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NEW GENERA AND SPECIES OF PROTURA.

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At the March meeting of the Entomological Society of Washington Mr. Barber and I reported the finding of Proturans in the vicinity of Washington, D. C. At that time they had been found only on a very few occasions and in numbers, only in one situation. Since then the writer has taken them in several local situations at Takoma Park, Maryland, and in some instances in large numbers.

The first specimen reported from the vicinity of Washington, which was accidentally found by Barber in some leaf mold in which he was rearing beetle larvae, and the two subsequent specimens taken near Plummer's Island, Maryland, have been found to be of the same species which is new. This species has been named *Acerentulus barberi* by the writer, and is described in a short paper which has been sent to the Entomological News for publication.

Since the finding of these primitive insects at Takoma Park, Maryland, large numbers of them have been taken there. Up to the present no less than twelve species have been found, and more than this, all of these twelve species are represented in collections from a single deposit of decaying leaves, twigs and other organic material situated only a few rods from the writer's home. It should be stated, however, that at no other place have Proturans been found in such diversity or numbers as at this particular spot where they were first located, almost by accident, one evening last February.

In reporting from a single locality as many as twelve different species, which number is only four less than have been described from the world, it is realized that some critics may be inclined to discredit the specific determinations of the same. To these the desire is expressed that they examine for themselves the types of these species which are deposited in the United States National Museum. If asked to explain the occurrence of such a large number of species in a single locality I can only state that it is my opinion that an unusually good sample of the North American species occurring in the Upper Austral Life Zone has been obtained. Certainly this collection can be nothing more and it may be much less than this; which fact causes one, upon

reflection, to conclude that the Nearctic Proturan fauna must be much richer in species than would be supposed if we should base a conclusion upon what has been known in the past of the species occurring in Europe or reported from the world.

In presenting the descriptions of these new species the writer wishes to acknowledge his indebtedness to Mr. H. S. Barber of this society for the many helpful suggestions he has made in regard to the method of studying living specimens and the preparation of mounted material.

Descriptions of Genera and Species.

The ten new species described in this paper fall into three genera recognized by Berlese or into the new genera here created, of which there are three.

Eosentomon Berlese.

Species of the genus *Eosentomon* differ from all the other Proturans in possessing tracheae and in having all pairs of the abdominal appendages large and two-segmented.

Eosentomon vermiforme, n. sp.

A medium sized but very long species. Head long, being fully twice as long as wide; pseudoculi entirely lateral in position and in the form of irregular pits; mouth-parts conspicuous; rostrum present, reaching the tips of extended maxillary palpi. Exposed portion of prothorax about twice as broad as long. Meso-, and metathorax of about the same length but in the latter slightly the longer; spiracles conspicuous, ventro-lateral. Abdomen very long, broadest at the fourth segment and all tergal plates distinctly yellowish; tergal apodemes slightly thickened toward the center, not antero-posteriorly arched and unbranched laterally; seventh abdominal segment equal to the eighth in length, the latter slightly narrower than the former and considerably narrower at its posterior margin than at its anterior margin. Abdominal appendages very slender, those of the first pair being about one-third as broad as long. Legs moderate; first pair extending beyond the rostrum by the full length of the tarsi and about one-half the length of the tibiae, and each leg ending in a tarsal claw which is of about the same length as those on the other legs but is less strongly curved. Total length, slightly extended, 1.32 mm.; width, 0.16 mm.

Type.—Cat. No. 24,578 U. S. N. M.

Described from a single specimen, a female, collected at Takoma Park, Maryland, from decaying leaves. This species differs from all the described species in being more slender and worm-like. It is rare at Takoma Park.

Eosentomon pallidum, n. sp.

A small, white species. Head broad, about two-thirds as broad as long; pseudoculi lateral, inconspicuous; rostrum minute; maxillary palpi when extended long, conspicuous, in this state equaling in length one-half the width of the

head. Exposed part of prothorax about two-thirds as long as broad. Meso-, and metathorax subequal; their stigmata small and lateral. Abdomen very whitish in front becoming more yellowish toward the tip; tergal apodemes not thickened toward the middle, not antero-posteriorly arched and not branched laterally; seventh abdominal segment slightly longer and slightly broader than eighth. Legs moderate; anterior pair extending beyond the tip of head by the full length of the tarsi and by about one-half the length of the tibiae, claws about as long as those on other legs but not so strongly or evenly curved. Total length, maximum extension, 1.14 mm.; width, 0.13 mm.

Type.—Cat. No. 24,579 U. S. N. M.

Described from a single female which was one of many specimens taken at Takoma Park, Maryland, from among decaying leaves. This species is very much smaller than *E. wheeleri* Silvestri, the only American species known in the past, and *E. vermiforme* just described. The species appears to be common in the smaller and finer-fibered leaves of decaying masses at Takoma Park.

Eosentomon minimum, n. sp.

A minute, yellowish species. Head long, being nearly twice as long as broad; pseudoculi either rudimentary or wanting; rostrum present, almost as broad as long. Prothorax as usual. Meso-, and metathorax subequal; spiracles, large, conspicuous and entirely lateral. Tergal plates of abdomen well developed and equally conspicuous on all the segments; tergal apodemes conspicuous, very slightly thickened toward the middle, not antero-posteriorly arched and not branched laterally; seventh and eighth abdominal segments similarly shaped, but the seventh is slightly the larger. Claws of anterior legs considerably longer and stouter than those on the other legs. Length with segments somewhat telescoped, 0.54 mm.; width, 0.12 mm.

Type.—Cat. No. 24,580 U. S. N. M.

Described from the type specimen, a male, taken at Takoma Park, Maryland, from decaying leaves. This species is closely related to *pallidum* but differs from it in several particulars, especially in having the more anterior segments of the abdomen as well chitinized as the posterior ones and in having a much longer head. It is rare at the locality where taken.

Protentomon, n. gen.

Tracheae and spiracles wanting. First and second abdominal appendages large, conspicuous and two-segmented; third abdominal appendages much smaller, one-segmented. Apodemes wanting. A single transverse row of dorsal setae on each abdominal segment.

Type.—*Protentomon transitans* Ewing.

This species, which is here to be described and which is made the type of this new genus, is by far the most important taxonomically of any of the American forms thus far discovered.

This is because it unites the two quite distinctive families of the Protura that have been recognized in the past; the Eosentomidae, which have tracheae and the Acerentomidae, which do not. The abdominal appendages of *P. transitans* are very similar to those of Eosentomidae, but on the other hand the absence of the tracheae and the presence of but a single transverse row of dorsal setae on each abdominal segment are characters of some of the species of Acerentomidae. The writer expects to make a more detailed study of this species later.

Protentomon transitans, n. sp.

Living specimen white; mounted specimen entirely hyaline. Head short; pseudoculi circular in outline, dorso-lateral; mouth-parts inconspicuous and hyaline except for the minute labial palpi which are yellowish. Prothorax large, exposed part being fully two-thirds as long as the mesothorax. Meso-, and metathorax subequal, without chitinous plates and with a few very minute setae. Abdomen long; dorsal setae minute except for segments seven to twelve where they are fairly conspicuous; segment nine about two-thirds as long as eight and eight two-thirds as long as seven. First and second abdominal appendages large, conspicuous and of the same size and constitution, each is noted for having an intersegmental plate at the junction of proximal with distal segment; last abdominal appendages one-segmented yet conspicuous, shaped as those of *Acerentomon*. Legs short, stout and similar; front pair only slightly larger than the others and with a similar claw. Length when moderately extended, 0.74 mm.; thickness, 0.08 mm.

Type.—Cat. No. 24,581 U. S. N. M.

Described from a single male, taken from decaying leaves at Takoma Park, Maryland. This species is in some respects probably the most generalized of any of the Proturan species yet described. The anterior legs are but little specialized, the prothorax is much more comparable to the mesothorax than in any other of our American species, and the seventh, eighth and ninth abdominal segments are remarkably similar except for size.

Acerentomon Silvestri.

This is the genus erected by Silvestri for the first species of the Protura to be described, the much studied *A. doderoi*. It is usually differentiated from the other genera of the family Acerentomidae as recognized by Berlese upon variations in the number of segments found in the maxillary and labial palpi. An investigation into the composition of these structures by the writer has caused him to doubt the occurrences of such differences as are supposed to exist, hence it appears best for the present to use other characters.

Acerentomon is distinguished from the other genera that should be recognized in its family by two good characters: First, in this genus some of the tergal apodemes are broadly branched laterally and, second, the second and third

abdominal appendages are by no means all but invisible vestiges, but are fully one-half as long as the large first segments of the first pair of appendages.

***Acerentomon americanum*, n. sp.**

Species medium-sized, uniformly yellowish. Head long, pointed and almost completely concealing the prothorax from above; pseudoculi lateral, pit-like; rostrum conspicuous. Dorsal part of prothorax about three times as broad as long. Mesothorax slightly smaller than metathorax and both with convergent sides. Abdomen long, unicolored; segment seven larger than eight, slightly swollen at the level of tergal apodeme, the latter with a stout posterior horn which reaches the pleuron and a more slender anterior horn which does not reach the pleuron, tergal plate with a single transverse line. Legs rather stout; anterior pair extending beyond the tip of rostrum by three-fourths the length of their tarsi; tarsi of anterior legs each ending in a long, slightly curved claw. Length when much extended, 1.17 mm.; width, 0.14 mm.

Type.—Cat. No. 24,582 U. S. N. M.

Described from the type specimen, a female collected in decaying leaves at Takoma Park, Maryland. This species differs from *doderoi* and *microrhinus* in several minor details and markedly in the shape of the rostrum and of the tergal apodemes, especially the seventh tergal apodeme. Only a single specimen of this species has been obtained.

***Acerentomon conurus*, n. sp.**

Species undersized for its genus, pale yellow and almost uniform in coloration. Head very long, being over twice as long as broad; pseudoculi pit-like, lateral; rostrum very small and short. Prothorax about as broad as mesothorax and mostly concealed above by the superplaced head. Meso-, and metathorax about equal, the latter slightly the broader. Abdomen with sides almost parallel from the base to the end of segment six; segment seven a truncate cone, as is eight; apodeme of seventh tergal plate twice forked laterally and squarishly thickened near its middle; eighth abdominal segment with transversely striated band. Anterior legs extending beyond the tip of rostrum by the full length of the tarsi; the latter armed with claws that are longer, stouter and less curved than those on the other legs. Length with segments neither extended nor telescoped, 0.81 mm.; width, 0.12 mm.

Type.—Cat. No. 24,583 U. S. N. M.

Described from the type only, a female taken at Takoma Park, Maryland, from decaying leaves. This species is considerably smaller than the others found in the genus and is at once separated by the peculiar shape of the seventh abdominal segment. An examination of the mouth-parts shows the maxillary palpi to be three-segmented, instead of four. The reason for the apparent discrepancy between the number of segments in this pair of appendages in this species and the number apparently found in others will be found only by further investigation. The species is abundant in moist decaying leaves at Takoma Park.

Acerentulus Berlese.

In this genus, *sensu restricto*, the following distinguishing characters may be given: Tergal apodemes never twice forked laterally; both tergal plates and apodemes present on the meso-, and metathorax and first eight abdominal segments; tarsi of front legs without row of spines. This genus is richest by far in number of species of all the genera of Protura.

Acerentulus oculus, n. sp.

A medium-sized species which has the thorax and first abdominal segment somewhat paler than the rest of the body. Head about twice as long as broad and strongly arched in front; pseudoculi (or ocelli?) dorso-lateral, conspicuous and provided each with a hemispherical cornea-like structure; rostrum absent; in front of eyes four transverse striations are present. Exposed part of prothorax about two-thirds as long as wide. Meso-, and metathorax similar, the latter broader than the former. Segments one to six inclusive of the abdomen quite similar in shape; seven narrower and slightly longer; eight much smaller than seven and with both striated band and pair of pectines. Some of tergal apodemes,—two to seven inclusively,—but slightly antero-posteriorly arched, squarishly thickened at the middle and branched laterally; most of tergal plates with two transverse lines, only one of which is conspicuous. Tarsi of first pair of legs about one and a third times as long as tibiae, and each terminated by a long, stout claw which is curved only beyond its middle. Length, with segments slightly telescoped, 0.89 mm.; width, 0.20 mm.

Type.—Cat. No. 24,584 U. S. N. M.

Described from type specimen, taken at Takoma Park, Maryland, from decaying leaves. This species is most nearly related to *A. confinis* (Berlese) of the described species but differs from *confinis* in having the head about twice as long as broad instead of about one and one-half times as long as broad, as well as in other characters. It is a common species at Takoma Park.

Acerentulus tenuiceps, n. sp.

A good sized, well chitinized, yellow species. Head very long, over twice as long as broad, somewhat squarish behind and cone-like in front; pseudoculi not conspicuous, slightly dorsal of lateral in position; rostrum in the form of a chitinous tubercle. Exposed part of prothorax not one-half as long as the mesothorax. Meso-, and metathorax large. Abdomen large, broadest at the fourth or fifth segments; some of tergal apodemes thickened near their middle and branched near their extremities, none of them strongly antero-posteriorly arched; seventh abdominal segment similar in shape to the eighth but much larger; eighth segment with transversely striated band and pair of pectines. Anterior legs much larger than the others; tarsal claw of anterior legs very long, curved only beyond its middle and without accessory spur at or by its base. Length with segments slightly telescoped, 0.85 mm.; width, 0.15 mm.

Type.—Cat. No. 24,585 U. S. N. M.

Description based on the type, a female taken from decaying leaves at Takoma Park, Maryland. This species is most nearly

related to *A. oculatus* just described, but differs from it in having small pseudoculi, which are more lateral in position, in having the head more slender and in minor details. The species is very common at the locality where it was taken.

Acerentuloides, n. gen.

The thorax and at least first abdominal segment without tergal plates and tergal apodemes; tergal plates present on some of the posterior abdominal segments, without transverse lines. Most of other characters similar to those of *Acerentulus*.

Type.—*Acerentuloides bicolor* Ewing.

The type species of this genus is minute and has the anterior part of the body hyaline and but little chitinized but the posterior part well chitinized. It differs from the species of *Acerentulus* known to the writer in many characters, but at present it can not be stated how many of these should be regarded as generic.

Acerentuloides bicolor, n. sp.

Minute species with head, thorax and anterior parts of abdomen whitish, while the posterior part of the abdomen is yellow. Head long; pseudoculi lateral; rostrum short, minute. Exposed part of prothorax about three times as broad as long. Meso-, and metathorax about equal, hyaline without tergal or sternal plates. First two abdominal segments without tergal plates, the remaining segments showing a progressive increase in the development of these plates from the third segment backward; seventh abdominal segment about one and a half times as broad as long and with two transverse rows of dorsal setae composed of seven setae to the row; eighth abdominal segment shaped similarly to the seventh but smaller, with transversely striated band. Anterior legs extending beyond the head by the full length of the tarsi and by about one-fourth the length of the tibiae; claws slightly longer and less curved than those on the other legs. Length when much extended, 0.82 mm.; width, 0.10 mm.

Type.—Cat. No. 24,586 U. S. N. M.

Description based on the type specimen, a female taken from a decaying mass of organic matter at Takoma Park, Maryland. This species is common at Takoma Park, but because of its small size is easily overlooked.

Microentomon, n. gen.

Differing from previously described genera of Acerentomidae in having but a single transverse row of dorsal setae to each abdominal tergum. Tergal plates very poorly developed; tergal apodemes broadly rounded and not thickened near their middle.

Type.—*Microentomon minutum* Ewing.

In this genus also should be placed the *Acerentulus perpusillus* of Berlese, described from Italy in 1910. Berlese's species is said by him to be rare, and he possessed but a single example. The members of this genus are exceedingly small. When well extended they are about .5 mm. in length, but in a

contracted state are much less. Being flattened and almost as slender as a nematode, they probably are the smallest insects known, although some others are shorter, *e. g.*, minute beetles and some of the parasitic Hymenoptera.

Microentomon minutum, n. sp.

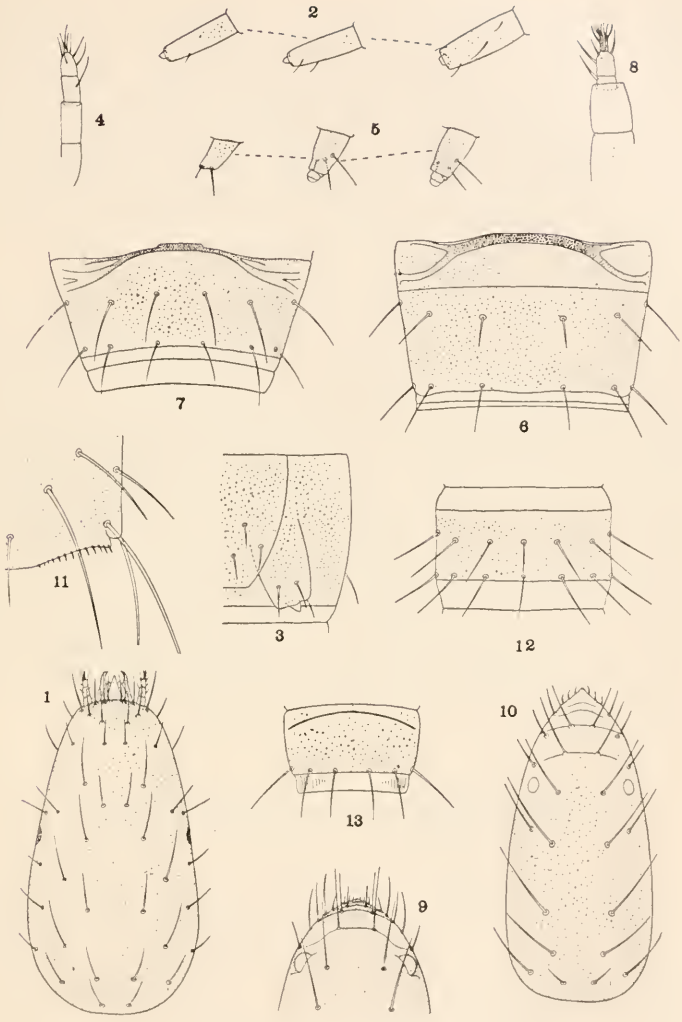
When living not seen by the unaided eye except when on a dark background and then appearing only as a minute white speck. Head about three-fifths as broad as long; pseudoculi inconspicuous, lateral, pit-like; rostrum in the form of a tubercle. Exposed part of prothorax about twice as broad as long. Meso-, and metathorax subequal. Abdomen with sides parallel for most of its length; tergal apodemes very slender, extending from pleuron to pleuron and unbranched laterally; seventh abdominal segment about twice as broad as long, with its single transverse row of dorsal setae situated at the posterior margin of the tergal plate and composed of six setae. Anterior legs, although larger and differently conformed from the others, yet not so much so as in most all other Proturans. This pair extends beyond the anterior margin of the head by about four-fifths the length of the tarsi. Length, well extended, 0.61 mm.; width, 0.09 mm.

Type.—Cat. No. 24,587 U. S. N. M.

Described from type specimen taken from decaying leaves and twigs at Takoma Park, Maryland. This minute insect normally inhabits moist decaying twigs, being found under the bark of the same. The species is probably very common, but is not usually observed because of its minute size and habits. Three mounted specimens are at hand, all of which lack the complete number of segments and the genital papilla hence are not mature. The generic characters of these specimens agree exactly with those of the single female found by Berlese. Because of its common occurrence it appears desirable to make this species the type of the genus, notwithstanding the fact that the mature form has not yet been taken. I have frequently observed live specimens of the species and studied them alive in the laboratory.

A Comparison Between the Palearctic and Nearctic Protura.

The number of Proturan species now known from the Nearctic Region is twelve, which number happens to be exactly the same as reported from the Palearctic Region. Of the more generalized forms which breathe through tracheae and constitute the family Eosentomidae, four species are known from each of these two zoogeographical regions. Of the forms without tracheae, the Palearctic is represented by four genera, one of which has not been found yet in the Nearctic; of these same atracheate forms the Nearctic is represented by five genera, two of which are yet not known to occur in the Palearctic. Most of the Palearctic species thus far described are over one millimeter long and are well chitinized; on the other hand most of the twelve



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species so far reported from the Nearctic are less than one millimeter long and are very poorly chitinized. This apparent difference between the two faunas is probably due to the fact that the writer has employed specialized methods of collection which has revealed better the microproturans than have those methods that have been used in Europe. Finally it should be stated that the study of our Nearctic Proturans shows that the group as a whole, at least as far as the Holarctic is concerned, is one of marked unity; a unity in fact not found in the case of the two other major groups of Apterygota, the Thysanura and the Collembola.

EXPLANATION OF PLATES.

Fig. 1, *Eosentomon vermiforme*, n. sp., dorsal view of head, x 333; fig. 2, *Eosentomon vermiforme*, n. sp., ventral abdominal appendages on left side, x about 267; fig. 3, *Eosentomon pallidum*, n. sp., ventral view of left appendage of second abdominal segment, together with a part of same segment, x 333; fig. 4, *Eosentomon minimum*, n. sp., left labial palpus from below (camera lucida drawing with oil immersion lens); fig. 5, *Protentomon transitans*, n. sp., abdominal appendages of right side, lateral view, x 333; fig. 6, *Acerentomon americanum*, n. sp., dorsal view of seventh abdominal segment, x 333; fig. 7, *Acerentomon conuris*, n. sp., seventh abdominal segment from above, x 333; fig. 8, *Acerentomon conurus*, n. sp., left maxillary palpus from outside (camera lucida drawing with oil immersion lens); fig. 9, *Acerentulus oculatus*, n. sp., dorsal view of anterior part of head, x 333; fig. 10, *Acerentulus tenuiceps*, n. sp., dorsal view of head, x 333; fig. 11, *Acerentulus tenuiceps*, n. sp., dorsal view of dorso-lateral part of eighth abdominal segment (oil immersion lens); fig. 12, *Acerentuloides bicolor*, n. sp., dorsal view of seventh abdominal segment, x 333; fig. 13, *Microentomon minutum*, n. sp., dorsal view of seventh abdominal segment, x 333.

OBSERVATIONS RELATIVE TO RECENT RECOVERIES OF PLEUROTROPIS EPIGONUS WALKER. (HYM.)

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It is the purpose, in the compilation of the data here submitted, to recapitulate very briefly the more essential facts regarding the introduction into this country from England of *Pleurotropis epigonus* Walker, a well-known Chalcidoid parasite of the Hessian fly *Phytophaga destructor* Say. It also seemed desirable to collect the records of distribution, and to assemble chronologically all available citations to the literature on the insect. Acknowledgment is gratefully made to Mr. A. B. Gahan of the Bureau of Entomology for much information furnished.

The original description of the species by Francis Walker appeared in 1839 under the name of *Entedon epigonus* Walker. This later was found by Dr. Riley (who compared specimens with Walker's type in the British Museum), to be synonymous