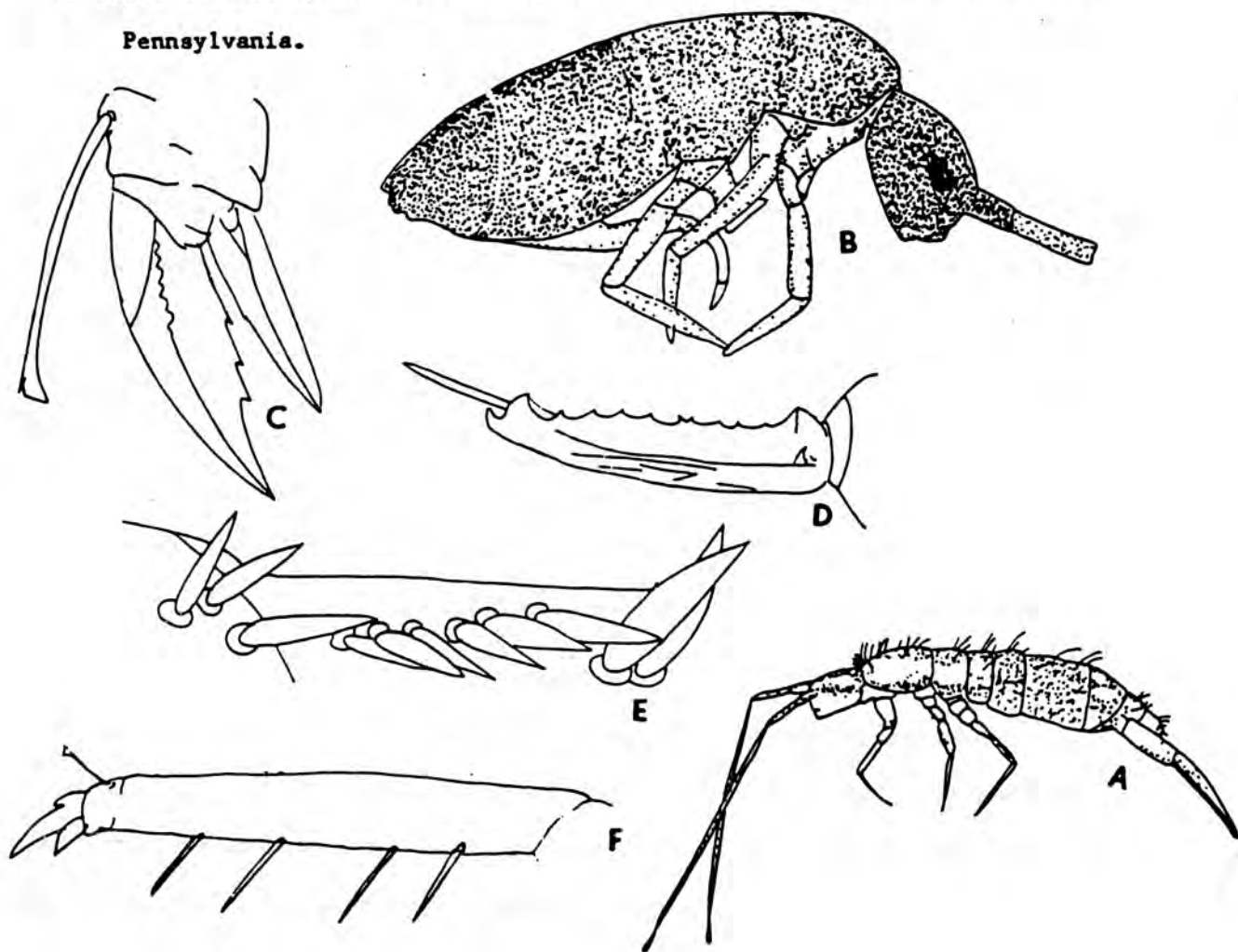
B) Habitus, after Christiansen.

C) Hind foot complex, after Christiansen.

D) Mucro, after Maynard.

E) Dental spines, after Maynard

F) Typical inner spine-like tibiotarsal setae, specimen from Franklin Co., Pennsylvania.



Refs.: Öfvers. K. VetenskAkad. Förh. 28:149 (Macrotoma); Christiansen, 1965.

Syn.: alba Packard, 1877, Bull. U.S. geol. Surv. 3:159; americanus

Schött, 1896, Proc. Calif. Acad. Sci. (2)6:172; arcticus Schött, 1893,

K. svenska VetenskAkad. Handl. B 25(11):43; pallidus Packard, 1888, Mem.

natn. Acad. Sci. 4:65; separatus Folsom, 1913, Proc. U.S. natn. Mus. 46:460.

Description

Color: in life mostly silvery gray to lead-colored, but occasionally pale cream; in alcohol, brown to grayish blue to off-white; without scales, usually yellowish; pigment when present usually uniformly distributed, except for occasional specimens with darker thoracic margins or scattered pale spots. Eye patches dark and trapezoidal. Third pair of legs only with 1 (rarely 2) large spine-like setae on inner surface of tibiotaler. Dentes without lateral external spine-like setae. Inner spine-like dental scale present, not medially constricted. Bothriotrichia with 0-1, macrochaetae with 1-4 basal microsetae. Maximum length 7.0 mm.

Remarks

The enormous variation within this species complex has been analyzed in detail (Christiansen, 1965). The various possible combinations of each variable organ type do not appear to follow any geographic pattern. Knight (1958) reports that in North Carolina the "forms" americanus and separatus co-exist without intermediates, and earlier Folsom (1913) noted that these forms and arcticus can be distinguished in some parts of the country but intergrade elsewhere. Our observations do not support these claims. As Christiansen pointed out in 1965, the intergradation in all characters studied so far is such that no workable taxonomic separation is possible at the present time. It is possible that new criteria will allow fragmentation of this array of forms into separate species, but it seems at least as likely that this polymorphic complex does not segregate into normal morphological species units. Much further study will be required to settle this point.

Localities: we have examined specimens from Alaska, southern Canada, and all parts of the United States. This is a common cave inhabitant.

Biology: Christiansen, 1970.

Tomocerus (Pogonognathellus) flavescens

A) Habitus.

All figures after Christiansen.

B) Chaetotaxy of left side, typical specimen.

C) Unusual second thoracic segment.

FIGURE 847

D) Unusual third abdominal segment, specimen from California.

E) Common foot complex type.

F) Common foot complex type.

G) Common foot complex type.

H) Common foot complex type.

I) Maxilla, specimen from Oregon.

J) Protruding middle maxillary lamella, specimen from Iowa.

K) Major mucronal type.

L) Different major type of mucro.

M) Inner dental spine like scales.

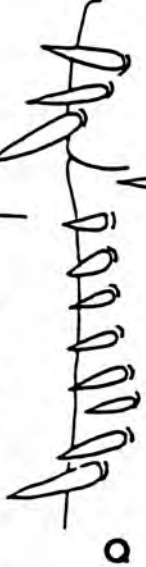
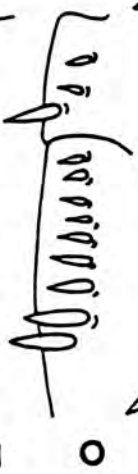
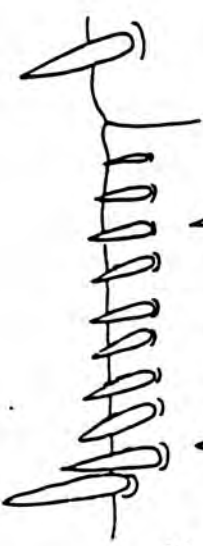
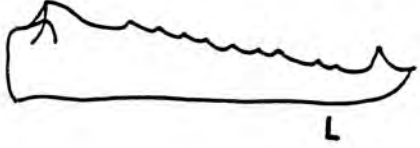
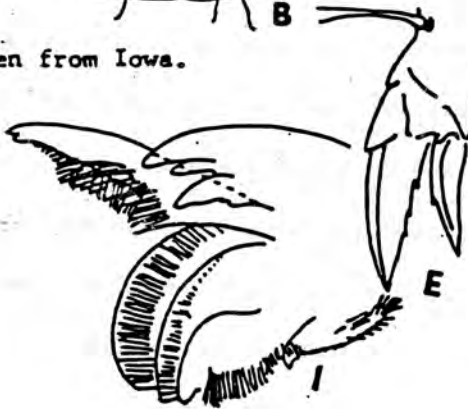
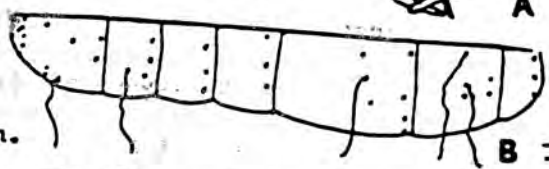
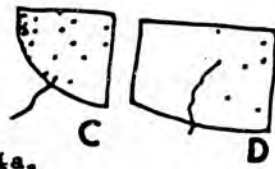
N) Different major dental spine type.

O) Different major dental spine type.

P) Different major dental spine type.

Q) Different major dental spine type.

R) Different major dental spine type.





Tomocerus (Plutomurus) grahami, Christiansen 1980

ref: Bull Iowa Acad. Sciences 37.1980 Description

Color: white, with a suffusion of pale gray pigment over tergites. Eyes absent or represented by a single pair of small dark patches without corneas. Tibiotarsi without spinelike setae. Tenent hairs of all legs small and slender but clearly clavate. Unguiculi with a series of setulae on inner margin. 2+2 large outer dental spines. Inner enlarged dental scales absent. Inner dental spines not striate. Mucro with 1-3 intermediate teeth. Bothriotricha with a semicircle of microchaetae; macrochaetae with 3-9 microchaetae around base. Maximum length 4.0 mm.

Remarks

This species is similar to T. reductus in many respects, but differs in eye number, mucronal shape, and abdominal and dental chaetotaxy.

Type locality: Terrero Cave, Terrero, Santa Fe Co., New Mexico, 8 February 1975 (N. Welbourn).

All figures of type specimens.

FIGURE 848

A) Chaetotaxy of the second through fifth abdominal segment.

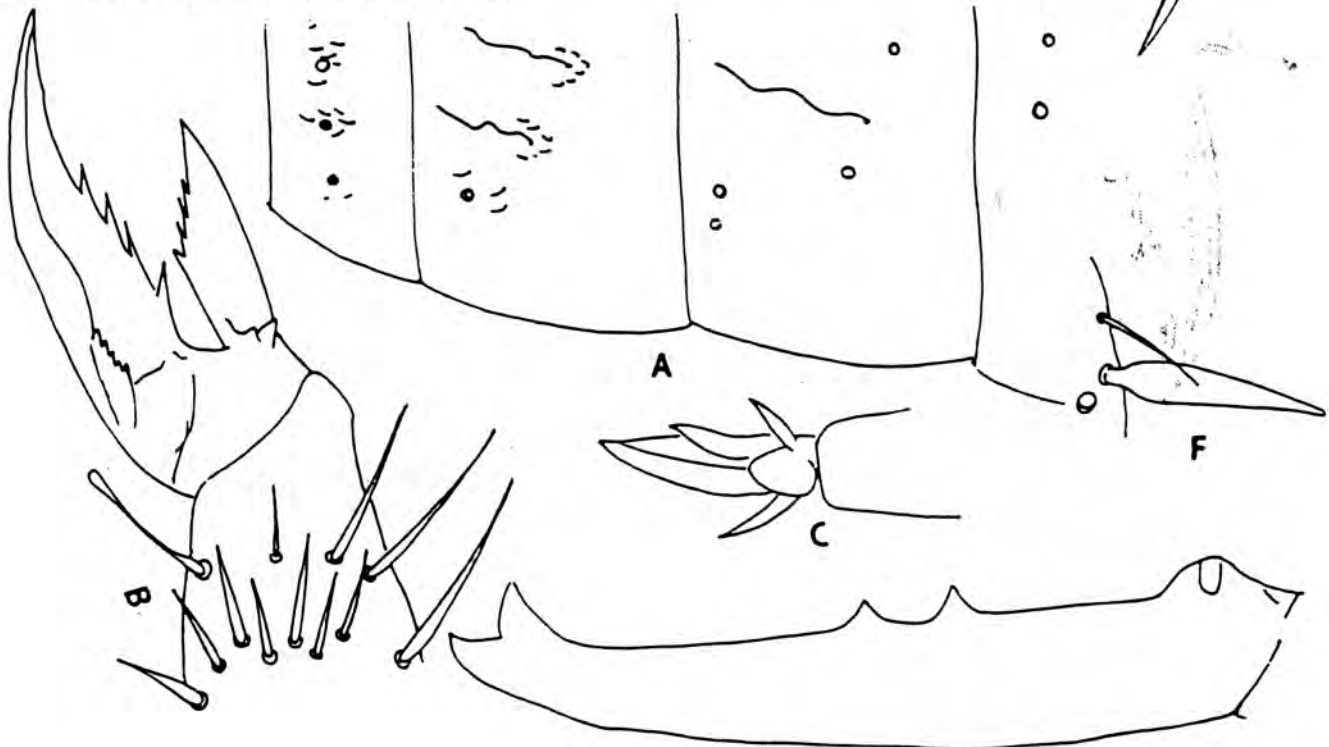
B) Fore foot complex.

C) Mid foot complex, showing pseudonychia.

D) Mucro.

E) Dental spines, seen from above; one lateral spinelike seta missing.

F) Lateral spine-like seta of dens.



Refs.: Collembola of Iowa:84; Christiansen, 1965; Yosii, 1967.

Description

Color: background off-white with scattered blue to blue-gray pigment covering entire body except for intersegmental membranes; pigment heaviest on anterior thorax and lateral and anterior portions of head; some specimens are unpigmented except for these regions and the antennae. Eye patches trapezoidal to triangular. Hind tibiotarsus only with a medial elongate seta which is not heavy or spine-like on the inner surface. Dentes without inner spine-like scale or outer spine-like setae. Dental spines smooth. Bothriotrichia without, macrochaetae with 0-1 basal microsetae. Maximum length 2.0 mm.

Remarks

The peculiar mucro and small size clearly distinguish this species from all Nearctic congeners. Most specimens may also be recognized by their dusty blue or blue-gray color.

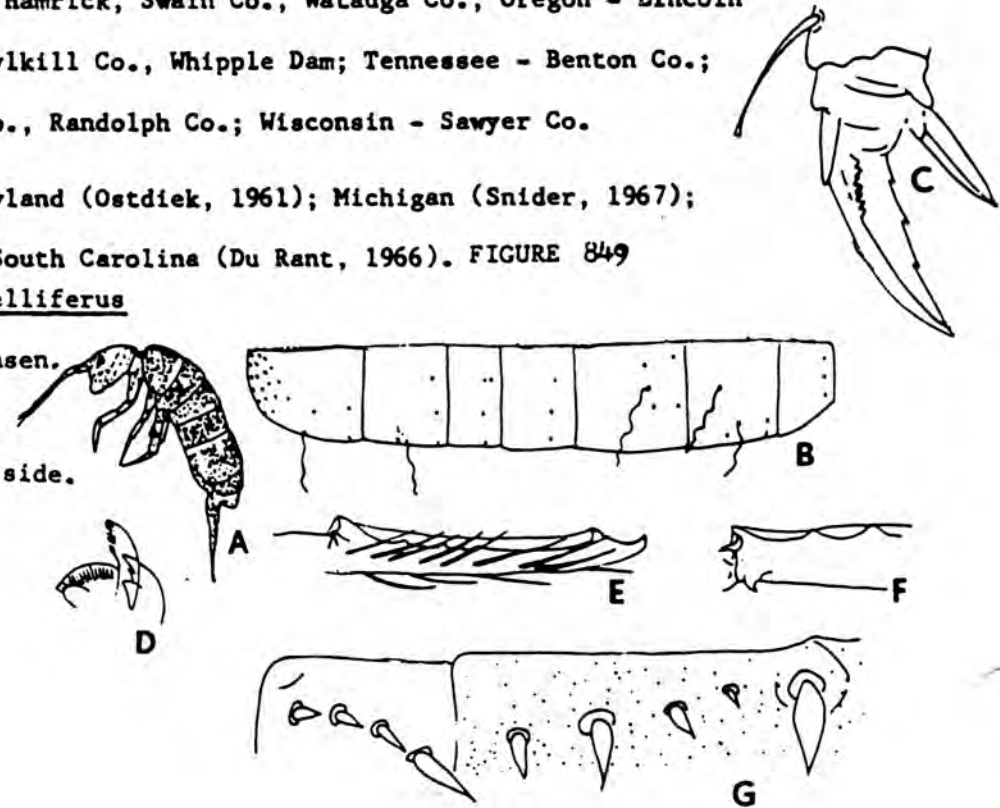
Localities: Alabama - Madison Co. (cave); Colorado - Mineral Co.; Florida - Alachua Co. ; Illinois - Adams Co., Alexander Co., Champaign Co., Johnson Co., Lake Co., Marshall Co., Union Co., Washington Co.; Iowa - Poweshiek Co., Story Co., Tama Co., Wapello Co. (type); Kentucky - Crail Hope, Edmonson Co., Lee Co. (cave); Montana - Essex; New Mexico - Eddy Co. (cave); North Carolina - Buncombe Co., Hamrick, Swain Co., Watauga Co.; Oregon - Lincoln Co.; Pennsylvania - Schuylkill Co., Whipple Dam; Tennessee - Benton Co.; West Virginia - Mercer Co., Randolph Co.; Wisconsin - Sawyer Co.

Additional records: Maryland (Ostdiek, 1961); Michigan (Snider, 1967); Missouri (Dowdy, 1965); South Carolina (Du Rant, 1966). FIGURE 849

Tomocerus (Tomocerina) lamelliferus

All figures after Christiansen.

- A) Habitus.
- B) Chaetotaxy of left side.
- C) Hind foot complex.
- D) Maxilla.
- E) Mucro.
- F) Base of mucro.
- G) Dental spines.



Tomocerus (Tomocerus) minor (Lubbock), 1862

Fig. 850

Refs.: Trans. Linn. Soc. 23:598 (Macrotoma); Christiansen, 1965.Syn.: tridentifera Tullberg, 1872 (Macrotoma), K. svenska VetenskAkad.

Handl. 10(10):37.

## Description

Color: background bluish black with numerous pale areas, particularly pronounced on thorax; when scales are present the animals appear uniformly blue-black or lead-colored. Eye patches prominent and triangular. Tibiotarsi with 2 rows of inner, large, heavy, ciliate or striate setae, 3-4 in anterior and 3 in posterior row. Inner base of dens with a heavy, variable but not spine like differentiated heavy scale. Dental spines with lateral teeth, normally triradiate. Bothriotrichia without, macrochaetae with 1-4 basal microsetae. Maximum length 6.0 mm.

## Remarks

This species is one of the easiest to identify, due to the unique serrate dental spines.

Localities: we have seen collections from the east coast, from Nova Scotia to New York. Most records are from port cities or from greenhouses, and it is questionable whether this species has become an established part of the Nearctic fauna.

Additional records: California (Wilkey, 1959); Indiana (Arnett, 1969); Michigan (Snider, 1967); Washington (Mills & Rolfs, 1933). Ontario (James, 1933).

Biology: Christiansen, 1967, 1970.

A) Habitus, after Maynard. Tomocerus (Tomocerus) minor

B) Chaetotaxy of left side of body, after C. & B.

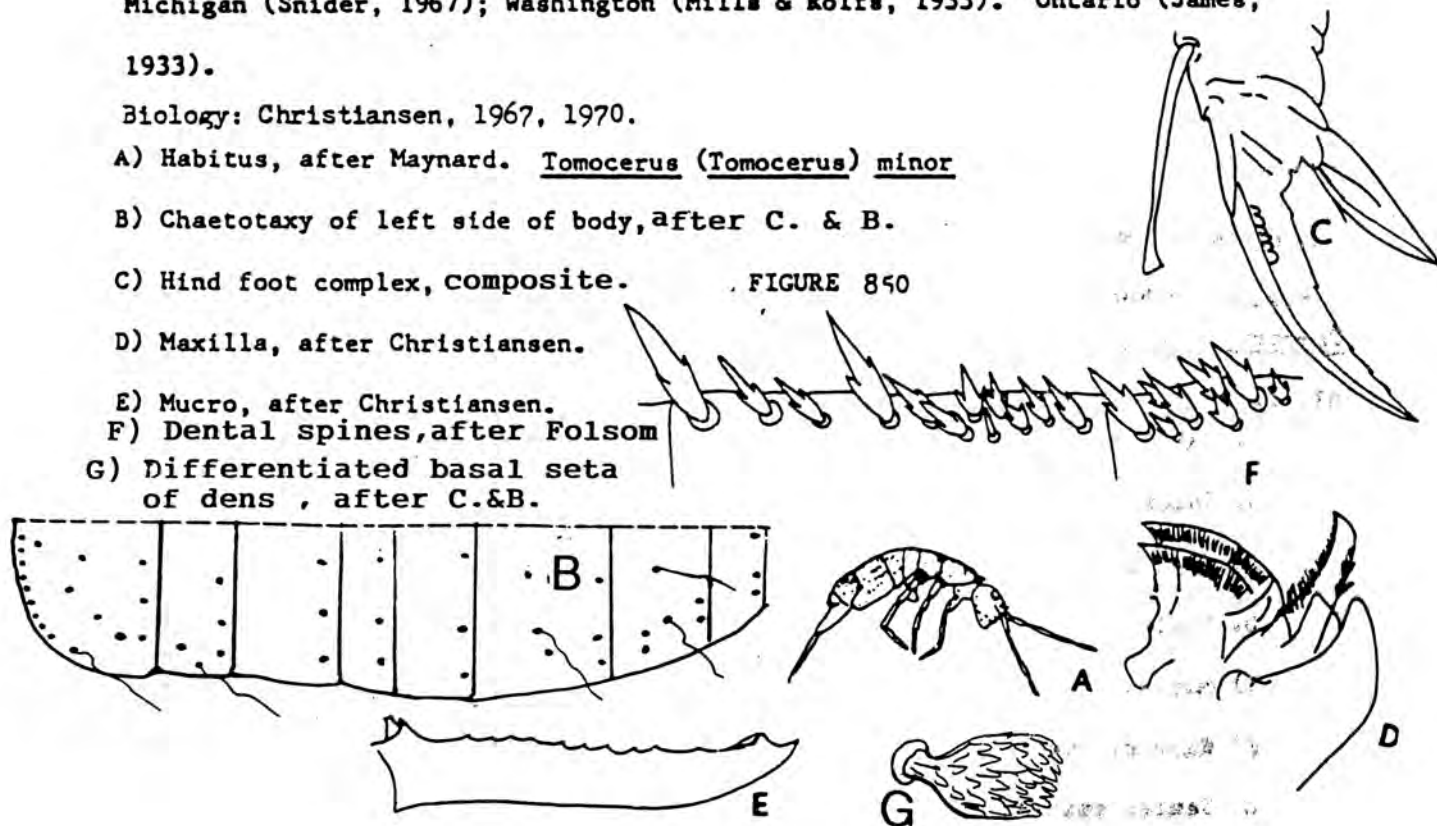
C) Hind foot complex, composite. FIGURE 850

D) Maxilla, after Christiansen.

E) Mucro, after Christiansen.

F) Dental spines, after Folsom

G) Differentiated basal seta of dens, after C.&B.



Refs.: Ann. ent. Soc. Am. 41:356; Christiansen, 1965; Yosii, 1967, 1970.

Description

Color: in alcohol, totally white or with scattered blue pigment granules.

Eyes completely absent. Hind tibiotarsus only with inner spine-like seta, shorter and more conical than in other species. Dentes with-

out inner spine-like scale or outer spine-like setae. Dental spines finely striate; only distalmost spine strikingly larger than remainder; 1-2 secondary

spines are often situated lateral to 1 spine of the series on the basal dental subsegment. Bothriotrichia with a semicircle of 9 microsetae around base;

macrochaetae with 0-5 such microsetae. Maximum length 3.0 mm.

Remarks

This subgenus appears to be a complex of closely related cave species. In addition to those listed below we now have specimens from caves in Arizona, Colorado and Indiana. Those from each region show some unique features but their overall similarity is so great that we feel further study will be required to determine whether there is a single geographically variable species or a series of separate species.

Localities (known only from caves): Illinois - Jersey Co. (type), Monroe Co.;

Kentucky - Livingston Co.; Missouri - Jefferson Co., Perry Co., Saint

Genevieve Co.

Tomocerus (Lethemurus) missus

A) Habitus, after Christiansen.

B) Chaetotaxy of left side of second thoracic segment through fourth abdominal segment, after Christiansen.

C) Chaetotaxy of left side of body, after Yosii.

D) Hind foot complex, after Christiansen

E) Hind foot complex, after Yosii.

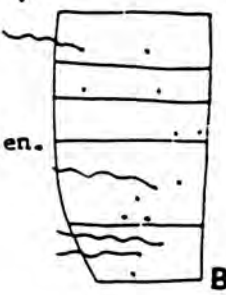
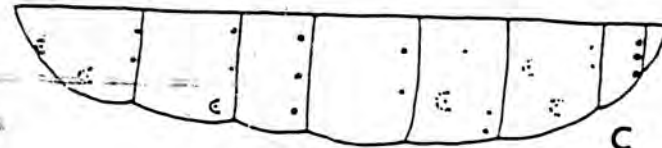
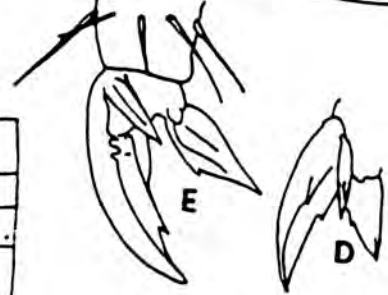
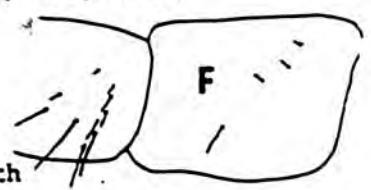
F) Trochanteral organ, after Yosii.

G) Maxilla, after Christiansen.

H) Mucro, after Christiansen.

I) Position of dental spines, after Christiansen.

J) Dental spines, after Yosii.





Refs.: Ann. ent. Soc. Am. 41:353 (Tomolonus); Christiansen, 1965; Yosii, 1967.

## Description

Color: in alcohol, background white to pale yellow with faint scattering of blue pigment over tergites and head. Eyespots small and triangular. Small postantennal organ present in young and some but not all adult specimens. Hind tibiotarsus only with 1-2 prominent setae on internal surface. Dens without internal spine-like scale but with 2 external spine-like setae. Dental spines smooth. Bothriotrichia with a circlet of 3-5 microsetae around base; macrochaetae with 2-4 such setae. Maximum length 2.5 mm.

## Remarks

This species shows resemblances to both lamelliferus and teres, but differs from both in eye number and the absence of a continuous mucronal lamella. We did not see a postantennal organ on the largest specimens, and this may be a juvenile organ as in a number of other species of the genus.

Localities: California - Alameda Co., Amador Co., Contra Costa Co., Monterey Co. (type); Mississippi - Harrison Co.; Oregon - Benton Co., Lincoln Co.

Tomocerus (Tomolonus) reductus

A) Habitus, after Yosii.

B) Chaetotaxy of left side of body, after Christiansen.

C) Hind foot complex, after Christiansen.

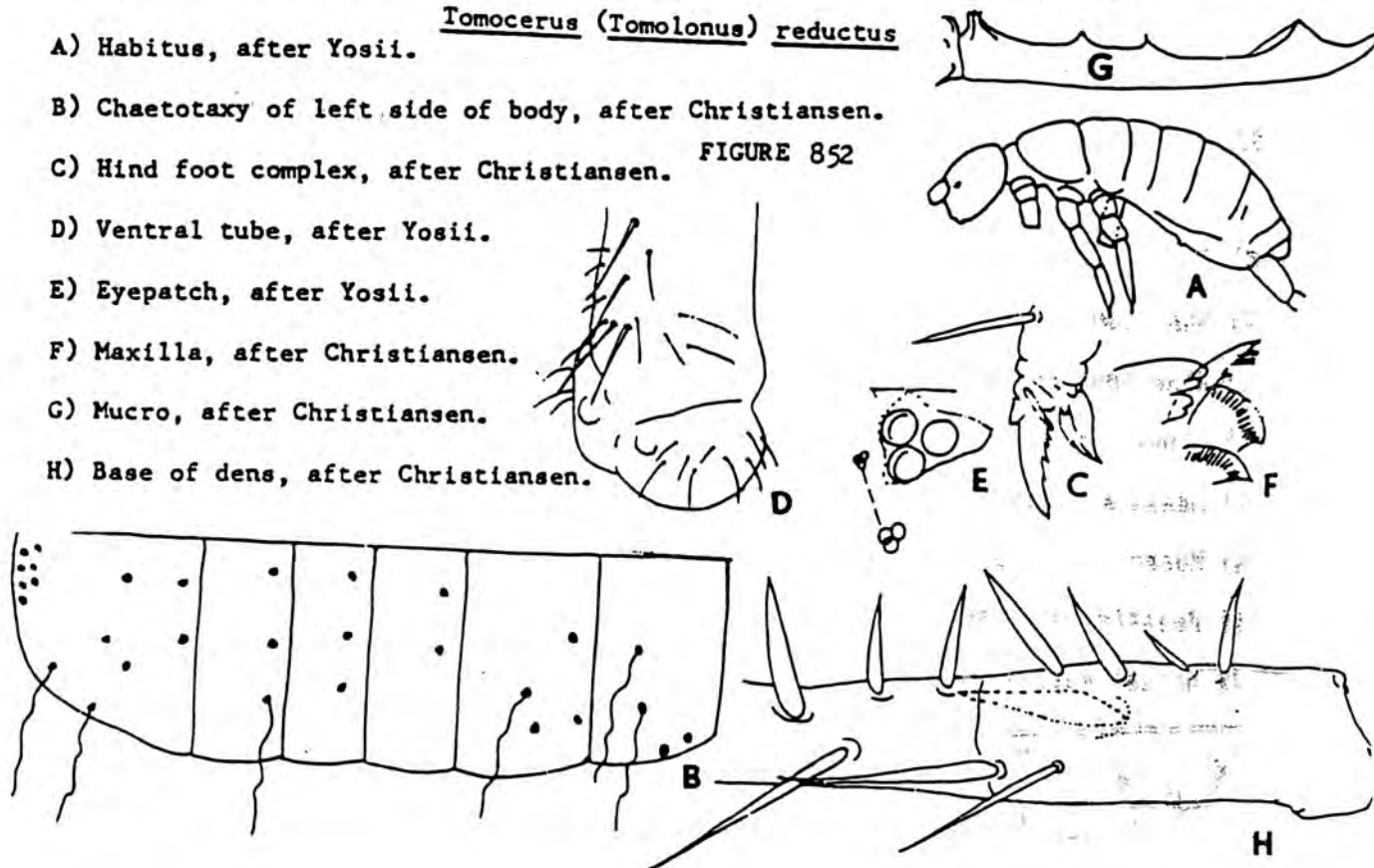
D) Ventral tube, after Yosii.

E) Eyepatch, after Yosii.

F) Maxilla, after Christiansen.

G) Mucro, after Christiansen.

H) Base of dens, after Christiansen.





Refs.: Revue Ecol. Biol. Sol 1:653; Yosii, 1967.

Description

Color: background in alcohol yellowish orange with heavy dark pigment scattered over tergites, legs, head, and antennae; pigment very irregular, more concentrated along lateral margins of segments and with numerous oval or round pale spots. Eye patches broadly triangular, with 2+2 eyes having well-developed corneas and 4+4 vestigial eyes lacking clear corneas. Hind tibiotarsus with 1 enlarged seta, only slightly longer than normal setae, on inner surface. Dentes without inner spine-like scale or outer spine-like setae. Dental spines smooth apically and granulate basally. Maximum length 1.8 mm.

Remarks

This distinctive species is easily separated from its Nearctic congeners by the unique mucro.

Localities: California - Del Norte Co. (type).

Tomocerus (Tomocerina) teres

A) Habitus.

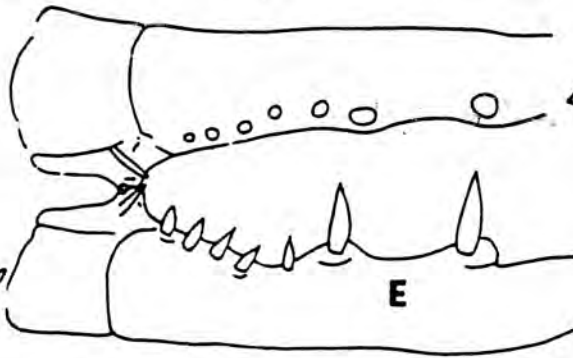
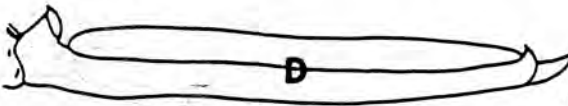
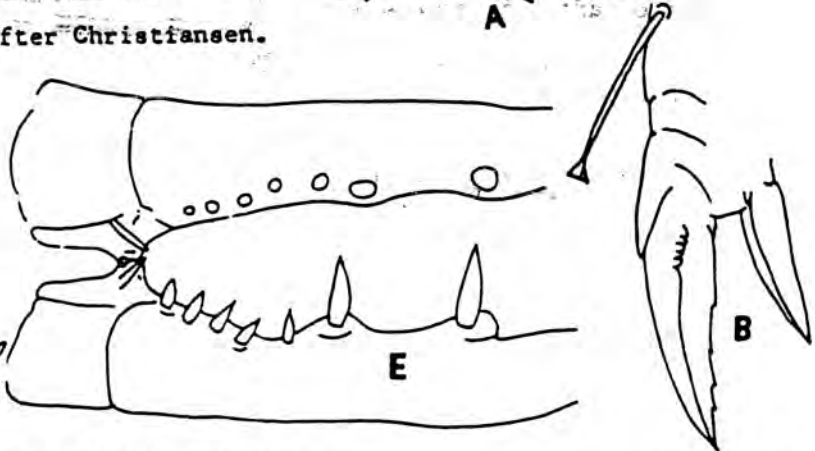
All figures after Christiansen.

B) Hind foot complex.

C) Maxilla. FIGURE 853

D) Mucro.

E) Dentes, seen from above.



Tomocerus (Tomocerus) vulgaris (Tullberg), 1871

Refs.: Öfvers. K. VetenskAkad. Förhandl. 28:149; Christiansen, 1965.

Description

Color: in alcohol, background gray to dull white; scales lead-colored to very dark purple. Eye patches trapezoidal. 4 (rarely 5) blunt spine-like setae on inner surface of all tibiotarsi. Dens without inner spine-like scale or outer spine-like setae. Dental spines finely striate. Bothriotrichia and macrochaetae lack basal microsetae or have only 1; rarely the posterior macrochaeta may have 2-3 microsetae. Maximum length 6.0 mm.

While adults are relatively constant in most respects, there is considerable variation in mucronal teeth and in the shape of the dental spines; some specimens, particularly on the West coast, have these spines short, heavy, and almost oval, while others have long conical spines. The coloration in intact, scaled specimens is dark, often black; pigment under the scales is scarce and uniformly distributed.

Localities: we have seen specimens from most parts of the United States from Missouri and Tennessee north, and from southern and eastern Canada and Alaska.

Cave records are rare.

Additional record: Louisiana (Hepburn & Woodring, 1963).

Tomocerus (Tomocerus) vulgaris

A) Habitus, after Maynard.

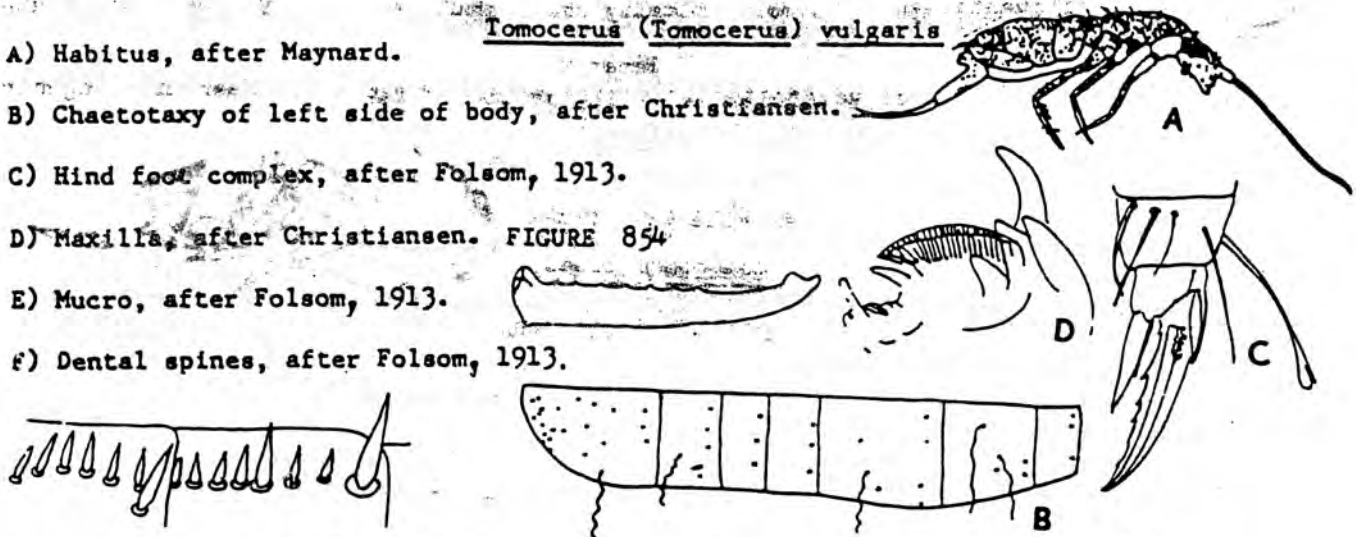
B) Chaetotaxy of left side of body, after Christiansen.

C) Hind foot complex, after Folsom, 1913.

D) Maxilla, after Christiansen. FIGURE 854

E) Mucro, after Folsom, 1913.

F) Dental spines, after Folsom, 1913.



Tomocerus (Plutomurus) wilkeyi Christiansen, 1965

Fig. 855

Refs.: Revue Ecol. Biol. Sol 1:659; Yosii, 1967

Description

Color: in alcohol, gray to dark blue with dark triangular eyespots and blue antennae. Hind tibiotarsus only with 1 long, heavy spine-like seta on inner surface, and sometimes with a second much shorter and more distal spine-like seta. Dens without internal spine-like scales; with 2-4 (usually 3) external spine-like setae. Dental spines smooth. Both bothriotrichia and macrochaetae with semicircle of 4-9 microsetae around base. Maximum length 4.0 mm.

Remarks

This species is closely related to brevimucronatus, but most specimens may easily be distinguished by the following characters:

Basal mucronal teeth paired.

Basal mucronal tooth single and displaced toward apex.

Tenent hair strongly clavate.

Tenent hair weakly clavate or pointed.

3-4 inner unguis teeth.

Usually 1-2 inner unguis teeth.

The intermediate mucronal teeth vary greatly, with the following numbers found in a scattered sample of adults:

Number of intermediate teeth	1	2	3	4	5
Specimens	5	5	3	1	2

Localities: Arizona - Cochise Co. (cave), Coconino Co.; California - Calaveras Co. (cave), Del Norte Co., El Dorado Co., Plumas Co. (cave) (type), Tulare Co.; Idaho - Pierce Co.; Oregon - Benton Co., Lincoln Co.; Utah - Utah Co. (cave).

Tomocerus (Plutomurus) wilkeyi

A) Chaetotaxy of left side of body, after Christiansen.

B) Hind foot complex, after Yosii.

C) Trochanteral organ, after Yosii.

D) Maxilla, after Christiansen.

E) Mucro, after Yosii.

F) Mucro, after Christiansen.

G) Base of dens, after Christiansen.

H) Different view of base of base of dens, after Christiansen.

