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Studies on neotropical Collembola, I Some Collembola from Guatemala

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ABSTRACT

Eight species of Collembola are recorded from an ant nest in Guatemala. Two species, described by Denis (1931a) from Costa Rica are redescribed more extensively. A new species of *Pseudosinella* is described.

In this paper a small collection of Collembola from Guatemala, Cuyotenango (Prov. Suchitepequez), sent to me by my friend K. G. Eveleens, is described. Drs. Eveleens and his colleague Dr. J. M. Campbell tried to dig up an *Atta*-nest, a vain effort, as they had to give up at a depth of 9 feet. At 6 to 8 feet they found a large detritus cavity, the contents of which was extracted by Mr. Campbell by means of a Berlese-funnel. The collecting date is January 21st, 1966. My collection number is 966001.

Among the material are two quite common species, viz., *Mesaphorura krausbaueri* and *Isotomiella minor*, as well as two new species, one of which, a *Ceratophysella*, will be described in a subsequent paper. Moreover, the material is of particular interest as it enables me to give some additional observations on two Costa Rican species described by Denis (1931a, 1933).

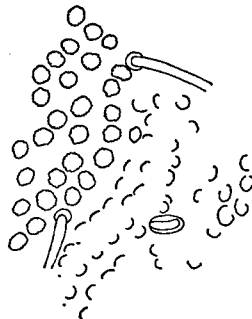
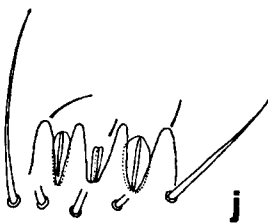
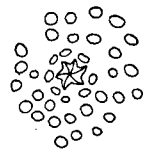
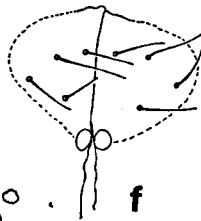
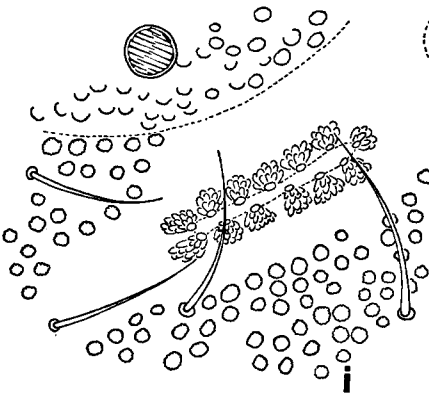
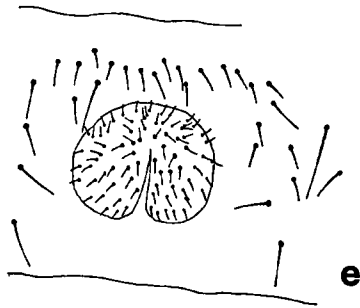
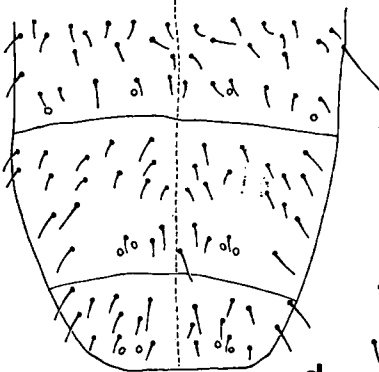
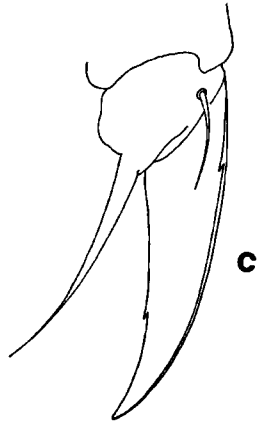
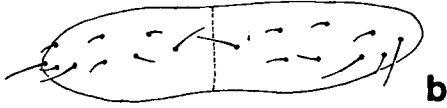
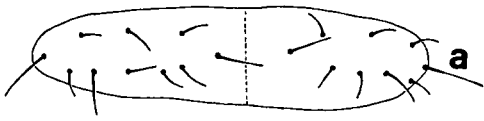
I am very much indebted to Messrs Campbell and Eveleens for entrusting me their material for study.

***Onychiurus* (O.) *subcadaverinus* Denis, 1931. Fig. 1.**

Denis (1931a) in his excellent study on the Collembola of Costa Rica described this species rather briefly and only in comparison with *O. cadaverinus* Handschin, 1920. In 1933 he gave a more elaborate description, and established a rather great variability in the arrangement of the pseudocelli.

In the present material this variability is absent, probably because of the fact that the specimens came from one single locality.

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As Denis gave neither a description of the male ventral organ, nor any figures, I let follow a more detailed description.

Total length. Ca. 1.5 mm.

Colour. Totally white.

Postantennal organ. 13—15 “compound” vesicles (fig. 1 i).

Antennal organ. Four very finely rugose tubercles, with four guarding setae, two normal sense rods and two smooth claviform sense cones (fig. 1 j).

Dorsal pseudocelli. 32/033/33332.

Ventral pseudocelli. 2/- - -/1111. The pseudocelli on abd. I—III are ventro-lateral in position, whereas the pair on abd. IV is located paramedially.

Subcoxae. All subcoxae with two pseudocelli.

Thoracal sensillae. Th. II and III bearing laterally, just above the ventralmost setae on the inferior margin of the tergite, a minute sensilla. This sensilla is rod-shaped and situated in a small groove (fig. 1 k). These sensillae are rather difficult to observe, since the integument is often folded in this region owing to compression of the specimen by the cover-glass. I could not observe such a sensilla on th. I, and believe that it is absent there.

These sensillae are not specific. I found the same organs in specimens of the related *Onychiurus (D.) silvarius* Gisin, 1952, from a Dutch marl-quarry (named “Sibbergroeve”). They were also present in material of *O. (Protaphorura) quadriocellatus* Gisin, 1947, from the Dutch locality Bergen (prov. of North Holland), as well as in the even less related *Mesaphorura krausbaueri* Börner, 1901. In two randomly chosen representatives of the family Hypogastruridae, viz., *Ceratophysella scotica* (Carpenter & Evans, 1899) (Netherlands, Het Hol) and *Hypogastrura viatica* (Tullberg, 1872) (Spitzbergen, Cape Boheman), I could locate similar sensillae. In these two species they were observed with certainty only on the inferior margin of the tergite of th. II, although there may be a vestige of them on th. III as well, but smaller than a skin granule.

Claw. The unguis bears lateral teeth. A ventral tooth is present, but often minute and visible with oil-immersion only. Unguiculus without inner lamella, extended into a hair which approximately equals the unguis in length (fig. 1 c).

Chaetotaxy. Composed of normal hairs and somewhat larger, blunt setae. Chaetotaxy of abd. V—VI as in fig. 1 d. The chaetotaxy of th. I is variable (fig. 1 a, b).

Male genital papilla. Normal, densely covered with fine setulae with proportionally large hair-rings.

FIG. 1. *Onychiurus (O.) subcadaverinus* Denis, a, dorsal chaetotaxy of th. I; b, the same of another specimen; c, claw; d, dorsal chaetotaxy and pseudocelli of abd. IV—VI; e, male genital papilla; f, labial chaetotaxy; g, modified seta of the male ventral organ; h, the same, seen from above; i, postantennal organ; j, ant. org. III; k, thoracal sensilla.

Ventral organ of male. 2 + 2 setae at the posterior margin of abd. II are modified. However, in certainly adult specimens, with a completely developed genital papilla, the rate of this modification is quite unequal. Sometimes these hairs are just somewhat thickened setae of normal length, but generally they are more strongly modified, as their surface becomes provided with six strong, slightly spiralled ridges. In some specimens these modified hairs are moreover much shorter, thereby assuming the shape of a short spine. Seen from above these spines give the impression of six-pointed stars (fig. 1 g, h).

Ventral tube. Number of hairs very variable: the number on one side may vary between 2 and 9. Moreover, the number on one side may differ greatly from that on the other side.

Material. Very numerous specimens, about twice as many females as males.

Mesaphorura krausbaueri Börner, 1901. Fig. 2.

Syn.: *Tullbergia iowensis* Mills, 1932
Mesaphorura iowensis, Bonet, 1944

The two specimens of this species in the present material agree completely with the Dutch material in my collection. These specimens differ from the description and drawings in Stach's monograph (1954) in the following minor details. The sensory hairs of ant. IV are slightly different in shape (fig. 2 f), the protectory fold in front of ant. org. III has a thickened margin (fig. 2 a) and the accessory sensory hair on ant. III is somewhat longer and curved (fig. 2 g, h).

The dorsal chaetotaxy varies in the position of the anterior row of hairs: there may be 1 + 1 seta in a more medial position than the median-most setae of the posterior row, as Stach figured, but this number may also be 2 + 2 (fig. 2 d).

On the sides of th. II and III the same sensillae in a groove, as are described in *Onychiurus (O.) subcadaverinus*, are found (fig. 2 c).

Mesaphorura krausbaueri has already been recorded by Rapoport & Rubio (1963) from Chili. The var. *bonariensis* Rapoport, 1959, from Argentina does not seem justified to me. The variety has been established on account of the different shape of the postantennal organ and the lower number of olfactory hairs on ant. IV. Neither character seems very convincing.

Xenylla welchi Folsom, 1916

One adult male, which agrees completely with the elaborate description by Stach (1949). The specimen measured 0.55 mm.

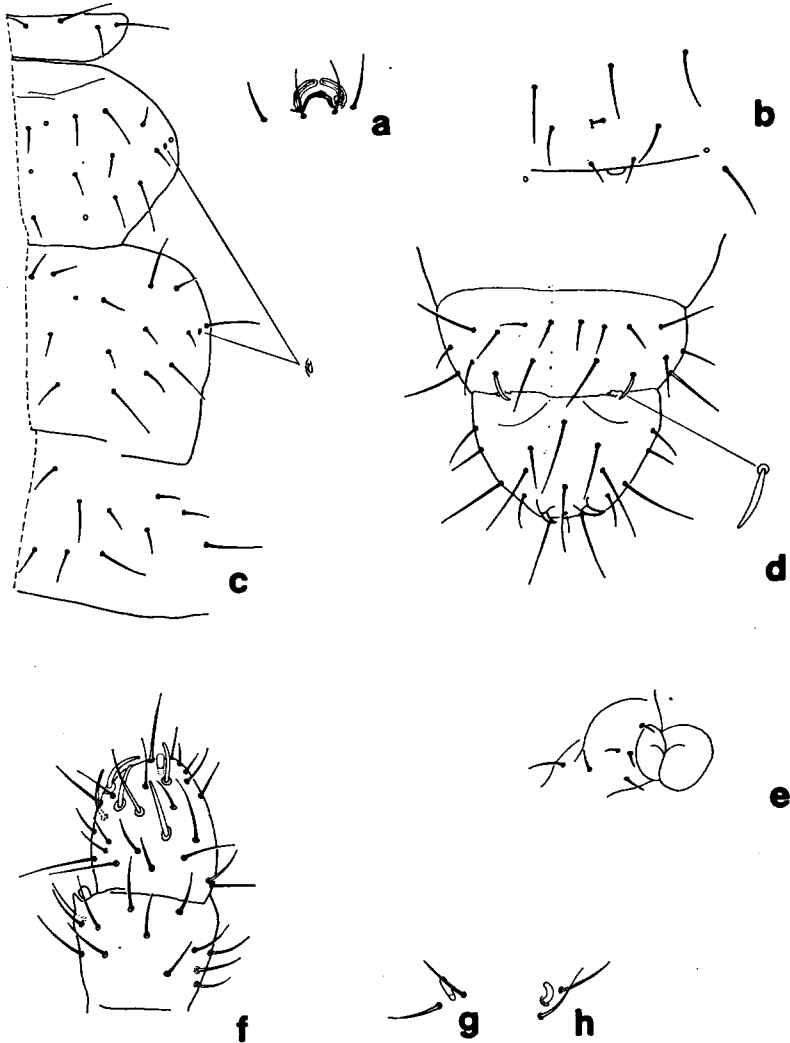


FIG. 2. *Mesaphorura krausbaueri* Börner. a, ant. org. III; b, female genital aperture; c, dorsal chaetotaxy of th. I—abd. I; d, dorsal chaetotaxy of abd. V—VI; e, ventral tube; f, ant. III—IV; g, h, accessory sensory club on ant. III.

***Arlesia albipes* (Folsom, 1927)**

One adult female, measuring 1.75 mm. The specimen has been treated with $\text{KClO}_3\text{—HCl}$ for depigmentation. This species was recorded from Surinam by Massoud (1963).

***Folsomides americanus* Denis, 1931. Fig. 3.**

This species was very accurately described by Denis (1931a). He mentioned

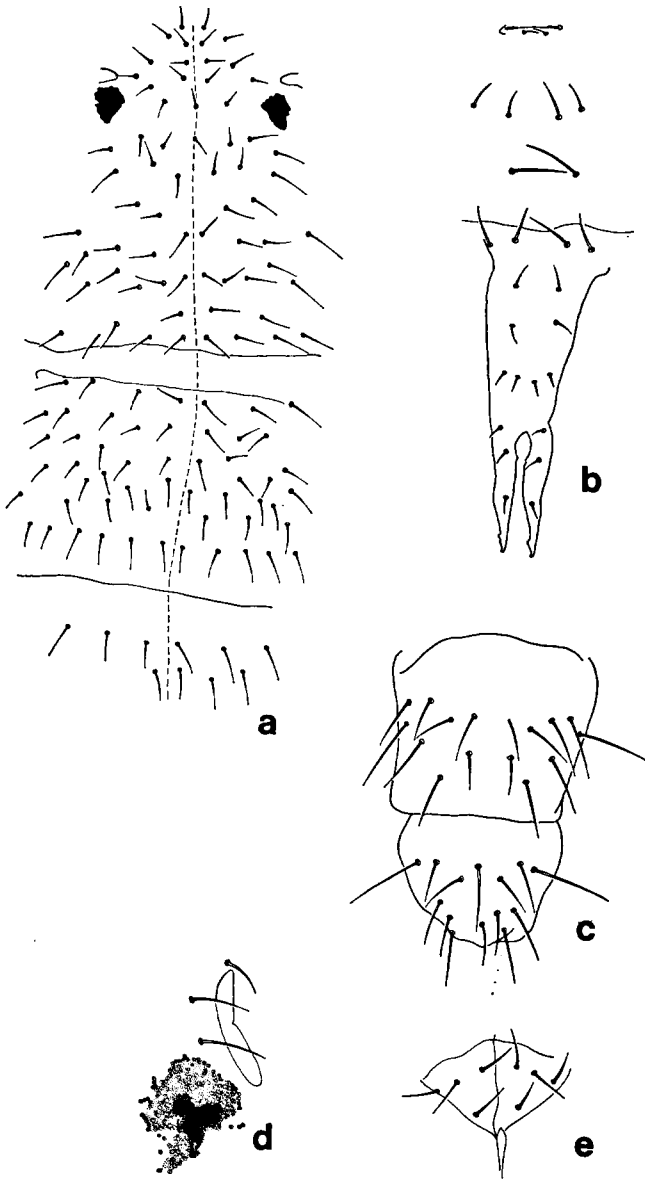


FIG. 3. *Folsomides americanus* Denis. a, dorsal chaetotaxy of head and th. II—III; b, posterior view of furca and female genital aperture; c, dorsal chaetotaxy of abd. V—VI; d, eye-patch and postantennal organ; e, labial chaetotaxy.

one omma, with a mass of pigment more posteriorly. In the only adult specimen available the situation is more simple. Only an accumulation of pigment was found, where a lens could be guessed.

Additional drawings are given of the dorsal chaetotaxy of the head and th. II (fig. 3 a), abd. V—VI (fig. 3 c), the furca (fig. 3 b), the labium (fig. 3 e) and the eye-patch with the postantennal organ (fig. 3 d).

The material contained a single adult female, 0.60 mm in length, and a juvenile specimen.

Rapoport (1962b) recorded this species from Argentina.

***Isotomiella minor* (Schäffer, 1896)**

Two specimens, which are quite indistinguishable from Dutch material. Rapoport (1962a) recorded this species from Argentina.

***Lepidocyrtus mutabilis* Denis, 1931. Figs. 4—5.**

Since the species of the *Lepidocyrtus*-complex badly need a revision (already initiated by Yosii, Gisin and others), a detailed description of this species follows here.

Maximum length. 1.31 mm.

Measurements. Length of th. II, abd. III and abd. IV of the largest specimen: 190 μ , 110 μ , 306 μ . Relative length of antennal segments (total length of antenna fixed = 100) I : II : III : IV = 15 : 21 : 21 : 43.

Pigmentation. Bluish pigment granules extremely sparsely dispersed all over the body. Antenna somewhat more intensely coloured, especially apically. Eye-patch black.

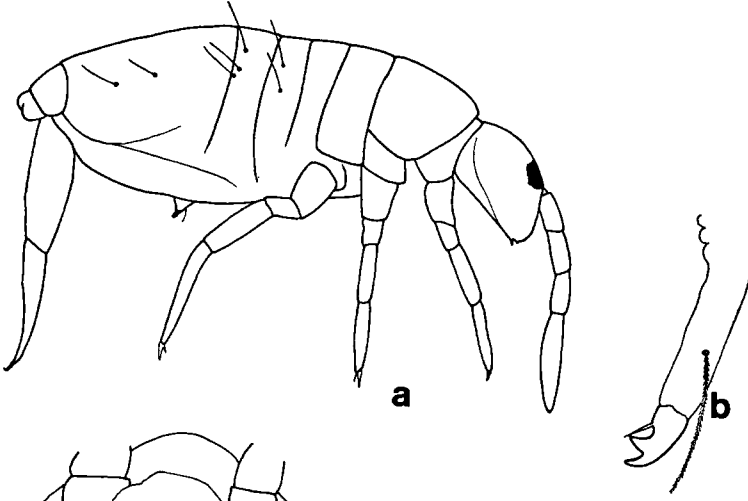
Habitus. Rather stout, although not as conspicuously as in the figure 4 a — this is owing to the compression of the specimen by the cover-glass. The antennae are somewhat longer than figured by Denis (1931a).

Chaetotaxy of body. 2 ÷ 2 strong, flexed, ciliated setae on abd. IV. One pair, situated rather posteriorly on the segment, lies in a transverse line with the pseudopores. The second pair is situated about half-way the segment, just in front of the posterior pair. Apart from the flexed setae there is a great number of fine smooth hairs. The body is densely covered with scales. The bases of the lasiotrichia, with their accompanying scales, are figured in fig. 4 f and 5 g. The anterior lasiotrichium on abd. IV has its base accompanied by 3 accessory scales ("s" in the nomenclature of Gisin, 1964, being absent).

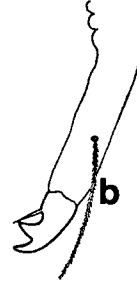
Pseudopores. One pair of pseudopores dorsally on each body segment. The pair on abd. IV is situated rather near the posterior margin of this segment. Moreover, th. I and th. III each have a pair of pseudopores ventrally, near the linea ventralis. In all specimens the sternites of th. II were hidden by the coxae, which made observation of pseudopores impossible. One more pair of pseudopores is situated near the base of the antennae (fig. 5 b).

Retinaculum. As usual in the group, quadridentate with a basal hair.

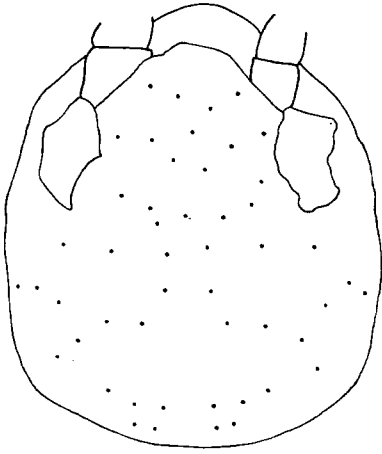
Ventral tube. Distal part (collar) laterally with 7 to 10 small, smooth



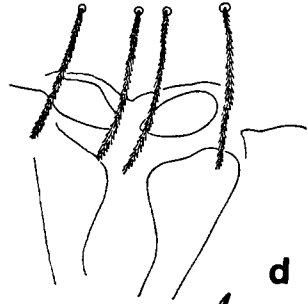
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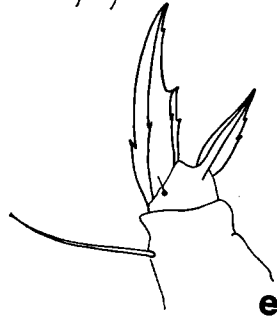
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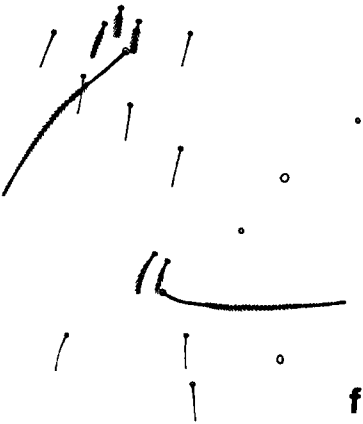
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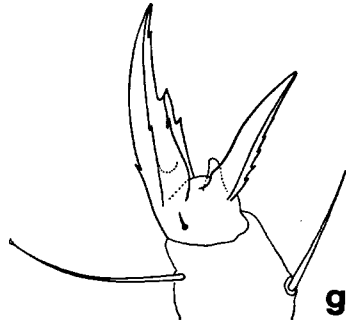
d



e



f



g

hairs, posteriorly with 1 + 1 a little larger, similarly smooth hairs. Basal part anteriorly with 10 to 17 flexed, ciliated setae, the distalmost being the strongest. Basal part posteriorly with 2 + 2 flexed ciliated setae.

Dorsal chaetotaxy of head. Cf. fig. 4 c.

Ventral chaetotaxy of head. Head ventrally with scales and ciliated hairs. Along the ventral groove 5 + 5 setae.

Labial chaetotaxy. All setae smooth and simple, except the hair "r" in the nomenclature of Gisin (1964), which is a small spine (fig. 5 c).

Labral margin. Smooth, without papillae.

Ocelli. 8 + 8 (fig. 5 b).

Antennae. Neither subdivided nor annulated, without scales. Ant. IV with apical papilla. Ant. org. III two small parallel rods.

Feet. Chaetotaxy of coxal region as illustrated in fig. 5 d. The feet are completely devoid of scales. All setae are ciliated, except the opposite seta of P_3 . Trochanteral organ of P_3 consisting of 10 small setulae (fig. 5 a). Unguiculus with a distinctly serrate outer lamella, not truncate. Unguis with dorsal and lateral teeth. Ventral distal unpaired tooth of unguis small, sometimes visible only under oil-immersion. Ventral proximal unpaired tooth strong, variable in position. Ventral paired teeth distinct. Tenent hair smooth, very faintly clavate (fig. 4 e, g).

Furca. Anterior face of manubrium and dentes with scales. Manubrium posteriorly and dentes laterally with ciliated, rather strong setae. Manubrium with 2 + 2 strong ciliated hairs distally on its posterior face (fig. 4 d). Dens without basal appendage. The distal, not annulated part of the dens (for which I propose the name submucro) bears setae. Mucro bidentate with basal spine.

Scales. Hyaline, rounded, with minute striation.

Material. 10 specimens.

Apart from some differences, such as feebler pigmentation, longer antennae and less developed dilatation of tenent hairs, which in my opinion are of minor importance, my material matches the description by Denis (1931a) very well. The main character seems to be the strong development of the proximo-internal paired teeth of the unguis.

None of my specimens agrees with *L. exaggeratus* Denis, 1931, which may well be a good species.

Lepidocyrtus mutabilis differs in three rather essential points from the type-species of the genus, *Lepidocyrtus curvicollis* Bourlet, 1839. None of the central labial setae is ciliated. The pair of pseudopores on the tergite of abd. IV is situated in a quite posterior position. Ant. IV has an apical papilla.

FIG. 4. *Lepidocyrtus mutabilis* Denis. a, habitus; b, submucro and mucro (somewhat diagrammatical: the submucro bears more hairs); c, dorsal chaetotaxy of head; d, posterior view of manubrium — dens junction; e, claw P_1 ; f, lasiotrichia and accompanying scales of abd. IV; g, claw P_3 .

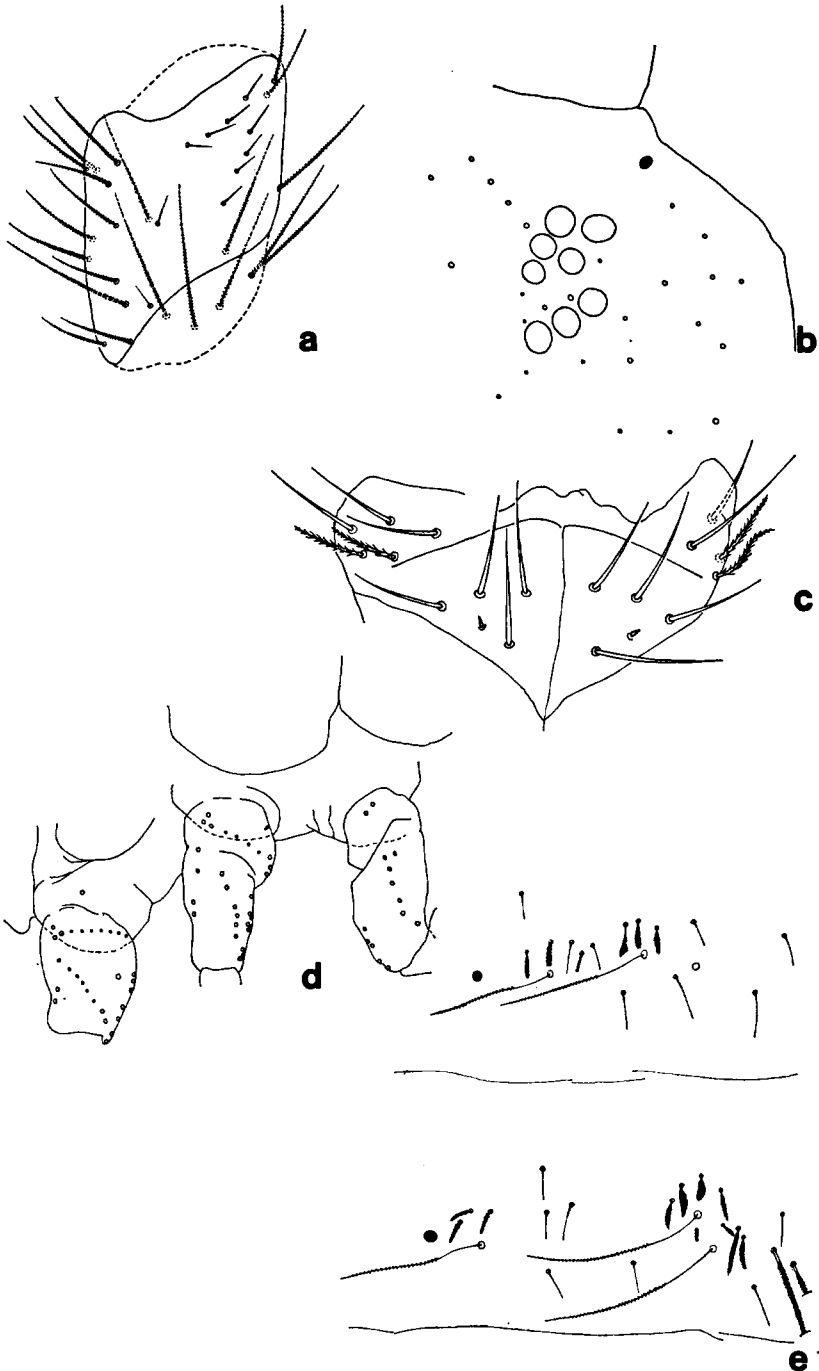


FIG. 5. *Lepidocyrtus mutabilis* Denis. a, trochanteral organ of P_3 ; b, eyes; c, labial chaetotaxy; d, chaetotaxy of coxal region; e, lasiotrichia and accompanying scales of abd. II (above) and abd. III.

***Pseudosinella biunguiculata* n. sp. Figs. 6—7.**

Length. 0.71 mm.

Measurements. Length of th. II, abd. III and abd. IV : 131 μ , 50 μ , 212 μ . Relative length of antennal segments (total length of antenna fixed = 100) I : II : III : IV = 16 : 25 : 21 : 38. All measurements after the holotype.

Pigmentation. Totally absent.

Habitus. Small (fig. 6 a).

Chaetotaxy of body. Reduced to one pair of strong hairs on the posterior part of abd. IV. This pair of macrochaetae lies in a transverse row with the pair of pseudopores on that segment. Moreover, abd. IV bears latero-dorsally a longitudinal row of three macrochaetae. The lasiotrichia and accompanying scales are illustrated in figs. 6 g and 7 j.

Pseudopores. One pair dorsally on each segment. Moreover one pair near the base of antenna, and ventrally one pair at least, on th. III, near the linea ventralis.

Retinaculum. As usual, quadridentate, with a basal strong hair.

Ventral tube. "Collar" laterally with 5 + 5 smooth setae, posteriorly with 2 + 2 somewhat stronger, similarly smooth setae. Basal part anteriorly with 4 + 4 strong, ciliated hairs, arranged in two transverse rows, one about half-way, a second more distad. Basal part posteriorly devoid of setae.

Dorsal chaetotaxy of head. Composed of small setae. Anteriorly a row of stronger ciliated setae (fig. 6 e).

Ventral chaetotaxy of head. Not well studied, at each side of the ventral groove there are 3 + 3 strong, ciliated setae.

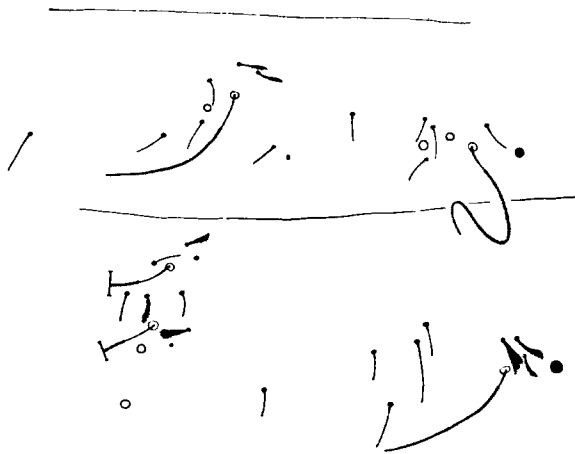
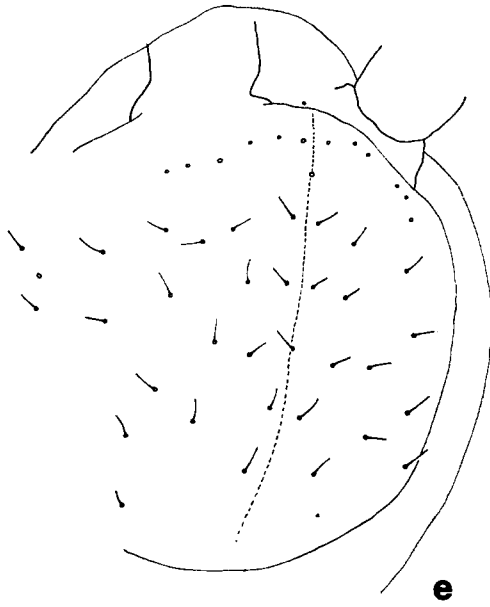
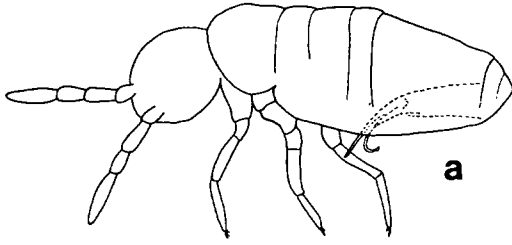
Ocelli. Absent.

Labial chaetotaxy. Cf. fig. 7 e.

Labral margin. Not quite straight, but provided with two oval slight protuberances (fig. 7 d).

Antennae. Neither subdivided nor annulated, devoid of scales. Ant. IV without apical papilla. All segments covered with finely serrate, rather strong hairs. Moreover, segments II—IV with fine, curved, bluntly ending sense-hairs. Ant. org. III consists of two slender sensillae half covered by a fold. Ant. III with three stout curved sense rods (fig. 7 a).

Feet. Without scales, covered with ciliated, pointed setae. Opposite hair present on P_3 , smooth, pointed and stiff. Tenent hairs smooth, not clavate. On the internal face of each tibiotarsus, about halfway, a peculiar club-like hair is present, which is ciliated, stiff, slightly curved and apically blunt (fig. 6 f). Outer lamella of unguiculus with a strong tooth. Unguis with dorsal and lateral teeth. Ventral distal unpaired tooth absent. Ventral proximal unpaired tooth distinct. Proximad of the ventral proximal unpaired tooth there is an extremely strong additional tooth, which in turn bears a tooth ventrally. It seems that the strong tooth is the posterior one of the ventral pair of teeth. The anterior tooth of this pair seems to be either absent, or fused with the posterior one, thus forming the ventral toothed lamella of the latter.



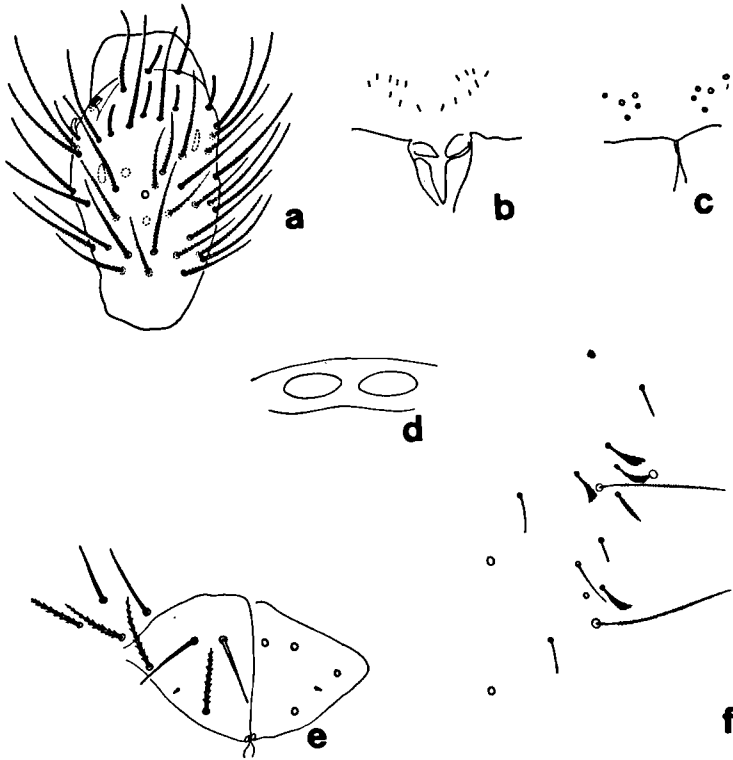


FIG. 7. *Pseudosinella biunguiculata* n. sp. a, ant. III; b, anterior view of manubrium — dens junction; c, posterior view of the same; d, labrum; e, labial chaetotaxy; f, lasiotrichia and accompanying scales of abd. IV.

Looking superficially, one gets the impression of a claw with two empodial appendages (fig. 6 b, c, d).

Furca. Of usual type. Manubrium and dentes ventrally scaled. Manubrium posteriorly and dentes laterally with ciliated setae. The pattern of insertion of the scales at the anterior distal face of the manubrium, and of the setae at the posterior face is figured in fig. 7 b, c. Submucro about as long as mucro, without setae. Mucro bidentate with basal spine, shaped like that in *P. vandeli meridionalis* Gisin, 1964.

Scales. Oval in shape, with rounded apex, and very faint striation.

Material. 3 specimens.

Discussion. The *Pseudosinella*-species lacking eyes and having an external tooth to the unguiculus form a well-defined group. This group

FIG. 6. *Pseudosinella biunguiculata* n. sp. a, habitus; b, claw P_3 ; c, claw P_1 ; d, claw P_2 in dorsal view; e, dorsal chaetotaxy of head; f, modified hair on tibiotarsus; g, lasiotrichia and accompanying scales and chaetotaxy of abd. II (above) and abd. III (pseudopores indicated by a dot).

consists of *P. petterseni* Börner, 1901, *P. violenta* (Folsom, 1924), generally synonymized with *P. petterseni*, *P. folsomi* Denis, 1931, described again by Christiansen (1960), *P. petterseni attenuata* Bonet, 1934 and *P. halophila* Bagnall, 1939, redescribed by Strenzke (1955). Neither of these species has a ventral toothed lamella to the strong ventral basal tooth nor the peculiar club-shaped hair halfway the tibiotarsus.

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