INSECTS OF THE SUBCLASS APTERYGOTA FROM CENTRAL AMERICA AND THE WEST INDIES

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This paper deals with the following forms:

Thysanura.

Lepidocampa zeteki, new species.
Gastrotheus lepismoideus Folsom.

Collembola.

Achorutes caecus, new species.
Pseudachorutes albipes, new species.
Folsomia fimetaria (Linnaeus) Tullberg.
Folsomia fimetaria (Linnaeus) Tullberg var. *dentata*, new variety.
Entomobrya cubensis, new species.
Lepidocyrtus usitatus, new species.
Lepidocyrtus nigrosetosus, new species.
Lepidocyrtus summersi MacGillivray.
Salina wolcotti, new species.
Cyphoderus inaequalis, new species.
Cyphoderus similis, new species.
Cyphoderus pinnatus Folsom.

Though all these forms are of interest because almost nothing has been published on the apterygotan fauna of Central America and the West Indies, some of them are of special interest for other reasons. Thus, *Lepidocampa* is a little known genus of generalized structure, being essentially a *Campodea* with scales. Four species of this paper are termitophilous. Three are cavernicolous. Two of the new species, occurring on sugar cane, may be of economic importance.

Eight species were collected by J. Zetek and I. Molino, of the Bureau of Entomology. Three forms were received from the Federal Horticultural Board, by whose inspectors they had been intercepted. Two species were collected in Porto Rico by G. N. Wolcott, entomologist. The termitophilous species were transmitted to the writer by Dr. T. E. Snyder, of the Bureau of Entomology.

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Syntypes have been deposited in the United States National Museum, Washington, D. C.

THYSANURA

Genus LEPIDOCAMPA Oudemans

The rare genus *Lepidocampa* is of special interest on account of its resemblance to *Campodea*. It differs from *Campodea* chiefly in having scales; also in the imperfect segmentation of the cerci, and the presence of peculiar fringed pulvilli. In most respects, however, the two genera agree anatomically, except as regards minute details of structure.

The genus was founded by Oudemans ('90) for *L. weberi*, a species from the East Indies. The diagnosis of this species is, by the way, inadequate, being almost entirely generic rather than specific. The same species has been reported by Silvestri ('98, '99) from Argentina, Paraguay, Brazil, and Ecuador; but he finds that to decide whether the species from South America is actually the same as that from the East Indies will require a minute examination of material from both regions.

Silvestri ('16, '18) afterward recorded *L. weberi* from Ceylon, Sumatra, British East Africa, and German East Africa.

Carpenter ('16) described *L. fimbriatipes* from the Seychelles Islands, properly preferring to hold the species as distinct, for the present. His paper has been very useful in the writer's study of the morphology of *Lepidocampa*.

LEPIDOCAMPA ZETEKI, new species

Plates 1–3, figs. 1–30

White. Campodeiform (fig. 1). Body clothed with scales.

Head.—The Y-shaped epicranial suture is conspicuous. Eyes absent. Antennae a little more than half as long as the head and body, moniliform. The number of antennal segments found was as follows: One male, 27; four females, 22, 25, 27, 27, respectively; sex unknown, 27, 30, 26. Segments mostly cup-shaped; first two segments short and broad (fig. 2); terminal segment (fig. 3) only one-fifth or one-fourth longer than the penultimate segment, ovate or oval. Segments 4–7, inclusive, each bear a dorsal pair of bothriotricha (fig. 2), which are extremely long, delicate, fringed threads. Segments 5 and 6 each bear, in addition, a ventral or ventro-lateral bothriotrix.

Mouth-parts.—The *labrum* (fig. 4) bears antero-entally a pair of chitinous subtriangular toothed appendages ("unciform processes" of Silvestri).

The head of the mandible (figs. 5, 6) does not have the series of parallel ridges forming a molar area as described by Carpenter, but

bears instead three teeth on one mandible and two on the opposite mandible.

The *lacinia* of the mandible also differs from that of Carpenter's species, being palmately cleft (figs. 5, 6), some of the slender tapering primary lobes bearing secondary teeth.

The *galea* of the maxilla (fig. 7) bears an anterior subclavate sensilla, mentioned by Carpenter. The *lacinia* is as in Figure 8. The lingua (fig. 9) is rounded anteriorly, with serrate antero-lateral margins. The *superlinguae* (*maxillulae*) are not subtriangular as in *fimbriatipes*, but are (fig. 9) rounded with the mesal margin anteriorly serrate, the teeth becoming successively smaller posteriorly. Each superlingua bears meso-basally a fingerlike lacinial lobe (fig. 9). The *palpus* of the *labium* bears an anterior sensory papilla, as in Figure 10.

Legs.—The *tibia* has an apical pair of stout, fringed, articulated spurs (fig. 11). The fringed *pulvilli* (fig. 12) are essentially like those described by Oudemans and by Carpenter, and quite unlike those figured by Silvestri.

Styli.—Styli are present on the first seven abdominal segments. Those of the first urosternum differ in form from the others, being (figs. 13, 14) stout, scarcely tapering, blunt, clothed throughout with setae, and ending in several spiniferous papillae. In the female (fig. 13) there are two simple setae on the mesal side of the base of the stylus. In the male (fig. 14) the stylus is relatively shorter than in the female, and the posterior region of the sternum is thickly clothed with setae; while the posterior border bears two rows of spiniferous papillae. The styli of the remaining segments (fig. 15) are elongate and tapering, each with 5 or 6 setae on the distal half, and a pair of strong spines, apical and subapical, respectively. *Exsertile vesicles* (fig. 15) are present on the second to the seventh abdominal segment, inclusive. The base of the vesicle is not, however, stiff and cylindrical like that of *fimbriatipes*.

Genitalia.—The external organs of reproduction pertain to the eighth abdominal segment. In the male (fig. 16) the eighth urosternum is prolonged posteriorly as a broad subtriangular lobe ending in a median rounded setigerous lobe; under the apical portion is the penis, composed of a pair of genital plates, described by Carpenter. In the female (fig. 17) the large sternal lobe terminates in a pair of blunt triangular lobes, each of which bears 4 or 5 setae; under these lobes is a pair of valves (fig. 18), each with 4 or 5 large setae.

Telson, cerci.—The telson (fig. 19) is subtriangular. The tenth sternum is divided posteriorly along the median line (figs. 20, 21). The anal valves are apparently not strongly developed in this species.

Only one intact cercus was present; this being one-third as long as the head and body. The segmentation of the cerci is not definite,

but the transverse sutures shown in Figure 22 could be seen rather clearly.

Clothing.—Chaetotaxy is doubtless as important for the separation of species in this genus as it is in *Campodea.*

The macrochaetae are unilaterally fringed or feathered. The head bears numerous short simple setae. The lateral setae of the thoracic terga (fig. 23) are constant in form, size, and position. On most of the abdominal segments there are postero-dorsal setae, as in Figure 24; a little in advance of each postero-lateral angle are two macrochaetae.

Beside the base of each stylus is a lateral series of 5 setae (figs. 13, 15); on the mesal side, except on the first abdominal segment, are 6 setae in both sexes (fig. 15).

Near the posterior border of each of the first seven urosterna are two fringed setae, one on each side of the median line, in both sexes.

A comparison of the setal characters shows many differences between this species and *fimbriatipes.*

The thorax and abdomen are clothed densely with scales, dorsally and ventrally, but scales are almost absent on head, antennae, legs, and cerci. The scales (figs. 25–30) are variable in form and size, but are relatively large and mostly broad, with a comparatively few strong striae.

Maximum length of specimens: Male, 2.5 mm.; female, 2.8 mm.

Margarita Swamp, Canal Zone, June 28, 1923, with *Anoplotermes* species in termitarium in tree stump, J. Zetek and I. Molino (Z. 2154*b*).

Syntypes.—Cat. No. 40381, U.S.N.M.

Genus GASTROTHEUS Casey

GASTROTHEUS LEPISMOIDEUS (Folsom) [New combination]

Atelura lepismoidea Folsom, 1923.

Professor Silvestri has kindly informed me that this termitophilous species, which I described from British Guiana, belongs in the genus *Gastrotheus*, which he redescribed from one of the types.

Nine males and ten females, Rio Chinilla, Canal Zone, August 19, 1923, with *Nasutitermes ephratae* Holmgren, J. Zetek, collector (Z. 2214).

COLLEMBOLA

Genus ACHORUTES Templeton

ACHORUTES (SCHÖTTELLA) CAECUS, new species

Plate 4, figs. 31–38

White. Eyes absent. Postantennal organ (fig. 31) with commonly 6 (often 5, and rarely 4 or 7) peripheral tubercles in a rosette.

Accessory body ("Nebenkorper") absent. Antennae three-fourths as long as the head; segments as 10 : 10 : 13 : 13; third and fourth segments demarcated by a suture ventrally but not dorsally. Sense organ of third antennal segment (fig. 32) consisting of a single peg, resembling a short stout seta, with four accompanying setae. Fourth segment with a terminal sense organ (fig. 33) composed of three eversible vesicles; also with several distal curving slender olfactory setae, but little different from ordinary setae. Unguis (fig. 34) stout, curving; inner margin with a minute tooth one-third from the base on fore and mid claws, the tooth obscure or absent on hind claws; a pair of minute slender lateral teeth, one-third from the base, occurs on the first and second pairs of ungues, but is often obscure or absent on the third pair. Unguiculus absent. Tenent hairs absent. Anal spines absent; anal lobes rounded. Furcula extending as far as the ventral tube. Dentes (fig. 35) stout, with a few dorsal tubercles somewhat larger than those of the cuticula in general, and with 5 dorsal setae. Mucrones (figs. 35–37) two-fifths as long as dentes, bilamellate; outer lamella wider and more rounded than the inner lamella, with margin either entire or roughened; both lamellae ending before the apex of the mucro, which is rounded and not upturned. Rami of tenaculum tridentate; corpus without setae. Body setae (fig. 38) stout, slightly curving, of two sizes—large and small—both kinds distally, and mostly unilaterally, serrate. Length, 0.8 mm., occasionally 1 mm.

The number of tubercles in the postantennal organ was as follows, in eighteen specimens:

Right	Left	Right	Left
6	6	5	6
5	6	6	8
?	4	5	6
6	5	0	6
6	5	6	6
6	7	6	5
6	7	7	6
7	6	6	7
7	7	7	3

The types were selected from a large number of specimens, taken in limestone caves in bat dung, in company with two other species described in this paper.

Headwaters of Chilibrillo River, Canal Zone, September 29, 1923, J. Zetek and I. Molino, collectors.

Syntypes.—Cat. No. 40382, U.S.N.M.

Genus PSEUDACHORUTES Tullberg

PSEUDACHORUTES ALBIPES, new species

Plate 5, figs. 39–43

Dark blue dorsally and laterally (fig. 39); white mottled with pale blue ventrally. Dorsum with small spots and narrow lines of pale orange; integument marked off by pale orange lines into minute polygonal areas, indicating the hypodermis cells. Head blue, with white buccal cone. First two antennal segments blue; third white, mottled with blue basally and with narrow apical band; fourth white. Legs white, faintly pigmented on coxa, trochanter and femur. Manubrium mottled with blue and white; dentes white with a little pigment; mucrones white. Total length to width as 5:3. Eyes (fig. 40) 5+5. Antennae one-half longer than the head; segments as 3:4:3:8; fourth segment elongate-conical; suture between third and fourth segments absent dorsally, as usual. Unguis (fig. 41) with an inner tooth one-fourth from the base. Unguiculus absent. Tenent hairs absent. Dentes longer than manubrium (as 8:7), slightly narrowing, rounded apically, naked ventrally, with six dorsal setae. Mucrones (figs. 42, 43) three-eighths as long as dentes; outer and inner lamellae equal, terminating before the apex; apical lobe short, rounded. Cuticula tuberculate, almost naked. Length, 1.5 mm.

Margarita Swamp, Canal Zone, June 28, 1923, with *Eutermes exiguus* Hagen in termitarium near base of tree stump, J. Zetek and I. Molino, collectors (Z. 2151*a*).

Monotype.—Cat. No. 40383, U.S.N.M.

Genus FOLSOMIA Willem

FOLSOMIA FIMETARIA (Linnaeus) Tullberg

This well-known species of the soil fauna is already known to be cosmopolitan in distribution.

Specimens intercepted by the Federal Horticultural Board on shipments from Guatemala agree with typical *fimetaria* from Europe except in one particular. The femur and tibiotarsus have each an incomplete distal subsegment, the suture of which occurs only on the lower side of the leg; that is, the side which bears the unguiculus.

Collected on *Chamaedorea* species (pacaya or salad palm) from Coban, Guatemala, at Inspection House, Washington, D. C., by W. B. Wood and H. L. Sanford on January 29, 1920 (F. H. B. No. 29456).

Taken on roots of *Chamaedorea* species from Coban, Guatemala, at Inspection House, Washington, D. C., by H. L. Sanford, February 18, 1920 (F. H. B. No. 29598).

FOLSOMIA FIMETARIA (Linnaeus) Tullberg var. DENTATA, new variety

Plate 5, figs. 44, 45

This new variety agrees with typical *fimetaria* except as follows: Postantennal organ (fig. 44) subelliptical with a notch at the middle of the anterior margin (present occasionally in the typical form also); in length one-third of the basal width of the first antennal segment. Antennae subequal to head in length, with segments in relative lengths about as 3:5:4:7 or 2:4:3:5. Unguis (fig. 45) strongly unidentate at the middle of the inner margin. Furcula short, extending not beyond the middle of the second abdominal segment. Dentes longer than manubrium (as 4.5:4 or 5:4). Erect sensory setae of abdomen relatively short (two-fifths as long as the segment, on abdominal segment 1 and abdominal segment 2, respectively), and simple—not distally serrate. Length, 2 mm.

This variety *dentata* is close to var. *caldaria* Axelson, of Finland and Poland (Axelson, '05, p. 790; Linnaniemi, '12, p. 116; Stach, '21, p. 160), which also has an inner tooth on the unguis.

Taken in Irish potatoes from Vera Cruz, Mexico, intercepted at New Orleans, La., by W. T. Dillard, March 30, 1923 (Fed. Hort. Board, N. O. No. 281).

Syntypes.—Cat. No. 40384, U.S.N.M.

Genus ENTOMOBRYA Rondani

ENTOMOBRYA CUBENSIS, new species

Plate 6, figs. 46–50

White, rather scantily marked with blue (figs. 46, 47). Large specimens have often a yellowish tinge. The pigment is in the form of loose flecks, forming spots or clouds of indefinite form. Head with a little lateral pigment and a pair of spots or a transverse mark in front of the eyes. Prothorax feebly pigmented laterally; mesonotum and metanotum bordered laterally with pigment. First three abdominal segments each clouded with pigment laterally. Dorsum of fourth abdominal segment with an antero-lateral patch and an irregular posterior band; abd. 5 and 6 each with dorsal and lateral spots. Antennal segments white basally, blue apically. Legs white, excepting a distal spot or band on the femur and a spot or band before the middle of the tibia. In large yellowish specimens the femora are orange distally, and the tibiotarsi proximally. Furcula white. Eyes (fig. 48) 8+8, unequal, the two inner proximal being the smallest. Antennae twice as long as the head; second segment almost twice as long as the first, and a little longer than the third; fourth one and one-half to two times as long as the third. Unguis (fig. 49) almost straight, slender, with a pair of long sharp

lateral teeth one-fourth from the base; a pair of strong inner teeth two-fifths from the base, and a pair of smaller teeth halfway between the first pair and the apex. Unguiculus lanceolate, extending three-fifths as far as the unguis. Tenent hair long and strong. Fourth abdominal segment from two and one-half to three and one-third times as long as the third. Furcula not attaining the ventral tube, extending a little beyond abd. 3. Dorsal crenulations of dens absent on the basal third, and ending at a distance from the apex equal to one and two-thirds the length of the mucro (fig. 50). Mucro short and stout, strongly rounded ventrally, falcate, with a single stout apical hook. Rami of tenaculum quadridentate; corpus with one long anterior seta. Feebly clavate fringed setae are numerous on the anterodorsal region of the head and on abd. 5 and 6. Short clavate fringed setae are present dorsally on the manubrium and the base of each dens. Length, 1.4 mm.

Taken on pineapple from Cuba, intercepted at New York City, April 22, May 6, May 14, 1924, by Inspectors I. Shiller, R. L. Trigg, A. C. Hill (Fed. Hort. Board, N. Y., Nos. 5034, 4227, 4232, 4278).

Taken in sugar cane from Tanamo, Cuba, intercepted at Philadelphia, Pa., June 15, 1924, by Mr. C. G. Albrecht (F. H. B., Phila. No. 2045).

Syntypes.—Cat. No. 40385, U.S.N.M.

Genus LEPIDOCYRTUS Bourlet

LEPIDOCYRTUS USITATUS, new species

Plate 6, figs. 51–54

White. In large specimens the head and body are minutely speckled with blue. Antennal segments with scattered blue pigment. Legs, excepting coxae, unpigmented. Furcula white. Mesonotum (fig. 51) not strongly projecting. Eyes (fig. 52) 8+8, unequal; the four proximal eyes smaller than the others, on each side. Antennae one-third longer than the head; second and third segments subequal and subclavate; fourth segment two and one-fourth to two and one-half times as long as the third. Unguis (fig. 53) slender, slightly curving, with a pair of lateral teeth one-fourth from the base; inner margin with a pair of teeth near the middle; other teeth absent. Unguiculus extending two-thirds as far as the unguis, on all the feet. Hind claws larger than the others. Tenent hair minutely knobbed, as long as unguiculus. Fourth abdominal segment four and one-half times as long as the third. Furcula attaining the ventral tube in large specimens, but not in small ones. Manubrium slightly shorter than dentes (as 10:11). Dorsal crenulations of dens ending at a distance from the apex equal to two and one-half times the length of

the mucro. Mucro (fig. 54) comparatively elongate, with apical and anteapical teeth and long proximal spine. Length, 1 mm.

Headwaters of Chilibrillo River, Canal Zone, September 29, 1923, in limestone caves in bat dung, J. Zetek and I. Molino, collectors.

Dakota, Tela division, Honduras, May 20, 1923, T. H. Hubbell.

Syntypes.—Cat. No. 40386, U.S.N.M.

LEPIDOCYRTUS NIGROSETOSUS, new species

Plate 7, figs. 55–57

Body color, cream yellow. The scales, where present, form brown patches. Pigment purple, scanty. Mesonotum clouded with purple along the lateral border; metanotum feebly pigmented laterally; fourth urotergite with a little pigment at the postero-lateral angle and along the lateral border. The head bears dorsally a spot between the bases of the antennae, and a narrow curving line along each antennal base. First three antennal segments each yellow with purplish distal ring or cloud; fourth segment purplish. Legs yellow; precoxal segments weakly pigmented. Furcula yellow. Eyes (fig. 55) 8+8, the two inner proximal eyes of each side somewhat smaller. Antennae one-half longer than the head; segments as 4:7:8:13; first segment subcylindrical, second and third clavate-cylindrical, fourth elliptical. Mesonotum not strongly projecting over the head. Unguis (fig. 56) with a pair of lateral teeth; inner margin with a proximal pair of teeth two-fifths from the base, and a smaller distal tooth midway between the proximal pair and the apex. Unguiculus extending three-fifths as far as the unguis, lanceolate-oblong, acuminate, untoothed. Tenent hair a little shorter than the unguis. Fourth abdominal segment four to six times as long as the third. Furcula not attaining the ventral tube; extending a little beyond abd. 3. Dorsal surface of dens denticulate in profile, the teeth continuing along the mucro as far as the proximal spine. Mucro (fig. 57) comparatively elongate; apical and anteapical teeth subequal; proximal spine present, long, acicular. Most of the setae are dark colored; these blackish fringed setae are particularly conspicuous on the antennae, oral region, lateral borders of mesonotum and metanotum, and on abd. 5 and 6. Length, 1.6 mm.

Manati, P. R., April 30, 1924, on wet dead leaves of "jaguey" (*Ficus laevigata*) on the ground, G. N. Wolcott, collector.

Syntypes.—Cat. No. 40387, U.S.N.M.

LEPIDOCYRTUS SUMMERSI (MacGillivray) [New combination]

Strongylonotus summersii MacGillivray, 1894

Plate 7, figs. 58–60.

White, marked with purplish (fig. 58). Second and third abdominal segments each bordered posteriorly with purplish; abd. 4 with a

broad irregular posterior band, in width about one-third of the length of the segment; or with large spots in place of a band. Ant. 3 with a basal and an apical spot; ant. 4 dull purplish except basally. Fore tibiotarsi with a little pigment proximally and considerable pigment distally; mid legs unpigmented; hind trochanters slightly pigmented; hind femora purplish except apically. Ventral tube unpigmented. Manubrium with a dorso-lateral stripe on each side. Eyes 8+8. Antennae two and one-half times as long as the head, or seven-tenths as long as head and body; segments as 25:33:33:55; last segment elliptico-cylindrical, obscurely and irregularly annulate distally. Mesonotum projecting over the head to an unusual degree. Fourth abdominal segment about eleven times as long as the third. Tibiotarsi each with two subsegments, the distal subsegment two-fifths as long as the entire segment. Unguis (fig. 59) slender, almost straight, with a pair of conspicuous lateral teeth two-thirds from the base and two pairs of inner teeth; the proximal pair two-fifths from the base; the distal pair midway between the proximal and the apex. Unguiculus narrowly lanceolate, extending four-fifths as far as unguis. Tenent hair strong, as long as the inner margin of the unguis. Manubrium five-sevenths as long as dentes. Dentes crenulate dorsally, the crenulations ending at a distance from the apex equal to twice the length of the mucro. Mucro (fig. 60) relatively long, strongly rounded ventrally; apical tooth large; anteapical small, inclined anteriorly; proximal spine short, acicular. Comparatively few setae are present on head and body, which are densely scaly; the scales being mostly elliptical. The posterior border of the fourth urotergite bears a fringe of straight, closely set setae, directed backward. Scales occur on the antennae and ventrally on the dentes except distally, where there are many long fringed setae. Length, 2 mm. and 2.4 mm.

This description was made from two types given to me by Doctor MacGillivray. The original description of the antennae was evidently based upon one of these types in which the antennae are deformed.

El Pilar, Venezuela, H. E. Summers, collector.

Syntypes.—Cat. No. 40388, U.S.N.M.

Genus SALINA MacGillivray

Salina MacGillivray, 1894
Cremastocephalus Schött, 1896

A study of my three types of *Salina banksii* MacGillivray shows that *Cremastocephalus* Schött is a synonym of *Salina* MacGillivray, a genus which had not been recognized since its description. I regret

that it is necessary to drop such a well known name as *Cremastocephalus*.

The species described here is quite different from either the Floridan species *banksii* MacGillivray or the Californian *trilobatus* Schött.

SALINA WOLCOTTI, new species

Plate 7, figs. 61–64; Plate 8, figs. 65–67

Yellow, marked with black (fig. 61). Mesonotum bordered with black laterally and anteriorly. Body with black spots, mostly amoebiform with a clear central spot. Small individuals, and an occasional large one, have few if any black markings on the body, or have at most the marginal pigment of the mesonotum. Antennal segments apically black. Legs yellow; femur with a distal black spot; tibiotarsus with a small proximal and a large distal spot. Furcula yellow. Eyes (fig. 62) 8+8, the two inner proximal smaller than the others. Antennae a little longer than the head and body; second and third segments subequal; fourth one-half longer than the third. Ratio of body segments, excepting prothorax, as 31:17:18:25:9:81:17:11 or 35:22:19:32:10:108:27:17. Abd. 4 nine to twelve times as long as abd. 3. Tibiotarsus divided into two subsegments by a suture two-fifths from the apex. Unguis (fig. 63) with two pairs of inner teeth, the proximal teeth larger than the distal. Unguiculus with an inner angle-tooth. Tenent hair strong, broadly expanded apically, as is usual in the genus. Furcula about two-thirds as long as the body, but variable in length, extending only to the ventral tube, or to the middle of the mesothorax. Dens varying from slightly longer to one-fourth longer than the manubrium. Mucro suboblong (figs. 64–66) except in young individuals (fig. 67), commonly bilobed apically (fig. 64), occasionally with a small or obscure third tooth (figs. 65, 66). Apical scale of dens (fig. 64) as long as mucro, subelliptical, ovate or obovate. Corpus of tenaculum with a strong anterior seta, and sometimes a small second seta below the first. Maximum length, 1.7 mm.

The third tooth of the mucro was distinguishable in 8 mucrones out of 28. In one individual the left mucro was bilobed and the right trilobed (fig. 65). The dorsal tooth of the mucro is usually larger than the ventral.

Numerous specimens collected on cotton leaves were almost entirely yellow.

The type material consists of an abundance of specimens collected in Porto Rico by G. N. Wolcott, after whom the species is named. He says that these springtails on corn are moderately abundant on the north side of the island, and on the south (dry) side of the island occur in enormous numbers.

Porto Rico—Point Cangrejos, February 6, on the ground; Rio Piedras, February 9, 11, 23, on Yautia; Bayamon, February 19, on canna and water hyacinth; Guinica, March 18, on cane; Bayamon, May 5; Isabella, August 1, on cotton leaves; Peñuelas, August 16, on corn.

Syntypes.—Cat. No. 40389, U.S.N.M.

Genus CYPHODERUS Nicolet

CYPHODERUS INAEQUALIS, new species

Plate 8, figs. 68, 69

White. Eyes absent. Antennae two-fifths longer than the head; segments variable in relative lengths, but about as 10:26:17:41 or 4:8:5:12. Hind claws slightly larger than the others. Unguis (fig. 68) stout, curving, with a pair of lateral teeth near the base. Antero-proximal lobe oblong-lanceolate, acute. Postero-proximal lobe much larger, extending one-half as far as the unguis, lanceolate, acuminate. A small but evident third tooth on the inner margin occurs opposite the antero-proximal tooth. Unguiculus long and broad, extending as far as the unguis, with a large acute inferior wing with rounded margin. Tenent hair small, as long as the wing of the unguiculus. Fourth abdominal segment slightly more than four times as long as the third. Manubrium: dentes: mucrones as 3:2:1. Outer dorsal setae of dens 7, the last 6 pinnate. Inner dorsal setae 7, the last 4 or 5 pinnate. Inner distal pinna (fig. 69) long, extending almost as far as the anteapical tooth of the mucro. Outer distal pinna three-fifths as long as the inner. Mucro subequally bidentate, the two teeth somewhat distant from each other. A narrow lamella extends forward from the anteapical tooth. Length, 1 mm.

Headwaters of Chilibrillo River, Canal Zone, September 29, 1923, in limestone caves in bat dung, J. Zetek and I. Molino, collectors.

Syntypes.—Cat. No. 40390, U.S.N.M.

CYPHODERUS SIMILIS, new species

Plate 8, figs. 70, 71

White. Eyes absent. Antennae one-fifth to two-fifths longer than head; segments as 2:5:3:6. Abd. 1 and 2 subequal; abd. 3 one-half longer than abd. 2; abd. 4 two and one-half to three and one-half times as long as abd 3. Unguis (fig. 70) stout, with a pair of lateral teeth one-fourth from the base; antero-proximal lobe linear, ending in a tooth; postero-proximal lobe large, lanceolate to ovate, extending two-thirds as far as the unguis; beyond the proximal lobes are two distal teeth, the more distal of the two being sometimes absent. Unguiculus extending two-thirds as far as unguis, with large acute

outer lobe. Tenent hair three-fourths as long as unguis. Dens (fig. 71) three-fourths as long as manubrium, and more than twice as long as mucro. Outer dorsal pinnae of dens 7 (occasionally 6). Inner dorsal pinnae 5. Inner distal pinna extending almost as far as the anteapical tooth of the mucro. Outer distal pinna a little more than half as long as the inner. Mucro (fig. 71) bidentate, with lamella extending to the anteapical tooth. Ventro-apical scale of dens extending as far as the anteapical tooth. Length, 1 mm.

Panama, April, 1917, J. Zetek, collector.

Syntypes.—Cat. No. 40391, U.S.N.M.

CYPHODERUS PINNATUS (Folsom) [New combination]

Plate 8, figs. 72–77

Borecus pinnatus FOLSOM, 1923

This variable species was described from British Guiana. My specimens from the Canal Zone agree with the types except in minor details, as follows:

The antero-proximal lobe of the unguis is usually smaller than the postero-proximal (fig. 72), though occasionally subequal to the latter, as in the types. At the middle of the inner margin of the unguis is a strong tooth, which is obscure in the types. The outer dorsal pinnae of the dens are 5; the inner usually 4 (sometimes 5 or 6). The inner distal pinna (fig. 73) extends to the second anteapical tooth of the mucro; the adjacent outer pinna (fig. 74) extending not quite so far. The teeth of the mucro (fig. 73) vary from 3 to 9 in the specimens at hand (figs. 75–77); an apical and two anteapical teeth being constant. Apical tooth relatively small, usually more or less hooked, sometimes almost straight. Anteapical teeth large, subequal, each giving rise anteriorly to a lamella. In addition to the three primary teeth there may be from one to six small secondary teeth; these occur between the two anteapical teeth, in front of the second anteapical tooth, or in both places. To express the number, size, and position of the mucronal teeth, the following formula may be used, in which the primary teeth are indicated by large numerals and the secondary teeth by small ones, beginning with the apical tooth. Thus the formula for Figure 75 would be 111; that for Figure 73, 1ı1.

In the specimens studied these formulae occurred:

Mucronal formula	Length of specimens (milimeters)
111 (fig. 75)	0.8, 1.2
1ı1 (fig. 73)	0.5, 1
1ıı1 (fig. 76)	0.5, 1
1ıı1ı1	1
1ıı1	1
1ıı1ı1 (fig. 77)	1
1ıı1ı1ı1	1.1

This table shows no close correlation between the number of secondary teeth and the size of the specimen as indicated by its length.

A pair of bothriotricha occurred on abd. 2, 3 and 4, respectively.

Maximum length, 1.2 mm.

Fort San Lorenzo, Canal Zone, June 14, 1923, with *Coptotermes niger* Snyder in termitarium on tree stump, J. Zetek, collector (Z. No. 2111*a*).

REFERENCES

Axelson, W. M. 1905. Einige neue Collembolen aus Finnland. Zool. Anz., vol. 28, pp. 788–794.

Carpenter, G. H. 1916. The Apterygota of the Seychelles. Proc. Roy. Irish Acad., vol. 33, sect. B, no. 1, pp. 1–70.

Folsom, J. W. 1923. Termitophilous Apterygota. Zoologica, vol. 3, pp. 383–402.

Linnaniemi, W. M. 1912. Die Apterygotenfauna Finlands. II. Spezieller Teil. Acta Soc. Sc. Fennicae, vol. 40, pp. 1–361.

MacGillivray, A. D. 1894. North American Thysanura—V. Can. Ent., vol. 26, pp. 105–110.

Oudemans, J. T. 1890. Apterygota des Indischen Archipels. Weber: Zool. Ergeb., vol. 1, heft 1, pp. 73–92. Leiden.

Schött, H. 1896. North American Apterygogenea. Proc. Cal. Acad. Sci., ser. 2, vol. 6, pp. 169–196.

Silvestri, F. 1898. Primera noticia acerca de los Tisanuros argentinos. Comun. Mus. Nac. Buenos Aires, vol. 1, no. 2, pp. 33–36.

———. 1899. Breve descrizione comparativa di Lepidocampa Oudms. con Campodea Westw. Anales Mus. Nac. Buenos Aires, vol. 6, pp. 391–396.

———. 1916. Descrizione di alcuni Tisanuri indo-malesi. Boll. Lab. Zool. gen, agr. etc., Portici, vol. 11, pp. 85–119.

———. 1918. Insectes Aptérygogéniens. I. Thysanoures. Voyage Ch. Alluaud et R. Jeannel en Afrique orientale (1911–1912). Résultats scientifiques, pp. 1–27. Paris. L. Lhomme.

Stach, J. 1921. Vorarbeiten zur Apterygoten-Fauna Polens. Teil II: Apterygoten aus den Pieniny. Bull. Acad. Polonaise Sc. Lettres, sér. B (1919), pp. 133–233.

EXPLANATION OF PLATES

Plate 1

Lepidocampa zeteki

Fig. 1. Dorsal aspect of female, × 25.
2. Dorsal aspect of base of right antenna of male, × 175.
3. Last two segments of left antenna of female, dorsal aspect, × 320.
4. Dorsal aspect of labrum, × 320.
5. Dorsal aspect of head of right mandible, × 505.
6. Dorsal aspect of head of left mandible, × 505.
7. Galea (*g*) and palpus (*p*) of right maxilla, dorsal aspect, × 505.
8. Lacinia of right maxilla, dorsal aspect, × 505.
9. Dorsal aspect of lingua and superlinguae, × 370.

PLATE 2

Lepidocampa zeteki

FIG. 10. Left half of labium. *g*, galea; *l*, lacinia; *p*, palpus, × 320.
11. Apical spurs of right fore tibia, × 505.
12. Claws and pulvilli of left hind foot, × 635.
13. Left stylus of first abdominal segment of female, × 290.
14. Left stylus of first abdominal segment of male, × 290.
15. Left stylus and exsertile vesicle of third abdominal segment of male, × 290.
16. Posterior region of eighth urosternum of male, × 298.
17. Posterior region of eighth urosternum of female, × 298.
18. Genital valves of female, × 505.

PLATE 3

Lepidocampa zeteki

FIG. 19. Telson of female, dorsal aspect, × 225.
20. Tenth sternum of male, × 262.
21. Right half of tenth sternum of female, × 262.
22. Dorsal aspect of right cercus of female, × 80.
23. Left side of thoracic terga of female, × 110.
24. Postero-lateral angle of fifth urotergite, × 175.
25–30. Dorsal scales, × 505.

PLATE 4

Achorutes (Schöttella) caecus

FIG. 31. Left postantennal organ, × 1264.
32. Sense organ of third segment of left antenna, × 1264.
33. Terminal sense organ of right antenna, × 1264.
34. Unguis of left mid foot, × 1016.
35. Left dens and mucro, × 808.
36. Left mucro, × 1264.
37. Left mucro, × 1264.
38. Dorsal setae of second abdominal segment, × 1016.

PLATE 5

Pseudachorutes albipes

FIG. 39. Dorsal aspect, × 45.
40. Eyes of right side, × 262.
41. Unguis of left hind foot, × 394.
42. Dorsal aspect of left mucro, × 757.
43. Dorsal aspect of right mucro, × 757.

Folsomia fimetaria dentata

FIG. 44. Left postantennal organ, × 757.
45. Unguis of left hind foot, × 757.

PLATE 6

Entomobrya cubensis

FIG. 46. Dorsal aspect, × 55.
47. Left aspect, × 55.
48. Eyes of right side, × 320.
49. Left hind foot, × 790.
50. Left mucro and end of dens, × 790.

Lepidocyrtus usitatus

FIG. 51. Head and mesonotum, × 110.
52. Eyes of left side, × 505.
53. Left hind foot, × 790.
54. Left mucro, × 790.

PLATE 7

Lepidocyrtus nigrosetosus

FIG. 55. Eyes of right side, × 320.
56. Right hind foot, × 505.
57. Left mucro and end of dens, × 505.

Lepidocyrtus summersi

FIG. 58. Left aspect, × 29.
59. Left mid foot, × 505.
60. Left mucro and end of dens, × 505.

Salina wolcotti

FIG. 61. Left aspect, × 37.
62. Eyes of right side, × 262.
63. Right mid foot, × 635.
64. Left mucro and end of dens, × 790.

PLATE 8

Salina wolcotti

FIG. 65. Mucro, × 635.
66. Mucro, × 790.
67. Mucro of small specimen, × 869.

Cyphoderus inaequalis

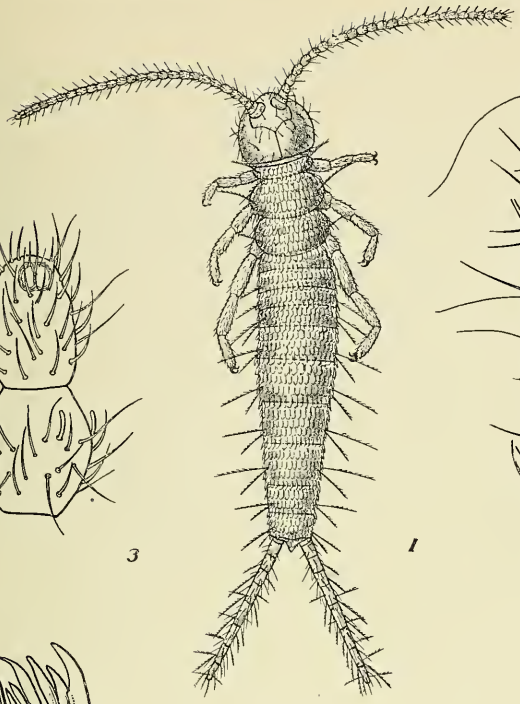
FIG. 68. Left fore foot, × 790.
69. Left mucro and end of dens, × 370.

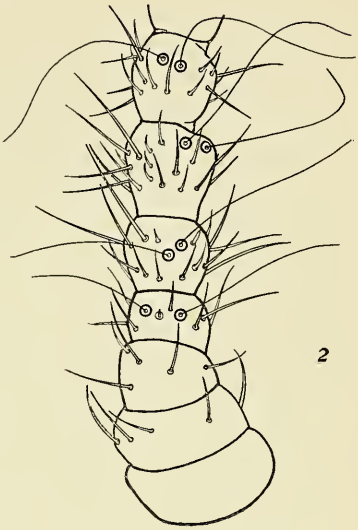
Cyphoderus similis

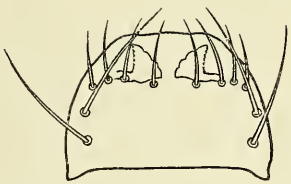
FIG. 70. Left hind foot, × 790.
71. Left dens and mucro, × 320.

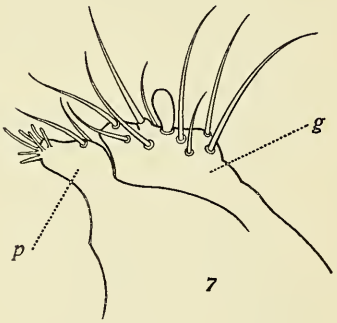
Cyphoderus pinnatus

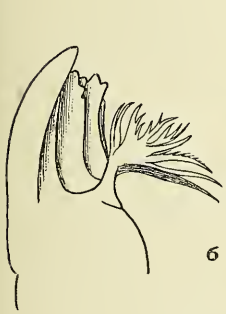
FIG. 72. Left hind foot, × 790.
73. Left mucro and end of dens, × 635.
74. Outer distal pinna of dens, × 635.
75–77. Left mucrones, × 635.

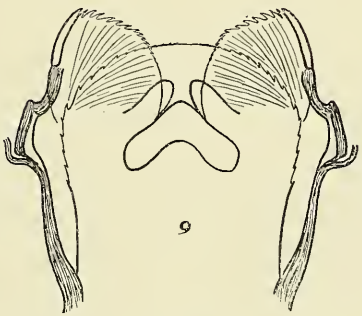


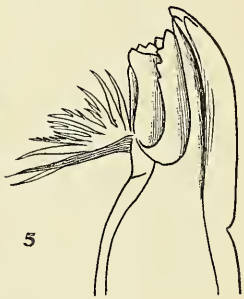












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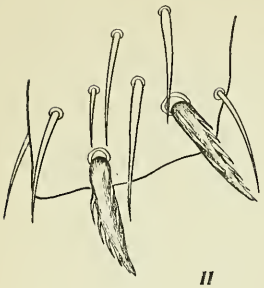

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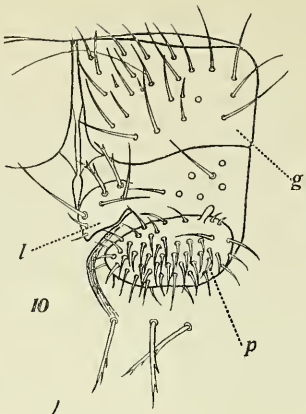

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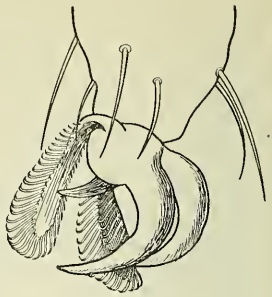

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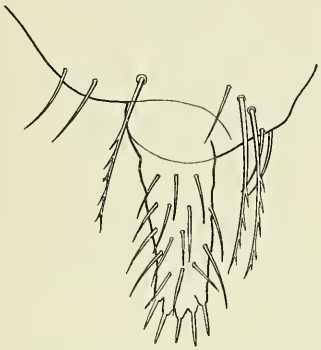

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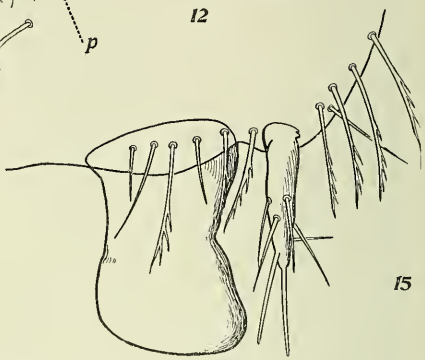

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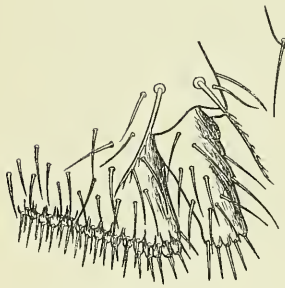

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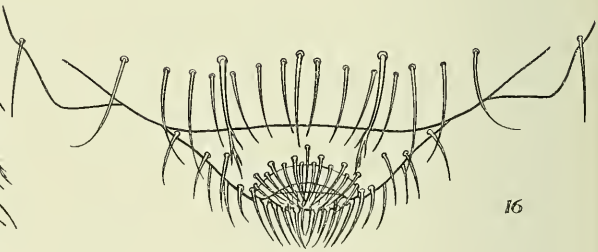

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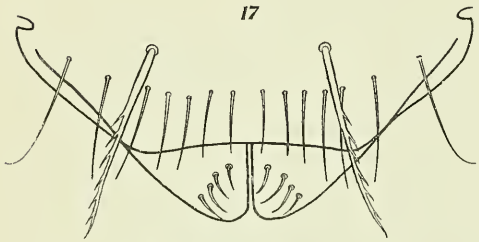

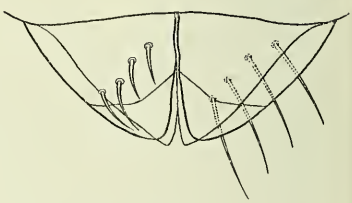

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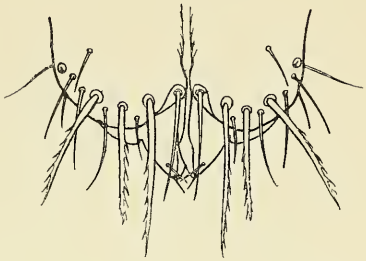

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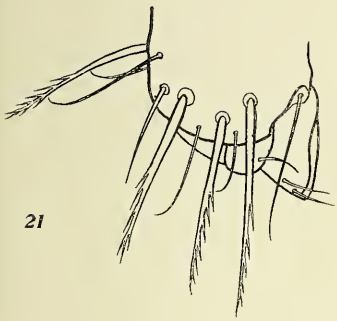

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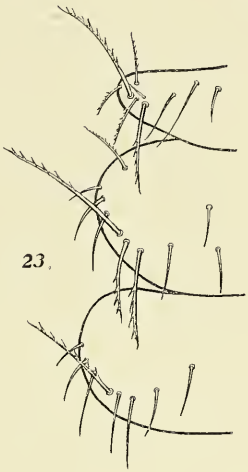

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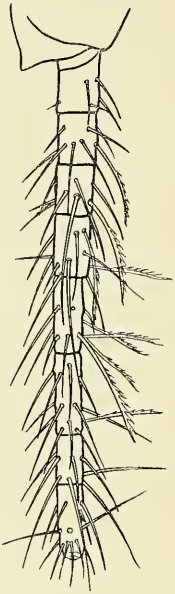

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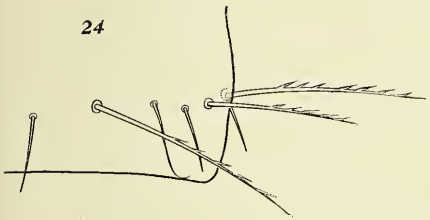

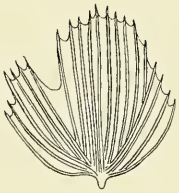

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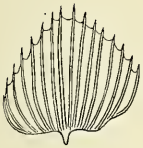

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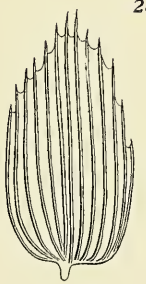

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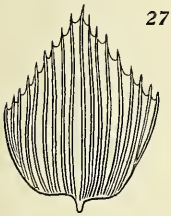

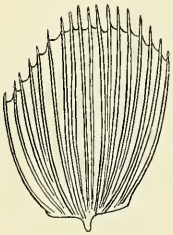

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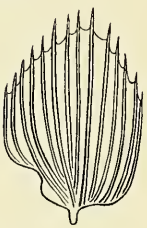

CENTRAL AMERICAN AND WEST INDIAN APTERYGOTA

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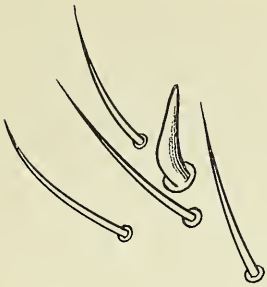

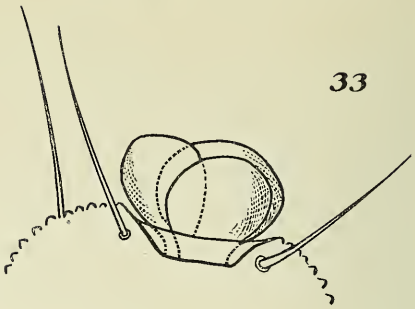

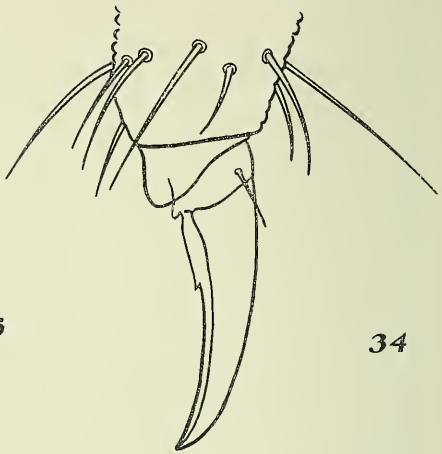

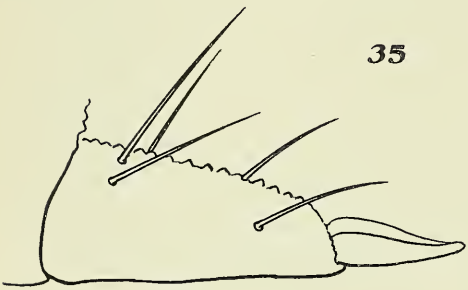

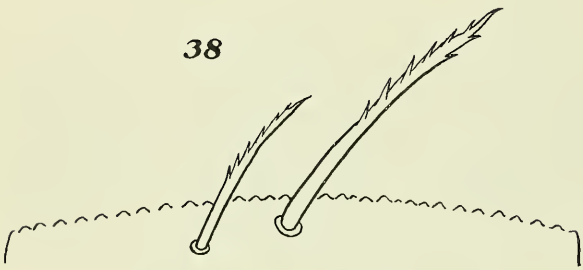

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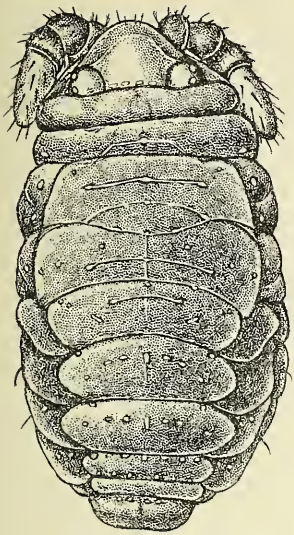

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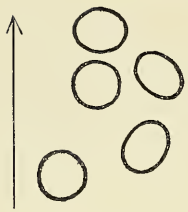

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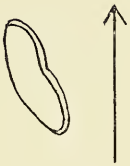

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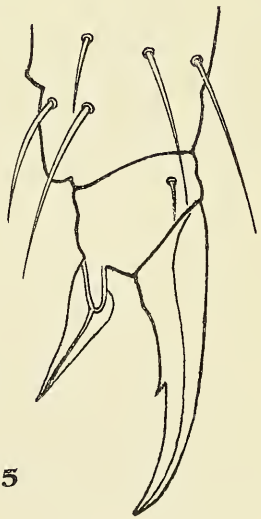

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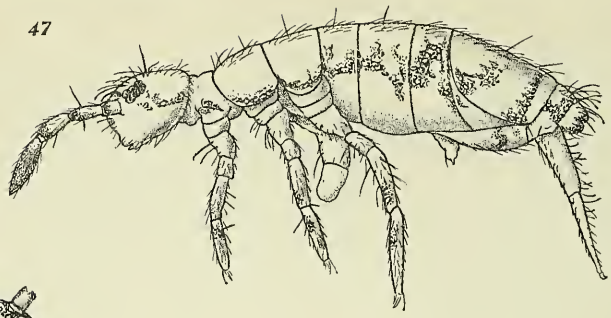

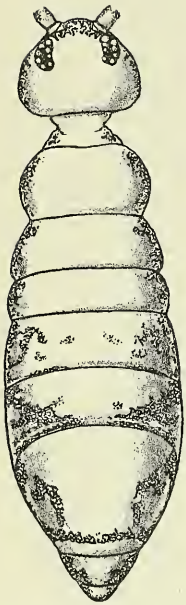

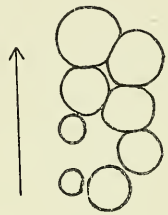

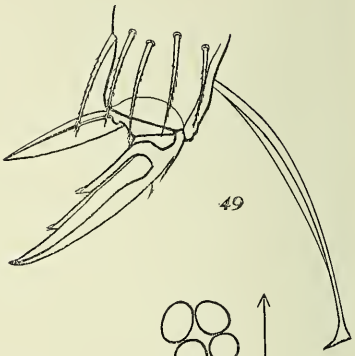

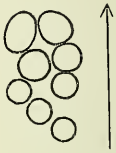

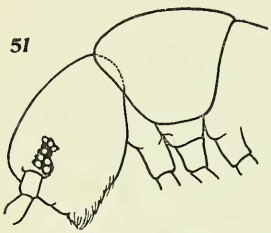

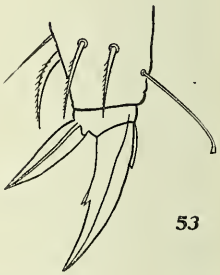

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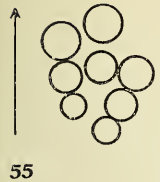

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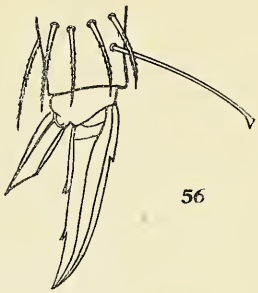

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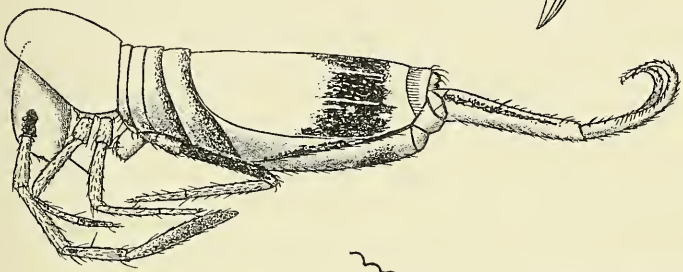

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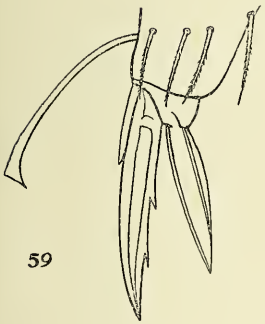

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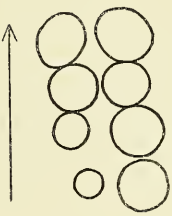

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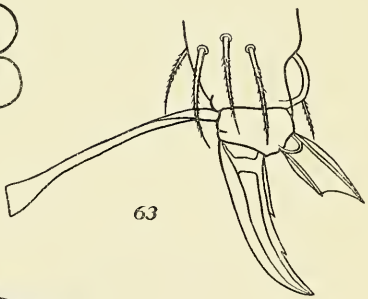

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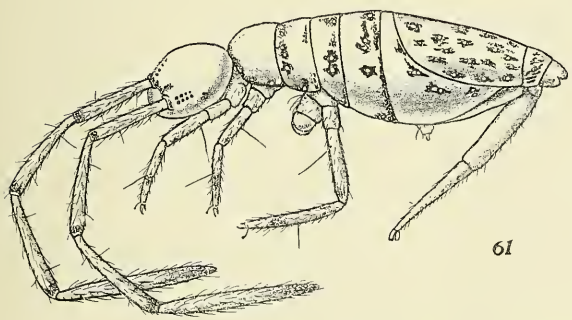

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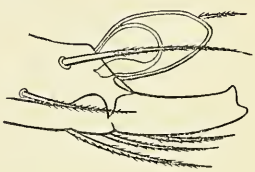

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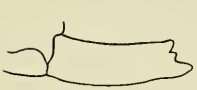

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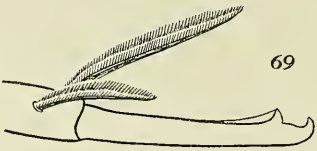

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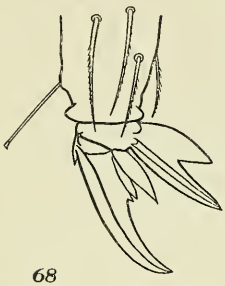

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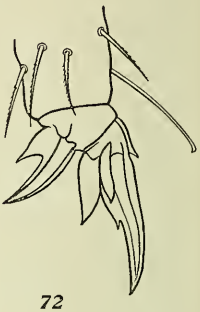

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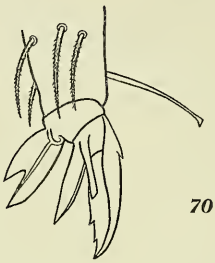

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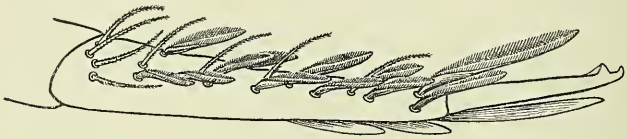

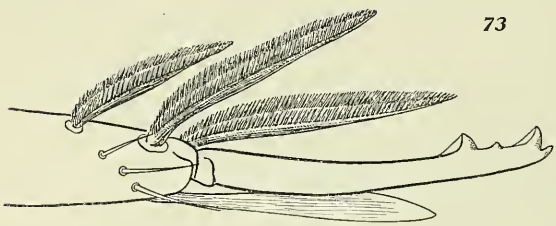

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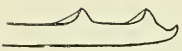

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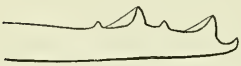

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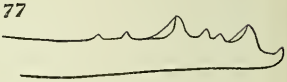

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