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NEW SPECIES OF COLLEMBOLA FROM NEW YORK STATE

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The immediate purpose of this paper is to describe several new species of Collembola in order that their names may be available for the forthcoming list of insects of New York State.

The forms described here, all of which belong to the family Entomobryidæ, consist of six species and one variety, namely:

Isotoma immersa, new species.
Entomobrya ligata, new species.
Entomobrya mineola, new species.
Entomobrya assuta, new species.
Orchesella ainsliei, new species.
Lepidocyrtus cyaneus Tullberg var. *cinereus*, new variety.
Lepidocyrtus violentus, new species.

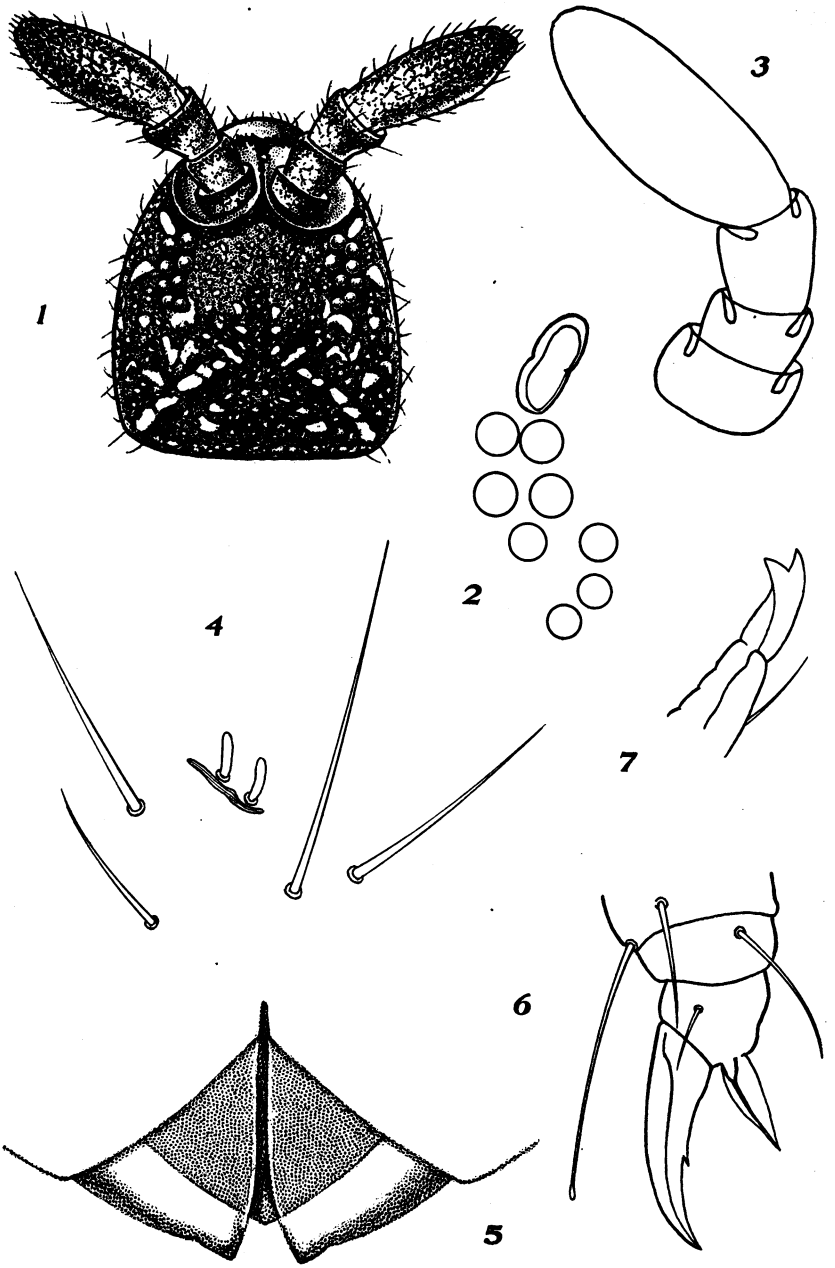
Most of the syntypes[1] have been given to The American Museum of Natural History, New York City. Other syntypes belong to the New York State Museum, Albany, the authorities of which have courteously permitted me to give certain specimens to the American Museum.

Isotoma immersa, new species

Figures 1 to 7

Ground color pale yellow in alcohol (possibly white in life); pigment purple, becoming blackish where dense. Head and body coarsely mottled with irregular spots dorsally; body segments bordered posteriorly with broad bands of blackish. First three antennal segments each with an apical band; fourth segment dark apically. Legs pale yellow, the segments mottled with more or less pigment. Furcula and ventral region unpigmented. Head (Fig. 1) large in proportion to body, and two-fifths as long as the latter. A blackish V-shaped mark extends forward from the eyes. Eyes (Fig. 2), 8+8, unequal. Postantennal organ (Fig. 2), close to eyes, elliptical to oval, usually constricted at the middle, and two to three times as long as the diameter of an adjacent eye. Antennæ stout, approximate, subequal to, or slightly longer than, the head, with segments in relative lengths about as 11:14:22:45. Antennal segments strongly telescopic (Fig. 3). Basal antennal segment cup-shaped, immersed in a pit (Fig. 1); second subcylindrical; third subclavate; fourth elliptical. Sense organ of third antennal segment (Fig. 4) with a pair of feebly curving rods subtended by a chitinous ridge. Fourth antennal segment without special olfactory setæ. Prothorax concealed from above by the head and mesonotum. Abdominal segments without ankylosis. Body segments (excepting prothorax) in relative lengths about as 10:6:4:5:6:8:5:4. Fourth abdominal segment longer than the third (as 2:1 or 3:2). Anal segment relatively long and broad; suranal and sub-

[1]This term is used instead of "cotype" to indicate that no holotype was selected.



Isotoma immersa.—Fig. 1: Head, × 280. Fig. 2: Eyes and postantennal organ of right side, × 808. Fig. 3: Right antenna, × 512. Fig. 4: Sense organ of third antennal segment of right side, × 1968. Fig. 5: Ventral aspect of anal lobes, × 1536. Fig. 6: Right hind foot, × 1152. Fig. 7: Left mucro, × 1112.

anal valves (Fig. 5) relatively large, subtriangular. Tibiotarsus with a distal subsegment (Fig. 6). Hind claws the largest. Unguis (Fig. 6) curving, without lateral teeth, unidentate at the middle of the inner margin. Unguiculus half as long as unguis, lanceolate, untoothed. One long tenent hair, extending almost to apex of unguis. Furcula appended (apparently) to the fifth abdominal segment, long, attaining the ventral tube. Manubrium with many dorsal setæ and two pairs of ventral subapical setæ. Dentes one-fourth longer than manubrium, tapering, slightly curving, with about twenty-five coarse dorsal crenulations, which become successively smaller from the base toward the apex of the dens, and end before the apex at a distance equal to the length of the mucro. Dentes with several dorsal setæ and stiff ventral setæ. Mucro (Fig. 7) as long as hind unguiculus, non-lamellate, subequally bidentate; apical tooth feebly curving; anteapical tooth slightly larger, suberect. Rami of tenaculum quadridentate; corpus with one ventral seta (sometimes two). General clothing of short dense simple setæ, longer on the posterior part of the abdomen; erect sensory setæ a little longer than the others, simple. Cuticula smooth. Maximum length, 0.7 mm.

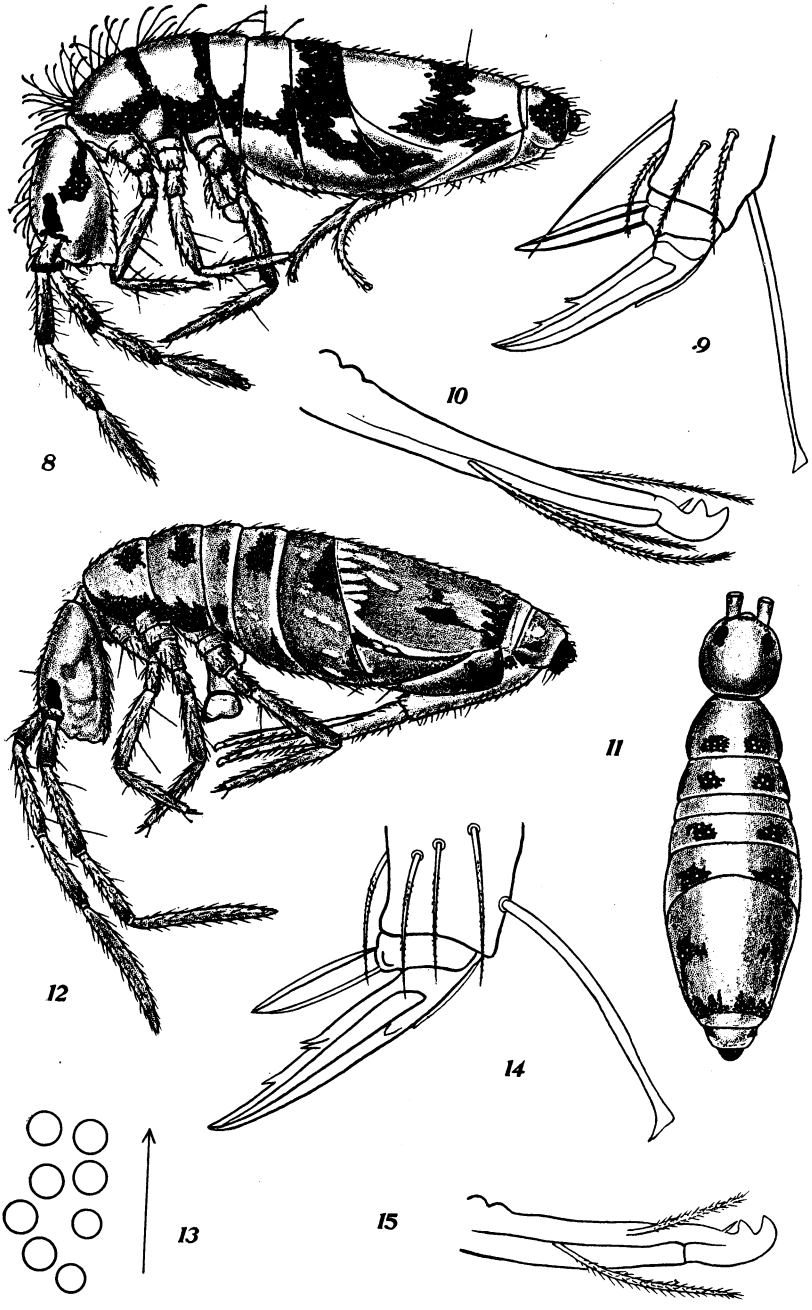
The apical tooth of the mucro is, in rare instances, reduced. Especially characteristic of the species are the strongly telescopic antennæ, inserted in foveæ, and the large anal segment. The species belongs in the subgenus *Proisotoma* Börner.

The only specimens of this species that I have seen are those given to me many years ago by Mr. Samuel Henshaw. They were taken from a vial containing practically innumerable individuals, found in a mushroom cellar on Long Island, NEW YORK, by Dr. J. A. Lintner.

Entomobrya ligata, new species

Figures 8 to 10

Yellow, with heavy black (dense purple) bands and spots (Fig. 8). The body has five dorsal bands, the anterior three of which are connected by a broad, irregular, lateral stripe, extending backward from the anterior border of the mesonotum and prolonged on the fourth abdominal segment. The dorsal bands occur respectively on mesonotum and metanotum posteriorly; abd. 3 except anteriorly; across the middle of abd. 4, this being a ragged band, that elongates laterally; and dorsally on genital and anal segments. The head bears a large postero-lateral spot, and an irregular line connecting the bases of the antennæ. First antennal segment yellow, with an apical band; second more or less purplish, with an apical band; third darker apically; third and fourth segments dull purplish. Legs almost entirely yellow; trochanters sometimes dark apically; femora pigmented apically on each side; tibiotarsi pigmented diffusely near the middle. Furcula pale yellow. Ventral tube yellow. Eyes 8+8. Antennæ one and one-half times as long as the head; segments in relative lengths about as 15:33:31:45. Fourth urotergite four and one-half times as long as the third. Unguis (Fig. 9) slender, almost straight, with a pair of small lateral teeth; inner margin with a pair of teeth near the middle and a single distal tooth. Unguiculus extending two-thirds as far as unguis on the hind feet, slender, acute. Tenent hair somewhat longer than unguis. Opposite the tenent hair is an



Entomobrya ligata.—Fig. 8: × 55. Fig. 9: Right hind foot, × 878. Fig. 10: Right mucro and end of dens, × 878.

Entomobrya mineola.—Fig. 11: Dorsal aspect, × 40. Fig. 12: Left aspect, × 38. Fig. 13: Eyes of left side, × 355. Fig. 14: Right mid foot, × 878. Fig. 15: Left mucro, × 878.

unusually long simple seta. Furcula attaining the ventral tube. Manubrium five-eighths as long as dentes. The dorsal crenulations of the dentes end before the apex at a distance equal to four times the length of the mucro. Mucrones (Fig. 10) with the usual apical and anteapical teeth, and with a short proximal spine. Large clavate fringed setæ occur dorsally and laterally on the thorax and anterior part of the abdomen, being dense on the head and anterior border of the mesonotum. Length, 1 mm.

Rarely, a narrow posterior band may occur on abd. 1 and abd. 2, respectively.

NEW YORK.—Ithaca, August 5, 1891, A. D. MacGillivray. Mineola, Long Island, July 8, 1923, Miss A. Wolf (N. Y. S. M.). Karner, July 14, 1923, Miss A. Wolf (N. Y. S. M.). Voorheesville, August 30, 1923, M. D. Leonard (N. Y. S. M.).

Entomobrya mineola, new species

Figures 11 to 15

Body color yellow; pigment dull purplish, blackish where dense; general color purplish yellow or reddish purple; pronotum yellow. In dorsal aspect (Fig. 11) four pairs of large black spots are characteristic; the pairs occurring on mesonotum, metanotum, abd. 2 and abd. 3 , respectively; in one specimen a pair of small dorsal spots was present on abd. 1 also (Fig. 12). Abd. 4 has spots on each side, as in Figures 11 and 12; a posterior black band with jagged anterior margin; also pale yellow tongue-like spots along the anterior border of the segment. Abd. 6, and sometimes abd. 5, is blackish. Mesonotum and metanotum with large blackish ventro-lateral spots (Fig. 12). Antennæ dull purplish; first segment and base of second, paler; second and third segments apically dark. Legs purplish yellow, with a little scattered pigment; coxæ pigmented and femora dark apically in large specimens. Furcula and ventral tube pale yellow. Eyes 8+8 (Fig. 13), the two inner proximal eyes smaller than the others. Antennæ two and one-half times as long as the head; segments in relative lengths about as 17:23:20:36; third segment thus shorter than the second. Fourth abdominal segment five times as long as the third. Unguis (Fig. 14) slender, almost straight, with a pair of lateral teeth and a minute outer basal tooth; inner margin with a pair of large teeth at the middle and a single distal tooth. Unguiculus extending more than half as far as unguis on mid and hind feet, half as far on fore feet, oblong elliptical, acute, untoothed. Tenent hair about as long as unguis, with a large knob. Furcula extending to the ventral tube. Dentes one-fourth longer than manubrium. The dorsal crenulations of the dentes end before the apex at a distance equal to twice the length of the mucro. Mucrones (Fig. 15) with the usual apical and anteapical teeth, and with a small proximal spine. Length, 1.6 mm.

Dr. Jan Stach informs me that this species has not been found in Europe.

Mineola, Long Island, NEW YORK; July 8, 1923; Miss A. Wolf (N. Y. S. M.).

Entomobrya assuta, new species

Figures 16 to 19

Dorsally yellow, banded and spotted with blue pigment, which appears black when dense; ventrally yellow. Head (Fig. 16) with a band connecting the eye spots and the bases of the antennæ. Mesonotum bordered anteriorly and laterally with more or less pigment. Metanotum bordered narrowly with pigment posteriorly and laterally. Abd. 1 with or without dorsal spots. Abd. 2 with a broad band along the posterior margin. Abd. 3 with large irregular dorsal spots as in Figure 16; the posterior margin edged with black. Abd. 4 yellow anteriorly; posteriorly with four large irregular yellow spots; two dorsal and two lateral. First and second antennal segments yellow or white, each with an apical band; or second segment purplish except basally; third and fourth segments dusky apically, or throughout. Legs mostly yellow; tibiotarsi suffused with pigment near the middle; hind femora with pigment distally, often in the form of a pair of stripes; fore and mid femora feebly pigmented distally. Eyes (Fig. 17), 8+8, the two inner proximal eyes much smaller than the others. Antennæ about twice as long as the head; second segment more than twice as long as the first; third shorter than the second; fourth about one-fourth longer than the third. Fourth abdominal segment from three to four times as long as the third. Unguis (Fig. 18), long and slender, with a pair of sharp lateral teeth two-fifths from the base; inner margin with three pairs of teeth. Unguiculus extending two-thirds as far as the unguis, slender, acute, untoothed. Tenent hair a little longer than unguis, strongly knobbed. Furcula extending to the ventral tube. Manubrium two-thirds as long as dentes. Dentes with minute dorso-distal teeth continued over the base of the mucro. Mucro (Fig. 19) strongly rounded ventrally, with stout apical and anteapical teeth, and with proximal spine. The last three abdominal segments bear laterally long fringed hairs or threads, some of which on abd. 4 are as long as the manubrium. Maximum length, 2 mm.

As a variation, the entire metanotum may be pigmented.

This species is not known to occur in Europe, according to Dr. Jan Stach, to whom I sent specimens.

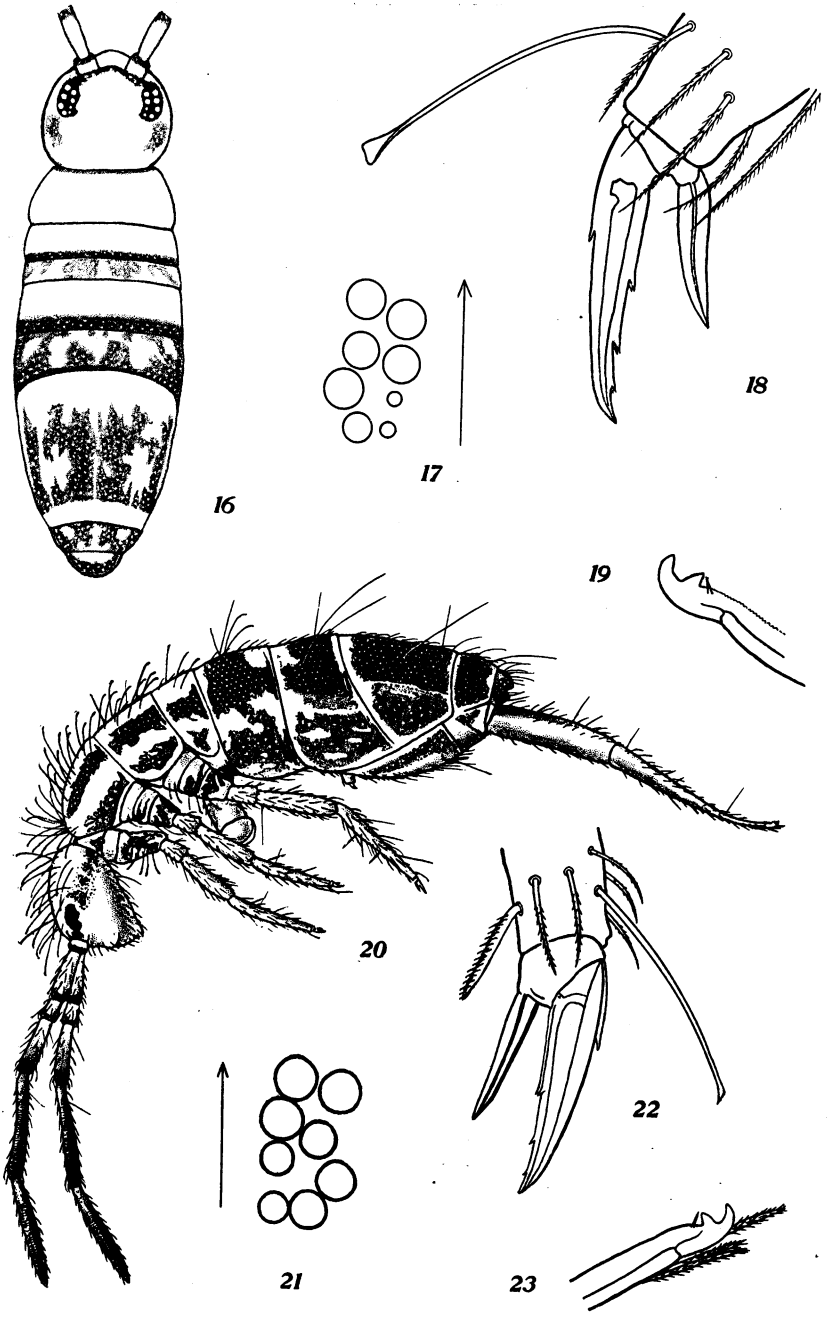
VERMONT.—Clarendon; March, April, 1898; under bark; O. W. Barrett.

NEW YORK.—Geneva; June 18, 1917; under apple bark; H. Glasgow.

Orchesella ainsliei, new species

Figures 20 to 23

Yellow or brownish yellow, marked with dark blue becoming blackish where dense (Fig. 20). Body with four conspicuous stripes, two dorsal and two lateral, interrupted intersegmentally, extending from the prothorax as far as abd. 2; the lateral stripe continued weakly across the head to the eye spot. Last five abdominal segments mostly blackish dorsally and laterally, but with irregular intersegmental bands of brownish yellow. Sternum yellow. First five antennal segments each with an apical band; sixth segment darker apically; first three segments yellowish;



Entomobrya assuta.—Fig. 16: Dorsal aspect, × 59. Fig. 17: Eyes of left side, × 194. Fig. 18: Left mid foot, × 800. Fig. 19: Right mucro, × 800.

Orchesella ainsliei.—Fig. 20: × 35. Fig. 21: Eyes of right side, × 355. Fig. 22: Right hind foot, × 878. Fig. 23: Left mucro, × 878.

fourth yellowish basally. Legs pale yellow, excepting pigment on coxæ and precoxal segments; tibiotarsi darker. Furcula pale yellow, with sometimes a little dorsal pigment at the base of the manubrium. Ventral tube pale yellow.

The preceding description applies to most of the larger individuals. Smaller specimens (about 1.3 mm. in length) are yellow for the most part, with the four interrupted stripes; the dorsal stripes extending the length of the body, and each lateral stripe represented by spots on the three thoracic segments and the second abdominal segment, respectively; coxæ feebly pigmented.

Some of the largest specimens, on the other hand, are almost entirely black, with a median dorsal yellow stripe extending to abd. 2; a broad interrupted lateral stripe ending on abd. 3; with the intersegmental regions yellow; and with considerable pigment on every leg-segment. Eyes (Fig. 21), 8+8, the two inner proximal eyes smaller than the others. Antennæ two and one-half to three times as long as the head, or about two thirds as long as head and body; the segments variable in relative lengths. Last two antennal segments obscurely annulate in large specimens, the annulations absent at the base of each segment. Body segments, excepting prothorax, in relative lengths about as 27:20:15:20:24:38:12:7. Fourth urotergite thus a little more than one and one-half times as long as the third. Unguis (Fig. 22) with a pair of evident lateral teeth; inner margin with a pair of small teeth near the middle, and two single teeth beyond, the distal tooth minute and sometimes absent. Unguiculus slender, tapering, acute, untoothed, extending half as far as unguis on first pair of feet, and two-thirds as far on second and third pairs; with a minute tooth beyond the middle of the outer margin. Tenent hair as long as unguis. Furcula extending beyond the ventral tube. Manubrium four-fifths as long as dentes. Mucrones (Fig. 23) with apical and anteapical teeth and a small proximal spine. Rami of tenaculum quadridentate; corpus with a pair of short anterior setæ. General body clothing of dense short curving fringed setæ. Long subclavate setæ occur dorsally and laterally on head, mesonotum, metanotum, and first two abdominal segments, being dense on head and thorax. Long, outstanding, minutely toothed, sensory setæ occur in a transverse series on almost every body segment, also on antennæ, legs, and furcula. Bothriotricha were seen on abd. 3 and 4. Length, up to 2 mm.

The annulations of the last two antennal segments are rather obscure, but become evident when the tissues are caused to shrink away from the cuticula, as by the application of glycerin.

Though some of the specimens from Voorheesville, N. Y., collected in November, are as long as 1.7 mm., all of them have the type of coloration that is characteristic of small specimens, namely, the two pairs of stripes, without other markings on the body.

Orchesella ainsliei is rather frequent in woods, under logs or dead leaves, or in the leaf mold.

NEW YORK.—Voorheesville; November 9, 1923; M. D. Leonard (N. Y. S. M.).

TENNESSEE.—Knoxville; February 18, 1921; C. N. and G. G. Ainslie.

ILLINOIS.—Urbana; April 5, 11, 1915, March 20, 1918, August 11, 1919; J. W. Folsom. Homer; April 30, 1923; J. W. Folsom.

Iowa.—Sioux City; March 21, 1919; C. N. Ainslie.

I take pleasure in naming this species after Mr. C. N. Ainslie, of the Bureau of Entomology.

Lepidocyrtus cyaneus Tullberg var. **cinereus,** new variety

Figures 24 to 27

With scales, metallic gray; occasionally with a trace of iridescent purple on some part of the body, but never purple throughout. Denuded of scales, the body shows alternating light and dark bands, the body color being whitish, yellow or orange, and the pigment purple. The pigment forms broad bands across the body segments, owing to its absence along the borders of the segments (Fig. 24); is interspersed with close rounded pale spots of various sizes, and interrupted laterally by elongate oblique pale spots. The mesonotum and the second and third abdominal segments are most strongly pigmented. Mesonotum edged with blackish anteriorly and laterally. Head with a mark connecting the eye spots anteriorly. Antennæ purple; first and second segments pale basally. Legs white, excepting base of coxa and the adjoining precoxal segment. Furcula white. Ventral tube pigmented basally. Sternum pale, with scattered pigment.

In more feebly pigmented individuals there is little pigment on abd. 4. Even in faintly pigmented specimens, however, the bands on abd. 2 and 3 are evident.

In strongly pigmented specimens all the segments except the prothorax are heavily mottled with pigment, but the pale intersegmental bands still remain. In such individuals a little pigment is present on trochanter, femur, and the base of the tibiotarsus; the antennæ being purple throughout, but the furcula white.

A weak coloration is not necessarily limited to young individuals, for one specimen of the maximum length was yellow, with the bands only feebly indicated.

Eyes (Fig. 25), 8+8, the two inner proximal eyes elliptical in outline. Antennæ slightly longer than the head, with stout segments; first three segments subclavate; fourth elliptical; third segment shorter than the second; fourth, twice as long as the third. Mesonotum concealing the pronotum, but not projecting far over the base of the head. Unguis (Fig. 26) with a pair of large lateral teeth and two pairs of inner teeth, the proximal pair being near the middle of the inner margin. Unguiculus sublanceolate, acute, untoothed, extending two-thirds as far as unguis on the second and third pairs of feet, and one-half as far on the first pair. Tenent hair four-fifths as long as unguis, feebly knobbed. Fourth abdominal segment two and one-half times as long as the third. Dentes and manubrium subequal in length. Dentes crenulate dorsally, the crenulations ending before the apex at a distance equal to three times the length of the mucro. Mucro (Fig. 27) with subequal apical and anteapical teeth, and strong proximal spine. Rami of tenaculum quadridentate; corpus with one strong anterior seta. Head and body densely scaled. Subclavate fringed setæ occur densely on the anterior border of the mesonotum. Long slender outstanding minutely fringed sensory setæ are present on abd. 2 to 5, inclusive, seven pairs being observed on abd. 4. Similar but shorter setæ occur on antennæ, legs and furcula. Maximum length, 1.1 mm.

Structurally, this form agrees essentially with *cyaneus* from Europe and the United States. In this variety, as compared with typical

cyaneus, ant. 4 is relatively longer than ant. 3; ant. 3 is shorter than 2; abd. 4 is shorter in relation to abd. 3; and manubrium and dentes are subequal in length. These differences are not very significant, however, for they concern characters that are variable normally. In coloration, on the contrary, *cinereus* is sharply separated from typical *cyaneus;* being metallic gray, with occasionally a trace of purple, but never deep iridescent purple throughout, with bronze or golden reflections, as in *cyaneus*.

This variety *cinereus* agrees with *cyaneus* var. *assimilis* Reuter as regards the presence of pale bands along the borders of the body segments, but differs in other respects, as I have been informed by Dr. Jan Stach, Krakau, Poland, who examined some of my specimens.

In eastern Massachusetts I found *cyaneus* (*metallicus* Packard) to be a ubiquitous species. It is seldom absent under sticks, stones or other objects on the ground. In woods it is common under dead leaves, in the humus, or under loose bark, and elsewhere; in cities it is common in spots of grass. Even on soil that is too dry for other collembolans, *cyaneus* is at home, by virtue of its exceptionally dense clothing of scales, which retard the loss of moisture from the body.

In central Illinois *cyaneus* is represented by this gray variety, common everywhere. In many years of collecting I have taken in this region only a few specimens that could be referred to typical *cyaneus*.

In material from New York (Voorheesville, August 30) both forms were present in the same vial.

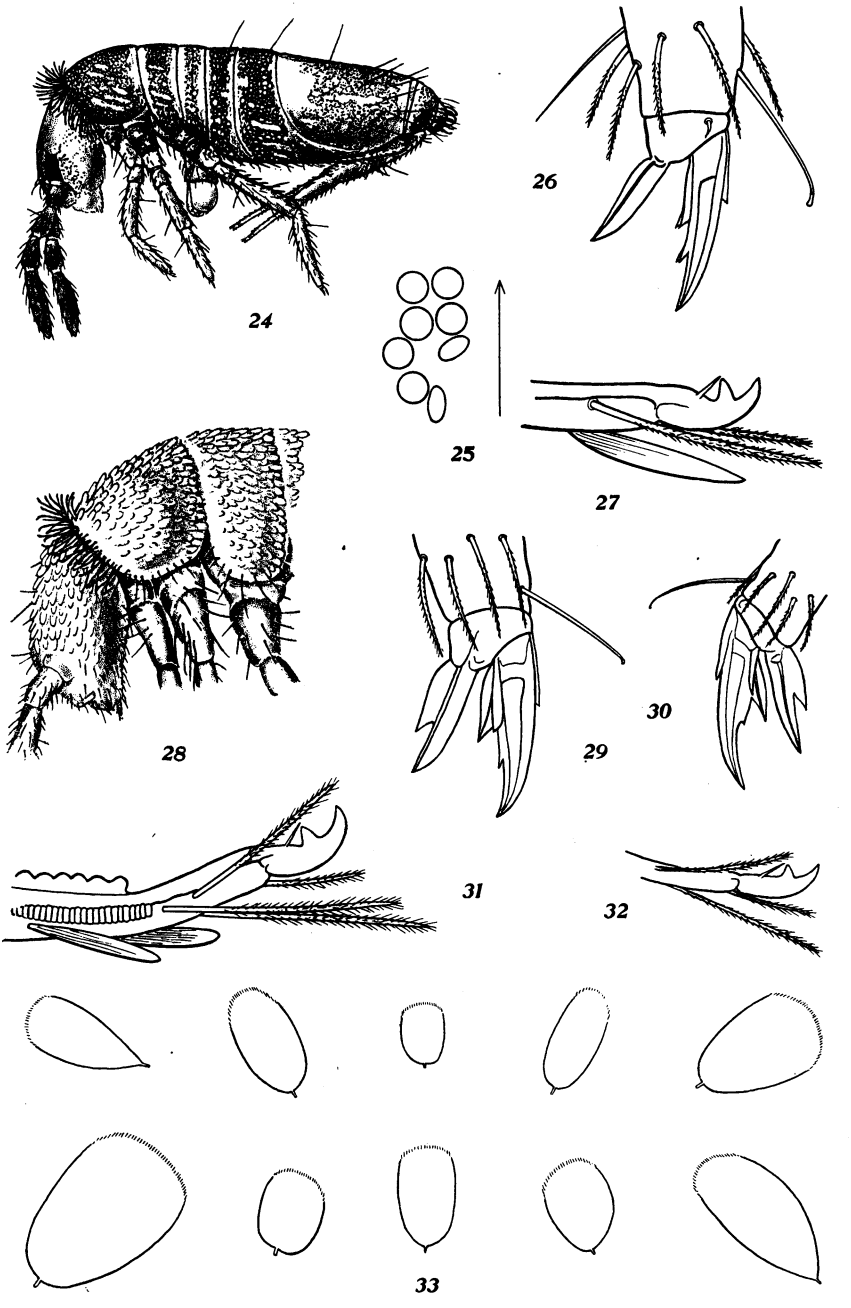
NEW YORK.—Voorheesville; August 30, 1923; M. D. Leonard and S. C. Bishop (N. Y. S. M.).

ILLINOIS.—Homer; April 23, May 13, 15, 16, 18, 20, 22, 23, 25, 26, 27, August 30, October 15, 20, 22, 31.

Lepidocyrtus violentus, new species

Figures 28 to 33

White. Eyes absent (Fig. 28). Antennæ about one and one-half times as long as the head; first three segments clavate; fourth subelliptical; third segment a little shorter than the second; fourth, one and three-quarters to two times as long as the third. Mesonotum concealing the pronotum, but projecting only slightly over the head. Fourth abdominal segment two and one-third to two and one-half times as long as the third. Claws successively longer on the three pairs of feet. Unguis (Figs. 29, 30) curving apically, with a pair of lateral teeth one-third from the base. The inner border of the unguis bears, instead of a pair of proximal teeth, a pair of pointed lobes, one of which is larger and sublanceolate, the other smaller and elongate. The smaller lobe is anterior in position, when the leg is extended at right angles to the long axis of the body. Beyond the proximal lobes is an evident distal tooth. Unguiculus extending two-thirds to three-fourths as far as unguis on third feet; one-half to



Lepidocyrtus cyaneus var. *cinereus*.—Fig. 24: × 60. Fig. 25: Eyes of left side, ×320. Fig. 26: Right hind foot, × 1050. Fig. 27: Left mucro and end of dens, ×1050.

Lepidocyrtus violentus.—Fig. 28: Anterior region, × 88. Fig. 29: Left hind foot, ×810. Fig. 30: Right fore foot, × 720. Fig. 31: Left mucro and end of dens, × 790. Fig. 32: Left mucro and end of dens, × 720. Fig. 33: Scales, × 320.

three-fifths as far on first and second feet; broad, with a large acute outer lobe. Tenent hair as long as unguiculus, feebly knobbed. Furcula attaining the ventral tube. Manubrium a little shorter than dentes (as 9:10). Dentes gradually tapering, crenulate dorsally, the crenulations ending before the apex at a distance equal to one and one-half times the length of the mucro. Mucrones (Figs. 31, 32) comparatively elongate, with long apical tooth, erect conical anteapical tooth, and long proximal spine. Rami of tenaculum quadridentate; corpus with one stout curving fringed anterior seta. Head and body densely scaled (Fig. 28), the scales varying greatly in form and size (Fig. 33) but mostly short, broad and asymmetrical, with the distal margin minutely fringed. Stout subclavate fringed setæ occur densely along the anterior border of the mesonotum (Fig. 28) and on abd. 5 and 6. Long slender feebly clavate fringed outstanding sensory setæ are present dorsally: a few on the head, and two pairs on each of the first four abdominal segments. Exceptionally long thread-like fringed hairs (bothriotricha) occur as follows: two pairs on abd. 2; two pairs on abd. 3; two or three pairs on abd. 4. Legs with stout pointed fringed outstanding setæ as follows: coxa, 3 or 4; trochanter, 1; femur, 1 to 3; tibiotarsus, 2 or 3. Furcula with scales ventrally; dorsally with dense curving fringed setæ, many of which are strongly clavate. Length, 1.2 mm.; usual maximum, 1.5 mm. One unusually large individual, taken in a greenhouse, was 2.1 mm. in length.

In some specimens the claws and mucrones are more slender than usual, as shown in Figures 30 and 32, from Massachusetts specimens.

Dr. Jan Stach, Krakau, Poland, to whom I sent examples of this form for comparison with European species, reported it to be a new species near *Lepidocyrtus petterseni* (*Pseudosinella petterseni* Börner, 1901, Zool. Anz., XXIV, p. 707).

Lepidocyrtus violentus belongs to the soil-fauna and is one of the commonest collembolans under boards, logs or stones. It occurs often in company with ants of various species, especially under stones embedded in the ground. Like other collembolans with a dense scaly covering, this species may be found on soil that is rather dry.

Its locomotion is characteristic, consisting of frequent dashes and momentary pauses; hence I call this species the "scooter." Though blind, the insect on exposure to sunlight loses no time in finding a dark crevice; in this reaction, positive thigmotropism is, of course, a possible factor.

MASSACHUSETTS.—Arlington, Cambridge, and Waverley; March 15, 28, May 1, 3, 7, 12, 13, 16, July 16, 26, September 18, November 5; J. W. Folsom.

NEW YORK.—Voorheesville; November 19, 1923; M. D. Leonard (N. Y. S. M.).

INDIANA.—Lafayette; April 13; T. H. Frison.

ILLINOIS.—Champaign and Homer; April 5, 8, 11, 12, 13, 24, 25, May 22, 27, 29 (minute young forms common), June 1, July 13, October 10, 19; J. W. Folsom.