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REEXAMINATION OF SPECIES OF PROTURA
DESCRIBED BY H. E. EWING

By F. BONET AND S. L. TUXEN¹

In 1948 F. Bonet went to Washington on a Guggenheim Memorial Scholarship to study the Ewing collection of Protura. He redescribed three of Ewing's species of *Eosentomon* in 1950 without, however, giving figures. In 1956 S. L. Tuxen, supported by the Carlsberg Foundation, Copenhagen, also went to Washington for the same purpose, after having discussed matters with Bonet in Mexico. They arranged to publish the redescrptions of Ewing collection jointly. Tuxen took Bonet's notes to Washington and limited himself to a study of the characters which Bonet had not taken into consideration. All figures in the present paper were made by Tuxen when it is not expressly stated "drawn by Bonet." The present paper was completed in 1957 and submitted for publication in November of that year.

The authors wish to express their sincerest thanks to the foundations which have supported their studies, and extend special thanks to Grace Glance without whose kind help they could not have made the studies.

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For the systematics of the Protura it seems of paramount importance to be able to define with certainty which species the first describers had before them. In his redescrptions of the species described by Berlese and Silvestri, Tuxen (1956) stressed characters not known by these authors: The setae and sensillae of the foretarsus, the female genital squama, and the chaetotaxy. In 1958 Tuxen did the same for a species described by Stach. In the present paper a similar study has been made of the species which were described by Ewing and are now kept in the U.S. National Museum, Washington.

Ewing described his species in several papers. In 1921 he described *Acerentulus barberi*, the first American proturan to be identified since Silvestri's specimen, collected in the vicinity of New York in 1909 and called *Eosentomon wheeleri*. The type specimen of *wheeleri* was supposed lost, until its rediscovery was reported by Tuxen (1960).

In 1921 Ewing also described 10 more species from the United States. They were placed in three old and three new genera. The specimens were all found near Washington, D.C. The next year he briefly mentioned the then known distribution of Protura in the United States. In 1924 he described a new species from Florida, and in 1927 a new species from the western states. In 1936 he compiled a "synonymy and synopsis" of the genera then known. A larger paper in 1940 summed up all the knowledge of the North American Protura and contained the descriptions of six new species. Thus 19 species were described by Ewing, besides the redescription of *E. wheeleri* Silvestri. Of these species, he identified *A. tenuiceps* as a synonym of *A. barberi* and, erroneously, *E. minimum* as a synonym of *E. pallidum* in 1940. The types of the remaining species will be discussed in the present paper.

The 1940 paper by Ewing is based on much more material than the types, in all about 200 slides. Part of this material is incorrectly determined and part of it probably comprises new, hitherto undescribed species, but it does not seem advisable to describe more species as long as the species of Ionescu and Womersley have not been reexamined. In 1960 Tuxen finished this task.

A small, ridiculous difficulty in describing arose. In 1949 both of us invented systems of numbering the dorsal abdominal setae, but unfortunately in opposite directions, Tuxen made the median setae No. 1, while Bonet made the lateral ones No. 1. Bonet used his system in 1949 and 1950. Tuxen used his system in 1949 and in the papers since 1955. Among the latter were the redescrptions of Berlese's and Silvestri's species. Since it is easier to define the position of the median setae than that of the lateral ones (the pleura are not always distinguishable from the terga), the "Tuxen-system" of numbering will be

used in this and all future papers by us. The setae and sensillae of the foretarsus are numbered on the figures according to the system described by Tuxen in 1955 and 1958. Readers of the Bonet papers of 1949 and 1950 should be aware of this difference.

The 18 species whose types we shall deal with here are the following:

Genus <i>Eosentomon</i> Berlese:	<i>A. conurus</i> Ewing
<i>E. vermiforme</i> Ewing	<i>A. andrei</i> Ewing
<i>E. pallidum</i> Ewing	<i>A. christensoni</i> Ewing
<i>E. minimum</i> Ewing	<i>A. occidentalis</i> Ewing
<i>E. yosemitense</i> Ewing	Genus <i>Acerentulus</i> Berlese:
<i>E. rostratum</i> Ewing	<i>A. barberi</i> Ewing (= <i>A. tenuiceps</i> Ewing)
<i>E. pusillum</i> Ewing	<i>A. oculus</i> Ewing
Genus <i>Protentomon</i> Ewing:	<i>A. bicolor</i> Ewing (= <i>Acerentuloides bicolor</i>)
<i>P. transitans</i> Ewing	<i>A. floridanus</i> Ewing (= <i>Acerentomon floridanum</i>)
Genus <i>Microentomon</i> Ewing:	<i>A. aureitarsus</i> Ewing
<i>M. minutum</i> Ewing	
Genus <i>Acerentomon</i> Silvestri:	
<i>A. americanum</i> Ewing	

A neotype of *Acerentomon californicum* (Hilton) (= *Acerentulus californicus* Hilton) is described and a redescription is given of *Eosentomon wheeleri* Silvestri on the basis of Ewing's specimens.

Of Ewing's genera only *Protentomon* is valid, and of his 19 species only the following are valid: *Eosentomon vermiforme*, *E. pallidum*, *E. yosemitense*, *E. rostratum*, *E. pusillum*, *Protentomon transitans*, *Acerentomon andrei*, *Acerentulus americanus*, *A. barberi*, *A. floridanus*, and *A. aureitarsus*.

The concept of *Acerentomon* and *Acerentulus* used in this paper is based on the labrum and the maxillary palpi, and holds good in extreme cases, but transitional forms may be found. The justification of the two genera needs reexamination.

Eosentomon wheeleri Silvestri

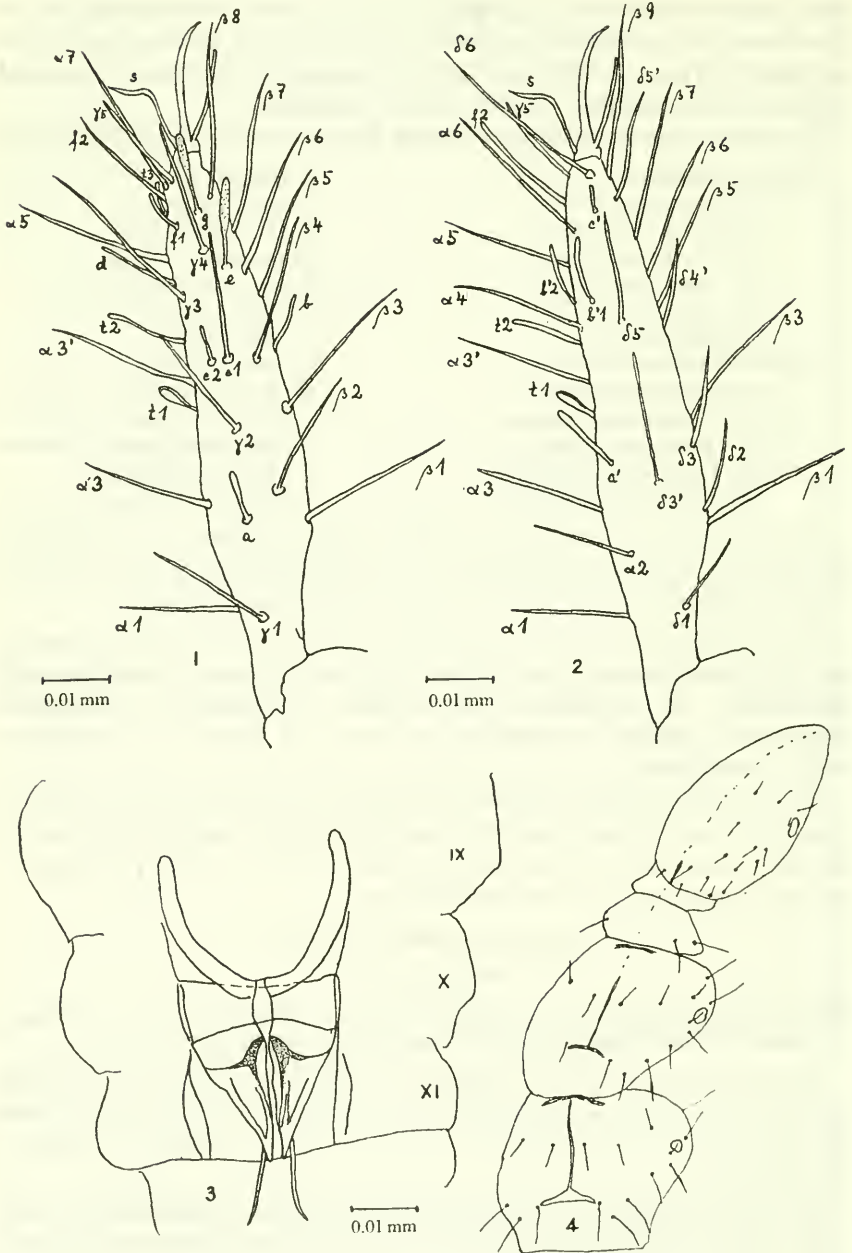
FIGURES 1-14

Eosentomon wheeleri Silvestri, 1909, p. 8.—Ewing, 1940, p. 523.—Not *Eosentomon wheeleri* Bonet, 1942, p. 15 (= *E. boneti* Tuxen, 1956b, p. 719).

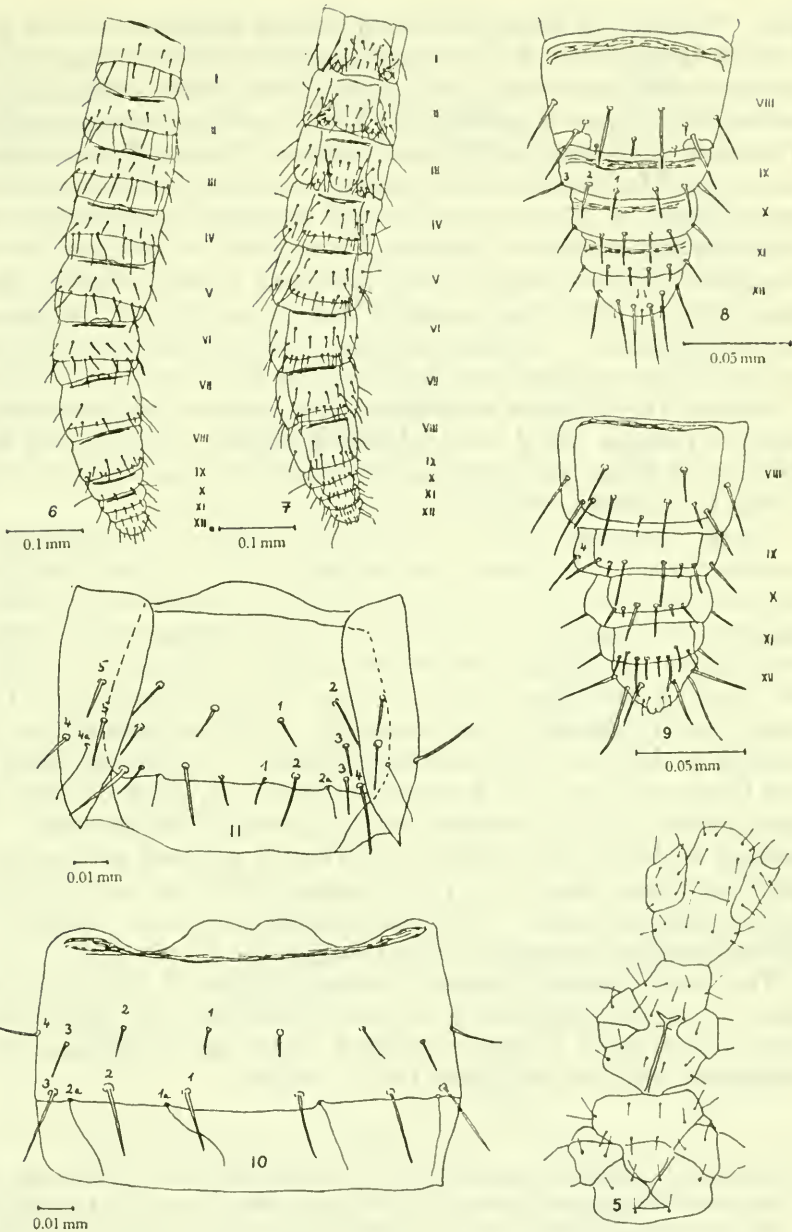
The species described by Silvestri in 1909 as *wheeleri* was collected in humus in woods around New York. The type was said (Tuxen 1956b, p. 719) to be missing from Silvestri's collection of Protura in Portici.

In 1940 Ewing described a species as *wheeleri* from material collected in Maryland, Virginia, and Texas. He had not seen the type specimen.

In 1942 Bonet described a species as *wheeleri* from several localities in Mexico. In 1956 Tuxen decided to make a specimen of this latter species the neotype of *wheeleri*, since the holotype was supposedly



FIGURES 1-4.—*Eosentomon wheeleri* Silvestri: 1, foretarsus, exterior side; 2, foretarsus, interior side; 3, female squama genitalis; 4, tergal chaetotaxy of head and thorax.



FIGURES 5-11.—*Eosentomon wheeleri* Silvestri: 5, sternal chaetotaxy of head and thorax; 6, tergal chaetotaxy of abdomen; 7, sternal chaetotaxy of abdomen; 8, tergal chaetotaxy of abd. VIII-XII; 9, sternal chaetotaxy of abd. VIII-XII; 10, abdominal tergum IV; 11, abdominal sternum IV.

lost. However, as Bonet had stated that his *wheeleri* had never been found outside Mexico, and as it was specifically different from Ewing's *wheeleri*, which was found in the eastern United States, it then seemed preferable to choose a specimen of Ewing's *wheeleri* for the neotype. Therefore, in his paper on Silvestri's types of Protura, Tuxen changed the name of Bonet's *wheeleri* to *boneti*, new name, and postponed the redescription of *wheeleri* until he had examined Ewing's material. In preparing the present paper we chose from this material for our description a female bearing the data Mount Rogers, Virginia, elevation 5,000 ft., under dead chestnut bark, Sept. 19, 1938, Ewing and Gurney collectors. Now that the actual holotype has been recovered, we find that our redescription agrees with it (see Tuxen, 1960, p. 298).

Some of the drawings were made from another slide containing 3 males, 3 females, and 2 maturi juniores labeled, under bark of logs, Elk Garden Ridge, Jefferson National Forest, Virginia, Sept. 18, 1938, Ewing and Gurney collectors.

On the foretarsus (figs. 1-2), compared with the drawings of *E. armatum* Stach (= *E. transitorium* Berlese) by Tuxen (1958), the following differences are noticed: The t 1 has a very characteristic thickening along one margin, in some cases making it appear to be a twined sensilla, the disc being more or less invisible. The a, c 1, e, and g are longer; d and f 2 are shorter in *wheeleri* than in *transitorium*; t 1 is nearer $\alpha 3'$ in *wheeleri*, a fact especially important inasmuch as the relation of the part of the foretarsus outside t 1 to the one inside t 1 will thus be 8:7 (=1.15), while in *transitorium* it is 8:8 (=1.00), the part outside t 1 being measured to the beginning of the pretarsus. We propose to denote this relation by the sign d:p (distal part:proximal part), and state that d:p=1.15 in *wheeleri* Silvestri and d:p=1.00 in *transitorium* Berlese. On the interior side of the foretarsus, a' is shorter than in *transitorium*; it just reaches the tip of t 1.

The female squama genitalis is shown in figure 3 from the dorsal side. It is very different from that of *transitorium*. The head of processus sternales is slightly rounded, rather like the squama of *E. mexicanum* Silvestri and *boneti* Tuxen (1956b).

FIGURES 12-22.—*Eosentomon wheeleri* Silvestri: 12, tarsus III; 13, mouth parts seen from the ventral side, obliquely, Ga=galea, Lb=labium, Mdb=mandible; 14, mouth parts seen from above. *Eosentomon vermiforme* Ewing: 15, foretarsus, exterior side, holotype; 16, foretarsus, interior side, paratype. 17, female squamta genitalis, holotype; 18, tergal chaetotaxy of abd. V; 19, sternal chaetotaxy of abd. V, 20, tarsus III, paratype; 21, shape of head, holotype; 22, mouth parts seen from above; La 1 and La 2=1st and 2nd lacinia.

The chaetotaxy (figs. 4-9) schematically is as follows (the pleural setae included in the tergal ones):

	Th. I	II	III	Abd. I	II-III	IV	V	VI	VII	VIII	IX-X	XI	XII
t	4	$\frac{10}{12}$	$\frac{10}{12}$	$\frac{4}{10}$	$\frac{12}{14}$	$\frac{12}{14}$	$\frac{10}{14}$	$\frac{10}{14}$	$\frac{8}{14}$	$\frac{6}{7}$	8	8	9
s	14	14	16	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{2}{7}$	6	8	10

^a "3" is missing.

^b "1" and "3" are missing.

^c "3a" is extremely short, not much longer than its pit.

The most remarkable features are the following: 1. s VIII $\frac{2}{3}$. Bonet (1949-50) divided the species of *Eosentomon* into groups according to the number of setae in s VIII. The *mexicanum* group has two anterior setae and no central posterior seta. The *pallidum* group has no anterior setae; *E. transitorium* belongs to this group. *E. wheeleri*, which has two anterior setae and a central posterior seta, belongs to a third group. We may call this the *wheeleri* group. Tuxen (1956b) shows that *E. boneti* belongs to the last group.

2. The presence of "3" in the anterior row of t III-IV, making a row of 12 setae. In *boneti* and *mexicanum* there are only 10 anterior setae. In *transitorium* 12 anterior setae are present in t III-IV as well as in V and VI, but these latter ones are missing in *wheeleri*.

The accessory setae are longer than the principal ones, as is also the case in *mexicanum* and especially *boneti*, but in *transitorium* they are equal. Figure 10 shows this as well as the shape of the lamina, anterior to the anterior apodeme. Figure 11 shows the sternal part of the same segment.

Tarsus III is provided with a distinct spine (fig. 12).

The mouth parts are shown in figures 13-14. Until now the mouth parts have not been used in the systematics of *Eosentomon*, but from the description of the next species it is apparent that they may differ widely within the genus. Those of *wheeleri* do not differ very much from those of *transitorium* (Berlese 1909).

Eosentomon vermiforme Ewing

FIGURES 15-22

Eosentomon vermiforme Ewing, 1921b, p. 194; 1940, p. 522.

We have examined and drawn figures from the holotype and a paratype slide of this species. The holotype was collected from decaying leaves in Takoma Park, Maryland, by H. E. Ewing, February 14, 1921, and the paratypes in dead leaves from Plummers Island, Maryland, by R. C. Shannon, March 18, 1924. The paratype slide contains 1 male and 2 females; only the male has foretarsi. The holotype specimen is a female.

On the foretarsus (figs. 15-16), t 1 resembles to some degree sensilla t 1 of *wheeleri* in having the thickening along one margin of the disc; the disc itself is often quite invisible. The a is very short, c 2 longer, and c 1 shorter than in *E. wheeleri*; they are nearly alike in size; e and especially g are shorter. The t 1 is located very near the base of α 3'; d:p is 8:11 (=0.75). The empodium is longer in relation to the claw than in *wheeleri*; the relation is 8:9 (=0.9). We will call this relation e:u, empodium:unguis; in *wheeleri* it is 3:5 (=0.6).

The female squama genitalis (fig. 17) resembles that of *wheeleri*, only the outer angles of the well-sclerotized part are longer and proceed proximally to a larger degree. Processus sternalis is as it is in *wheeleri*.

The chaetotaxy is schematically as follows (the pleurals are included in the tergum):

	Abd. I	II-III	IV	V-VI	VII	VIII	IX-X	XI	XII
t	$\frac{4}{10}$	$\frac{12}{14}$	$\frac{12}{14}$	$\frac{a 10}{14}$	$\frac{b 8}{14}$	$\frac{6}{7}$	8	8	9
s	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{2}{7}$	6	8	12

a "3" is missing.

b "1" and "3" are missing.

Figures 18-19 show the chaetotaxy of abd. V. It is apparent that the accessory setae in the terga are a little shorter than the principal ones, "1a" in VII being as usual very much shorter. The shape of the anterior tergal lamina is also shown.

On the basis of the chaetotaxy of s VIII, the species belongs to the *wheeleri* group; it is apparent that the chaetotaxy exhibits no difference at all from this species.

Tarsus III has a spine which is weaker than that usually found in the genus, although it is distinctly stronger than even the strongest of the setae. Figure 20 shows that the setae on the tarsus are of extremely different development.

The most significant characters are found in the mouth parts and in the slender shape of the head (fig. 21). The mouth parts (fig. 22) exceed the foremargin of the head so that the tip of the mandibles, which is equipped with distinct striae, is easily seen. The galea and outer lacinia (La 2) are nearly as long as the maxillary palpus. Both laciniae have a very characteristic appearance different from that of *E. wheeleri* and *E. transitorium*.

Eosentomon pallidum Ewing

FIGURES 23-28

Eosentomon pallidum Ewing, 1921b, p. 194; 1940, p. 525.—Bonet, 1950, p. 116.

This species, especially the chaetotaxy, was redescribed in 1950 by Bonet, but without figures. In 1940 Ewing supposed *E. minimum*

Ewing (1921b) to be synonymous with this species; however, a reexamination of the holotype of *minimum* showed it to be *E. vermiforme* Ewing.

The holotype, a female, was collected from decaying leaves at Takoma Park, Maryland, by H. E. Ewing, April 3, 1921.

The drawings were all made from the holotype except figures 25-26 and 28, which were made from a female collected in Fayette County, Kentucky, by Ritcher and Sanderson on May 6, 1947, and determined by Bonet.

No foretarsus (see fig. 23) was found lying in a position suited for drawing it from the interior side. The t 1 is remarkable in its pointed shape, without the thickening along the margin as seen in the two former species. In other respects the shape and size of the sensillae are equal to those of *vermiforme*; however, b is stouter, and a and f 1 are much longer in *E. pallidum*. The t 1 is placed rather near α 3 and away from α 3'; d:p=75:80 (=0.95); e:u=22:24(=0.9).

The female squama genitalis (fig. 24) is of a peculiar shape, different from that of the two former species. The processus sternales have no sharp edges as in *E. transitorium* nor any beak-shaped rounding as in *wheeleri* and *vermiforme*.

The chaetotaxy is described by Bonet (1950, note that for denoting the setae he uses other numbers than we do). Schematically it is given as follows:

	Abd. I	II-III	IV	V-VI	VII	VIII	IX-X	XI	XII
t	$\frac{4}{10}$	$\frac{12}{14}$	$\frac{12}{14}$	$\frac{a10}{14}$	$\frac{b6}{14}$	$\frac{6}{7}$	8	8	9
s	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{0}{7}$	6	8	10

a "3" missing.

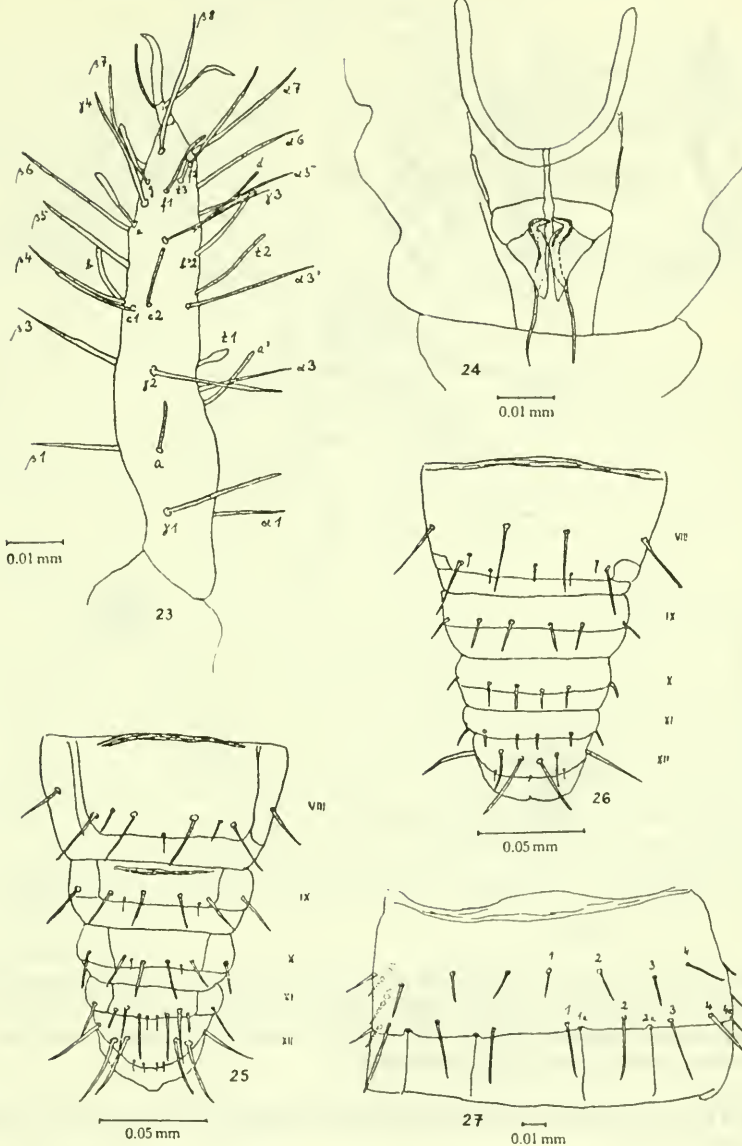
b "1-3" missing.

The most remarkable facts are the missing anterior row of sVIII (Bonet, 1950, built the *pallidum* group on this character), and the missing six interior setae in the anterior row of tVII; only the lateral one and the two "pleural" ones on each side are present. In the first character *pallidum* resembles *transitorium*; in the second one it does not.

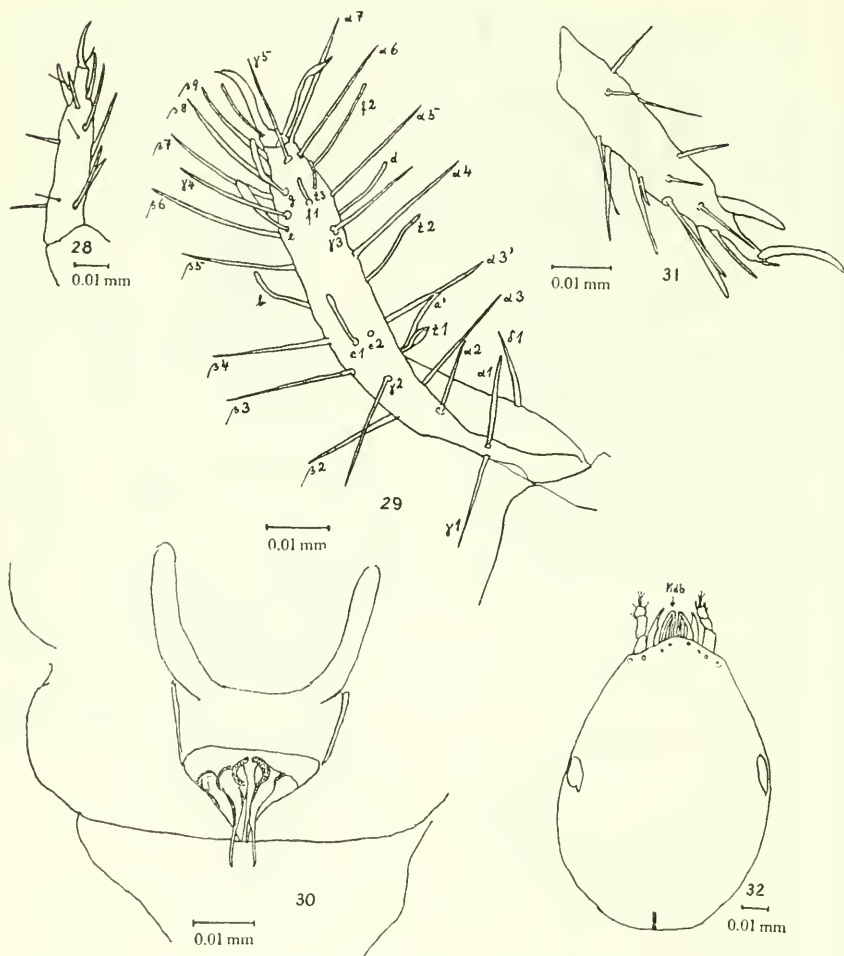
Figures 25-26 show the position of the ventral and tergal setae in abd. VIII-XII from the specimen determined by Bonet.

Figure 27 is of the holotype and shows tIV; it is apparent that the accessory setae are much longer than the principal ones. The lamina anterior to the anterior apodeme is nearly invisible.

Tarsus III (fig. 28) shows a very distinct spine. It is further remarkable in its long empodium. The drawing is from the specimen determined by Bonet.



FIGURES 23-27.—*Eosentomon pallidum* Ewing: 23, foretarsus, exterior side, holotype; 24, female squama genitalis, holotype; 25, sternal chaetotaxy of abd. VIII-XII, specimen from Fayette County; 26, tergal chaetotaxy of abd. VIII-XII, same specimen; 27, tergal chaetotaxy of abd. IV, holotype.



FIGURES 28-32.—*Eosentomon pallidum* Ewing: 28, tarsus III, specimen from Fayette County. *Eosentomon yosemitense* Ewing: 29, foretarsus, exterior side, holotype; 30, female squama genitalis, holotype; 31, tarsus III, holotype; 32, mouth parts and head seen from above of holotype; Mdb=mandible.

The mouth parts were not suited for drawing; they resemble those of *wheeleri*.

Eosentomon minimum Ewing

Eosentomon minimum Ewing, 1921b, p. 195.

In 1940 Ewing abandoned *E. minimum* and stated that it is a synonym of *E. pallidum* Ewing (1940, p. 525). He made a mistake; an examination of his holotype in the U.S. National Museum has shown that it is a specimen of *E. vermiforme* Ewing. Therefore, *E. minimum* Ewing is a synonym of *E. vermiforme* Ewing.

Eosentomon yosemitense Ewing

FIGURES 29-32

Eosentomon yosemitensis Ewing, 1927, p. 146; 1940, p. 528.—Bonet, 1950, p. 123

According to grammatical rules the spelling should be *yosemitense* since *Eosentomon* is neuter.

The species was redescribed, especially in respect to the chaetotaxy, by Bonet (1950) without figures.

The holotype is the only specimen of the species known, and bears the label, floor of Yosemite Valley, California, in decaying leaves and twigs, H. E. Ewing collector, April 15, 1927. It is impossible to give a complete description of all characters.

Only one of the foretarsi (see fig. 29) is present on the holotype and is somewhat damaged. The sensillae on the interior side as well as some of the exterior ones are not visible. The t 1 has the same thickened rim as in *E. vermiforme*, but is situated more proximally to α 3'; d:p=7:6(=1.15). The a could not be seen, and c 2 seems to be broken off; b is situated distally to c 1-c 2, not in a row as in *vermiforme*; e:u=10:12(=0.85).

In 1940 Ewing remarked that "the dorsal setae of tarsus I arise from tubercles." This statement is incorrect; we can see no difference in this respect from the other *Eosentomon* species.

The female squama genitalis (fig. 30) is very different from that of the other species, the processus sternales forming a kind of ring, open at two sides, surrounding the opening of the oviduct. It must be pointed out that the squama in the drawing is seen from the ventral side, but in the drawings of the other American species, from the dorsal side. However, this change cannot account for the great difference (see also the drawings of the squama of *E. armatum* (= *E. transitorium*) from both sides in Tuxen, 1958). The "ring" is not horizontal but somewhat oblique.

The chaetotaxy schematically is as follows:

	Abd. I	II-III	IV	V-VI	VII	VIII	IX-X	XI	XII
t	$\frac{4}{10}$	$\frac{12}{14}$	^a $\frac{10}{14}$	^b $\frac{8}{14}$	^c $\frac{6}{14}$	$\frac{6}{7}$	8	8	9
s	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{0}{7}$	4	8	10

a "2" is missing.
 b "2" and "3" are missing.
 c "1-3" are missing.

The missing anterior row of s VIII places the species in the *pallidum* group of Bonet; characteristic are the missing No. 2 in the anterior row of t IV and Nos. 2-3 in the anterior row of t V-VI; in other cases the setae will be lacking in the following order (from abd. IV-VII): "3," "1," and "2." Also the small number of setae in s IX-X is characteristic.

Generally speaking the accessory setae are longer than the principal ones; no drawing has been made to show this. Bonet (1950) states that the principal setae are very short.

Tarsus III (fig. 31) bears a distinct spine and a short empodium.

The mouth parts (fig. 32) were only roughly sketched during the stay in Washington and could not be checked at a later time. They resemble those of *vermiforme*, in exceeding the foremargin of the head and in having mandibular striae.

Eosentomon rostratum Ewing

FIGURES 33-36

Eosentomon rostratum Ewing, 1940, p. 520.

This species was described by Ewing as having a very long labrum, unique in the genus *Eosentomon*. Curiously, Ewing (1940) stated that formerly he "doubtless confused this labrum with the mandibles." In fact the species does not have a labrum.

There are two specimens on the holotype slide, and the data are, Highlands, North Carolina, on molding hemlock and deciduous tree leaves, May 8, 1936, V. R. Watson collector. These specimens were mentioned by Brimley (1938, p. 502) as *E. vermiforme*.

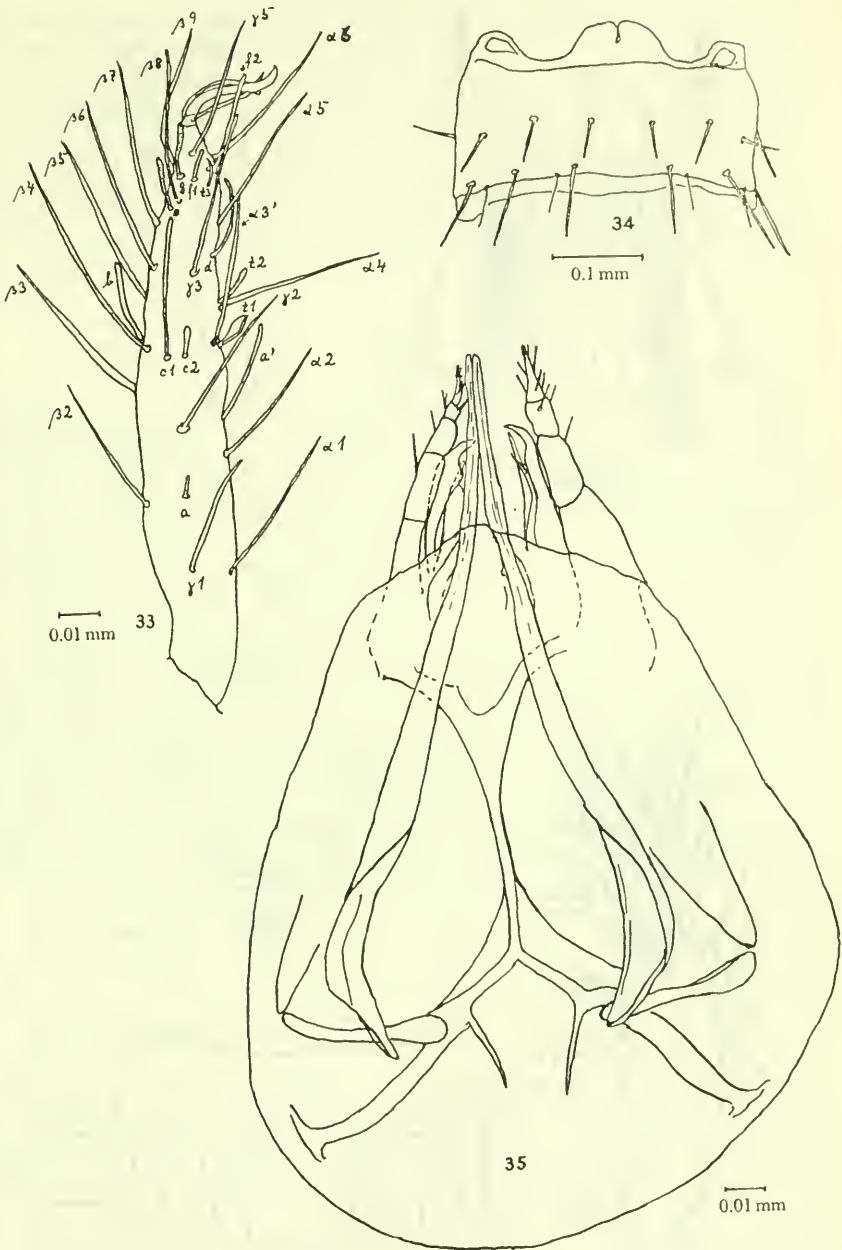
Only one other specimen of this species is known, collected at Ganntown, Illinois, December 29, 1932, by B. Harper and determined by Bonet. This specimen also has been used for the present description. It is a male.

Only one foretarsus (see fig. 33) was present on the holotype slide, and it was clearly visible only from the exterior side. The t 1 has a thickened rim, a is very short, c 2 extremely short, and c 1 long; b, c 1, and c 2 are in a line just as they are in *E. wheeleri* and *vermiforme*. The t 2 is short and d long; e and g are insignificantly broadened; a' is very long, t 1 just at the base of α 3'; d:p=58:90(=0.65), a very unusual proportion probably due to some degree to the foretarsus not lying horizontally in the mount; e:u=20:26(=0.75).

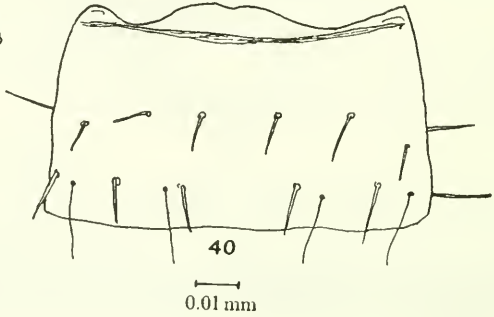
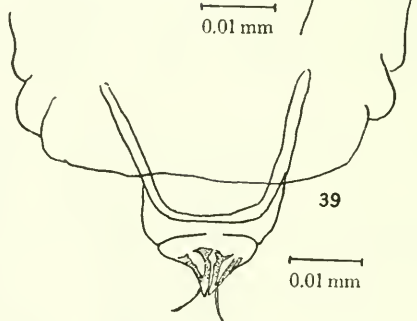
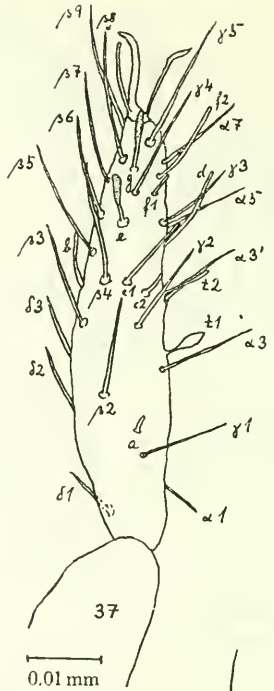
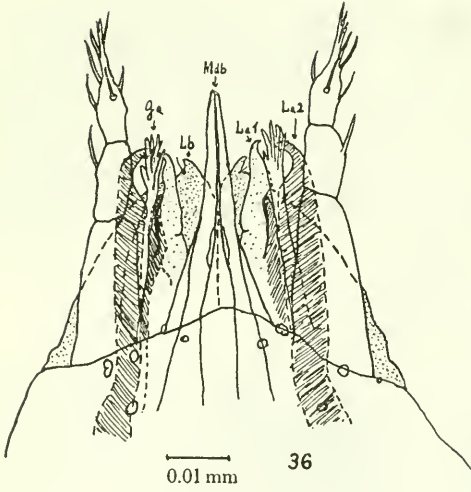
The chaetotaxy in every respect is equal to that of *vermiforme*, with the exception that s IX-X=4, not 6. Figure 34 of tV shows that the accessory setae are shorter than the principal ones, as they are in *vermiforme*.

Tarsus III has a distinct spine.

The mouth parts (figs. 35-36) are characterized by the very long and slender mandibles, which proceed very far in front of the foremargin of the head; in the holotype they even exceed the maxillary palpi. The galea and laciniae resemble in shape the corresponding ones in *vermiforme*. The mandibles are striated as in *vermiforme*.



FIGURES 33-35.—*Eosentomon rostratum* Ewing: 33, foretarsus, exterior side, holotype; 34, tergal chaetotaxy of abd. V, holotype; 35, head and mouth parts seen from above, holotype.



For explanation, see opposite page.

We have given figures of the mouth parts of both the holotype and the specimen determined by Bonet.

The female squama genitalis could not be drawn from the holotype as the tip of the abdomen is bent downwards; so far as could be seen it resembles that of *vermiforme*.

Although this species has very many features in common with *vermiforme*, we think that it is a different species because of the very curious mandibles, the different sizes of the sensillae a' and especially the proportion c 2:c 1, and the difference in the number of setae in s IX-X.

Eosentomon pusillum Ewing

FIGURES 37-42

Eosentomon minimum Ewing, 1924, p. 46.—Not Ewing, 1921b, p. 195.

Eosentomon pusillum Ewing, 1940, p. 527.—Bonet, 1950, p. 111.

Bonet redescribed *pusillum* in 1950 without figures. There are only two slides present of this species, a female holotype in good condition and three paratypes in poor condition. Data for holotype and paratypes are, Orlando, Florida, in decaying leaves and twigs, H. E. Ewing collector, May 26, 1922.

On the foretarsus (figs. 37-38), t 1 is without a thickened rim; a is very small; the other sensillae are as they are in *E. wheeleri*. The empodium is nearly as long as the claw; c:u=15:17(=0.9). The t 1 is near α 3, not α 3'; d:p=55:45(=1.2). The c' and t 3 were not visible on the only foretarsus present on the four specimens.

The female squama genitalis (fig. 39) is very different from that of the other species; the processus sternales has pointed edges.

The chaetotaxy as given by Bonet schematically is as follows:

	Abd. I	II-III	IV	V-VI	VII	VIII	IX-X	XI	XII
t	$\frac{4}{10}$	$\frac{12}{14}$	$\frac{12}{14}$	$\frac{12}{14}$	$\frac{^* 8}{14}$	$\frac{6}{7}$	8	8	9
s	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{2}{7}$	6	8	10

* "1" and "3" are missing.

The most important points in the chaetotaxy are the presence of all anterior setae on t V-VI and the fact that only four setae are missing on t VII. Having two anterior setae on s VIII and a central posterior one, the species belongs to the *wheeleri* group.

FIGURES 36-40.—*Eosentomon rostratum* Ewing: 36, Head and mouth parts, seen from above of the specimen from Ganntown; Ga=galea; La 1 and La 2= 1st and 2nd lancia; Lb, hyaline membrane of labium; Mdb=mandible. *Eosentomon pusillum* Ewing: 37, foretarsus, exterior side, holotype; 38, foretarsus, interior side, holotype; 39, female squama genitalis, holotype; 40, tergal chaetotaxy of abd. V, holotype.

Figure 40 shows the accessory setae to be much longer than the principal ones. It also shows the shape of the lamina before the anterior apodeme.

Tarsus III possesses only a very insignificant spine (fig. 41), the existence of which one would deny if he were not prepared to find it.

The pseudoculi (fig. 42) are extraordinarily large. The mouth parts have not been examined, but must resemble those of *wheeleri*.

Protentomon transitans Ewing

FIGURES 43-44

Protentomon transitans Ewing, 1921b, p. 196.—Ewing, 1940, p. 532.

Ewing mentions only one specimen, the holotype, of this tiny species, but in fact two more are present in his collection. Data for the holotype are, Takoma Park, Maryland, in decaying leaves, H. E. Ewing collector, April 24, 1921. Data for the other two specimens are Jasper County, Georgia, in peach orchard soil, William F. Turner collector, July 24, 1936. They were determined by Ewing as *Protentomon* and *Proturentomon* respectively, but the abdominal comb being without teeth indicates that they belong to *Protentomon* (see Tuxen 1956a).

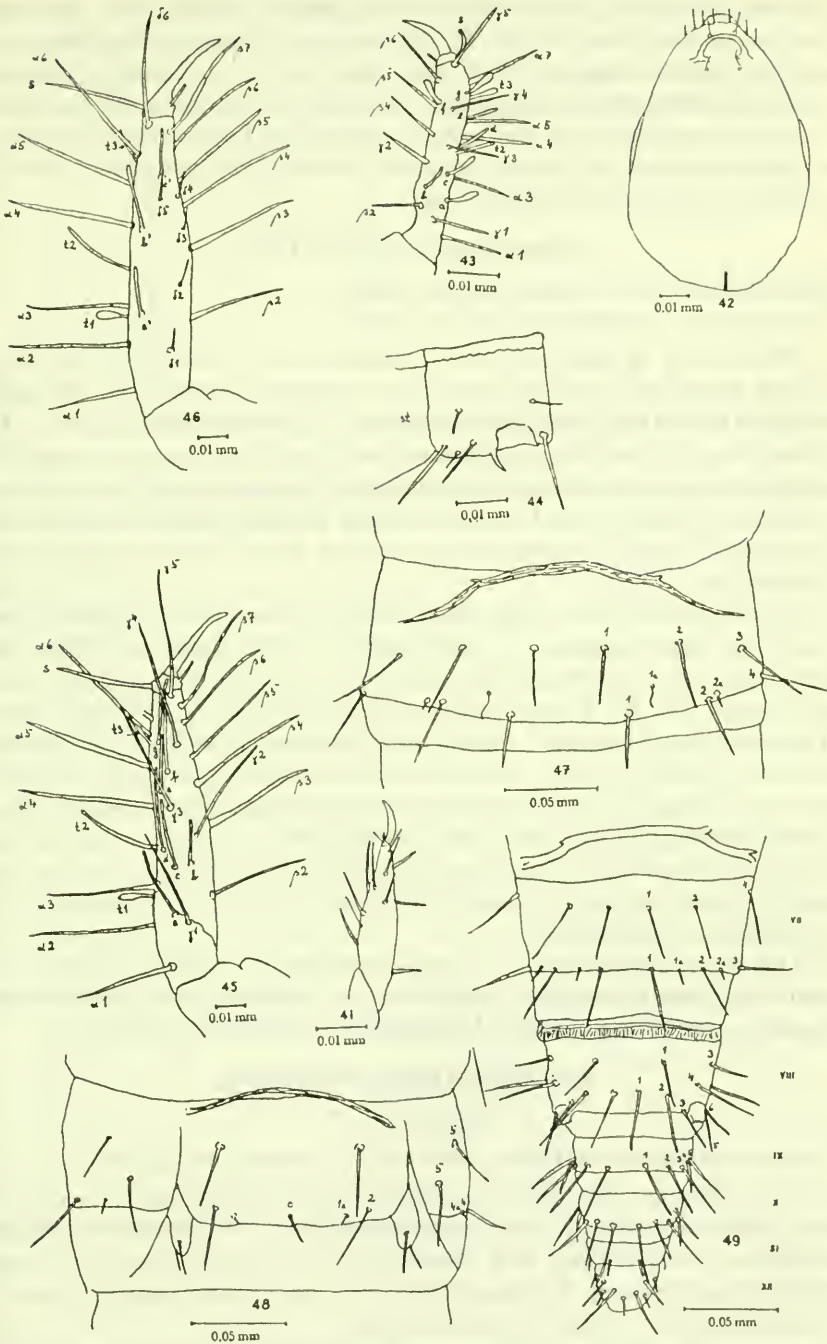
We have drawn the foretarsus from the exterior side and the abdominal comb of the holotype (figs. 43-44) to show the likeness with *Protentomon perpusillum* Berlese as described by Tuxen (1956a, pp. 247-252); in fact there is no difference at all in these characters. The only difference is found in the chaetotaxy, and it is very slight. Tuxen (1956a) did not venture to decide whether *Protentomon perpusillum* Berlese and *Protentomon thienemanni* Strenzke were in fact different species on account of the small chaetotactical differences. The chaetotaxy of *Protentomon transitans* is in accordance with neither of them.

Thus the difference is stated schematically as follows:

	<i>perpusillum</i>	<i>thienemanni</i>	<i>transitans</i>
t VIII ant.	4	6	4
t X	8	6	10
s XI	4	6	6

We should warn, however, against placing too much stress on these differences in chaetotaxy. For instance, it is worth noticing that in

FIGURES 41-49.—*Eosentomon pusillum* Ewing: 41, tarsus III, holotype; 42, shape of head, holotype. *Protentomon transitans* Ewing: 43, foretarsus, exterior side, holotype; 44, comb on abd. VIII, holotype. *Acerentomon americanum* Ewing: 45, foretarsus, exterior side, holotype; 46, foretarsus, interior side, holotype; 47, tergum of abd. III, specimen from Luray Caverns, Virginia; 48, sternum of abd. III, same specimen. 49, terga of abd. VII-XII, same specimen.



For explanation, see opposite page.

the two specimens of *transitans*? from Jasper County, only the two long setae on either side of XI are present, in *perpusillum* the long and the short setae on either side and in one specimen of *thiennemanni* all three setae are present. Probably the number of setae may vary to some degree, as was already shown by Tuxen (1955); so until a larger series of the three "species" is available, we cannot decide whether to give them specific rank.

Microentomon minutum Ewing

Microentomon minutum Ewing, 1921b, p. 200.

Microentomon perpusillum Ewing, 1940, p. 533.

The history of this species is a curious one (Tuxen 1956a, p. 249). Ewing described it in 1921 from three immature specimens, although he said that he had often seen specimens (supposedly adult) alive. In 1936 he stated that the tarsi are without sensillae, that the second abdominal legs are one segmented, and that the genus should be included in the subfamily Protentomoninae (with 2-segmented second abdominal leg). In 1940 he even synonymized it with Berlese's *Acerentulus perpusillus*.

All three slides were originally labeled *Microentomon minutum*, but two were later changed to *perpusillum*. Two slides including the holotype bear the data, Takoma Park, Maryland, in decaying leaves and twigs, H. E. Ewing collector, April 10, 1921; the third one, Takoma Park, Maryland, under bark of decaying twig, H. E. Ewing collector, April 24, 1921. All three specimens are immature and have only 10 abdominal segments; all very distinctly possess one-segmented second abdominal legs and furthermore have a distinct comb on the eighth abdominal tergum. They are evidently young specimens of an acerentomid, and very probably of Ewing's *Acerentomon conurus*, with which they were found.

The genus *Microentomon* should therefore be entirely abandoned, and the species *minutum* considered as identical with *Acerentomon conurus*, a junior synonym of *Acerentulus americanus* (Ewing).

Acerentomon americanum Ewing

FIGURES 45-54

Acerentomon americanum Ewing, 1921b, p. 197.—Ewing, 1940, p. 536.

Two slides are labeled as this species, but they probably belong to two different species, one of them undescribed. We shall here confine ourselves to describing and drawing the holotype, a female. Data for the holotype are Takoma Park, Maryland, from decaying leaves, March 27, 1921, H. E. Ewing collector.

The foretarsus (figs. 45-46) is typically acerentomid (Tuxen 1955). The t_1 is placed proximally on the tarsus; $d:p=70:35(=2)$. The

empodium is short; $e:u=8:28(=0.3)$; a is long, c longer than b, d very long, and f much longer than g. The t 3 is long, lancetlike, t 1 long, claviform. The b' and c' are longer than a'.

The chaetotaxy (figs. 47-50) schematically is as follows (pleurals as usual included in the tergalis):

	Abd. I	II-III	IV-VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{12}$	$\frac{a8}{b14}$	$\frac{b8}{b14}$	$\frac{c8}{16}$	$\frac{6}{14}$	10	10	4	9
s	$\frac{3}{2}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{4}{2}$	4	4	6	6

* "4" is missing.

b "3" is missing.

o "3" is missing.

It is characteristic that 1a in the posterior row of the terga is situated anteriorly to the other setae of the row (fig. 47); also characteristic are the setae missing in the anterior and posterior rows of the terga. The s VIII has two posterior setae. Ewing drew t VII and made a point of the next to lateral seta in the anterior row being situated "in front of and out of line with the other setae of the row." He did not realize, however, that the next to lateral seta in t VII is No. 4, while in the first six terga it is No. 3, which as usual is situated out of line, but behind the other setae of the row.

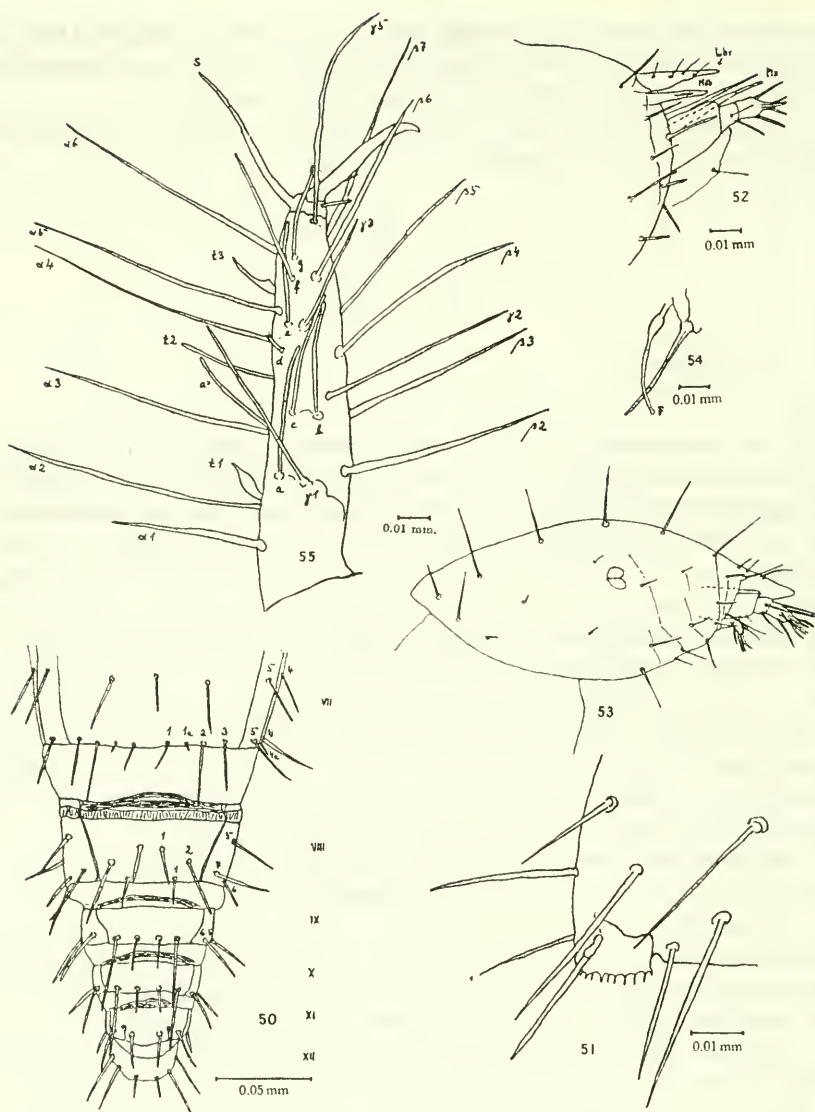
The drawings of the chaetotaxy were made from two specimens determined by Bonet with the label Luray Cavern, Virginia, June 4, 1948, E. W. Baker and F. Bonet collectors. The anterior apodeme is only slightly branched, not as much as shown by Ewing.

The comb on abd. VIII (fig. 51) has about 10 equally long teeth. There is no other comb or row of teeth either on abd. V or VIII-X.

The mouth parts of the holotype are drawn in figure 52. A short labrum is present, a mandible with a small split, pointed maxilla lobes, and a rather slender maxillary palpus. The whole as seen from the side and showing the chaetotaxy is drawn in figure 53 by Bonet.

The filamento di sostegno is shown in figure 54 from the holotype and therefore from the side; it is short and without remarkable features.

Because of the shape of the maxillary palpus (3-segmented, according to Berlese, i.e., without a limit between the outermost segment and the tusk of hairs on its tip) and the very small labrum, we are inclined to put the species in the genus *Acerentulus* without, however, having made up our minds as to the justification of keeping *Acerentulus* and *Acerentomon* apart, or even perhaps dividing them into more genera. In extreme cases there seems to be no doubt that the species belongs to one or the other genus, but some cases are doubtful. Therefore, for the present, the species should be called *Acerentulus americanus* (Ewing).



FIGURES 50-55.—*Acerentomon americanum* Ewing: 50, sterna of abd. VII-XII, specimen from Luray Caverns; 51, comb on abd. VIII, holotype; 52, foremost part of head with "labrum" (Lbr) and mouth parts of holotype; Mdb=mandible; Mx=maxilla; 53, chaetotaxy of head, holotype, drawn by Bonet; 54, filament di sostegno, holotype. *Acerentomon andrei* Ewing: 55, foretarsus, exterior side, holotype.

Acerentomon conurus Ewing

Acerentomon conurus Ewing, 1921b, p. 197.—Ewing, 1940, p. 541.

There are several slides determined by Ewing as *conurus*, among them the holotype, with the label, Takoma Park, Maryland, in decaying leaves and twigs, April 10, 1921, H. E. Ewing collector. The holotype specimen lies on this slide in such a way that the foretarsus appears to be very greatly shortened. The mutual size and placement of the sensillae therefore look different from those of *Acerentulus americanus*. It would be misleading to print the drawing of this foretarsus, as in fact there is no difference between the foretarsus of the other specimens of *conurus* and *americanus*. They are alike in every feature.

The chaetotaxy, the comb of abd. VIII, the shape of the head, and the filamento di sostegno are also the same in every respect as they are in *americanus*. A small difference might be found in the placement of the two small setae anteriorly and posteriorly to the pseudoculus. In *americanus* the distance of the two setae from the pseudoculus is the same; in *conurus* the postocular seta is nearer to the pseudoculus than the preocular one. We should not like to make this difference, which might even be subject to individual variation, a specific character, however, and so we feel justified in stating that *Acerentomon conurus* Ewing is a synonym of *Acerentulus americanus* (Ewing), the latter name having priority.

Acerentomon andrei Ewing

FIGURES 55-65

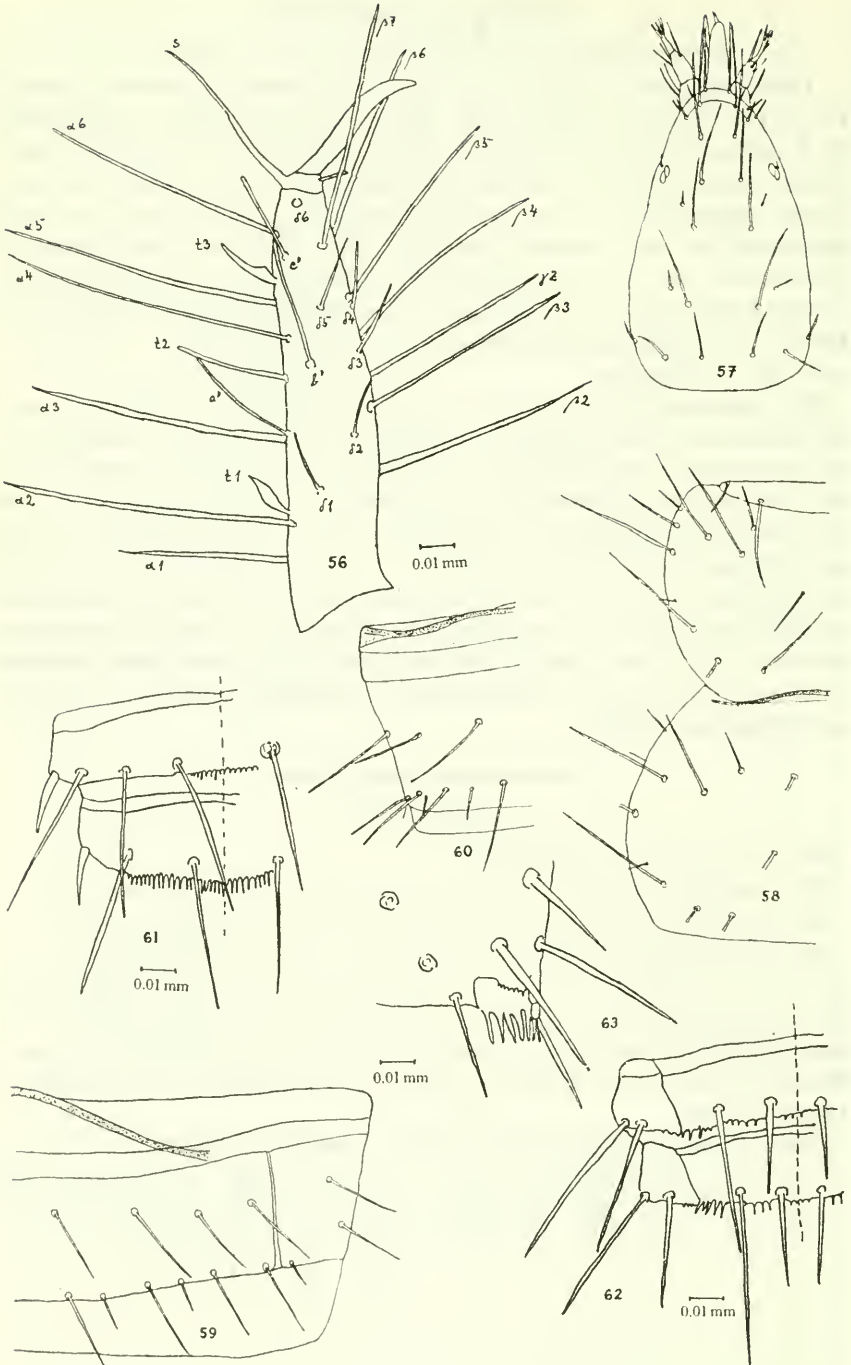
Acerentomon andrei Ewing, 1940, p. 537.

The holotype female is the only specimen present, with the label, Utah, Salt Lake, dead leaves, Aug. 3, 1937, F. Andre collector.

On the foretarsus (figs. 55-56), t 1 has a curious shape, clavate but pointed; $d:p=99:34(=3.0)$; t 3 is long, lancetlike. All sensillae are long, including probably also d, which is broken; b and c are of the same length; f is much longer than g; f reaches halfway out on the claw. The a', b', and c' are also very long. The empodium is short; $e:u=10:45(=0.2)$.

The chaetotaxy (figs. 57-62) schematically is as follows:

	Abd. I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{4}{12}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{8}{16}$	$\frac{6}{15}$	12	12	6	9
s					$\frac{3}{9}$	$\frac{4}{2}$	4	4		6



For explanation, see opposite page.

Figure 57 gives the tergal chaetotaxy of the head and figure 58 that of the thorax; figures 59-60 give that of abd. II and VII; all were drawn by Bonet.

The presence of a posterior row of setae in s VIII and a central seta in the posterior row of t VIII is important.

A row of teeth is found on the hind margin of terga IX and X; about 20 small teeth are on t IX, and about 40 larger ones are on t X (fig. 61). The hind margins of the pleura and sterna of these segments also show rows of teeth (fig. 62). No row of teeth is present on the pleuron of abd. VIII or V.

The comb of abd. VIII (fig. 63) consists of 7-8 long teeth. As is well known, this comb marks the lower border of the opening of the large abdominal glands. A row of quite small teeth is also present on the upper lid of this opening in the present species.

There is a well developed labrum, nearly one-fourth the length of the head (fig. 64). The maxillary palpi are long and the outermost tusk of each seta is clearly defined as a fourth segment. All long setae of the head are extremely long.

The filamento di sostegno (fig. 65) is short.

The species belongs, without doubt, to the genus *Acerentomon* as defined by Berlese (1909).

Acerentomon christensoni Ewing

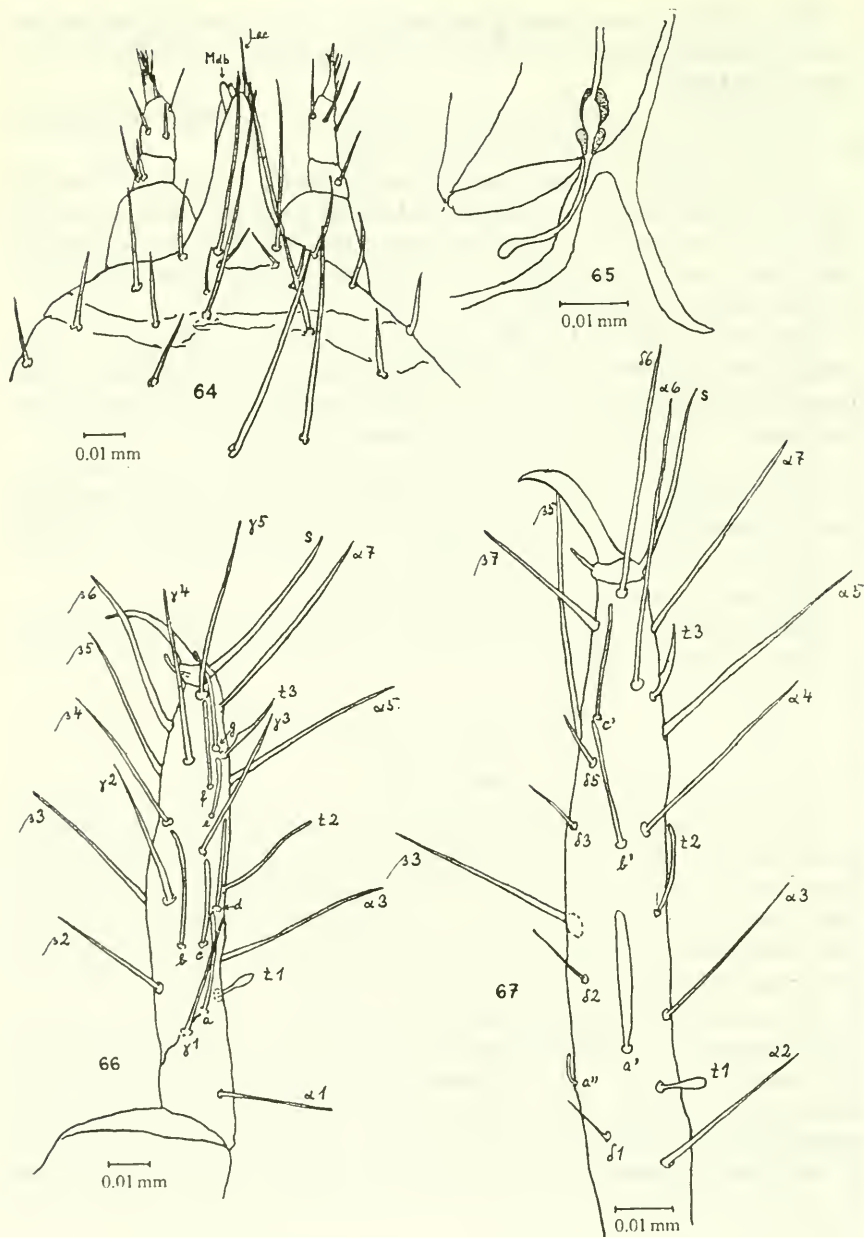
FIGURES 66-69

Acerentomon christensoni Ewing, 1940, p. 537.

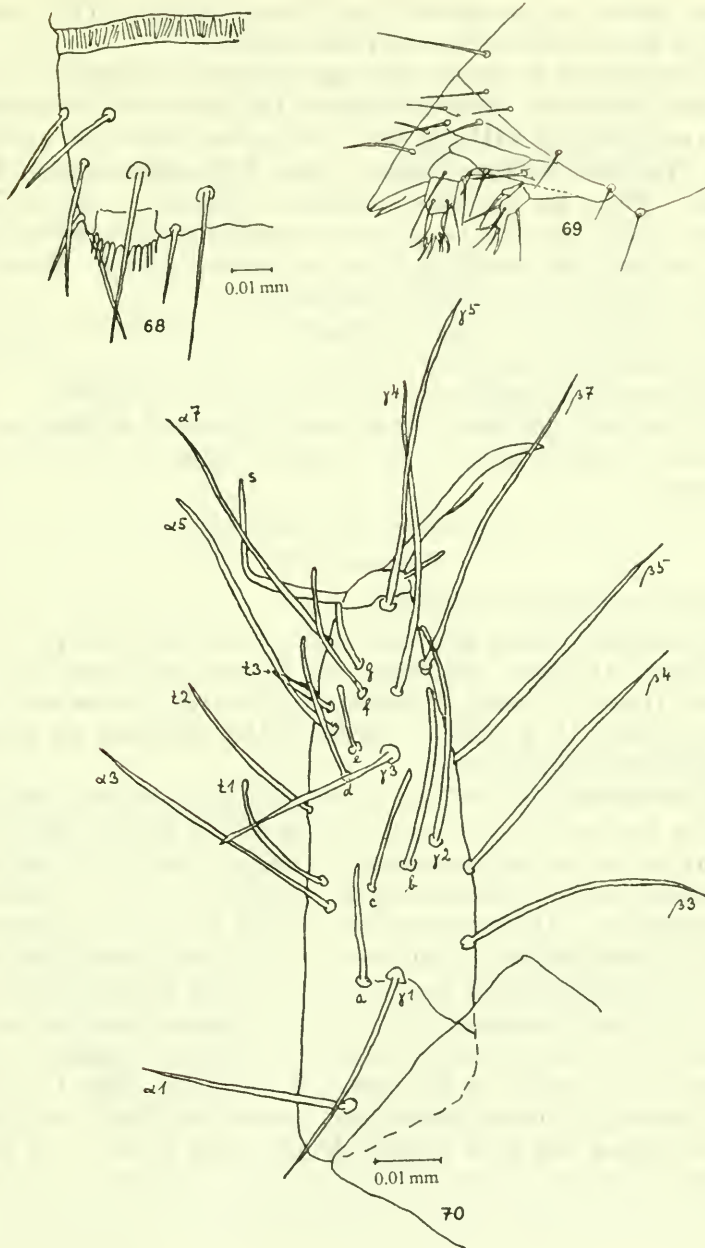
Several slides of this species are present. We have made descriptions and drawings from the type slide which contains 4 females, and a paratype slide with 3 females. Data of the type slide are, Brigham, Utah, in peach orchard soil, April 20, 1938, L. D. Christenson collector. The paratype slide bears the data, Medford, Oregon, in peach orchard soil, Sept. 12, 1938, L. D. Christenson collector.

The exterior side of the foretarsus (figs. 66-67) was drawn from a specimen on the type slide, of one of the paratypes. The t 1 is clavate, t 3 long, lancetlike. The difference from *Acerentulus americanus* is seen in b being longer than c, g longer than f, d short; and what is very remarkable, a' is broad and long, and a small a'' (=β1) is present. In all these characters the foretarsus resembles that of *Acerentulus*

FIGURES 56-63.—*Acerentomon andrei* Ewing: 56, foretarsus, interior side, holotype; 57, chaetotaxy of head, holotype, drawn by Bonet; 58, chaetotaxy of thorax, holotype, drawn by Bonet; 59, tergum of abd. II, holotype, drawn by Bonet; 60, tergum of abd. VII, holotype, drawn by Bonet; 61, terga of abd. IX-X, holotype; 62, sterna of abd. IX-X, holotype; 63, comb of abd. VIII, holotype.



FIGURES 64-67.—*Acerentomon andrei* Ewing: 64, foremost part of head seen from above holotype; Lac=lacinia; Mdb=mandible; 65 filamento di sostegno, holotype. *Acerentomon christensoni* Ewing: 66, foretarsus, exterior side, holotype; 67, foretarsus, interior side, paratype.



FIGURES 68-70.—*Acerentomon christensoni* Ewing: 68, comb of abd. VIII, holotype; 69, foremost part of head, paratype, drawn by Bonet. *Acerentomon occidentalis* Ewing: 70, foretarsus, exterior side, holotype.

confinis Berlese as reexamined by Tuxen (1956a). The broad *a'* seems to be very characteristic of this species.

The chaetotaxy is exactly like that of *confinis*; therefore, we shall not give it in detail. Also the shape of the apodemes is the same.

The comb of abd. VIII (fig. 68) is drawn from one of the specimens on the type slide, because it seems to be a little different from that of *confinis*. There are the same number of teeth, about 12, but Tuxen (1956a, p. 232) states that one of the central teeth of *confinis* is longer than the rest; this condition is not so in *christensoni*. We do not, however, consider this difference important.

The head (fig. 69) is drawn by Bonet from a specimen on the type slide; it is a typical *Acerentulus* head.

The filamento di sostegno is exactly like that of *confinis*.

Thus we conclude that *Acerentomon christensoni* is identical with *Acerentulus confinis* Berlese and should be lowered to the rank of a synonym.

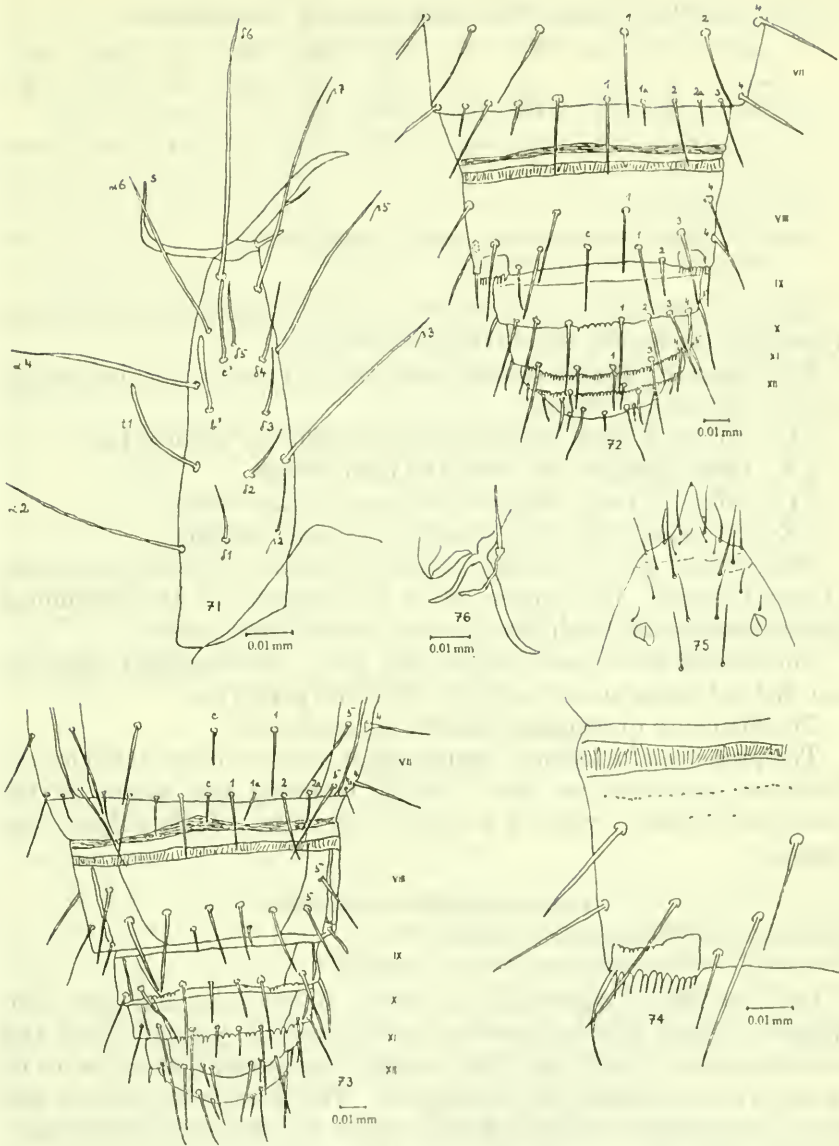
Acerentomon occidentalis Ewing

FIGURES 70-76

Acerentomon occidentalis Ewing, 1940, p. 540.

There are three slides present of this species, the holotype and two paratypes. All three specimens are females and bear the data, floor of Yosemite Valley, California, in decaying leaves and twigs, April 15, 1927, H. E. Ewing collector. Our drawings are from the holotype and one paratype.

The foretarsus (figs. 70-71) is extremely broad and short compared with the foretarsi of other acerentomids known to us. The ratio of the claw to the rest of the tarsus is 53:150, i.e., nearly 1:3; in *Acerentulus americanus*, for instance, it is 32:105, i.e., 1:3.5; this ratio is more common. Also the ratio of breadth to length of foretarsus (without pretarsus) is 45:140, about 1:3; in *americanus* it is 20:100 or 1:5, as is more or less the case in the other species. This ratio, however, is only discernible if the specimen is seen from the side, not from above or below. The *t* 1 is long and slender, not clavate, placed exactly in the middle of the tarsus; *d:p*=70:70. The *t* 3 is long, lancet shaped; *b* is much longer than *c*; *d* and *f* are long, *e* and *g* short. On the interior side *a'* is missing; *b'* is a little broader and shorter than *c'*.



FIGURES 71-76.—*Acerentomon occidentalis* Ewing: 71, foretarsus, interior side, holotype; 72, terna of abd. VII-XII, paratype; 73, sterna of abd. VII-XII, paratype; 74, comb of abd. VIII, holotype; 75, foremost part of head, holotype, drawn by Bonet; 76, filamento di sostegno, paratype.

The chaetotaxy (figs. 72-73) schematically is as follows:

	Abd. I	II	III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{12}$ ^a	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{8}{16}$ ^b	$\frac{6}{13}$	12	10	4	9
s	$\frac{4}{4}$	$\frac{4}{5}$ ^c	$\frac{3}{5}$	$\frac{5}{8}$	$\frac{4}{8}$ ^d	$\frac{3}{9}$	$\frac{4}{2}$	4	4	6	6

^a "1," "2," and "5."

^b "3" is missing.

^c "4" in the paratype, "5" in the holotype; both are probably abnormal.

^d "4" in the paratype, probably abnormal; "5" in the holotype.

There is some difference between the holotype and one of the paratypes, due, no doubt, to individual variation.

Very characteristic are several rows of small teeth on the hind margin of abd. IX-XI, as follows:

s IX: about 6 small teeth dispersed outside the outer setae.

s X: teeth dispersed all along the hind margin.

t IX: about 6 teeth dispersed between the inner setae.

t X-XI: closely set teeth all along the hind margin.

The comb of abd. VIII (fig. 74) possesses about 12 rather long teeth of equal length. The upper lid of the opening of the abdominal glands bears small teeth like those in *Acerentomon andrei*.

The species has a small labrum (fig. 75). The maxillary palpi are not distinct either in the holotype or in the paratype.

The filamento di sostegno (fig. 76) is very small.

The presence of a labrum, though short, and the many teeth on the hindmost segments, we think, justify retaining this species in the genus *Acerentomon*, where it is a junior synonym of *A. californicum* (Hilton).

Acerentulus californicus Hilton

Acerentulus californicus Hilton, 1929, p. 132.

Acerentulus barberi californicus, Ewing, 1940, p. 550.

In 1929 Hilton described *Acerentulus californicus* and gave two figures. These figures, however, give only the general shape and numerous setae, which are often wrongly placed and far too few to be of any value in identifying the species. The description is short and does not contain anything which would not fit any acerentomid. The type is said to be in the Pomona College collection.

Ewing (1940) made a new description based on a female specimen sent to him by Hilton and part of some material from the type locality.

We both independently wrote to Professor Hilton asking him about his types. He replied that he had been unable to locate the types, but that he had sent some specimens to the U.S. National Museum, and that he did not possess any more material. Hilton's types of *Acerentulus americanus* (Tuxen 1955, p. 125) and *A. cali-*

formicus are not in the U.S. National Museum, as we both had the opportunity of ascertaining when we were in Washington. They must therefore be regarded as lost.

The *californicus* slide on which Ewing based his short redescription, however, is present. It bears the label in Hilton's writing, *A. calif.* ♀ Cobell's Canyon, Calif., Jan. 1938. As this seems to be the only known specimen of the species, and as it was determined by Hilton, we designate it as a neotype. It is a well preserved female, cleared and stained.

Now it appears that this specimen is exactly identical with the type of *Acerentomon occidentalis* Ewing. The foretarsi are visible from above and therefore do not appear to be as broad as those in the type specimen of this species, but all sensillae are visible and of the same length and position as in *occidentalis*. The chaetotaxy is exactly alike, the only differences being within the range of variability (see above), viz., s II-III = $\frac{1}{2}$, s VI = $\frac{1}{2}$. The teeth on t IX-XI and s IX-X are exactly alike, as are the labrum and the filamenta di sostegno. It is impossible for us to see any difference, and so we must state that *Acerentulus californicus* Hilton is a synonym of *Acerentomon occidentalis* Ewing. As *californicus* is the older name, it has priority in spite of the poor description given by Hilton. Thus, the species should be called *Acerentomon californicum* (Hilton).

Acerentulus barberi Ewing

FIGURES 77-83

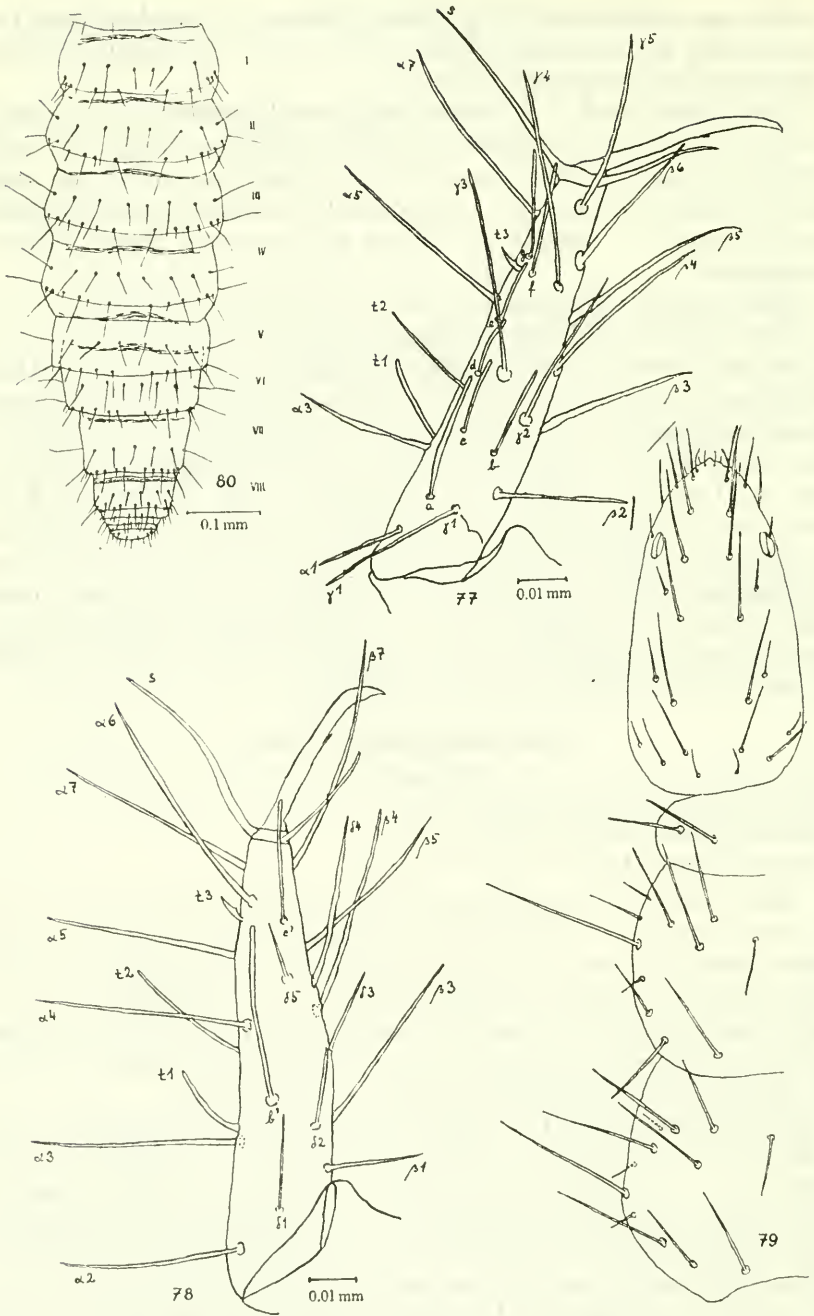
Acerentulus barberi Ewing, 1921a, p. 240.

Acerentulus tenuiceps Ewing, 1921b, p. 198.

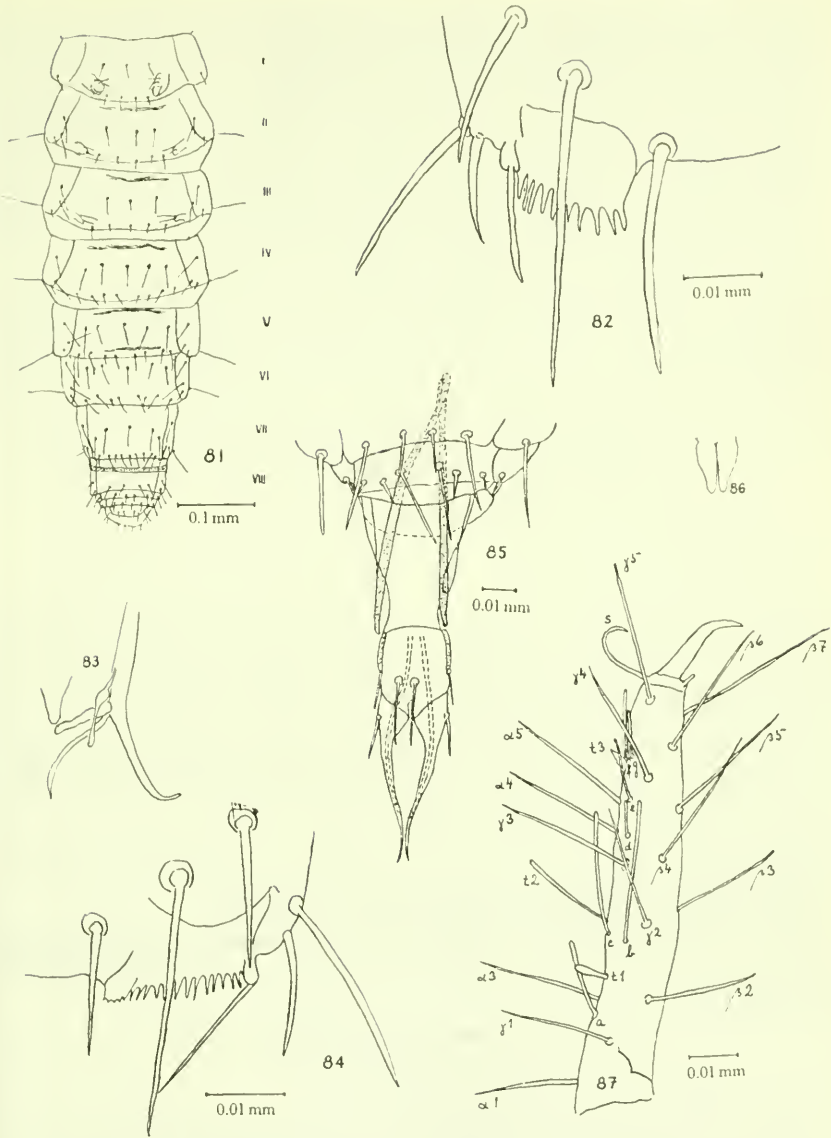
Acerentulus barberi barberi Ewing, 1940, p. 549.

This was the first American proturan to be described after Silvestri's *E. wheeleri*. There are many slides in the collection, some of them marked *barberi* and others *tenuiceps*. Ewing realized in 1940 that these two species described by him were identical. Then he called the species *barberi barberi*, as he thought Hilton's *californicus* was a variety of it. It has been shown above, however, that this is correct; so the species should keep its binary name.

The holotype bears the label, Takoma Park, Maryland, Feb. 14, 1921, from decaying leaves, H. E. Ewing collector. In addition to the holotype, we examined a male and a female determined as *barberi* and labeled, Chesterville, Illinois, Oct. 18, 1921, in decaying leaves and twigs, killed Nov. 7, 1921, H. E. Ewing collector (we will call these "specimens 2 and 3"), and also a male and a female determined as *tenuiceps*, but corrected by Ewing to *barberi* and bearing the label, Takoma Park, Maryland, April 3, 1921, from decaying leaves, H. E. Ewing collector (we will call these "specimens 4 and 5").



FIGURES 77-80.—*Acerentulus barberi* Ewing: 77, foretarsus, exterior side, specimen 4; 78, foretarsus, interior side, same specimen; 79, chaetotaxy of head and thorax, holotype, drawn by Bonet; 80, abdominal terga, specimen 2.



FIGURES 81-87.—*Acerentulus barberi* Ewing: 81, abdominal sterna, specimen 2; 82, comb of abd. VIII, specimen 2; 83, filamento di sostegno, holotype, drawn by Bonet. *Acerentulus oculatus* Ewing: 84, comb of abd. VIII, male in copula; 85, male squama genitalis seen from the ventral side, male in copula. *Acerentulus bicolor* Ewing: 86, preimaginal male squama genitalis, holotype, drawn by Bonet. *Acerentulus floridanus* Ewing: 87, foretarsus, exterior side, paratype.

The foretarsus (figs. 77-78) is characterized by t 1 being long and slender, not clavate, and placed proximally on the tarsus; $d:p=85:45(=2)$; t 2 is longer and more slender than t 1; t 3 short, lancet-like. Exteriorly the long and broadly spindle-shaped a is noticeable; interiorly the very long a' (erroneously, b' on fig. 88) is also noticeable; b' is missing; e is placed in the middle between d and f; f and g are near each other. Also peculiar is the very long seta δ 4. The empodium is a little more than half the claw; $e:u=35:65$.

The chaetotaxy schematically is as follows (the plurals as usual are included in the tergals; the dorsal chaetotaxy of head and thorax are shown in fig. 79, of the holotype; figs. 80-81 were made from specimen 2):

	Abd. I	II-III	IV-VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{12}$	$\frac{10}{18}$	$\frac{10}{18}$	$\frac{8}{18}$	$\frac{8}{18}$	12	8	6	9
s	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{5}{8}$	$\frac{5}{9}$	4	4	4	6	6

* "1" is missing.

There is a small variability among the five specimens. In the anterior row of t VI, one specimen has only nine setae, one even eight. In t VII, two specimens have nine setae. Two specimens have only two setae in the posterior row of s I.

Unfortunately in all specimens the outermost segments (IX-XII) were pulled so closely together, that it was impossible to make clear drawings of them.

The comb of abd. VIII (fig. 82) consists of 10 rather long and irregular teeth.

The filamento di sostegno (fig. 83) is very short.

The species is without a labrum and has short, blunt, three-segmented maxillary palpi. It belongs without doubt to Berlese's genus *Acerentulus*.

Acerentulus oculatus Ewing

FIGURES 84-85

Acerentulus oculatus Ewing, 1921b, p. 198; 1940, p. 545.

Only a few specimens are present. We have examined the holotype, a female labeled, Takoma Park, Maryland, from decaying leaves, March 6, 1921, H. E. Ewing collector; and another specimen labeled, male, taken in copula in breeding cell, March 4, 1922.

It appears that in nearly all characters the specimens are identical with the specimens of *Acerentulus barberi*. In the foretarsus the characteristic spindle-shaped a, the long and slender t 1, the extraordinarily

long δ 4 show the identity with *barberi*. In the chaetotaxy the only difference from the scheme given for *barberi* is that only 2 setae are found in the posterior row of s I, but this variation was also found in specimens of *barberi*.

The only other difference is found in the shape of the comb of abd. VIII (fig. 84). The innermost part is separated as a small lobe with 4-5 very small teeth. We have never seen this feature before in any acerentomid and cannot say if it is an individual variation, which we think most probable, or a specific character. It was found in both specimens examined.

The specimen taken in copula has a distended copulatory apparatus, which we have drawn (fig. 85), as it shows the shape and chaetotaxy of this organ very distinctly.

Thus we conclude that *Acerentulus oculatus* Ewing is synonymous with *A. barberi* Ewing, the latter name having priority.

Acerentulus bicolor Ewing

FIGURE 86

Acerentuloides bicolor Ewing, 1921b, p. 199.

Acerentulus bicolor Ewing, 1940, p. 543.

Four slides are present in the series of this species, but two of them (from Florida) are *Acerentulus floridanus* Ewing. The holotype of *bicolor* is labeled, Takoma Park, Maryland, in decaying leaves and twigs, April 10, 1921, H. E. Ewing collector. It is a male preimago. The paratype, with the same label but only dated 1921, is a matus junior. We have examined these two specimens.

The foretarsus is exactly like that of *Acerentulus americanus*, except that in the holotype b is a little longer than c; in *americanus* the opposite is the case. The chaetotaxy, abdominal comb, and filamento di sostegno are all alike.

Womersley in 1927 abandoned the genus *Acerentuloides* as based on immature specimens. Ewing in 1936 kept the genus, saying that it was based on a female, but abandoned it in 1940 as based upon variable characters. In fact the holotype is not a female, but a preimaginal male (fig. 86), a mistake which even Berlese made (*Acerentulus cephalotes*, see Tuxen, 1956a, p. 234).

Unfortunately Bonet did not give the setae in his drawing of the squama genitalis, and Tuxen forgot to correct this when in Washington.

It is therefore concluded that not only the genus *Acerentuloides* should be abandoned, but also the specific name *bicolor* Ewing, due to the following synonymy: *Acerentuloides bicolor* Ewing = *Acerentulus americanus* (Ewing).

Acerentulus floridanus Ewing

FIGURES 87-93

Acerentomon floridanum Ewing, 1924, p. 44.*Acerentulus floridanus* Ewing, 1940, p. 546.

We have examined and made drawings of two specimens of this species, the holotype, a female, and a paratype with extended female genitalia; both specimens are labeled, Orlando, Florida, May 26, 1922, in decaying leaves and twigs, H. E. Ewing collector.

The foretarsus (figs. 87-88) has a clavate t 1 and a small, rather blunt, lancetlike t 3; d:p=84:40(=2.10). The most characteristic features are the very long sensillae b and c, and the short f and g; f and g are rather close; e is in the middle between d and f; b' is missing (a' given erroneously as b' in fig. 88). The empodium is short; e:u=4:27(=0.15).

	Abd. I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{4}{12}$	$\frac{a\ 8}{b\ 14}$	$\frac{8}{14}$	$\frac{c\ 8}{16}$	$\frac{d\ 6}{16}$	$\frac{6}{14}$	14	12	6	9
s	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	4	4	4	6	6

a "4" is missing.

b "4" is missing.

c "3" is missing.

d "1" and "3" are missing.

The comb of abd. VIII (fig. 92) is very peculiar, having teeth which appear to be coalesced nearly to the tip. There are about 8-10 teeth, and only the outermost tips of them are free, but their borders seem to be visible within the lamina.

The filamento di sostegno (fig. 93) is very short.

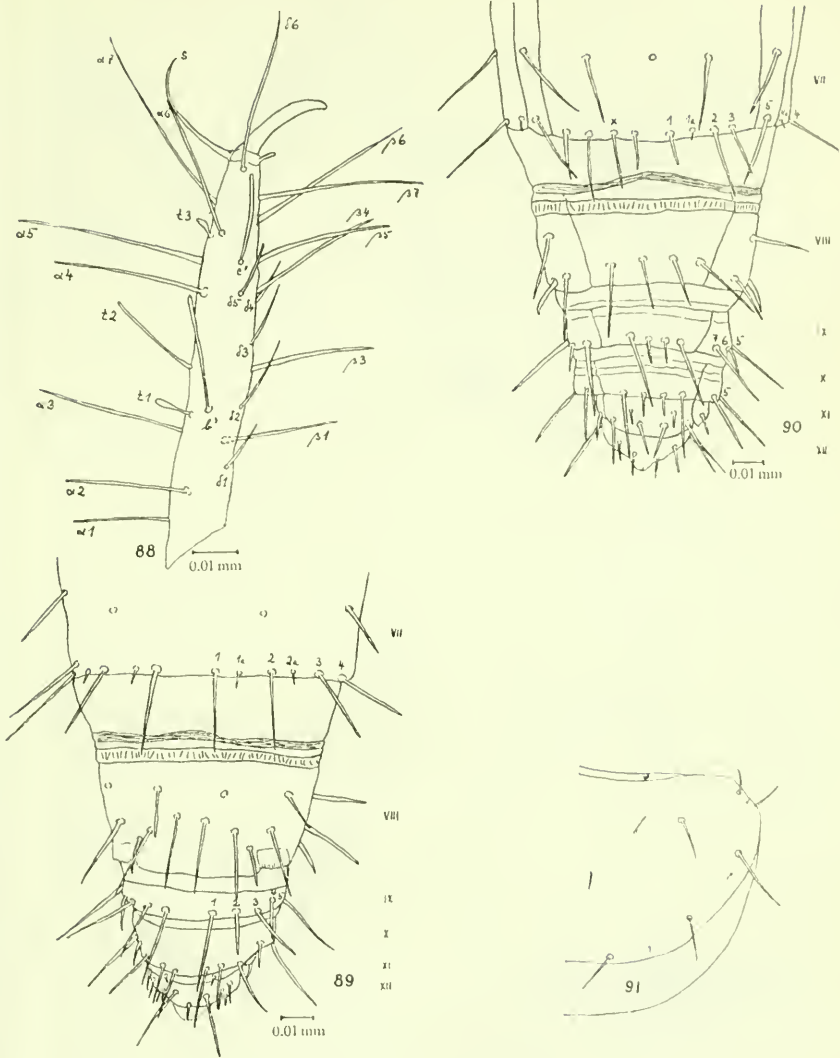
The characters mentioned are identical in the two specimens and there seems to be no doubt about the specific rank of the species on account of the large sensillae b and c of the foretarsus and the very characteristic comb. The species belongs to the genus *Acerentulus*.

Acerentulus aureitarsus Ewing

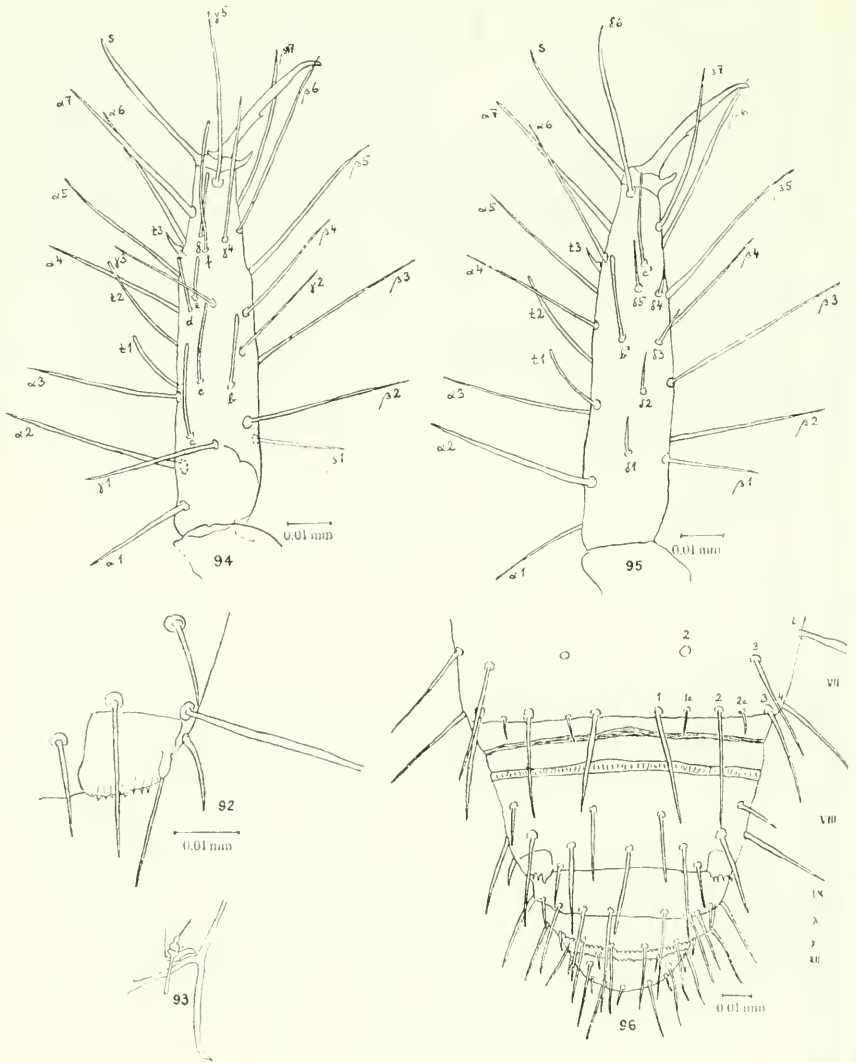
FIGURE 94-103

Acerentulus aureitarsus Ewing, 1940, p. 544.

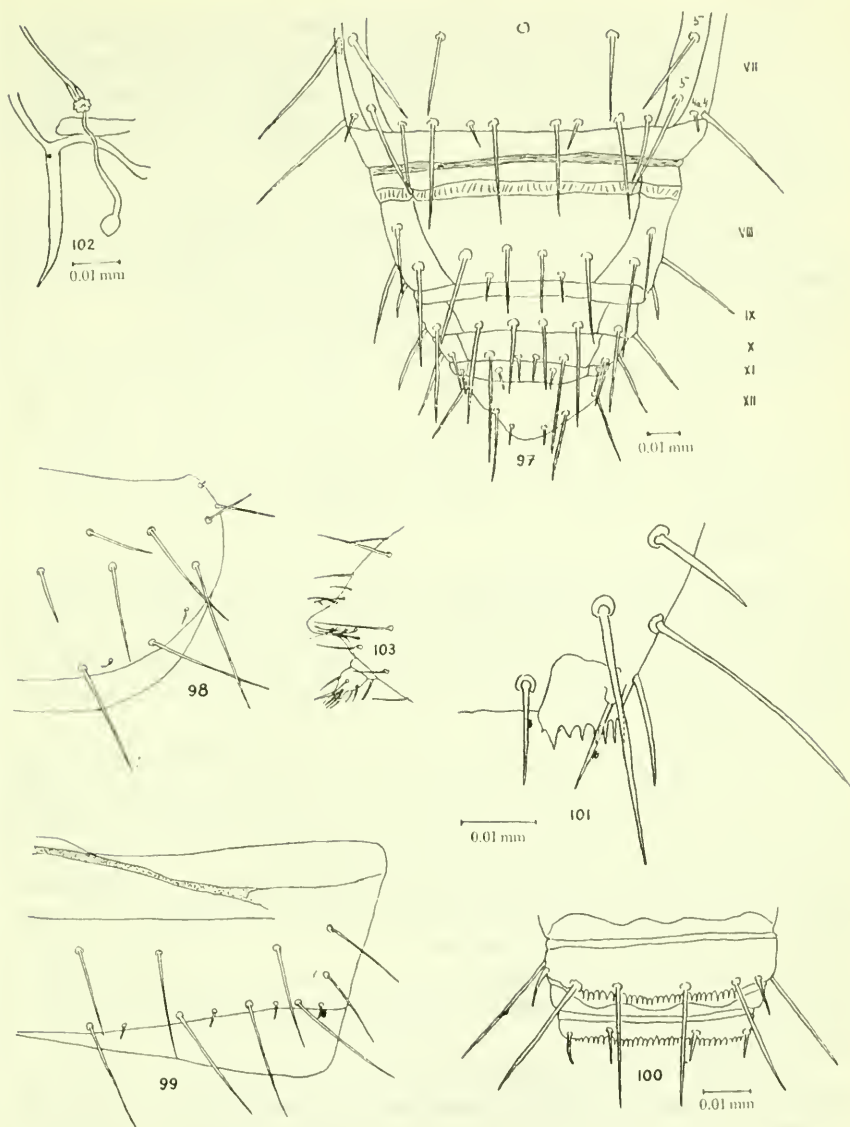
Only two slides are present of this species, the holotype, a matusus junior, labeled, Difficult Run, Virginia, Sept. 4, 1938, Snodgrass and Ewing collectors; and a paratype, also a matusus junior, labeled, near Prospect Hill, Virginia, Sept. 25, 1921, in decaying leaves and twigs, H. E. Ewing collector. We have also examined four specimens determined by Bonet with the label, Dead Run, Virginia, May 29, 1948, E. A. Chapin collector.



FIGURES 88-91.—*Acerentulus floridanus* Ewing: 88, foretarsus, interior side, paratype; 89, terga of abd. VII-XII, paratype; 90, sterna of abd. VII-XII of paratype; x is an abnormally long Ia; 91, chaetotaxy of mesonotum, holotype, drawn by Bonet. The a' is erroneously given as b' in figure 88.



FIGURES 92-96.—*Acerentulus floridanus* Ewing: 92, comb of abd. VIII, paratype; 93, filamento di sostegno, holotype, drawn by Bonet. *Acerentulus aureitarsus* Ewing: 94, foretarsus, exterior side, paratype; 95, foretarsus, interior side, paratype; 96, terga of abd. VII-XII, specimen from Dead Run, Virginia.



FIGURES 97-103.—*Acerentulus aureitarsus* Ewing: 97, sterna of abd. VII-XII, specimen from Dead Run, Virginia; 98, chaetotaxy of mesonotum, holotype, drawn by Bonet; 99, chaetotaxy of tergum of abd. IV, holotype, drawn by Bonet; 100, terga of abd. X-XI, specimen from Dead Run, Virginia; 101, comb of abd. VIII, paratype; 102, filamento di sostegno, specimen from Dead Run, Virginia; 103, foremost part of head, paratype, drawn by Bonet.

The specimens determined by Bonet agree with the holotype in every character (sensillae of foretarsus, comb, filamento di sostegno, teeth on hind border of terga X and XI), except in the chaetotaxy; as they are mature specimens, however, we shall give the chaetotaxy on the basis of them, and show afterward the deviation from the holotype.

On the foretarsus (figs. 94-95), t 1 is long and slender, not clavate; t 3 long, lancetlike; $d:p=75:50(=1.5)$. The e is rather short and situated extraordinarily near d; f is much longer than g. The a' is missing. The empodium is small; $e:u=9:46(=0.2)$.

The chaetotaxy (figs. 96-97) schematically is as follows:

	Abd. I	II	III	IV-VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{14}$	$\frac{10}{18}$	$\frac{10}{18}$	$\frac{10}{18}$	$\frac{a\ 8}{b\ 16}$	$\frac{6}{13}$	12	10	6	9
s	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{5}{5}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{4}{2}$	4	4	2	6

a "1" is missing.

b "3a" is missing.

The chaetotaxy of the holotype differs in the following points: s I posterior row, 2 setae (in all other specimens, including the paratype, 4 setae); s III-V anterior row, 3 setae (also in the paratype; in the other specimens, 5 setae); s VI anterior row, 4 setae (which must be abnormal).

It is remarkable that the microchaeta "3a" is present in t II-VI (fig. 99). Another unique feature is the difference between the number of setae in the anterior row of s II and s III, a difference which does not seem to develop until the adult stage.

On the hind margin of t X and t XI there is a row of fine teeth which are smaller in the maturi juniores and larger in the adults (fig. 100). No teeth are visible on the sterna.

The comb of abd. VIII (fig. 101) is remarkable in that its median tooth is broad and has a small secondary tooth in the middle; there are 7-8 teeth.

The filamento di sostegno (fig. 102) is rather long, with a large spherical bulb at the end; the swelling is not smooth but verrucous.

The head (fig. 103) shows a very small labrum; however, this condition does not justify transferring the species to *Acerentomon*. The palpi maxillares are distinctly like those of *Acerentulus*.

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