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Contributions Toward a Monograph of the Sucking Lice

PART IV.

BY

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SYSTEMATIC TREATMENT (Cont.)

Genus **POLYPLAX** Enderlein.

1904. *Polyplax* Enderlein, *Zool. Anz.* **28**: 139, 142, 223.
1907. *Eremophthirius* Glinkiewicz, *Sitz. d. Kaiserl. Ak. Wiss. Wien, Natur. Klasse* **116**: 381-83.
1908. *Polyplax* Dalla Torre, "Anoplura," *Gen. Ins.*, p. 13.
1909. *Hæmatopinus* (*Polyplax*) Neumann, *Arch. de Parasit.* **13**: 529-32.
1910. *Polyplax* Mjöberg, *Arkiv f. Zool.* **6**: 159.
1912. *Polyplax* Fahrenholz, *Jahresb. des Niedersäch. Zool. Ver.* **2-4**: 29-30.
1913. *Polyplax* Patton and Cragg, "Textbook of Medical Entomology," p. 543.
1915. *Polyplax* Kellogg and Ferris, "Anoplura and Mall. North Amer. Mamm.," *Stanford Univ. Publ.*, p. 11.
1916. *Polyplax* Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) **6**: 171.

Anoplura without eyes; with five-segmented antennæ which are frequently sexually dimorphic, the third segment in the male having the distal, pre-axial angle more or less produced and terminating in a recurved spine or stout seta; with the anterior legs small and weak, the middle legs usually somewhat stouter than the anterior but of the same shape, the posterior legs stouter and with broader claw than the middle; pleural plates always developed, present on the second to seventh or eighth segments, those of the second segment usually distinctly divided longitudinally; female with two rows of setæ on the second and fourth to seventh abdominal tergites and the second to seventh sternites, these usually, but not always, accompanied by more or less well developed plates; male typically with two rows of setæ on the second tergite and second and third sternites of the abdomen but sometimes with only a single row on all the sternites or exceptionally two rows on the second to eighth sternites, always with but a single row on the other tergites and sternites; second plate of the second tergite in the male not emarginate posteriorly; sternal plates of the second and third abdominal segments never extending from pleurite to pleurite; head usually with distinct post-antennal angles and with a distinctly constricted occipital region; genitalia of the males of no especially distinctive type but always with the basal plate undivided and with the pseudo-penis usually wedge-shaped.

HOSTS. Occurring as far as known only on rodents of the family *Muridæ* (the rats and mice) with the exception of two species that occur on members of the insectivoran genus *Sorex*.

TYPE OF THE GENUS. *Pediculus spinulosus* Burmeister.

SYNONYMICAL LIST OF NAMES PREVIOUSLY USED IN THE GENUS:

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

- acanthopus* (Burmeister).
Hoplopleura acanthopus (Burmeister).
aculeatus Neumann.
Eulinognathus aculeatus (Neumann).
affinis (Burmeister) (misidentification).
Polyplax serrata (Burmeister).
affinis (Burmeister).
Hoplopleura affinis (Burmeister).
antennata (Osborn).
Neohæmatopinus sciurinus (Mjöberg).
arvicanthus Bedford (amended spelling).
Polyplax arvicanthus Bedford (typographical error).
Polyplax arvicathus Bedford (typographical error).
arvicanthus Bedford (typographical error).
Polyplax arvicanthus Bedford.
arvicathus Bedford (typographical error).
Polyplax arvicanthus Bedford.
auricularis Kellogg and Ferris.
bidentata (Neumann).
Hoplopleura bidentata (Neumann).
brachyrrhynchus Cummings.
calva Waterston.
clavicornis (Nitzsch).
Pediculus clavicornis Nitzsch (of uncertain position).
columbianus (Osborn).
Neohæmatopinus læviusculus (Grube).
cummingsi Ferris.
Polyplax gracilis Fahrenheit (misidentification).
echinata Neumann.
Neohæmatopinus echinatus (Neumann).
erratica (Osborn).
Hoplopleura erratica (Osborn).
gracilis Fahrenheit.
gracilis Fahrenheit (misidentification).
Polyplax cummingsi Ferris.
hesperomydis (Osborn).
Hoplopleura hesperomydis (Osborn).
jonesi Kellogg and Ferris.
læviuscula (Grube).
Neohæmatopinus læviusculus (Grube).
longula (Neumann).
Hoplopleura longula (Neumann).
maniculata Neumann.
Hoplopleura maniculata (Neumann).
miacantha Speiser.
montana (Osborn).
Neohæmatopinus læviusculus (Grube).

- Hoplopleura quadridentata* (Neumann).
otomydis Cummings.
oxyrrhynchus Cummings.
pectinata Cummings.
Hoplopleura pectinata (Cummings).
pectinifer Neumann.
Neohæmatopinus pectinifer (Neumann).
pleurophæa (Burmeister).
Schizophthirus pleurophæus (Burmeister).
præcisa (Neumann) (part).
Hæmatopinus præcitus Neumann (part; typographical error).
Hæmatopinus (Polyplax) præcisus (Neumann) (part).
præcisa (Neumann) (part).
Hoplopleura neumanni Fahrenholz.
præcita (Neumann) (typographical error).
Polyplax præcisa Neumann (part).
Hoplopleura neumanni Fahrenholz (part).
quadridentata Neumann.
reclinata (Nitzsch).
Pediculus reclinatus Nitzsch.
Hæmatopinus reclinatus (Nitzsch).
Hæmatopinus (Polyplax) spiniger reclinatus (Nitzsch).
sciuropteri (Osborn).
Neohæmatopinus sciuropteri (Osborn).
serrata (Burmeister).
Pediculus serratus Burmeister.
Hæmatopinus serratus (Burmeister).
Polyplax affinis (Burmeister) (misidentification).
sphærocephala (Burmeister).
Enderleinellus sphærocephalus (Burmeister).
spiculifera (Gervais).
Pediculus spiculiferus Gervais (of uncertain position).
spiniger (Burmeister).
Pediculus spiniger Burmeister.
Hæmatopinus spiniger (Burmeister).
spiniger reclinata (Burmeister).
Polyplax reclinata (Burmeister).
spinulosa (Burmeister).
Pediculus spinulosus Burmeister.
Hæmatopinus spinulosus (Burmeister).
Pediculus denticulatus Nitzsch.
stephensi (Christophers and Newstead).
Hæmatopinus stephensi Christophers and Newstead.
Hæmatopinus (Polyplax) stephensi Christophers and Newstead.
suturalis (Osborn).
Enderleinellus suturalis (Osborn).
ventricosa (Denny).
Hæmodipsus ventricosus (Denny).
villosa Galli-Valerio.

Hoplopleura acanthopus (Burmeister).
waterstoni Bedford.
wernerii (Glinkiewicz).

Eremophthirus wernerii Glinkiewicz.

NOTES.—This genus, as I have here defined it, forms a very homogeneous group with the exception of one species, *P. calva*, the inclusion of which somewhat complicates the diagnosis. The only difficulty is to exclude from it certain other groups, such as *Neohamatopinus* and *Eulinognathus*, which in their typical form are distinct enough but which grade sufficiently toward *Polyplax* to make their separation difficult even though it appears justifiable.

The most distinctive character of *Polyplax*—as compared with these closely related genera—is that of the form of the pleural plates of the second abdominal segment. In the majority of the species these plates are very distinctly divided longitudinally into two pieces. The arrangement is very similar to that seen in the genus *Fahrenholzia* except that there is no tendency for the ventral piece to migrate to the ventral side of the body. In one or two species these plates are apparently not divided and in all well-stained preparations are necessary in order to determine the point with certainty.

Aside from this the arrangement of the setæ on the abdomen of the male is quite characteristic. Typically there are but two rows of setæ on the second tergite and the second and third sternites with a single row on the remaining segments. In some cases, however, there is but a single row on all the sternites and in the case of the rather anomalous species, *P. calva*, there are two rows on the third to seventh sternites. The second row of the second tergite in the male is never arranged along an emarginate plate as in *Neohamatopinus*.

Typically the antennæ are sexually dimorphic (Fig. 120D), the third segment in the male being modified, but some species show no trace of this although in other respects they appear to be representative of the genus.

My material of the immature stages is very scanty and for a description of these I am relying chiefly upon the notes given by Cummings¹ with which my observations are in accord as far as they go. According to Cummings there are at least three immature stages, during all of which the head, thorax and legs are essentially as in the adult, the chief differences being in the abdomen. In the first stage the pleural plates are entirely lacking and the setæ are reduced to a median series, dorsally, of two on each segment. In the second stage the rudiments of the pleural plates appear and a median series of two setæ appears on each sternite. In the third stage the pleural plates are still more strongly developed. According to my own observations there is in this stage no trace of the division of the pleurites of the second segment.

There are listed in this paper 26 species of *Polyplax*, of which eight are described as new. Of three of the described species I have not seen material. Two species of the older authors which have previously been referred to *Polyplax* are here excluded as unrecognizable and will be listed in a section reserved for such species at the end of this series of papers. These two species are *Pediculus clavicornis* Nitzsch and *P. spiculiferus* Gervais.

¹ Cummings, B. F. *Proceedings Zool. Soc. London*, pp. 260-71. 1915.

1. *Polyplax spinulosa* (Burmeister).

FIGS. 119, 120A, 120D, 120F, 120H.

1839. *Pediculus spinulosus* Burmeister, "Rhynchota," *Gen. Ins.* No. 8.
 1842. *Hæmatopinus spinulosus* (Burm.), Denny, "Mon. Anopl. Brit.," p. 26; pl. 24, f. 5.
 1842. *Hæmatopinus spiniger* (Burm.), Denny, *ibid.*, p. 27; pl. 24, f. 6.
 1864. *Pediculus denticulatus* Nitzsch, *Zeits. f. ges. Naturw.* 23: 24.
 1874. *Hæmatopinus spinulosus* (Burm.), Giebel, "Insecta Epizoa," pp. 38-9; pl. 1, f. 7.
 1880. *Hæmatopinus spinulosus* (Burm.), Piaget, "Les Pediculines," pp. 636-7; pl. 52, f. 2.
 1891. *Hæmatopinus spinulosus*. (Burm.), Osborn *U. S. Dept. Agric., Div. Ent., Bul.* 7, o. s.: 22.
 1896. *Hæmatopinus spinulosus* (Burm.), Osborn, *ibid.*, *Bul.* 5, n. s.: 181.
 1904. *Polyplax spinulosa* (Burm.), Enderlein, *Zool. Anz.* 28: 142.
 1904. *Hæmatopinus spinulosus* (Burm.), Tiraboschi, *Arch. de Parasit.* 8: 316-7; fig.
 1905. *Polyplax spinulosa* (Burm.), Enderlein, *Zool. Anz.* 29: 192-4.
 1908. *Polyplax spinulosa* (Burm.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 14.
 1909. *Hæmatopinus (Polyplax) spinulosus* (Burm.), Neumann, *Arch. de Parasit.* 13: 526; fig. 26.
 1910. *Polyplax spinulosa* (Burm.), Mjöberg, *Ark. f. Zool.* 6: 160.
 1910. *Polyplax spinulosa* (Burm.), Banks, *U. S. Treasury Dept. Bul.* 30: 79; f. 7.
 1912. *Polyplax spinulosa* (Burm.), Mjöberg, *Tijdschr. Ent.* 55: 336-7.
 1912. *Polyplax spinulosa* (Burm.), Fahrenholz, *Jahresb. des Niedersäch. Zool. Ver.* 2-4: 30-7; tf. 8-10; pl. 2, f. 8-13.
 1913. *Polyplax spinulosa* (Burm.), Johnston and Harrison, *Proc. Royal Soc. Queensland* 24: 107.
 1913. *Hæmatopinus (Polyplax) spinulosus* (Burm.), Patton and Cragg, "Textbook of Medical Entomology," p. 550.
 1913. *Polyplax spinulosa* (Burm.), Evans, *Proc. Royal Physical Soc. Edinburgh* 19: 93.
 1915. *Polyplax spinulosa* (Burm.), Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.*, pp. 12-3; tf. 1; pl. 5, f. 11a b; pl. 6, f. 7.
 1915. *Polyplax spinulosa* (Burm.), Cummings, *Proc. Zool. Soc. London*, pp. 256 7, 268-71; tf. 7, 15, 16.
 1916. *Polyplax spinulosa* (Burm.), Ferris, *Psyche* 23: 99.
 1917. *Polyplax spinulosus* (Burm.), Moll, *Jn. Parasitology* 4: 89-90.
 1919. *Polyplax spinulosa* (Burm.), Bedford, *Rept. Div. Vet. Res., Dept. Agric. Un. S. Africa*, 6-7: 715.

PREVIOUS RECORDS. Originally described from the "brown rat," *Epimys norvegicus* (= *Mus decumanus*) in Europe. It has been recorded from this species and from *E. rattus* and *E. rattus alexandrinus* in many parts of the world and from *Microtus californicus*, *Microtus* sp. and *Phenacomys longicaudus* in California and *Microtus intermedius*, Nevada, U. S. A. (Kellogg and Ferris; Ferris). Neumann has recorded it from *Apodemus* (= *Mus*) *sylvaticus* but it is probable that he was dealing with *P. serrata*.

SPECIMENS EXAMINED. From *Epimys norvegicus*, England (Water-

ston; Nuttall); California; Melbourne, Australia (H. F. Clinton); *Epimys rattus*, Amritsar District and Punjab, India (Indian Museum); Galapagos Islands, Panama Canal Zone (L. H. Dunn); *Epimys rattus kijabius* and undetermined host, Kakamega, Kenya Colony, British East Africa (British Museum); *Epimys calcis*, Baguio, Luzon, Philippine

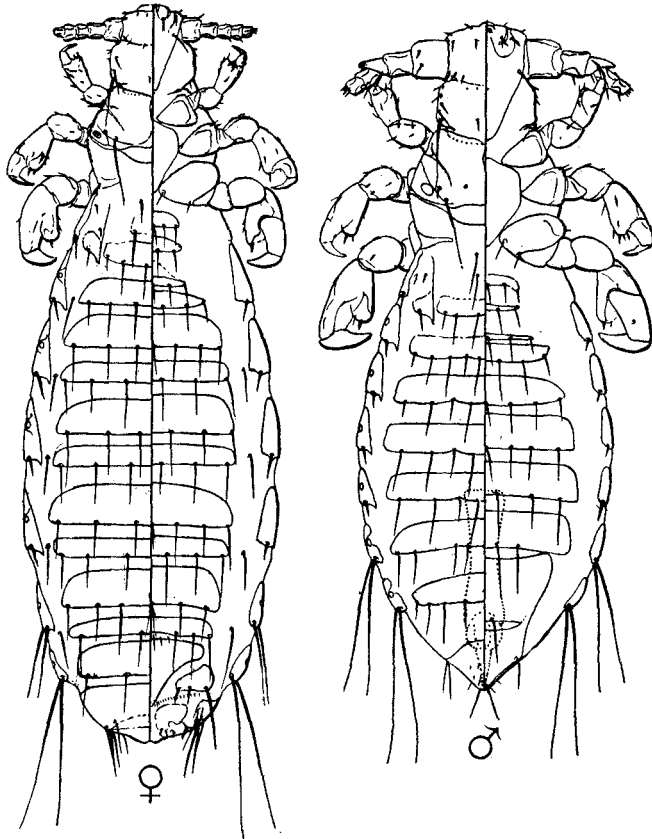


Fig. 119.—*Polyplax spinulosa* (Burm.): female from *Epimys rattus*, Panama Canal Zone, male from the same host, Galapagos Islands.

Islands (U. S. N. M. 145778); *Epimys stridens*, Pulo Troman, Malay Peninsula (U. S. N. M. 104998); *Gunomys bengalensis*, Burma (Nuttall); "*Mus* sp.," Java (E. Jacobson) and Anderstepoort, South Africa (Bedford); *Microtus californicus* and *Microtus* sp. and *Phenacomys longicaudus*, California; *Synaptomys borealis*, Norway House, Northwest Territory, Canada; *Apodemus sylvaticus*, England (Waterston); *Crocidura*

cærulea, Rangoon, Burma (Nuttall); "rat," British Guiana (British Museum).

Of these hosts the next to the last named is an insectivore of the family *Soricidæ* (the shrews), the others are rodents, all belonging to the family *Muridæ*, the genera *Microtus*, *Phenacomys* and *Synaptomys* being members of the subfamily *Microtinæ*, the others of the subfamily *Murinæ*.

FEMALE (Fig. 119). Length 1.3 mm. General form moderately stout. *Head* nearly as broad as long, almost truncate anteriorly, with the antennæ set close to the anterior margin, with prominent post-antennal angles and a constricted occipital region and with the lateral margins of the hind head parallel. *Thorax* somewhat longer and broader than the head, with the lateral margins angularly convex; legs of ordinary form, the middle pair intermediate in stoutness between the anterior and posterior pairs; sternal plate (Fig. 120A) broad, with the lateral margins almost parallel, the posterior margin produced into a blunt point.

Pleural plates (Fig. 120H) as follows: plates of the second segment distinctly divided into two lobes, the ventral lobe slender, the dorsal broader and produced into a slight tooth, each lobe with a short seta; plates of the third to sixth segments triangular, with the dorsal posterior angle produced into a slight tooth and the ventral angle somewhat rounded, each plate with a pair of short, thorn-like setæ of nearly equal length on the posterior margin; plates of the seventh and eighth segments smaller, each with a pair of long setæ; spiracles quite small.

Tergal and sternal plates of the abdomen strongly developed, reaching nearly from pleurite to pleurite and occupying the greater part of the surface, the anterior plate of each segment tending to be considerably longer than the posterior, the plates with for the most part five to seven small, slender and quite widely spaced setæ. Between the ends of the posterior plate and the corresponding pleurite on the third to seventh segments dorsally and the fourth to seventh segments ventrally is a single small seta.

MALE (Fig. 119). Length .9 mm. *Head* relatively broader and stouter than in the female, the first segment of the antennæ (Fig. 120D) more swollen, the third segment strongly modified.

Tergal and sternal plates and rows of setæ of the abdomen arranged in the typical manner, the plates strongly developed, occupying the greater part of the width of the abdomen and with for the most part seven or eight small, slender setæ of varying lengths.

Genitalia (Fig. 120F) with the basal plate (*bp*) moderately stout, the posterior angles strongly produced and enclosing the anterior end of the parameres (*par*), the latter short, strongly curved and articulating closely at their apices with the stout, wedge-shaped pseudopenis (*pp*). The

pseudopenis is strongly curved dorso-ventrally in the form of a hook and has slight lateral expansions at the proximal end. Between the parameres is the penis (*p*) with somewhat vague and weakly chitinized structures which probably represent the endomerall pieces.

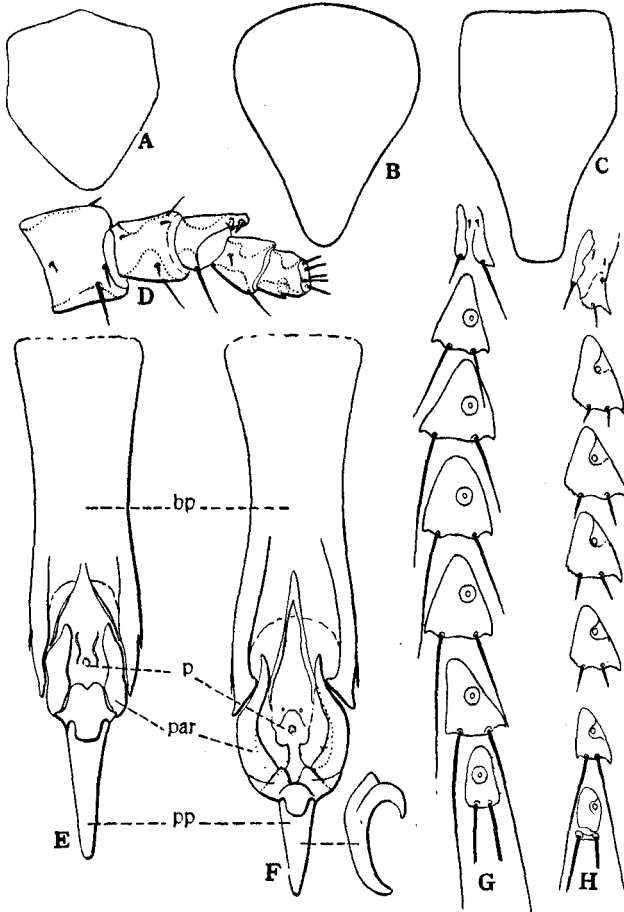


Fig. 120.—*Polyplax spinulosa* (Burm.): *A*, sternal plate; *D*, antenna of male; *F*, genitalia of male; *H*, pleural plates of female, from same specimens as in Fig. 119. *Polyplax serrata* (Burm.): *B*, sternal plate; *E*, genitalia of male; from specimens from *Apodemus sylvaticus sylvaticus*, Europe. *Polyplax reclinata* (Nitzsch): *C*, sternal plate; *G*, pleural plates of female; from *Crocidura* sp., Valley of Kashmir.

NOTES.—This species appears characteristically to be associated with the “domestic rats” but it is evidently normal also to at least a part of the hosts recorded above and

it evidently transfers with some readiness from one host species to another. I am quite unable to detect any differences between the specimens from these different hosts. *P. spinulosa* is very similar to *P. serrata* and *P. reclinata* but these three species differ so constantly in certain details that I do not question their distinctness, even though *spinulosa* may occur upon the same hosts as the others at times. The differences will be pointed out in connection with the discussions of *serrata* and *reclinata*.

Through the very great kindness of Mr. James Waterston of the British Museum I have been enabled to examine one of the original specimens recorded by Denny from *Arvicola* (= *Hypudæus*) *amphibius* as *Hamatopinus spiniger* (Burm.). This specimen seems to me to be undoubtedly identical with *spinulosus*.

2. *Polyplax serrata* (Burmeister).

FIGS. 120B, 120E.

1839. *Pediculus serratus* Burmeister, "Rhynchota," *Gen. Ins.* No. 6.
 1842. *Hamatopinus serratus* (Burm.), Denny, "Mon. Anopl. Brit." p. 36.
 1864. *Pediculus serratus* Burm., Nitzsch, *Zeit. f. ges. Naturw.* 23: 27.
 1874. *Hamatopinus serratus* (Burm.), Giebel, "Insecta Epizoa," p. 36; pl. 1, f. 6.
 1880. *Hamatopinus serratus* (Burm.), Piaget, "Les Pediculines," p. 639.
 1904. *Polyplax serrata* (Burm.), Enderlein, *Zool. Anz.* 28: 142.
 1904. *Polyplax serratus* (Burm.), Csiki, *Rovart. Lapok* 11: 182.
 1908. *Polyplax serrata* (Burm.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 14.
 1912. *Polyplax affinis* (Burm.), Fahrenholz, *Jahresb. des Niedersäch. Zool. Ver.* 2-4: 39-42; tf. 13-15. (Misidentification).
 1913. *Polyplax serrata* (Burm.), Evans, *Proc. Royal Phys. Soc. Edinburgh* 19: 94.
 1916. *Polyplax affinis* (Burm.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 172 (part).
 1916. *Polyplax serrata* (Burm.), Ferris, *ibid.* p. 175.

PREVIOUS RECORDS. Originally described from the "house mouse," *Mus musculus*, in Europe. It has since been recorded from this host only from the Forth District, Scotland and the Shetland Islands (Evans). Under the name of *Polyplax affinis* (Burm.) it has been recorded by Fahrenholz from *Apodemus* (= *Mus*) *sylvaticus*, Europe.

SPECIMENS EXAMINED. From *Mus musculus*, Edinburgh, Scotland (Waterston), and "tame mouse," England (Waterston); *Mus spicilegus hispanicus*, Valencia, Spain (U. S. N. M. 152840); *Apodemus agrarius mantchuricus*, Sungaree River, Manchuria (U. S. N. M. 197805); *A. agrarius pallidior*, Feng Siang, Shensu, China (F. C. M. 18929); *A. speciosus peninsulae*, Tao Chou, Kansu, China (F. C. M. 19709); *A. sylvaticus sylvaticus*, Haida, Bohemia (U. S. N. M. 120950), St. Gallen, Switzerland (U. S. N. M. 84718) and England (Waterston).

NOTES.—This species is extremely close to *P. spinulosa*, differing only in the following details: It is somewhat smaller, female 1.1 mm. and male .6 mm., and distinctly more slender. The sternal plate (Fig. 120B) is more produced posteriorly, is more rounded and has the sides of the tapering portion concave instead of straight. The pleural plates differ constantly in having the ventral seta on the plates of the third segment much longer than the dorsal seta. The genitalia of the male (Fig. 120E)

while of the same type as in *P. spinulosa* differ distinctly in detail, especially in the form of the parameres (*par*) which are much smaller and are almost entirely enclosed between the produced tips of the basal plate, and in the form of the pseudo-penis (*pp*) which is longer and has the lateral margins at the base less expanded. Fahrenholz (ref. cited) considers that the two species differ in the form of the head but I have been unable to see anything significant here.

I have not the slightest doubt that all the specimens above are referable to the same species, regardless of the differences in host. That this is not the *Pediculus affinis* of Burmeister seems quite certain as I have pointed out in an earlier number of this series (Part II, p. 78) but that it is the *Pediculus serratus* of the same author is perhaps open to doubt.

The original description of *Pediculus serratus* is as follows: "Capite brevior, genis post antennis incrassatis; lividus, abdomine in basi angusto, segmentis utrinque dilatatis, marginum abdominis serratum referentibus. Long 1/3. Hab. Mus musculus." It would seem from this that the species is a *Polyplax* rather than a *Hoplopleura* (the only other genus that is likely to enter into the question). And while there is the possibility that it is not the species at hand there seems no reason for concluding that it is not.

3. *Polyplax reclinata* (Nitzsch).

Figs. 120C, 120G.

1864. *Pediculus reclinatus* Nitzsch, *Zeit. f. ges. Naturw.* 23: 23.
 1874. *Hæmatopinus reclinatus* (Nitzsch), Giebel, "Insecta Epizoa," p. 37.
 1880. *Hæmatopinus reclinatus* (Nitzsch), Piaget, "Les Pediculines," p. 639.
 1904. *Polyplax reclinata* (Nitzsch), Enderlein, *Zool. Anz.* 28: 142.
 1904. *Hoplopleura reclinata* (Nitzsch), Enderlein, *ibid.* 28: 222.
 1908. *Hoplopleura reclinata* (Nitzsch), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 14.
 1910. *Hæmatopinus (Polyplax) spiniger reclinatus* (Nitzsch), Neumann, *Arch. de Parasit.* 13: 524-5; ff. 24.
 1912. *Polyplax reclinata* (Nitzsch), Fahrenholz, *Zool. Anz.* 39: 55.
 1912. *Polyplax reclinata* (Nitzsch), Fahrenholz, *Jahresb. des Niedersäch. Zool. Ver.* 2-4: 37-9; ff. 11-2; pl. 1, f. 12-13; pl. 2, f. 2-4; pl. 3, f. 7.
 1916. *Polyplax reclinata* (Nitzsch), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 175.

PREVIOUS RECORDS. From *Sorex araneus*, Europe.

SPECIMENS EXAMINED. From *Crocidura cærulea*, Rangoon, Burma (Nuttall); *Crocidura* sp., Atchebal, Valley of Kashmir (U. S. N. M. 201120); *Scutisorex* sp., Medjie, (American Museum Nat. History 48477); *Pachyura luzonensis*, Manila, Philippine Islands (U. S. N. M.).

NOTES.—Like *P. serrata* very closely resembling *P. spinulosa* from which it differs only in minute, but apparently quite constant, details. The sternal plate (Fig. 120C) is much more produced posteriorly than in *spinulosa* and is very bluntly pointed and the sides of the produced portion are concave instead of straight. The pleural plates (Fig. 120G) have the setæ as long or longer than the plates themselves and characteristically the spiracles are much larger than in *spinulosa*, although in some specimens this character is not so marked. The genitalia of the male seem to be identical with those of *P. serrata* (Fig. 120E).

I have not seen specimens of this from the type host but the hosts of the specimens examined are closely related to this and the description and figures given by Fahrenholz are sufficient to permit its reasonably certain identification.

4. *Polyplax spinigera* (Burmeister).

1839. *Pediculus spiniger* Burmeister, "Rhynchota," *Gen. Ins.* No. 9.
 1842. *Hæmatopinus spiniger* (Burm.), Denny, "Mon. Anopl. Brit.," p. 27; pl. 24, f. 6.
 1864. *Pediculus spiniger* Burm., Nitzsch, *Zeits. f. ges. Naturw.* 23: 23.
 1874. *Hæmatopinus spiniger* (Burm.), Giebel, "Insecta Epizoa," p. 39; pl. 2, f. 1.
 1880. *Hæmatopinus spiniger* (Burm.), Piaget, "Les Pediculines," p. 637-8; pl. 52, f. 3.
 1904. *Polyplax spinigera* (Burm.), Enderlein, *Zool. Anz.* 28: 142.
 1908. *Polyplax spinigera* (Burm.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 14.
 1909. *Hæmatopinus (Polyplax) spiniger* (Burm.), Neumann, *Arch. de Parasit.* 13: 524; tf. 24.
 1916. *Polyplax spiniger* (Burm.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 176.

PREVIOUS RECORDS. Known only from *Arvicola* (= *Hypudæus*) *amphibiis* in Europe.

NOTES.—The only Anopluran from the host of this species that I have seen is the specimen recorded under *P. spinulosa* which is one of those recorded by Denny as *Hæmatopinus spiniger* (Burm.). As I have noted I consider this specimen to be *P. spinulosa*. Whether or not *spinigera* is identical with *spinulosa* is a problem that can only be settled—if at all—by extended collecting from this host. Judging from the meager descriptions and the partial figures that are available it is at least certainly close to *spinulosa*. The figure of the pleural plates given by Neumann might very well have been made from specimens of the latter, and in fact possibly was, and according to this author the sternal plate is nearly identical with that of *spinulosa*.

The original figure and description of Burmeister are worthless and can not aid in making a decision. The figures of the two species given by Giebel indicate rather marked differences in the form of the head. Consequently, while I am personally inclined to the belief that the two are identical, there is the possibility that there is a distinct species on this host. Very probably *Hoplopleura acanthopus* occurs upon it, but this species hardly needs to be considered as the legs in all the figures indicate a *Polyplax*. If extended collecting should reveal only specimens of *spinulosa*, *spinigera* should be placed as a synonym.

5. *Polyplax waterstoni* Bedford.

FIGS. 121, 122.

1919. *Polyplax waterstoni* Bedford, *Rept. Div. Vet. Res., Dept. Agric. Un. S. Africa* 6-7: 715-6; pl. 1, f. 1, 2, 4, 5.

PREVIOUS RECORDS. From "several rats (two species)," Anderste-poort, Pretoria, South Africa.

SPECIMENS EXAMINED. From *Epimys peromyscus*, Molo, British East Africa (F. C. M. 17025).

FEMALE (Fig. 121). Length 1.3 mm. Head nearly as broad as long, slightly rounded anteriorly; with the antennæ set close to the anterior

margin; with prominent post-antennal angles and a much constricted occipital region, the lateral margins of the hind head nearly straight and parallel. *Thorax* about as long as the head, with angularly convex lateral margins; sternal plate (Fig. 122B) roughly half-oval; legs of ordinary form, the middle pair intermediate in stoutness between the anterior and posterior pairs.

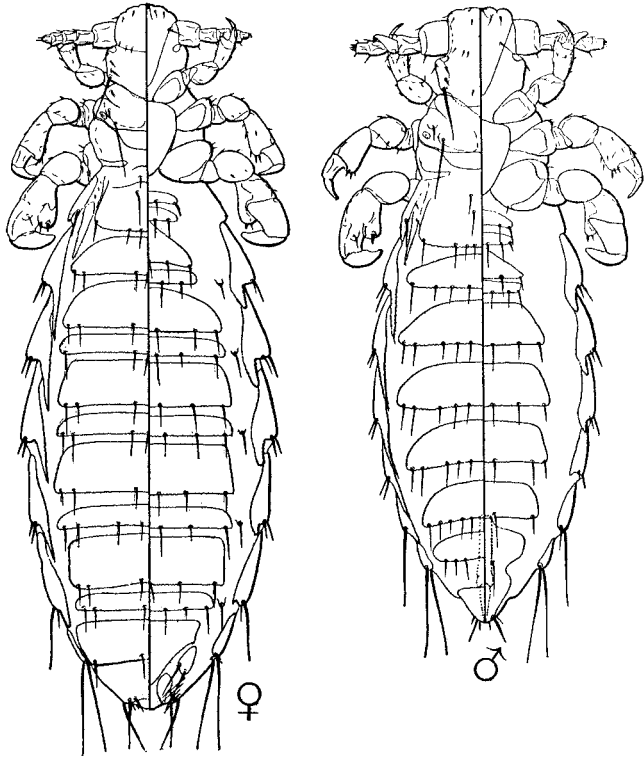


Fig. 121.—*Polyplax waterstoni* Bedford: male and female from *Epimys peromyscus*, Molo, British East Africa.

Pleural plates (Fig. 122A) as follows: plates of the second segment divided into two slender pieces, each of which bears a slender, tapering, free lobe and a small seta; plates of the third to sixth segments each with the dorsal posterior angle produced into a slender, tapering process which is more than half as long as the plate itself and with the ventral posterior angle produced into a shorter, broader and more bluntly pointed process; plates of the seventh segment with the dorsal process alone present; plates of the eighth segment small, without processes; the third to sixth plates

bear a pair of small setæ, the seventh a pair of unequal length, the longest about as long as the plate, and the eighth a pair of long setæ; plates of the third to seventh pairs constricted somewhat at about the middle; lobes of all the plates with a scaly appearance.

Tergal and sternal plates of the abdomen strongly developed, extending almost from pleurite to pleurite and occupying the greater part of the surface, the anterior plate of each pair about twice as long as the

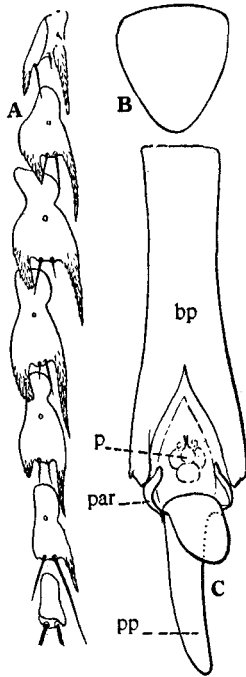


Fig. 122.—*Polyplax waterstoni* Bedford: *A*, pleural plates of female; *B*, sternal plate; *C*, genitalia of male; from specimens from *Epimys peromyscus*, Molo, British East Africa.

posterior; plates for the most part with five to seven very small setæ; ventral side with a single small seta on the third to seventh segments between the ends of the posterior sternal plate and the corresponding pleurite.

MALE (Fig. 121). Length .9 mm. *Head* slightly broader and slightly more truncate anteriorly than in the female; antennæ with the basal segment somewhat enlarged, the third segment strongly modified.

Tergal and sternal plates of the abdomen arranged in the typical manner, strongly developed, the tergal plates reaching almost from pleurite to pleurite and bearing for the most part ten small setæ, the sternal

plates occupying about the median two-thirds and for the most part with six small setæ.

Genitalia (Fig. 122C) with the basal plate (*bp*) deeply cleft posteriorly, the parameres (*par*) very small, strongly curved, articulating at the apex with the relatively extremely large and stout pseudopenis (*pp*) which is bent dorso-ventrally into the form of a hook and is without lateral expansions at the base; penis (*p*) surrounded by weakly chitinized and ill-defined structures.

NOTES.—This is a very distinct species, the peculiar form of the pleural plates and the structure of the genitalia marking it at once. Its relationships seem to be most closely with the group that centers about *P. spinulosa*.

6. *Polyplax præcisa* (Neumann).

FIG. 123.

1901. *Hæmatopinus præcitus* Neumann, *Arch. de Parasit.* 5: 600-1 (part; typographical error for *præcisus*).

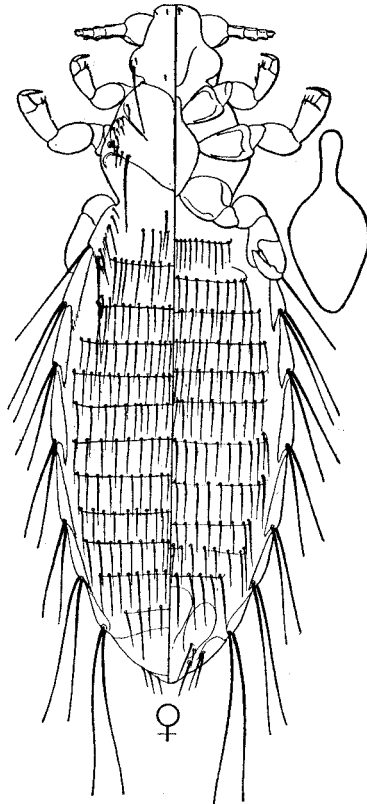


Fig. 123.—*Polyplax præcisa* (Neumann): female and sternal plate from a co-type specimen.

1902. *Hæmatopinus præcisus* Neum., Neumann, *ibid.* 6: 144; fig.
1904. *Polyplax præcisa* (Neum.), Enderlein, *Zool. Anz.* 28: 143 (part).
1908. *Polyplax* (?) *præcisa* (Neum.), Dalla Torre, "Anoplura," *Gen. Ins.*, p. 13 (part).
1909. *Hæmatopinus* (*Polyplax*) *præcisus* Neum., Neumann, *Arch. de Parasit.* 13: 523 (part).
1916. *Hæmatopinus* (*Polyplax*) *præcisus* Neum., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 178 (part).
1919. *Polyplax præcisa* (Neum.), Fahrenholz, *Jahresb. des Niedersäch. Zool. Ver.* 5-10: 25-6.

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

SPECIMENS EXAMINED. A single female from the type specimens of Neumann, received through the kindness of Professor A. Martin of the Ecole Veterinaire of Toulouse, and single female from Budarna Kwepa, Uganda, labeled as from *Rattus coucha ugandæ*, received from the British Museum, which is apparently this species.

FEMALE (Fig. 123). Length 1.75 mm. *Head* nearly as broad as long, almost truncate anteriorly, with the antennæ set close to the anterior margin, with prominent post-antennal angles and a strongly constricted occipital region, the lateral margins of the hind head bulging and rounded; antennæ with the basal segment considerably enlarged. *Thorax* considerably longer than the head, with the lateral margins strongly convex; dorsally with a submarginal series of short setæ cephalad of the spiracles; sternal plate (Fig. 123) elongate oval with a short, handle-like projection anteriorly; legs of ordinary form, the middle pair longer than, but not so stout as, the posterior.

Pleural plates difficult to work out from the specimen examined but apparently as follows: plates of the second segment probably divided longitudinally, each lobe with a single very long seta and the dorsal lobe with several small setæ along its dorsal margin; plates of the third to seventh segments each with a short, tapering process at each posterior angle and with a pair of very long setæ; plates of the eighth segment without teeth and likewise with a pair of long setæ.

Tergal and sternal plates of the abdomen arranged as usual but their extent not clearly determinable from the specimen examined, with for the most part as many as sixteen to twenty-four small, slender setæ.

NOTES.—In my catalogue of the Anoplura (1916) I called attention to the fact that the *Hæmatopinus præcisus* of Neumann appeared to include two species belonging to different genera. Fahrenholz (1919) accepted this conclusion and named the species *Hoplopleura neumanni*, for the "female" described by Neumann, retaining the name *Polyplax præcisa* for the "male."

The slide that I have received from Professor Martin contains three specimens and is labeled as containing a male and two females but all the specimens are females.

The single female of the one species represents *Polyplax præcisa* and it appears that Neumann did not have the male of this species, which is therefore unknown.

Unfortunately this single specimen of *præcisa* is somewhat difficult to study and the accompanying figure is not entirely complete. The species should be readily recognizable, however, by the peculiar form of the head, the presence of the numerous small, submarginal setæ on the dorsum of the thorax and the long setæ of all the pleural plates. It may be regarded as the type form of a small series of species that follow, all of which are from members of the subfamily *Gerbillinae*.

7. *Polyplax tateræ* n. sp.

FIGS. 124, 125B-D.

SPECIMENS EXAMINED. One male (the holotype) and two females from *Tatera vicina*, Mt. Sukenya, British East Africa (F. C. M. 16704). The host is a *Murid* of the subfamily *Gerbillinae*.

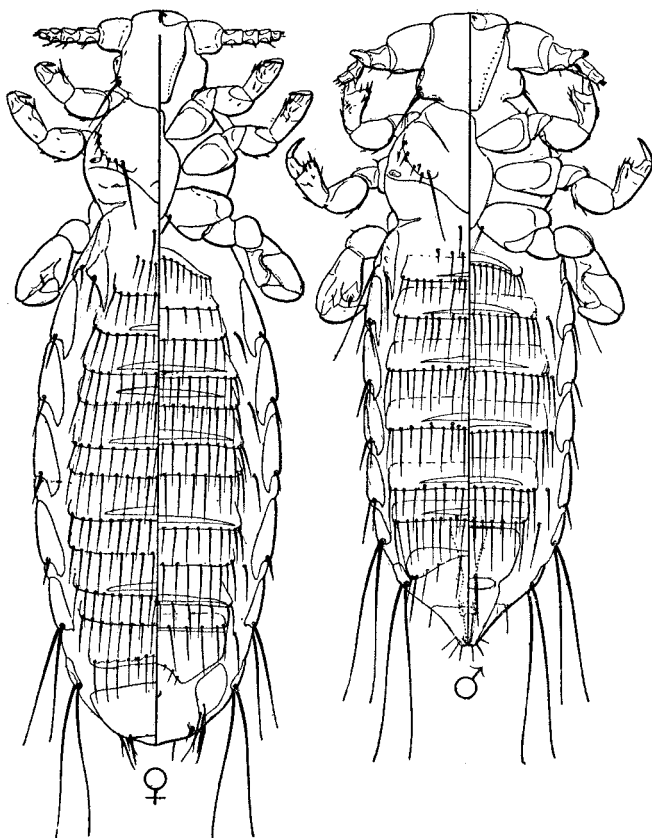


Fig. 124.—*Polyplax tateræ* n. sp., male and female.

FEMALE (Fig. 124). Length 1.4 mm. *Head* nearly as broad as long, almost truncate in front of the antennæ which are set close to the anterior margin; with prominent post-antennal angles and a strongly constricted occipital region and with the lateral margins of the hind head straight and very slightly convergent; antennæ with the basal segment somewhat enlarged. *Thorax* about as long as the head, with the lateral margins strongly and roundly convex and with a dorsal, submarginal series of small setæ cephalad of the spiracles; sternal plate (Fig. 125C) elongate oval, with a handle-like process anteriorly; legs of ordinary form.

Pleural plates (Fig. 125B) as follows: plates of the second segment distinctly divided longitudinally, the dorsal portion with a tapering lobe, each portion with a slender seta; plates of the third to sixth segments with each posterior angle produced into a tooth, that of the ventral side somewhat the broader, and each with a pair of slender setæ which are about as long as the plate itself; plates of the seventh and eighth segments without pronounced teeth and with the usual long setæ.

Tergal and sternal plates reaching nearly from pleurite to pleurite but except for a slender central portion not strongly chitinized, bearing for the most part as many as twenty slender setæ.

MALE (Fig. 124). Length 1.2 mm. *Head* relatively broader than in the female and with the hind head shorter; antennæ with the basal segment much enlarged and with the third segment strongly modified.

Tergal and sternal plates strongly developed, the latter departing from the usual arrangement, there being not more than one plate on each segment; all the plates quite large, reaching nearly from pleurite to pleurite, with a more strongly chitinized central portion as in the female and bearing for the most part as many as eighteen or twenty slender setæ.

Genitalia (Fig. 125D) with the basal plate (*bp*) large, expanded anteriorly, the parameres (*par*) very short and quite broad, articulating with the stout, wedge-shaped pseudopenis (*pp*).

NOTES.—This species is evidently quite close to *P. præcisa*, the female differing chiefly in the short setæ of the pleural plates and the angular hind head. The male resembles somewhat the male of *P. werneri* but differs especially in the form of the sternal plate.

8. *Polyplax biseriata* n. sp.

FIGS. 125A, 126.

SPECIMENS EXAMINED. Several males and females (holotype a male) from *Tatera bohmi varia*, South Guaso Nyiro, British East Africa (U. S. N. M. 162250). Also a male and female from *Tatera* sp., Bothaville, Orange Free State (Bedford).

FEMALE (Fig. 126). Length 1.3 mm. *Head* somewhat longer than

wide, slightly rounded in front of the antennæ which are set close to the anterior margin; with distinct post-antennal angles and a strongly constricted occipital region, the lateral margins of the hind head nearly straight and parallel; antennæ with the basal segment not strongly swollen. *Thorax* about as long as the head, with the lateral margins roundly convex, dorsally with a pair of small submarginal setæ cephalad of the spiracles; sternal plate oval, with a slight anterior process.

Pleural plates (Fig. 125*A*) as follows: plates of the second segment

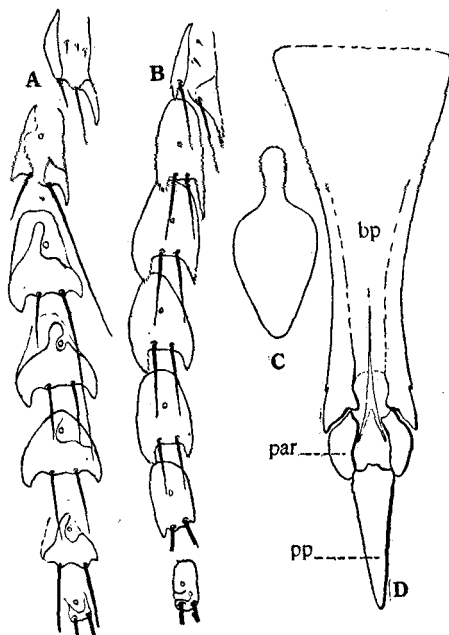


Fig. 125.—*Polyplax tateræ* n. sp.: B, pleural plates; C, sternal plate; D, genitalia of male. *Polyplax biseriata* n. sp.: A, pleural plates.

distinctly divided longitudinally, the dorsal part with a slender, tapering process and each part with a slender seta; plates of the second to sixth segments each with a broad tooth at each posterior angle, those of the third segment divided longitudinally, those of the third and fourth segments each with the dorsal seta about twice as long as the plate itself and the ventral seta shorter than the plate, those of the fifth and sixth segments with the setæ about as long as the plate; plates of the seventh and eighth segments small, each with a pair of long setæ.

Tergal and sternal plates of the abdomen very small, extending across not more than the median half of the abdomen, bearing for the most part

eight to ten slender setæ. On the dorsal side between the ends of each plate on the fourth to eighth segments and the corresponding pleurites are one or two setæ and on the ventral side are one to three setæ on the third to seventh segments in a similar situation.

MALE (Fig. 126). Length 1.1 mm. *Head* relatively broader and more

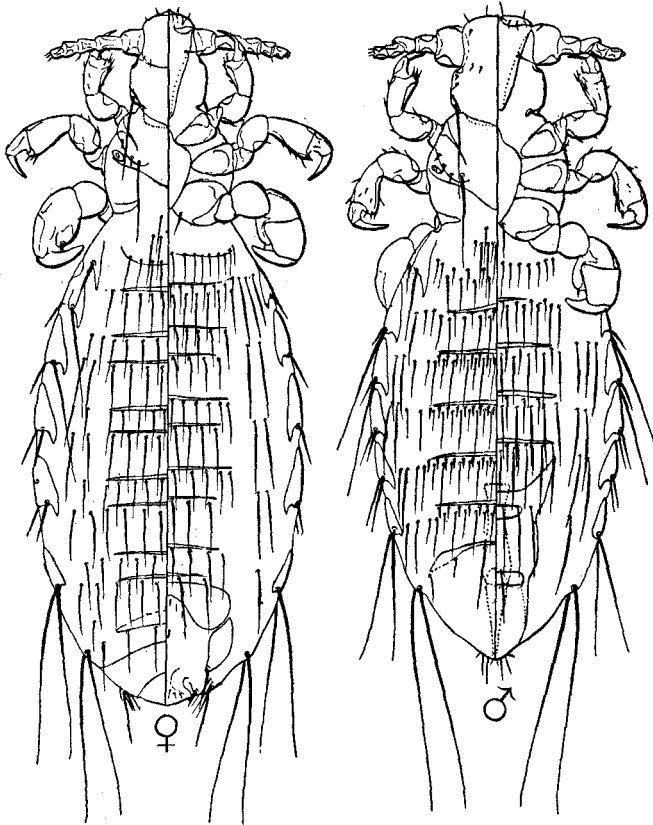


Fig. 126.—*Polyplax biseriata* n. sp., male and female.

nearly truncate anteriorly than in the female; antennæ with the basal segment much enlarged and with the third segment strongly modified.

Tergal and sternal plates weakly developed, occupying about the median half of the abdomen, departing from the typical arrangement in that there is not more than one plate on any of the sternites. Setæ of the dorsum arranged in a double row on the fourth to seventh segments, the posterior row extending entirely across the segment and consisting of as many as twenty or more setæ of various lengths, the anterior row confined to the region of the tergal plate and consisting of about twenty small,

stout setæ. Setæ of the ventral side arranged in an irregularly double row on each segment.

◆ *Genitalia* practically as in *P. tateræ* (see Fig. 125D).

NOTES.—This species is certainly a member of the *precisa* group but is readily distinguishable by the weakly developed tergal and sternal plates of the abdomen and the arrangement of the setæ in the male.

9. *Polyplax weneri* (Glinkiewicz).

FIG. 127.

1907. *Eremophthirius weneri* Glinkiewicz, *Sitzb. d. Kaiserl. Akad. d. Wissens. Wien, Math. Natur. Klasse* 116: 381-3; figs.

1910. *Hoplopleura* (?) *weneri* (Glink.), Mjöberg, *Ark. f. Zool.* 6: 164.

1916. *Polyplax weneri* (Glink.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 177.

PREVIOUS RECORDS. From *Pachyuromys duprasi*, Natron Valley, Egypt.

SPECIMENS EXAMINED. Two males from the above host and locality taken from skins in the British Museum by Mr. James Waterston.

MALE (Fig. 127A). Length .7 mm. Head slightly broader than

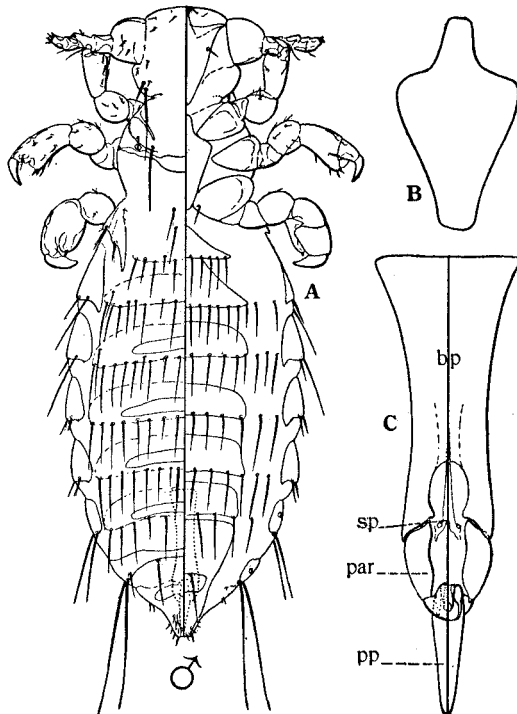


Fig. 127.—*Polyplax weneri* (Glink.): A, male; B, sternal plate; C, genitalia.

long, almost truncate in front of the antennæ, which are set close to the anterior margin; with prominent post-antennal angles and a strongly constricted occipital region, the lateral margins of the hind head rounded convex and strongly convergent; antennæ with the basal segment much enlarged and with the third segment strongly modified. *Thorax* about as long as the head, with the lateral margins roundly convex; sternal plate (Fig. 127*B*) triangular, the posterior end blunt, the anterior end with a short median process; legs of ordinary form.

Pleural plates with the posterior angles but little or not at all produced; plates of the second segment divided longitudinally, each lobe with a small seta; plates of the third and fourth segments each with a long dorsal seta and a smaller ventral, those of the fifth and sixth segments with a pair of small setæ and those of the seventh and eighth with the usual long setæ.

Tergal and sternal plates large but rather weakly chitinized, the former occupying nearly the entire width of the abdomen, the latter the median half. Tergal plates with as many as sixteen to twenty small setæ. Sternal plates departing from the usual arrangement in that there is but a single plate on each segment, the plates with for the most part eight to ten setæ, the third to seventh segments with one or two setæ between the ends of the sternal plates and the corresponding pleurite.

Genitalia (Fig. 127*C*) with the basal plate (*bp*) deeply cleft posteriorly, the parameres (*par*) short and stout, articulating at their tips with the short, wedge-shaped pseudopenis (*pp*).

FEMALE. According to the original description the female is 1.2 mm. long. The description and figures contain nothing that would aid especially in its recognition.

NOTES.—The two males of this species that I have examined were received as a loan from Mr. James Waterston who very kindly examined the skins of its host in the British Museum collection. The species is evidently one of the *præcisæ* group, distinguishable chiefly by the form of the head and sternal plate and the extent of the tergal and sternal plates of the abdomen.

10. *Polyplax gerbilli* n. sp.

FIGS. 128, 129.

SPECIMENS EXAMINED. A male and three females from *Gerbillus pyramidum*, Khartum, Egypt (S. Hirst, coll.). Holotype a female. These specimens were received as a loan from the British Museum, through the kindness of Mr. Waterston, and are deposited in the collections of that institution.

FEMALE (Fig. 128). Length 1.1 mm. *Head* slightly longer than wide, slightly rounded in front of the antennæ which are set close to the

anterior margin; with very slight post-antennal angles, the lateral margins of the hind head strongly curved and little or not at all convergent; antennæ with the basal segment not exceptionally enlarged. *Thorax* about as long as the head, with the lateral margins angularly convex, dorsally

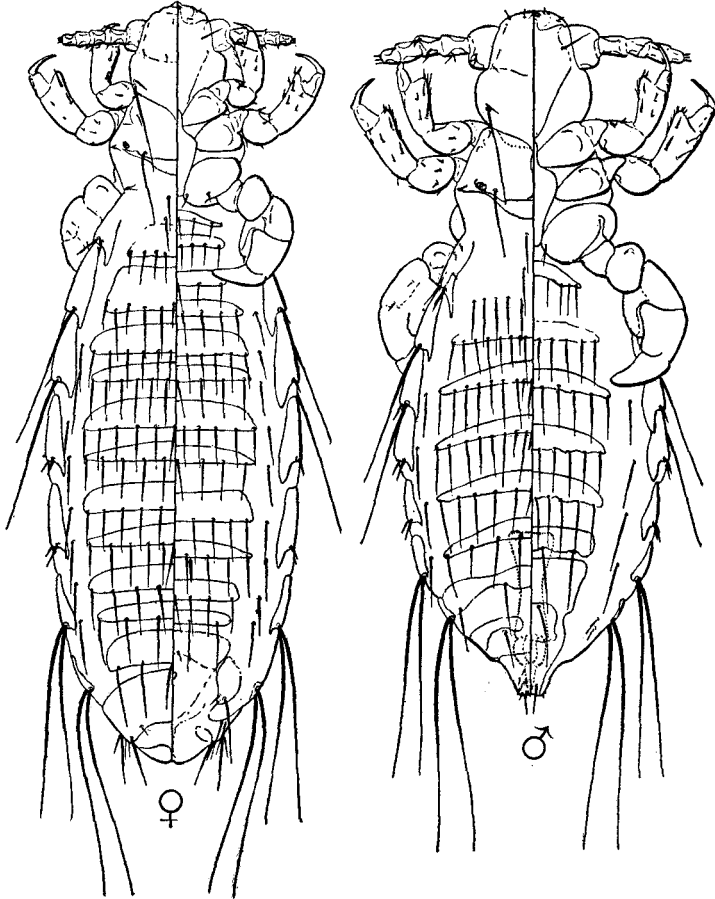


Fig. 128.—*Polyplax gerbilli* n. sp., male and female.

without submarginal setæ cephalad of the spiracles; sternal plate (Fig. 129B) with a very slight anterior process and with the posterior end blunt.

Pleural plates as follows: plates of the second segment divided longitudinally, although the division is very faint, the dorsal part with a slender, tapering process and each part with a small seta; plates of the third to sixth segments each with a small tooth at the dorsal posterior angle and a much broader and longer tooth at the ventral angle, those of the third and fourth segments with a short ventral seta and a very long, slender

dorsal seta, those of the fifth and sixth segments with a pair of short setæ; plates of the seventh and eighth segments with the usual long slender setæ and without teeth.

Tergal and sternal plates of the abdomen quite large and occupying the greater part of the width of the abdomen, the tergal plates bearing for the most part ten to twelve slender setæ, the sternal plates bearing for the most part seven or eight.

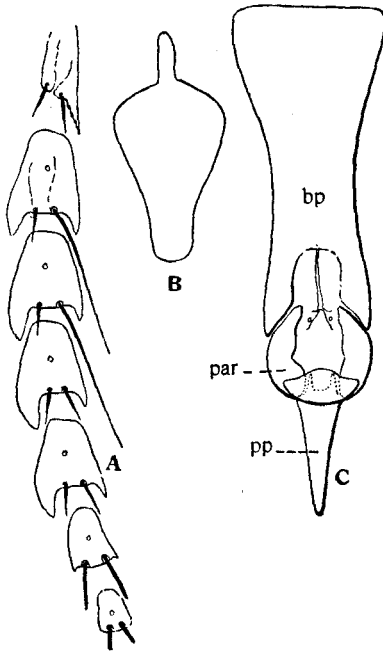


Fig. 129.—*Polyplax gerbilli* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

MALE (Fig. 128). Length .8 mm. *Head* almost as in the female, the basal segment of the antennæ not unusually enlarged, the third segment definitely but not conspicuously modified.

Tergal and sternal plates of the abdomen quite strongly developed, the rows of setæ arranged in the normal manner except that there is not more than one row on each sternite. Dorsally the rows contain for the most part ten to sixteen slender setæ and ventrally for the most part ten.

Genitalia (Fig. 129C) very similar to those of *P. wernerii*, the basal plate (*bp*) quite large and broad, slightly expanded anteriorly, the parameres (*par*) very short and rather broad, strongly curved and articulating

at the tips with the stout, wedge-shaped pseudopenis (*pp*) which is quite strongly expanded at the base.

NOTES.—This species is another of the *præcisa* group, which in the male seems most closely to resemble *P. wernerii*. It differs from the latter, however, especially in the form of the head, the much less modified antennæ and the broad ventral tooth of the pleural plates. The female is distinguishable from any of the other species of the group especially by the form of the head and the character of the pleural plates.

11. *Polyplax stephensi* (Christophers and Newstead).

FIGS. 130, 131.

1906. *Hæmatopinus stephensi* Christophers and Newstead, *Thompson Yates and Johnston Laboratories Rept.* (n. s.) 7: 3-6; pl. 1.

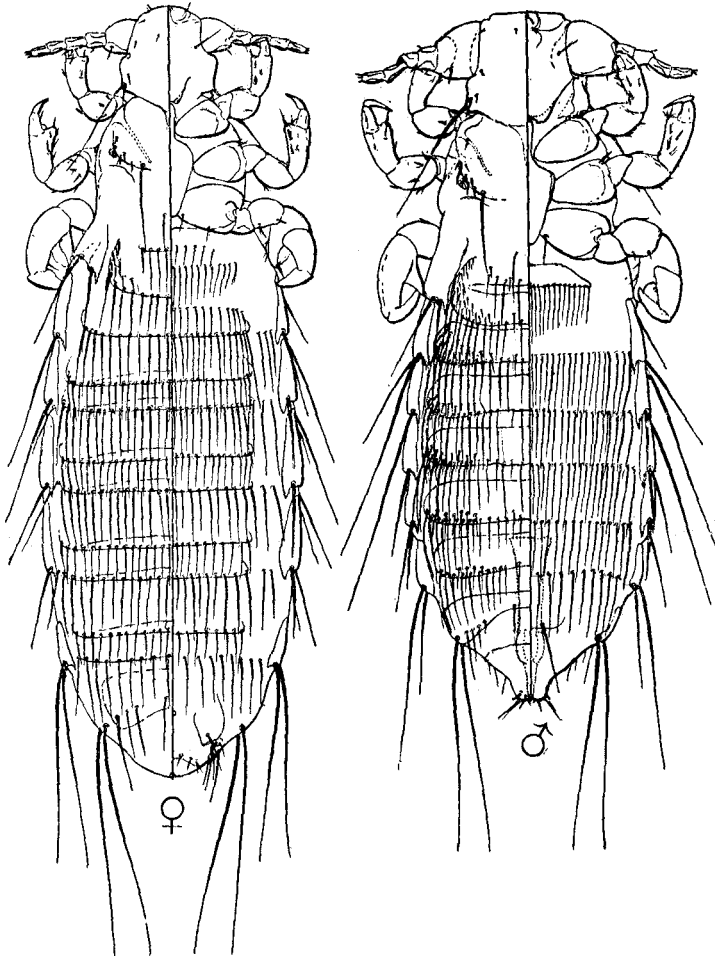


Fig. 130.—*Polyplax stephensi* (Chr. and Newst.), male and female, from co-types.

1909. *Hæmatopinus (Polyplax) stephensi* Chr. and Newst., Neumann, *Arch. de Par.* 13: 525-6; f. 25.
1913. *Hæmatopinus (Polyplax) stephensi* Chr. and Newst., Patton and Cragg, "Medical Entomology," pp. 550-1; pl. 68, f. 4-6.
1915. *Polyplax stephensi* Chr. and Newst., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 177.

PREVIOUS RECORDS. Originally recorded from *Tatera* (= *Gerbillus*) *indica*, India, without more precise indication of locality. Co-type specimens are labeled as from Madras. Also recorded by Patton and Cragg from India.

SPECIMENS EXAMINED. A male and a female, co-types; several specimens from the type host, "Dharwar District"; "Central India, Hoshangabad District"; "Central India." All these are in the British Museum Collection and were received as a loan through the kindness of Mr. James Waterston.

FEMALE (Fig. 130). Length 1.7 mm. *Head* about as long as wide, slightly rounded anteriorly, with the antennæ set close to the anterior margin; with moderately prominent post-antennal angles and a much constricted occipital region, the lateral margins of the hind head nearly straight and parallel. *Thorax* somewhat longer than the head, the lateral margins roundly convex, with a dorsal, series of three or four small setæ cephalad of the spiracle; sternal plate (Fig. 131) spatulate, the angles rounded.

Pleural plates (Fig. 131A) as follows: those of the second segment faintly divided into two lobes, each of which bears a long, slender seta; those of the third to sixth segments each with a very small tooth at the dorsal apical angle and a slightly larger tooth at the ventral angle and with a pair of slender setæ as long as the plate itself except on the plates of the third and fourth segments where the dorsal seta is about twice as long as the plate; plates of the seventh segment with a very small tooth at each angle, those of the eighth without teeth, each pair with the usual long setæ.

Tergal and sternal plates of the abdomen arranged in the usual manner. In the specimens examined they appear to be quite weakly chitinized but occupy nearly the entire width of the abdomen and both dorsally and ventrally bear for the most part from twenty to thirty slender setæ, those of the anterior plate on each segment being slightly shorter than those of the posterior plate. The second plate of the second tergite bears several small setæ at each end.

MALE (Fig. 130). Length 1.3 mm. *Head* relatively broader than in the female with the hind head shorter and the anterior margin more nearly truncate; antennæ with the first segment greatly enlarged and with the third segment strongly modified.

Tergal plates of the abdomen arranged in the normal manner, large, occupying nearly the entire width of the abdomen, bearing for the most part as many as thirty or more slender setæ. In addition to these the plates of the second to seventh segment bear several small setæ at each end and in some specimens these small setæ extend entirely across the segment. These small setæ are especially numerous on the second and third segments. Sternal plates apparently not developed or at the most very weakly so in the specimens examined, the sternal setæ departing from the typical

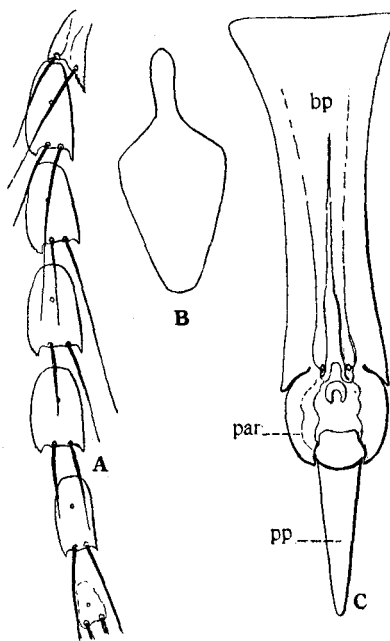


Fig. 131.—*Polyplax stephensi* (Chr. and Newst.): A, pleural plates of female; B, sternal plate; C, genitalia of male; from co-types.

arrangement in that there is but a single row to each segment, these rows containing for the most part from thirty to forty slender setæ.

Genitalia (Fig. 131C) with the basal plate (*bp*) large, somewhat expanded anteriorly, the parameres (*par*) short and strongly curved, articulating at the apex with the stout, wedge-shaped pseudopenis (*pp*) which is slightly expanded at the base.

NOTES.—This species is another of the *precisa* group distinguishable especially in the male by the small setæ of the abdominal tergites and in the female by the form of the head and pleural plates and the numerous setæ of the abdomen.

12. *Polyplax chinensis* n. sp.

Figs. 132, 133.

SPECIMENS EXAMINED. Several males and females from *Meriones auceps*, Shensi, China (U. S. N. M. 172573). Holotype a female.

FEMALE (Fig. 132). Length 1.4 mm. Head about twice as long as wide, acutely rounded in front of the antennæ which are set well forward; with slight post-antennal angles and a markedly constricted occipital

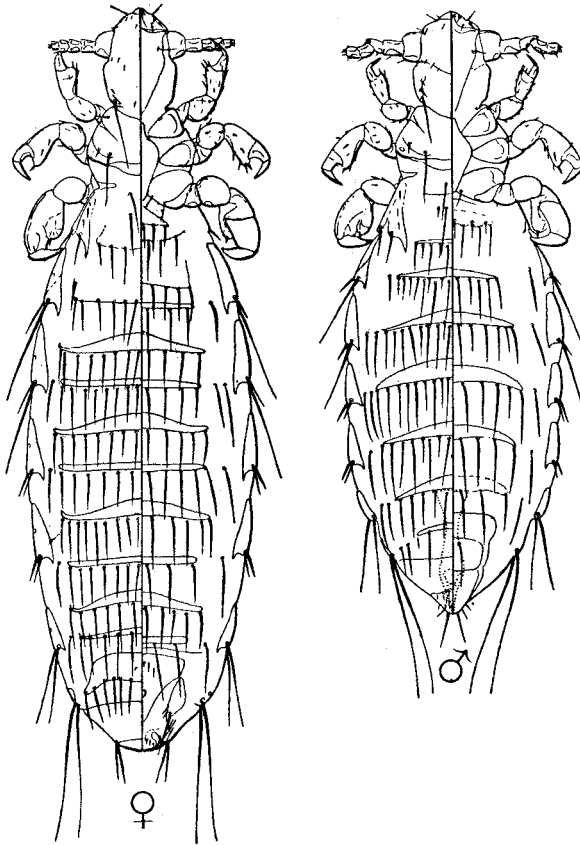


Fig. 132.—*Polyplax chinensis* n. sp., male and female.

region, the lateral margins of the hind head nearly straight and slightly convergent; antennæ with the first segment not conspicuously enlarged. *Thorax* slightly shorter than the head, with convex lateral margins; sternal plate (Fig. 133B) elongate, triangular, bluntly pointed posteriorly and with a slight anterior process; legs of ordinary form.

Pleural plates (Fig. 133A) as follows: plates of the second segment

distinctly divided longitudinally, each lobe with an acute process and bearing a small seta; plates of the third to seventh segments triangular, with a slight tooth at each posterior angle, those of the third segment divided longitudinally; plates of the third and fourth segments with the dorsal seta longer than the plate itself, the shorter seta quite small; plates of the fifth and sixth segments with a pair of small setæ and of the seventh and eighth with the usual long setæ.

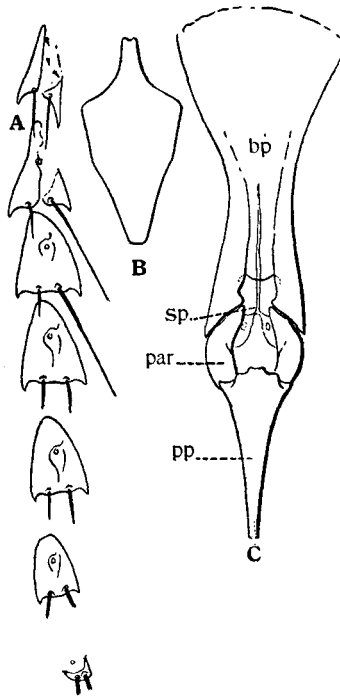


Fig. 133.—*Polyplax chinensis* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

Tergal and sternal plates of the abdomen reaching nearly from pleurite to pleurite but quite slender, the anterior plate of each pair somewhat stouter than the posterior, the tergal plates bearing for the most part as many as twelve to sixteen slender setæ, the sternal plates eight to ten. Between the ends of the posterior plate on the fourth to seventh tergites and the third to seventh sternites and the corresponding pleurites is a single seta.

MALE (Fig. 132). Length 1.1 mm. *Head* practically as in the female, the first segment of the antennæ slightly enlarged, the third modified.

Tergal and sternal plates of the abdomen well developed, reaching

nearly from pleurite to pleurite but slender, the tergal plates with as many as sixteen to eighteen setæ, the sternal plates with eight or ten. Sternal plates departing from the typical arrangement in that there is but one on each sternite.

Genitalia (Fig. 133C) with the basal plate (*bp*) constricted medially, the parameres (*par*) short and broad, the pseudopenis (*pp*) nearly half as long as the basal plate, wedge-shaped.

NOTES.—This species is another of the *præcisa* group, distinguishable chiefly by the rather slender head, the form of the tergal and sternal plates of the abdomen, the sternal plate of the thorax and the setæ on the pleural plates.

13. *Polyplax otomydis* Cummings.

Figs. 134, 135.

1912. *Polyplax otomydis* Cummings, *Bull. Ent. Res.* 3: 395-7; tf. 2.
 1914. *Polyplax otomydis* Cumm., Waterston, *Ann. S. African Mus.* 10: 275.
 1915. *Polyplax otomydis* Cumm., Kellogg and Ferris, *Ann. Durban Mus.* 1: 150.
 1916. *Polyplax otomydis* Cumm., Ferris, *ibid.* 1: 240; tf. 23A.
 1916. *Polyplax otomydis* Cumm., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 173.
 1919. *Polyplax otomydis* Cumm., Bedford, *Rept. Div. Vet. Res., Dept. Agric. Un. S. Africa* 5: 715.

PREVIOUS RECORDS. Types from *Otomys irroratus tropicalis*, Mt. Kenya, British East Africa. Also from *O. irroratus*, Anderstepoort, Pretoria, (Bedford) and Mfongosi, Zululand (Kellogg and Ferris; Ferris) and *O. brantsi luteolus* without indication of locality (Waterston).

SPECIMENS EXAMINED. Those upon which the above records by Kellogg and Ferris were based and others from *Otomys angoniensis elassodon*, Naivasha, British East Africa (F. C. M. 16687).

FEMALE (Fig. 134). Length 1.5 mm. Head slender, more than twice as long as wide, acute in front of the antennæ which are set somewhat back from the apex; with slight post-antennal angles and a distinctly constricted occipital region, the lateral margins of the hind head straight and slightly convergent; antennæ with the first segment but little enlarged. Thorax about three-fourths as long as the head, the lateral margins angularly convex; sternal plate (Fig. 135B) spatulate.

Pleural plates (Fig. 135A) as follows: plates of the second segment distinctly divided longitudinally into small linear pieces, each with a short seta; plates of the third to sixth segments triangular, each with the ventral angle somewhat produced and each with a pair of short setæ except those of the fourth segment which have the dorsal seta about twice as long as the plate itself; plates of the seventh and eighth segments small, bearing the usual long setæ.

Tergal and sternal plates of the abdomen strongly developed, occupying about three-fourths of the width of the body and covering the greater part of the surface. Tergal plates with for the most part eight to ten slender setæ, the sternal plates with seven or eight.

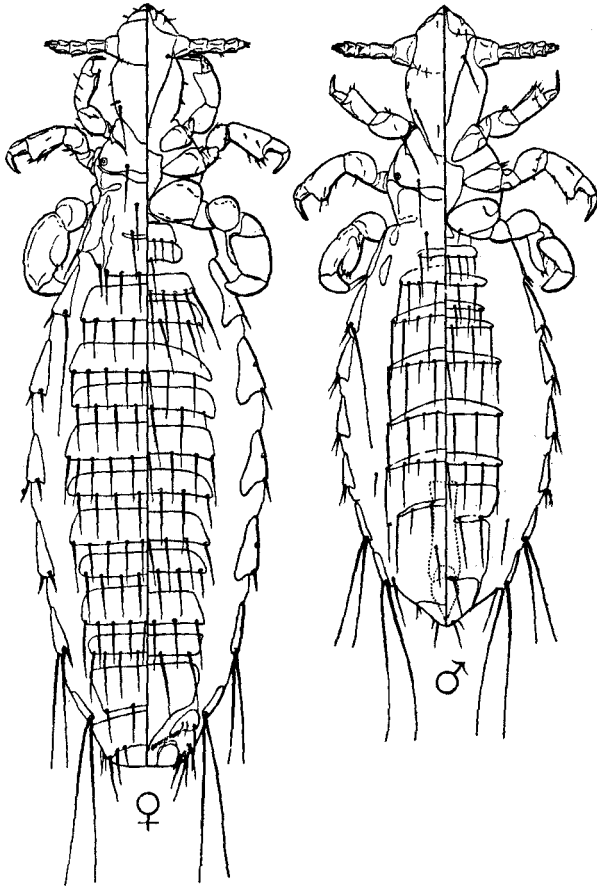


Fig. 134.—*Polyplax otomydis* Cumm., male and female from specimens from *Otomys irroratus*, Mfongosi, Zululand.

MALE (Fig. 134). Length 1 mm. *Head* as in the female, the antennæ not at all modified.

Tergal and sternal plates arranged in the typical manner, occupying a little more than the median half of the body, rather slender, bearing for the most part six to eight setæ.

Genitalia (Fig. 135C) with the basal plate (*bp*) quite broad, the posterior angles produced; parameres (*par*) quite long and tapering,

enclosing the wedge-shaped pseudopenis (*pp*) and the small statumen penis (*sp*).

NOTES.—This species may be regarded as the type of a group which is distinguished by the form of the genitalia of the males, the pseudopenis being enclosed between the parameres instead of being articulated with their tips as in the groups of *P. spinulosa* and *P. præcisa*.

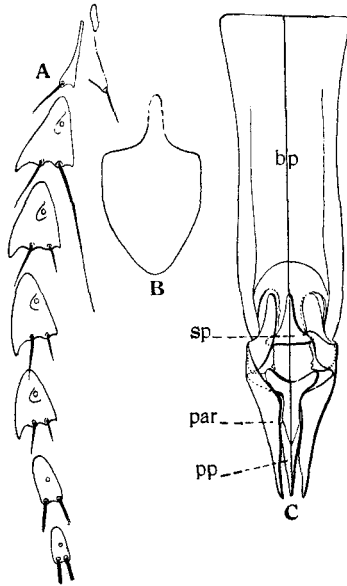


Fig. 135.—*Polyplax otomydis* Cum.: *A*, pleural plates of female; *B*, sternal plate; *C*, genitalia of male; from specimens from *Otomys irroratus*, Mfongosi, Zululand.

14. *Polyplax cummingsi* Ferris.

FIGS. 136, 137.

1916. *Polyplax gracilis* Fahrenholz, Ferris, *Ann. Durban Mus* 1: 240; tf. 23C, 24 (misidentification).

1916. *Polyplax cummingsi* Ferris, *ibid.* 1: 240-3; tf. 25, 26A.

PREVIOUS RECORDS. Originally described from the female only from *Dasymys incomtus*, Mfongosi, Zululand. Also recorded as *P. gracilis* Fahr. from *Mus chrysophilus* at the same place.

SPECIMENS EXAMINED. Those upon which the above records were based and others from *Dasymys incomtus helukus*, Kaimosi, British East Africa (U. S. N. M. 183151), an allotype has been selected from the latter lot.

FEMALE (Fig. 136). Length 1.3 mm. Head somewhat longer than wide, acutely rounded in front of the antennæ, which are set somewhat

back from the apex, with the post-antennal angles rounded and with a distinctly constricted occipital region, the lateral margins of the hind head, sub-parallel; antennæ with the first segment but little swollen. *Thorax* slightly shorter than the head, the lateral margins convex; sternal plate (Fig. 137*B*) spatulate; anterior and middle legs of practically the same

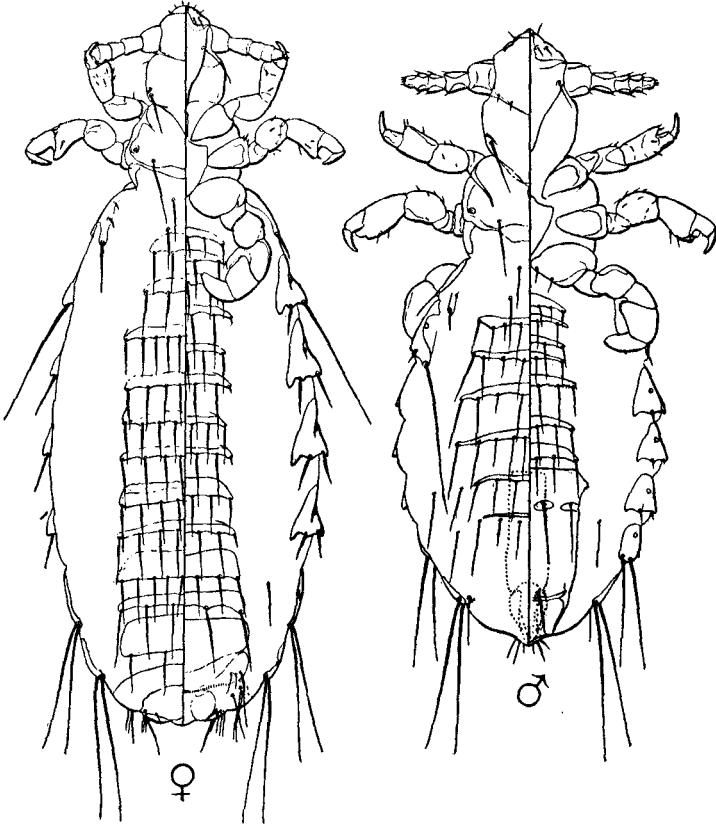


Fig. 136.—*Polyplax cummingsi* Ferris, male and female, from the types.

size, posterior legs stout, the trochanter attached to the coxa in such a manner that normally the legs are disposed beneath the abdomen.

Pleural plates (Fig. 137*A*) as follows: plates of the second segment divided into two small pieces, each with a short seta; plates of the third to sixth segments triangular, the ventral posterior angle produced into a tooth, each with a pair of short setæ except those of the third segment which have the dorsal seta about twice as long as the plate itself; plates of the seventh and eighth segments small, with the usual long setæ.

Tergal and sternal plates of the abdomen occupying about the median

half, rather weakly chitinized, the tergal plates with for the most part eight to ten slender setæ, the sternal plates with four to six.

MALE (Fig. 136). Length .9 mm. *Head* as in the female, the antennæ not modified. *Pleural plates* as in the female except that the setæ are somewhat smaller.

Tergal and sternal plates of the abdomen slender, the tergal plates occupying slightly more than one-half of the width of the body, the sternal plates slightly less than half, the sternal plates arranged in the typical

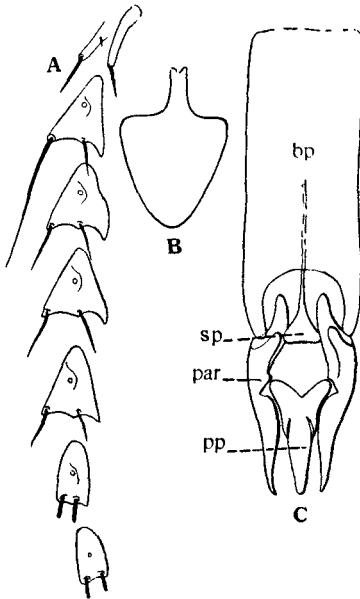


Fig. 137.—*Polyplax cummingsi* Ferris: A, pleural plates of female; B, sternal plate; C, genitalia of male; from the types.

manner. Tergal plates with for the most part six to eight small setæ of variable lengths, the sternal plates with four to six.

Genitalia (Fig. 137C) with the basal plate (*bp*) short and broad, the posterior angles produced; parameres (*par*) a little more than half as long as the basal plate, tapering, sub-parallel, enclosing the wedge-shaped pseudopenis (*pp*) and a small statumen penis (*sp*).

NOTES.—For reasons which are now entirely incomprehensible I at one time (ref. cited) assigned some specimens of this species to *Polyplax gracilis* and described others as *P. cummingsi*. I am not now able to see any special differences between these two lots nor is it at all probable that the species is *P. gracilis*, in fact upon re-reading the description of the latter it becomes evident that it is not.

On the basis of the character of the genitalia *P. cummingsi* belongs to the group of *P. otomydis*, differing from the latter chiefly in the lesser extent of the tergal and sternal plates of the abdomen in the female and in the form of the genitalia of the male.

15. *Polyplax jonesi* Kellogg and Ferris.

Figs. 138, 139.

1915. *Polyplax jonesi* Kellogg and Ferris, *Ann. Durban Mus.* 1: 151-2; pl. 15, f. 3-3e.
 1916. *Polyplax jonesi* K. and F., Ferris, *ibid.* 1: tf. 23B, 26B.
 1916. *Polyplax jonesi* K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Sci.* (4) 6: 173.

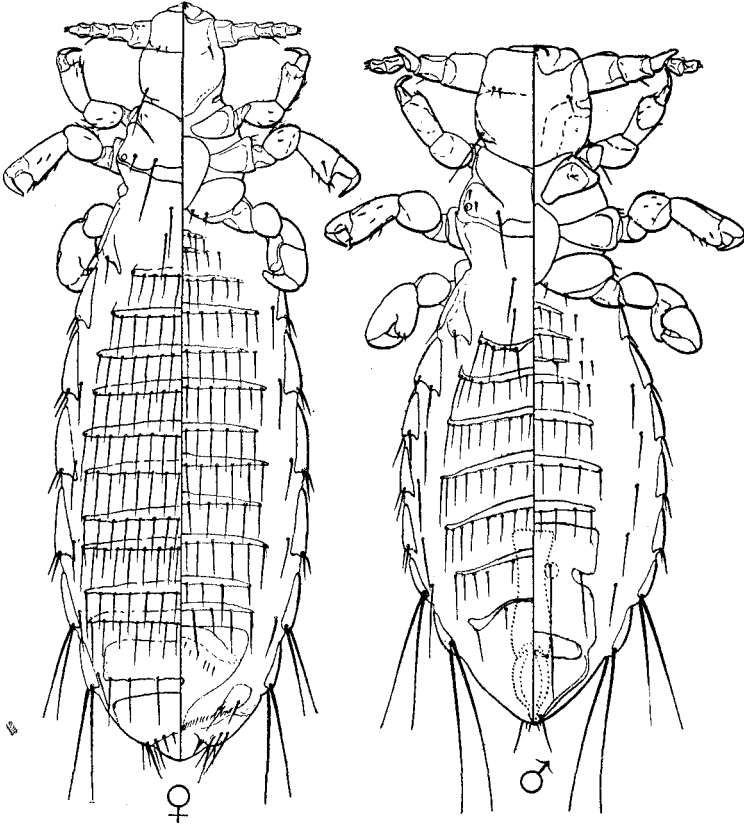


Fig. 138.—*Polyplax jonesi* Kellogg and Ferris, male and female; from the types.

PREVIOUS RECORDS. From *Saccostomus campestris*, Mfongosi, Zululand.

SPECIMENS EXAMINED. Only as above recorded.

FEMALE (Fig. 138). Length 1.4 mm. Head slightly longer than wide, acutely rounded in front of the antennæ which are set close to the apex; with the post-antennal angles almost obsolete but with a distinctly constricted occipital region, the lateral margins of the hind head almost parallel; antennæ with the first segment not especially enlarged. Thorax

slightly shorter than the head, with the lateral margins convex; sternal plate (Fig. 139B) oval; legs of ordinary form, the middle pair larger than the first and somewhat longer, although much less stout, than the posterior pair.

Pleural plates (Fig. 139A) as follows: plates of the first segment divided into a narrow ventral and a broader dorsal piece, each with a small seta; plates of the third to sixth segments triangular, with each posterior angle produced into a very slight tooth, that of the ventral side

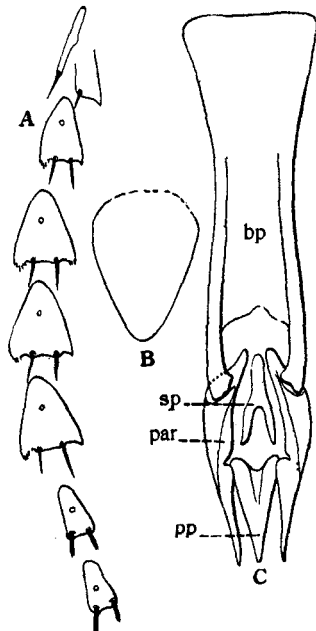


Fig. 139.—*Polyplax jonesi* Kellogg and Ferris: A, pleural plates of female; B, sternal plate; C, genitalia of male; from the types.

broader and somewhat frayed, each plate with a pair of small, stout setæ; plates of the seventh and eighth segments smaller, each with the usual pair of long setæ.

Tergal and sternal plates of the abdomen reaching almost from pleurite to pleurite but rather slender, the tergal plates with for the most part as many as fourteen to eighteen small, slender setæ, the sternal plates with twelve to fourteen.

MALE (Fig. 138). Length .8 mm. *Head* broader and more nearly truncate anteriorly than in the female; antennæ with the first segment much enlarged and with the third segment strongly modified.

Tergal and sternal plates of the abdomen arranged in the typical

manner, the tergal plates occupying the greater part of the width of the body and bearing as many as sixteen or seventeen small setæ, the sternal plates occupying about the median half of the body and with for the most part eight or nine small setæ.

Genitalia (Fig. 139C) with the basal plate moderately slender, the parameres (*par*) about half as long as the basal plate, tapering, sub-

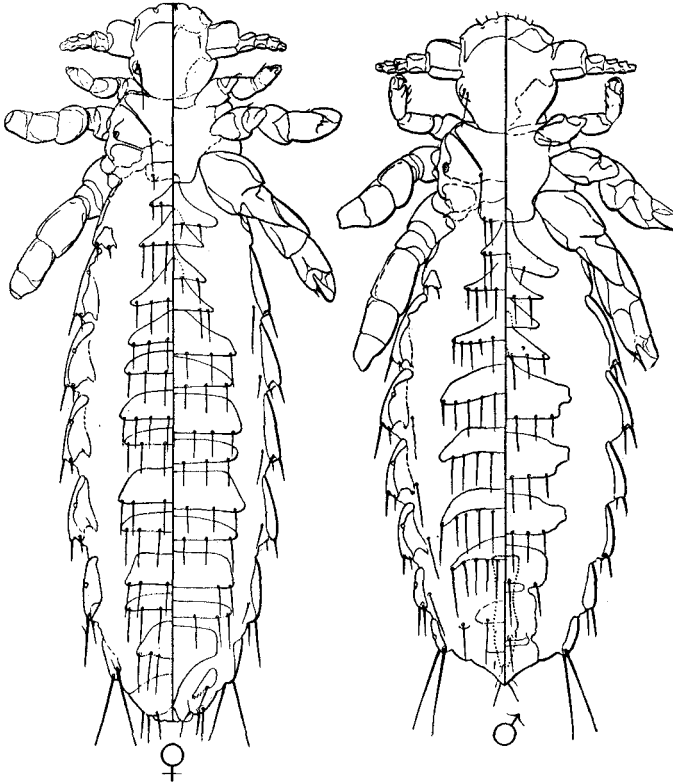


Fig. 140.—*Polyplax auricularis* Kellogg and Ferris, male and female, from the types.

parallel and enclosing the short, wedge-shaped pseudopenis (*pp*) and the small statumen penis (*sp*).

NOTES.—This is a member of the *P. otomydis* group, distinguished chiefly by the form of the head, the chaetotaxy and form of the pleural plates and the modified antennæ of the male.

16. *Polyplax auricularis* Kellogg and Ferris.

FIGS. 140, 141.

1915. *Polyplax auricularis* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.*, p. 13-15; tf. 2; pl. 1, f. 4; pl. 4, f. 8.

1916. *Polyplax auricularis* K. and F., Ferris, *Psyche* 23: 99.

1916. *Polyplax auricularis* K. and F., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 172.

PREVIOUS RECORDS. Types from *Peromyscus maniculatus rubidus*, Inverness, Marin County, California. Also from *Peromyscus sitchensis prevostensis*, Forrester Island, Alaska; *Peromyscus maniculatus gambeli*, Yosemite National Park, California; *Onychomys torridus pulcher*, Victorville, California; *O. leucogaster arcticeps*, Colorado Springs, Colorado.

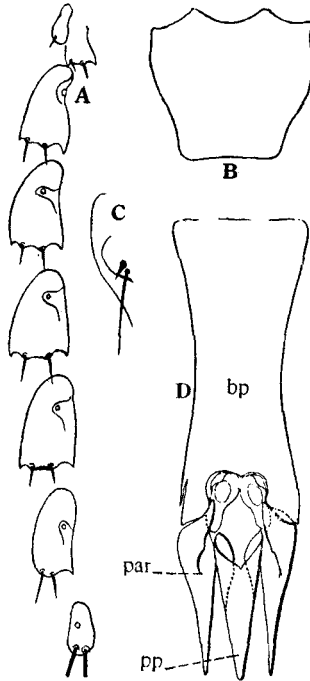


Fig. 141.—*Polyplax auricularis* Kellogg and Ferris: *A*, pleural plates of female; *B*, sternal plate; *C*, lateral margin of hind head; *D*, genitalia of male; from the types.

SPECIMENS EXAMINED. All those upon which the above records are based and the following: *Peromyscus* sp., Woodward, Oklahoma; *Reithrodontomys mexicanus*, Tohontepec, Chiapas, Mexico, (U. S. N. M. 68685) and *Neotomodon allstoni*, near Mexico City, Mexico (U. S. N. M. 50656).

FEMALE. (Fig. 140). Length 1.5 mm. Head as broad as long, broadly rounded in front of the antennæ, which are set close to the anterior margin; with the post-antennal angles prominent and rounded, the posterior lateral angles represented by a small, ear-like flap which is set

somewhat in from the lateral margin (Fig. 141C) and from which arise the usual setæ, the lateral margins of the hind head roundly convex and strongly convergent; antennæ with the first segment much enlarged. *Thorax* scarcely longer than the head, the lateral margins convex; sternal plate (Fig. 141B) very broad, ill defined; middle and posterior legs nearly of equal size except for the coxæ of the hind legs which are much enlarged.

Pleural plates (Fig. 141A) as follows: first pair divided, the dorsal lobe broader than the ventral and bearing two small setæ, the ventral with but one; plates of the third to sixth segments each with a slight tooth at each posterior angle and with a pair of small setæ; plates of the seventh segment with a tooth at the dorsal angle only and with two small setæ; plates of the eighth segment small, with the usual long setæ.

Tergal and sternal plates of the abdomen well developed, occupying about the median half of the body, for the most part with six small setæ.

MALE (Fig. 140). Length 1.1 mm. *Head* as in the female except the third antennal segment modified.

Tergal and sternal plates of the abdomen arranged in the typical manner, large, occupying the median half of the body, the tergal plates with for the most part eight to ten small setæ, the sternal with four to six.

Genitalia (Fig. 141D) with the basal plate quite broad, the parameres (*par*) tapering, parallel, enclosing the wedge-shaped pseudopenis (*pp*).

NOTES.—This species in the form of the genitalia of the male is a member of the *otomydis* group but it is easily recognizable from the peculiar form of the head and the sternal plate alone.

17. *Polyplax brachyrrhynchus* Cummings.

FIGS. 142, 143.

1915. *Polyplax brachyrrhynchus* Cummings, *Proc. Zool. Soc. London*, p. 246-251, 265-8; tf. 1-3, 13-14.

1916. *Polyplax brachyrrhynchus* Cumm., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 172.

PREVIOUS RECORDS. From *Acomys cahirinus*, Assiut, Egypt.

SPECIMENS EXAMINED. From *Acomys hystrella*, Nimule, Uganda (U. S. N. M. 165216) and *Acomys percivali*, Marsabit Road, British East Africa (U. S. N. M. 182953).

FEMALE (Fig. 142). A very slender species. Length 1.4 mm. *Head* somewhat longer than broad, truncate in front of the antennæ which are set close to the anterior margin; with slight post-antennal angles and with a distinctly constricted occipital region, the lateral margins of the hind head sub-parallel; antennæ with the first segment not greatly enlarged. *Thorax* about as long as the head and scarcely wider, the lateral margins

nearly straight and parallel; sternal plate obsolete, the coxæ of all the pairs of legs almost contiguous; middle legs but little larger than the anterior; posterior legs relatively very large and stout.

Pleural plates as follows: each except the first with a pair of long

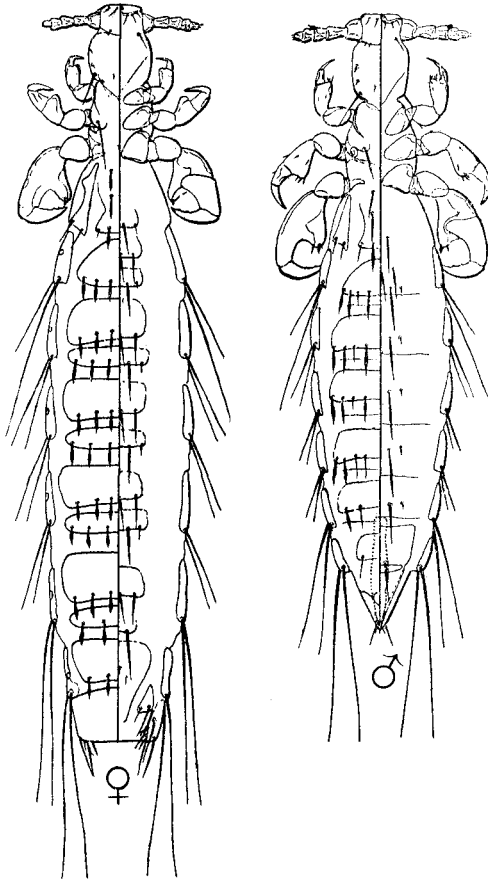


Fig. 142.—*Polyplax brachyrrhynchus* Cumm., male and female, from specimens from *Acomys hystrella*.

setæ; first pair not divided longitudinally; plates of the third to eighth segments quite small, without a tooth at the posterior angles.

Tergal plates strongly developed, occupying the greater part of the width of the abdomen, the anterior plate of each pair the larger, for the most part with six short but stout, clavate setæ (Fig. 143B). *Sternal plates* very weakly developed and confined to less than the median half of the abdomen, with from two to four slender setæ.

MALE (Fig. 142). Length 1.1 mm. *Head* as in the female, except the third segment of the antennæ slightly modified.

Tergal plates strongly developed and large, with for the most part eight setæ of which part are slender and part are stout and clavate as in the female. *Sternal plates* lacking, the rows of setæ departing from the typical arrangement in that there are two rows on the third segment only; rows of setæ consisting for the most part of a median pair of long and an outer pair of very small setæ.

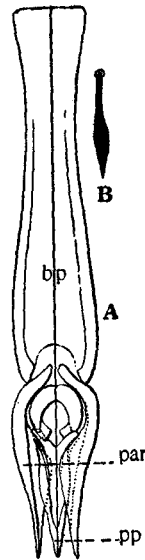


Fig. 143.—*Polyplax brachyrrhynchus* Cumm.: A, genitalia of male; B, seta from abdomen; from specimens from *Acomys hystrella*.

Genitalia (Fig. 143A) with the basal plate (*bp*) long and slender; parameres (*par*) slightly less than half as long as the basal plate, tapering, sub-parallel, enclosing the rather long, wedge-shaped pseudopenis (*pp*) and a ring-shaped piece which is perhaps the statumen penis (*sp*).

NOTES.—This is, in the character of the male genitalia, a member of the *P. otomydis* group but it is a very distinctive species, recognizable at once by the attenuated form, the peculiarly shaped setæ of the abdominal tergites and the entire absence of a sternal plate on the thorax. It seems to occur normally in company with *P. oxyrrhynchus* and these two species form one of the very few cases in which two species of the same genus occur normally together on the same host.

18. *Polyplax phthisica* n. sp.

FIGS. 144, 145.

SPECIMENS EXAMINED. Holotype, a female, and allotype from *Lophuromys aquilus*, Ngani Narok River, British East Africa (U. S. N. M. 162548). Also from *L. zena*, Molo, British East Africa (F. C. M. 16866); *L. sikapusi pyrrhus*, Rhino Camp, Uganda (U. S. N. M. 165210),

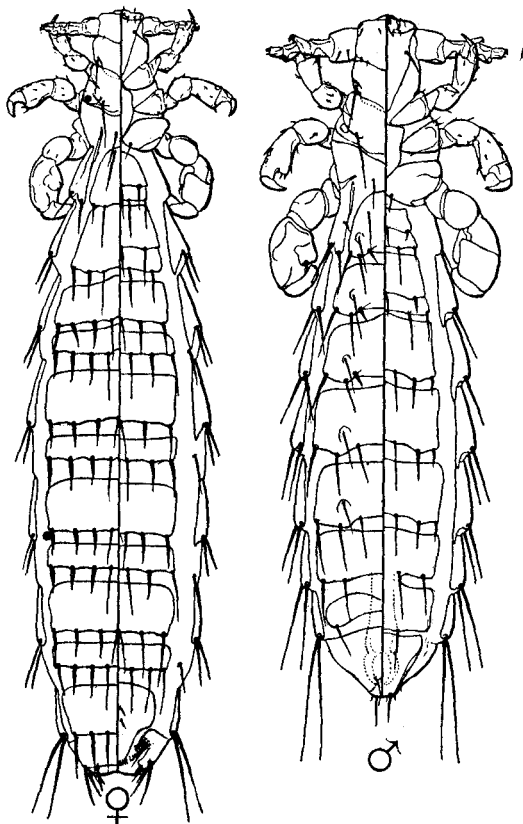


Fig. 144.—*Polyplax phthisica* n. sp., male and female, from the types.

and *Lophuromys* sp., Mlanje Plateau, Nyasaland (British Museum). A single specimen from *Thamnomys ibeanus*, British East Africa (F. C. M. 17097) is possibly a straggler.

FEMALE (Fig. 144). A very slender species. Length 1.5 mm. Head relatively very small, about as broad as long, truncate in front of the antennæ, which are set close to the anterior margin; with very slight post-antennal angles and a distinctly constricted occipital region, the lateral margins of the hind head almost parallel; antennæ with the basal

segment but little enlarged. *Thorax* slightly less than twice as long as the head and but little wider, the lateral margins slightly convex; sternal plate (Fig. 145*B*) shield-shaped; middle legs somewhat larger than the anterior, the posterior legs short and stout.

Pleural plates (Fig. 145*A*) as follows: each with a pair of setæ which are as long as the plate itself; plates of the first segment not divided longitudinally; plates of the third to sixth segments very slender, with the

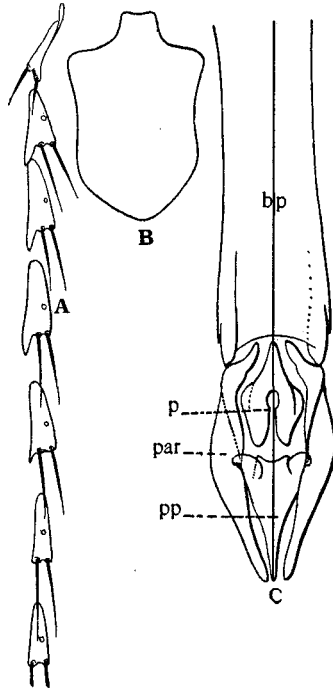


Fig. 145.—*Polyplax phthisica* n. sp.: *A*, pleural plates of female; *B*, sternal plate; *C*, genitalia of male; from the types.

ventral angle produced into a short tooth; plates of the seventh and eighth segments smaller, without teeth.

Tergal and sternal plates of the abdomen occupying the greater part of the width of the body, the anterior plate of each pair much larger than the posterior. Tergal plates with for the most part seven to eight setæ of which part are stout but sharply pointed; the others slender; sternal plates with for the most part five or six setæ, similar to those on the dorsum. Posterior margin of the plates slightly emarginate between the setæ.

MALE (Fig. 144). Length 1 mm. *Head* as in the female except the first segment of the antennæ much enlarged and the third strongly modified.

Tergal and sternal plates of the abdomen arranged in the typical manner, strongly developed, occupying the greater part of the surface. Tergal plates with the median half of the posterior margin slightly emarginate, the lateral prominences bearing three quite stout setæ. Cephalad of these setæ, on the second to sixth segments, is a single small seta well removed from the posterior margin. Sternal plates likewise slightly emarginate medially but with the setæ evenly spaced, with for the most part four to six in each row.

Genitalia (Fig. 145C) with the basal plate (*bp*) moderately stout; parameres (*par*) more than half as long as the basal plate, tapering, sub-parallel, enclosing the acute, wedge-shaped pseudopenis (*pp*) and a ring-shaped statumen penis (*sp*).

NOTES.—In its slender form this species approaches *P. brachyrrhynchus* but the shape of the sternal plate and pleural plates and the form of the tergal plates of the male are very distinctive.

19. *Polyplax oxyrrhynchus* Cummings.

FIGS. 146, 147.

1915. *Polyplax oxyrrhynchus* Cummings, *Proc. Zool. Soc. London*, p. 251-65; ff. 4-6, 8, 9, 11-13.
 1916. *Polyplax oxyrrhynchus* Cumm., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 174.

PREVIOUS RECORDS. From *Acomys cahirinus*, Assiut, Egypt.

SPECIMENS EXAMINED. A male and a female from *Acomys hystrella*, Nimule, Uganda (U. S. N. M. 165216) and a single female from *A. percivali*, Marsabit Road, British East Africa (U. S. N. M. 182953).

FEMALE (Fig. 146). General form quite slender. Length 1.5 mm. *Head* about twice as long as wide, acutely pointed in front of the antennæ which are set well back from the apex; with very slight post-antennal angles and without a constricted occipital region, the lateral margins of the hind head nearly straight and slightly convergent; antennæ with the first segment not greatly enlarged. *Thorax* very small, scarcely more than half as long as the head and but little wider, with the lateral margins angularly convex; sternal plate (Fig. 147B) shield-shaped; legs of ordinary form, the middle pair but little larger than the anterior, the posterior pair very large and stout.

Pleural plates (Fig. 147A) as follows: each with a pair of setæ as long or longer than the plate itself; plates of the second segment distinctly divided longitudinally, the parts very small; plates of the third to sixth

segments slender, elongate, each with a short tooth at the ventral posterior angle; plates of the seventh and eighth segments without teeth.

Tergal and sternal plates of the abdomen strongly developed, occupying about three-fourths of the width of the body, the anterior plate of

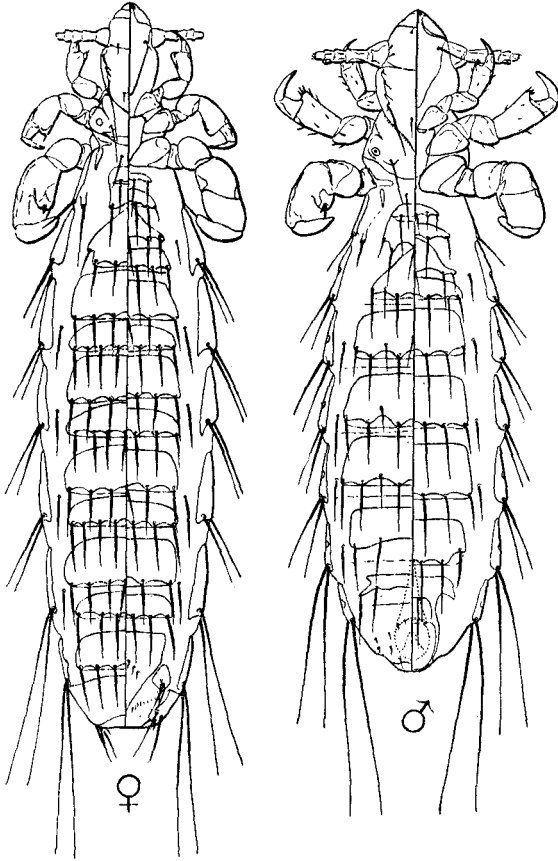


Fig. 146.—*Polyplax oxyrrhynchus* Cum., male and female, from specimens from *Acomys hystrella*.

each pair about twice as long as the posterior, the plates with for the most part six to eight quite large setæ. Posterior margin of the plates emarginate between the setæ.

MALE (Fig. 146). Length 1 mm. *Head* as in the female, the antennæ not modified.

Tergal and sternal plates of the abdomen arranged in the typical manner, strongly developed, with for the most part six to eight setæ. Plates emarginate between the setæ.

Genitalia (Fig. 147C) with the basal plate (*bp*) strongly expanded posteriorly; parameres (*par*) laterally compressed and strongly curved, forming almost a circle, enclosing the Y-shaped pseudopenis (*pp*) and the penis (*p*).

NOTES.—This is to be regarded as a member of the *P. otomydis* group. The character of the pleural plates and the peculiar genitalia of the males are distinctive characters. It appears to occur normally in company with *P. brachyrrhynchus*, as has been pointed out in connection with the latter.

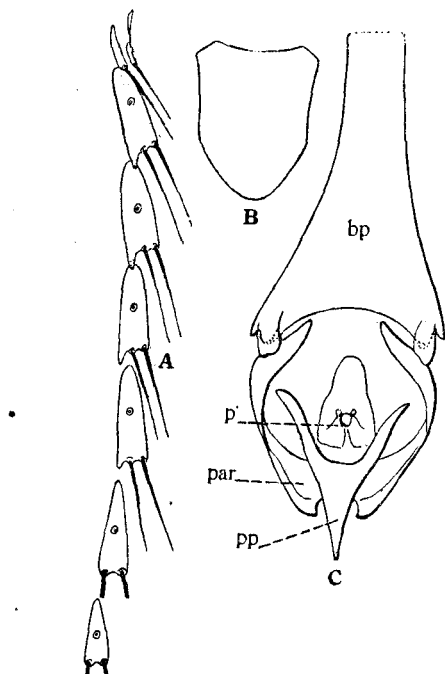


Fig. 147.—*Polyplax oxyrrhynchus* Cumm.: A, pleural plates of female; B, sternal plate; C, genitalia of male.

20. *Polyplax arvicanthus* Bedford.

FIGS. 148, 149.

1919. *Polyplax arvicanthus* Bedford, *Rept. Div. Vet. Res., Dept. Agric., Un. S. Africa* 5-6: 716-7; pl. 1, f. 3, 6. (Captions of figures labeled *P. arvicanthus*.)

PREVIOUS RECORDS. From *Arvicanthus* (= *Arvicanthus*) *pumilio*, Onderstepoort, Pretoria, South Africa.

SPECIMENS EXAMINED. From *Arvicanthus pumilio diminutis*, Mt. Kenya, British East Africa (U. S. N. M. 164194) and from the type host and locality, the latter received through the kindness of Mr. Bedford.

FEMALE (Fig. 148). Length 1.2 mm. *Head* as broad as long, narrowly truncate anteriorly, with the antennæ set close to the apex, with rounded post-antennal angles, the lateral margins of the hind head slightly convergent, the posterior lateral angles represented by small processes

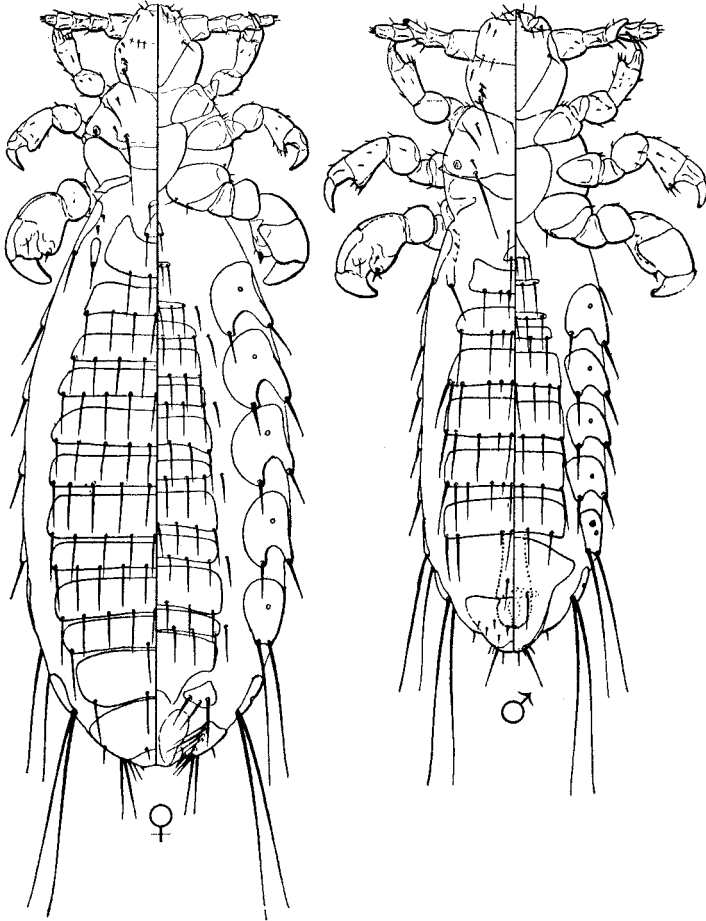


Fig. 148.—*Polyplax arvicantis* Bedford, male and female, from specimens from *Arvicantis pumilio*, Anderstepoort, South Africa.

slightly removed from the margin; antennæ with the basal segment not greatly enlarged. *Thorax* much longer and broader than the head, the lateral margins strongly convex; sternal plate as in Fig. 149B; anterior and middle legs nearly of the same size, the posterior legs large and stout.

Pleural plates of an unusual form; plates of the second segment

divided into two small lobes, each bearing a short seta; plates of the third to sixth segments large, the dorsal margin nearly straight, the ventral margin almost semi-circular, the posterior margin with a deep emargination, each of the points formed by this emargination bearing a short seta; plates of the seventh and eighth segments smaller, without the posterior emargination and with the usual long setæ.

Tergal and sternal plates strongly developed, the former occupying nearly the entire width of the abdomen, the latter the median half. *Tergal*

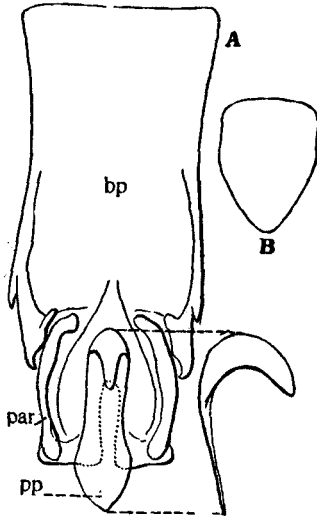


Fig. 149.—*Polyplax arvicantis* Bedford: *A*, genitalia of male; *B*, sternal plate; from specimens from *Arvicantis pumilio*, Anderstepoort, South Africa.

plates with for the most part eight to ten small setæ, the sternal plates with six or seven.

MALE (Fig. 148). Length .6 mm. *Head* broader than in the female, the basal segment of the antennæ enlarged, the third segment modified.

Tergal and sternal plates of the abdomen arranged in the typical manner, large, occupying the greater part of the surface of the abdomen. *Tergal plates* with for the most part ten to twelve setæ of variable lengths, the *sternal plates* with six or seven.

Genitalia (Fig. 149*A*) with the basal plate very broad, the posterior angles produced; parameres (*par.*) short, nearly parallel and flattened at the apex so fused with the endomerical pieces as to be difficult to distinguish; pseudopenis (*pp*) enclosed between the parameres, the base bent upward in the form of a strong hook as in the species of the *spinulosa* group.

NOTES.—The very peculiar pleural plates and genitalia of the male separate this species widely from all the others of the genus except the next, which, in the female at least is somewhat of the same type.

The proper spelling of the name of this species is doubtful owing to typographical errors in the original description. I have adopted the spelling *arvicanthis*.

21. *Polyplax abyssinica* n. sp.

FIG. 150.

MATERIAL EXAMINED. Females only; one, the holotype, from *Arvicanthus abyssinicus nubilans*, Bugondo Teso, Uganda; two from the same host, S. Bugishu, Bubulu, Uganda; one from *Otomys tropicalis elgonis* and

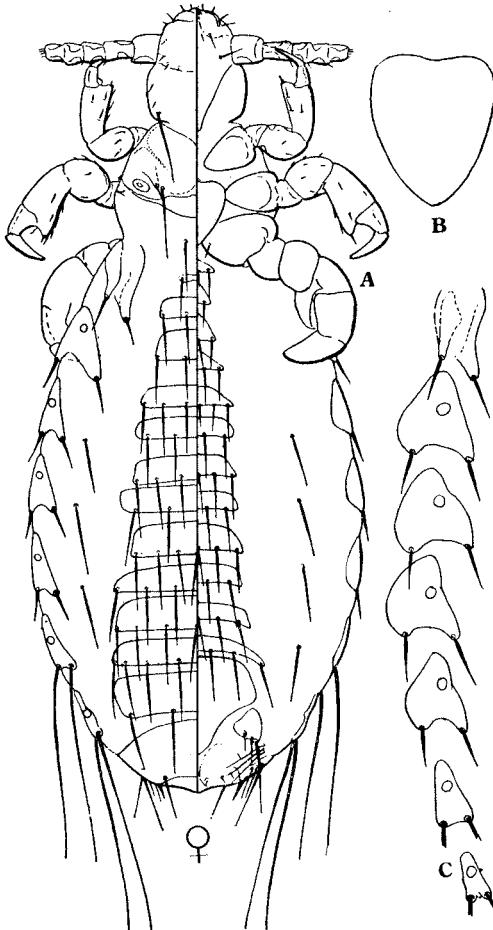


Fig. 150.—*Polyplax abyssinica* n. sp.: A, female; B, sternal plate; C, pleural plates; from the holotype.

one from *Cenomys bacchante*, N. Bugishu, Sipi, Uganda. All these are included in material received as a loan from the British Museum and are deposited in the collections of that institution.

FEMALE (Fig. 150A). Length 1.2 mm. *Head* slightly longer than wide, slightly produced in front of the antennæ; with very slight post-antennal angles but with a distinctly constricted occipital region, the lateral margins of the hind head very slightly convex and nearly parallel. *Thorax* about as long as the head, the lateral margins rather roundly convex; sternal plate (Fig. 150B) cordate.

Pleural plates (Fig. 150C) as follows: plates of the second segment very distinctly divided into two lobes, each of which bears a short seta; plates of the third to sixth segments triangular in form with the posterior margin slightly emarginate, the dorsal margin nearly straight and the ventral margin somewhat convex, each posterior angle with a short seta; plates of the seventh and eighth segments small, more or less triangular, with the usual long setæ; spiracles noticeably large.

Tergal and sternal plates of the abdomen well developed but small, the tergal plates occupying scarcely the median half of the abdomen and bearing for the most part six or seven slender setæ, the sternal plates occupying a third or less of the width of the abdomen and bearing for the most part four or five slender setæ.

NOTES.—This species is evidently quite close to *P. arvicanthis* but is easily separable by the much smaller tergal and sternal plates and the smaller and less deeply emarginate pleural plates.

22. *Polyplax insulsa* n. sp.

FIGS. 151, 152A-C.

SPECIMENS EXAMINED. From *Epimys sabanus*, Bunguran, Natuna Islands (U. S. N. M. 104765). Holotype a female.

FEMALE (Fig. 151). Length 1.05 mm. *Head* relatively large, acute anteriorly, with the antennæ set somewhat back from the apex; post-antennal angles slight, rounded; without a constricted occipital region, the lateral margins of the hind head nearly straight, very slightly convergent; antennæ with the first segment not greatly enlarged. *Thorax* shorter than the head, with the lateral margins strongly angulate; sternal plate (Fig. 152B) very small, almost quadrate; middle legs nearly as large as the posterior but with more slender claw, posterior legs very stout, the outer proximal angle of the tarsus with a small tooth-like projection.

Pleural plates (Fig. 152A) as follows: plates of second segment divided into two small pieces, the ventral with a short seta, the dorsal with a very long seta; plates of the third to sixth segments triangular with a small dorsal tooth and a longer ventral process; plates of the third segment

with the dorsal seta very long, the ventral short, the others with the setæ nearly equal and short; plates of the seventh segment with but a slight dorsal tooth and with a pair of long setæ; plates of the eighth segment small, with the usual long setæ.

Tergal plates very slender and occupying but the median half of the

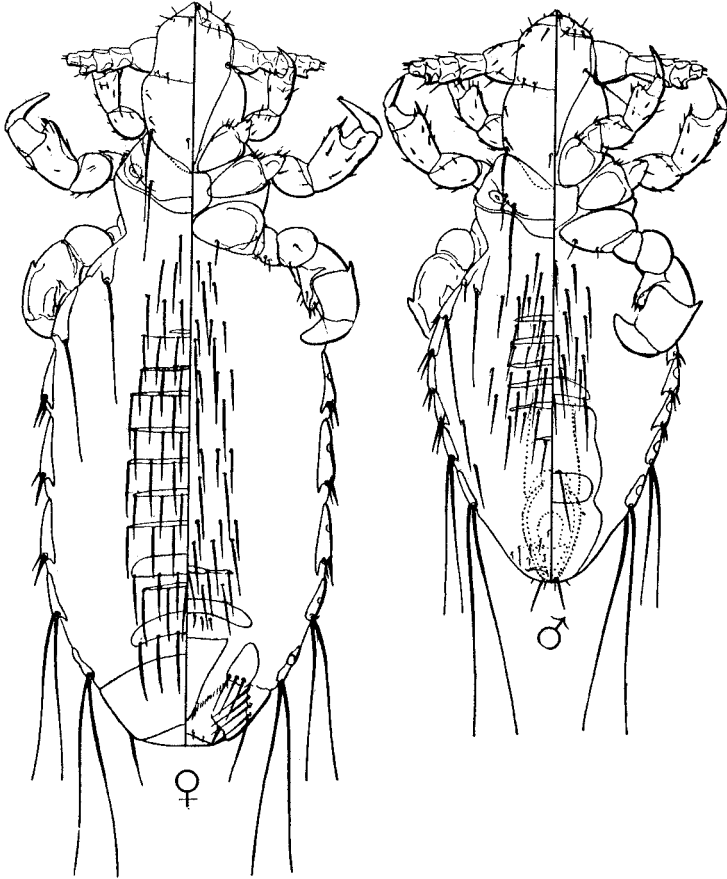


Fig. 151.—*Polyplax insulsa* n. sp., male and female.

abdomen, with for the most part six rather large setæ. *Sternal plates* undeveloped, except for the seventh segment and the genital plate; rows of setæ confined to less than the median half of the abdomen, each with four to six setæ.

MALE (Fig. 151). Length .6 mm. *Head* as in the female, the antennæ not modified.

Tergal plates of the abdomen slender and occupying not more than the median half, the rows of setæ with for the most part six or seven. *Sternal plates* undeveloped except for the very large genital plate, which extends forward nearly to the middle of the abdomen, and the plate of the seventh segment; rows of setæ containing but four setæ, apparently departing from the typical arrangement in that there are two rows on not more than one of the segments (second or third probably).

Genitalia (Fig. 152C) with the basal plate very broad, the parameres (*par*) more than half as long as the basal plate, curved and somewhat

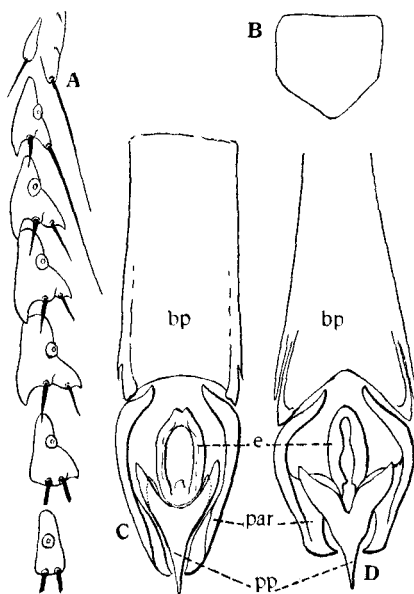


Fig. 152.—*Polyplax insulsa* n. sp.: A, pleural plates of female; B, sternal plate; C, genitalia of male. *Polyplax asiatica* n. sp.: D, genitalia of male.

flattened at the tips, enclosing the Y-shaped pseudopenis and a ring-shaped endomerale piece (*e*) which surrounds the penis (*p*).

NOTES.—This species is possibly a member of the *otomydis* group. The small sternal plate of the thorax, the character of the pleural plates, the absence of sternal plates on the abdomen and the character of the genitalia of the male are distinctive. Its nearest relative is the next species.

23. *Polyplax asiatica* n. sp.

FIG. 152D.

SPECIMENS EXAMINED. Holotype, a female, and allotype from *Crociodura caerulea*, a shrew, Rangoon, Burma (Nuttall). Several females from

a murine rodent, *Nesokia harwickii*, Quetta, Beluchistan (U. S. N. M. 200314) appear to be the same species and it is possible that the normal hosts are rodents.

FEMALE. Practically identical with the female of *P. insulsa* except for the absence of the tergal and sternal plates on the abdomen, the genital plate alone being developed. Size somewhat larger, length 1.3 mm.

MALE. Practically as in the male of *P. insulsa* except that the genital plate is much smaller and the details of the genitalia are slightly different (Fig. 152D). Length .9 mm.

NOTES.—It is possible that this should not be recognized as distinct from *P. insulsa*, at least as anything more than a subspecies. However, the material is scanty and nothing is known as to the possible range of variation and as the two forms are recognizably different they may for the present be separated.

24. *Polyplax gracilis* Fahrenholz.

1910. *Polyplax gracilis* Fahrenholz, *Zool. Anz.* 35: 317.

1912. *Polyplax gracilis* Fahr., Fahrenholz, *Jahresb. d. Niedersäch. Zool. Ver.* 2-4: 42; tf. 16-17; pl. 1, f. 10-11.

1916. *Polyplax gracilis* Fahr., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 173 (part).

PREVIOUS RECORDS. From *Micromys* (= *Mus*) *minutus*, Europe.

NOTES.—I have not seen specimens of this species. As far as may be judged from the original description and figures of Fahrenholz it is a member of the *spinulosa* group, although the genitalia of the male were not described. According to Fahrenholz it differs from *spinulosa* in having the post-antennal and post-lateral angles of the head more rounded, the head thus appearing more slender and in the chaetotaxy of the abdomen, the pleural plates being the same.

According to the description: "Die übrigen Borsten des Abdomens sind wesentlich schwächer als bei *Polyplax affinis*, nur das mittlere Paar der einzelnen Segmente auf der Dorsalseite des ♂ sind verhältnis mässig kräftig gebaut; dieselben Borstenpaare des fünften, sechsten und siebten Segments bieten ausserdem noch ein besonderes Artmerkmal, da sie dem vorderen Segmentrande viel näher stehen als der stets am Hinterrande inserierten Querreihe der übrigen Borsten ihres Segments."

I have previously erroneously identified as this species, specimens from South Africa that I now refer to *Polyplax cummingsi* Ferris.

25. *Polyplax calva* Waterston.

FIGS. 153, 154.

1917. *Polyplax calva* Waterston, *Parasitology* 9: 199-212; figs.

PREVIOUS RECORDS. Types from *Cricetomys gambianus*, Accra. Also from *Cricetomys* sp., Zanzibar. The host is a murine rodent.

SPECIMENS EXAMINED. From *Cricetomys gambianus*, Accra (received through the kindness of Miss A. M. Evans); *C. gambianus osgoodi*, Mazeras, British East Africa (U. S. N. M. 181806); *C. gambianus enguwi*,

Taita Mts., British East Africa (U. S. N. M. 183125); *Cricetomys* sp., Voi, British East Africa (F. C. M. 17043).

FEMALE (Fig. 153). Length 1.9 mm. *Head* at least twice as long as broad, acutely rounded anteriorly, the antennæ set well back from the apex; with no post-antennal angles, the hind head merely somewhat swollen, but with a distinctly constricted occipital region; antennæ slender,

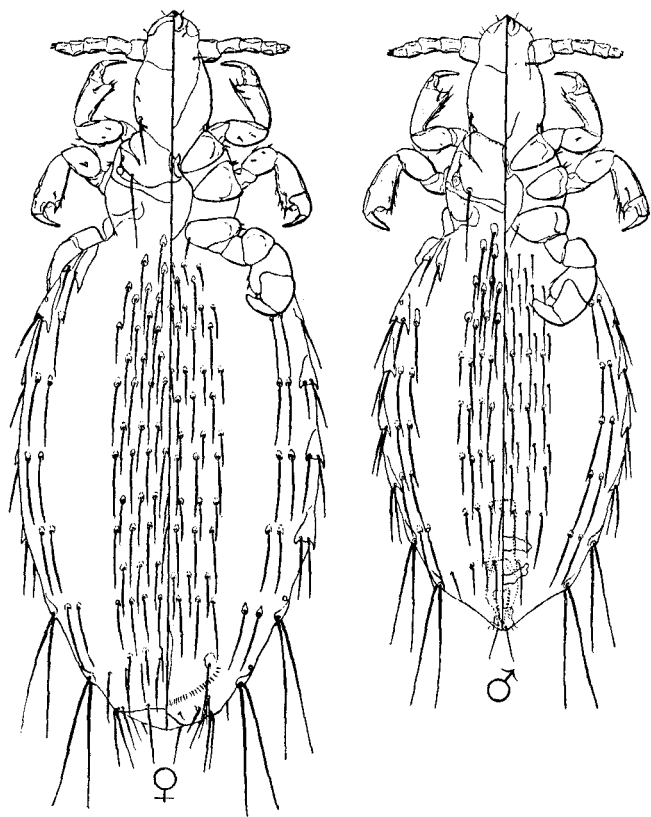


Fig. 153.—*Polyplax calva* Waterston, male and female, from specimens from *Cricetomys gambianus*, Accra.

the basal segment not enlarged. *Thorax* about as long as the head, with the lateral margins convex; sternal plate (Fig. 154B) with a handle-like anterior piece composed of two longitudinally separated parts; anterior and middle legs quite large, but slender, posterior legs stout.

Pleural plates (Fig. 154A) relatively very small, all, except on the second segment, nearly quadrate in shape, with the posterior angles slightly produced and with a pair of long stout setæ on the posterior margin,

except on the seventh and eighth segments where the usual slender setæ are present; plates of the second segment divided longitudinally into a small ventral piece and an elongate dorsal piece.

Tergal and sternal plates of the abdomen entirely lacking. Setæ arranged in three series, a median group of for the most part six or eight and on the third to eighth segments a lateral group of one or two close to the margin on each side. All the setæ are quite long.

MALE (Fig. 153). Length 1.5 mm. *Head* as in the female, the antennæ not at all modified.

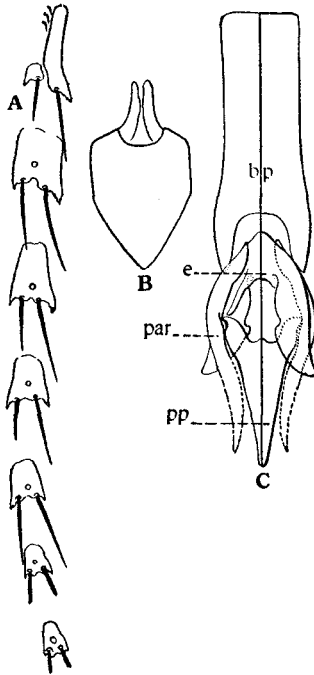


Fig. 154.—*Polyplax calva* Waterston: A, pleural plates; B, sternal plate; C, genitalia of male; from specimens from *Cricetomys gambianus*, Accra.

Tergal and sternal plates of the abdomen entirely lacking except for the very small genital plates. Setæ distributed in three series as in the female, the arrangement of the rows departing from that typical in *Polyplax* in that there are two rows on the second to sixth sternites.

Genitalia (Fig. 154C) with the basal plate (*bp*) rather short, the posterior angles produced; parameres (*par*) more than half as long as the basal plate curved, enclosing the stout wedge-shaped pseudopenis. At the base of the parameres is a piece in the form of an inverted V which possibly represents the endomeres.

NOTES.—This species departs so far from typical *Polyplax* that its inclusion in the genus is perhaps open to question and certainly complicates the generic diagnosis. However, it may remain here for the present.

26. *Polyplax miacantha* Speiser.

1905. *Polyplax miacantha* Speiser, *Centralbl. f. Bakter., Originale*, **38**: 318-9. (The figure does not belong with this.)
 1908. *Polyplax miacantha* Speiser, Dalla Torre, "Anoplura," *Gen. Ins.* p. 13.
 1916. *Polyplax miacantha* Speiser, Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) **6**: 173.

PREVIOUS RECORDS. Recorded as found "auf einer kleinen Ratte mit sehr dicken stachelartigen Haaren in der Sammlung des Zoologischen Museums zu Königsberg i. Pr., die nebst 2 anderen Mus-Arten in demselben Glase als aus Salomona in Abessinien stammend bezeichnet war. . . ." Described from the female alone.

NOTES.—The original description of this species is entirely inadequate and will not permit a decision even as to the generic position.

The only important points in this description may be summarized as follows: length 1.5-1.75 mm.; head as long as broad, produced in front of the antennæ so that the latter stand about two-fifths of the length of the head back from the apex; thorax smaller anteriorly than the hind head, becoming somewhat broader posteriorly, longer than broad posteriorly, dorsally without setæ; sternal plate shield-shaped; anterior legs small, with slender claw, middle legs longer and with strong, rather thick claw, posterior legs very short, heavy and compressed; abdomen with but one thorn-like seta on the lateral margin of the fourth to seventh segments.

The species is likely to remain unrecognizable until the types have been examined.

Genus *NEOHÆMATOPINUS* Mjöberg.

1910. *Neohæmatopinus*, Mjöberg, *Arkiv f. Zool.* **6**, 13: 160.
 1910. *Acanthopinus*, Mjöberg, *ibid.* **6**, 13: 160.
 1912. *Neohæmatopinus*, Cummings, *Bull. Ent. Res.* **3**: 393.
 1914. *Linognathoides*, Cummings, *ibid.* **5**: 159.
 1915. *Linognathoides*, Kellogg and Ferris, "Anoplura and Mall. North Amer. Mamm.," *Stanford Univ. Publ.* p. 23.
 1915. *Neohæmatopinus*, Kellogg and Ferris, *ibid.* p. 35.
 1915. *Lutegus*, Fahrenholz, *Archiv f. Naturges.* **81**, 11: 31.
 1916. *Linognathoides*, Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) **6**: 158.
 1916. *Neohæmatopinus*, Ferris, *ibid.* p. 168.

Anoplura without eyes; with five-segmented antennæ which are usually sexually dimorphic, the third segment in the male having the distal pre-axial angle more or less produced and bearing one or two stout, recurved setæ, some species having the first segment in both sexes with the distal, post-axial angle bearing a very stout seta or with such a seta near the posterior margin of this segment; with the anterior legs small and weak, the middle and posterior legs much larger, sub-equal and with stout claw; pleural plates always present on the second to eighth segments and at

times in vestigial form on the first segment, the plates of the second segment showing no traces of a longitudinal division; female with two (exceptionally three) rows of setæ on the second to seventh tergites and the second to sixth sternites of the abdomen, these either accompanied wholly or in part by, or entirely without, chitinized plates; male always with two rows of setæ on the second tergite and the second to sixth sternites of the abdomen, exceptionally with two rows on the second to sixth tergites, the second plate of the second tergite always more or less emarginate posteriorly; sternal plates of third abdominal segment never, and of the second rarely, extending from pleurite to pleurite; head usually with strong post-antennal angles and a distinctly constricted occipital region; genitalia of the males of no constantly distinctive type.

HOSTS. Occurring characteristically on rodents of the family *Sciuridæ*, the squirrels, ground squirrels, marmots and the like, and the family *Petauristidæ*, the flying squirrels. Two species occur on rodents of the family *Muridæ*, the particular species infested being of the so-called "wood rats" or "pack rats" of western United States and Mexico.

TYPE OF THE GENUS. *Hæmatopinus sciuropteri* Osborn.

SYNONYMICAL LIST OF NAMES PREVIOUSLY USED IN THE GENUS.

NOTE.—Names in italics are synonyms of the names with which they are coupled. The genera *Acanthopinus*, *Linognathoides* and *Lutegus* are considered as synonyms of *Neohæmatopinus* and names used in these genera are included as if used in *Neohæmatopinus*.

antennatus (Osborn).

Neohæmatopinus sciurinus (Mjöberg).

antennatus var. *semifasciatus* Ferris.

Neohæmatopinus sciurinus (Mjöberg).

citelli (Cummings).

Linognathoides citelli Cummings.

Linognathoides spermophili Cummings (not of Grube).

columbianus (Osborn).

Neohæmatopinus læviusculus (Grube).

faurei (Bedford).

Linognathoides faurei Bedford. (Generic position doubtful; to be considered later.)

echinatus (Neumann).

Hæmatopinus (*Polyplax*) *echinatus* Neumann.

heliosciuri Cummings.

inornatus (Kellogg and Ferris).

Linognathoides inornatus Kellogg and Ferris (part).

inornatus (Kellogg and Ferris) (part; misidentification).

Neohæmatopinus sciurinus (Mjöberg).

læviusculus (Grube).

Pediculus læviusculus Grube.

Pediculus spermophili Grube.

- Hæmatopinus læviusculus* (Grube).
Polyplax læviuscula (Grube).
Linognathoides læviusculus (Grube).
Hæmatopinus montanus Osborn.
Polyplax montana (Osborn).
Linognathoides montanus (Osborn).
Hæmatopinus columbianus Osborn.
Polyplax columbiana (Osborn).
Enderleinellus læviusculus (Grube).
macrospinosus Fahrenholz.
Neohæmatopinus sciurinus (Mjöberg).
montanus (Osborn).
Neohæmatopinus læviusculus (Grube).
pacificus Kellogg and Ferris.
pectinifer (Neumann).
Hæmatopinus setosus Piaget (not of Burmeister).
Linognathoides setosus (Piaget).
Hæmatopinus (*Polyplax*) *pectinifer* Neumann.
Linognathoides pectinifer (Neumann).
Lutegus pectinifer (Neumann).
sciurinus (Mjöberg).
Acanthopinus sciurinus Mjöberg.
Hæmatopinus antennatus Osborn (not of Piaget).
Polyplax (?) *antennata* (Osborn).
Acanthopinus antennatus (Osborn).
Neohæmatopinus antennatus (Osborn).
Neohæmatopinus macrospinosus Fahrenholz.
Neohæmatopinus antennatus var. *semifasciatus* Ferris.
Linognathoides inornatus Kellogg and Ferris (part; misidentification).
sciuropteri (Osborn).
Hæmatopinus sciuropteri Osborn.
Polyplax (?) *sciuropteri* (Osborn).
setosus (Piaget) (not of Burmeister).
Neohæmatopinus pectinifer (Neumann).

NOTES.—At first glance this genus, as I here interpret it, seems to form a rather heterogeneous group. The strongly modified first antennal segment of such species as *N. sciurinus* would seem to separate these species quite sharply from the others in which this character does not appear and to form an excellent generic character. It is in fact upon this that the genus *Acanthopinus* was originally based. But it is evident from the rather large amount of material that is available to me that this character is of no real importance for some specimens in which this peculiar modification appears scarcely or not at all are not separable in any other way from specimens in which it is strongly developed. In fact it is questionable in some cases that it is even of specific value.

With this character removed from consideration there remains nothing of significance by which the genus can be divided and there are several characters by which the included species are quite closely bound together. The only really disturbing species are *N. petaristæ* n. sp. and *N. batuanæ* n. sp. which seem really to belong here but which require a considerable stretching of the generic definition in order to permit

their inclusion. These two species might perhaps stand as one subgeneric group, with another for *N. citelli*, *laviusculus*, *marmota* and *pectinifer* and another for the typical forms, but I see no necessity for subgenera at present.

N. pectinifer has been made the type of the genus *Lutegus* but this appears to be strictly congeneric with *Linognathoides*, even were the latter to be separated from *Neohæmatopinus*.

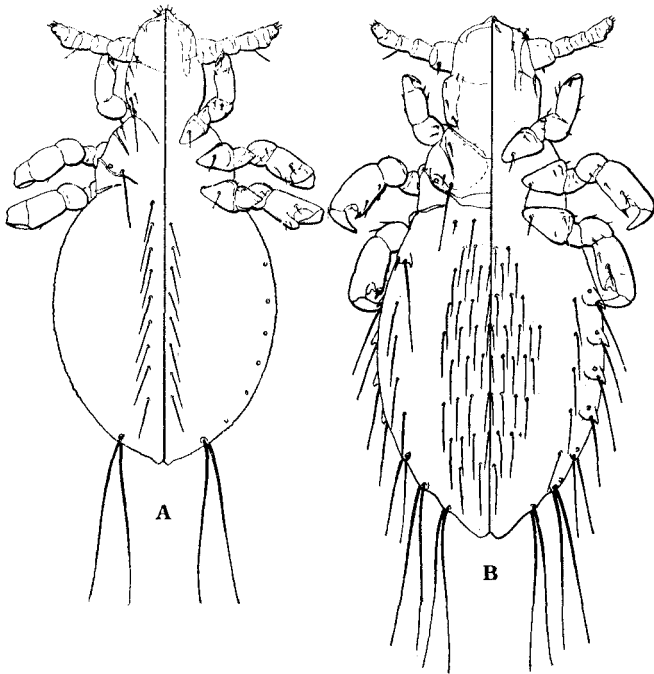


Fig. 155.—*Neohæmatopinus sciurinus* (Mjöberg): A, first (?) stage; B, second (?) stage; from specimens from the type material.

The nearest relatives of the genus appear to be *Polyplax* on the one side and *Eulinognathus* on the other. From the former it is separable chiefly by the non-divided pleural plates of the second abdominal segment and the distribution of the abdominal setæ in the male together with the emarginate second tergal plate in the male. This plate in its typical development is quite distinctive (Fig. 157A) and evidences of the emargination are to be seen in all the species here included under *Neohæmatopinus*. From *Eulinognathus* it is separable chiefly by the distribution of the abdominal setæ and the absence of the emarginate second tergal plate in the male of the latter.

The genus as I here understand it includes fifteen species, of which six are here described as new. Specimens of at least one sex of all the described species have been available for examination.

The immature stages are very poorly represented in my material. In Fig. 155A is shown what is possibly the first stage of *N. sciurinus* and in Fig. 155B what is possibly the second stage. Specimens of *N. laviusculus* are present which are undoubt-

edly the same stages and which differ relatively little from those figured. It may be noted that the enlarged seta at the distal post-axial angle of the first antennal segment, which is so conspicuous in typical *sciurinus*, appears in this second (?) stage well removed from the angle.

1. *Neohæmatopinus sciuropteri* (Osborn).

Figs. 156, 157.

1891. *Hæmatopinus sciuropteri* Osborn, U. S. Dept. Agric., Div. Ent., Bull. (o. s.) 7: 23-4; f. 12.
 1896. *Hæmatopinus sciuropteri* Osborn, Osborn, *ibid.*, Bull. (n. s.) 5: 182-3; f. 105.
 1904. *Polyplax* (?) *sciuropteri* (Osborn), Enderlein, Zool. Anz. 28: 143.
 1908. *Polyplax* (?) *sciuropteri* (Osborn), Dalla Torre, "Anoplura," Gen. Ins. p. 14.
 1910. *Neohæmatopinus sciuropteri* (Osborn), Mjöberg, Ark. f. Zool. 6, 13: 160; f. 79.
 1912. *Neohæmatopinus sciuropteri* (Osborn), Cummings, Bull. Ent. Res. 3: 393.
 1915. *Neohæmatopinus sciuropteri* (Osborn), Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," Stanford Univ. Publ., p. 36; pl. 1, f. 1; pl. 5, f. 2, 13.
 1916. *Neohæmatopinus sciuropteri* (Osborn), Ferris, "Cat. Anoplura," Proc. Cal. Acad. Sci. (4) 6: 170.
 1916. *Neohæmatopinus sciuropteri* (Osborn), Ferris, Psyche 23: 101-2; f. 1-2.

PREVIOUS RECORDS. From *Sciuropterus volans* (= *volucella*), Ames, Iowa (Osborn); *Sciuropterus* sp., Eureka, California (Kellogg and Ferris); *Sciuropterus* (= *Glaucomyx*) *sabrinus lascivus*, Yosemite National Park, California (Ferris).

SPECIMENS EXAMINED. Those upon which the above records by Ferris, and Kellogg and Ferris were based.

FEMALE (Fig. 156). A quite elongate and slender species. Length 1.9 mm. Head as broad as long, broadly rounded anteriorly, with the antennæ set close to the anterior margin, with the post-antennal angles very prominent, the lateral margins of the hind head nearly straight and parallel, the occipital region greatly constricted; under side of the head with the gular region elevated; first segment of antennæ with a very stout seta about the middle. Thorax about as long as and but little wider than the head; sternal plate (Fig. 157D) somewhat kite-shaped, with the posterior angles produced.

Pleural plates as follows: plates of the first segment represented by a small, weakly chitinized piece which bears a pair of small setæ; plates of the second to sixth segments each with the posterior angles produced into a strong tooth and each with a pair of setæ on the posterior margin which are about as long as the plate; plates of the seventh and eighth segments smaller, without teeth and with a pair of moderately long setæ.

Tergal and sternal plates strongly developed, reaching nearly from pleurite to pleurite, bearing for the most part six to eight slender setæ, a plate accompanying each row of setæ.

MALE (Fig. 156). Length 1.4 mm. *Antennæ* (Fig. 157*B*) with the first segment longer than in the female (Fig. 157*C*) and with the distal, pre-axial angle of the third segment strongly produced and bearing a pair of stout, recurved setæ.

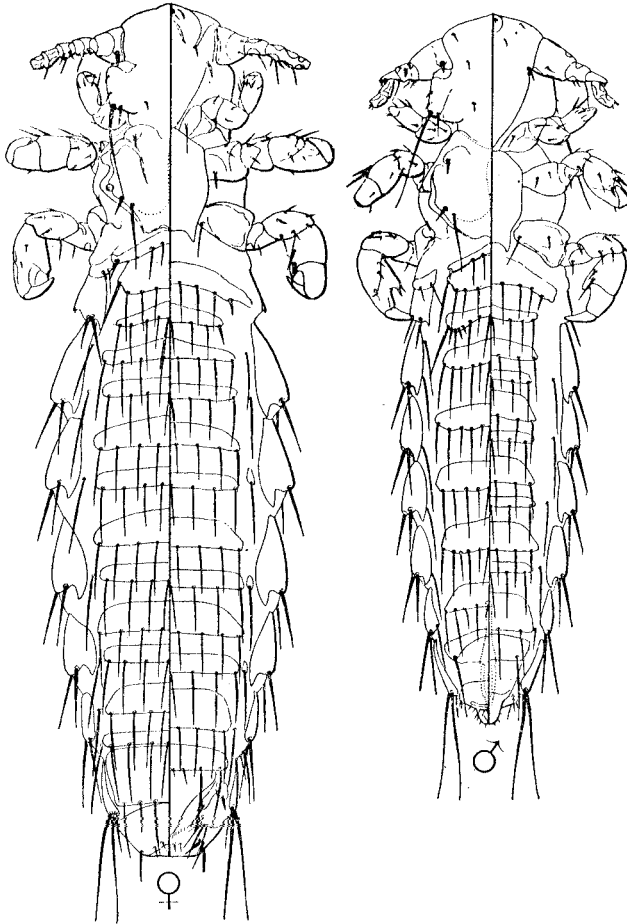


Fig. 156.—*Neohamatopinus sciuropteri* (Osborn), male and female, from specimens from *Sciuropterus sabrinus lascivus*, California.

Tergal and sternal plates strongly developed, arranged in the typical manner, a plate accompanying each row of setæ. Second plate of the second tergite (Fig. 157*A*) strongly emarginate posteriorly, with a cluster of small setæ at each end. Tergal plates with for the most part ten to twelve setæ of variable lengths; sternal plates with for the most part five to six small setæ.

Genitalia (Fig. 157E) with the basal plate (*bp*) quite long and slender; parameres (*par*) more than half as long as the basal plate, nearly straight and parallel, enclosing the ring-shaped endomeral piece (*e*), the penis (*p*) and the stout, wedge-shaped pseudopenis (*pp*).

NOTES.—This is a very distinct species, marked especially by the very broad head, the character of the antennæ, the strong development of the tergal and sternal plates of the abdomen and the genitalia of the male. Its nearest relatives are to be found in *N. sciurinus* and similar species.

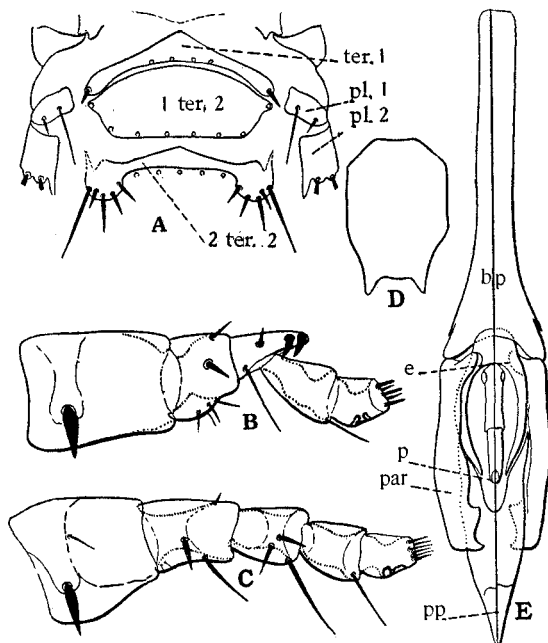


Fig. 157.—*Neohæmatopinus sciuropteri* (Osborn): A, tergal plates of the first and second abdominal segments; B, antenna of male, C, antenna of female; D, sternal plate; E, genitalia of male; from specimens from *Sciuropterus sabrinus lascivus*, California.

2. *Neohæmatopinus sciurinus* (Mjöberg).

(Synonymy under subspecies).

2a. *Neohæmatopinus sciurinus sciurinus* (Mjöberg).

FIGS. 155, 158, 159.

1891. *Hæmatopinus antennatus* Osborn, U. S. Dept. Agric. Div. Ent., Bul. 7, o. s.: 25; f. 13 (not of Piaget).
 1896. *Hæmatopinus antennatus* Osb., Osborn, *ibid.*, Bul. 5, n. s.: 183-4; fig. 106.
 1904. *Polyplax* (?) *antennata* (Osb.), Enderlein, Zool. Anz. 28: 143.
 1908. *Polyplax* (?) *antennata* (Osb.), Dalla Torre, "Anoplura," Gen. Ins., p. 13.
 1910. *Acanthopinus antennatus* (Osb.), Mjöberg, Ark. f. Zool. 6: 161.

1910. *Acanthopinus sciurinus* Mjöberg, *ibid.* 6: 161-4; figs. 80-3.
 1912. *Neohæmatopinus sciurinus* (Mjöberg), Cummings, *Bull. Ent. Res.* 3: 393.
 1915. *Neohæmatopinus antennatus* (Osborn), Kellogg and Ferris, "Anoplura and Mallophaga N. Amer. Mamm.," *Stanford Univ. Publ.*, p. 36-7; tf. 14a-b; pl. 5, f. 10; pl. 6, f. 5.
 1916. *Neohæmatopinus antennatus* (Osborn), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 169.
 1916. *Neohæmatopinus antennatus* var. *semifasciatus* Ferris, *ibid.*, p. 169 (without description).
 1916. *Linognathoides inornatus* Kellogg and Ferris, Ferris, *ibid.*, p. 158 (part; mis-identification).
 1916. *Neohæmatopinus antennatus* var. *semifasciatus* Ferris, *Psyche* 23: 100.
 1916. *Linognathoides inornatus* Kellogg and Ferris, Ferris, *ibid.*, p. 100.
 1919. *Neohæmatopinus macrospinosus* Fahrenholz, *Jahresb. des Niedersäch. Zool. Ver.* 5-10: 24.

PREVIOUS RECORDS. From *Sciurus niger rufiventer* (= *S. cinereus ludovicianus*), Ames, Iowa (Osborn, types of *antennatus*); *S. niger ssp.* (= *S. vulpinus*), Zoological Garden, Hamburg, Germany (Mjöberg, types of *sciurinus*); *S. douglasi mollipilosus* and *S. douglasi albolimbatus*, California (Ferris, types of *antennatus* var. *semifasciatus*); *Neotoma fuscipes streator*, Yosemite National Park, California (Ferris).

SPECIMENS EXAMINED. Several males and females and immature specimens from the type lot of *N. sciurinus*, received through the kindness of Dr. von Brunn of the Hamburg Museum, the specimens upon which the above records by Ferris were based and the following: United States: *Sciurus aberti ferreus*, Colorado Springs, Colorado (U. S. N. M. 12385); *S. carolinensis*, Bayou St. Louis, Mississippi (U. S. N. M. 23691); *S. hudsonicus richardsoni*, Florence, Montana (F. C. Bishop); *S. niger rufiventer*, Indiana and Valentine, Nebraska; "fox squirrel," Victoria, Texas. Mexico: *S. alleni*, Sierra Gaudelupe (U. S. N. M. 11691); *S. apache*, Colonia Garcia, Chihuahua (U. S. N. M. 132347); *S. aureogaster hypopyrrhus*, Quichicon, Oaxaca (U. S. N. M. 73297); *S. collic*, Santiago, Tepic (U. S. N. M. 91245); *S. deppoi*, Teapa, Tabasco (U. S. N. M. 100048); *S. nelsoni*, Huizilac, Morelos (U. S. N. M. 51156); *S. oculatus*, State of Vera Cruz (U. S. N. M. 54235); *S. poliopus*, Cerro San Felipe, Oaxaca (U. S. N. M. 68182); *Hodomys alleni merriami*, Manzanillo (U. S. N. M. 32706). Central America: *Sciurus æstuans hoffmani*, Santa Clara, Costa Rica (U. S. N. M.). South America: *S. versicolor zulia*, Rio Aurare, Venezuela (F. C. M. 18732). Asia, Malayan Region: *Sciurus borneensis*, Pulo Kanchut, Borneo (U. S. N. M. 142319); *S. davisoni*, Trong, Lower Siam (U. S. N. M. 83495); *S. ferrugineus cinnamomeus*, South East Siam (U. S. N. M. 201408); *S. finlaysoni folletti*, Koh Phai Island, Gulf of Siam (U. S. N. M. 201383); *S. finlaysoni portus*, Koh Si Chang Island, Gulf of Siam (U. S. N. M. 201395); *S. juvencus*, Puerto

Princesa, Philippine Islands (U. S. N. M.); *S. procerus*, Bunguran, Natuna Islands (U. S. N. M. 104699); *Lariscus obscurus*, Pagi Island (U. S. N. M. 121644; *Menetes bermorei rufescens*, Koh Kut Island, South East Siam (U. S. N. M. 201426); "Malaysian squirrel," Zoological Garden, London.

All the above hosts are *Sciuridæ* of the sub-family *Sciurinae*, the "tree

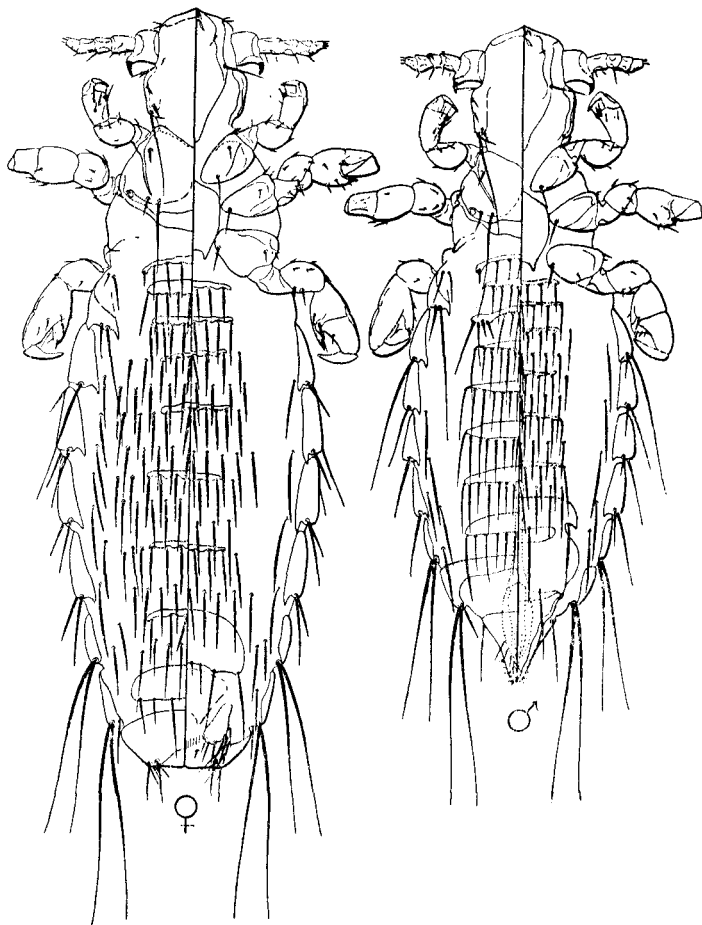


Fig. 158.—*Neohæmatopinus sciurinus* (Mjöberg), from specimens from the type lot of *sciurinus*.

squirrels," except the genera *Neotoma* and *Hodomys*, which belong to the sub-family *Cricetinae* of the *Muridæ*.

FEMALE (Fig. 158). Length 2 mm. Head somewhat longer than broad, broadly rounded anteriorly with a slight median point, with the

antennæ set close to the anterior margin; with prominent post-antennal angles and a strongly constricted occipital region, the lateral margins of the hind head nearly straight and slightly convergent; ventral side with a raised gular region. Antennæ typically with the distal, post-axial angle somewhat produced and terminating in a stout, recurved seta but varying

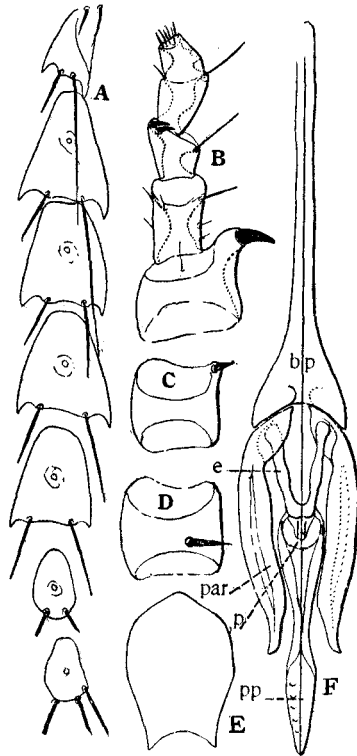


Fig. 159.—*Neohamatopinus sciurinus* (Mjöberg): *A*, pleural plates of female; *B*, antenna of male; *E*, sternal plate; *F*, genitalia of male; from specimens from type lot of *sciurinus*; *C*, first segment of antenna from specimen from *Sciurus carolinensis*; *D*, first segment of antenna from specimen from *Neotoma fuscipes streator*.

from this to an entire absence of this seta or with the seta reduced in size and removed from the apex of the segment.

Thorax about as long as the head and considerably wider, the lateral margins quite strongly convex; sternal plate (Fig. 159*E*) somewhat kite-shaped, with the posterior angles produced.

Pleural plates (Fig. 159*A*) as follows: plates of the first segment represented merely by a pair of small setæ; plates of the third to sixth

segments quite large, with the posterior angles produced into a short tooth and with a pair of slender setæ which are about as long as the plate itself, except the dorsal seta on the second and third segments which is longer than the plate; plates of the seventh and eighth segments quite small, with the usual long setæ.

Tergal and sternal plates developed only in connection with the anterior row of setæ on each segment, except on the second where there are two plates both dorsally and ventrally; plates typically quite small and slender but much larger in some specimens. On the dorsum the rows of setæ are practically continuous across the abdomen and contain for the most part from eight to fourteen setæ. On the ventral side they are restricted to the median portion of the abdomen, with for the most part six to ten setæ in each row and with a single seta on each segment near the pleural plate.

MALE (Fig. 158). Length 1.5 mm. *Antennæ* strongly modified (Fig. 159B) the third segment with the distal pre-axial angle produced and bearing a pair of stout, recurved setæ at the apex.

Tergal plates of the abdomen strongly developed, bearing for the most part ten to fourteen slender setæ of variable lengths. *Sternal plates* developed only in connection with the anterior row of setæ except on the second segment, small and slender. Setæ confined to the median portion of the abdomen, the rows for the most part with seven to eight, the third to seventh segments with a single seta at each side near the pleurite.

Genitalia (Fig. 159F) with the basal plate (*bp*) long and slender and slightly expanded at the apex; parameres (*par*) more than half as long as the basal plate, tapering, nearly parallel, enclosing the small, U-shaped endomerical piece (*e*), the penis (*p*) and the pseudopenis (*pp*). The pseudopenis is somewhat compressed Y-shaped, with the arms slender, the shaft longer than the arms and somewhat lanceolate with the terminal portion transversely ridged.

NOTES.—The specific name *antennatus* having previously been used in the genus *Hæmatopinus* is invalid as applied to the species here under discussion. Fahrenholz has proposed to replace it by the name *macrospinosus* but the species described by Mjöberg as *sciurinus* appears certainly to be identical with Osborn's *antennatus* and therefore the name *macrospinosus* becomes unnecessary and a synonym.

Through the kindness of Dr. von Brunn of the Hamburg Museum I have been enabled to examine specimens from the type lot of *sciurinus* and as specimens from the type host of *antennatus* are at hand I feel no hesitation in placing the two as the same. As to the many other specimens that I am referring to this species, however, there is certainly room for abundant argument.

Typically the first antennal segment in this species has the distal post-axial angle strongly produced and terminating in a very stout, recurved seta, yet I am including in this species specimens in which this seta is even entirely absent or in some cases is far removed from the apex of the segment. Certainly if only these extremes were

available it would seem absurd to unite them under a single species yet I am compelled to this step by the fact that there exists a complete series of intergrades between these two extremes, a series so finely graded that it would be impossible to assign any definite limits were it broken up. Nor are these differences connected with any others that can be of aid in specific differentiation for the only apparent variations are in slight differences in the size of the tergal and sternal plates of the abdomen and in the number of the abdominal setæ.

If the specimens be arranged according to host in a series beginning with those in which the development of this seta is most extreme we have an arrangement as follows. The specimens from *Sciurus aestuans* have the seta even larger than in typical examples. These are followed by part of those from the type host and those from *S. alleni*, *aureogaster*, *hudsonicus*, *collia*, *oculatus*, *darvisoni*, *lancavensis*, and "Malaysian squirrel" which are nearly typical. The specimens from *S. nelsoni*, *apache*, *procerus*, and *Lariscus obscurus* have the seta somewhat reduced in size. Those from *S. carolinensis* (Fig. 159C), *finlaysoni*, *ferrugineus*, *deppoi* and *poliopus* have the seta much reduced in size. Those from *S. borneensis*, *juvencus* and *aberti* have the seta very minute. In part of those from the type host, *S. niger* (Valentine, Nebraska), and in those from *Menetes berdmorei* it appears to be absent. In those from *S. versicolor* and from the two Murid genera *Neotoma* and *Hodomys* the seta is somewhat enlarged but is near the base of the segment and not at the distal post-axial angle (Fig. 159D).

It will be seen from this that there is apparently no constant geographical arrangement in the series and further that in at least one host species, *S. niger*, and that the host of the type both extremes are to be found. In the face of this there appears to be no alternative but to refer all the specimens to a single species. In such cases as this the only solution of the problem lies in the highly difficult approach by the methods of the geneticist.

N. sciurinus was made the type of the genus *Acanthopinus* by Mjöberg but there seems to be no reason for recognizing this genus.

2b. *Neohæmatopinus sciurinus griseicolus* n. ssp.

1915. *Neohæmatopinus antennatus* (Osborn), Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.*, p. 36-7; tf. 14 A-B; pl. 5, f. 10; pl. 6, f. 5 (part; misidentification).
 1916. *Neohæmatopinus antennatus* (Osborn), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 169 (part).

PREVIOUS RECORDS. From *Sciurus griseus* (= *S. fessor nigripes*), Inverness, Marin County; Freestone, Sonoma County, Mount Sanhedrin, Mendocino County, and Mount Hamilton, California.

SPECIMENS EXAMINED. Only as above recorded. Holotype, a female, and allotype from Freestone, Sonoma County.

NOTES.—This form differs from typical *N. sciurinus* only in the complete absence of tergal and sternal plates on the abdomen of the female except for the tergal plates of the first, second, eighth and ninth segments, the sternal plates of the second segment and the genital plate. The male appears not to differ from the typical form. The seta at the distal post-axial angle of the first antennal segment is very strongly developed.

It is possible that further work will show that this form should not be recognized.

3. *Neohæmatopinus pacificus* Kellogg and Ferris.

Figs. 160A-D.

1915. *Neohæmatopinus pacificus* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.*, p. 38-40; tf. 14C, D; pl. 1, f. 2; pl. 5, f. 3, 7a-b.
1916. *Neohæmatopinus pacificus* Kellogg and Ferris, Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 170.
1916. *Neohæmatopinus pacificus* Kellogg and Ferris, Ferris, *Psyche* 23: 100.

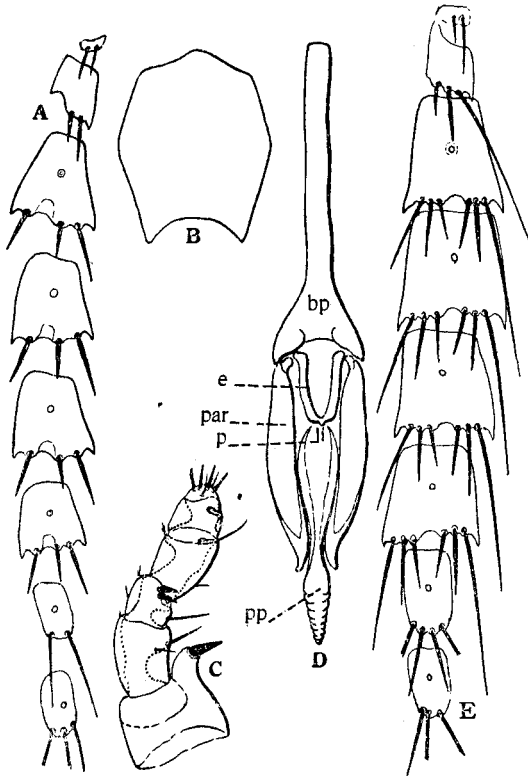


Fig. 160.—*Neohæmatopinus pacificus* Kellogg and Ferris: A, pleural plates; B, sternal plate; C, antenna of male; D, genitalia of male; from paratypes. *Neohæmatopinus syriacus* n. sp.: E, pleural plates of female.

PREVIOUS RECORDS. Types from *Eutamias towsendi oregonensis*, Freestone, Sonoma County, California. Also from *Eutamias hindsi*, Cazadero, Sonoma County, *E. merriami pricei*, Stanford University, *E. alpinus* and *E. speciosus frater*, Yosemite National Park, *Eutamias* sp., South Yolla Bolly Mt., and *Eutamias* sp., Mount Sanhedrin, Mendocino County, California.

The hosts are *Sciurids*, commonly known as "chipmunks."

NOTES.—This species, in general appearance is practically indistinguishable from *N. sciurinus* but it differs sharply in the character of the pleural plates (Fig. 160A), those of the third to sixth segments having two stout setæ, which are shorter than the plate on the dorsal lobe and one on the ventral lobe. The antennæ (Fig. 160C), sternal plate (Fig. 160B) and genitalia of the male (Fig. 160D) are practically as in typical *sciurinus*. The species is smaller than typical *sciurinus*, the female being about 1.4 mm. long and the male 1 mm.

4. *Neohæmatopinus syriacus* n. sp.

FIG. 160E.

SPECIMENS EXAMINED. But two specimens, the holotype, a male, from *Sciurus syriacus*, North Syria (U. S. N. M. 13511), and a female from the same host species, Soumela, Asia Minor (U. S. N. M. 152748).

FEMALE. Length 1.5 mm. In general practically identical with typical *N. sciurinus* as figured (Fig. 158). Differing significantly only in the character of the pleural plates (Fig. 160E); plates of the second segment with three setæ of which the dorsal is long and slender and the others shorter than the plate; plates of the third to sixth segments each with three setæ on each lobe, the ventral seta being about as long as the plate, the four middle setæ about half as long as the plate, the dorsal setæ slender and longer than the plate; plates of the seventh segment with the usual slender setæ and with a pair of short setæ; plates of the eighth segment with the usual slender setæ and with one short seta.

MALE. Length 1.3 mm. Practically identical with the male of typical *N. sciurinus* in every respect except for the pleural plates which differ as in the female.

5. *Neohæmatopinus echinatus* (Neumann).

FIG. 161.

1909. *Hæmatopinus (Polyplax) echinatus* Neumann, *Arch. de Parasit.* 13: 517-21; f. 19-20.

1912. *Neohæmatopinus echinatus* (Neum.), Cummings, *Bull. Ent. Res.* 3: 393.

1916. *Neohæmatopinus echinatus* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 170

PREVIOUS RECORDS. KNOWN only from the original record, from *Funambulus* (= *Sciurus*) *palmarum*, Rajkote, India, and, undoubtedly as an erroneous record, from a bat, *Scotophilus wroughtoni*, Navapour, India.

SPECIMENS EXAMINED. A single male from *Funambulus tristriatus* *tristriatus*, Colombo, Ceylon (U. S. N. M. 114084).

MALE (Fig. 161A). Length 1.52 mm. *Head* as broad as long, smoothly rounded in front and with the antennæ set very close to the anterior margin, with the post-antennal angles very prominent and with

a much constricted occipital region, the lateral margins of the hind head nearly straight and slightly convergent. Ventral side of the head with the gular region elevated. In the angle, just behind the base of the antennæ, is a conspicuous chitinized spot. Antennæ with the first segment elongated and bearing a slightly enlarged seta near the distal post-axial angle; with the third segment strongly modified.

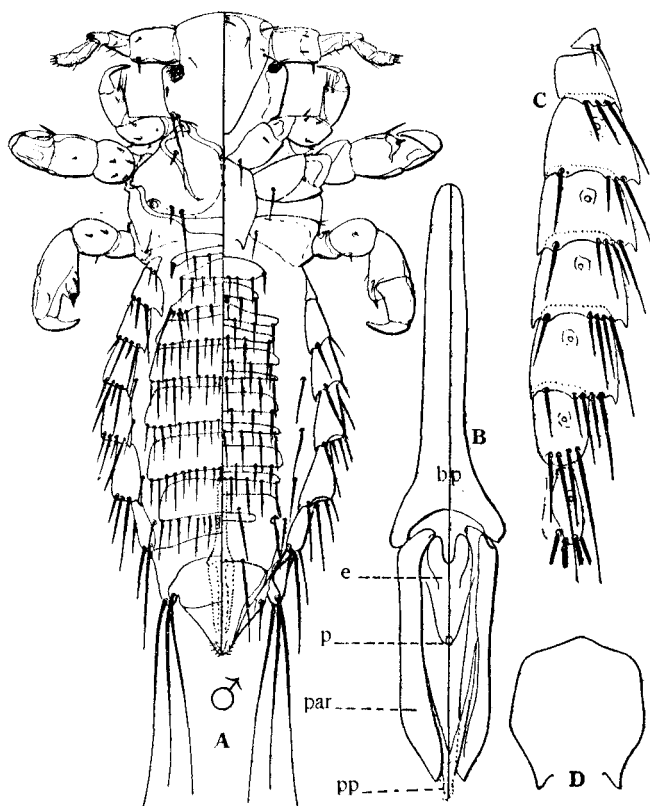


Fig. 161.—*Neohamatopinus cchinatus* (Neumann): *A*, male; *B*, genitalia of male; *C*, pleural plates; *D*, sternal plate; from specimen from *Funambululus tristriatus tristriatus*, Colombo, Ceylon.

Thorax about as long as the head and much broader; sternal plate (Fig. 161*D*) rather short and broad, somewhat kite-shaped.

Pleural plates (Fig. 161*C*) as follows: plates of the first segment represented merely by a small, chitinized area bearing a pair of small setæ; plates of the second segment with a small tooth at the dorsal posterior angle and with three setæ on the posterior margin; plates of the

third to sixth segments each with a small tooth at each posterior angle, with a single seta on the ventral lobe and four stout setæ on the dorsal lobe; plates of the seventh segment with two moderately long and two shorter setæ; plates of the eighth segment with three very long and one short seta.

Tergal and sternal plates of the abdomen present in connection with each row of setæ, both dorsally and ventrally, the rows of setæ arranged in the typical manner. Tergal plates very large, occupying the greater part of the dorsal surface and bearing for the most part as many as twenty small slender setæ. Sternal plates slender, for the most part with six or seven setæ.

Genitalia (Fig. 161*B*) with the basal plate (*bp*) slender, expanded posteriorly; parameres (*par*) more than half as long as the basal plate, nearly parallel; enclosing the small pseudopenis (*pp*), the penis (*p*) and a vague endomeral piece (*e*).

FEMALE. According to the original description the female has the abdominal setæ arranged in the normal manner, but nothing is said as to the development of the plates. Length 1.94 mm. according to Neumann.

NOTES.—This is a very distinctive species, the form of the antennæ, the broad head and the character of the pleural plates marking it at once. It is possible that the specimen examined by me is not really referable to *echinatus* for according to Neumann's description and figures the fourth to sixth segments have three or four setæ on the ventral lobe instead of one. In all other respects, however, my single specimen agrees exactly with *echinatus* and being from a host of the same genus and from the same region there is good reason for accepting it as that species.

6. *Neohæmatopinus inornatus* (Kellogg and Ferris).

FIGS. 162, 163.

1915. *Linognathoides inornatus* Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.*, p. 25-7; tf. 10; pl. 2, f. 1; pl. 4, f. 7; pl. 5, f. 5; pl. 6, f. 3.
1916. *Linognathoides inornatus* Kellogg and Ferris, Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 158 (part).
1916. *Linognathoides inornatus* Kellogg and Ferris, Ferris, *Psyche* 23: 100 (part).

PREVIOUS RECORDS. Type from *Neotoma cinerea occidentalis*, South Yolla Bolly Mountain, Tehama County, California. Also from *N. cinerea cinerea*, Yosemite National Park, California. Specimens doubtfully recorded as this species by Ferris, from *N. fuscipes streatoris*, are here referred to *N. sciurinus*.

The hosts are *Murids*, commonly known as "bushy tailed wood rats."

SPECIMENS EXAMINED. Those upon which the above records are based.

FEMALE (Fig. 162). Length 1.6 mm. *Head* slightly longer than

broad, smoothly rounded anteriorly; with the antennæ set close to the anterior margin; with the post-antennal angles rounded, with a distinctly constricted occipital region and with the lateral margin of the hind head somewhat convex. Ventral side of the head with the gular region slightly

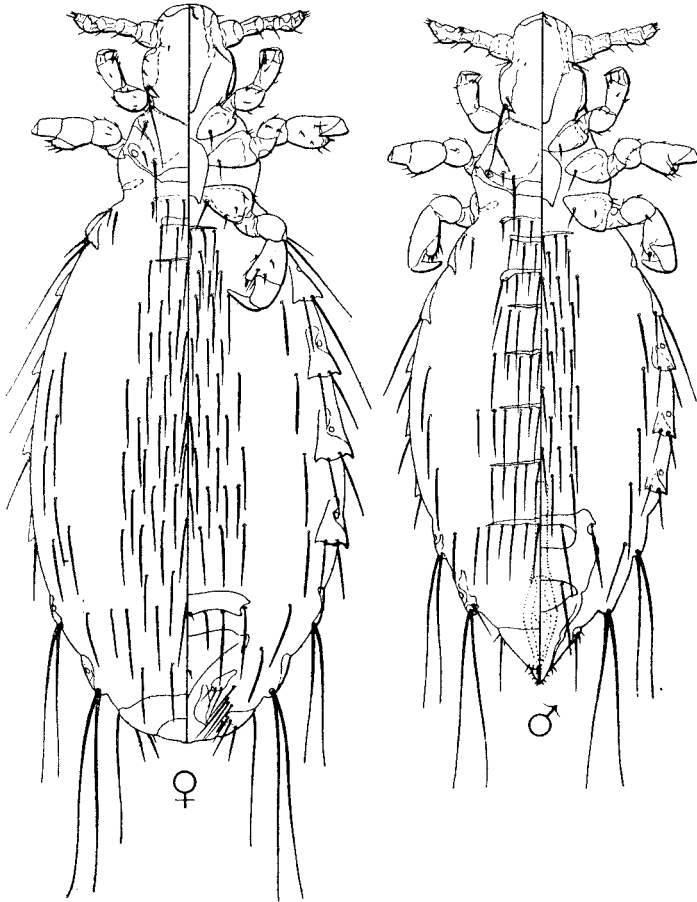


Fig. 162.—*Neohamatopinus inornatus* (Kellogg and Ferris), male and female, from the types.

elevated. Antennæ without an enlarged seta at the distal post-axial angle of the first segment.

Thorax shorter than the head and somewhat broader; sternal plate (Fig. 163A) more or less kite-shaped, with the posterior angles prolonged.

Pleural plates quite small, each with a pair of slender setæ on the posterior margin, the dorsal seta of the second and third segments much

longer than the others, the seventh and eighth segments with the usual long setæ.

Tergal and sternal plates of the abdomen entirely lacking except for the ninth tergite, the genital plate and faint vestiges on the first and second tergites and the second sternite. Rows of setæ arranged in the normal manner, with a median group of five to seven in each row and one or two near each lateral margin on the third to seventh segments.

MALE (Fig. 162). Length 1.3 mm. *Antennæ* (Fig. 163B) with the third segment very slightly modified and bearing a pair of small, stout recurved setæ.

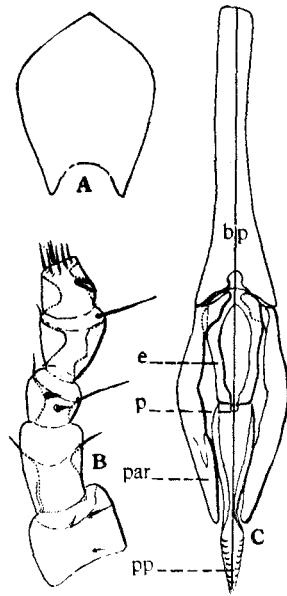


Fig. 163.—*Neohamatopinus inornatus* (Kellogg and Ferris): A, sternal plate; B, antenna of male; C, genitalia of male; from the types.

Tergal plates very small and slender, the second plate of the second segment slightly but distinctly emarginate. *Sternal plates* lacking except for the genital plate and the first plate of the second segment. Setæ arranged in the typical manner, the dorsal rows with ten to twelve in a median group and with a single seta near the margin on the fourth to seventh segments, the ventral rows with four or five in a median group and a single seta near the margin on the third to seventh segments.

Genitalia (Fig. 163C) with the basal plate (*bp*) slender, expanded but little posteriorly, the parameres (*par*) three-fourths as long as the basal plate, tapering and slightly curved, enclosing a ring-shaped endomerone

piece (*e*), the penis (*p*) and the pseudopenis (*pp*). The latter is of compressed Y-shape, with the shaft lanceolate and transversely ridged.

NOTES.—This species is unquestionably a member of the *sciurinus* group, in spite of the apparent anomaly in the host. It is readily distinguishable by the unmodified antennæ, the absence of the tergal and sternal plates in the female and their weak development in the male and the small size of the pleural plates.

Specimens from *Neotoma fuscipes streator*, which I have previously referred to this species certainly do not belong with it and I am referring them to *N. sciurinus*.

7. *Neohæmatopinus heliosciuri* Cummings.

FIGS. 164, 165A, 165C, 165E, 165H.

1912. *Neohæmatopinus heliosciuri* Cummings, *Bull. Ent. Res.* 3: 393-5; f. 1.

1916. *Neohæmatopinus heliosciuri* Cum., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 170.

PREVIOUS RECORDS. From *Paraxerus* (= *Heliosciurus*) *palliat*us, Uchweni Forest, Witu, British East Africa.

SPECIMENS EXAMINED. From *Paraxerus palliat*us *suahelicus*, British East Africa (U. S. N. M. 182794); *P. jacksoni capitis*, British East Africa (U. S. N. M. 182795) and Kijabe, British East Africa (F. C. M. 16747); *Parasciurus animosus*, Mt. Lololokwi, British East Africa (U. S. N. M. 182776). The hosts are the so-called "scrub-squirrels."

FEMALE (Fig. 164). Length 1.7 mm. *Head* as broad as long, slightly pointed in front with the antennæ set close to the anterior margin; with rounded post-antennal angles and a distinctly constricted occipital region and with the lateral margins of the hind head convex. Under side of the head with a raised gular region. Antennæ with the distal post-axial angle of the first segment slightly produced and bearing a short stout seta.

Thorax about as long and considerably broader than the head; sternal plate (Fig. 165C) large and broad.

Pleural plates (Fig. 165A) as follows: plates of the first segment very small and obscure, bearing a pair of small setæ; plates of the second segment with a small tooth at each posterior angle and with a pair of slender setæ; plates of the third to sixth segments large, with a quite long, acute tooth at each posterior angle and a pair of slender setæ about as long as the plate; plates of the seventh and eighth segments very small, without teeth, bearing the usual long setæ.

Tergal and sternal plates of the abdomen strongly developed, reaching nearly from pleurite to pleurite and arranged in a manner unusual for the genus, the second to seventh tergites and the second to seventh sternites each with three plates, the remainder with one, bearing for the most part eight to ten small setæ. Sternal plate of the second segment longer than the others, extending practically entirely across the abdomen.

MALE (Fig. 164). Length 1 mm. *Antennæ* (Fig. 165E) with the

third segment somewhat modified and bearing a single stout, recurved seta on the dorsal surface.

Tergal and sternal plates of the abdomen arranged in the manner typical of the genus. Tergal plates large, bearing for the most part

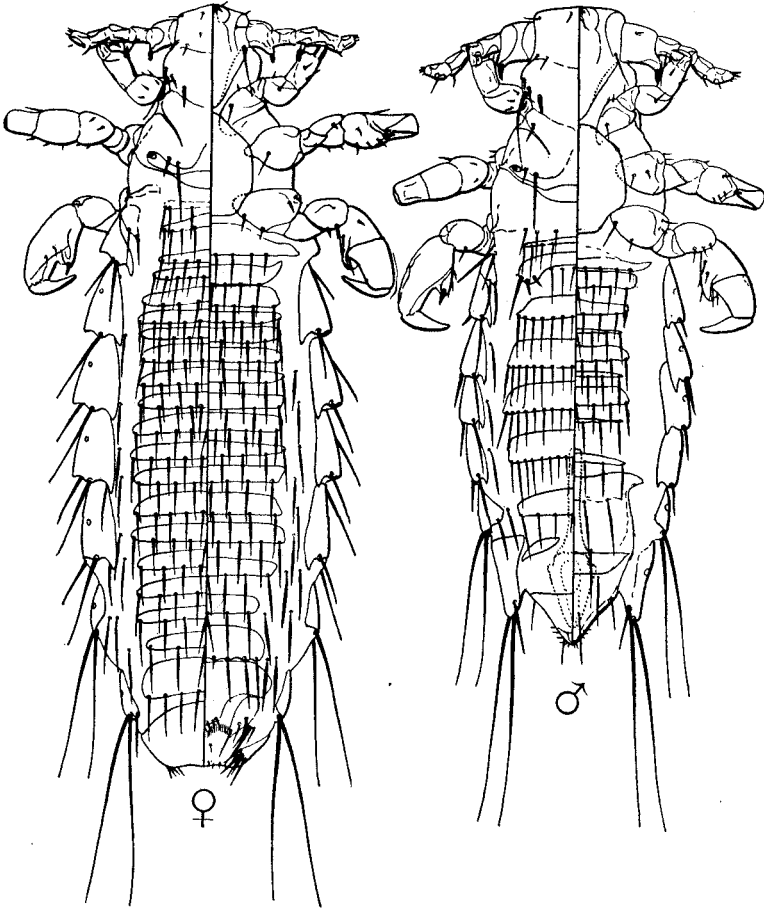


Fig. 164.—*Neohæmatopinus heliosciuri* Cumm., male and female, from specimens from *Paraxerus palliatus suahelicus*.

fourteen to eighteen small setæ of varying lengths. Sternal plates slender, bearing six or seven setæ, the anterior plate of the fourth to sixth segments much more slender than the posterior.

Genitalia (Fig. 165H) with the basal plate (*bp*) slender, slightly expanded at the posterior end; parameres (*par*) slightly more than half as long as the basal plate, nearly parallel, each with a prominent lateral

shoulder near the base, the outline of the two together nearly triangular. Between the parameres is a small U-shaped endomerale piece (*e*), the penis (*p*) and the slender V-shaped pseudopenis (*pp*).

NOTES.—This is a very distinctive species, that may be regarded as the type of a group which occurs on the African "scrub squirrels." This group, which includes two species here described as new, is distinguished by the presence of three tergal and sternal plates on the majority of the abdominal segments of the female, a character that is strongly reminiscent of the genus *Hoplopleura*. However the male is entirely as in typical *Neohamatopinus*.

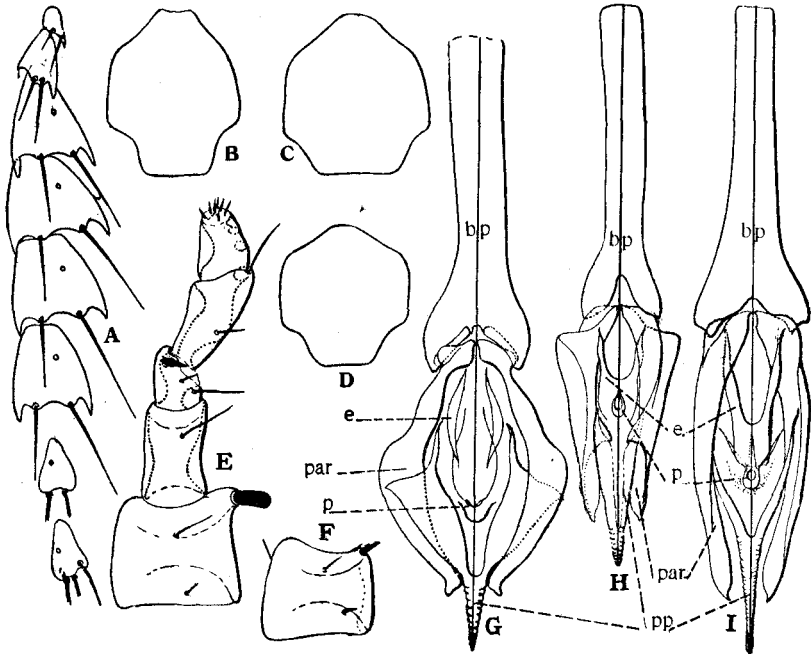


Fig. 165.—*Neohamatopinus heliosciuri* Cumm.: *A*, pleural plates of female; *C*, sternal plate; *E*, antenna of male; *H*, genitalia of male; from specimens from *Paraxerus palliatus suahelicus*. *Neohamatopinus suahelicus* n. sp.: *B*, sternal plate; *F*, first segment of antenna; *G*, genitalia of male; from the types. *Neohamatopinus kenia* n. sp.: *D*, sternal plate; *I*, genitalia of male; from type.

The three species of this group that I am recognizing are somewhat puzzling. It is possible that there has been some mixing in my material but if not they appear to be more or less indiscriminately present on several host species, at least two of the three species often occurring together. The males are readily distinguishable by the form of the genitalia but the females are so very similar that I have not in all cases been certain as to just which male they belong with.

N. heliosciuri is marked in the female by the strongly modified seta of the first antennal segment, while the male is distinguished by this and by the sharp shoulders of the parameres and the form of the pseudopenis. It seems to be clear from Cummings' figures and description that the form so marked is his *heliosciuri*.

8. *Neohæmatopinus suahelicus* n. sp.

FIGS. 165B, 165F, 165G.

SPECIMENS EXAMINED. Holotype, a male, and allotype, from *Paraxerus palliatus suahelicus*, British East Africa (U. S. N. M. 182804). Also from *P. palliatus ornatus*, Ngoye Hills, Zululand (U. S. N. M. 141472), *P. jacksoni capitis*, Kijabe, British East Africa (F. C. M. 16747), and *Parasciurus animosus*, Mt. Lololokwi, British East Africa (U. S. N. M. 182776).

FEMALE. Apparently differing from the female of *N. heliosciuri* only in having the seta of the distal post-axial angle of the first antennal segment strongly reduced (Fig. 165F) or even absent and in having the sternal plate of the thorax (Fig. 165B) slightly more elongate and more produced posteriorly.

MALE. Differing from the male of *N. heliosciuri* in the same characters as above enumerated and in the form of the genitalia. These (Fig. 165G) have the parameres (*par*) strongly curved, the two together forming an oval, and the pseudopenis (*pp*) broadly Y-shaped with the arms flattened and expanded.

9. *Neohæmatopinus keniaë* n. sp.

FIGS. 165D, 165I.

SPECIMENS EXAMINED. Holotype, a male, from *Heliosciurus keniaë*, Mt. Kenia, British East Africa, and one paratype male from *H. ruwenzorii*, Mubuku Valley, Mt. Ruwenzori, British East Africa (U. S. N. M. 172921).

MALE. Differing from the male of *N. heliosciuri* in having the seta of the distal post-axial angle of the first antennal segment very small and in the form of the genitalia. These (Fig. 165I) have the parameres (*par*) long and slender, without a lateral shoulder near the base, and the pseudopenis elongate Y-shaped. The sternal plate of the thorax is somewhat more angular and somewhat shorter and broader than in *heliosciuri* and *suahelicus*.

FEMALE. Not definitely recognized.

10. *Neohæmatopinus petauristæ* n. sp.

FIGS. 166, 167A, 167C-E.

SPECIMENS EXAMINED. From *Petaurista inornata*, Kashmir (U. S. N. M.). Holotype a female. The host is a "flying squirrel."

FEMALE (Fig. 166). Length 2.3 mm. Head somewhat longer than broad, acutely rounded in front with the antennæ set somewhat back from the apex; with the post-antennal angles practically obsolete, with a dis-

tinctly constricted occipital region and with the lateral margins of the head nearly straight and parallel. Ventral side of the head with a raised gular region. Antennæ with a quite long, slender seta at the distal post-axial angle of the first segment. *Thorax* considerably shorter than the head; sternal plate (Fig. 167D) irregularly seven-sided.

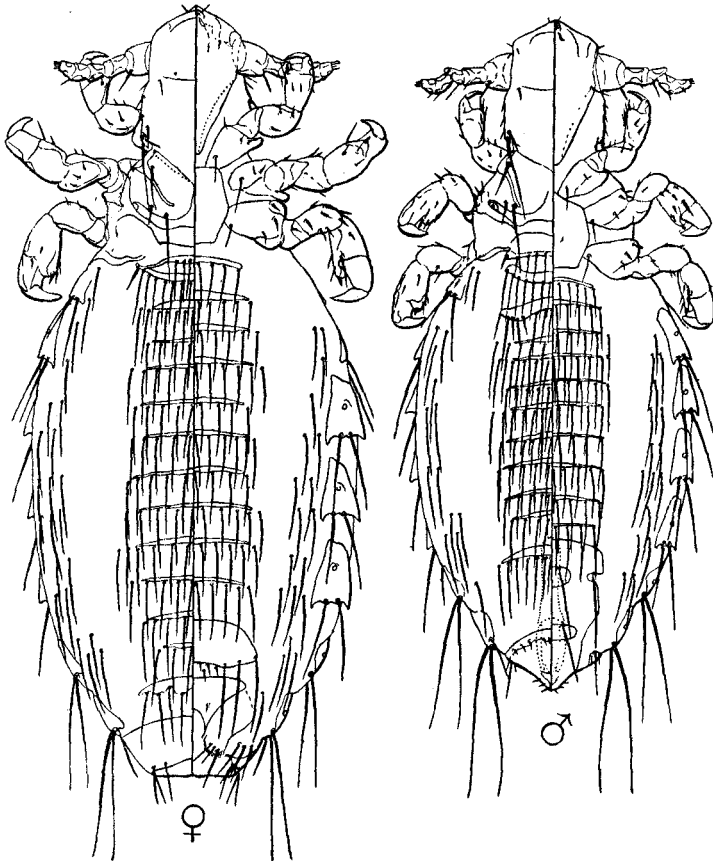


Fig. 166.—*Neohamatopinus petauristæ* n. sp., male and female.

Pleural plates (Fig. 167A) as follows: plates of the first segment obsolete, their position marked by three slender setæ; plates of the second segment with a small dorsal tooth and a pair of long setæ; plates of the third to sixth segments rather narrow, each with an acute tooth at each posterior angle and with a pair of setæ which are somewhat longer than the plate itself; plates of the seventh and eighth segments small, without teeth and with the usual slender setæ.

Tergal and sternal plates of the abdomen slender, occupying the median half of the body, arranged in the typical manner, for the most part with seven to ten slender setæ. Each segment, except the first ventral, with from one to three setæ near the margin opposite the end of each row of setæ.

MALE (Fig. 166). Length 1.8 mm. *Antennæ* (Fig. 167C) with the third segment somewhat modified and bearing a pair of stout, recurved setæ.

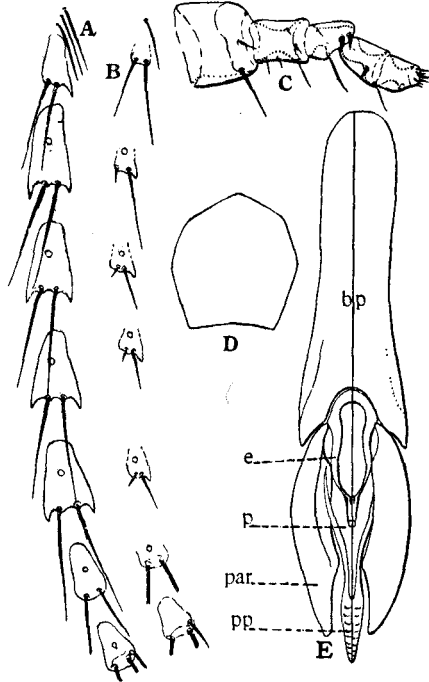


Fig. 167.—*Neohematopinus petauristæ* n. sp.: A, pleural plates; C, antenna of male; D, sternal plate; E, genitalia of male. *Neohematopinus batuanæ* n. sp.: B, pleural plates.

Tergal and sternal plates of the abdomen departing from the typical arrangement in that there are two rows instead of one on the third to sixth tergites. Second plate of the second tergite distinctly emarginate. All the plates slender, occupying about the median half of the body. Setæ much as in the female.

Genitalia (Fig. 167E) with the basal plate (*bp*) moderately broad, but little expanded at the apex; parameres (*par*) more than half as long as the basal plate, stout, somewhat curved but nearly parallel, enclosing the ring-shaped endomerical piece (*e*), the penis (*p*) and the pseudopenis (*pp*).

the last is slender Y-shaped with the arms very slender, the shaft lanceolate and transversely ridged.

NOTES.—In the arrangement of the tergal plates of the male this species departs sharply from the typical form of this genus, yet it seems undoubtedly to belong here in spite of this. It is a very distinctive form that is approached closely only by the next species, which is likewise from a flying squirrel. Neither of these two species at all closely approaches *N. sciuropteri*, which occurs on the New World flying squirrels.

11. *Neohæmatopinus batuanæ* n. sp.

FIG. 167B.

SPECIMENS EXAMINED. From *Petaurista batuanæ*, Batu Islands, Malaysia (U. S. N. M.). Holotype a female.

FEMALE. Length 1.8 mm. Closely resembling the female of *N. petauristæ* in general appearance but with the tergal and sternal plates of the abdomen entirely obsolete except for the genital plate and the tergites of the first, second, and ninth segments. *Pleural plates* (Fig. 167B) very small and weakly developed, those of the third to sixth segments with the ventral seta very small and the dorsal scarcely longer than the plate.

MALE. Length 1.3 mm. Closely resembling the male of *N. petauristæ* but differing in the pleural plates as does the female and in the entire absence of chitinized tergal and sternal plates on the abdomen except for the genital plate and the tergal plates of the first and second segments.

NOTES.—While this species is evidently closely related to *N. petauristæ* the differences given above seem to mark it as sufficiently distinct.

12. *Neohæmatopinus citelli* (Cummings).

FIGS. 168, 169.

1914. *Linognathoides spermophili* Cummings, *Bull. Ent. Res.* 5: 160-3; tf. 3 (not of Grube).

1916. *Linognathoides citelli* Cum., *Annals and Mag. Nat. Hist.* (8) 17: 107.

1916. *Linognathoides citelli* Cum., Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 158.

PREVIOUS RECORDS. From *Citellus leptodactylus* and (probably as straggler) from *Cricetulus phæus*, Transcaspia. The first named, which is in all probability the normal host, is a *Sciurid* of the sub-family *Citellinæ*, the second a *Murid* of the sub-family *Cricetinæ*.

SPECIMENS EXAMINED. A female and a male from the type lot, from *Citellus leptodactylus*, received through the kindness of Mr. James Waterston.

FEMALE (Fig. 168). A stout bodied species. Length 1.8 mm. *Head* (Fig. 172B) somewhat longer than broad, acutely rounded in front of the antennæ, which are set well back from the apex, with the post-antennal

angles very prominent and acute, with no constricted occipital region, the lateral margins of the hind head strongly convergent; all chitinized areas very strongly marked. Ventral side of the head without a raised gular region. Antennæ without a modified seta on the first segment. *Thorax* shorter than the head and not greatly wider; sternal plate not chitinized.

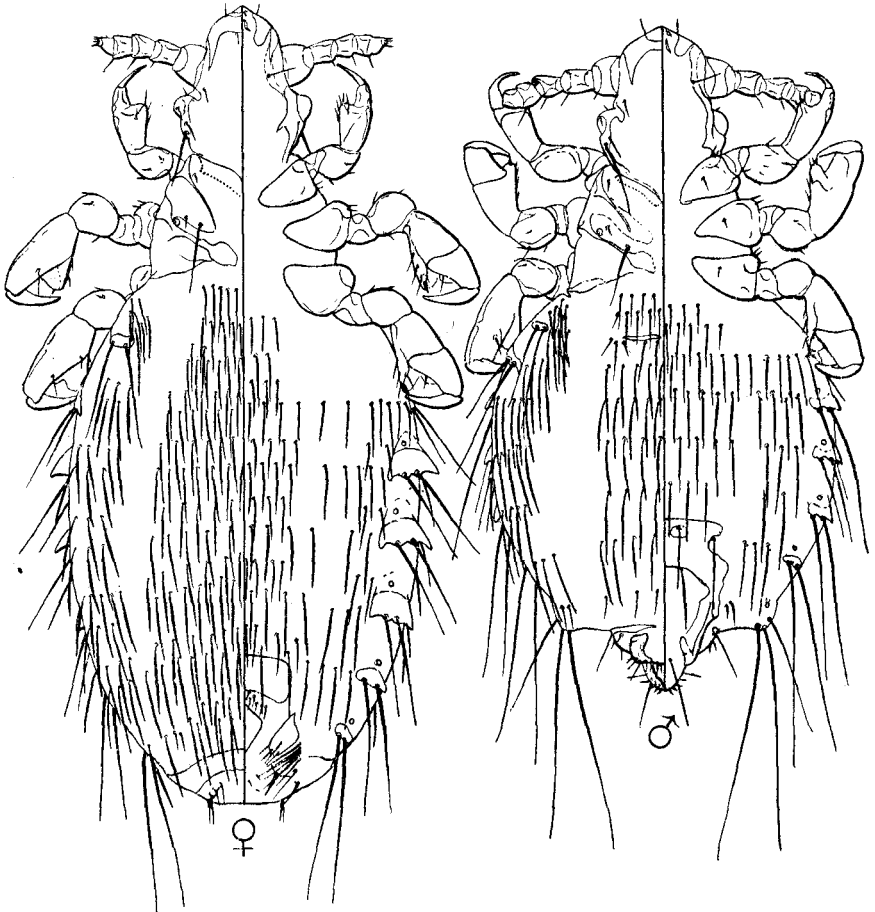


Fig. 168.—*Neohamatopinus citelli* (Cumm.), male and female, from co-types.

Pleural plates (Fig. 169A) as follows: first pair lacking; second very small, oval, bearing a pair of long setæ; third to sixth pairs relatively small, with a prominent tooth at each posterior angle and with a pair of long setæ; seventh and eighth very small, each with a pair of long setæ.

Tergal and sternal plates of the abdomen entirely obsolete except for the genital plate and the ninth tergite. Rows of setæ arranged in the

normal manner. Tergal rows divided into median and lateral groups, the lateral groups with from two to four setæ, the median group with for the most part ten to fifteen slender setæ. Ventral rows extending, with irregular interruptions across the body except on the second segment and the first row of the third where the setæ are confined to the median region, the rows with for the most part twelve to twenty slender setæ.

MALE (Fig. 168). Length 1.2 mm. *Antennæ* with a stout seta on the dorsal aspect of the apical, pre-axial angle of the third segment.

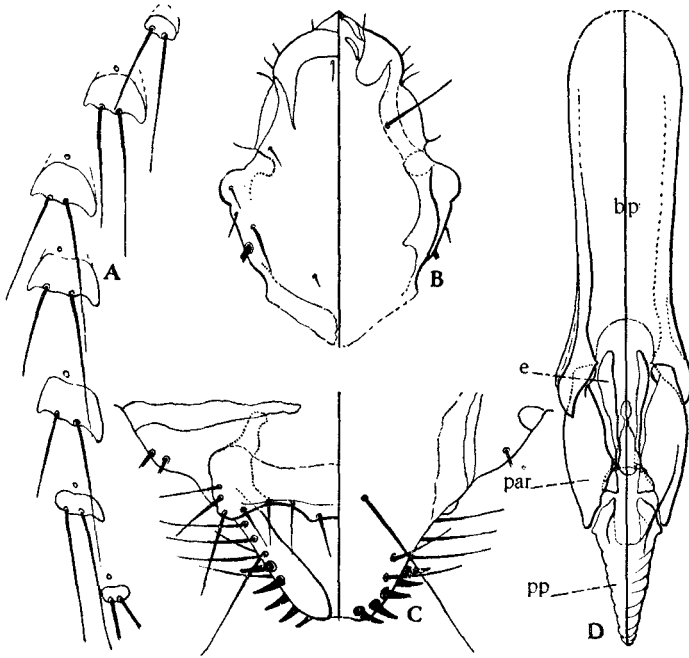


Fig. 169.—*Neohamatopinus citelli* (Cum.): A, pleural plates; B, head; C, apex of abdomen of male; D, genitalia of male.

Tergal and sternal plates of the abdomen entirely lacking except for faint vestiges of the second plate of the second tergite, the setæ of this row, however, still showing faint but definite indications of the usual emargination. Dorsal setæ arranged in the typical manner, those of the median group slightly fewer than in the female. Setæ of the ventral side departing from the arrangement normal in the genus in that there appears to be but a single row on each segment. Tip of the abdomen (Fig. 169C) with a pair of flaps which bear several short, stout setæ.

Genitalia (Fig. 169D) with the basal plate (*bp*) moderately stout; parameres (*par*) short, stout, and nearly parallel, enclosing a narrowly

U-shaped endomerale piece (*e*) and an irregular statumen penis (*sp*) and articulating at the tips with the stout, wedge-shaped pseudopenis (*pp*) which is transversely striate.

NOTES.—This species is the type of the genus *Linognathoides* and if the inclusion of this genus in *Neohæmatopinus* be objected to *Linognathoides* may be restored, although I am unable at present to see upon what grounds it can be separated. It is true that *N. citelli* appears to depart rather widely from the type of *Neohæmatopinus* yet the essential characters of the genus remain. The male is the most disturbing, owing to the presence of but a single row of setæ on each abdominal sternite, yet in the face of the evident relationship with *N. læviusculus* this can hardly be given any weight.

N. citelli is evidently close to *N. læviusculus* but it is readily separable by the form of the head, of the pleural plates and the genitalia as well as by the absence of a thoracic sternal plate.

This was originally described under the name of *Linognathoides spermophili*, this name later being changed by Cummings because of the previous use of *citelli* for the species now called *læviusculus*. There might be some question as to the correctness of this since the name *citelli* was used only in connection with Grube's figure of the species, the name *læviusculus* being used in the text but the change is apparently necessary under the rules of the International Code.

13. *Neohæmatopinus læviusculus* (Grube).

FIGS. 170, 171A, 171B, 171D, 171G.

1851. *Pediculus læviusculus* Grube, "Middendorff's Reise," 2: 498.
 1851. *Pediculus spermophili* Grube, *ibid.* pl. 32, f. 5.
 1874. *Hæmatopinus læviusculus* (Grube), Giebel, "Insecta Epizoa," p. 38.
 1880. *Hæmatopinus læviusculus* (Grube), Piaget, "Les Pediculines," p. 641.
 1896. *Hæmatopinus montanus* Osborn, U. S. Dept. Agric., Div. Ent. Bul. 5, n. s.: 184; f. 107.
 1900. *Hæmatopinus columbianus* Osborn, *Can. Ent.* 32: 215-6.
 1904. *Polyplax læviuscula* (Grube), Enderlein, *Zool. Anz.* 28: 142.
 1904. *Polyplax columbiana* (Osb.), Enderlein, *ibid.* 28: 143.
 1904. *Polyplax* (?) *montana* (Osb.), Enderlein, *ibid.* 28: 143.
 1908. *Polyplax læviuscula* (Grube), Dalla Torre, "Anoplura," *Gen. Ins.* p. 13.
 1908. *Polyplax columbiana* (Osb.), Dalla Torre, *ibid.* p. 13.
 1908. *Polyplax* (?) *montana* (Osb.), Dalla Torre, *ibid.* p. 13.
 1910. *Polyplax læviuscula* (Grube), Mjöberg, *Ark. f. Zool.* 6: 160.
 1914. *Linognathoides* (?) *columbianus* (Osb.), Cummings, *Bul. Ent. Res.* 5: 160.
 1915. *Linognathoides montanus* (Osb.), Kellogg and Ferris, "Anoplura and Mall. N. Amer. Mamm.," *Stanford Univ. Publ.* pp. 24-5; tf. 9; pl. 5, f. 1; pl. 6, f. 4.
 1916. *Linognathoides læviusculus* (Grube), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 158.
 1916. *Linognathoides montanus* (Osb.), Ferris, *ibid.* p. 159 (part).
 1916. *Linognathoides montanus* (Osb.), Ferris, *Psyche* 23: 99-100.
 1916. *Enderleinellus læviusculus* (Grube), Fahrenholz, *Archiv f. Naturges.* 81, 11: 29.

PREVIOUS RECORDS. From *Citellus* (= *Spermophilus*) *eversmanni*, Jakutsk, Siberia (Grube) and "Pitlekaj" (Mjöberg); *Citellus* (= *Sper-*

mophilus columbianus, Pullman, Washington (Osborn, Kellogg and Ferris); *C. barrowensis*, Point Barrow, Alaska (Kellogg and Ferris); *C. beecheyi*, *beldingi* and *douglasi*, California (Kellogg and Ferris, Ferris); *C. grammurus*, Santa Catalina Mountains, Arizona (Ferris); *C. mexicanus*, Guanajuato, Mexico (Kellogg and Ferris); *C. oregonus*, Pine Forest Mountains, Nevada (Ferris); *C. plesius ablusus*, Prince William Sound, Alaska (Ferris); *Cynomys leucurus*, Routt County, Colorado (Ferris); *Marmota* (= *Arctomys*) *flaviventer*, Burns, Oregon (Kellogg and Ferris); "western gray squirrel" (probably a species of *Citellus*), Fort Collins, Colorado (Osborn); "rock squirrel" (probably a species of *Citellus*), Boulder Canyon, Colorado (Kellogg and Ferris).

Erroneously recorded by Ferris from *Marmota flaviventer sierra* in California. These specimens are here referred to a distinct species.

SPECIMENS EXAMINED. All those upon which the above records by Ferris and Kellogg and Ferris are based and the following: *Citellus eversmanni*, Altai, Siberia (U. S. N. M. 175306); *C. buxtoni*, Cichiga, northeastern Siberia (U. S. N. M. 199576); *C. elegans*, Colorado Springs, Colorado; *C. osgoodi*, Circle, Alaska (U. S. N. M. 128369); *Callospermophilus castanurus*, Park City, Utah (U. S. N. M.).

The hosts are all *Sciurids*, "ground squirrels" (*Citellus*), "prairie dogs" (*Cynomys*) and "marmots" or "wood chucks" (*Marmota*). Ferris (1916) has translated Osborn's "western gray squirrel" into *Sciurus cinereus* but there is no warrant for this.

FEMALE (Fig. 170). A stout bodied species. Length 1.6–1.7 mm. *Head* acutely rounded in front with the antennæ set well back from the apex; with the post-antennal angles rounded and not prominent, with a slightly constricted occipital region and with the lateral margins of the hind head straight and nearly parallel. Ventral side of the head without a raised gular region. Antennæ without a modified seta on the first segment. *Thorax* about as long as the head; sternal plate (Fig. 171B) roughly oval, wider than long, with a slight median, posterior point.

Pleural plates (Fig. 171A) as follows: plates of the first segment lacking; plates of the second segment small, each posterior angle produced into a small lobe, the posterior margin with a pair of small setæ; plates of the third to sixth segments irregular in form, with each posterior angle produced into a bluntly rounded point and with two or three slender setæ (the number varying even in a single specimen); plates of the seventh and eighth segments very small, bearing the usual long setæ.

Tergal and sternal plates of the abdomen entirely lacking except for the genital plate, the ninth tergite and faint vestiges on the second tergite. Rows of setæ arranged in the normal manner, for the most part extending entirely across the abdomen, including as many as thirty setæ, these

slender except for a few on the ventral side near the lateral margins of the third to sixth segments which are sometimes more or less enlarged.

MALE (Fig. 170). Length 1.1–1.3 mm. *Antennæ* with the third segment not at all modified.

Tergal and sternal plates of the abdomen very narrow, the sternal

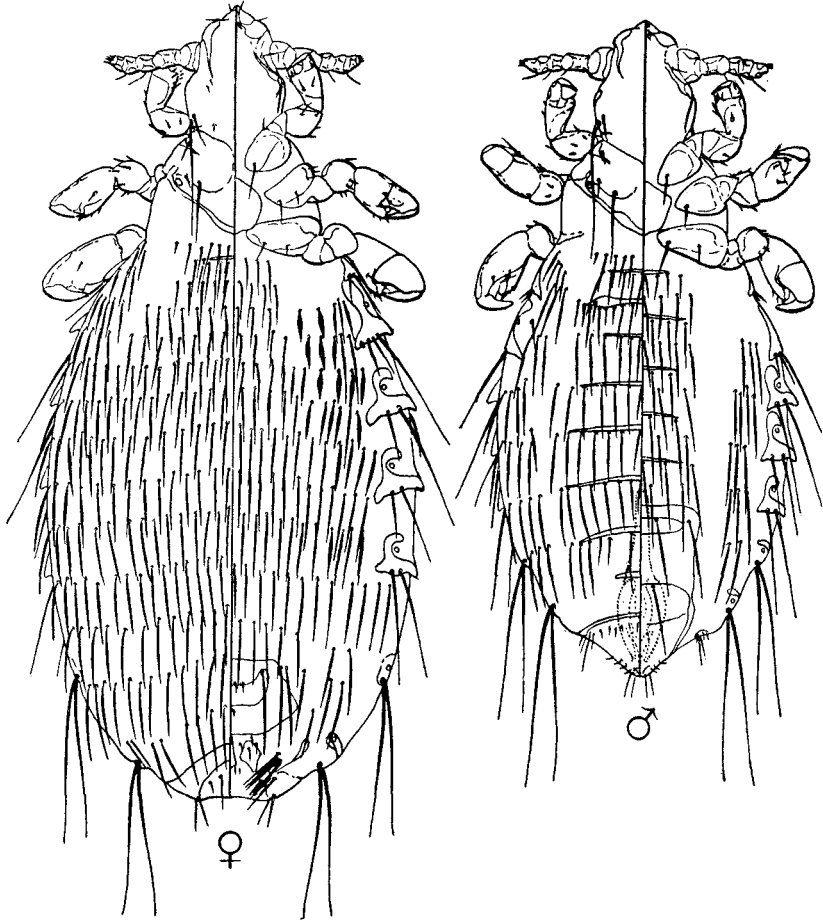


Fig. 170.—*Neohamtopinus laeviusculus* (Grube), male and female, from specimens from *Citellus eversmanni*.

plates present only in connection with the anterior row of setæ on each segment. Second plate of the second tergite slightly but definitely emarginate. Rows of setæ distributed in the normal manner, arranged, both dorsally and ventrally, in median and lateral groups. Dorsal median groups with for the most part fifteen or sixteen setæ, the lateral groups

with three or four. Ventral median groups with four or five setæ, the lateral groups with three or four.

Genitalia (Fig. 171D) with the basal plate (*bp*) short and rather broad; parameres nearly as long as the basal plate, heavy, tapering, and nearly parallel, enclosing a slender, V-shaped endomerteral piece (*e*), the penis (*p*) and the pseudopenis (*pp*). The last is broadly V-shaped, with the arms expanded and serrate externally.

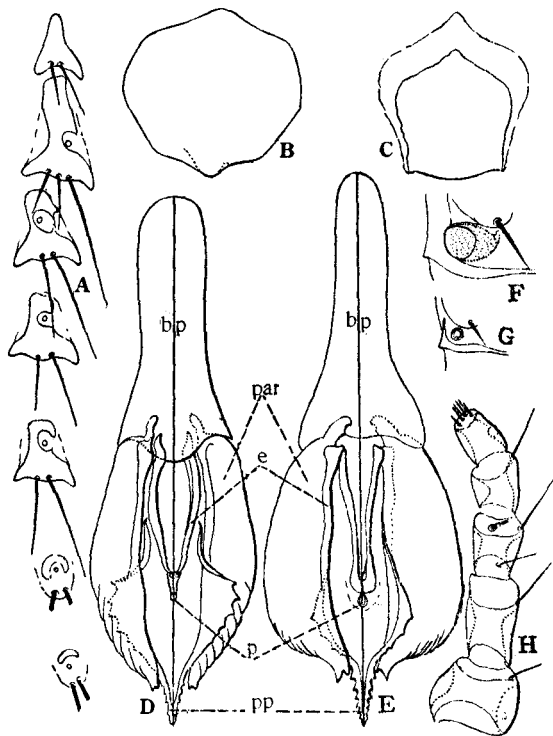


Fig. 171.—*Neohamatopinus laeviusculus* (Grube): A, pleural plates; B, sternal plate; D, genitalia of male; G, thoracic spiracle; from specimens from *Citellus evermanni*. *Neohamatopinus marmota* n. sp.: C, sternal plate; E, genitalia of male; G, thoracic spiracle; H, antenna of male.

NOTES.—I feel no doubt in placing all the specimens above listed under a single species for there is surprisingly little variation in spite of the wide geographical range. In some specimens the majority of the pleural plates bear three setæ instead of two but this character is not at all constant, even as between the two sides of the same individual. On the other hand, specimens from *Marmota* that I have previously referred to this species seem really to be distinct.

Fahrenheit (1916) has referred the *Pediculus laeviusculus* of Grube to *Enderleinellus* and if this view were accepted the name *montanus* should be used for the

species here dealt with. However, I can not concur in Fahrenholz's view. The original description and figures of *læviusculus* are poor but they seem sufficiently definite to establish with reasonable certainty the application of the name to the species here considered.

14. *Neohæmatopinus marmotæ* n. sp.

FIGS. 171C, 171E, 171F.

1916. *Linognathoides montanus* (Osborn), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 159 (part; misidentification).

1916. *Linognathoides montanus* (Osborn), Ferris, *Psyche* 23: 99 (part; misidentification).

PREVIOUS RECORDS. From *Marmota flaviventer* (= *flaviventris*) *sierræ*, Yosemite National Park, California.

SPECIMENS EXAMINED. The types (holotype a male) from the above. Also from "ground hog," *Marmota* sp., Florence, Montana (F. C. Bishop). A single male from *Marmota aurea*, Tagdumdash, Pamir, Asia (U. S. N. M. 62116) is doubtfully referred here.

FEMALE. Length 2.3 mm. In general quite closely resembling *N. læviusculus* but differing notably in its much larger size, heavier chitinization of all the parts, in having the sternal plate of the thorax (Fig. 171C) quite differently shaped and more weakly chitinized and in having the thoracic spiracles (Fig. 171F) strikingly large, these spiracles in *læviusculus* being very small (Fig. 171G).

MALE. Length 1.7 mm. Differing in the same respects as does the female. With the third segment of the antennæ (Fig. 171H) slightly modified and bearing a single stout seta. With the genitalia (Fig. 171E) slightly different, the parameres (*par*) being heavier and tapering sharply near the tips instead of tapering gradually, the pseudopenis (*pp*) with the arms less expanded.

NOTES.—This seems to be sufficiently distinct from *N. læviusculus* to merit full specific standing. The specimen from *Marmota aurea* is evidently quite close to this but is not in good condition and is referred here only tentatively.

15. *Neohæmatopinus pectinifer* (Neumann).

FIG. 172.

1885. *Hæmatopinus setosus* Piaget, "Les Pediculines," Supplement, p. 143; pl. 15, f. 6 (not of Burmeister).

1908. *Hæmatopinus setosus* (Piaget), Dalla Torre, "Anoplura," *Gen. Ins.* p. 11.

1909. *Hæmatopinus* (*Polyplax*) *pectinifer* Neumann, *Arch. de Parasit.* 13: 528-9; f. 28-9.

1914. *Linognathoides setosus* (Piaget), Cummings, *Bull. Ent. Res.* 5: 160.

1916. *Linognathoides pectinifer* (Neum.), Ferris, "Cat. Anoplura," *Proc. Cal. Acad. Sci.* (4) 6: 159.

1916. *Lutegus pectinifer* (Neum.), Fahrenholz, *Archiv. f. Naturges.* 81, 11: 31.

PREVIOUS RECORDS. From *Xerus getulus*, without indication of locality (Piaget) and from "squirrel," without indication of locality (Neumann). The type host is a native of northern Africa.

SPECIMENS EXAMINED. A single male from the material recorded by Neumann, received through the kindness of Professor A. Martin of the Ecole Veterinaire de Toulouse.

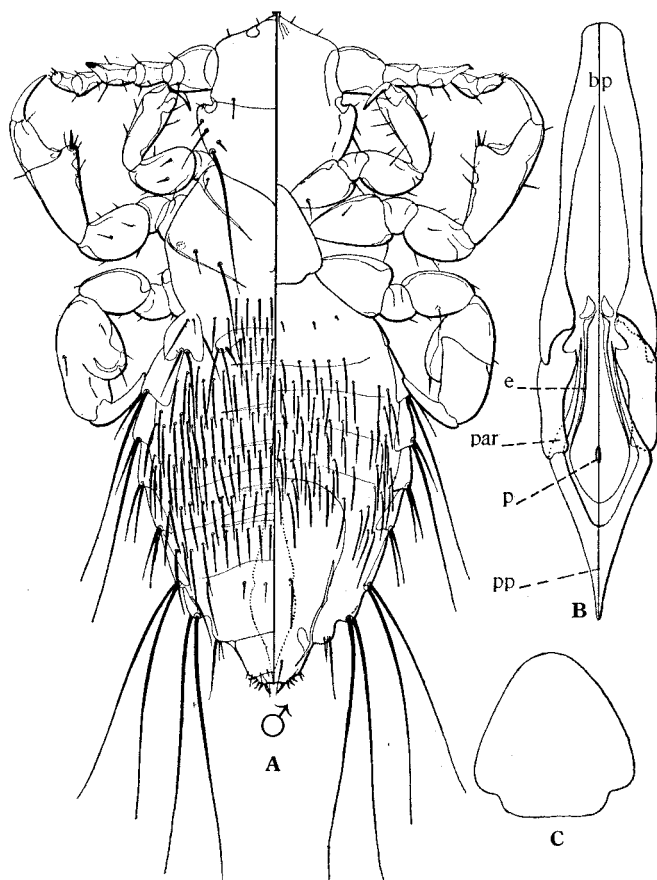


Fig. 172.—*Neohamatopinus pectinifer* (Neumann): A, male; B, genitalia of male; C, sternal plate.

MALE (Fig. 172A). Length 1.3 mm. Head as broad as long, slightly pointed in front, with the antennæ set close to the anterior margin; with prominent, acute post-antennal angles, without a constricted occipital region, the lateral margins of the hind head convex and quite strongly convergent. Ventral side without a raised gular region. Antennæ relatively very long, the first segment noticeably enlarged but without a

modified seta, the third segment modified and bearing a stout, recurved seta at the apex.

Thorax about as long as the head and with the lateral margins strongly convex; sternal plate (Fig. 172C) triangular, with rounded angles and with the apex anteriorly; legs large and stout.

Pleural plates as follows: first pair apparently obsolete, their position marked by a pair of small setæ; second with each posterior angle produced into a small, rounded lobe and bearing a pair of slender setæ; plates of the third to seventh segments without a tooth at the posterior angles or at the most with this very small, the plates of the third and fourth segments with the dorsal seta very long, the ventral seta about as long as the plate, the plates of the seventh and eighth segments with the usual long setæ.

Tergal plates very small and slender, the second plate of the second segment very distinctly emarginate. *Sternal plates* apparently entirely obsolete. Rows of setæ arranged in the normal manner, continuous across the abdomen, containing as many as twenty to thirty setæ.

Genitalia (Fig. 172B) with the basal plate (*bp*) quite broad, almost completely divided into two longitudinal pieces; parameres (*par*) very short and stout, nearly parallel, enclosing a slender, loop-shaped endomeral piece (*e*) and the penis (*p*); pseudopenis (*pp*) relatively very large, V-shaped, nearly twice as long as the parameres, with the arms convergent anteriorly. Tip of the abdomen beset with short, stout setæ.

FEMALE. The description given by Piaget is inadequate to afford a definite picture of the female.

NOTES.—Fahrenheit, merely on the basis of the published descriptions of this species, has made it the type of the genus *Lutegus*. I am unable to see any reason for this genus. At the best it cannot be separated from *Linognathoides*, even if the latter be regarded as distinct from *Neohematopinus*. The form of the head and the character of the genitalia are its most distinctive features.

The single specimen that I have examined was not in the best of condition for study and it is possible that some details of the accompanying figures may not be entirely exact.

