Contributions Toward a Monograph of the Sucking Lice

PART I.

BY

GORDON FLOYD FERRIS
Instructor in Entomology

LELAND STANFORD JUNIOR UNIVERSITY PUBLICATIONS
UNIVERSITY SERIES

STANFORD UNIVERSITY, CALIFORNIA
PUBLISHED BY THE UNIVERSITY
1919
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Genus Enderleinellus</td>
<td>7</td>
</tr>
<tr>
<td>Enderleinellus nitzschi (Fahr.)</td>
<td>8</td>
</tr>
<tr>
<td>Enderleinellus malaysianus n. sp.</td>
<td>12</td>
</tr>
<tr>
<td>Enderleinellus menetensis n. sp.</td>
<td>14</td>
</tr>
<tr>
<td>Enderleinellus larisci n. sp.</td>
<td>17</td>
</tr>
<tr>
<td>Enderleinellus longiceps K. and F.</td>
<td>19</td>
</tr>
<tr>
<td>Enderleinellus kelloggi Ferris</td>
<td>22</td>
</tr>
<tr>
<td>Enderleinellus extremus n. sp.</td>
<td>24</td>
</tr>
<tr>
<td>Enderleinellus venezuelae n. sp.</td>
<td>25</td>
</tr>
<tr>
<td>Enderleinellus platyspicatus n. sp.</td>
<td>26</td>
</tr>
<tr>
<td>Enderleinellus dremomydis n. sp.</td>
<td>29</td>
</tr>
<tr>
<td>Enderleinellus nannosciuri n. sp.</td>
<td>30</td>
</tr>
<tr>
<td>Enderleinellus zonatus n. sp.</td>
<td>32</td>
</tr>
<tr>
<td>Enderleinellus schwrotamiasis n. sp.</td>
<td>35</td>
</tr>
<tr>
<td>Enderleinellus euxert n. sp.</td>
<td>37</td>
</tr>
<tr>
<td>Enderleinellus helioschiri n. sp.</td>
<td>40</td>
</tr>
<tr>
<td>Enderleinellus suturalis (Osborn)</td>
<td>42</td>
</tr>
<tr>
<td>Enderleinellus osborni K. and F.</td>
<td>46</td>
</tr>
<tr>
<td>Enderleinellus marmota n. sp.</td>
<td>47</td>
</tr>
<tr>
<td>Enderleinellus tamiasis Fahr.</td>
<td>48</td>
</tr>
<tr>
<td>Genus Microphthirus new genus</td>
<td>49</td>
</tr>
<tr>
<td>Microphthirus uncinatus (Ferris)</td>
<td>49</td>
</tr>
</tbody>
</table>
INTRODUCTION

This paper is the first of a proposed series, which when complete, it is hoped, will constitute what may justly be considered a monograph of the insect order Anoplura, or the sucking lice.

As a basis for this series of papers there is available what is without a doubt the largest and most comprehensive collection of these insects that is now in existence. This collection contains approximately three-fourths of the described species, among these being many that are known only from the extremely imperfect descriptions of the earlier authors. In addition to these, the collection includes a relatively very large number of new forms. With this material to begin with it is not unreasonable to hope that a nearly complete collection of the known species may finally become available for examination, and that this series of papers may thereby aspire to the dignity of a truly monographic study.

The sources of the material included in this collection are various, but by far the more significant portion has been obtained by the examination of the mammal skins in the collections of certain museums. It is the author’s belief that in such collections there lies buried a nearly complete representation of the Anopluran fauna of the world, doubtless only a few of the species that occur on the larger mammals being lacking. It is perhaps not out of place to urge that the examination of such collections be undertaken whenever possible, nor, perhaps, is it out of place for the author to express a plea for additional material to the end that this monograph may be made as useful as possible.

Owing to the amount of new material, much of which belongs to types quite different from any that have been described, and to the necessary rearrangements that the examination of such a large percentage of the described forms will doubtless show to be advisable, all discussion of the group as a whole and all keys to the families and genera must of necessity be delayed until the final papers of the series.1

The final papers will also contain a complete host list, a bibliography, acknowledgments of the sources of material, and other matter of general interest.

The preliminary papers will, therefore, be of a purely descriptive

---

1 Keys to the genera (with the exception of a few recently named) together with a bibliographic catalog of species and a list of hosts will be found in the following reference: Ferris, G. F., "A Catalog and Host List of the Anoplura," Proceedings California Academy of Sciences, Series 4, 6: 129-213, 1916.
INTRODUCTION

character. The order in which the various genera will be dealt with will be governed entirely by convenience, those genera of which the most complete representation of described species is available being considered first. By thus leaving until the end the genera that are poorly represented it is hoped that opportunity will be given for the accumulation of additional material in these groups.

The author is thoroughly convinced of the futility of written descriptions when dealing with objects of such complexity as are the members of this group. For this reason the emphasis throughout these papers will be placed upon the figures. The usual procedure is to regard the figures as merely explanatory of the text. In these papers the text will be regarded as being merely explanatory and confirmatory of the figures. The descriptions will consider only the more important characteristics of each species and these as briefly as is consistent with clarity.

All figures are from corrected camera lucida sketches made from individuals (the types whenever possible), that have been carefully prepared and in the majority of cases stained in order to permit more accurate observation. It is believed that the figures are accurate to a degree which is well within the limits of normal variation and the limits imposed by the processes through which the specimens pass in the course of their preparation for study. In all cases the figures have been drawn to the most convenient scale and are not to be used as a basis for judgment as to relative sizes. In all figures of the entire insect and of the genitalia (unless otherwise indicated) the left half of the figure represents the dorsal side, the right half the ventral side.

Keys to the species will not be given. It is the author's belief that the determination of species may be accomplished more quickly by reference to the name of the host and to the figures.

Finally, the benefit of criticism is desired that the standard of these papers may continuously be bettered and their usefulness increased.

SYSTEMATIC TREATMENT

Genus ENDERLEINELLUS Fahrenholz.

1912. Fahrenholz, 2, 3, u. 4, Jahresb. des Niedersæch. zool. Ver. zu Hannover, 52, 58.

Anoplura without eyes; with five-segmented antennæ which are not sexually dimorphic; with the anterior and middle pairs of legs of equal size, small and weak and with weak claw, the posterior pair very stout and with broad, heavy claw; second sternite of the abdomen usually with a pair of small selerites, each of which bears a backward-pointing, chitinous process; pleural plates present on a variable number of segments; each segment of the abdomen, both dorsally and ventrally, with at the most a single transverse row of spines or hairs; tergites and sternites of the abdomen without chitinized plates or with these very small; head more or less cylindrical, never with well-marked anterior-lateral and posterior-lateral angles; genitalia of the males of various types.

HOSTS. Confined, as far as known, to members of the rodent family Sciuridae.

TYPE OF THE GENUS. Enderleinellus nitasci Fahrenholz (= Pediculus sphaeroccephalus of Nitzsch, not of Oiffers).

SYNONYMY LIST OF NAMES PREVIOUSLY USED IN THE GENUS

Note—Synonyms are in italics.

Kellogi Ferris.

kellugi (Grube).

Longicornus keliiculus (Grube).

longiceps Kellogg and Ferris.

nitasci Fahrenholz.

Pediculus sphaeroccephalus (Nitzsch).

Hematopterus sphaeroccephalus (Nitzsch).

Polyplax (?) sphaeroccephalus (Nitzsch).

Enderleinellus sphaeroccephalus (Nitzsch).

osborni Kellogg and Ferris.

Enderleinellus xaculata var. osborni Kellogg and Ferris.

Sphaeroccephalus (Nitzsch).

nitasci Fahrenholz.
suturaalis (Osborn).

Hematolitus suturalis Osborn.

Polsipax (f) suturalis (Osborn).

Enderleinellus suturalis var. occidentalis Kellogg and Ferris.

suturaalis var. occidentalis Kellogg and Ferris.

Enderleinellus suturalis (Osborn).

suturaalis var. osborni Kellogg and Ferris.

Enderleinellus osborni Kellogg and Ferris.

tanaisius Fabrencholz.

uncinatus Ferris.

Microphthirus uncinatus (Ferris).

Norns.—The affinities of this genus are at present extremely obscure. All the species (excepting only E. exsuri n. sp.) agree in the possession of a pair of small chitinous areas on the second sternite of the abdomen, each of which bears a backward-pointing process, a character that appears in no other group. The homologies of these structures are doubtful, but it is possible that they represent portions of the first pair of pleural plates. Some support to this view is lent by the fact that in E. suturalis these chitinous areas are almost continuous with the first pair of pleurites and by the fact that in one other genus, Fabrencholzidae, the first pair of plates are divided, one-half lying on the dorsal side and the other half on the ventral side. No evidence is afforded by the developmental stages as these areas on the second sternite appear only at the last ecdysis.

The one species, E. exsuri n. sp., in which these areas are lacking is in other respects sufficiently like the other members of the genus to render unnecessary any attempt to separate it generically. I am, however, removing from this genus the species previously described by me as E. uncinatus. Although the affinities of this remarkable little species are clearly with Enderleinellus it is so peculiar that it well merits special recognition.

Fabrencholz has recently referred Pediculus laevus Grube to Enderleinellus. This species was described from Cetelius evermanni. I have at hand two species from this host, one an Enderleinellus, the other a Leporeles. The original description of P. laevus is extremely brief and the figure crude, but there are certain points about both which leave no doubt that the species to which they refer is the Leporeles and not the Enderleinellus.

The immature stages of but few species of this genus are at hand, and of these it is almost exclusively the penultimate stage that is represented. This stage differs from the adult chiefly in the absence of the paired sclerites on the second sternite and in a general reduction in the number of spines.

1. Enderleinellus nitschi Fabrencholz.

Figs. 1, 2.

1818. Pediculus sphaerocephalus Nitsch, German's Mag., 3: 365. (Not Pediculus sphaerocephalus Ollers, 1816.)


1874. Hematoptenus sphaerocephalus (Nitsch), Giebel, "Insecta Epizoa," 35-6; pl. 1, f. 4.


Fig. 1.—Enderleinellus nitschi Fabrencholz.

HOST OF THE TYPE. Sciurus vulgaris, Europe.

MATERIAL EXAMINED. From Sciurus vulgaris fuscoater, Switzerland; S. syriacus, North Syria; S. hudsonicus petulans, Glacier Bay, Alas-
occult the median third or fourth. Spines all quite slender, arranged in median and sub-marginal series. In the median series there are four spines on the first and second segments, six to eight on the third to seventh segments and two on the eighth and ninth segments. In each submarginal series there is one on the third segment, three on the fourth, two on the fifth, and one on the sixth and seventh. Eighth and ninth segments each with a pair of long, slender setae at each lateral margin. On the ventral side the arrangement is quite similar, except that the greater part of the seventh to ninth segments is occupied by the large genital plate. The lobe-like processes at the end of the abdomen each bear a single large spine and at their bases there is a cluster of smaller spines.

**Male** (Fig. 1). *Length* 0.8 mm. In all respects closely resembling the female, except that the end of the abdomen is sharply pointed. Genital plate a broad sclerite occupying most of the seventh sternite and with its posterior lateral angles produced into a slender process which reaches the lateral margins at the posterior lateral angles of the eighth segment.

**Genitalia** (Fig. 2A) of a simple type. Basal plate *pp* a slender rod which is expanded and deeply bifid at the posterior end. To the basal plate articulate the flattened parameres *(par)*. Between the parameres is the pseudo-penis *(pp)*, the arms of which appear likewise to articulate with the basal plate. The penis, the endomerites, and certain other parts usually associated with them appear to be lacking, or it were probably more correct to say, unchitined. The vesicula penis *(v)* is plainly evident by reason of the numerous teeth that it bears.

**Notes.**—The description given above is based upon the specimens from *Scirius vulgaris*, but those from the other hosts agree with these in all respects.

This species is a rather extreme member of the genus, the very short head, the presence of five pairs of pleural plates and the character of the genitalia of the male distinguishing it sharply from the nearest related forms which is possibly to be found in *E. kelloggi* Ferris.

---

*The terminology of the parts of the male genitalia used herein is that used by Cummings (Proc. Zool. Soc. London, p. 287, 1916), except that the term "vesicula penis" is used in lieu of "preputial sac," the former term being that employed by Nuttall (Parasitology, 9: 301, 1916). The latter author has made a very careful study of the genitalia of *Pediculus humanus* Linnaeus and has proposed a set of descriptive terms for the parts of the male genitalia of this species. Unfortunately the study was confined to this species alone and aids but little in homologizing the structures found in other species. In the absence of any careful comparative studies of numerous forms it becomes a difficult matter to interpret and homologize these structures. It should therefore be understood that in this paper the application of the various terms is purely tentative and is extremely subject to error.*
2. Enderleinellus malaysianus n. sp.

Host of the Type. Semen lacertosus, St. Lukes Id., Mergui Archipelago, Malaysia. Holotype, a male.

Specimens Examined. From the type host; from S. bentinckiius, Bentinck Id., Mergui Archipelago; S. borneoensis, Pulo Kanchut, Borneo;

Fig. 3—Enderleinellus malaysianus n. sp.

S. darwini, Trang, Lower Siam; S. domelenais, Domel Id., Mergui Archipelago; S. lancavensis, Pulo Teratau.

Male (Fig. 3). Length 0.6 mm. Head somewhat longer than wide, the anterior margin broadly rounded, the lateral margins nearly parallel; antennae well back from the anterior margin; rostrum on the ventral side, slightly anterior to the bases of the antennae. Thorax about as long as the head; sternal plate (Fig. 4B) cordate, the lateral portions more heavily chitinized than the remainder.

Abdomen elongate-oval, the apex rounded. Pleurites (Fig. 4C) present on the second to fifth segments. Spiracles present on the last three pairs of pleurites, apparently lacking on the remaining segments,

extraordinarily large and conspicuous. Fourth to seventh tergites each with a very narrow sclerite occupying the median fourth of the segment; ninth with a narrow sclerite extending across its entire width. Spines of the dorsum, moderately stout, arranged as follows: First to fourth segments each with a median group of four, fifth segment with median group of six, sixth and seventh with an unbroken transverse row of ten to fourteen, third to fifth with one or two submarginal spines, seventh

Fig. 4—Enderleinellus malaysianus n. sp.: A, genitalia of male; B, sternal plate; C, pleural plates.
and eighth each with a pair of long setae at each lateral margin. On the ventral side the arrangement is very nearly the same except that the sixth and seventh segments bear each a median group of two or four spines and a single submarginal spine instead of an unbroken transverse row. Genital plate occupying the greater part of the seventh sternite, quadrate in form, its posterior angles produced to the lateral margin of the ninth segment.

Gentilia (Fig. 4A). Basal plate (bp) composed of a single piece, which is cleft for more than half its length, the two arms having their tips widely separated. To the tips of the arms articulate the parameres (por), and between the parameres is the rather stout pseudo-penis (pp). Anterior to the pseudo-penis is an irregularly U-shaped piece (c), each arm of which articulates with a small sub-apical process on the corresponding arm of the basal plate. This piece is possibly the fused endomeses. Between the arms of the basal plate there is also a small, weakly chitinized structure which is probably the penis (p).

Female (Fig. 3). Length 0.7 mm. Differing from the male chiefly in the larger number of spines on the abdomen and in the absence of the small tergal and sternal sclerites. First to third tergites each with four small spines, fourth to sixth each with a continuous transverse row of fourteen to eighteen larger spines, seventh with ten, eighth with four. On the ventral side the arrangement is much the same except that the eighth sternite, which is for the most part occupied by the genital plate, bears but two spines. Extremity of the abdomen without lobe-like processes but with two or three large, flattened spines at the angles.

Notes.—While this species appears to be a member of the nitidulidae group, it approaches in the character of the genitalia of the male most nearly E. menetensis n. sp. It is readily recognizable in either sex by the extraordinarily large spiracles and the presence of four pairs of pleural plates. The genitalia of the male are likewise quite distinctive.

3. Enderleinellus menetensis n. sp.

Figs. 5, 6.

Host of the Type. Menetes boromrei rufescens, Koh Kut Id., Southeast Siam. Holotype, a male.

Specimens Examined. From the above host and locality only.

Male (Fig. 5). Length 0.7 mm. Head slightly longer than wide, the anterior margin broadly rounded, the lateral margins almost parallel. Antennae set well back from the apex of the head. Rostrum on the ventral side slightly back from the anterior margin of the head. Thorax about as long as the head, the sternal plate (Fig. 6B) quadrate. Posterior femora each with a pair of tooth-like processes on the anterior margin and the posterior tarsi with a similar process at the outer anterior angle.

Abdomen broadly oval, the tip slightly pointed. Pleurites (Fig. 6C) present on the second to fourth segments, each with a pair of small spines on the posterior margin. Spiracles present on the last two pairs of pleural plates and on the fifth and sixth (and perhaps the seventh) segments, also; extremely small. Fourth to ninth tergites each with a very narrow sclerite occupying the median fourth of the segment. Spines all small
and slender, few. The first, second, seventh, and eighth tergites each bear a median group of two, the remainder each bear a median group of four. Fourth and fifth segments each with a single submarginal spine. Seventh and eighth each with a pair of long setae at each lateral margin. On the ventral side the arrangement of the spines is practically the same as on the dorsum, but all are conspicuously stouter. Sternites without chitinization except for the very small genitalic plate which consists merely of a small, transverse sclerite on the eighth segment.

Genitalia (Fig. 6A). Basal plate ($bp$) consisting of a single piece which is divided for more than half its length into two slender arms.

![Diagram](image)

Fig. 6.—Enderleinella mexieata n. sp.: A, genitalic of male; B, sternal plate; C, pleural plates.

The parameres ($par$) are rather slender and nearly straight, their tips converging. Between the parameres lies the stout pseudo-penis ($pp$). Anterior to the pseudo-penis are two small pieces which are perhaps the endomerces ($e$). Between the arms of the basal plate is a small, chitinized structure ($i$) which is perhaps the penis.

Female (Fig. 5). Length 0.6 mm. In all essential respects closely resembling the male, but with the posterior end of the abdomen truncate, and with the tergites and sternites not chitinized, except for the genital plate and a narrow sclerite which extends across the tergum of the ninth segment. Apex of the abdomen with the angles slightly produced and bearing two or three flattened spines.

Notes.—In the character of the genitalic this species is quite close to the preceding, but the presence of but three pairs of pleural plates, the very small spiracles and the porosity of spines will suffice to separate the two in both sexes. It is also probably quite close to the next species, E. lanzag n. sp., from which it differs by the few spines in both sexes and in the genitalic of the male.

4. Enderleinella larisci n. sp.

Figs. 7, 8.

Host of the type. *Laricus diversus*, Lanchut, southwest Borneo. Holotype, a male.

Specimens examined. From the above host and locality only.

Male (Fig. 7). Length 0.5 mm. Head slightly longer than wide, the anterior margin broadly rounded, the lateral margins nearly parallel. Antennae set well toward the apex of the head. Rostrum on the ventral side, slightly back from the margin.

Thorax somewhat shorter than the head, the sternal plate consisting of two detached, oval pieces. Posterior femora with three tooth-like processes on the anterior margin and the posterior tarsi with a similar process at the outer anterior angle.

Abdomen broadly oval, sharply rounded at the tip. Pleural plates present on the second to fourth segments. Spiracles present on second to fifth segments, quite small. Tergites entirely unchitinized. Spines numerous, for the most part quite large and stout, arranged in median and sub-marginal series. In the median series there are two slender spines on the second and third segments, four on the fourth, six stout spines on the fifth, sixth and seventh and two on the eighth. The spines of the sub-marginal series are stouter than the others; there is a single spine on the third and seventh segments and four on the fifth to seventh. Seventh and eighth segments each with a pair of long setae at each lateral margin. On the ventral side the spines are somewhat stouter. The arrangement is practically the same as on the dorsum except that there is no division into median and sub-marginal series. Sternites unchitinized except for the genital plate which consists of a small transverse sclerite occupying the median half of the seventh segment.

Genitalia (Fig. 8A). Basal plate ($bp$) quite stout, divided for about one third of its length into two sharply diverging arms. Parameres ($par$) flat and sharply pointed, their spines curving toward each other. Between the extreme tips of the parameres lies the very small pseudo-penis ($pp$).
Also between the parameres are two elongated pieces (e), which are perhaps the endomeres. The penis (p) is quite small and usually lies well forward on the basal plate.

Female (Fig. 7). Length 0.55 mm. In general very closely resembling the male, but with the abdomen slightly truncate at the tip, with the spines slightly more numerous. Ninth segment with a narrow, transverse sclerite extending across. Genital plate occupying the greater part of the eighth and ninth sternites. Apex of the abdomen with the lateral angles produced into small lobes, each of which bears two or three flattened, spine-like processes.

Figure 8—Enderleinellus larici n. sp.: A, genitalia of male; B, sternal plate; C, pleural plates.

Notes.—This species probably is most closely related to the two preceding, E. moorei and E. malayanus, but is readily separable by the numerous stout spines, and the character of the genitalia.

5. Enderleinellus longiceps Kellogg and Ferris.

Figs. 9, 10.

1915. Enderleinellus longiceps Kellogg and Ferris. Anop., a and M. N. Amer. Mamm., 44-6; pl. 2, f. 5; pl. 4, f. 12; pl. 6, f. 2. Stanford University Publ.


Host of the Type. “Gray squirrel,” Lincoln, Neb. Both Scirurus niger rufiventris and S. carolinensis ssp. occur in this locality and both harbor this species. The typical host may be taken as the former.

Material Examined. The types and in addition the following: from Scirurus niger rufiventris, Waterloo, Ind., and Valentine, Neb.; S. carolinensis, Bayou St. Louis, Mississippi; S. kaibabensis, Kaibab National Forest, Arizona; S. olerti ferreus, Fates Park, Colorado; S. apache,
Colonia Garcia, Chihuahua, Mexico; *S. oculatus*, State of Vera Cruz, Mexico; *S. nayaritensis*, Sierra Madre, Zacatecas, Mexico.

**Male (Fig. 9).** Length 0.65 mm. **Head** considerably longer than wide, the anterior margin broadly rounded, the lateral margins almost straight and practically parallel. Rostrum on the ventral side of the head, well back from the anterior margin. Antennae set well toward the apex of the head.

**Thorax** about as long as the head, the sternal plate (Fig. 10B)

Mandible elongate-oval, the apex rounded. Pleurites (Fig. 10) present on the second to fifth segments, all with the posterior angles somewhat produced and with a pair of small spines. Spiracles present only in connection with the last three pairs of pleural plates, quite large and conspicuous. Tergites unchitnized except for a very narrow sclerite occupying the median third of each of the third to seventh segments. Spines quite numerous, varying from quite slender to moderately stout, arranged in median and submarginal series as follows: First, second, and third tergites with median group of four, fourth to seventh with median group of six. Second and seventh with a single submarginal spine, third and fourth with two, fifth and sixth with three. Seventh and eighth segments each with a pair of long, slender setae at each lateral margin. On the ventral side the arrangement of the spines is practically as on the dorsum, but the spines are somewhat stouter. Stermites unchitnized except for the genital plate, which consists of a narrow
sclerite occupying the median two-thirds of the seventh sternite and curved back to meet the lateral margin of the ninth segment.

Genitalia (Fig. 10A) extremely conspicuous, large, heavily chitinized and of a complex type. The basal plate (bp) consists of a pair of nearly parallel, widely separated rods, the anterior ends of which are connected by a less heavily chitinized cross piece. The tips of these rods are somewhat attenuated and to them attach the very small, flattened parameres (par) which point almost toward each other. Between the parameres is the pseudo-penis (pp), the arms of which are at an obtuse angle to each other. Between the arms of the basal plate lies a large and extraordinarily complex structure which is composed of the penis (p) and probably several other parts so fused as to have lost their identity. On the dorsal side of the basal plate and lying partially posterior to the penis is a U-shaped piece (e) which is possibly composed of the fused endomerses.

FEMALE (Fig. 9). Length 0.7 mm. In general closely resembling the male, but with none of the tergites chitinized except for a narrow sclerite extending across the ninth segment. Tip of the abdomen rounded or somewhat truncate, with the angles produced into small lobes, each of which bears a large, stout spine. Genital plate occupying the greater part of the eighth sternite.

Notes.—This species may be taken as the type of a group of species from American species of Sciurus, this group including E. kelloggi Ferris and two other species that I am here describing as new. The group is distinguished by the peculiar character of the genitalia of the males, which, in their general characteristics, are similar in all the included species but differ in certain details. The females of this group are scarcely separable.


Fig. 11.


Host of the Type. Sciurus griseus migrates, Stanford University, California.

Material Examined. The types and material from the following hosts: Sciurus griseus griseus, Pleasant Valley, Mariposa Co., Cal.; S. goldmani, Huehuetan, Chiapas, Mexico; S. boothiae, San Pedro Sula, Honduras; S. melania, Boqueron, Colombia. Specimens from Microsciurus minutus, Colombia, are tentatively referred to this species.

Male. Differing from the male of E. longiceps only in the character of the genitalia.

Genitalia (Fig. 11A) in general resembling the genitalia of E. longiceps but with the rods of the basal plate more slender and much closer together, the parameres (par) larger and not pointing toward each other, the pseudo-penis relatively larger and with its arms meeting at a much more acute angle, the U-shaped endomer piece (e) longer, the structures surrounding and including the penis (p) very much smaller, and anterior to the penis a weakly chitinized structure (sp) which is perhaps the statumen penis of Nuttall.

FEMALE. Not recognizably different from the female of E. longiceps.

Notes.—The specimens from Sciurus boothiae differ from typical E. kelloggi somewhat in the character of the genitalia (Fig. 11B). The arms of the basal plate (bp) diverge somewhat instead of being nearly parallel, the penis and its surrounding structures are more weakly developed and the U-shaped endomer piece (e) is smaller and very weakly chitinized. However, the specimens from S. goldmani stand directly between these two forms, as do those from S. melania. It is possible that further collecting may indicate the desirability of a separation.

The specimens from Microsciurus minutus are referred to E. kelloggi only provisionally. The genitalia are of the type seen in the specimens from Sciurus boothiae, the pleural plates seem to be somewhat larger, the genital plate of the male is larger and the tergal sclerites in the male are likewise noticeably larger. The material at hand, however, is not satisfactory and the specimens may be referred to kelloggi for the present.
7. *Enderleinellus extremus* n. sp.

**Fig. 12.**

**Host of the Type.** Sciurus socialis, Nenton, Guatemala.

**Specimens Examined.** From the type host and the following: Sciurus aureogaster, Papanita, Vera Cruz, Mexico; *S. aureogaster hypopyrrhus*, Quichico, Oaxaca, Mexico; *S. deppei*, Teapa, Tabasco, Mexico; *S. grisigollum chiapensis*, San Cristobal, Chiapas, Mexico; *S. negiliger*, Alta Mira, Tamaulipas, Mexico; *S. Nelsoni*, Huitzilac, Morelos, Mexico;

*S. pelopius*, Cerro San Felipe, Oaxaca, Mexico. In addition to the above I refer tentatively to this species specimens from the following: Sciurus *astus hoffmani*, Santa Clara, Costa Rica; *S. collus*, Santiago, Tepic, Mexico; *S. nesius*, Margarita Isl., Venezuela; *S. arizonensis huachucana*, Huachuca Mts., Arizona.

**Male.** Differing from *E. longiceps* in the character of the genitalia, the posterior ends of the arms of the basal plate being much expanded and deeply bi-lobed.

8. *Enderleinellus venezuelae* n. sp.

**Fig. 13.**

**Host of the Type.** Sciurus grisigollum, Macuto, Venezuela. Holotype, a male.

**Specimens Examined.** From the type host and the following: *S. meridensis*, Montes del Escorial, Merida, Venezuela; *S. versicolor&zilche*, Rio Aurare, Venezuela.

**Male.** Of the general type of *E. longiceps*, differing essentially only in the character of the genitalia, these most nearly resembling the genitalia of *E. extremus*.

Genitalia (Fig. 13A). Basal plate (*bp*) with the ends of the arms expanded and deeply bi-lobed, the lobes nearly equal. To the mesal face of the outer lobe articulate the short, flat parameres, which are curved toward each other. Between the parameres is the pseudo-panis (*pp*) the tip of which is quite short and the arms set at an obtuse angle to each
other. The U-shaped endosomal piece \((e)\) is broad and short. The penis \((p)\) and its surrounding structures are of a characteristic shape, the whole structure being triangular or of a trefoil shape with the apex directed forward, in contrast to the more or less quadrate form seen in other species.

Fig. 13.—*Enderleinellus crenulatus* n. sp.: A, genitalia of male; B, ventral aspect of portion of tip of abdomen of female.

**FEMALE.** In all respects like the female of *E. longiceps*, except for the unusual size of a structure (Fig. 13A, \(e\)), in all probability the spermatheca, which lies within the body on the median line above the genital plate. In related species this structure, while present, is very small.

**Notes.—** This species is obviously nearest *E. extremus*, but the differences between the two, while small, appear to be constant and are quite definite.

9. *Enderleinellus platyspicatus* n. sp.

Figs. 14, 15.

**Host of the Type.** *Funambulus triatrus*, Colombo, Ceylon.

**Holotype.** A female.

**Specimens Examined.** From the above host and locality only.

**Female (Fig. 14).** Length 0.5 mm. Head short, only slightly broader than long. Anterior margin rounded, lateral margins nearly par-

Fig. 14.—*Enderleinellus platyspicatus* n. sp.
Abdomen elongate-oval, rather slender, the apex rounded or slightly truncate. Pleural plates (Fig. 15) present on the second to fourth segments only, the first and third plates quite small, the second much larger and bearing a pair of quite long spines on the posterior margin. Spiracles apparently present only in connection with the last two pairs of pleural plates, moderately large and conspicuous. Tergites unchitinized except for a very small sclerite occupying the median fourth of each of the first three segments and a broad sclerite which extends entirely across the ninth segment. First segment with a median pair of small, slender spines, second and third with a median pair of extremely minute spines, and outside of these a pair of slender spines. Fourth to seventh segments each

with a continuous transverse row of twelve to fourteen large, flattened spines which are broadest near the base and taper regularly to the blunt apex. Eighth segment with a median pair of such spines and a pair of very long, slender setae at each lateral margin. On the ventral side the first segment bears a small transverse sclerite with six small spines, the remainder being unchitinized, except for the genital plate. Third to sixth segments each with an unbroken row of eight to twelve spines similar to those on the dorsum. Seventh segment with a submarginal pair of such spines on each side. Genital plate occupying most of the seventh sternite, divided transversely into two plates. The posterior plate bears a long fringe on its posterior margin and a single flattened spine at each posterior angle. The apex of the abdomen bears a flattened spine at each angle and anterior to this spine are two more of similar character.

Male (Fig. 14). In general resembling the female but with the apex of the abdomen sharply pointed. Third to seventh tergites each with a narrow sclerite occupying the median half of the segment. Spines slightly fewer than in the female, the rows tending to be broken into median and submarginal series. On the ventral side the arrangement of the spines is much as on the dorsum, the third to sixth sternites bearing a small transverse sclerite. Genital plate quite large, extending forward to the anterior margin of the sixth segment.

Genitalia not available for description.

Notes.—The single specimen found of the male of this species was unfortunately destroyed by accident before a drawing of the genitalia could be made.

The only species at all closely resembling this is E. dremomydis n. sp. The curiously flattened spines are quite distinctive.

10. Enderleinellus dremomydis n. sp.

Fig. 16.

Host of the Type: Dremomyx pernyi, West Szechuan, China. Holotype, a female.

Specimens Examined. From the above host and locality only.

Female (Fig. 16A). Length 0.55 mm. Head short, only slightly longer than broad, the anterior margin rounded, the lateral margins nearly parallel. Rostrum on the ventral side at a slight distance from the anterior margin. Antenna set well toward the apex of the head. Thorax slightly shorter than the head, the sternum plate (Fig. 16C) more or less oval, slightly wider than long, with the anterior margin slightly emarginate; legs of the usual type, the posterior femora with three tooth-like processes on the anterior margin.

Abdomen elongate-oval, the posterior extremity more or less truncate. Pleural plates (Fig. 16B) present on the second to sixth segments, each with a pair of small spines on the posterior margin, except the first, which has but a single spine. Spiracles quite small, present on the third to eighth segments. Tergites entirely unchitinized. First to fifth segments each with a median group of four small, slender spines. Fifth with a submarginal pair of short, flattened, sharply pointed spines. Fifth to seventh each with an unbroken row of ten to fourteen large, stout, sharply pointed spines. Eighth with a median pair of such spines. Seventh with a marginal pair of moderately long, slender setae; eighth with a marginal pair which are considerably longer than those of the seventh.

On the ventral side the third tergite alone bears a narrow, transverse sclerite. First sternite with a median group of four slender spines. Third and fourth with median group of six short, flattened, sharply pointed spines. Fifth and sixth with twelve such spines which are somewhat longer than those of the preceding segments. Seventh with a single large, submarginal spine on each side. Genital plate occupying the greater part of the seventh sternite. Posterior end of the abdomen with
a small lobe-like process at each angle which bears a single stout spine. Anterior to this process is a cluster of several smaller spines.

**Males.** Not available for description.

![Diagram](image)

**Fig. 16.—*Enderleinellus dremanydex* n. sp.; A, female; B, pleural plates; C, sternal plate.

**Notes.**—This species is possibly closest to the preceding, *E. platypicatus*, but the presence of five pairs of pleural plates is alone sufficient to distinguish it.

11. **Enderleinellus nannosciuri** n. sp.

**Fig. 17.**

**Host of the Type.** *Nannosciurus melanotis*, Natavia, Java. Holotype, a female.

**Specimens Examined.** From the above host and locality only.

**Female** (Fig. 17A). Length 0.5 mm. **Head** somewhat elongate, considerably narrower in front of the antennæ than behind, the anterior margin pointed or narrowly rounded. **Rostrum** close to the apex of the head. **Thorax** slightly shorter than the head. **Sternal plate** (Fig. 17B) quadrate, with the anterior and posterior margins slightly produced medially. **Legs** of the usual type, the posterior femora with a single tooth-like process on the anterior margin. **Abdomen** elongate-oval, the posterior extremity truncate. **Pleural plates** (Fig. 17C) present on the second to fifth segments, all relatively quite large and with a pair of short spines on the posterior margin. **Spiracles** quite small, apparently present only in connection with the last.
three pairs of pleural plates. Tergites unchitinnized except for a rather large, oval sclerite which occupies the median third of the third and fourth segments. Spines arranged as follows. First, second, and third segments each with a median group of two slender spines. Fourth with median group of six spines. Fifth, sixth, and seventh each with a transverse row of eight to twelve quite large, stout, and sharply pointed spines, the submarginal spine on the fifth and sixth segments somewhat separated from the others. Second, third, and fourth segments each with a single slender, submarginal spine. Eighth segment with a median pair of spines. Seventh with a pair of slender, moderately long setae at each lateral margin; eighth with similar but much longer setae.

On the ventral side the arrangement of the spines is practically as on the dorsum. None of the sternites is chitinized, except for the genital plate which occupies most of the seventh segment. Apex of the abdomen with the angles not produced into a lobe-like process but bearing a cluster of quite stout spines.

**Male.** Not available for description.

**Notes.** In the absence of the male it is difficult to indicate the affinities of this species. It is possibly closest to the preceding, *E. drenowitsa*, but this is at the best only a surmise.

12. *Enderleinellus zonatus* n. sp.

**Fig. 18, 19.**

**Host of the Type.** *Parascirrus jacksoni capitis*, Kijabe, British East Africa. Holotype, a female. Allotype from *Parascirrus animatus*, Mt. Lolokroi, British East Africa.

**Specimen Examined.** From the following: *Parascirrus jacksoni capitis*, Kijabe, British East Africa; *Parascirrus palliatus swahilicus*, British East Africa; *Parascirrus palliatus ornatus*, Nyoge Hills, Zululand, South Africa; *Parascirrus animatus*, Mt. Lolokroi, British East Africa.

**Female** (Fig. 18). Length 0.6 mm. Head quite short, but little longer than broad, with the anterior margin broadly rounded, the lateral margins nearly parallel. Antennae set well toward the apex of the head. Rostrum on the ventral side of the head, at a slight distance from the anterior margin. Thorax about as long as the head; sternal plate (Fig. 19A) quadrate, with the anterior angles somewhat produced and the anterior margin emarginate; legs of the usual type, the posterior femora with a pair of tooth-like processes on the anterior margin, the posterior tarsi with a similar process at the outer anterior angle.

**Abdomen** elongate-oval, the posterior extremity truncate. Pleural plates (Fig. 19B) present on the second to fourth segments only; the second pair bearing a pair of moderately long spines on the posterior margin. Spiracles quite small, present only on the last two pleural plates. Second and third tergites each with a weakly chitinized area occupying the median half of the segment. Fourth with a chitinized area occupying nearly the entire width of the segment. Fifth to eighth each with a weakly chitinized area extending entirely across the segment, thus giving the abdomen a banded appearance. Spines very few, small and slender, confined to a median group of two to four on each segment. Eighth segment with a pair of long, slender setae at each lateral margin.

Ventral side similar to the dorsal except that the chitinized areas do not reach to the lateral margin on any segment. Genital plate very large, occupying most of the seventh and eighth segments. The pair of sclerites with their projecting processes on the second sternite are unusually small.
End of the abdomen without lobe-like processes at the angles but with a single large, stout spine and several smaller spines in this region.

**Male (Fig. 18).** *Length 0.5 mm.* For the most part resembling the female but with the end of the abdomen sharply pointed. The transverse bands are wider, leaving only small, unchitinized intersegmental spaces. The spines are somewhat more numerous, there being a submarginal spine at each lateral margin of the fourth to seventh segments. On the ventral side the third to sixth sternites each bear a chitinized area which occupies the median half of the segment. These sternites together occupy only the anterior half of the venter, the remainder being taken up by the extraordinarily large genital plate.

![Diagram of lice](image)

**Fig. 19.—Enderleinellus zoannii n. sp.: A, genitalia of male; B, pleural plates; C, sternal plate.**

**Genitalia (Fig. 19A)** unusually large and conspicuous, the basal plate extending almost to the posterior margin of the thorax. Basal plate (*bp*) a slender rod which is somewhat expanded and slightly bifid at its posterior extremity. To the end of the basal plate articulate the very large, flattened, and tapering parameres (*par*). The amount of material at hand is not sufficient to permit of dissections, and it has not been possible to work out the remaining parts.

**Notes.—** A very singular and isolated species, bearing no very close resemblance to any others that I have seen. The banded appearance, the paucity of spines and the extraordinary genitalia of the male are all quite distinctive.

**Specimens Examined.** From the above host and locality only.

**Male (Fig. 20).** *Length 0.55 mm.* Head elongate, about twice as wide as long. Anterior margin quite sharply rounded, lateral margins nearly parallel. Antennæ set well back from the apex of the head. Rostrum on the ventral side at a slight distance from the apex of the

![Diagram of lice](image)

**Fig. 20.—Enderleinellus scirotamiasis n. sp.**

**Host of the Type.** *Scirotamias dravidianus*, Shensi, China. Holotype, a male.
head. In front of the rostrum is a narrow sclerite which borders the anterior margin of the head, and articulating to the end of this sclerite there is on each side another narrow sclerite which extends posteriorly toward the median line for nearly half the length of the head.

Fig. 21.—Enderleinellus scirotomiasis n. sp.: A, genitalia of male; B, pleural plates; C, sternal plate.

Thorax considerably shorter than the head. Sternal plate (Fig. 21C) spatulate, having a handle-like portion which extends forward between the anterior coxae. Legs of the usual type, the posterior femora with a pair of tooth-like processes on the anterior margin, the posterior tarsi with a similar process at the outer anterior angle.

Abdomen broadly oval. Pleural plates (Fig. 21B) present on the second to fifth segments. Each plate with a pair of spines on the posterior margin, those of the last pair larger and stoutier than the others. Spiracles quite small, present only in connection with the last three pairs of pleural plates. Dorsum with a narrow sclerite occupying the median third or fourth of the fourth to seventh segments and with a very narrow sclerite extending entirely across the ninth segment. Spines few and small. Third and eighth segments with a single, submarginal spine on each side. Second to seventh segments each with a median group of two to four spines. Seventh and eighth segments each with a pair of long, slender setae at each lateral margin.

On the ventral side none of the sternites are chitinized, and each segment bears only a median pair of spines. The genital plate consists of a narrow, transverse sclerite occupying the median third of the seventh sternite, with its ends produced back to meet the lateral margin of the ninth segment.

Genitalia (Fig. 21A). The basal plate (bp) consists of a long, slender piece which is expanded and quite deeply bifid at its posterior end. To the arms attach the slender parameres (par) which are more than half as long as the basal plate. Between the tips of the parameres, which are turned toward each other, lies the pseudo-penis (pp), the arms of which are set at an acute angle to each other, are flattened, expanded, and transversely striate. Also between the parameres are two slender rods (t) which are perhaps the telomeres. What are possibly the endomeres (e) are two slender pieces between which lie a complex of structures which appear in part at least to be the penis (p).

FEMALE (Fig. 20). Length 0.6 mm. In all respects quite closely resembling the male, but with none of the tergites chitinized. Tip of the abdomen truncate, the angles without lobe-like processes but with a cluster of spines of which two or three are flattened and expanded.

Notes.—An isolated species, apparently not closely related to any other that I have seen.

14. Enderleinellus euxeri n. sp.

Host of the Type. Euxerus microdon, Wambaun and Oni, British East Africa. Holotype, a male, from the first named locality.

Specimens Examined. Only as above recorded.

Male (Fig. 22). Length 0.9 mm. Head elongate, the apex sharply pointed, the lateral margins behind the antennae nearly parallel. Antennae unusually slender, set about the middle of the head. Rostrum close to the apex. The entire head is quite heavily chitinized, especially on the dorsal side.

Thorax slightly shorter than the head. Sternal plate (Fig. 23B) quadrate, the angles rounded. Legs unusually large, especially the posterior pair.

Abdomen almost subcircular, the posterior extremity slightly pointed.
Pleural plates (Fig. 23C) present on the second to seventh segments. The first pair is very small; second pair large and bi-lobed, a very long, slender seta arising from the apex of one lobe. Remaining plates one-lobed, being successively smaller, the seventh being very small. Spiracles small, present in connection with the second to seventh pleural plates. The derrn is everywhere slightly chitinated and presents a minutely papillate appearance. Spines few, arranged as follows. Second and third segments each with a single very long, slender seta near each lateral margin. Third to sixth each with a median pair of rather short, stout spines. Eighth with two or three very long, slender setae at each lateral margin. On the ventral side there are only a median pair on the fifth and sixth segments and two median pairs on the genital plate. The pair of sclerites usually present on the second sternite is lacking.

Genitalia (Fig. 23A). Relatively small. Basal plate (bp) a simple rod, which is expanded and quite deeply bifid at the tip. Parameres (par) short and broad. Beyond the ends of the parameres is the short, wedge-shaped pseudo-penis (pp), and between the parameres are two proximally fused pieces which are perhaps the endomeres (e). Overlying the ends of the parameres and the pseudo-penis is a U-shaped piece (t) of doubtful homology, but possibly representing the telomeres.

Fig. 23.—Enderleinellus euserti n. sp.: A, genitalia of male; B, sternal plate; C, pleural plates.

Female (Fig. 22). Length 1 mm. In general closely resembling the male, but having the median spines of the dorsum long and slender. End of the abdomen rounded, bearing a pair of lobe-like processes, each of which terminates in a short, flattened, blunt spine.

Notes.—A most anomalous species, differing from all the other members of the genus in the absence of the paired plates on the second sternite as well as in several other important characters. I am unable to suggest its relationships unless they be with the following species, E. heliosciuri n. sp.
15. Enderleinellus heliosciuri n. sp.

Figs. 24, 25.

Host of the Type. Heliosciurus undulatus daucinus, Mazeras, British East Africa. Holotype, a male.

Specimens Examined. From the type host and the following: Heliosciurus rufohaliatus nyansa, Lukosa River, British East Africa; H. multicolor madihe, Uma, Uganda, Africa; H. ruenzorii, Mubu-ki Valley, Mt. Ruenzori, British East Africa; Protoxisus stangeri bea, Lukosa River, British East Africa.

Fig. 24.—Enderleinellus heliosciuri n. sp.

Male (Fig. 24). Length 0.85 mm. Head elongate, more than twice as long as wide, cigar-shaped, the apex sharply pointed. Anten-

Fig. 25.—Enderleinellus heliosciuri n. sp.: A, pleural plates; B, sternal plate; C, genitalia of male.
Genitalia (Fig. 25C). Basal plate (bp) a rather short, broad piece which is much expanded and shallowly bifid at the posterior end. Parameres (par) about half as long as the basal plate, nearly straight. Between the tips of the parameres is the small pseudo-penis (pp), the arms of which meet a small, subapical projection in the parameres. Between the proximal ends of the parameres are two small, curved pieces (x) of doubtful homology. Likewise between the parameres is an oval, ring-shaped piece (e), which is perhaps formed by the fusion of the endomeres. Extending from the anterior end of the endomeral piece to the pseudo-penis is a narrow, indistinct sclerite of doubtful homology.

Female (Fig. 24). Length 1 mm. In general quite closely resembling the male, but with a transverse sclerite extending across the ninth segment with the end of the abdomen truncate and with a slightly different arrangement of the setae on the dorsum. There is a tendency for the spine on the second pleural plate to become a long, slender seta, although it is sometimes quite short. End of the abdomen with a small, lobelike process at each angle, this bearing a single stout spine.

Notes.—In the specimens from Protocerus the spines of the median groups, both dorsally and ventrally are larger than in the type but there is obviously some variation and this difference is probably not significant.

This is an isolated species, possibly closest to E. exsuxi, but yet quite different.

16. Enderleinellus suturalis (Osborn)

Figs. 26, 27, 28.

1908. Polyplax (?) suturalis (Osb.), Dalla Torre, Anopliwa, 14, Gen. Ins.
1915. Enderleinellus suturalis var. accidentalis Kellogg and Ferris, ibid., 42; pl. 2, f. 3; pl. 4, f. 10; pl. 5, f. 17.

Host of the Type. In the original description this species was recorded from Céllus ( = Spermophilus) franklini and C. 13-irneatus, at Ames, Iowa. The former may be considered as the type host, and it is upon specimens from this host that the present figures and description are based.
long as wide, the apex rounded or slightly pointed and more or less deflexed. Head widening somewhat behind the antennae, the margins nearly parallel. The post-antennal suture is unusually well defined. On the ventral side the rostrum, which is situated near the apex, is almost surrounded by a ring-like sclerite. Antennae set slightly in advance of the middle of the head.

![Image of Euderleciellus satralis](image)

Fig. 27.—*Euderleciellus satralis* (Osb.): A, pleural plates; B, sternal plate; C, genitalia of male. Figures from specimens taken from *Cistus franklini*, Walhalla, North Dakota.

Thorax somewhat shorter than the head. Sternal plate (Fig. 27B) more or less quadrate, the anterior end slightly narrower than the posterior. Legs of the usual type, the posterior femora with a single tooth-like process on the anterior margin, the posterior tarsi without such a process at the outer anterior angle.

Abdomen broadly oval or subcircular, the posterior extremity rounded. Pleural plates (Fig. 27A) present on the second to fifth segments, quite large, each with the posterior angles produced and broadly rounded and with a median lobe on the posterior margin. Second pair with a single seta and a very small spine on the posterior margin, third pair with two long, slender spines. Derm membranous through-out except for a narrow transverse sclerite extending across the ninth tergite. Spines extremely numerous, all quite long and stout. On the dorsum the arrangement is as follows: First segment with a single submedian spine and a median pair of small spines. Ninth with a median pair. Remaining segments with an unbroken row of eighteen to twenty-four spines. Seventh and eighth segments each with a pair of long, slender setae at each lateral margin.

On the ventral side the arrangement of the spines is much as on the dorsum, but all the spines tend to be somewhat shorter and stouter. The paired sclerites on the second sternite are produced laterally, reaching to the first pair of pleural plates, with which they are closely associated, although they are not actually attached. The genital plate is rather small, occupying the median half of the eighth segment. The end of the abdomen bears a pair of short stout spines which are sometimes seen at some distance from the margin.

**Male** (Fig. 26). *Length* 0.75 mm. In general very closely resembling the female but with the abdomen slightly more pointed. The genital plate consists merely of a pair of narrow sclerites which extend forward from the margin of the ninth segment to the middle of the seventh sternite.

Genitalia (Fig. 27C). Basal plate (*bp*) a simple rod which is expanded and deeply bifid posteriorly. Parameres (*par*) about half as long as the basal plate, diverging posteriorly, with their tips bent toward each other.
other. Between the tips lies the small pseudo-penis (pp). Between the parameres is an oval, ring-like piece (e), which perhaps represents the fused endomerites. Overlying the posterior portion of the endomeral piece is a small, flattened, elongate sclerite of doubtful homology. The posterior extremity of this piece is blunt and is tipped by a pair of small spines.

Notes.—I am including under this species forms, the extremes of which are sufficiently different perhaps to merit recognition as species. However, these extremes are connected by a series of intermediate forms so complete that the limits of these species would be scarcely possible of definition. I therefore retain them as one species; but I shall point out the differences.

The form described above is the typical form. This occurs on Cistelus franklini, C. tetracpilipes, Amnospnermophilus neotoni and the various species of Callotermophilus. Specimens from Callotermophilus have previously been separated by Kellogg and Ferris as the variety occidentalis, but this is quite untenable.

The specimens from Cistelus baldus (Fig. 28 A) have the dorsal spines noticeably fewer, more slender and tending to be arranged in marginal and median series. Also the ventral spines are much shorter and stouter than those of the dorsum. With these specimens those from Cistelus eversmanni, Cistelus’ mollis, C. elegans, and probably those from Cistelus mongolicus (represented only by males) agree quite closely.

The specimens from Cistelus aequalis and C. tenuimg are similar to those from Cistelus baldus in the paucity and slenderness of the dorsal spines, but have the ventral spines longer and relatively more slender.

The specimens from the genus Cymops (Fig. 28 B) all agree in having the dorsal spines few and slender as in those from Cistelus baldus, but the ventral spines are likewise small and slender, differing but little from those of the dorsum.

17. Enderleinellus osborni Kellogg and Ferris.

Fig. 29.

1915. Enderleinellus osborni Kellogg and Ferris. Anopla and Mall. N. Am. Mam., 41-44; pl. 4, t. 11; pl. 6, f. 6, Stanford Univ. Publ.

Host of the Type. Cistelus douglasii, Covel, Mendocino County, California. In Ferris, Cat. Anopla, the host is erroneously stated to be Cistelus beecheyi.

Specimens Examined. From Cistelus douglasii, Cazadero and Cojelo, Calif.: C. beecheyi beecheyi, Carmel Point, Monterey County, Calif.; C. beecheyi fisheri, Pleasant Valley, Mariposa County, Calif.; C. grammurus, Oracle, Ariz.; C. buckleyi, Llano, Texas; Xeroptermophilus tereticaudus, Imperial County, Calif.

Female (Fig. 29). Definitely separable from E. suturalis only by the fact that the fourth tergite bears a median group of from two to six long, slender setae. The type of this species differs further from suturalis in that the spines, both of dorsum and venter, are much fewer and are much shorter and stouter. In specimens from other hosts, however, the spines approach the condition found in typical suturalis, the long setae of the fourth tergite remaining as the only distinguishing character.

Male (Fig. 29). Differing from the female in the absence of the long, slender setae of the fourth tergite. In the typical form the male may be distinguished from the male of suturalis by the much fewer and stouter spines, but in other forms it is scarcely distinguishable.

Notes.—It is possible that this form should not be distinguished as a species, but it is easily recognizable in the female sex.

Specimens from Cistelus beecheyi beecheyi and C. beecheyi fisheri agree closely with the type. Those from C. beecheyi and C. grammurus and Xeroptermophilus tereticaudus approach more closely E. suturalis, differing chiefly in the long setae of the fourth tergite.

18. Enderleinellus marmote n. sp.

Fig. 30.

Host of the Type. Marmota monax rufescens. Grafton, S. D.

Holotype, a female.
Specimens Examined. From Marmota monax rufescens, Grafton, S. D., and Elk River, Minn.; Marmota monax monax, Marble Cave, Mo.; Sandy Springs, Md., and Washington, D. C.

Fig. 30.—Enderleinellus marmotae n. sp. abdomen of female.

Male and Female. Length of the female 0.95 mm., length of the male 0.9 mm. Differing from E. suturalis and related forms constantly and chiefly in the presence of two long, slender setae on the posterior margin of each pleural plate and at the lateral margins of the sixth, seventh, and eighth segments.

Notes.—All the specimens at hand agree closely in the characters indicated above, and as the form is readily recognizable it may well be regarded as a distinct species.

19. Enderleinellus tamiasis Fahrenholz.


Host of the Type. Tamias striatus, in the Zoological Garden in Berlin.

Notes.—I have not been able to obtain specimens of this species although I have examined numerous skins of its reputed host, which is a native of central United States and Canada. The original description is inadequate, there being no reference to the genitalia of the male, and the description is not accompanied by adequate figures.

Genus Microphthalmus new genus.

Anoplura without eyes; with five-segmented antennae, which are not sexually dimorphic and which are beset with tooth-like processes; with the anterior and middle pair of legs small and weak, with weak claw, the posterior pair very stout, with broad, heavy claw; pleural plates consisting merely of very small sclerites, the edges of which are not free; abdominal segments with not more than one transverse row of spines; tergites and sternites of the abdomen with well-defined plates; head more or less cylindrical, not widening abruptly behind the antennae.

Hosts. Known only from the genus Sciuropterus of the rodent family Petriurididae, the flying squirrels.

Type of the Genus. Enderleinellus uncinnatus Ferris.

Notes.—While the single species upon which this genus is based is certainly most closely related to the members of the genus Enderleinellus, it is so different in numerous respects as to render a separation advisable. The small first and second pairs of legs and the stout third pair with its broad claw and the cylindrical head connect the species with Enderleinellus; but the absence of free pleural plates, the absence of the paired serylites on the second sternite, and the extraordinary antennae are sufficient grounds for a separation.

1. Microphthalmus uncinnatus (Ferris).

Figs. 31, 32.


Host of the Type. Glaucomys (=Sciuropterus) sabrinus insaevis, Yosemite National Park, California.

Specimens Examined. From type host and locality only.

Female (Fig. 31). Length 0.45 mm. Head somewhat longer than broad, the anterior margin broadly rounded, the lateral margins, behind the antennae, nearly parallel. Rostrum on the ventral side at a slight distance from the apex of the head. On the ventral side of the head there are between the bases of the antennae two irregular chitinized areas. Behind each of these areas there is a smaller area, the posterior margin of which is deeply three-toothed. The antennae (Fig. 32B) are of a very
peculiar type, the first segment bearing on its ventral side a series of four stout teeth and the third and fourth segments with the anterior proximal angle likewise produced into a tooth.

Thorax much shorter than the head, widest across its posterior margin, the division between the thorax and the abdomen scarcely indicated. Sternal plate very poorly defined but apparently quite broad, occupying the greater part of the venter of the thorax. Posterior femora each bearing a single small tooth-like process.

Abdomen elongate-oval, the apex rounded or narrowly truncate, terminated by a pair of lobe-like processes. Pleural plates present on the third to sixth segments, consisting merely of small, chitinized areas, the posterior margins of which are not free, each bearing a pair of stout, tapering, sharply pointed spines. The seventh segment bears at each lateral margin a single slender, moderately short seta and a spine. The eighth segment bears at each lateral margin a pair of long, slender setae. Spines of the dorsum few, arranged in median groups of two to four on each segment. The tergites show a tendency toward a weak chitinization of their median portion.

On the ventral side the third to sixth segments each bear a narrow transverse sclerite which touches the pleural plates and bears at each end a stout, flattened spine. Genital plate occupying the greater part of the seventh and eighth segments.

Male (Fig. 31). Length 0.35 mm. Resembling the female entirely except for its smaller size and for having the abdomen terminated by a broad, truncate process which bears several short, thorn-like spines.

Genitalia (Fig. 32, A) very small and so highly modified as to preclude any definite conclusions as to the homologies of the parts. It is possible to recognize definitely only the basal plate (bp) to which is attached a broad, flattened piece, which possibly represents the fused parameres and other parts.

Notes.—The measurements given above are from specimens which have been somewhat expanded in preparation and are consequently somewhat greater than those of the original description which were from untreated specimens. The length of the female in life is probably not more than 0.4 mm., and that of the male 0.35 mm.