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Contributions Toward a Monograph  
of the Sucking Lice

PART II.

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## CONTENTS

	PAGE
PREFATORY NOTE . . . . .	57
GENUS HOPLOPLEURA . . . . .	59
<i>Hoplopleura acanthopus</i> (Burm.) . . . . .	63
<i>Hoplopleura acanthopus acanthopus</i> (Burm.) . . . . .	63
<i>Hoplopleura acanthopus aequidentis</i> Fahr. . . . .	67
<i>Hoplopleura acanthopus edentulus</i> Fahr. . . . .	67
<i>Hoplopleura hispida</i> (Grube) . . . . .	67
<i>Hoplopleura longula</i> (Neum.) . . . . .	68
<i>Hoplopleura hesperomydis</i> (Osborne) . . . . .	70
<i>Hoplopleura angulata</i> n. sp. . . . .	73
<i>Hoplopleura affinis</i> (Burm.) . . . . .	75
<i>Hoplopleura malaysiana</i> n. sp. . . . .	79
<i>Hoplopleura chrotomydis</i> n. sp. . . . .	81
<i>Hoplopleura oenomydis</i> n. sp. . . . .	82
<i>Hoplopleura apomydis</i> n. sp. . . . .	84
<i>Hoplopleura sukenyae</i> n. sp. . . . .	86
<i>Hoplopleura quadridentata</i> (Neum.) . . . . .	87
<i>Hoplopleura nesoryzomydis</i> n. sp. . . . .	90
<i>Hoplopleura intermedia</i> K. and F. . . . .	90
<i>Hoplopleura laticeps</i> n. sp. . . . .	92
<i>Hoplopleura enormis</i> K. and F. . . . .	94
<i>Hoplopleura enormis enormis</i> K. and F. . . . .	94
<i>Hoplopleura enormis pelomydis</i> n. ssp. . . . .	96
<i>Hoplopleura enormis mylomydis</i> n. ssp. . . . .	97
<i>Hoplopleura merionidis</i> n. sp. . . . .	98
<i>Hoplopleura pectinata</i> (Cumm.) . . . . .	99
<i>Hoplopleura neumanni</i> Fahr. . . . .	101
<i>Hoplopleura biseriata</i> n. sp. . . . .	103
<i>Hoplopleura cryptica</i> n. sp. . . . .	104
<i>Hoplopleura veprecula</i> n. sp. . . . .	105
<i>Hoplopleura erratica</i> (Osborne) . . . . .	106
<i>Hoplopleura erratica erratica</i> (Osborne) . . . . .	106
<i>Hoplopleura erratica arboricola</i> K. and F. . . . .	109
<i>Hoplopleura sciuricola</i> n. sp. . . . .	110
<i>Hoplopleura maniculata</i> (Neum.) . . . . .	112
<i>Hoplopleura erismata</i> n. sp. . . . .	113
<i>Hoplopleura distorta</i> n. sp. . . . .	115
<i>Hoplopleura trispinosa</i> K. and F. . . . .	115

CONTENTS

	PAGE
Hoplopleura hirsuta Ferris . . . . .	117
Hoplopleura phaiomydis n. sp. . . . .	120
Hoplopleura oxymycteri n. sp. . . . .	122
Hoplopleura reducta n. sp. . . . .	124
Hoplopleura audax n. sp. . . . .	125
Hoplopleura alata n. sp. . . . .	127
Hoplopleura bidentata (Neum.) . . . . .	129
Hoplopleura disgrega n. sp. . . . .	132

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## PREFATORY NOTE

Since the publication of Part I<sup>1</sup> of this series of papers the title of the publication in which it appeared has been altered. The former "Leland Stanford Junior University Publications, University Series," without volume or part numbers and with each part paged separately, has in part become "Stanford University Publications, University Series, Biological Sciences," with volume and part numbers. The papers included in this series of contributions will constitute Volume II of the Biological Sciences series, and Part I will stand as the first part of this volume. The parts will be consecutively paged and the figures consecutively numbered.

Except for certain slight changes in form, Part II is entirely continuous with Part I. In the list of **specimens examined** the origin of specimens taken by the author from skins in the United States National Museum and the Field Columbian Museum has been indicated by the abbreviations U. S. N. M. and F. C. M., followed by the museum numbers of the skins from which they were taken. I may add that paratypes of all species based upon specimens from the National Museum will be deposited in the collections of that institution.

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<sup>1</sup> Part I is dated 1919, but was not issued officially until January 14, 1920.

## SYSTEMATIC TREATMENT (Cont.)

### Genus HOPLOPLEURA Enderlein.

1904. *Hoplopleura*, Enderlein, *Zool. Anz.*, **28**: 221-223.  
1908. *Hoplopleura*, Dalla Torre, "Anoplura," *Gen. Ins.*, p. 14.  
1909. *Hæmatopinus (Polyplax)*, Neumann, *Arch. de Parasit.*, **13**: 531.  
1912. *Hoplopleura*, Fahrenholz, *2-3-4th Jahresb. des Niedersäch. Zool. Ver.*, pp. 44-46.  
1915. *Hoplopleura*, Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.*, pp. 15-16.  
1916. *Hoplopleura*, Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), **6**: 153.

Anoplura without eyes; with five-segmented antennæ which are not sexually dimorphic; with the anterior legs small and weak and with weak, slender claw, the middle legs somewhat larger and with stouter claw, the posterior legs still larger, more or less flattened and with stout, blunt claw and usually with a tooth-like "olecranon process" at the outer proximal angle of the tibia; pleural plates always well developed, present on at least the first to seventh segments, the first pair always small and lying upon the dorsum; female usually with the third to seventh abdominal tergites and sternites bearing three transverse rows of setæ (and usually with a like number of chitinized plates), but occasionally with three rows of setæ on the third tergite and sternite only, the other segments with not more than two; male always with two rows of setæ on the third to seventh sternites, and the third tergite usually with but one row of setæ on the remaining tergites, but occasionally with two on the fourth to seventh; first plate of the third sternite in both sexes usually extending from pleurite to pleurite and usually with two pairs (or occasionally two groups of three) of conspicuously enlarged setæ; head usually with slight post-antennal angles and without a constricted occipital region; genitalia of the males of a quite uniform type, the basal plate undivided, the parameres large and usually enclosing the pseudopenis.

HOSTS. Occurring as far as known only on rodents of the families *Muridæ* (the rats and mice), *Sciuridæ* (the squirrels), *Petauristidæ* (the flying squirrels), and *Octodontidæ* (the coypus and tuco-tucos). The genus appears to be especially characteristic of the first two families named.

TYPE OF THE GENUS. *Pediculus acanthopus* Burmeister.

#### SYNONYMICAL LIST OF NAMES PREVIOUSLY USED IN THE GENUS.

NOTE.—Names in italics are synonymms of the name with which they are coupled.

*acanthopus* (Burmeister).

*Pediculus acanthopus* Burmeister.

- Hæmatopinus acanthopus* (Burmeister).  
*Polyplax acanthopus* (Burmeister).  
*Hoplopleura acanthopus* var. *americana* Kellogg and Ferris.  
*acanthopus* var. *americana* Kellogg and Ferris.  
*Hoplopleura acanthopus* (Burmeister).  
*affinis* (Burmeister).  
*Pediculus affinis* Burmeister.  
*Hæmatopinus affinis* (Burm.).  
*Polyplax affinis* (Burm.) (not of Fahrenholz).  
*arboricola* Kellogg and Ferris, (part).  
*Hoplopleura erratica* (Osborn).  
*arboricola* Kellogg and Ferris, (part).  
*Hoplopleura erratica arboricola* Kellogg and Ferris.  
*arboricola* Kellogg and Ferris, (part).  
*Hoplopleura sciuricola* n. sp.  
*bidentata* (Neumann).  
*Hæmatopinus (Polyplax) bidentatus* Neumann.  
*enormis* Kellogg and Ferris.  
*erratica* (Osborn).  
*Hæmatopinus erraticus* Osborn.  
*Polyplax erratica* (Osborn).  
*Hoplopleura arboricola* Kellogg and Ferris, (part).  
*erratica arboricola* Kellogg and Ferris.  
*Hoplopleura arboricola* Kellogg and Ferris, (part).  
*hesperomydis* (Osborn).  
*Hæmatopinus hesperomydis* Osborn.  
*Polyplax hesperomydis* (Osborn).  
*hirsuta* Ferris.  
*hispidata* (Grube).  
*Pediculus hispidus* Grube.  
*Pediculus gracilis* Grube.  
*Hæmatopinus hispidus* (Grube).  
*Polyplax hispidata* (Grube).  
*intermedia* Kellogg and Ferris. .  
*lineata* Fahrenholz.  
*Hoplopleura longula* (Neumann).  
*longula* (Neumann).  
*Hæmatopinus (Polyplax) longula* Neumann.  
*Hoplopleura lineata* Fahrenholz.  
*maniculata* (Neumann).  
*Hæmatopinus (Polyplax) maniculata* Neumann.  
*neumannii* Fahrenholz.  
*Hæmatopinus (Polyplax) præcisus* Neumann, (part).  
*Hæmatopinus præcisus* Neumann, (part).  
*Polyplax præcisa* (Neumann), (part).  
*quadridentata* (Neumann).  
*Hæmatopinus (Polyplax) quadridentata* Neumann.  
*quadridentata* (Neumann), (misidentification).  
*Hoplopleura nesoryzomydis* n. sp.  
*trispinosa* Kellogg and Ferris.

NOTES.—In spite of the fact that this genus, as I have here limited it, seems, on the whole, to form quite a natural group, it is somewhat difficult to define, for of all the assemblage of characters that I have noted above but few are common to and peculiar to all the species of the genus, although there is a certain facies that is characteristic of the group.

The one really distinctive character that appears to occur in all the species of the genus and that I have not noted in any other forms is the position and form of the first pair of pleural plates, which are always developed and lie entirely upon the dorsum.

In the majority of the species the abdomen of the female bears three rows of setæ (and usually three transverse plates) upon the majority of the segments, both dorsally and ventrally. However, in at least two species that appear referable to this genus this arrangement is lost and the third segment alone appears to bear three rows of setæ, the remainder having not more than two. Furthermore, although this arrangement is characteristic of *Hoplopleura* it is not entirely peculiar to that genus. I have at hand two species that I consider to belong to *Neohamato-pinus* (if that genus be indeed distinct from *Polyplax*) in the females of which the abdominal tergites and sternites bear three rows of setæ, although all the other members of this group have but two rows on each segment.

The arrangement of the setæ and plates on the abdomen of the male is also characteristic, but is subject to certain modifications. Normally of the tergites the third alone possesses two rows of setæ, but in at least three species (one of which is the type of the genus) the third to seventh segments likewise have two rows. In all the species that I refer to the genus, the third to seventh sternites of the male have two rows of setæ.

I may note that a different interpretation may be given to the arrangement of the abdominal setæ. It is possible that in each case the second tergite, both in male and female, has two rows of setæ, rather than that the second has but one and the third two or three in accordance with the sex. Yet after careful consideration of this point I have been led to adopt the first interpretation.

The paired setæ of the third sternite are peculiar to the members of this genus, yet they are not always developed even in some species that are in all other respects typical of the group.

The legs are to some extent characteristic of the group, especially in the presence of the tooth-like "olecranon process" on the posterior tibiæ. In a few species, however, this process is not developed.

The genitalia of the males are of a more or less characteristic type and, compared with the genitalia in *Enderleinellus*, are extremely conservative. In but a few cases are they of any very marked value in aiding in the recognition of species. The basal plate is always undivided, and at its tip are set the parameres, which are usually slightly curved and nearly parallel, enclosing a weakly chitinized and somewhat U-shaped piece which I consider to represent the endomeres, within which is the penis. The pseudopenis usually lies between the tips of the parameres and consists of a pair of more or less curved and divergent arms which unite into a short shaft, the whole having a Y or V shape. The structures are so simple and the homologies so easily determinable that I have not lettered the parts in the figures.

The available material of the immature stages is not sufficient to permit a definite statement as to the number of instars. There are certainly three and possibly four. There appears to be a considerable variety of form in the earliest stages,

and no generalizations are possible except to call attention to the apparently general occurrence of small tubercles on the ventral side of the head and thorax. The antennæ and legs are in general of the same relative form as in the adult, the former five-segmented, the posterior legs without the olecranon process.

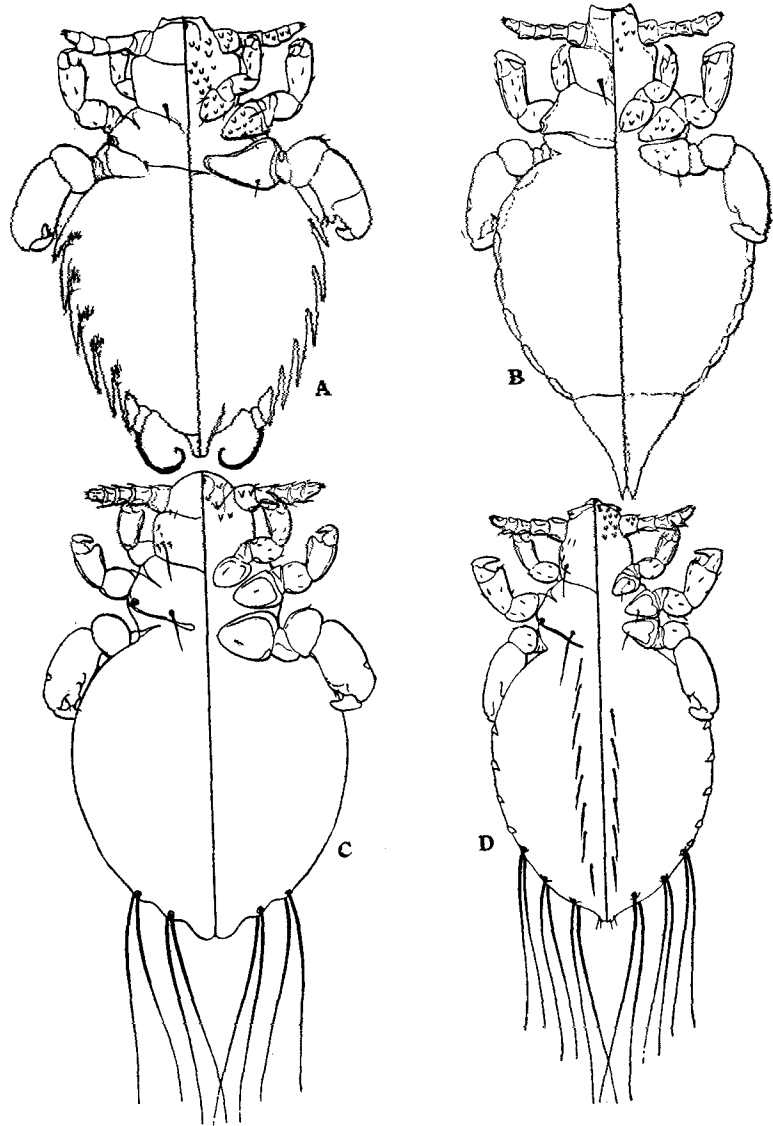


Fig. 33.—A, *Hoplopleura intermedia* K. and F., first (?) stage; B, *H. enormis pelomydis* n. sp., first (?) stage; C, *H. acanthopus* (Burm.), second (?) stage; D, *H. erratica arboricola* K. and F., second (?) stage.



In Figure 33 are shown the available immature stages of certain species. Figure 33A is of what appears to be the first stage of *H. intermedia* Kellogg and Ferris. Figure 33B is of what is probably the first stage of *H. enormis pelomydis* n. sp. Figure 33C is the probable second stage of *H. acanthopus* (Burm.). One specimen of this form was found still within the derm of the preceding stage, the latter differing in having but the posterior pair of long setæ on the abdomen. Figure 33D is of the apparent second stage of *H. erratica arboricola* Kellogg and Ferris, this, too, having been found within the derm of an earlier stage, from which it differs only in the presence of the rudimentary pleural plates. There are at hand, also, immature stages of *H. hirsuta* Ferris, which are similar to this, except that three segments of the abdomen are provided with long setæ. Within one of these specimens appears a fully formed adult male.

The genus, as I here understand it, might possibly be divided, such forms as *H. audax* n. sp. and *H. alata* n. sp., for instance, presenting characters upon which a separation might easily be made. Yet I am not inclined to any such step. The group here included (with the possible exclusion of *H. disgrega* n. sp.) constitutes almost an ideal expression of my present conception of a genus. There are listed in this paper 41 forms, of which 25 are here described as new. Two of the forms that are listed are in all probability synonyms, but as I have not seen specimens from their type hosts I retain the names. Excepting only these two and one other, representatives of all the included forms have been available for examination.

### 1. *Hoplopleura acanthopus* (Burm.)

(Synonymy under subspecies.)

#### 1a. *Hoplopleura acanthopus acanthopus* (Burm.).

Figs. 34, 35.

1839. *Pediculus acanthopus* Burmeister, "Rhynchota," *Gen. Ins.*, No. 5, pl. 1, f. 2.  
 1842. *Hæmatopinus acanthopus* (Burm.), Denny, "Mon. Anopl. Brit.," p. 25, pl. 24, f. 3.  
 1864. *Pediculus acanthopus* Burm., Nitzsch, *Zeits. f. ges. Naturw.*, 23: 27.  
 1874. *Hæmatopinus acanthopus* (Burm.), Giebel, "Insecta Epizoa," pp. 36-37, pl. 2, f. 3.  
 1880. *Hæmatopinus acanthopus* (Burm.), Piaget, "Les Pediculines," pp. 638-640, pl. 52, f. 4.  
 1891. *Hæmatopinus acanthopus* (Burm.), Osborn, *U. S. Dept. Agric., Div. Ent.*, Bul. 7, o. s.: 23, f. 11.  
 1896. *Hæmatopinus acanthopus* (Burm.), Osborn, *ibid.*, Bul. 5, n. s.: 181-182, f. 104.  
 1904. *Polyplax acanthopus* (Burm.), Enderlein, *Zool. Anz.*, 28: 142.  
 1904. *Hoplopleura acanthopus* (Burm.), Enderlein, *ibid.*, 28: 220-223, f. 1-2.  
 1908. *Hoplopleura acanthopus* (Burm.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 14.  
 1910. *Hoplopleura acanthopus* (Burm.), Mjöberg, *Ark. f. Zool.*, 6: 164.  
 1912. *Hoplopleura acanthopus* (Burm.), Fahrenholz, *2-3-4th Jahresb. des Niedersäch. Zool. Ver.*, pp. 46-52, tf. 18-20; pl. 2, f. 14-15.  
 1915. *Hoplopleura acanthopus* var. *americanus* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mam.," *Stanford Univ. Publ.*, p. 16, tf. 3; pl. 4, f. 2; pl. 5, f. 8.  
 1916. *Hoplopleura acanthopus* (Burm.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 153.

1916. *Hoplopleura acanthopus* var. *americanus* Kellogg and Ferris, Ferris, *Ibid.*, 6: 154.

PREVIOUS RECORDS. Type from *Microtus* (= *Arvicola*) *arvalis*, Europe. Recorded from this host by various writers (Nitzsch, Giebel, Fahrenholz); from *Microtus* (= *Hypudæus* = *Arvicola*) *agrestis*, England and continental Europe (Denny, Enderlein, Mjöberg); *Microtus*

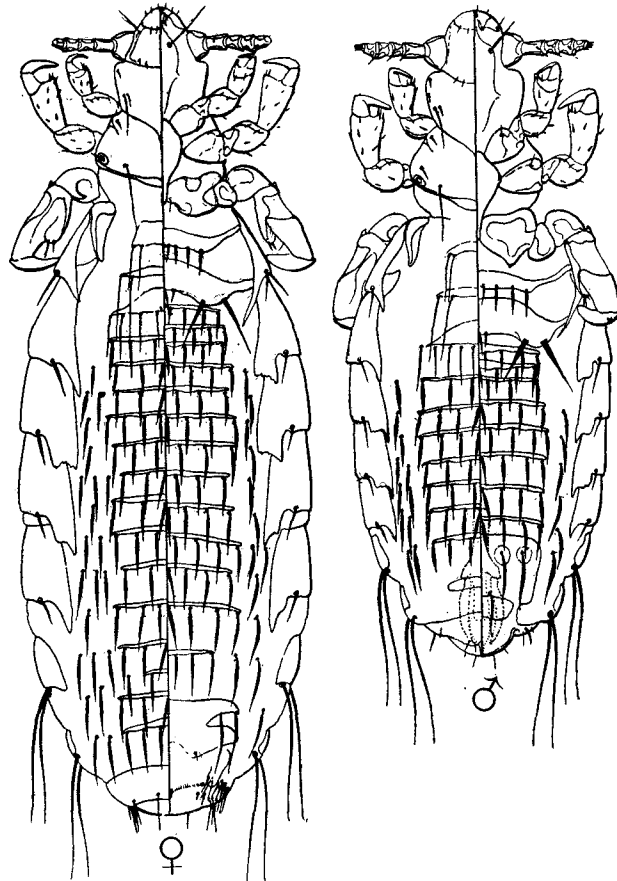


Fig. 34. *Hoplopleura acanthopus* (Burm.), female from *Microtus californicus*, male from *Microtus agrestis*.

(= *Arvicola*) *nivalis*, Europe (Fahrenholz); *Dicrostonyx* (= *Lemmus*) *torquatus*, Europe (Mjöberg); *Mus musculus*, Europe (Piaget, Mjöberg); *Microtus* (= *Arvicola*) sp., Ames, Iowa, U. S. A. (Osborn); *Microtus constrictus*, Mendocino City, *M. californicus*, Covelo, and *Microtus* sp., South Yolla Bolly Mountain, California, U. S. A. (Kellogg

and Ferris); "white lemming," Pt. Barrow, Alaska (?) (Kellogg and Ferris).

**SPECIMENS EXAMINED.** The specimens upon which the above records by Kellogg and Ferris are based and the following: Europe, *Microtus agrestis*, Jemtland, Sweden (U. S. N. M. 105752); *Microtus nivalis*, Chamonix, France (U. S. N. M. 124482); *Mus musculus*, Rumania (U. S. N. M. 105244); *Mus spicilegus*, Upsala, Sweden (U. S. N. M. 85056). North America, *Evotomys nivarius*, Happy Lake, Wash. (F. C. M. 6247); *Lemmus alascensis*, Pt. Barrow, Alaska (U. S. N. M. 107733); *Neotoma cinerea*, Yosemite National Park, California (probably straggler); *Pity-*

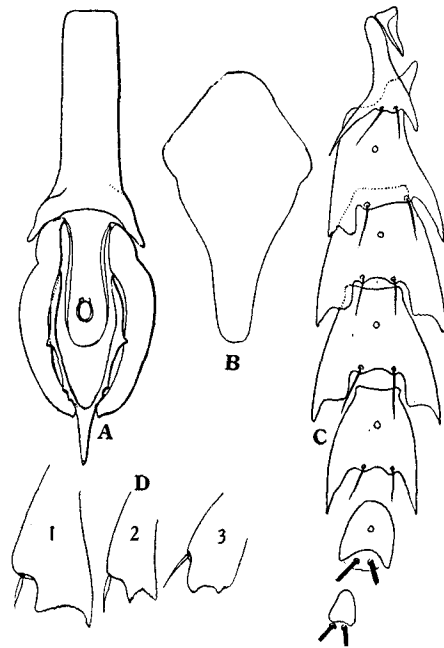


Fig. 35.—*Hoplopleura acanthopus* (Burm.): A, genitalia of male from *Microtus agrestis*; B, sternal plate of female from the same host; C, pleural plates of female from *Microtus californicus*; D, copies of Fahrenholz' figures of (1) *H. acanthopus acanthopus*, from *Microtus arvalis*, (2) *H. acanthopus aequidentis*, (3) *H. acanthopus edentulus*.

*mys pinetorum*, New York (U. S. N. M. 88733), and Council Bluffs, Iowa (U. S. N. M. 31888); *Synaptomys* sp., Athabasca Landing, Canada (U. S. N. M. 129396); "mouse," Lafayette, Ind., and Florence, Mont.

All of the hosts belong to the family *Muridæ* and all to the subfamily *Microtinæ*, except the genus *Mus*, which belongs to the *Murinæ*, and the genus *Neotoma*, which belongs to the *Neotominæ*.

FEMALE (Fig. 34). Length 1.2–1.4 mm. *Head* narrowly rounded in front, with moderately prominent post-antennal angles and with a narrow, elongate, chitinized area on the ventral side between the bases of the antennæ. *Thorax* and legs of ordinary form; sternal plate (Fig. 35B) elongate, tapering and bluntly pointed posteriorly.

*Pleural plates* (Fig. 35C) as follows: First pair of ordinary form; second pair with a short tooth at the dorsal angle and a long tapering process at the ventral angle; third with a long, tapering tooth at the dorsal angle and with a broad ventral lobe, the tooth and the lobe separated by a broad interspace; fourth and fifth each with the angles produced into a short tooth, the posterior margin divided into two broad lobes by a deep, broad incision; sixth with the dorsal and ventral angles each produced into a long, tapering tooth; seventh and eighth small and without teeth; second to sixth each with a pair of short setæ on the posterior margin, the seventh and eighth with the usual pairs of long setæ.

*Tergites and sternites* of the abdomen with the normal number of rows of setæ and plates, the latter narrow, of variable lengths, the longest occupying about half the width of the abdomen. Tergal plates for the most part with five to seven setæ. Fourth to eighth segments with one to three setæ between the ends of each plate and the pleurites. Sternal plates with six to eight setæ, the fourth to seventh segments with one to two setæ between the ends of each plate and the pleurites. Paired setæ of the third sternite long and slender.

MALE (Fig. 34). Length 0.9–1.1 mm. *Pleural plates* essentially as in the female but with the lobes and teeth slightly shorter.

*Tergites* of the third to seventh segments with two rows of setæ and two plates. Eighth segment with one plate and no setæ. Plates for the most part with six to seven setæ of uniform length and the fourth to seventh segments with one or two setæ between the ends of each plate and the tergites. *Sternites* with the normal arrangement of plates and setæ, the setæ essentially as on the dorsum.

*Genitalia* (Fig. 35A) with the basal plate rather short, not greatly longer than the parameres, the pseudopenis with the arms long and slender.

NOTES.—I have not seen specimens from the typical host, but as the many specimens available from numerous closely related host species show extremely little variation there is no reason to doubt the correctness of their identification. Kellogg and Ferris have previously separated specimens on American hosts as the variety *americanus*, but this is quite untenable.

It is extremely probable that *Pediculus hispidus* Grube, from *Lemmus obensis*, is a synonym of *H. acanthopus*. This species is unquestionably a *Hoplopleura*, and *H. acanthopus* occurs upon other species of *Lemmus*. However, in the absence of specimens from this host I have not reduced the species.

*H. acanthopus* is a very distinctive form, recognizable by the form of the pleural plates and the presence of two tergal plates on the majority of the abdominal segments of the male.

### 1b. *Hoplopleura acanthopus aequidentis* Fahr.

FIG. 35D2.

1916. *Hoplopleura acanthopus* var. *aequidentis* Fahrenholz, *Archiv. f. Naturges.*, Abt., A, **81**: 26, f. 21b. (August.)  
 1916. *Hoplopleura acanthopus aequidentis* Fahrenholz, *Zool. Anz.*, **48**: 92. (October.)

PREVIOUS RECORDS. Type from *Pitymys* (= *Arvicola*) *subterraneus*, "bei Neustadt (Siebenbürgen)." The host is distributed throughout Europe. It is a member of the subfamily *Microtinæ* of the family *Muridæ*.

NOTES.—I have not seen specimens of this form. According to Fahrenholz, "Zur Charakterisierung genügt es, die Ventralfortsätze der Pleurite des 3. Abdominal segments zu vergleichen. Wie Fig. (35D1) zeigt, hat *Hoplop. acanth* ♀ (von *Arvicola arvalis*) an dem betreffenden Pleurit zwei zahnartige Fortsätze, von denen der äussere stumpf und der innere spitz und länger ist; var. *aequidentis* (Fig. 35D2) trägt zwei spitze, die unter sich gleich sind."

Figure 35D is a copy of the figure given by Fahrenholz. Unless there are other differences than those indicated by Fahrenholz, this form seems scarcely to merit recognition as distinct from *H. acanthopus*.

### 1c. *Hoplopleura acanthopus edentulus* Fahr.

FIG. 35D3.

1916. *Hoplopleura acanthopus* var. *edentulus* Fahrenholz, *Archiv. f. Naturges.*, Abt. A., **81**: 26, f. 21c. (August.)  
 1916. *Hoplopleura acanthopus edentulus* Fahrenholz, *Zool. Anz.*, **48**: 93. (October.)

PREVIOUS RECORDS. Type from *Evotomys* (= *Mus*) *rutilus*, "aus Siebenbürgen, Kronstadt." The host is a native of northern Europe and Asia and is a member of the subfamily *Microtinæ* of the family *Muridæ*.

NOTES.—I have not seen specimens of this form. According to Fahrenholz, "Das fragliche Pleurit (the third) hat hier nur zwei unbedeutende Höcker (Fig. 35D3); . . . Entsprechende Abänderung zeigen auch die Fortsätze der übrigen Pleurite; . . ."

Figure 35D3 is a copy of the figure given by Fahrenholz. If the statement that the remaining pleurites show characters similar to the third be correct it would certainly seem that this form is a distinct species.

## 2. *Hoplopleura hispida* (Grube).

1851. *Pediculus hispidus* Grube, Middendorff's Reise, Zool., p. 497, pl. 2, f. 2 (figure labeled *P. gracilis*).  
 1874. *Hæmatopinus hispidus* (Grube), Giebel, "Insecta Epizoa," p. 38.  
 1880. *Hæmatopinus hispidus* (Grube), Piaget, "Les Pediculines," p. 640.  
 1904. *Polyplax hispida* (Grube), Enderlein, *Zool. Anz.*, **28**: 142.  
 1908. *Polyplax hispida* (Grube), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 13.  
 1916. *Hoplopleura hispida* (Grube), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), **6**: 156.

PREVIOUS RECORDS. Known only from the original record by Grube, who recorded specimens from *Lemmus obensis*, "am Taimyrsee," Siberia. The host belongs to the subfamily *Microtinæ* of the family *Muridæ*.

NOTES.—I have not seen specimens from this host, but the original description and figure are sufficiently good to show that the species is unquestionably a *Hoplopleura*. In view of the fact that *H. acanthopus* (Burm.) occurs upon other species of *Lemmus*, there is every reason to believe that the species from *L. obensis* is *H. acanthopus*. In the absence of specimens, however, I have not reduced the species.

### 3. *Hoplopleura longula* (Neum.)

Figs. 36, 37.

1909. *Hematopinus (Polyplax) longulus* Neumann, *Arch. de Parasit.*, 13: 513-515, f. 15-17.  
 1910. *Hoplopleura lineata* Fahrenholz, *Zool Anz.*, 35: 715.  
 1915. *Hoplopleura (?) longula* (Neum.), Kellogg and Ferris, *Ann. Durban Mus.*, 1: 155.  
 1916. *Hoplopleura longula* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 156.

PREVIOUS RECORDS. Type from *Micromys* (= *Mus*) *minutus*, Colchester, Essex, England. Also recorded by Fahrenholz (as *H. lineata*) from the same host without indication of locality. The host belongs to the subfamily *Murinae* of the family *Muridæ*.

SPECIMENS EXAMINED. A male and a female from the type lot, received through the kindness of Professor G. H. F. Nuttall, and one female from *Micromys minutus*, Brunswick, Germany (U. S. N. M. 85374).

FEMALE (Fig. 36). Length 1.1 mm. *Head* rather short, rounded or narrowly truncate in front, with moderately prominent postantennal angles and with a broad, chitinized area on the ventral side between the antennæ. *Thorax* and legs of ordinary form, the sternal plate (Fig. 37C) elongate, slender, tapering and bluntly pointed posteriorly.

*Pleural plates* (Fig. 37A) strongly scaly or reticulate; first pair of ordinary form; second with a short dorsal tooth and a long, tapering ventral process; third, fourth, and fifth with the angles produced into a short tooth and with the posterior portion divided into two equal lobes by a deep and quite narrow incision in the posterior margin; sixth likewise divided into lobes, but these unequal, the ventral lobe tapering and pointed; seventh and eighth without lobes; second with a pair of short setæ on the posterior margin, third with a single stout seta at the base of the incision; seventh and eighth each with the usual pair of slender setæ, remainder without setæ.

*Tergites and sternites* of the abdomen with the usual number of rows of setæ and with the plates well developed, of more or less uniform length, occupying slightly more than half the width of the segment. Each tergal

plate with from four to seven quite large tapering setæ. Sternal plates with from seven to eight setæ, those occupying the median area noticeably smaller than the others. Fifth to seventh sternites with a single seta between the ends of one or two of the plates and the pleurites. All of the setæ appear as if divided by slight diagonal constrictions into two parts (Fig. 37B), an appearance that is found in other species but is especially marked in this. Paired setæ of the third sternite quite long and slender.

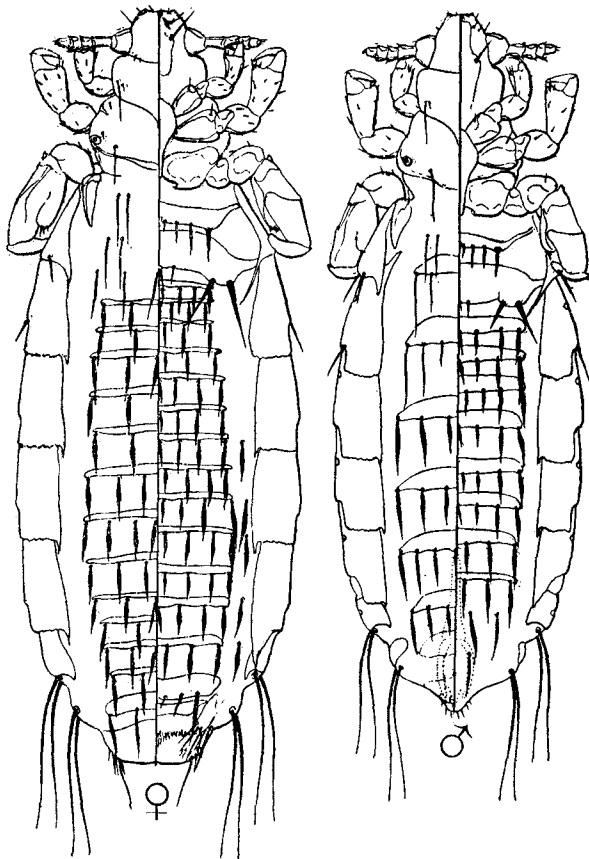


Fig. 36.—*Hoplopleura longula* (Neum.), female from Brunswick, Germany, male from the type lot.

MALE (Fig. 36). Length 1 mm. *Pleural* plates as in the female. *Tergites* of all the abdominal segments except the third with one plate, the third with two. Eighth tergite without setæ, the remainder with four to seven, those of the fourth to seventh segments quite large. *Sternites* with

from six to eight setæ, all smaller than those of the dorsum, those of the median area tending to be noticeably smaller than the others.

*Genitalia* of the single available male distorted and not in condition for description, apparently presenting no especially distinctive characters.

NOTES.—There is, I believe, no question that *Hoplopleura lineata* Fahr. is identical with *H. longula* (Neum.). The species is one of a series of forms occurring on various *Muridæ*, all very similar and differing chiefly in the details of the pleural plates, the form of the sternal plate, and, to a slight degree, the arrangement

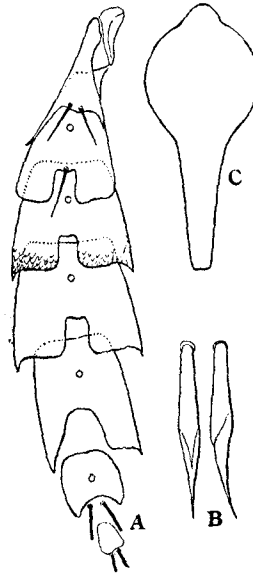


Fig. 37.—*Hoplopleura longula* (Neum.): A, pleural plates of female from Brunswick, Germany; B, abdominal setæ of same; C, sternal plate of same.

of the setæ on the abdomen. The broad lobes of the third pair of pleural plates, the tapering ventral lobe of the sixth pair and the absence of lobes on the seventh and eighth pairs, together with the peculiarly marked abdominal setæ, may be considered to distinguish this species from *H. hesperomydis*, *H. affinis*, and other very similar forms.

#### 4. *Hoplopleura hesperomydis* (Osborn).

FIGS. 38, 39.

1891. *Hæmatopinus hesperomydis* Osborn, U. S. Dept. Agric., Div. Ent., Bul. 7, o. s.: 26, f. 14.  
 1896. *Hæmatopinus hesperomydis* Osborn, U. S. Dept. Agric., Div. Ent., Bul. 5, n. s.: 184-185, f. 108.  
 1904. *Polyplax* (?) *hesperomydis* (Osborn), Enderlein, Zool. Anz., 28: 143.  
 1908. *Polyplax* (?) *hesperomydis* (Osborn), Dalla Torre, "Anoplura," Gen. Ins., p. 14.



1915. *Hoplopleura hesperomydis* (Osborn), Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mam.," *Stanford Univ. Publ.*, p. 17, tf. 4-5; pl. 4, f. 1; pl. 5, f. 14.
1916. *Hoplopleura hesperomydis* (Osborn), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 155.
1916. *Hoplopleura hesperomydis* (Osborn), Ferris, *Psyche*, 23: 112.

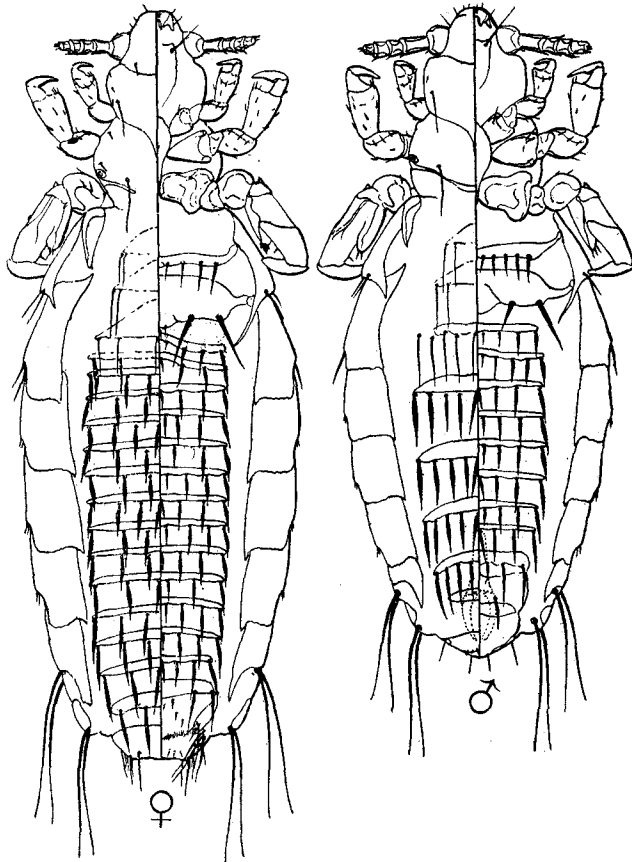


Fig. 38.—*Hoplopleura hesperomydis* (Osb.), male and female from *Peromyscus leucopus noveboracensis*, Piedmont, Mo.

PREVIOUS RECORDS. Type from *Peromyscus* (= *Hesperomys*) *leucopus*, Ames, Iowa, U. S. A. Recorded by Ferris and Kellogg and Ferris from various subspecies of *Peromyscus maniculatus* and *P. boylei* in California, and by Ferris from *Onychomys torridus pulcher*, Victorville, Cal., *O. leucogaster arcticeps*, Colorado Springs, Colo., and *Mus musculus*, Stanford University, Cal.

SPECIMENS EXAMINED. All of those upon which the preceding records by Ferris and Kellogg and Ferris are based and the following: *Eligmodontia collisæ*, Goya, Argentina (U. S. N. M. 94164); *Mus musculus*, Dzharkent, Russian Turkestan (U. S. N. M. 155467), and West Falls Church, Va., U. S. A.; *Mus gansus*, Taochou, Kansu, China (F. C. M. 19073); *Mus wagneri mongolium*, Tai-yuan-fu, Shensi, China (U. S. N. M. 172503); *Onychomys torridus longicaudus*, Independence, Cal.; *Oryzomys chaparensis*, Todos Santos, Bolivia (F. C. M.); *Oryzomys fulvescens*, Orizaba, Vera Cruz, Mexico (U. S. N. M. 58259).

All of the hosts are *Muridæ*, the members of the genus *Mus* belonging to the subfamily *Murinae*, the remainder to the *Cricetinae*.

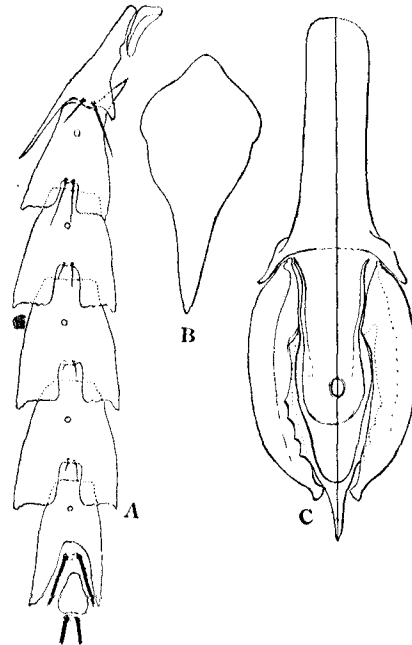


Fig. 39.—*Hoplopleura hesperomydis* (Osb.): A, pleural plates of the female from *Peromyscus leucopus noveboracensis*; B, sternal plate of same; C, genitalia of male from same host.

FEMALE (Fig. 38). Length 1 mm. Head narrowly rounded in front of the antennæ, the post-antennal angles moderately prominent, the ventral side with a median, shield-shaped, chitinized area. Thorax and legs of normal form, the sternal plate (Fig. 39B) elongate, tapering and acutely pointed posteriorly.

*Pleural plates* (Fig. 39A) as follows: First pair of normal form; second with a short dorsal tooth and a long, tapering ventral process;

third to sixth each divided into two equal lobes by a deep and quite narrow incision in the posterior margin and with the posterior angles produced into slight teeth; seventh likewise divided into two lobes, but with these narrow and tapering; eighth without teeth or lobes; second to sixth each with two setæ at the base of the incision, these very small except on the second and third; seventh and eighth with the usual pair of slender setæ; all the plates presenting a more or less scaly appearance.

*Tergal and sternal plates* of the abdomen well developed and of nearly uniform width, occupying slightly more than half the width of the abdomen. Each tergal plate with from four to seven quite stout setæ. Sternal plates with from six to eight setæ, these slightly smaller than those of the dorsum and with those of the median area tending to be slightly smaller than the others. Typically there are no setæ between the ends of any of the plates and the pleurites, either dorsally or ventrally. Paired setæ of the third sternite long and slender.

MALE (Fig. 38). *Length* 0.6 mm. *Pleural plates* as in the female except that the lobes of the seventh pair are scarcely longer than the body of the plate. *Tergal plates* presenting the normal arrangement, the third segment with two, the remainder with one. Tergal plate of the eighth segment without setæ, the remainder with from four to nine, these for the most part quite stout. *Sternal plates* with from six to nine setæ, these much smaller than those of the dorsum and those of the median area smaller than the others.

*Genitalia* (Fig. 39C) presenting no especially distinctive characters; pseudopenis with the arms much longer than the shaft and not greatly curved.

NOTES.—In many respects this species is very similar to *H. longula* (Neum.), but it is distinguishable by the equal lobes of the sixth pleurite and the slender lobes of the seventh. All the specimens that I refer to it agree quite closely except those from *Onychomys*, in which the setæ are all noticeably slender and the posterior margins of the pleural plates extremely serrate. The specimens from the various species of *Mus* are inseparable from those from *Peromyscus*, in spite of the apparent anomaly in their distribution.

##### 5. *Hoplopleura angulata* n. sp.

FIGS. 40, 41.

SPECIMENS EXAMINED. Type from *Rhipidomys venezuelæ*, Venezuela (F. C. M. 7048). Holotype a female. Also from *Rhipidomys* sp., Rio San Miguel, Peru (U. S. N. M. 194500); *R. venustus*, Merida, Venezuela (U. S. N. M. 137507); and *Thomasomys cinereus*, Balsas, Peru (F. C. M. 19824). All the hosts are Murids of the subfamily *Cricetinae*.

FEMALE (Fig. 40). *Length* 1.4 mm. *Head* (Fig. 41C) narrowly rounded in front and with acute, projecting post-antennal angles. *Thorax*

and legs of normal form; sternal plate (Fig. 41E) wedge-shaped, acute posteriorly.

*Pleural plates* (Fig. 41A) strongly scaly or reticulate; first pair of normal form; second pair with a short dorsal tooth and a longer, tapering, ventral tooth; third to sixth divided into two lobes, of which the ventral is slightly the narrower, by a deep incision in the posterior margin, this somewhat narrower than the lobes; seventh with a slight tooth at each angle; eighth small and without teeth; second and third each with a pair of small setæ; fourth to sixth each with a small seta at the base of the incision; seventh and eighth with the usual pair of long setæ.

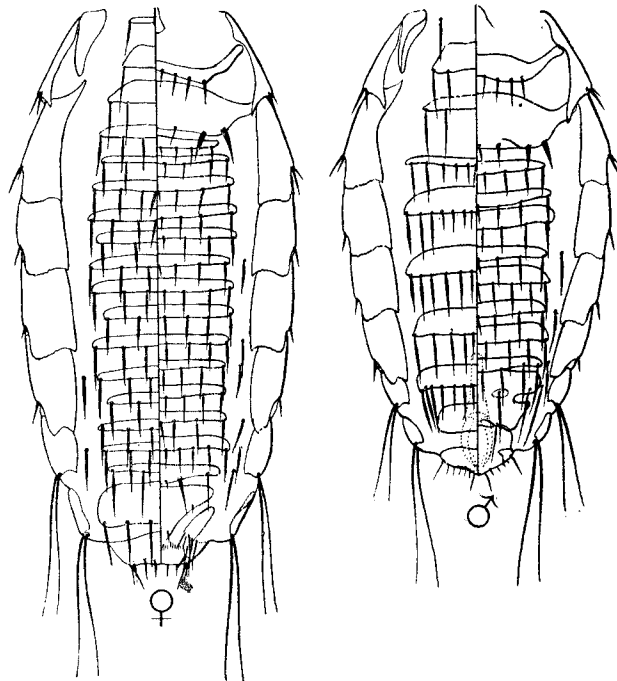


Fig. 40.—*Hoplopleura angulata* n. sp.: abdomens of male and female.

*Tergal and sternal plates* strongly developed, of the normal number and arrangement, the widest occupying something more than half the width of the abdomen. Tergal plates with from four to seven rather small and slender setæ. Sternal plates with seven to eight setæ, these somewhat smaller than those of the dorsum. Paired spines of the third sternite stout, rather short, and slightly curved.

MALE (Fig. 40). Length 1.1 mm. *Pleural plates* as in the female. *Tergal plates* strongly developed, the third segment with two, the remain-

der with but one, these, except for the eighth, with as many as fourteen slender setæ. *Sternal plates* narrower than the tergal plates, arranged as usual, with from eight to ten slender setæ.

*Genitalia* (Fig. 41B) with the arms of the pseudopenis strongly curved, not serrate externally.

NOTES.—This species is in general quite close to *H. hesperomydis* but is marked chiefly by the absence of processes on the seventh pair of pleural plates. In typical

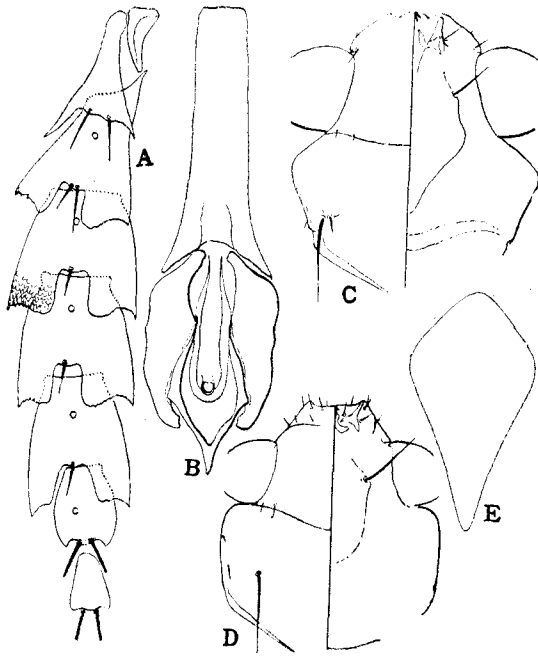


Fig. 41.—*Hoplopleura angulata* n. sp.: A, pleural plates of female; B, genitalia of male; C, head; E, sternal plate. *Hoplopleura hesperomydis* (Osb.); D, head of typical example.

specimens the angular head is likewise quite distinctive (compare Figs. 41C and 41D), but in those from *Thomasomys* this character is not so marked. There are likewise minor, but possibly not important, differences in the size of the tergal and sternal plates and of the setæ.

## 6. *Hoplopleura affinis* (Burm.).

FIGS. 42, 43.

1839. *Pediculus affinis* Burmeister, "Genera Insectorum, Rhynchota," p. 10.  
 1842. *Hæmatopinus affinis* (Burm.), Denny, "Mon. Anopl. Brit.," p. 36.  
 1864. *Pediculus affinis* Burm., Nitzsch, *Zeit. f. ges. Naturw.*, 23: 22.  
 1874. *Hæmatopinus affinis* (Burm.), Giebel, "Insecta Epizoa," p. 39, pl. 1, f. 9.

1880. *Hæmatopinus acanthopus* var. *affinis* (Burm.), Piaget, "Les Pediculines," p. 639.  
 1904. *Polyplax affinis* (Burm.), Enderlein, *Zool. Anz.*, **28**: 142.  
 1908. *Polyplax affinis* (Burm.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 13.  
 1916. *Polyplax affinis* (Burm.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), **6**: 172, (part).

PREVIOUS RECORDS. From *Apodemus* (= *Mus*) *agrarius* and *A. sylvaticus*, Europe. Type host not designated.

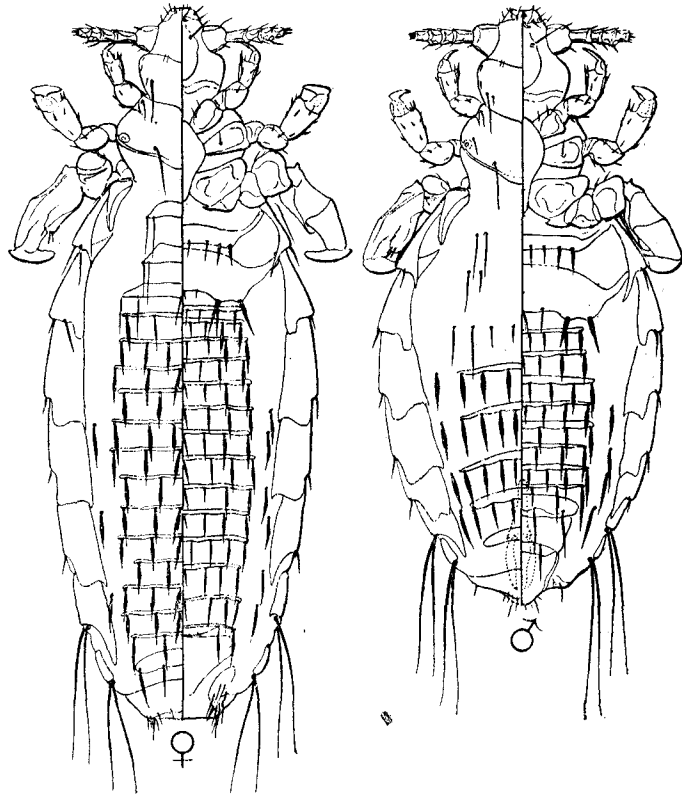


Fig. 42. *Hoplopleura affinis* (Burm.): female from *Apodemus sylvaticus tscherga*, Altai, Siberia; male from *A. agrarius agrarius*, Dresden, Germany.

SPECIMENS EXAMINED. From *Apodemus agrarius agrarius*, Dresden, Germany (U. S. N. M. 120955); *A. agrarius mantchuricus*, Sungaree River, Manchuria (U. S. N. M. 197805); and *A. sylvaticus tscherga*, Altai, Siberia (U. S. N. M. 175174); *Rattus nigricaudus loringii*, Nainasha Station, British East Africa (U. S. N. M. 162539); *Cricetulus incanus*, Shensi, China (U. S. N. M. 172550); *Akodon arenicola*, La Plata, Argentina (U. S. N. M. 94161); *A. arviculoides montensis*, Sapucay,

Paraguay (U. S. N. M. 121380) and Chubut, Valle del Lago Blanco, Argentina (F. C. M. 18891); *A. aurosus*, Chunchumayo, Peru (U. S. N. M. 148841); *A. cursor*, Piquette, São Paulo, Brazil (F. C. M. 18182); *A. mollis*, Molinopampas, Peru (U. S. N. M. 181334); *Euneomys* sp., La Raya Pass, Peru (U. S. N. M. 194544); *Phyllotis domorum*, Parotani, Bolivia (F. C. M.); *P. micropus*, Rio Chico, Patagonia (U. S. N. M. 84290); *P. pictus*, Junin, Peru (F. C. M. 21140); *Reithrodon hatcheri*, Cordilleras, Patagonia (U. S. N. M. 54199).

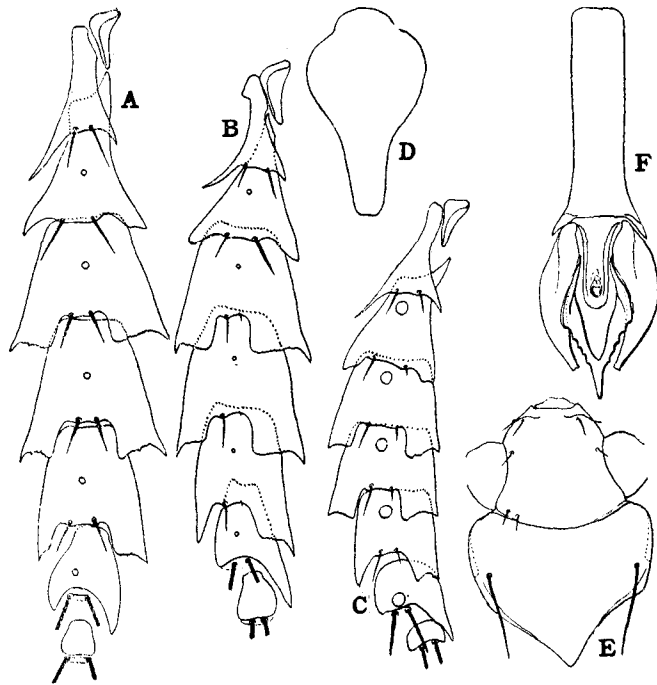


Fig. 43. *Hoplopleura affinis* (Burm.): A, pleural plates of female from *Cricetulus incanus*, Shensi, China; B, pleural plates of female from *Euneomys* sp., La Raya Pass, Peru; C, pleural plates of male from *Apodemus agrarius agrarius*, Dresden, Germany; D, sternal plate of female from same host as C; E, head of female from same host as C; F, genitalia of male from same host as C.

All of the hosts belong to the family *Muridae*, the genera *Apodemus* and *Rattus* to the subfamily *Murinae*, the remainder to the *Cricetinae*.

**FEMALE** (Fig. 42). Length 1.1 mm. *Head* (Fig. 43E) narrowly rounded in front of the antennæ, with slight post-antennal angles, the posterior lateral margins curved and converging slightly posteriorly, the ventral side with a narrow, chitinized area between the antennæ. *Thorax*

and legs of normal form; sternal plate (Fig. 43D) roughly circular, with the posterior portion narrowly produced, tapering and with truncate apex.

*Pleural plates* (Fig. 43C) strongly developed, overlapping, presenting a somewhat scaly appearance; first pair of ordinary form; second with a short dorsal tooth and a longer, tapering ventral process; third with a short, narrow, truncate or pointed lobe at each posterior angle; fourth and fifth each with a broad lobe at each angle, the ventral lobe slightly the narrower, and between them a somewhat broader interspace; seventh with a similar dorsal lobe and with a tapering ventral tooth; eighth without teeth; second to sixth each with a pair of small setæ on the posterior margin, the ventral setæ the larger; seventh and eighth with the usual pairs of long setæ.

*Tergal and sternal plates* of the abdomen well developed, arranged in the usual manner. Tergal plates with from four to six quite stout, tapering setæ, the first plate of the fifth to seventh segments with a single seta between each end and the pleurite. Sternal plates with seven to eight setæ, these all smaller than the dorsal setæ and with those of the median area noticeably smaller than the others. Paired setæ of the third sternite quite long and slender.

MALE (Fig. 42). *Length* 0.95 mm. *Pleural Plates* as in the female. *Tergal and sternal plates* well developed except on the first three tergites. Third tergite with two rows of setæ, remainder with one or none. Setæ for the most part quite large and stout, each segment, except the eighth, with from four to eight along the plate, the fourth to seventh with one seta on each side between the end of the plate and the pleurite. Sternal plates arranged as usual, with practically the same number of setæ as on the dorsum but these smaller, those of the median area distinctly smaller than the others.

*Genitalia* (Fig. 43F) presenting no especially distinctive characters, the pseudopenis with the arms quite strongly angular and serrate.

NOTES.—The identification of this species with the *Pediculus affinis* of Burmeister will doubtless be questioned and requires an explanation.

Two species of Anoplura, one a *Polyplax*, the other a *Hoplopleura*, occur on the genus *Apodemus*. Superficially the members of these two genera are very similar and if taken together would probably not have been separated by the earlier authors. The original description of *Pediculus affinis* (as quoted by Denny) is as follows: "Pallidus, sincipite parabolico genis post antennas incrassatis; thorace rhombeo." I am unable to see in this description anything that can throw much light on the identity of the species in question.

The description given by Giebel is equally inadequate, but his figure is unmistakably a *Hoplopleura*, as is evidenced by the form of the head. Fahrenholz, however, has recently identified the species of *Polyplax* occurring on *Apodemus* as *affinis*.



Perhaps the name should be discarded, but if it is to be accepted at all it is probably better to use it as understood by the earliest author who figured or described the species in a recognizable manner, and if this be done the name will stand for the species recorded by Giebel and not for that recorded by Fahrenholz. The disposition of the latter species will be considered in connection with the genus *Polyplax*.

Males alone are available from *Apodemus agrarius agrarius*, and it is upon these that the description and figures of the male given above are based. These agree very closely with the males from *Apodemus sylvatica tscherga*, and the description and figures of the female are based upon the specimens from the latter host.

The specimens from *Cricetulus incanus* agree quite closely in the form of the pleural plates (Fig. 43A) with the typical examples, but the spiracles are noticeably smaller and the setæ much more slender and somewhat more numerous.

The specimens from the various South American hosts are for the most part similar in the form of the pleural plates (Fig. 43B), but the spiracles are smaller, the sternal plate is more angular, and in the majority of the specimens the setæ are more numerous and much more slender, although the examples from *Phyllotis micropus* differ but little in this respect from typical examples. The specimens from *Reithrodon hatcheri* lack the lobe on the seventh segment but in other respects are similar.

It is possible that I have been unduly conservative in referring all the above specimens to a single species, yet it seems certain that all are very closely related, and the differences separating the various forms are after all quite small. Speculation, on the basis of mounted specimens alone, as to whether they may not constitute subspecies is futile. The species as a whole is distinguishable from its nearest relatives, *H. hesperomydis*, *H. longula*, *H. malaysiana*, by the narrow and widely separated lobes of the third pleurite, the tapering, slender, ventral lobe of the sixth pleurite and the usually present, tapering dorsal lobe of the seventh.

#### 7. *Hoplopleura malaysiana* n. sp.

FIGS. 44, 45.

**SPECIMENS EXAMINED.** From *Rattus vociferans lancavensis*, Lan-kavi Island, Malay Straits (U. S. N. M.). Holotype a female. The host belongs to the subfamily *Murinae* of the family *Muridae*.

**FEMALE** (Fig. 44). Length 1mm. Head rather short and broad, truncate anteriorly, with moderately prominent post-antennal angles and with a broad, chitinized area on the ventral side between the antennæ. Thorax and legs of ordinary character; sternal plate (Fig. 45B) short and broad.

*Pleural plates* (Fig. 45A) not at all or but weakly scaly, the spiracles moderately large; first pair of plates of ordinary form; second with a short dorsal tooth and a longer, tapering ventral tooth; third to sixth each divided into two truncate lobes, the ventral lobe much narrower than the dorsal, that of the sixth pair tapering and pointed; seventh and eighth

pairs without lobes or teeth; second to sixth each with a pair of small setæ, the seventh and eighth with the usual slender setæ.

*Tergal and sternal plates* well developed, occupying a little more than half the width of the abdomen, arranged as usual. Tergal plates for the most part with four to eight rather slender setæ. Sternal plates with about the same number of setæ, but these smaller than those of the dorsum.

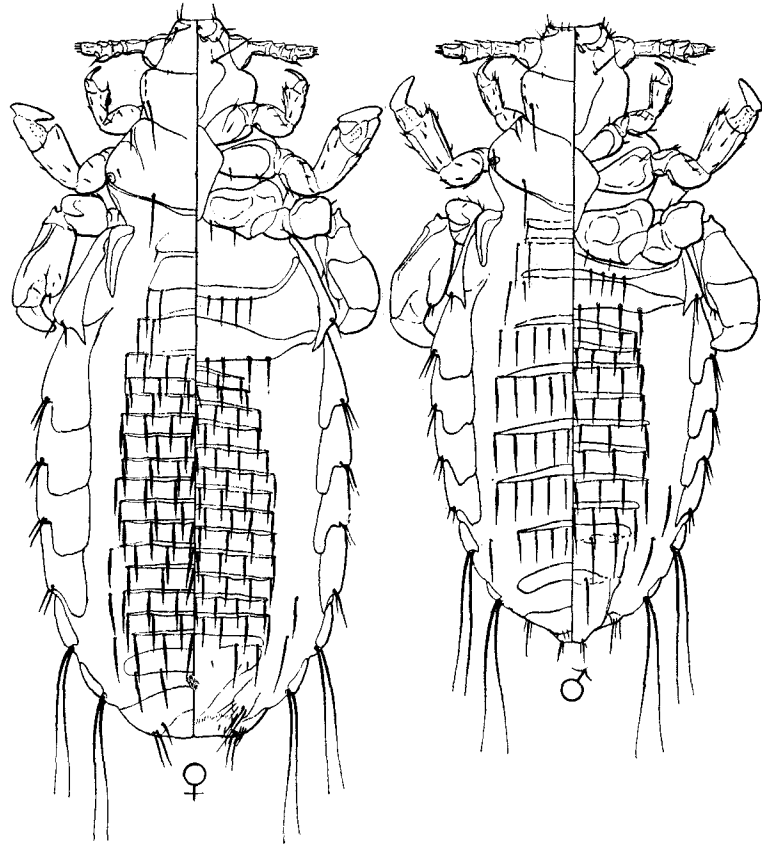


Fig. 44.—*Hoplopleura malaysiana* n. sp., male and female.

Paired setæ of the third sternite weakly developed, not borne on prominences.

MALE (Fig. 44). Length 0.9 mm. Pleural plates as in the female. Tergal and sternal plates arranged in the usual manner, the former with for the most part eight to ten slender setæ, the latter with six to seven. Genitalia (Fig. 45C) with no especially distinctive characters.

NOTES.—This species is somewhat of the type of *H. longula* and *H. affinis*. It is distinguishable by the narrow ventral lobes of the pleural plates and the weak development of the paired setæ of the third sternite.

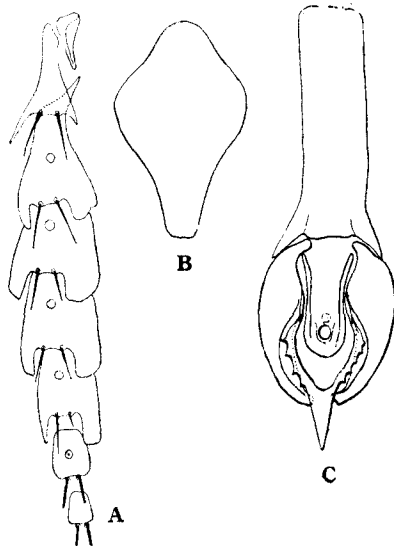


Fig. 45.—*Hoplopleura malaysiana* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

#### 8. *Hoplopleura chrotomydis* n. sp.

FIG. 46.

SPECIMENS EXAMINED. From *Chrotomys whiteheadi*, Irian, Benguet, Philippine Islands (U. S. N. M.). Holotype a female. The host is a Murid of the subfamily *Hydromyinae*.

FEMALE. In general form and appearance closely resembling the preceding, *H. malaysiana*. Differing chiefly in the form of the pleural plates (Fig. 46A), the dorsal lobe being narrower and more or less truncate, the ventral lobe in each case slender, tapering and pointed. *Sternal plate* (Fig. 46B) slightly more angular than in *malaysiana*. *Tergal and sternal plates* with for the most part six to nine setæ, these all quite slender. Paired setæ of the third sternite well developed, borne on slight prominences.

MALE. *Pleural plates* as in the female but with the dorsal lobe pointed and tapering. *Tergal and sternal plates* arranged as usual, the tergal plates for the most part with eight to nine slender setæ, the sternal plates with from five to seven, these slightly stouter than those of the dorsum. *Genitalia* (Fig. 46C) with the arms of the pseudopenis long, diverging but little.

NOTE.—In general this species approaches quite closely *H. malaysiana* but is readily distinguishable by the form of the pleural plates, the tapering, ventral lobe of the third to sixth plates being quite distinctive.

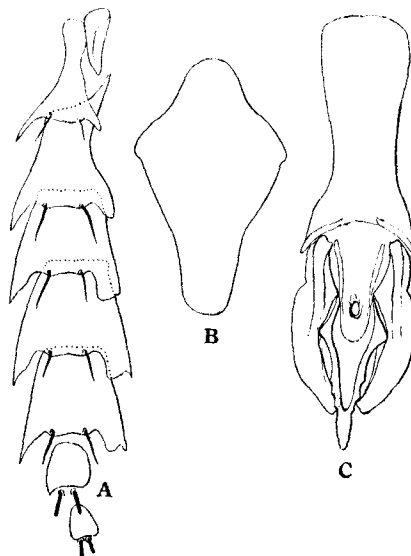


Fig. 46. *Hoplopleura chrotomydis* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

### 9. *Hoplopleura oenomydis* n. sp.

FIGS. 47, 48.

**SPECIMENS EXAMINED.** Types from *Oenomys hypoxanthus bachante*, Molo, British East Africa (F. C. M. 17090). Holotype a female. Also from *Dasymys incomptus helukus*, Nairobi, British East Africa (F. C. M. 17046), (a single specimen, perhaps a straggler); *Thamnomys surdaster polionopus*, Sukenya Mountain, British East Africa (F. C. M. 17133); *Limnomys mearnsi*, Grand Malindang, Mindanao, Philippine Islands (U. S. N. M. 144621); *Rattus calcis*, Baguio, Luzon, Philippine Islands (U. S. N. M. 145778). The hosts are Murids.

**FEMALE** (Fig. 47). Length 1.5 mm. Head rather slender and relatively small, narrowly rounded in front of the antennæ and with slight post-antennal angles and with the lateral margins of the hind head curved and somewhat convergent. Thorax and legs of ordinary form; sternal plate (Fig. 48B) elongate, tapering and blunt posteriorly.

**Pleural plates** (Fig. 48A) slightly or not at all scaly, the spiracles moderately large; first pair of plates of normal form; second pair with a short dorsal and longer ventral tooth; third to sixth pairs divided into two lobes by a deep and rather broad incision, the ventral lobe in each

case considerably smaller than the dorsal lobe, on the sixth pair being merely a tapering tooth; seventh and eighth pairs without lobes; second pair with a pair of small setæ, third to sixth each with a single small seta, seventh and eighth with the usual pairs of slender setæ.

*Tergal and sternal plates* distinctly developed, arranged as usual. Tergal plates with for the most part six to seven rather slender setæ, ster-



Fig. 47.—*Hoplopleura ænomydis* n. sp., male and female from *Cenomys hypoxanthus bacchante*.

nal plates with seven to eight, these slightly smaller than those of the dorsum. Paired setæ of the third sternite well developed, slender, set on slight prominences.

**MALE** (Fig. 47). *Length* 0.95 mm. *Pleural plates* in general as in the female, but with the ventral lobes narrower. *Tergal and sternal plates* normally arranged, the tergal plates with for the most part six to eight slender setæ, the sternal plates with seven or eight. *Genitalia* (Fig. 48C) with no especially distinctive characters.

NOTES.—This species is one of the *affinis-hesperomydis* group, distinguishable chiefly by the broad dorsal and narrower ventral lobe of the third pair of pleural plates, the tapering ventral lobe of the sixth pair and the absence of lobes on the

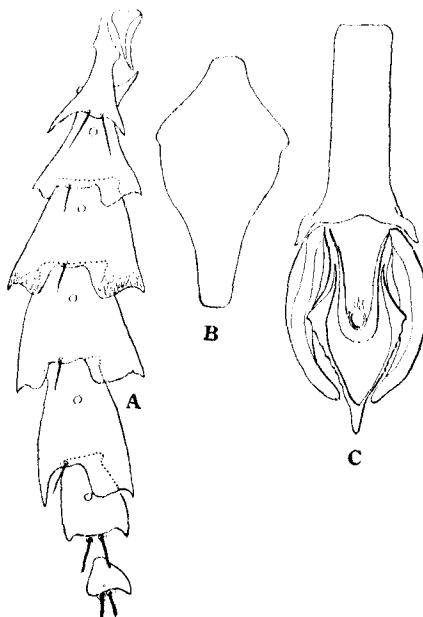


Fig. 48.—*Hoplopleura anomydus* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male. All figures from specimens from *Ænomys hypoxanthus bacchante*.

seventh and eighth pairs. In the types the head is noticeably slender, but this character is not especially marked in the specimens from the other hosts. It is possible that the specimens from the Philippine hosts should not be referred to this species, but I am unable to find any very definite characters upon which to separate them.

#### 10. *Hoplopleura apomydis* n. sp.

FIGS. 49, 50.

SPECIMENS EXAMINED. From *Apomys bardus*, Malindang Peak, Mindanao, Philippine Islands (U. S. N. M. 144592). Holotype a female. The host is a Murid.

FEMALE (Fig. 49). Length 1.1 mm. Head rather short and broad, with slight post-antennal angles. Thorax and legs of normal form; sternal plate rounded, produced posteriorly.

Pleural plates (Fig. 50A) slightly scaly, spiracles moderately large; first pair of plates of ordinary form; second pair with a short dorsal and a slightly longer ventral tooth; third to sixth pairs divided into two lobes

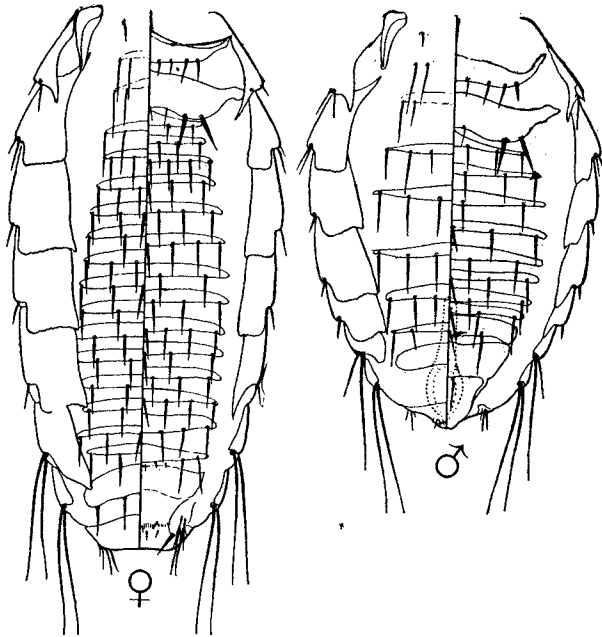


Fig. 49.—*Hoplopleura apomydis* n. sp., abdomens of male and female.

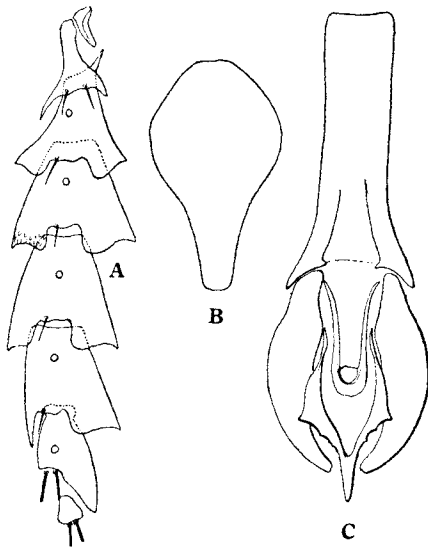


Fig. 50.—*Hoplopleura apomydis* n. sp.: *A*, pleural plates of female; *B*, sternal plate; *C*, genitalia of male.

by a deep and rather broad incision, the ventral lobes slightly narrower than the dorsal, except on the sixth pair, where the ventral lobe is a tapering tooth; seventh with a broad, tapering dorsal lobe; eighth without lobes; second with two small setæ, third to sixth with one small seta, seventh and eighth with the usual pairs of slender setæ.

*Tergal and sternal plates* arranged as usual, but unusually large. Tergal plates with from four to six small, slender setæ. Sternal plates for the most part with six to seven similar setæ. Paired setæ of the third sternite slender, set on slight prominences.

MALE (Fig. 49). *Length* 0.75 mm. *Pleural plates* in general as in the female, but with the ventral lobes narrower, all more or less tapering. *Tergal and sternal plates* arranged as usual with for the most part four to six small, slender setæ. *Genitalia* (Fig. 50C) with no especially distinctive characters.

NOTES.—This species is another of the *affinis-hesperomydis* group, characterized by the broad dorsal and ventral lobes of the third pair of pleural plates, the tapering ventral lobe of the sixth pair and the broad, tapering dorsal lobe of the seventh pair, the unusually large tergal and sternal plates, and the smallness and paucity of the dorsal and ventral setæ.

#### 11. *Hoplopleura sukenyae* n. sp.

FIG. 51.

SPECIMENS EXAMINED. A single female from *Mus triton*, Mt. Sukenya, British East Africa (F. C. M. 16769). The host belongs to the subfamily *Murinae* of the *Muridae*.

FEMALE (Fig. 51) *Length* 1.2 mm. *Head* narrowly rounded or slightly truncate in front, with slight post-antennal angles. *Thorax* and legs of ordinary form; sternal plate (Fig. 51B) almost quadrangular, slightly produced anteriorly and with a short, almost parallel-sided process posteriorly.

*Pleural plates* (Fig. 51C) strongly scaly; first pair of ordinary form; second with a small, lobe-like process at each posterior angle; third to seventh each divided into two lobes by a deep, narrow incision in the posterior margin, the lobes of the third pair rounded, those of the fourth and fifth with the internal angles rounded and the external angles slightly pointed, those of the sixth and seventh narrow and rounded; eighth without lobes; second to sixth each with a pair of small setæ at the base of the incision; seventh and eighth with the usual slender setæ.

*Tergal and sternal plates* arranged as usual, strongly developed, extending almost across the abdomen. Tergal plates with for the most part four to six small, stout, acute setæ. Sternal plates with for the most part



seven to eight small, slender setæ. Paired setæ of the third sternite rather small, not borne on prominences.

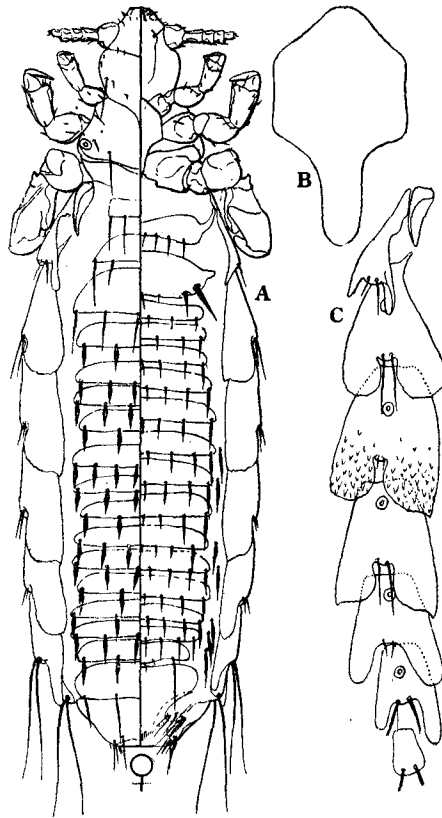


Fig. 51.—*Hoplopleura sukenyæ* n. sp.: A, female; B, sternal plate; C, pleural plates.

NOTE.—This is a member of the *affinis-hesperomydis* group, the pleural plates resembling most closely those of the latter species but marked by the peculiarly shaped lobes.

## 12. *Hoplopleura quadridentata* (Neum.).

FIGS. 52, 53.

1909. *Hæmatopinus* (*Polyplax*) *quadridentatus* Neumann, *Arch. de Parasit.*, **13**: 5; 3-15, f. 13, 14.
1915. *Hoplopleura* (?) *quadridentatus* (Neum.), Kellogg and Ferris, *Ann. Durban Mus.*, **1**: 155.
1916. *Hoplopleura quadridentatus* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), **6**: 156, (part).

PREVIOUS RECORDS. Recorded by Neumann from *Nectomys* (= *Holochilus*) *squamipes*, "Haut Peru." Later erroneously recorded by Ferris from *Nesoryzomys narboroughi* from the Galapagos Islands.

SPECIMENS EXAMINED. From *Nectomys squamipes*, Sapucay, Paraguay (F. C. M. 18162), and *N. palmipes*, Princetown, Island of Trinidad (F. C. M. 4908); *Oryzomys fulvescens*, Orizaba, Vera Cruz, Mexico (U.

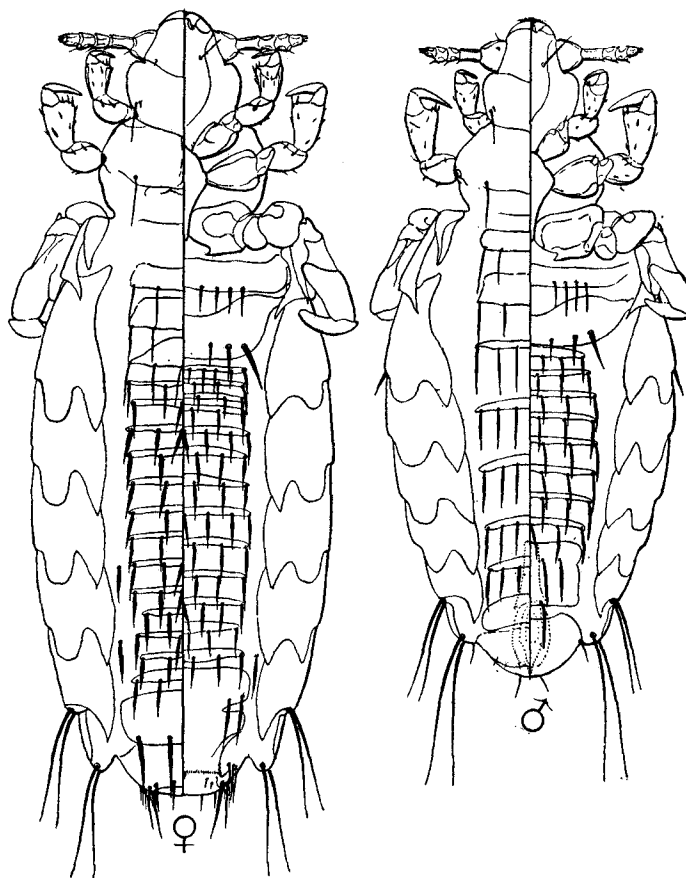


Fig. 52.—*Hoplopleura quadridentata* (Neum.), male and female from *Nectomys squamipes*.

S. N. M. 58259); and *O. rostratus*, Alta Mira, Tamaulipas, Mexico (U. S. N. M. 92935). All the hosts are Murids of the subfamily *Cricetinae*.

FEMALE (Fig. 52). Length 1.25 mm. Head narrowly rounded in front of the antennæ, with rather prominent post-antennal angles and with a broad, chitinized area on the ventral side between the antennæ. Thorax

and legs of normal form; sternal plate (Fig. 53C) elongate, tapering posteriorly.

*Pleural plates* (Fig. 53B) large, overlapping and presenting a markedly scaly or reticulate appearance; first pair of normal form; second with short dorsal and ventral teeth; third to sixth with the posterior margin divided into four prominent lobes of nearly equal size, the outer lobes somewhat acute, the median lobes rounded; seventh with two quite long, tapering lobes, the dorsal lobe with a small lobule on the inner margin;

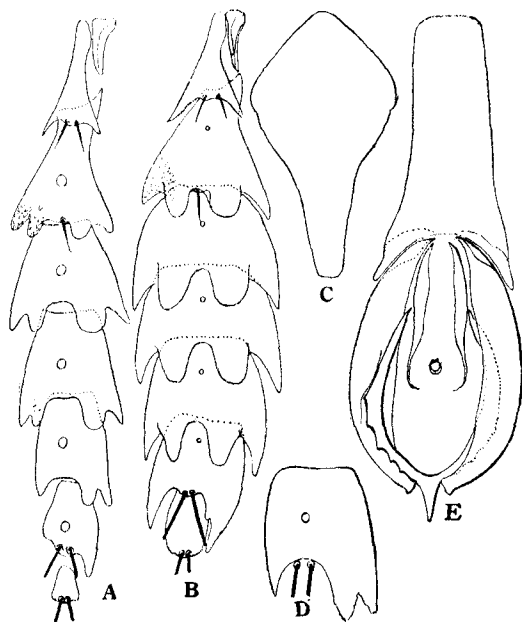


Fig. 53.—*Hoplopleura quadridentata* (Neum.): B, pleural plate of female; C, sternal plate; E, genitalia of male. From specimens from *Nectomys palmipes*; D, sixth pleural plate of specimen from *Oryzomys rostratus*. *Hoplopleura nesoryzomydis* n. sp.: A, pleural plates of female, paratype.

eighth without lobes; second with two setæ, third with one, the remainder with none except for the usual pairs on the seventh and eighth.

*Tergal and sternal plates* well developed, but occupying scarcely half the width of the abdomen, arranged as usual, the tergal plates for the most part with four to five rather stout setæ, the sternal plates for the most part with six or seven setæ. Paired setæ of the third sternite rather weakly developed, not borne on prominences.

MALE (Fig. 51). Length 0.95 mm. *Pleural plates* in general as in the female, but with the lobes somewhat less prominent. *Tergal and sternal plates* arranged as usual, with for the most part six rather slender

setæ. *Genitalia* (Fig. 52E) with the basal plate scarcely longer than the parameres and with arms of the pseudopenis strongly curved.

NOTES.—Having at hand specimens from the host species from which the types of this species were taken the determination may be regarded as quite definite. In the light of these specimens it appears that the species previously recorded by me as *H. quadridentata* from *Nesoryzomys narboroughi* must be considered as distinct, *H. quadridentata* is a quite well-defined form that may be regarded as a rather near relative of *H. hesperomydis*, from which it is distinguishable by the deeply lobed pleural plates. It is also very similar, at least superficially, to *H. isomydis* n. sp., an African form. The latter differs, however, especially in having the head strongly angular behind the antennæ.

The specimens from the two species of *Oryzomys* differ somewhat from those from *Nectomys*, those from *O. fulvescens* lacking the ventral lobe of the seventh pleural plate and those from *O. rostratus* having the dorsal lobe of this plate (Fig. 53D) broader than in the typical specimens and distinctly two-toothed. I am, however, not disposed to recognize these as distinct forms.

### 13. *Hoplopleura nesoryzomydis* n. sp.

FIG. 53A.

1916. *Hoplopleura quadridentata* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 156, (part).  
 1916. *Hoplopleura quadridentata* (Neum.), Ferris, *Psyche*, 23: 116, f. 9b, 11c, 12. (Misidentification.)

PREVIOUS RECORDS. Recorded by Ferris as *H. quadridentata* (Neum.) from *Nesoryzomys narboroughi*, and *N. defessus*, Galapagos Islands.

SPECIMENS EXAMINED. As recorded above, the types from *Nesoryzomys narboroughi* (holotype a female) and the following: *Oryzomys angouya*, Sapucay, Paraguay (F. C. M. 18167), and *O. xantheolus*, Menocucho, Peru (F. C. M. 19431); *Zygodontomys seorsus*, San Miguel Id., Panama (U. S. N. M. 116671). The hosts are Murids of the subfamily *Cricetinae*.

MALE AND FEMALE. In all respects closely resembling *H. quadridentata* except in the following details: *Pleural plates* (Fig. 53A) with but one ventral lobe on the sixth segment, without the ventral lobe on the seventh and with the lobes on all the plates less well defined.

NOTES.—It is possible that this form should not be recognized as anything more than a subspecies of *H. quadridentata*, but it is quite well marked and maintains its characters over a rather wide host and territorial range.

### 14. *Hoplopleura intermedia* Kellogg and Ferris.

FIGS. 54, 55B-C-D, 56B.

1915. *Hoplopleura intermedia* Kellogg and Ferris, *Ann. Durban Mus.*, 1: 153, pl. 16, f. 5-5d.  
 1916. *Hoplopleura intermedia* K. and F., Ferris, *Ibid.*, 1: 243, tf. 27.

1916. *Hoplopleura intermedia* K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 156.

PREVIOUS RECORDS. From *Rattus* (= *Mus*) *coucha*, Mfongosi, Zululand, South Africa.

SPECIMENS EXAMINED. As recorded above and from the following: *Dendromys mesomelas insignis*, Kaimosi, British East Africa (U. S. N. M. 184091); *Rattus tullbergi peromyscus*, Molo (F. C. M. 17025) and

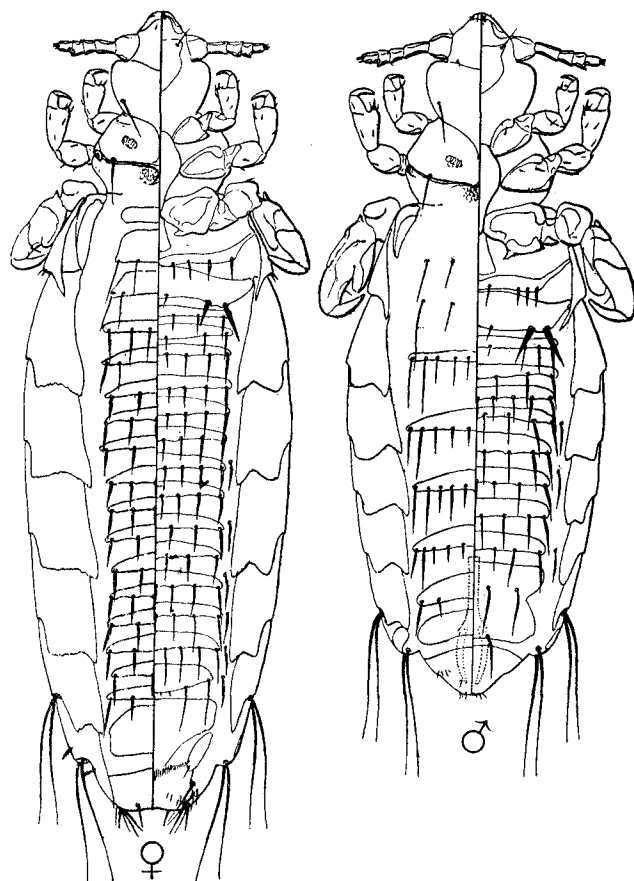


Fig. 54. *Hoplopleura intermedia* Kellogg and Ferris, male and female, from paratypes.

Guas Naishu Plateau, British East Africa (U. S. N. M. 163353); *Zelotomys hildegardæ*, Mt. Sukenya, British East Africa (F. C. M. 16955). The hosts are Murids belonging to the subfamily *Murinae*, except the genus *Dendromys*, which belongs to the *Dendromyinae*.

FEMALE (Fig. 54). *Length* 1.2 mm. General form elongate and slender. *Head* (Fig. 56B) quite short and broad, narrowly truncate in front, with prominent, rounded, post-antennal angles. *Thorax* quite short and broad, quite heavily chitinized and distinctly reticulated; sternal plate (Fig. 55C) elongate, rounded.

*Pleural plates* (Fig. 55B) large, overlapping and strongly reticulate or scaly; first pair of ordinary form; second to fifth divided into two lobes by a deep, narrow incision in the posterior margin and with the outer angles somewhat produced; seventh likewise deeply divided into two lobes, these narrow; eighth with a single slender, tapering, dorsal lobe; second to sixth each with two very small setæ at the base of the incision, the seventh and eighth with the usual pairs of slender setæ.

*Tergal and sternal plates* arranged as usual, strongly developed, all of about the same width and occupying about half the width of the abdomen. *Tergal plates* with for the most part four small, stout setæ, the *sternal plates* with six to eight, these smaller than those of the dorsum. Paired setæ of the third sternite large and stout, set on slight prominences.

MALE (Fig. 54). *Length* 0.75 mm. *Pleural plates* as in the female except for the absence of the lobe on the eighth pair. *Tergal and sternal plates* arranged as usual, the *tergal plates* with for the most part about ten small setæ, the *sternal plates* with about eight. *Genitalia* (Fig. 55D) with no especially distinctive characters.

NOTES.—This species is to be regarded as a member of the *affinis-hesperomydis* group but is marked especially by the dorsal and ventral lobes of the seventh pleural plates and the dorsal lobe of the eighth, as well as by the pronounced angles of the head. Its nearest relative is perhaps the next species.

#### 15. *Hoplopleura laticeps* n. sp.

FIGS. 55A, 56A.

SPECIMENS EXAMINED. Two females only from *Arvicanthis univittatus*, mouth of the Benito River, West Africa (U. S. N. M. 101514).

FEMALE. *Length* 1.5 mm. In general appearance closely resembling the preceding, but with the post-antennal angles of the head (Fig. 56A) acute and even more pronounced, with the setæ of the abdomen larger and with the third to seventh pleural plates (Fig. 55A) quite deeply four-lobed.

NOTES.—I regard this species as most closely related to *H. intermedia*, but in the form of the pleural plates it suggests *H. quadridentata* from South America.

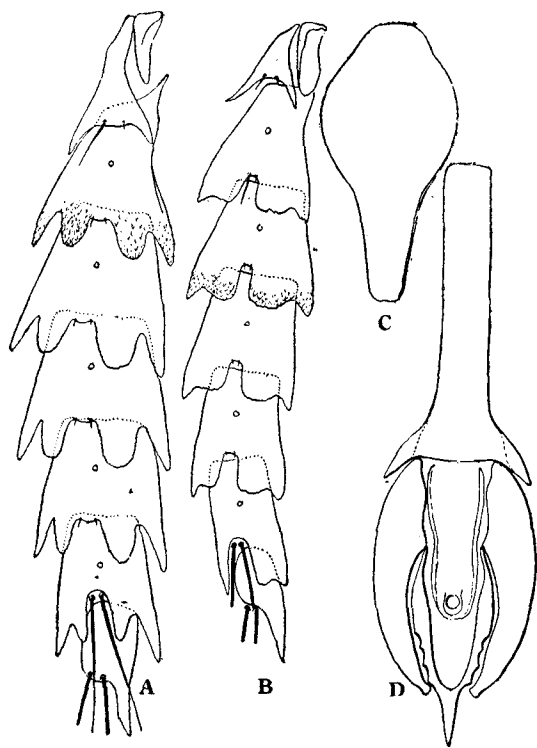


Fig. 55.—*Hoplopleura laticeps* n. sp.: A, pleural plates. *Hoplopleura intermedia* Kellogg and Ferris; B, pleural plates; C, sternal plate.

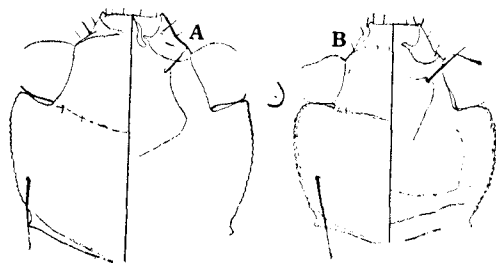
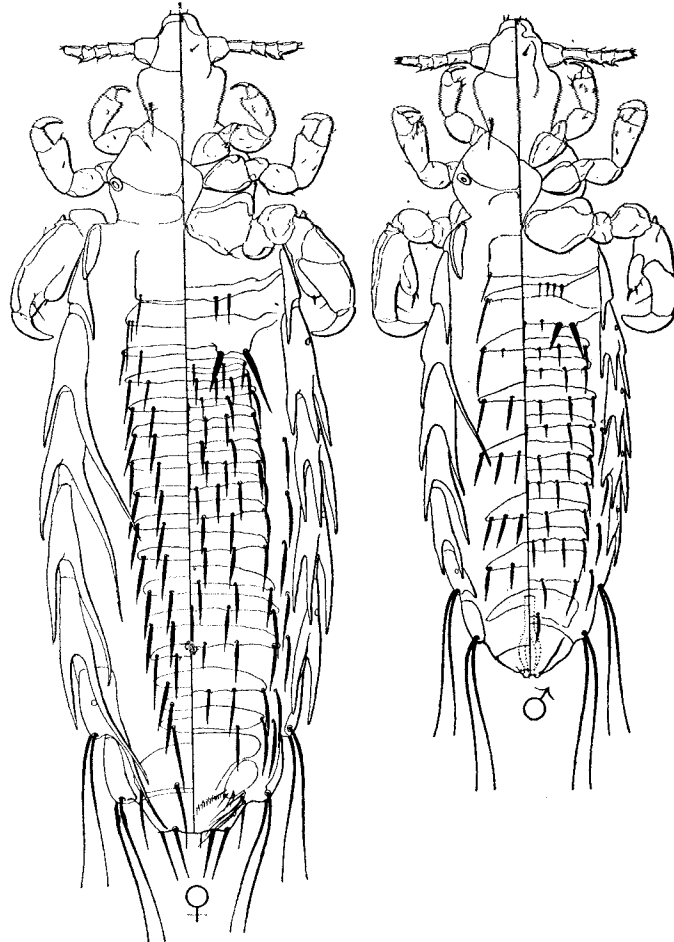


Fig. 56.—Heads of: A, *Hoplopleura laticeps* n. sp., and B, *H. intermedia* Kellogg and Ferris.

16. *Hoplopleura enormis* Kellogg and Ferris.16a. *Hoplopleura enormis enormis* Kellogg and Ferris.

Figs. 57, 58B-C, 59B.

1915. *Hoplopleura enormis* Kellogg and Ferris, *Ann. Durban Mus.*, 1: 155, pl. 16, f. 4-4e.1916. *Hoplopleura enormis* K. and F., Ferris, *Ibid.*, 1: 247.1916. *Hoplopleura enormis* K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 154.Fig. 57.—*Hoplopleura enormis enormis* K. and F., male and female.

PREVIOUS RECORDS. From *Arvicanthis dorsalis*, Mfongosi, Zululand, South Africa. According to Dr. G. S. Miller the proper name for this is *Lemniscomys griselda spinalis*.



**SPECIMENS EXAMINED.** The types and two females from *Lemniscomys barbarus zebra*, Rhino Camp, Gondokoro, Africa (U. S. N. M. 165195). The hosts are Murids of the subfamily *Murinae*.

**FEMALE** (Fig. 57). *Length* 1.3 mm. *Head* (Fig. 58B) elongate, the anterior margin narrow and truncate, the post-antennal angles moderately prominent, the lateral margins of the hind head curved and slightly convergent. *Thorax* and legs of ordinary form; sternal plate (Fig. 58C) short, broad, and produced but little posteriorly.

*Pleural plates* (Fig. 59B) somewhat scaly; first pair of ordinary form; second with a slender, tapering process both dorsally and ventrally; third to fifth with four and the sixth with three tapering finger-like processes of which the dorsal is nearly twice as long as the plate itself, the others scarcely longer than the plate; seventh with a single dorsal process which is longer than the plate; eighth with no processes; none of the plates with setæ except for the usual pairs of slender setæ on the seventh and eighth.

*Tergal and sternal plates* arranged as usual, strongly developed, occupying about half the width of the abdomen. Tergal plates with for the most part four quite stout setæ; sternal plates with five to eight setæ, those of the median area smaller than the others. Paired setæ of the third sternite large and long, set on slight prominences.

**MALE** (Fig. 57). *Length* 1 mm. *Pleural plates* in general as in the female, but with the dorsal processes tending to be shorter, that of the seventh pair practically obsolete. *Tergal and sternal plates* arranged as usual. Tergal plates with for the most part four to six rather stout setæ, sternal plates with six to seven, these smaller than those of the dorsum. *Genitalia* not in condition for description.

**NOTES.**—The specimens from *Lemniscomys barbarus zebra* differ from the type in having the dorsal processes of the pleural plates noticeably shorter. However, the two specimens available are in poor condition, and I do not care to base a name upon them. It is possible that these represent *Pediculus spiculifer* Gervais, recorded as from a subspecies of this host ("*Mus barbarus*") but the original description is too inadequate to permit a decision, especially as there is every probability that there is another species also on this host.

This is a most extraordinary form, but it is evident that the remarkable character of the pleural plates is merely an extreme development of the conditions seen in *H. quadridentata* and *H. laticeps*. The affinities of the species are probably with *laticeps*.

It is possible that the two forms described below should be recognized as distinct species, but they are evidently very close to *H. enormis*, and I should wish to know something of the amount of variation before placing them as such. For the present I regard them as subspecies of *enormis*.

16b. *Hoplopleura enormis pelomydis* n. ssp.

Figs. 58A, 59A.

SPECIMENS EXAMINED. Type from *Pelomys fallax iridescens*, Summit Sagalla, British East Africa (U. S. N. M. 183667). Holotype a female. Also from *Lemniscomys pulchellus*, River Ja, Cameroon (U. S. N. M. 125426), and *Lemniscomys striatus ardens*, Wambugu, British East Africa (U. S. N. M. 163646). The hosts are Murids of the subfamily *Murinae*.

FEMALE. Length 1.3 mm. Differing from the female of *H. enormis enormis* in the form of the pleural plates (Fig. 59A), the sixth pair having

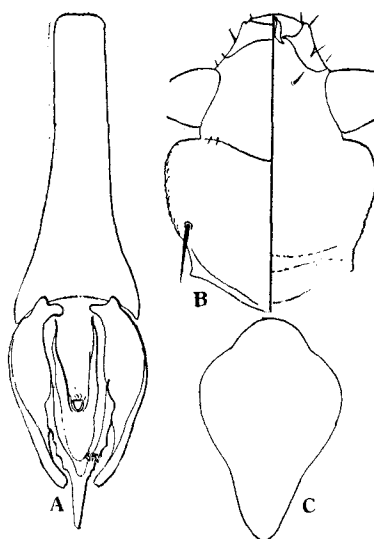


Fig. 58.—*Hoplopleura enormis pelomydis* n. sp.: A, genitalia of male. *Hoplopleura enormis enormis* K. and F.: B, head; C, sternal plate.

four processes instead of three, the seventh pair two processes instead of three and having no long setæ, and the eighth having a single long dorsal process.

MALE. Length 1 mm. Differing from the male of *H. enormis enormis* in having the dorsal process of each pleural plate, except the third, shorter than the second process. *Genitalia* (Fig. 58A) with no especially distinctive characters.

16c. *Hoplopleura enormis mylomydis* n. ssp.

FIG. 59C.

SPECIMENS EXAMINED. From *Mylomys roosevelti*, Kaimosi (U. S. N. M. 183602), and Molo (F. C. M. 16842), British East Africa. Types from the first-named locality. Holotype a female. The host is a Murid of the subfamily *Murinae*.

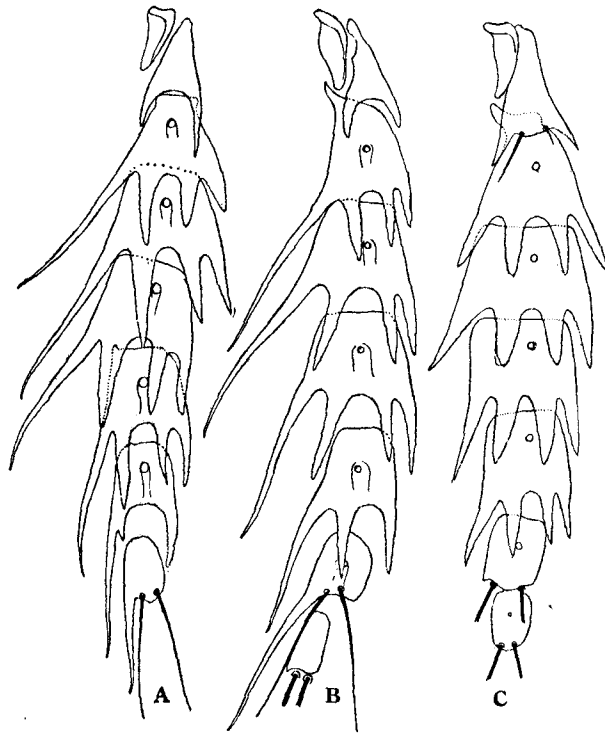


Fig. 59.—Pleural plates of females of: A, *Hoplopleura enormis pelomydis* n. sp.; B, *H. enormis enormis* K. and F.; C, *H. enormis mylomydis* n. sp.

FEMALE. Length 1.5 mm. Resembling the type form except that the second pair of pleural plates bear two setæ, the dorsal process on each plate is but little longer than the others, and the seventh plate bears no process.

MALE. Length 1.1 mm. Resembling the type form except that the dorsal process is on none of the pleural plates longer than the second process.

17. *Hoplopleura merionidis* n. sp.

FIG. 60.

SPECIMENS EXAMINED. Three females from *Meriones psammophilus*, Shensi, China (U. S. N. M. 172528). The host is a Murid of the subfamily *Gerbillinae*.



Fig. 60.—*Hoplopleura merionidis* n. sp.; A, female; B, sternal plate; C, pleural plates.

FEMALE (Fig. 60A). Length 1.1 mm. Head elongate, acute anteriorly, with slight prominences at the post-antennal angles and with the lateral margins of the hind head nearly parallel. Thorax and legs of ordinary form; sternal plate (Fig. 60B) short and shield-shaped.

Pleural plates (Fig. 60C) but slightly or not at all scaly; first pair of ordinary form; second with a short dorsal tooth and a long, tapering ventral tooth; third to sixth divided into two lobes by a quite deep, curved

emargination, the outer angles somewhat produced and the posterior margin of the lobes having a ragged appearance; seventh and eighth without lobes; second to sixth with a pair of short setæ in the emargination, the seventh and eighth with the usual pairs of long setæ.

*Tergal and sternal plates* of the abdomen rather weakly developed, some of them tending to be obsolete, arranged as usual, for the most part with from six to eight slender setæ and with one or two setæ between their ends and the pleurites. Paired setæ of the third sternite, long and slender, borne on slight prominences.

NOTES.—This is apparently a member of the *affinis-hesperomydis* group, but the peculiarly shaped head and sternal plate distinguish it from all other species.

### 18. *Hoplopleura pectinata* (Cummings).

FIGS. 61, 62.

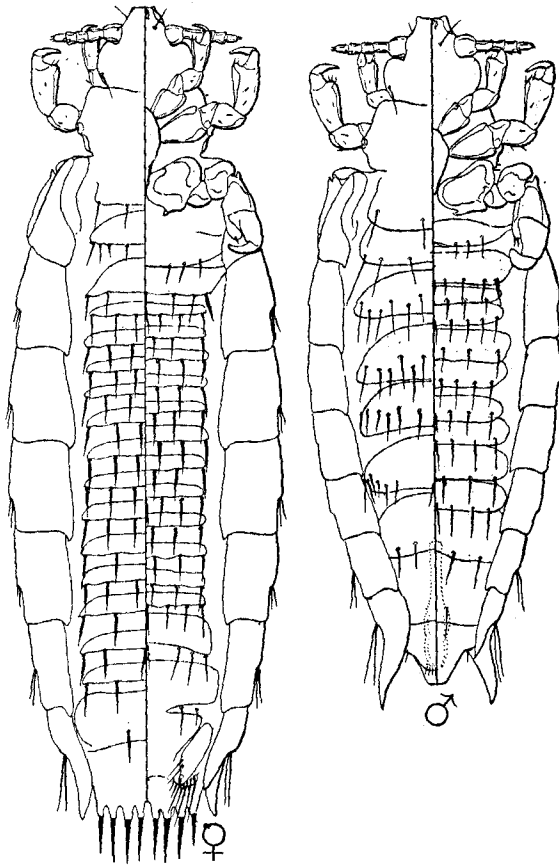


Fig. 61. *Hoplopleura pectinata* (Cummings), male and female.

1913. *Polyplax pectinata* Cummings, *Bul. Ent. Res.*, 4: 35.

1916. *Polyplax pectinata* Cum., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 174.

1916. *Hoplopleura pectinata* (Cum.), Ferris, *Ibid.* (4), 6: 205.

PREVIOUS RECORDS. From *Rattus* (= *Epimys*) *surifer*, Biserat, Jalor, Malay Peninsula. This host was erroneously recorded by Ferris (ref. cited) as *Epimys auifer*.

SPECIMENS EXAMINED. From *Rattus surifer*, Trong, Lower Siam (U. S. N. M. 86750). The host is a Murid of the subfamily *Murinae*.

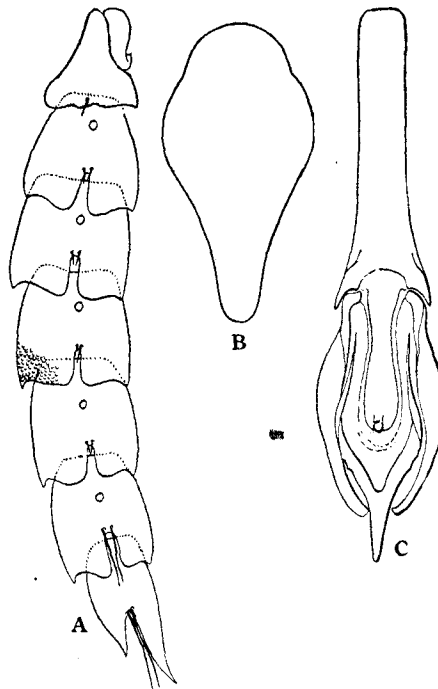


Fig. 62.—*Hoplopleura pectinata* (Cummings): A, pleural plates of female; B, sternal plate; C, genitalia of male.

FEMALE (Fig. 61). General form elongate and slender, derm everywhere tending to be chitinized and scaly or reticulated. *Length* 2 mm. *Head* short and broad, narrowly truncate in front, with prominent and acutely rounded post-antennal angles. *Thorax* unusually short and broad, the lateral margins almost straight, the spiracles borne on slight prominences; sternal plate (Fig. 62B) rounded, elongate.

*Pleural plates* (Fig. 62A) very large, overlapping, strongly reticulate; first pair apparently not free from the dorsum and but weakly chitinized; third to seventh pairs divided into two broad and nearly equal lobes by a

deep, narrow incision in the posterior margin and with the outer angles slightly produced; eighth pair likewise with two lobes, but these slender and tapering, the dorsal lobe longer than the ventral; third to sixth pairs with two very small setæ in the incisions, the seventh and eighth with the setæ slightly longer but much shorter than usual.

*Tergal and sternal plates* arranged as usual, strongly developed, for the most part with four to six small, slender setæ. Paired setæ of the third sternite scarcely or not at all differentiated.

Abdomen terminating in a series of eight quite long, stout spines, each of which is borne at the tip of a low prominence.

MALE (Fig. 61). Length 1.25 mm. *Pleural plates* as in the female. *Tergal plates* arranged as usual, very large, occupying the greater part of each segment, for the most part with an irregular row of four to twelve short, slender setæ, these set some distance in from the posterior margin of the plate. *Sternal plates* likewise arranged as usual, each with seven to nine small setæ. *Genitalia* (Fig. 63C) with all the parts somewhat elongated, but otherwise not especially distinctive.

NOTE.—This is a peculiar and isolated species, probably finding its nearest relatives in the *affinis-hesperomydis* group, but not intimately connected with any other known form.

### 19. *Hoplopleura neumanni* Fahr.

FIG. 63.

1901. *Hæmatopinus præcisus* Neumann, *Arch. de Parasit.*, 5: 600-601, (part). (Ty-pographical error for *præcisus*).
1902. *Hæmatopinus præcisus* Neumann, *Ibid.*, 6: 144, (part).
1908. *Polyplax* (?) *præcisus* (Neumann), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 13, (part).
1909. *Hæmatopinus* (*Polyplax*) *præcisus* Neumann, Neumann, *Arch. de Parasit.*, 13: 523-524, f. 23.
1916. *Hæmatopinus* (*Polyplax*) *præcisus* Neumann, Ferris, *Proc. Cal. Acad. Sci.* (4), 6: 178, (part).
1919. *Hoplopleura neumanni* Fahrenholz, *Jahresb. des Niedersäch Zool. Ver.*, p. 26.

PREVIOUS RECORDS. Known only from the original description and record, from "gros rats" in Abyssinia.

SPECIMENS EXAMINED. A single female from the type lot and a single female from *Tatera nigricauda nyama*, Iriola River, British East Africa (U. S. N. M. 183935). The genus *Tatera* belongs to the subfamily *Gerbillinæ* of the family *Muridae*.

FEMALE (Fig. 64). Length 1.8 mm. *Head* (Fig. 64D) narrowly truncate anteriorly, but little produced in front of the antennæ; post-antennal angles acute and prominent. *Thorax* short and broad, the sternal plate (Fig. 63B) somewhat cordate, the legs of the type common to the genus.

*Pleural plates* (Fig. 63C) as follows: First pair of ordinary form; second with a short dorsal and a longer ventral process; third to sixth each with four slender, acute processes which are slightly shorter than the body of the plate and with a median pair of short, rounded processes from each of which there rises a long, slender seta; seventh with a single slender dorsal process, with two long and one shorter seta; eighth without processes, with the usual pair of slender setæ and two shorter setæ.

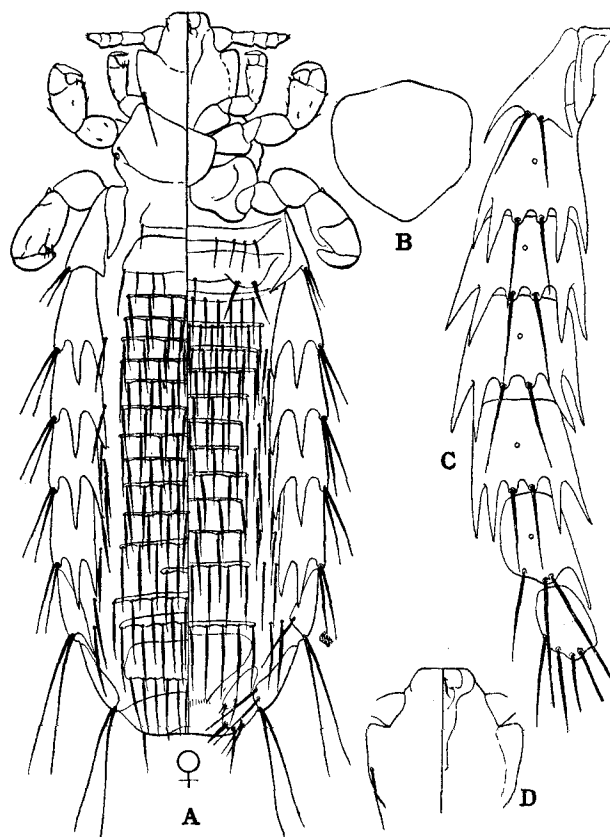


Fig. 63.—*Hoplopleura neumanni* Fahr.: A, female; B, sternal plate; C, pleural plates; D, head.

*Tergal and sternal plates* occupying about half the width of the abdomen, narrow and for the most part bearing from six to ten slender setæ. Fourth to seventh segments with one or two setæ between the ends of each tergal and sternal plate and the pleurites. Paired setæ of the third sternite of ordinary form.

NOTES.—In my catalogue of the Anoplura (1916) I expressed the opinion that the original description of *Hæmatopinus præcisus* was based upon specimens repre-



senting two species of different genera. Fahrenholz (1919) has accepted this viewpoint and (although he has not seen specimens) has pointed out that one of the species is a *Polyplax*, the other a *Hoplopleura*. He has restricted the name *præcisus* to the species of *Polyplax*, which is the male described by Neumann, and has given the name *Hoplopleura neumanni* to the female.

Through the very great kindness of Professor A. Martin of the École Vétérinaire of Toulouse I have been enabled to see one of Neumann's slides and to confirm the above opinions. Unfortunately the female only of *H. neumanni* was represented on this slide, and the male remains unknown.

*H. neumanni* is one of a peculiar group of African species which includes three other species that I am here describing as new. A relationship with *H. enormis* and its related forms is suggested.

## 20. *Hoplopleura biseriata* n. sp.

FIG. 64A.

SPECIMENS EXAMINED. A single female from *Malacothrix* sp., Bothaville, Orange Free State, Africa, received through the kindness of Mr.

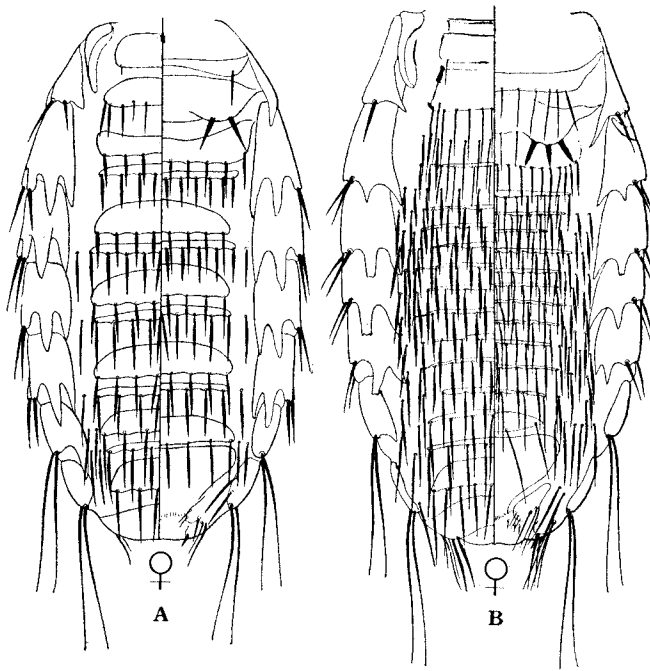


Fig. 64.—Abdomen of female of: A, *Hoplopleura biseriata* n. sp., and B, *H. veprecula* n. sp.

G. A. H. Bedford and now in Mr. Bedford's collection. The host is a Murid of the subfamily *Dendromyinae*.

FEMALE (Fig. 64A). *Length* not recorded. *Head* rather broad, with quite prominent post-antennal angles. *Thorax* and legs of ordinary form, the sternal plate as in *H. neumanni*.

*Pleural plates* identical with those of *H. neumanni*. *Tergal and sternal plates* strongly developed, the third segment both dorsally and ventrally with three plates, the remainder with not more than two. In each case the anterior plate is the broader. Dorsal plates with eight or nine rather stout setæ, ventral plates with 8-10. First plate of the third sternite with the usual paired setæ.

NOTES.—This species is undoubtedly closely related to *H. neumanni*, but the presence of but two tergal and sternal plates on the majority of the abdominal segments is quite distinctive. It is a striking example of how even the most stable characters may at times break down.

## 21. *Hoplopleura cryptica* n. sp.

FIGS. 65, 66B, 66D, 66E, 66G.

SPECIMENS EXAMINED. From *Tatera liodon smithii*, Kikindu, Uganda (U. S. N. M. 165302). Holotype a female. The host is a Murid of the subfamily *Gerbillinae*.

FEMALE (Fig. 65). *Length* 1.6 mm. A stout-bodied species. *Head* (Fig. 66E) and thorax quite heavily chitinized, the head rather short and broad, with prominent, rounded post-antennal angles. *Thorax* and legs of the usual form, the thorax without the usual pair of dorsal setæ; sternal plate (Fig. 66D) slightly broader than long, oval, produced slightly anteriorly and posteriorly.

*Pleural plates* (Fig. 66B) large; first pair of ordinary form; second with short dorsal and ventral teeth; third to sixth each with four slender, finger-like processes which are about half as long as the plate itself and are more or less serrate at the tips; seventh with a single dorsal process; eighth with none; second to sixth each with a pair of stout setæ borne upon prominences between the two median lobes; seventh and eighth with the usual pair of slender setæ and with one to three stout setæ along the ventral margin.

*Tergal and sternal plates* well developed, arranged as usual, almost concealed beneath the many long, stout setæ, of which each plate bears from ten to twenty. Third sternite with two groups of three stout setæ instead of the usual two pairs.

MALE (Fig. 65). *Length* 1.3 mm. *Pleural plates* as in the female except for the presence of a short process at the dorsal angle of the seventh plate. *Tergal and sternal plates* arranged as usual, very large, bearing from fourteen to more than thirty stout setæ. *Genitalia* (Fig. 66G)

with the parameres broad and flattened, the pseudopenis small and weak with the shaft almost obsolete and the arms not serrate.

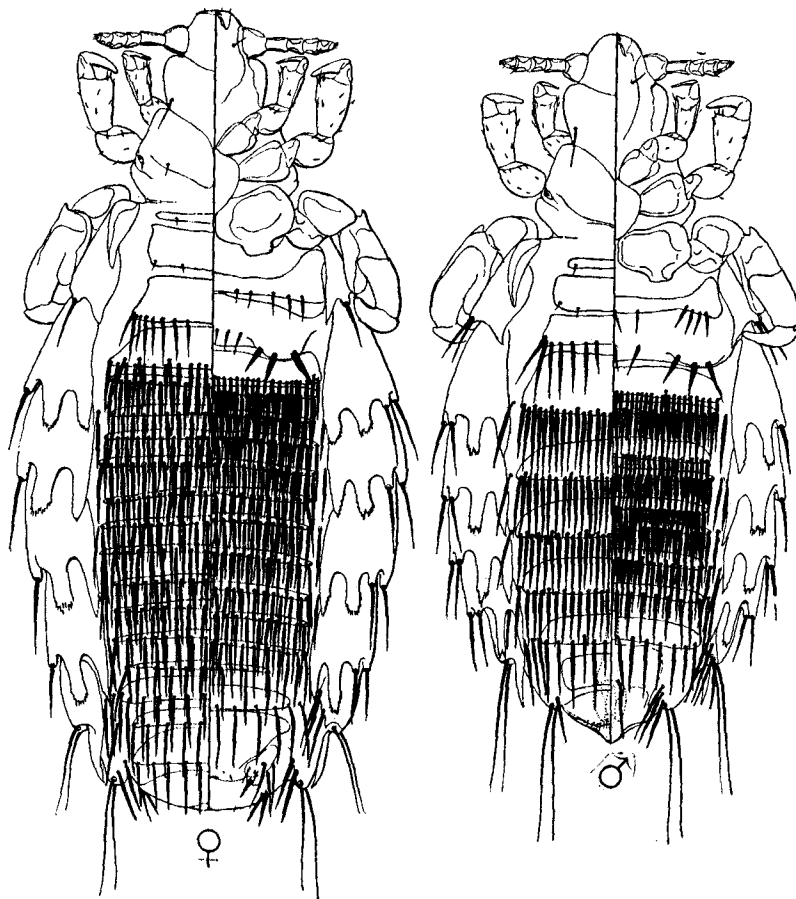


Fig. 65.—*Hoplopleura cryptica* n. sp., male and female.

NOTES.—This remarkable species resembles *H. neumanni* in the form of the pleural plates, but is readily distinguishable by the great number of stout setæ.

## 22. *Hoplopleura veprecula* n. sp.

Figs. 64B, 66A, 66C, 66F.

SPECIMENS EXAMINED. Three females from *Tatera bohmi varia*, South Guaso Nyiro, British East Africa (U. S. N. M. 162250). The host is a Murid of the subfamily *Gerbillinae*.

FEMALE. Length 1.6 mm. Head (Fig. 66F) somewhat elongate. Sternal plate (Fig. 66C) more or less quadrangular. Pleural plates (Fig.

66A) with the setæ not borne on prominences and with the lobes shorter than in *H. cryptica* and but little serrate. Tergal and sternal plates more weakly developed than in *cryptica* and with from eight to twelve slender setæ.

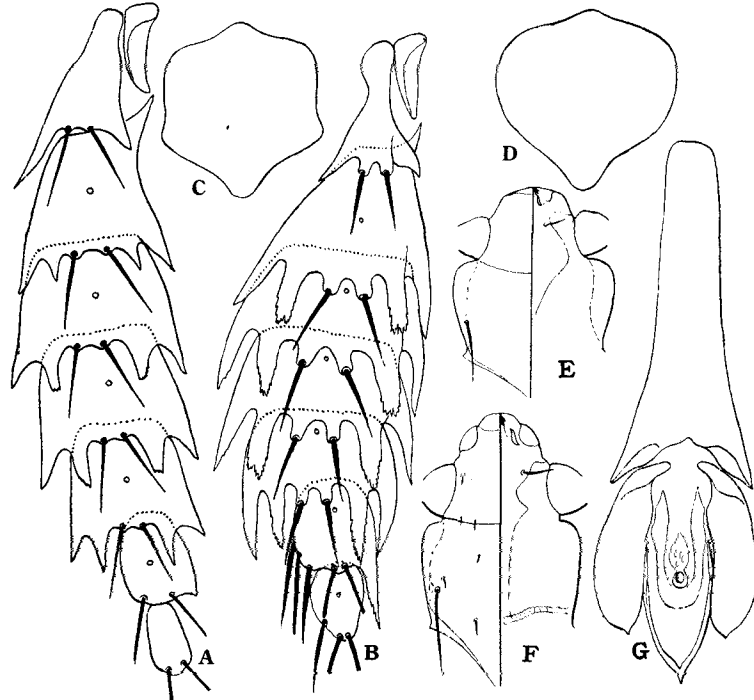


Fig. 66.—*Hoplopleura veprecula* n. sp.: A, pleural plates of female; C, sternal plate; F, head. *Hoplopleura cryptica* n. sp.: B, pleural plates of female; D, sternal plate; E, head; G, genitalia of male.

NOTES.—This is evidently a close relative of *H. cryptica*, but the more slender head, the differently shaped sternal plate, the differently shaped pleural plates, and the smaller and less numerous setæ render it quite distinct. It differs from *H. neu-manni* especially in the shape of the pleural plates, which do not have the setæ borne on prominences.

### 23. *Hoplopleura erratica* (Osborn).

(Synonymy under subspecies.)

#### 23a. *Hoplopleura erratica erratica* (Osborn).

Figs. 67, 68.

1896. *Hæmatopinus erraticus* Osborn, U. S. Dept. Agric., Div. Ent., Bul. 5, n. s.: 186.

1904. *Polyplax* (?) *erratica* (Osbn.), Enderlein, Zool. Anz., 28: 143.

1908. *Polyplax* (?) *erratica* (Osb.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 13.  
 1915. *Hoplopleura* (?) *erratica* (Osb.), Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mam.," *Stanford Univ. Publ.*, p. 18.  
 1916. *Hoplopleura erratica* (Osb.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 155.

PREVIOUS RECORDS. Type said to have been taken from a gull (*Larus* sp.), but this evidently is an error. Also recorded by Osborn from

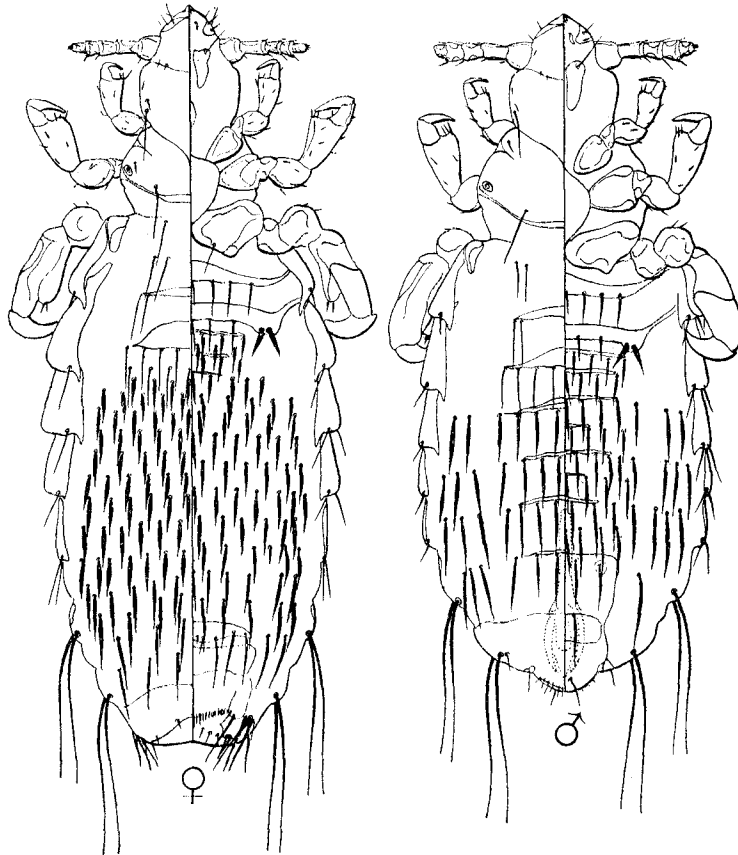


Fig. 67.—*Hoplopleura erratica erratica* (Osb.), male and female.

*Sciuropterus volans* (= *volucella*), *Microtus* (= *Arvicola*) *pennsylvanicus* and *Tamias* (= *Sciurus*) *striatus*. As is indicated in the notes below, all these records except that of *Tamias striatus* are to be regarded as erroneous, and this is to be taken as the type host. The host is a Sciurid of the subfamily *Sciurinae*.

SPECIMENS EXAMINED. From *Tamias striatus*, Sing Sing, New York (U. S. N. M. 135553); Washington, D. C. (U. S. N. M.); Clarks-

ville, Tenn. (U. S. N. M. 35147); Waterloo, Ind.; *Eutamias alpinus*, Tuolumne Meadows, Cal. The hosts are Sciurids.

FEMALE (Fig. 67). *Length* 1.1 mm. *Head* acutely rounded anteriorly, with slight post-antennal angles and with a pair of small, chitinized areas on the ventral side between the bases of the antennæ. *Thorax* and legs with no unusual characters except for the absence of the olecranon process on the posterior tibiæ; sternal plate (Fig. 68B) triangular, with the apex posteriorly.

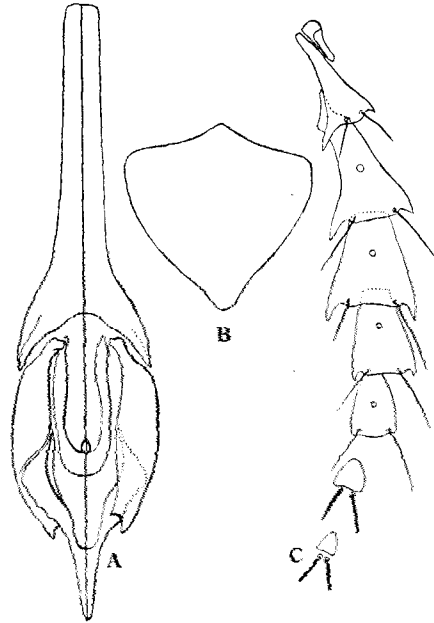


Fig. 68.—*Hoplopleura erratica erratica* (Osb.): A, genitalia of male; B, sternal plate; C, pleural plates of female. From specimens from *Tamias striatus*, Clarksville, Tenn.

*Pleural plates* (Fig. 68C) rather small, overlapping but little, not scaly; first pair of ordinary form; second with a short dorsal tooth and a slightly longer ventral tooth; third to fifth each with each posterior angle produced into a slight tooth; sixth to eighth without teeth; second to sixth each with a pair of slender setæ and the seventh and eighth with the usual pairs of long setæ.

*Tergal and sternal plates* undeveloped except for the two anterior plates of the third tergite, the second sternite and the three plates of the third sternite and the first plate of the fourth sternite. Rows of setæ, however, arranged in the normal manner, for the most part with ten to

twelve rather stout setæ. Paired setæ of the third sternite small, stout, close together on slight prominences.

MALE (Fig. 67). Length 0.9 mm. Pleural plates as in the female. Tergal and sternal plates very weakly developed, arranged in the usual manner, with from eight to ten setæ and with two or three setæ between the ends of the plates and the pleurites on the fourth to seventh segments. Genitalia (Fig. 68A) with the basal plate rather long and slender, the parameres notched at the tip, and the pseudopenis with short, strongly bent arms, which are but little longer than the shaft.

NOTES.—The original description of this species is unusually inadequate and affords not even a hint as to the identity of the species. The types, however, are still in existence in the collection of the Boston Society of Natural History, and Mr. C. W. Johnson, curator of that collection, has kindly examined them for me and has also sent me some other specimens from *Tamias striatus*, from the Osborn collection, which he considers to be the same species. Accepting his conclusions (and they are probably correct) the species of *Hoplopleura* infesting *Tamias striatus* will stand as *H. erratica*.

This species may be regarded as the type of a group which occurs in part on hosts of the family *Sciuridæ* and in part on *Muridæ*, the group being distinguished chiefly by the simplicity of the pleural plates.

### 23b. *Hoplopleura erratica arboricola* Kellogg and Ferris.

1915. *Hoplopleura arboricola* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mam.," *Stanford Univ. Publ.*, p. 19, pl. 4, f. 8; tf. 6, 7, (part).

1916. *Hoplopleura arboricola* K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 154, (part).

1916. *Hoplopleura arboricola* K. and F., Ferris, *Psyche*, 23: 112, (part).

PREVIOUS RECORDS. Type (see notes below) from *Eutamias hindsi*, Inverness, Marin County, Cal. Also from *Eutamias townsendi ocrogenys*, Freestone and Cazadero; *Eutamias speciosus frater*, Yosemite National Park; *Eutamias merriami pricei*, Stanford University, and *Eutamias* species, Covelo and South Yolla Bolly Mountain, California. Erroneously recorded from *Eutamias alpinus*, *Sciurus griseus* and *Sciurus douglasi*, California, and *Tamias striatus*, Iowa. The hosts are Sciurids.

SPECIMENS EXAMINED. As above recorded.

FEMALE. Differing from that of *H. erratica erratica* only in the presence of very attenuated plates on all the segments of the abdomen.

MALE. Apparently not differing from that of *H. erratica erratica*.

NOTES.—In the original description of this species there were included specimens from *Sciurus douglasi*, *S. griseus*, and *Tamias striatus*. Those from the species of *Sciurus* and from *Tamias* I now regard as distinct species. No type was designated, and in a later note (1916) I designated as the type host *Sciurus douglasi albo-limbatus*. This was in error, as specimens from this host were not included in the original description. The matter of the type is therefore still open, and I designate as lectotypes specimens from *Eutamias hindsi*, Inverness, Cal.

This form is very close to *H. erratica* and more or less intergrades with it.

24. *Hoplopleura sciuricola* n. sp.

Figs. 69, 70.

1915. *Hoplopleura arboricola* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mam.," *Stanford Univ. Publ.*, p. 19, (part).  
 1916. *Hoplopleura arboricola*. K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 154, (part).  
 1916. *Hoplopleura arboricola* K. and F., Ferris, *Psyche*, 23: 112, (part).

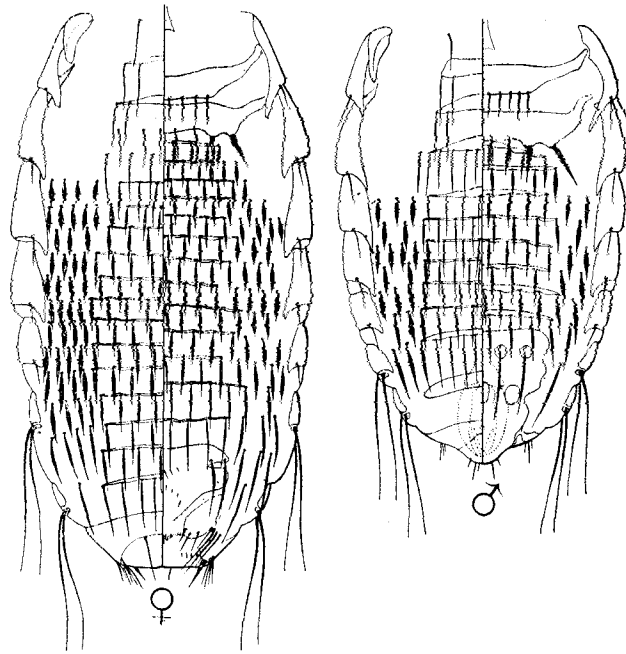


Fig. 69.—*Hoplopleura sciuricola* n. sp., abdomen of male and female.

PREVIOUS RECORDS. Recorded as *Hoplopleura arboricola*, from *Sciurus griseus*, *S. douglasi albolimbatus* and *S. douglasi mollipilosus*, from various points in California.

SPECIMENS EXAMINED. As above recorded and from the following: Holotype (a female) and allotype from *Sciurus carolinensis*, Bayou St. Louis, Miss. (U. S. N. M. 23691), and Tarpon Springs, Fla.; *S. arizonensis huachucha*, Huachucha Mountains, Arizona; *S. griseogena*, Macuto, Venezuela (F. C. M. 17621); *S. hudsonicus petulans*, Glacier Bay, Alaska, and *S. hudsonicus vancouverensis*, Kuiu Islands, Alaska; *S. kaibabensis*, Kaibab National Forest, Arizona (U. S. N. M. 168301); *S. nescius*, Margarita Island, Venezuela (F. C. M. 16606); *S. variabilis saltusensis*, Palomina, Colombia (U. S. N. M. 107224); *S. ignitus*, Rio San



Miguel, Peru (U. S. N. M. 194488); *Sciurus sp.*, Rio Combrecito, Peru (U. S. N. M. 194486); *Sciurus sp.*, Buena Vista, Bolivia (F. C. M.).

FEMALE (Fig. 70). Length 1.6 mm. Head as in *H. erratica*. Sternal plate (Fig. 71B) somewhat more elongate than in *erratica*. Pleural plates (Fig. 71B), with the posterior angles of all but the seventh and eight pairs produced, more so than in *erratica*, and with the posterior margin smoothly emarginate.

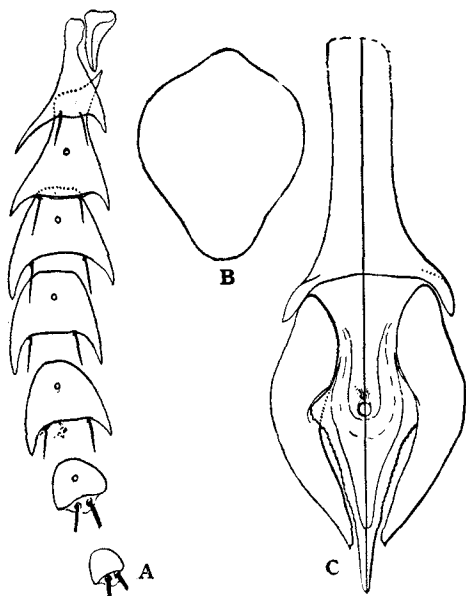


Fig. 70.—*Hoplopleura sciuricola* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male. From types.

*Tergal and sternal plates* present but very slender, bearing for the most part 6–10 setæ. Between the ends of all the plates and the pleurites on the fourth to eighth segments are from four to six setæ, these much stouter than those along the plates. Paired setæ of the third sternite quite large and slender, well separated, borne on small prominences.

MALE (Fig. 70). Length 1.2 mm. Head, thorax, and pleural plates as in the female. Third to seventh abdominal tergites and third to seventh sternites each with two plates and two rows of eight to ten setæ, the plates small. Between the ends of all the plates and the pleurites on the fourth to seventh segments are from two to four setæ, which are much stouter than those along the plates.

*Genitalia* (Fig. 71C) with the ends of the parameres acute and not notched, the arms of the pseudopenis long and slender.

NOTES.—Owing in part to a failure to appreciate the characters of importance and in part to the inadequacy of the microscopic preparations employed this species has heretofore been confused by the present writer with *H. erratica* and *H. erratica arboricola*. However, it is very distinct, the presence of two rows of setæ on the third to seventh tergites of the male being sufficient evidence of this. The females are not greatly different from those of *H. erratica arboricola*, although there are slight differences in the form of the pleural plates. The size and number of the abdominal setæ are subject to considerable variation, but the other characters, especially of the male, remain quite constant throughout the rather large series examined.

### 25. *Hoplopleura maniculata* (Neum.).

FIGS. 71, 72A, 72D, 72G.

1909. *Hæmatopinus* (*Polyplax*) *maniculatus* Neumann, *Arch. de Parasit.*, 13: 521, f. 21, 22.  
 1915. *Hoplopleura* (?) *maniculata* (Neum.), Kellogg and Ferris, *Ann. Durban Mus.*, 1: 155.  
 1916. *Hoplopleura maniculata* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 156.

PREVIOUS RECORDS. From *Funambulus* (= *Sciurus*) *palmarum*, Rajkote, India. Also recorded by Neumann from specimens from Navapour, India, which were erroneously attributed to a bat, *Scotophilus wroughtoni*.

SPECIMENS EXAMINED. A female from the material recorded from Navapour, received through the kindness of Professor G. H. F. Nuttall, and males and females from *Funambulus tristriatus*, Colombo, Ceylon (U. S. N. M. 114084). The hosts are Scurids.

FEMALE (Fig. 71). Length 1.3 mm. Head rounded in front, with slight post-antennal angles and with a pair of rather large, chitinized areas on the ventral side between the antennæ. Thorax and legs of normal form, the posterior tibiæ apparently without the usual olecranon process; sternal plate (Fig. 72A), triangular, with broadly rounded angles.

Pleural plates very similar to those of *H. erratica*, but with the posterior angles slightly more produced; none of the plates with the anterior angles produced laterally (Fig. 72D).

Tergal and sternal plates strongly developed, occupying at least three-fourths of the width of the abdomen, for the most part with from six to nine rather small setæ; fifth to seventh segments with one or two setæ between the end of each plate and the corresponding pleurite. Paired setæ of the third sternite set close together on slight prominences.

MALE (Fig. 71). Length 0.7 mm. Pleural plates as in the female. Tergal and sternal plates presenting the normal arrangement, strongly developed, with for the most part 8-10 slender setæ, those of the sternum smaller than those of the dorsum. One or two setæ present between the

ends of the fourth to seventh tergal plates and the posterior sternal plate of the fifth to seventh segments and the corresponding pleurites.

*Genitalia* (Fig. 72G) with the basal plate slender, expanded posteriorly, the parameres slender and not notched at the apex, the pseudopenis with the arms strongly curved.

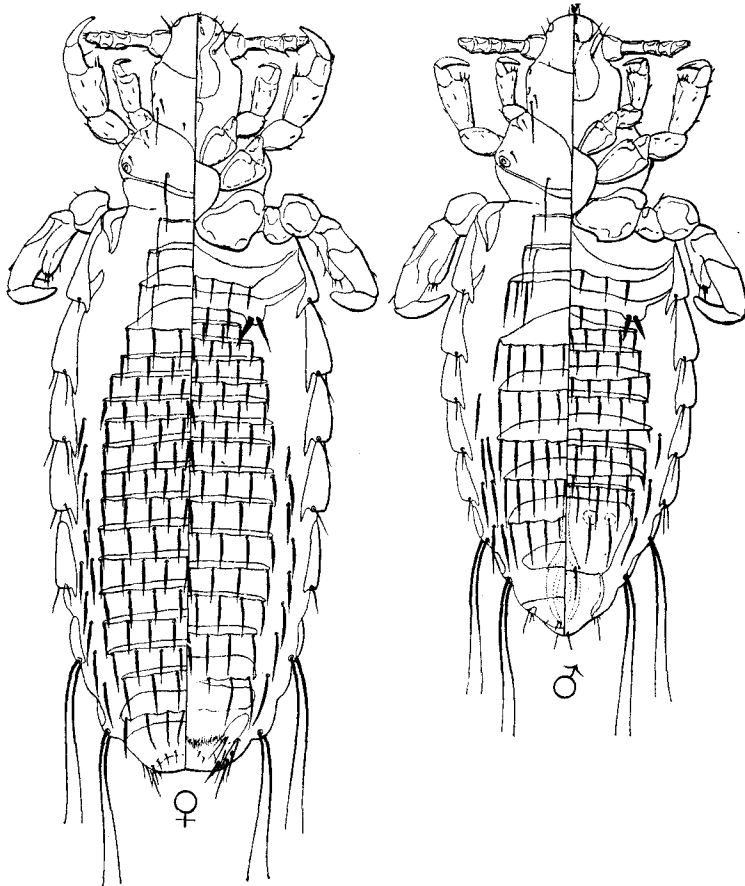


Fig. 71.—*Hoplopleura maniculata* (Neum.), male and female. From specimens from *Funambulus tristriatus*, Colombo, Ceylon.

NOTES.—This species is very similar to *H. erratica*, the differences which distinguish it being only the markedly stronger development of the tergal and sternal plates and the slightly different genitalia of the male.

## 26. *Hoplopleura erismata* n. sp.

FIGS. 72B, 72E, 72F.

SPECIMENS EXAMINED. From *Sciurus ferrugineus cinnamomeus*, South East Siam (U. S. N. M. 201408), (holotype, a female, and allo-

type); *Sciurus davisoni*, Trong, Lower Siam (U. S. N. M. 83495); *Tamiops* sp., Tenasserim, Telok Besar (U. S. N. M. 124254). The hosts are Scurids.

FEMALE. In all respects practically identical with *H. maniculata* except that the fourth and fifth pairs of pleural plates have the anterior

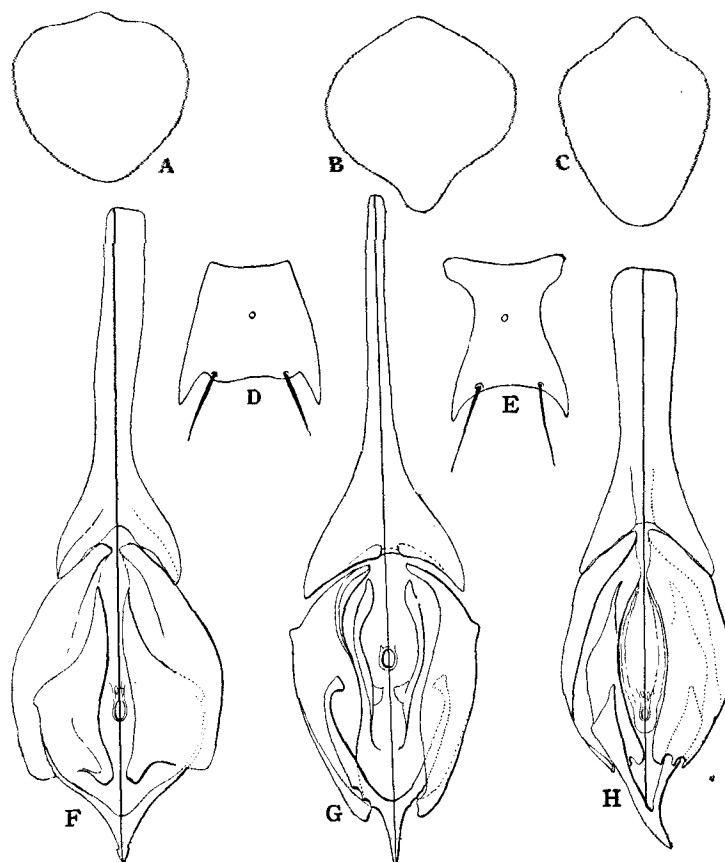


Fig. 72.—*Hoplopleura maniculata* (Neum.): A, sternal plate; D, fourth pleural plate; G, genitalia of male. *H. crismata* n. sp.: B, sternal plate; E, fourth pleural plate; F, genitalia of male. *H. distorta* n. sp.: C, sternal plate; H, genitalia of male.

angles strongly produced laterally (Fig. 72E). Sternal plate (Fig. 72B) slightly broader than in *maniculata*.

MALE. In general closely resembling the male of *H. maniculata*, but with the pleural plates differing as in the female and with the genitalia very different. *Genitalia* (Fig. 72F) with the parameres strongly ex-

panded and flattened, the pseudopenis small and slender, with widely diverging arms.

NOTES.—This is evidently very close to *H. maniculata*, yet the differences noted are very definite and it seems certainly to be a distinct species.

### 27. *Hoplopleura distorta* n. sp.

FIGS. 72C, 72H.

SPECIMENS EXAMINED. From *Rhinosciurus* sp., Hsing-lung-shan, 65 miles northeast of Peking, China (U. S. N. M. 199559). Holotype a male. The host is a Sciurid.

FEMALE. Almost identical with that of *H. maniculata*, but with the fourth and fifth pairs of pleural plates with shoulders as in *H. erismata* and with the outer seta of each of the pairs on the third sternite strongly curved. Sternal plate (Fig. 72C) elongate.

MALE. Closely resembling the male of *H. maniculata*, but with the pleural plates and the paired setae of the third sternite differing as in the female. Genitalia (Fig. 72H) with the parameres broad and with the tips twice notched and with the pseudopenis curved to one side, the arms stout, forming a V and not serrate.

NOTES.—Like *H. erismata*, to which it is probably most closely related, this species very closely resembles *H. maniculata*, yet the differences noted are very sharp and constant.

### 28. *Hoplopleura trispinosa* Kellogg and Ferris.

FIGS. 73, 74.

1915. *Hoplopleura trispinosa* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mam.," *Stanford Univ. Publ.*, p. 22, pl. 4, f. 3; tf. 8.

1916. *Hoplopleura trispinosa* K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 157.

1916. *Hoplopleura trispinosa* K. and F., Ferris, *Psyche*, 23: 111, f. 11d.

PREVIOUS RECORDS. Type from *Sciuropterus* (= *Glaucmys*) sp., Brownsville, Ore. Also from *Sciuropterus sabrinus lascivus*, Yosemite National Park, California, and *S. volans* (= *volucella*), Kensington, Md.

SPECIMENS EXAMINED. As above listed. The hosts belong to the *Petauristidae*.

FEMALE (Fig. 73). Length 1 mm. Head rounded in front, with slight post-antennal angles and with a pair of small, chitinized areas on the ventral side between the bases of the antennae. Thorax and legs of ordinary form, the posterior tibiae without the usual olecranon process; sternal plate (Fig. 74B) of a somewhat triangular form.

Pleural plates (Fig. 74C) with the posterior angles of the second to sixth pairs produced into short teeth and with a pair of short setae on the posterior margin.

*Tergal and sternal plates* well developed, occupying somewhat more than half the width of the abdomen and with for the most part six to nine short setæ, the fourth to seventh segments with a single seta between the end of each plate and the corresponding pleurite. Third sternite with two groups of three setæ each, the outer seta in each group strongly curved.

MALE (Fig. 73). Length 0.75 mm. *Head, thorax, and pleural plates* as in the female. *Tergal and sternal plates* arranged as usual, well developed, with for the most part from six to nine setæ. Fourth to seventh segments with two or three setæ between the ends of each tergal plate and one seta between the posterior sternal plate and the corresponding pleurite.

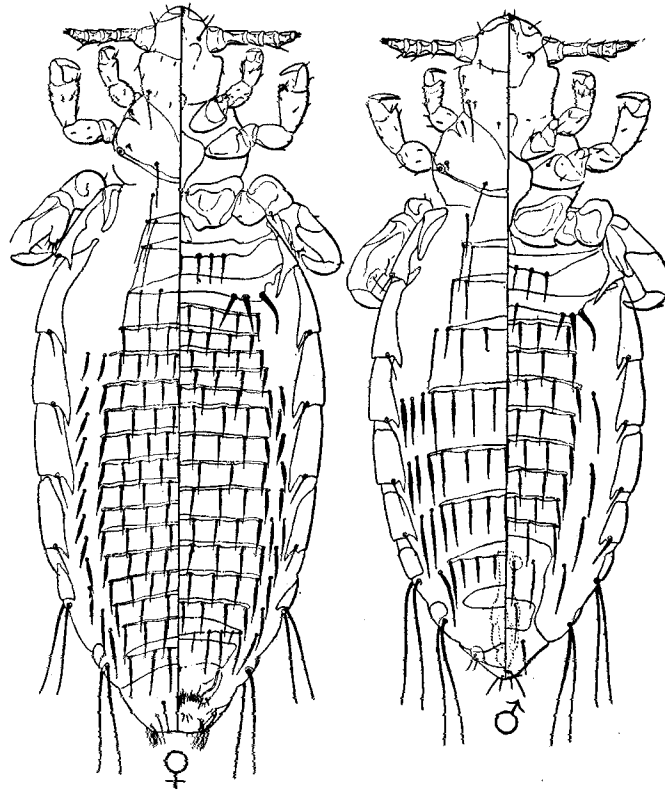


Fig. 73.—*Hoptopleura trispinosa* K. and F., male and female. From specimens from *Sciuropterus alpinus lascivus*, California.

*Genitalia* (Fig. 74A) of an unusual type, the basal plate broad and expanded at each end, the parameres very short and stout, the pseudopenis V-shaped and articulating with the tips of the parameres.

NOTES.—This species is in general appearance very similar to the other members of the *erratica* group, but the presence of three setæ in each group on the third sternite, together with the curved outer seta of these groups and the peculiar genitalia of the male are quite distinctive.

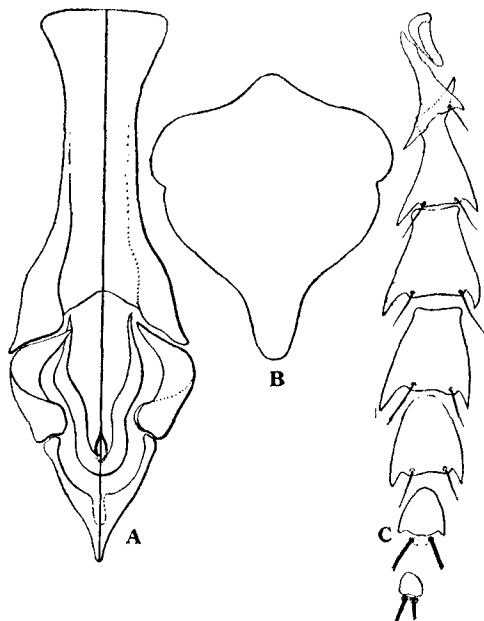


Fig. 74.—*Hoplopleura trispinosa* K. and F.: A, genitalia of male; B, sternal plate; C, pleural plates of female.

### 29. *Hoplopleura hirsuta* Ferris.

FIGS. 75, 76.

1916. *Hoplopleura hirsuta* Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 155 (without description).

1916. *Hoplopleura hirsuta* Ferris, *Psyche*, 23: 112, f. 8, 9A, 10, 11B.

PREVIOUS RECORDS. Type from *Sigmodon hispidus hispidus*, Raleigh, N. C. Also from *S. hispidus texianus*, Rockport, Tex., and *S. hispidus eremicus*, Sacaton, Ariz., and Fort Yuma, Cal.

SPECIMENS EXAMINED. As above recorded and the following: *Sigmodon ocoznathus*, Parral, Chihuahua, Mexico (U. S. N. M. 96268); *S. peruanus*, Pacasmayo, Peru (F. C. M. 19216); *Xenomys nelsoni*, Hacienda Magdalena, Colima, Mexico; *Rhipidomys venustus*, Merida, Venezuela (U. S. N. M. 137507). The last two hosts were represented by but a single specimen each and the records are probably untrustworthy. The hosts are Murids of the subfamily *Cricetinae*.

FEMALE (Fig. 75). *Length* 1.4 mm. *Head* rather slender, narrowly rounded in front, with slight post-antennal angles and with the lateral margins of the hindhead converging but little. *Thorax* and legs of ordinary form; sternal plate (Fig. 76B) rounded, produced but little posteriorly.

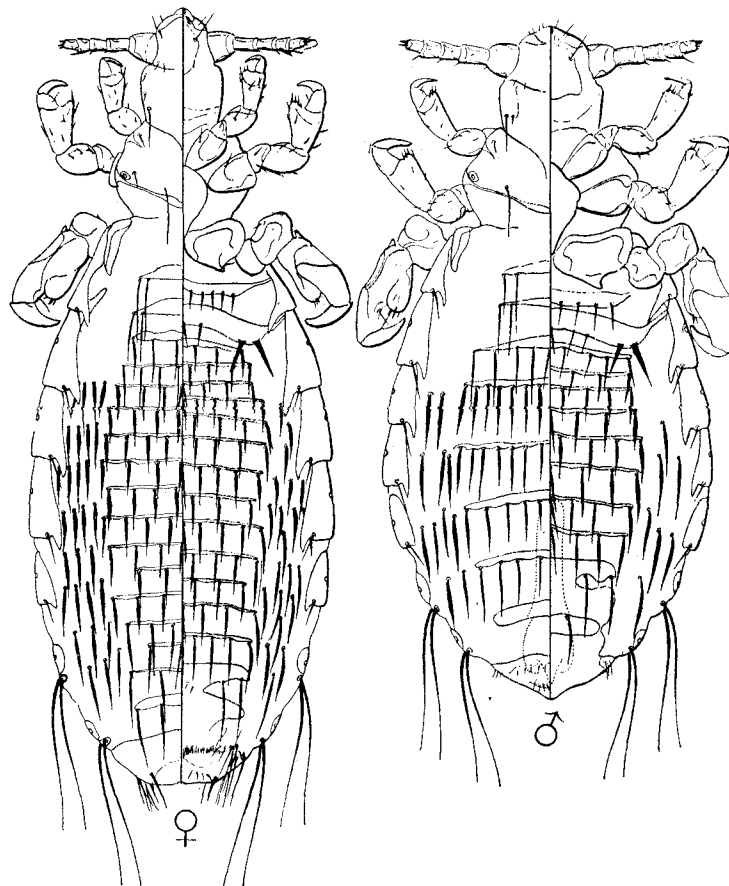


Fig. 75.—*Hoplopleura hirsuta* Ferris, female from specimen from *Sigmodon hispidus eremicus*, Sacaton, Ariz., and male from specimen from *S. hispidus hispidus*, Raleigh, N. C.

*Pleural plates* (Fig. 76C) relatively small, overlapping but little, first pair of ordinary form; second to sixth with each posterior angle prolonged into a short tooth and with the posterior margin between the teeth nearly straight; seventh and eighth without teeth; second to sixth each with a pair of small setæ, seventh and eighth with the usual slender setæ.



*Tergal and sternal plates* of the abdomen very attenuated, arranged as usual, for the most part with four to eight rather slender setæ. Fourth to seventh segments with three or four setæ between the ends of most of the plates and the corresponding pleurites. Paired setæ of the third sternite well developed, set on slight prominences.

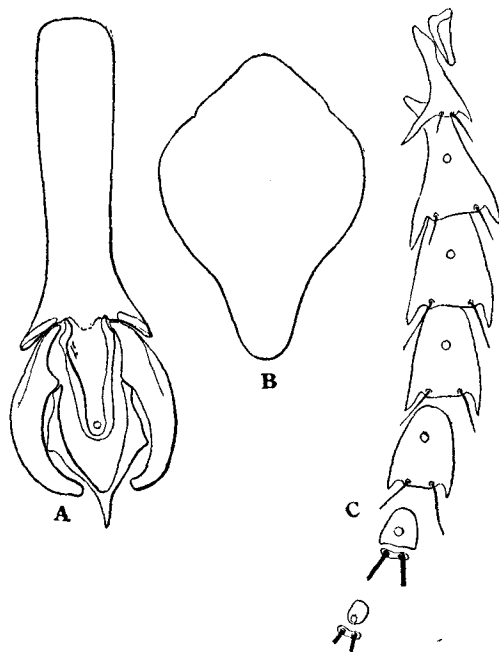


Fig. 76.—*Hoplopleura hirsuta* Ferris: A, genitalia of male; B, sternal plate; C, pleural plates of female.

**MALE** (Fig. 75). Length 1 mm. *Pleural plates* as in the female. *Tergal and sternal plates* of the abdomen arranged as usual, for the most part with four to twelve setæ, those of the ventral side shorter and relatively stouter than those of the dorsum. Fourth to seventh segments with from one to four setæ between the ends of the plates and the corresponding pleurites.

*Genitalia* (Fig. 76A) with the parameres strongly curved, not notched at the tip and with the arms of the pseudopenis angular.

**NOTES.**—Although the hosts of this species are all Murids it resembles most closely the species of the *erratica* group which occur on the *Sciuridæ*. In fact it differs significantly from *H. erratica arboricola* only in the somewhat differently shaped sternal plate and in the genitalia of the male, the parameres not being notched at the tip.

30. *Hoplopleura phaiomydis* n. sp.

FIGS. 77, 78.

SPECIMENS EXAMINED. From *Phaiomys* sp., East Ladak, Kashmir (U. S. N. M. 198570). Holotype a male. The host is a Murid of the subfamily *Microtinae*.

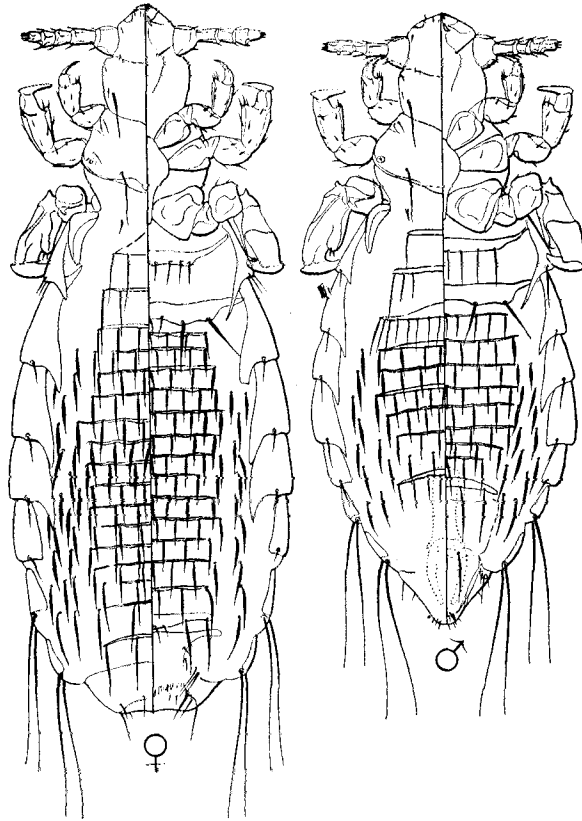


Fig. 77.—*Hoplopleura phaiomydis* n. sp., male and female.

FEMALE (Fig. 77). Length 1.3 mm. Head narrowly rounded anteriorly, with slight post-antennal angles. Thorax and legs of ordinary form; sternal plate (Fig. 78B) with sharp lateral angles and with the posterior portion strongly produced.

Pleural plates (Fig. 78A) overlapping but little; first pair of ordinary form; second pair with a short dorsal tooth and a longer, tapering ventral tooth; third to fifth pairs with both posterior angles produced into quite long, tapering teeth; sixth to eighth without teeth; second to sev-

enth with a pair of small setæ, seventh and eighth with the usual slender setæ.

*Tergal and sternal plates* of the abdomen slender, with for the most part four to eight slender setæ. Fourth to seventh segments with one or two stouter setæ between the ends of the plates and the corresponding pleurites.

**MALE** (Fig. 77). *Length* 1 mm. *Pleural plates* as in the female. *Tergites* of the abdomen with two rows of setæ on the third to sixth seg-

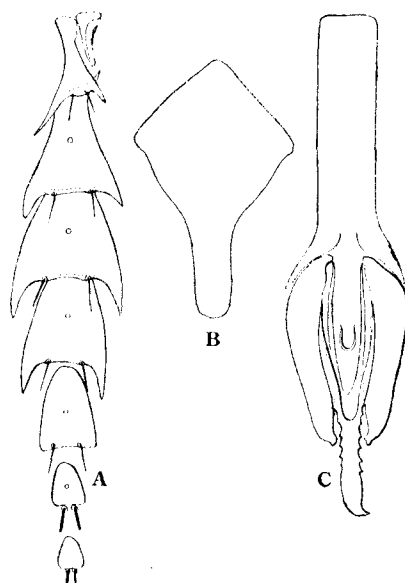


Fig. 78.—*Hoplopleura phaiomydis* n. sp.: *A*, pleural plates of female; *B*, sternal plate; *C*, genitalia of male.

ments. *Sternites* with the usual arrangement of the plates. All the plates slender, weakly developed, with for the most part six to eight small setæ. Fourth to seventh segments with one or two larger setæ between the ends of the plates and the corresponding pleurites.

*Genitalia* (Fig. 78C) with the parameres nearly straight and nearly as long as the basal plate; pseudopenis unusually large, the arms short and slender, the shaft long and stout and with its margins toothed.

**NOTES.**—In the form of the pleural plates this species closely resembles the species of the *erratica* group, although its host is a Murid. It is marked chiefly by the presence of two rows of setæ on the third to sixth tergites of the male, a character that appears elsewhere only in *H. acanthopus* and *H. sciuricola*, and by the peculiar genitalia of the male, in which it is approached only by *H. oxymycteri* n. sp.

31. *Hoplopleura oxymycteri* n. sp.

Figs. 79, 80.

SPECIMENS EXAMINED. From *Oxymycterus* sp., Occabamba Pass, Peru (U. S. N. M. 194701). Holotype a male. The host is a Murid of the subfamily *Cricetina*.

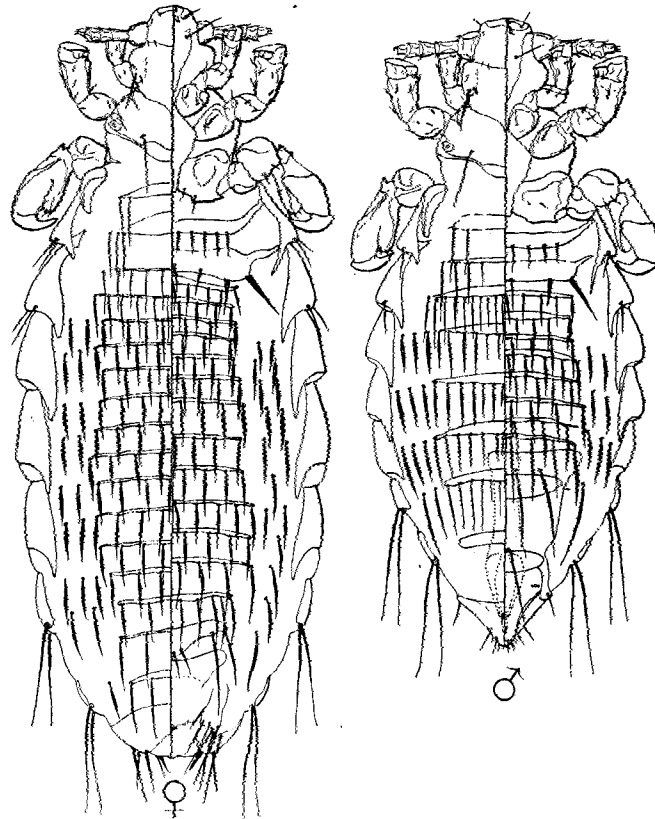


Fig. 79.—*Hoplopleura oxymycteri* n. sp., male and female.

FEMALE (Fig. 79). Length 1.4 mm. Head short and almost truncate in front, with quite prominent post-antennal angles. Thorax and legs of ordinary form; sternal plate (Fig. 80B) with sharp lateral angles and strongly produced posteriorly.

Pleural plates (Fig. 80A) overlapping but little; first pair of ordinary form; second with a short dorsal tooth and a longer, tapering ventral tooth; third to sixth pairs with each posterior angle produced into a long, tapering tooth; seventh and eighth without teeth; second and third

with a pair of small setæ, the remainder without setæ except for the usual long pairs on the seventh and eighth.

*Tergal and sternal plates* of the abdomen slender, arranged as usual, the tergal plates with for the most part four to eight slender setæ. Fourth to seventh segments with two or three stouter setæ between the ends of part of the plates and the corresponding pleurites.

MALE (Fig. 79). Length 1 mm. *Pleural plates* as in the female. *Tergal and sternal plates* arranged as usual, the tergal plates with for the most part as many as twelve slender setæ, the sternal plates with eight or nine, these somewhat stouter than those of the dorsum. Fourth to sev-

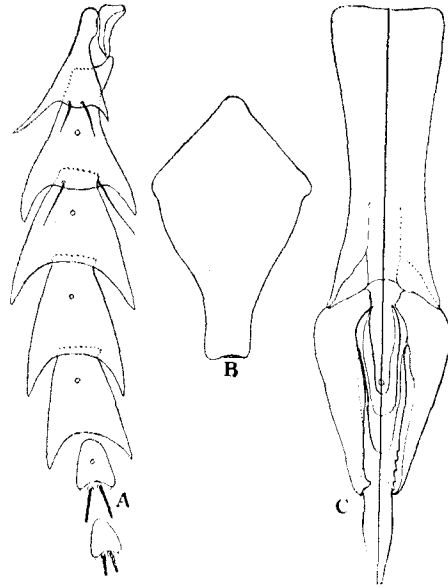


Fig. 80.—*Hoplopleura oxymycteri* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

enth segments with one to three setæ between the ends of the plates and the corresponding pleurites.

*Genitalia* (Fig. 80C) with the parameres nearly as long as the basal plate, straight, tapering and nearly parallel; the pseudopenis unusually large, the arms short and slender, the shaft long and stout, serrate for part of its length.

NOTES.—In the shape of the pleural plates this species resembles the members of the *erratica* group. It is distinguishable chiefly by the absence of setæ on most of the pleural plates, by the shape of the sternal plate and by the peculiar genitalia of the male. In the latter character it resembles *H. phaiomydis* n. sp., from which it differs in having but one row of setæ on all the tergites except the third in the male.

32. *Hoplopleura reducta* n. sp.

FIG. 81.

SPECIMENS EXAMINED. From *Phyllotis micropus*, Chubut, Valle del Lago Blanco, Argentina (F. C. M. 18891). Females only. The host is a Murid of the subfamily *Cricetinae*.

FEMALE (Fig. 81A). Length 1.1 mm. Head rather acute in front, with very slight post-antennal angles, somewhat elongate. Thorax and legs of ordinary form; sternal plate (Fig. 81B) roughly quadrangular, with an acute median, posterior process.

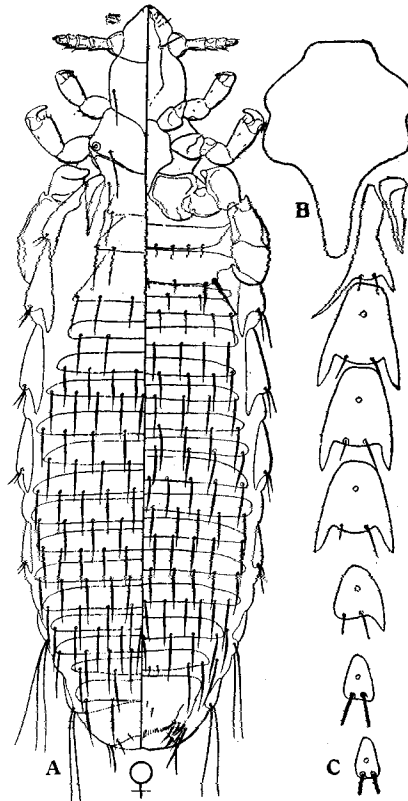


Fig. 81.—*Hoplopleura reducta* n. sp.: A, female; B, sternal plate; C, pleural plates.

*Pleural plates* (Fig. 81C) small, not at all overlapping; first pair of ordinary form; second with a short dorsal tooth and a longer, tapering ventral process; third to fifth with each posterior angle produced into a slender tooth; sixth with the dorsal angle alone produced into a tooth; seventh and eighth without teeth; second to sixth each with a pair of small

setæ; seventh and eighth with the usual slender setæ. *Tergal and sternal plates* of the abdomen very strongly developed, reaching almost from one side of the abdomen to the other, arranged in the normal manner. Plates for the most part with from eight to nine slender setæ. Paired setæ of the third sternite slender, set close together.

NOTES.—This species appears to be a member of the *erratica* group. It is distinguished chiefly by the unusual development of the tergal and sternal plates of the abdomen.

### 33. *Hoplopleura audax* n. sp.

FIGS. 82, 83.

SPECIMENS EXAMINED. From *Præchimys semispinosus* (types, holotype a female) (U. S. N. M. 113273), and *Nelomys miræ*, San Javier, North Ecuador (U. S. N. M. 113303). The hosts are Octodontids.

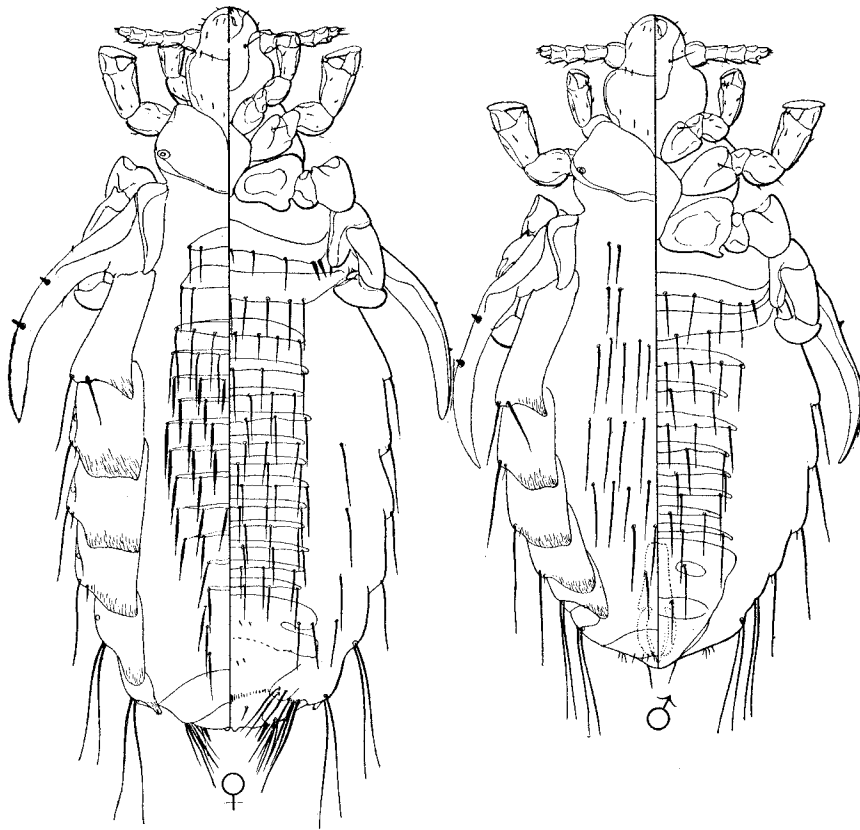


Fig. 82.—*Hoplopleura audax* n. sp., male and female.

FEMALE (Fig. 82). *Length* 1.3 mm. *Head* broadly rounded in front, with slight post-antennal angles. *Thorax* and legs of ordinary form; sternal plate (Fig. 83A) bluntly produced posteriorly.

*Pleural plates* of unusual form; first pair of ordinary character; second greatly elongated, forming a long, curved, flattened process that projects wing-like from the side of the abdomen; remaining plates lying entirely upon the dorsum, large, overlapping and with the posterior portion marked by fine, longitudinal striations; third pair with the dorsal angle produced into a slight tooth; fourth to sixth with a broad dorsal lobe; seventh and eighth with a narrow, rounded dorsal lobe; third with a pair of slender setæ; fourth to sixth each with one short and one long seta; seventh and eighth with the usual pairs of slender setæ.

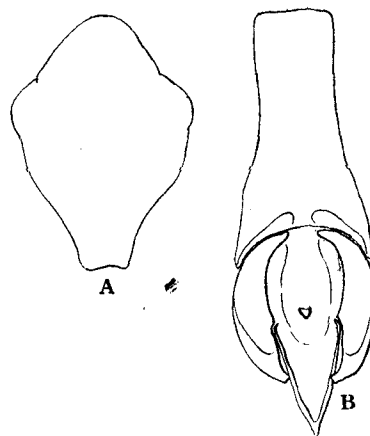


Fig. 83.—*Hopopleura audax* n. sp.: A, sternal plate; B, genitalia of male.

*Tergal and sternal plates* of the abdomen arranged as usual, the dorsal plates small, tending to become obsolete posteriorly, the ventral plates well developed; dorsal plates with from two to six rather stout setæ, ventral plates with for the most part six slender setæ. Paired setæ of the third sternite lacking, the second sternite instead at times with small, paired setæ.

MALE (Fig. 82). *Length* 0.95 mm. *Pleural plates* as in the female except for the absence of the lobe on the eighth pair. *Abdomen* without tergal plates, but with the setæ arranged as usual, each row with from two to eight, all slender. Sternal plates well developed, arranged as usual, for the most part with four to eight slender setæ.

*Genitalia* (Fig. 83B) with the basal plate short and broad; parameres short and crescent-shaped; pseudopenis V-shaped, the shaft almost obsolete, the arms slender.



NOTES.—This is a most peculiar form, quite unlike any species heretofore described, finding its only near relative in *H. alata* n. sp., which is described below. These two species might possibly be regarded as forming a distinct genus, yet I consider that their relationships are with *Hoplopleura*, and they may rest quite comfortably in that genus for the present.

### 34. *Hoplopleura alata* n. sp.

FIGS. 84, 85.

SPECIMENS EXAMINED. From *Kerodon australis*, Upper Rio Chico, Patagonia (U. S. N. M. 84175). Holotype a female. The host is an Octodontid.

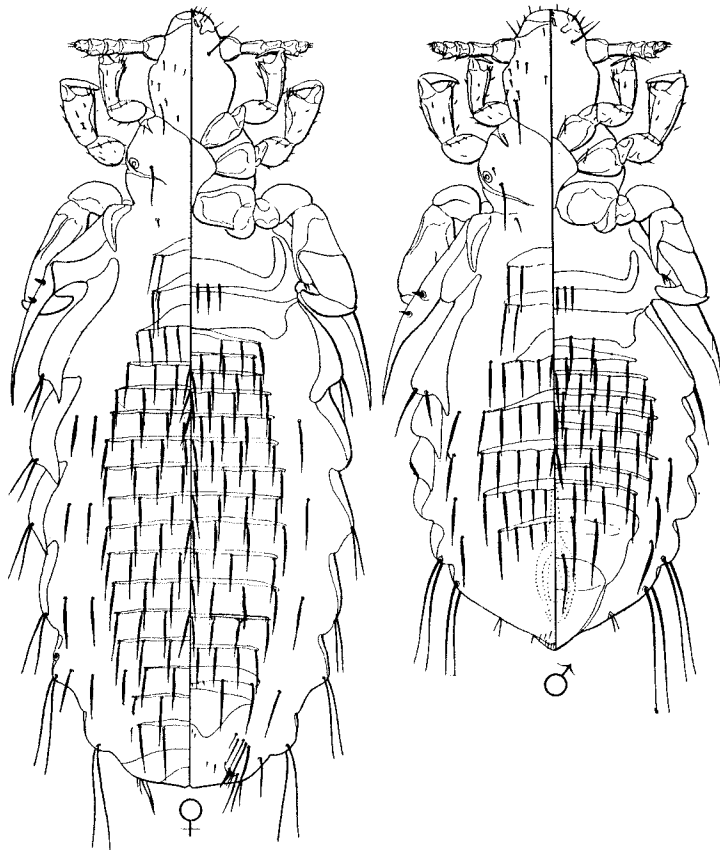


Fig. 84.—*Hoplopleura alata* n. sp., male and female.

FEMALE (Fig. 84). Length 1 mm. Head rounded anteriorly, with slight post-antennal angles. Thorax and legs of ordinary form, the posterior tibiae without the usual olecranon process; sternal plate (Fig. 85C)

triangular, with the apex anteriorly and with a short, median posterior process.

*Pleural plates* (Fig. 85A) of the same type as in *H. audax* but without the longitudinal striations; second pair produced into a narrow, tapering, blade-like process; third with a short, curved tooth at each posterior angle; fourth to sixth with the dorsal angle alone somewhat produced; seventh and eighth small, rounded; second with a pair of short, stout setæ, remainder with a pair of long, slender setæ.

*Tergal and sternal plates* arranged as usual, well developed, bearing for the most part six or seven slender setæ. Paired setæ of the third sternite lacking.

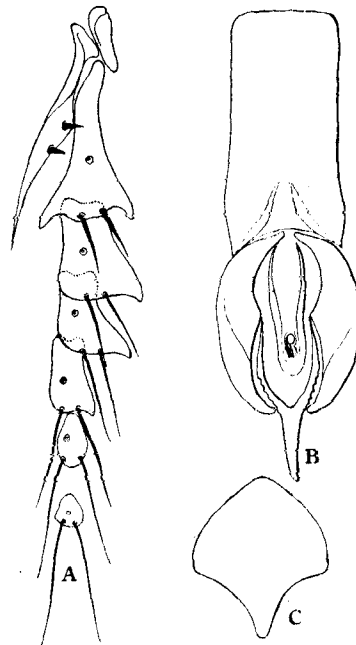


Fig. 85.—*Hoplopleura alata* n. sp.: A, pleural plates of female; B, genitalia of male; C, sternal plate.

MALE (Fig. 84). Length 0.75 mm. *Pleural plates* as in the female except that setæ are lacking on the fourth to sixth pairs. *Tergal and sternal plates* well developed, arranged as usual, with for the most part seven to eight setæ. *Genitalia* (Fig. 85B) with the basal plate short and broad; parameres crescent-shaped; pseudopenis with the arms curved and about as long as the shaft.

NOTES.—This is quite closely related to *H. audax*, described above, but the marked differences in the pleural plates are enough to distinguish it.

35. *Hoplopleura bidentata* (Neumann).

Figs. 86, 87.

1909. *Hamatopinus* (*Polyplax*) *bidentatus* Neumann, *Arch. de Parasit.*, 13: 515, f. 18.  
 1913. *Polyplax bidentatus* (Neum.), Johnston and Harrison, *Proc. Royal Soc. Queensland*, 24: 108.  
 1915. *Hoplopleura* (?) *bidentata* (Neum.), Kellogg and Ferris, *Ann. Durban Mus.*, 1: 155.  
 1916. *Hoplopleura bidentata* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4), 6: 154, 205.

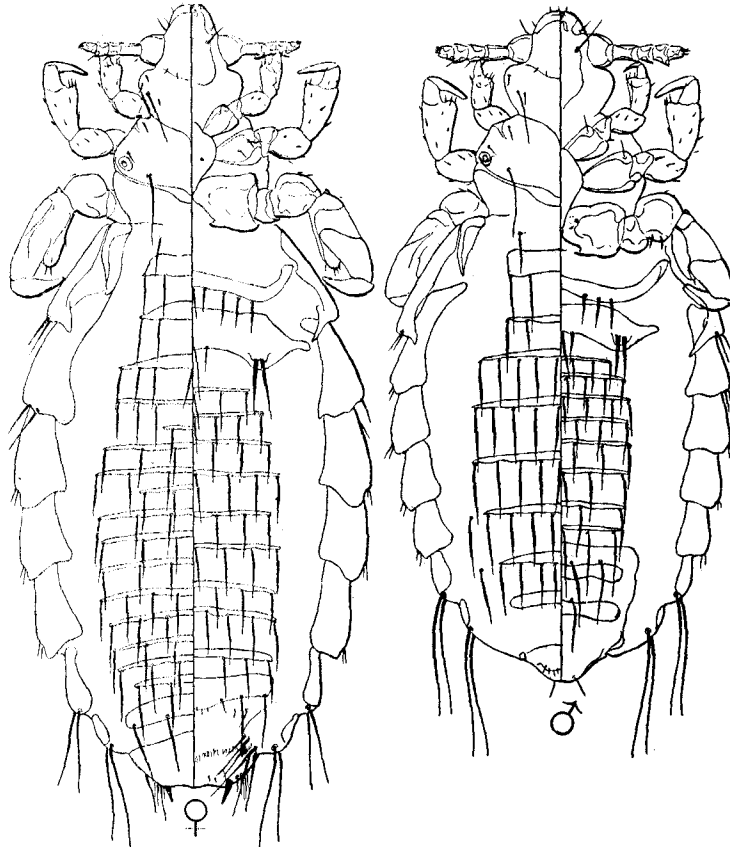


Fig. 86.—*Hoplopleura bidentata* (Neum.), male and female.

PREVIOUS RECORDS. Originally attributed by Neumann to *Mus rattus*, Lake Torrens, Australia. Johnston and Harrison, however, have shown that this attribution is in error and that the specimens undoubtedly came from *Hydromys chrysogaster*. They have recorded the species from this host at Sydney, Australia.

SPECIMENS EXAMINED. From *Hydromys chrysogaster*, New South Wales, Australia (U. S. N. M. 83708). The host is a Murid of the sub-family *Hydromyinae*.

FEMALE (Fig. 86). Length 1.3 mm. Head narrow and rounded in front of the antennæ, with quite prominent post-antennal angles and with the lateral margins of the hind head curved and strongly convergent. Thorax and legs of ordinary form; sternal plate (Fig. 87B) roughly circular with a broad, blunt, median, posterior process.

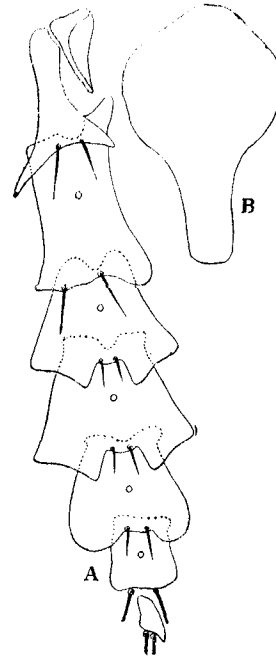


Fig. 87.—*Hoplopleura bidentata* (Neum.): A, pleural plates of female; B, sternal plate.

*Pleural plates* (Fig. 87A) strongly developed and overlapping; first pair of ordinary form; second with a short, tapering dorsal tooth and a longer ventral process; third with the dorsal angle produced and rounded, the ventral angle acute; fourth to sixth pairs divided into two lobes by a rather shallow median incision in the posterior margin, the lobes of the sixth pair rounded, the others angular; seventh plate rectangular, without lobes; eighth very small; second to sixth with a pair of small setæ; seventh and eighth with the usual slender setæ.

*Tergal plates* of the abdomen arranged as usual, well developed, with for the most part six slender setæ. *Sternal plates* with an unusual ar-

rangement, the third segment alone having three, the fourth to seventh each with but two plates and two rows of setæ. Paired setæ of the third sternite long and slender, set close together.

MALE (Fig. 86). Length 0.9 mm. *Pleural plates* as in the female. *Tergal and sternal plates* of the abdomen arranged as usual, well developed, the tergal plates with eight or nine setæ, the sternal plates with five or six. *Genitalia* of the single available specimen not in condition for description.

NOTES.—This is an isolated species having no close relatives among the other members of the genus. I can not avoid a feeling that it has some connection with *H. audax* and *H. alata*, although the resemblances are indeed few.

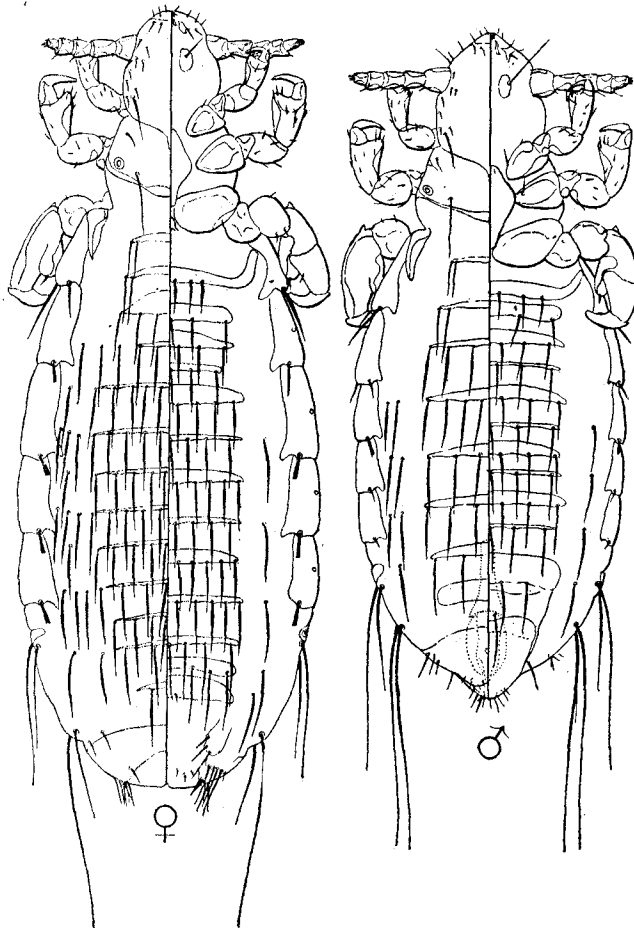


Fig. 88.—*Hoplopleura disgrega* n. sp., male and female.

36. *Hoplopleura disgrega* n. sp.

FIGS. 88, 89.

SPECIMENS EXAMINED. From *Octodontomys simonsi*, Orura, Bolivia (U. S. N. M. 121167). Holotype a female. The host is an Octodontid.

FEMALE (Fig. 88). Length 0.9 mm. Head rounded anteriorly, with practically no post-antennal angles. Thorax and legs of ordinary form; sternal plate (Fig. 89B) rounded, produced anteriorly and posteriorly.

Pleural plates (Fig. 89A) overlapping but little, not reticulate or scaly; first pair of ordinary form; second with a slight tooth at the dorsal and ventral angles; third to fifth each with a curved, subapical tooth at each angle; sixth with the dorsal angle prolonged into a tooth; seventh very small, without teeth; eighth obsolete; second with a pair of slender setæ, third to sixth each with a pair of short, flattened setæ, the tips of which have a slightly serrate appearance as if they had been broken; seventh pair and the margin of the eighth segment with a pair of slender setæ.

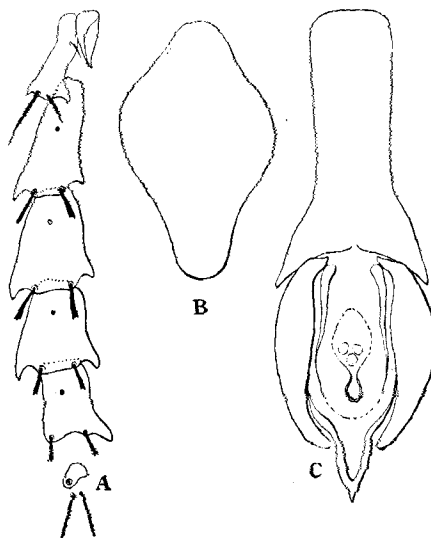


Fig. 89.—*Hoplopleura disgrega* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

Tergal and sternal plates of the abdomen well developed, the third segment alone having three plates both dorsally and ventrally, the fourth to seventh segments with but two plates and two rows of setæ. Tergal plates with for the most part 6-10 slender setæ, the fourth to seventh segments with 1-3 setæ between the ends of the plates and the pleurites.

Sternal plates with 5-10 setæ, the paired setæ of the third sternite lacking and with the first plate of the third segment not extending across the segment.

MALE (Fig. 88). *Length* 0.7 mm. Pleural plates as in the female. *Tergal and sternal plates* well developed, arranged as usual with for the most part from 4-6 setæ, the first plate of the third sternite as in the female. *Genitalia* (Fig. 89C) with the basal plate quite broad; parameres nearly as long as the basal plate, curved and tapering; pseudopenis with the shaft obsolete, the arms curved and slender.

NOTES.—This is an isolated species with no near relatives among the other species of the genus. The peculiar arrangement of the abdominal plates in the female is duplicated only in the otherwise very different *H. biseriata* and the shape of the pleural plates is quite unusual. However, the male is quite of the usual type found in the genus and the character of the legs and of the first pleural plate is typical.

