

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE TAXONOMY OF THE ANOPLURAN GENERA
POLYPLAX AND EREMOPHTHIRIUS, INCLUD-
ING THE DESCRIPTION OF NEW SPECIES.

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The anopluran genera *Polyplax* Enderlein and *Eremophthirius* Glinkiewicz are very closely related. Together they constitute a natural group of the subfamily Hoplopleurinae, family Haematopinidae, which parasitize exclusively hosts of one family of rodents, the Muridae, and of one family of insectivores, the Soricidae. The group is widely distributed, being found on all continents except Australia. It is best represented in Africa, where 16 species are known.

The occurrence of species of *Polyplax* on shrews (Soricidae) is of special interest. A number of such records have been made; yet for only one species is there convincing evidence that shrews are the true hosts. There are many records of the occurrence of *Polyplax reclinata* (Nitzsch) on shrews in Europe and Asia, and no records of this species from other kinds of hosts. These shrews belong to four different genera and are widely distributed.

This shrew-infesting louse is so near to the type species that it is distinguished from the latter only by very trivial, yet constant, characters. Its unusual host relationship, therefore, is not associated with any unusual morphological character. Its characters are unmistakably those of a murid-infesting louse, of lice that evidently evolved on and with murid rodents. We have no evidence that *Polyplax* evolved upon insectivores. Lice of insectivores, as far as known, are of a type quite different from *Polyplax*. Thus we are forced to conclude that not very far back in geological history the ancestor of *Polyplax reclinata* must have "bridged the phylogenetic gap" between murid rodents and insectivores, in crossing over from hosts of the former group to those of the latter.

TAXONOMIC VALUE OF THE THIRD ANTENNAL SEGMENT OF THE MALE IN POLYPLAX AND EREMOPHTHIRIUS.

The writer wishes to point out the taxonomic value, in the genera *Polyplax* and *Eremophthirius*, of the third antennal segment of the male. In striving to clear up some of the involved synonymy, recourse was had to the chaetotaxy and morphology of this segment. A study of the males at hand, which represent more than half of those known, shows that the maximum number of setae is six. It also shows that this is the typical number. These setae have been named (fig. 1) and their positions shown for the species *Polyplax spinulosa* (Burmeister). It is also noted that the apical spine and the general shape of the segment are of equal taxonomic importance.

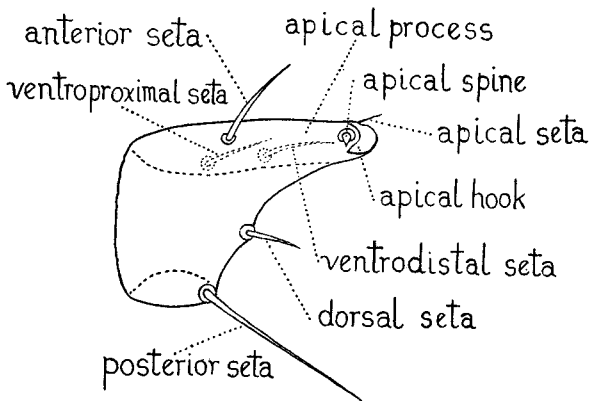


FIG. 1.— Dorsal view of the third antennal segment of male of *Polyplax spinulosa* (Burmeister).

While this third antennal segment lends itself excellently to specific differentiation, nowhere in the literature can a description of it, or any mention of its chaetotaxy, be found. In fact, in our most up-to-date descriptions it seldom is mentioned at all, and in our recent outline drawings of sucking lice, of which we have many good ones, usually no setae are shown on this segment, and even the apical spine and hook frequently must be searched for in vain. The writer believes that a careful description of this segment is of more importance in the identification of a species than that of any other structure unless it be the male genitalia. By all means future descriptions of species of *Polyplax* and *Eremophthirius* should include a description of the third antennal segment of the male.

CHAETOTAXY AND TERMINOLOGY OF THE THIRD ANTENNAL SEGMENT OF THE MALE.

The modification of the third antennal segment in the male louse consists fundamentally in the development of an apical process armed with a spine.

This process, known as the *apical process*, consists of an extension distally of the anterior or anterodorsal part of the segment. Above, near the tip of this process, is a spine, the *apical spine*, which in different species varies much in size, shape, and position. In a generalized type of segment, such as that of the male of *Polyplax spinulosa*, six setae are always present. The most conspicuous of these is the one on or near the posterior margin, which may be termed the *posterior seta*. On or near the front margin is another, less conspicuous, seta, the *anterior seta*. Above, more commonly near the distal margin, is a medium-sized seta, the *dorsal seta*. On the underside of the third antennal segment, usually nearer the anterior margin than the posterior margin, are two setae. The more proximal may be called the *ventroproximal seta*, and the more distal the *ventrodiscal seta*. Finally, in most species there is a very minute seta, the *apical seta*, at the apex.

These six antennal setae may be detected in most of the known species of *Polyplax*, but some of them are lacking in a few species. Moreover, these setae are found to vary much in size and position, a fact which makes them admirably suited for specific differentiation.

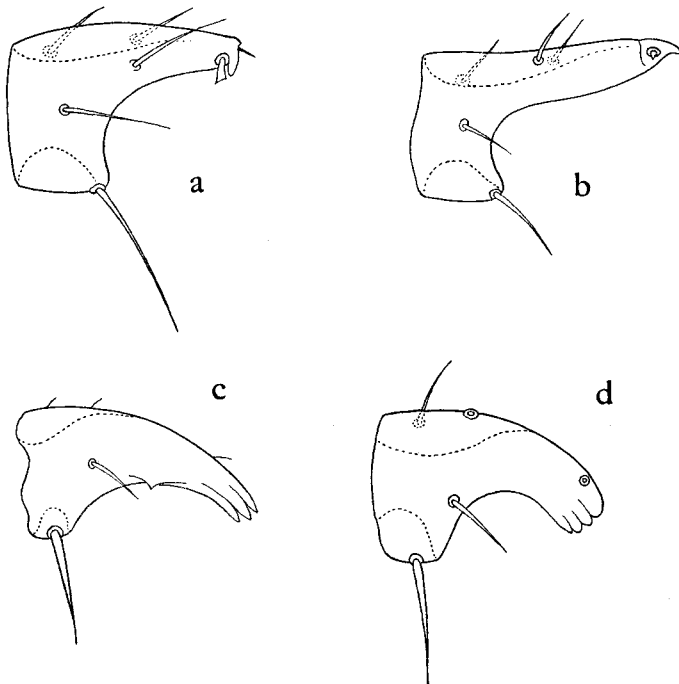


FIG. 2—Dorsal views of third antennal segment of the male of three species of *Polyplax* and one of *Eremophthirius*; a, *P. alaskensis* Ewing; b, *E. eropepli*, new species; c, *P. denticornis*, new species; d, *P. tarsomydis*, new species.

Of equal importance with the chaetotaxy of the third antennal segment of the male is the shape of the apical process, and probably most important of all are the size and shape of the apical spine. The apical process is absent in a few species. Usually it is more or less curved, probably reaching the extreme of this condition in *tarsomydis*, new species (fig. 2, *d*), although in some species, as in *eropepli*, new species (fig. 2, *b*), it is straight.

The apical spine varies much in size and shape, but not much in its position. More commonly it has the shape of a stout, but very short and sharp, spine. It has this shape in the species *spinulosa* (fig. 1). In several species this spine is flattened and truncate distally, as in *alaskensis* (fig. 2, *a*). In some it is absent, as in *dentaticornis*, new species (fig. 2, *c*).

KEY TO THE SPECIES OF *Polyplax* ENDERLEIN.

1. Third antennal segment of male without apical process; endomere (of male genitalia) very broad, pseudopenis Y-shaped, parameres usually short, incurved, not articulating distally with base of pseudopenis.....*oxyrrhynchus* group, 4
 Third antennal segment of male with apical process, or conspicuous apical spine; male genitalia of a different type.....2
2. Paratergal setae situated between the two posterior corners of the paratergal plate.....3
 Paratergal setae situated at the two posterior corners of the paratergal plate; anterior tergite of a typical abdominal segment of female larger than posterior tergite. Occurring in Africa.....*arvicanthis* group, 22
3. Parameres (of male genitalia) long, freely projecting, clasperlike, not articulating distally with base of pseudopenis; tergites usually large, first tergite of typical abdominal segment of female usually larger than second. Confined to Africa, except for one species.....*otomydis* group, 7
 Parameres greatly reduced, never clasperlike, usually articulating distally with base of pseudopenis.....*spinulosa* group, 12
4. Sternum without anterior median process; ventral endomere of male genitalia absent or poorly developed.....5
 Sternum with anterior median process; ventral endomere of male genitalia well developed, with conspicuous lateral processes extending beyond the sides of the parameres.....
P. calva (Waterston)
5. Typical paratergal plates with a cusplike projection at each posterior angle; sternum broader than long. Occurring in Asia.....6
 Typical paratergal plates with a cusplike projection only at the posteroventral angle; sternum longer than broad. Occurring in Africa.....*P. oxyrrhynchus* Cummings
6. Abdominal tergites of female present; tips of parameres of male genitalia but slightly incurved.....*P. insulsa* Ferris
 Abdominal tergites of female absent; tips of parameres of male genitalia strongly incurved.....*P. asiatica* Ferris

7. Forehead typical of the genus, being a low cone; body of a shape typical of the genus; tergal setae setiform. Occurring in Africa and the New World.....	8
Forehead greatly reduced or almost obliterated; body long and slender; tergal setae frequently enlarged or flattened. Occurring in Africa.....	11
8. Anterior tergite of a typical abdominal segment of the female larger than the posterior tergite.....	9
Tergites small and of the same size on a typical abdominal segment of the female..... <i>P. jonesi</i> (Kellogg and Ferris)	
9. Sternum with anterior median process. Occurring in Africa.....	10
Sternum without anterior median process. Occurring in America <i>P. auricularis</i> (Kellogg and Ferris)	
10. Tergites of female reaching about two-thirds the distance across the abdomen; pseudopenis sharp, similar distally to one of the parameres.....	<i>P. otomydis</i> (Cummings)
Tergites of female not reaching half way across the abdomen; pseudopenis stouter distally than one of the parameres.....	<i>P. cummingsi</i> (Ferris)
11. Posterior legs greatly enlarged and of the same size in the two sexes; some of the tergal setae spatulate or lanceolate; integument somewhat scaled.....	<i>P. brachyrrhynchus</i> (Cummings)
Posterior legs of male only greatly enlarged; none of tergal setae spatulate, although some are enlarged... <i>P. phthisica</i> (Ferris)	
12. Sternum with anterior median process.....	13
Sternum without anterior median process.....	15
13. Two posterior lobes (cusps) of typical paratergal plates small, subequal.....	14
Ventral lobe of each typical paratergal plate fully twice as large as dorsal and equaling or surpassing in length the ventral paratergal seta.....	<i>P. gerbilli</i> Ferris
14. Lobes on paratergal plates distinct, cusplike; terminal spine of modified antennal segment of male present.....	<i>P. chinensis</i> Ferris
Lobes on paratergal plates greatly reduced, vestigial; terminal spine of modified antennal segment of male absent.....	<i>P. tarsomydis</i> , new species
15. Typical paratergal plates with two cusplike lobes.....	16
Typical paratergal plates with but one lobe, which is cusplike.....	21
16. Lobes (cusps) of typical paratergal plates simple (or nearly so), shorter.....	17
Lobes of typical paratergal plates serrate, longer.....	20
17. Front margin of sternum broadly rounded, sides rounded.....	
<i>P. serrata</i> (Burmeister)	
Front margin of sternum not broadly rounded, sides straight, parallel.....	18
18. Sternum angulate posteriorly.....	<i>P. praomydis</i> Bedford
Sternum produced posteriorly into a broadly rounded or truncate process.....	19

19. Paratergal plates of seventh abdominal segment with lobes.
 Occurring in Europe and Asia.....*P. reclinata* (Nitzsch)
 Paratergal plates of seventh abdominal segment without lobes.
 A circumpolar species.....*P. alaskensis* Ewing
20. Lobes on paratergal plates inconspicuous, never as much as one-third the length of plate bearing them; modified antennal segment of male curved, hornlike, trifurcate distally and without terminal spine and terminal seta. Occurring in China
P. denticornis, new species
 Lobes on paratergal plates long, conspicuous, some of them almost as long as plate bearing them; modified antennal segment of male not hornlike, not trifurcate, and with terminal spine. Occurring in Africa.....*P. waterstoni* Bedford
21. Temporal regions of head somewhat quadrangular, the post-antennal and posterolateral angles being but little rounded
P. spinulosa (Burmeister) and *P. spinigera* (Burmeister)
 Temporal regions of head not quadrangular, the postantennal and posterolateral angles being somewhat rounded.....
P. gracilis Fahrenholz
22. The tergites of a typical abdominal segment of female equal in their transverse dimensions and each extending about three-fourths the distance across the segment; posterior emarginations of typical paratergal plates deep.....*P. arvicanthis* (Bedford)
 The two tergites of a typical abdominal segment of female of unequal transverse dimensions, the first being shorter than the second, and neither extending more than half the distance across the segment; posterior emarginations of typical paratergal plates broad and shallow.....*P. abyssinica* (Ferris)

NEW SPECIES OF POLYPLAX ENDERLEIN.

Two new species of the genus *Polyplax* are here described. Each shows the apical process of the third antennal segment of the male developed into a strongly recurved, hooklike process. One species comes from the Philippine Islands and the other from China.

***Polyplax tarsomydis*, new species.**

Male.—Forehead greatly reduced, its margin broken up into six very low festoons. Antennae about as long as head, with first segment twice as broad as long and twice as broad as second segment. *Third antennal segment* (fig. 2, *d*) with apical process in the form of a curved, hooklike appendage, the tip of which is formed into four lobes; posterior seta as long as width of segment itself; dorsal seta conspicuous, situated just inside of distal margin; anterior seta (detached?) represented by seta pit; ventro-proximal seta conspicuous, situated near anterior margin and about half its length from base of segment; apical seta probably present (its seta pit is present); apical spine absent. Thorax typical of the genus; outer mesothoracic pleurite platelike, touching thoracic spiracle, its seta exceeding

in length the diameter of the thoracic spiracular bulb; inner mesothoracic pleurite larger than outer, its seta equal in length to half the length of the thorax. Sternum with an anterior median process and angulate behind. Sternites and tergites of abdomen well developed, each with a single transverse row of setae. Typical paratergal plates triangular in shape, with cusplike lobes that are minute or even absent, each with a large spiracle situated slightly in front of the center. Ventral paratergal seta on a typical paratergal plate a little shorter than the plate itself, dorsal paratergal seta longer than the paratergal plate. *Genital armature* of the type found in the type species of the genus. Rods of basal plate bent inward near their tips and somewhat Y-shaped, the fork of the Y receiving the side of a paramere on its articulating surface; each paramere continued forward beyond its articulating surface in the form of an out-turned hook, and articulating distally with the base of the large, hooklike pseudopenis.

Length, 0.93 mm.; width, 0.29 mm.

Type host.—*Tarsomys apoensis*.

Type locality.—Mindanao, Philippine Islands.

Type (holotype).—Cat. No. 44904, U. S. N. M.

Described from a single male, taken from the skin of the type host, a member of the rodent family Muridae, which was taken at the type locality.

The third antennal segment of the male is of unusual shape and easily identifies the species.

***Polyplax dentaticornis*, new species.**

Male.—Forehead practically obliterated, its very broadly rounded margin being practically continuous with the front margins of the first antennal segments. Antennae about as long as the head; first antennal segment slightly broader than long and twice as broad as second segment. *Third antennal segment* (fig. 2, c) greatly modified, the apical process including most of it and formed into a long, curved, hornlike process which is trifurcate distally; posterior seta situated on short posterior margin, in length equal to width of segment; dorsal seta about half as long as posterior seta, situated centrally; anterior seta, ventroproximal seta, and ventrodistal seta minute and all situated on anterior margin; apical seta absent. Apical spine absent, but along the dorsal side of the incurved distal margin is a sharp, spinelike tubercle. Temples not swollen. Thorax slightly broader than long; outer mesothoracic pleurite almost contiguous with thoracic spiracle; its seta very short; inner mesothoracic pleurite overlapped by outer; its seta very large, reaching beyond posterior margin of thorax. Sternum without anterior median process, lateral margins almost parallel. Abdominal sternites and tergites moderately well sclerotized, each with but one transverse row of setae. Typical paratergal plates with small, serrate lobes, and with spiracle situated near the center; paratergal setae stout, some of them spinelike. *Genital armature* typical for the subgenus; each rod of basal plate separated from lateral margin for most of its length by a suture, angularly emarginate on its mesodistal articulating surface; each paramere articulating with rod of basal plate for about two-

thirds its length and extending forward beyond articulation as a straight process; pseudopenis a large, hooklike structure.

Length, 0.91 mm.; width, 0.30 mm.

Last nymph.—Quiescent nymph, with male forming inside, showing no enlargement of third antennal segment; first antennal segment smaller in proportion to the others than in male. Dorsal abdominal setae two to a segment, arranged in two paramedian longitudinal rows; ventral abdominal setae of similar arrangement. Paratergal plates poorly sclerotized.

Length, 0.80 mm.; width, 0.28 mm.

Type host.—*Cricetulus andersoni*.

Type locality.—Shansi, China.

Type (holotype).—Cat. No. 44905, U. S. N. M.

Described from a male (holotype) and a last nymph taken from skin (U. S. N. M. 172610) of type host, a murid of the subfamily Cricetinae, collected at the type locality.

In this species the apical process of the third antennal segment of the male reaches its extreme development, and the setae of the third segment undergo their greatest reduction in size.

KEY TO THE SPECIES OF *Eremophthirius* GLINKIEWICZ.

1. Paratergal plates long, the lobes of one plate overlapping the base of the following plate; paratergal setae very long, on typical abdominal segments as long as or longer than the paratergal plates.....2
 - Paratergal plates shorter, the lobes of one plate not overlapping the base of the following plate; paratergal setae shorter, usually not so long as the paratergal plates.....3
2. Temporal lobes evenly rounded.....*E. praecisa* (Neumann)
 - Temporal lobes not evenly rounded, but with postantennal angles and posterolateral angles well developed.....
 - E. stephensi* (Christophers and Newstead)
3. Some lobes of paratergal plates with serrate margins and very conspicuous.....*E. laterae* (Ferris)
 - No lobe of paratergal plates conspicuous and none with serrate margins.....4
4. Typical paratergal plates with distinct cusplike lobes.....5
 - Typical paratergal plates with vestigial lobes; apical process of third antennal segment of male almost straight, longer than the segment proper, with apical seta absent and apical hook only slightly recurved and not turned upward.....
 - E. eropepli*, new species
5. Each typical abdominal segment of male with two transverse rows of setae, the setae of the first row much shorter than those of the other row.....*E. biseriata* (Ferris)
 - Each typical abdominal segment of male with but a single transverse row of setae.....*E. wernerii* Glinkiewicz

A NEW SPECIES OF EREMOPHTHIRIUS GLINKIEWICZ.

One of the six species of *Eremophthirius* is new. It comes from a murid host of the subfamily Murinae, which was taken in Celebes.

***Eremophthirius eroepli*, new species.**

Male.—Forehead but little developed, its margin broken up into four low festoons. Antennae slightly longer than the width of the head; first segment about as broad as long; second segment almost as long as first but only about one-half as broad. *Third antennal segment* (fig. 2, *b*) with a very long, straight apical process, this being about twice as long as the segment proper; posterior seta not so long as width of segment, situated at posterodistal corner of segment; dorsal seta somewhat smaller than posterior, situated at about the middle of the segment; anterior seta situated just back of front margin of segment and about half way from the base of the same to the tip of the apical process; ventroproximal seta situated at distance equal to about two-thirds its length from the base of the segment and the front margin of the same; ventrodistal seta situated slightly distad of the anterior seta; apical spine short, straight, spinelike; apical hook slightly recurved, not bent upward. Temporal lobes broadly rounded. Thorax broader than long; outer mesothoracic pleurite a crescentic ridge, which is fused with the inner mesothoracic pleurite and projects over and above the front part of the thoracic spiracle; outer mesothoracic pleural seta spinelike, situated directly above the thoracic spiracle; inner mesothoracic pleurite a sclerotized ridge; inner mesothoracic pleural seta about two and a half times as long as the outer. Typical paratergal plates with very small, vestigial, simple lobes; setae on typical paratergal plates somewhat spinelike. Tergal setae arranged in a single transverse row on each abdominal segment, variable in size. *Genital armature of male* as follows: Basal plate reaching forward to middle of sixth abdominal segment, lateral margins incurved, rods separated from lateral margins for much of their length by a suture; parameres very short, each articulating distally with base of pseudopenis, below with ventral endomere, and extending as a small straight process; posterior endomere formed into a large, hooklike pseudopenis with a broad base.

Length, 1.03 mm.; width, 0.45 mm.

Female.—Forehead more protruding than in the male. First antennal segment longer than broad and only about one and a half times as broad as second segment; third antennal segment as broad as long and longer than the fourth. Inner seta of each genital tuft distinctly spinelike and somewhat shorter than the others.

Length, 1.42 mm.; width, 0.49 mm.

Type host.—*Eroepplus canus*.

Type locality.—Celebes.

Type slide (cotypes).—Cat. No. 44906, U. S. N. M.

Described from two males and two females taken from the skin (U. S. N. M. 219711) of the type host, which was collected at the type locality.

This species is nearest *E. weneri* Glinkiewicz, but differs from the latter in the shape of the paratergal plates and in some other characters.

POSTSCRIPT.

The species described by Professor G. F. Ferris of Stanford University as *Polyplax borealis*, new species,¹ is as he suspected only a synonym of my *Polyplax alaskensis*. His beautiful illustrations of this circumpolar louse are most welcome.

¹Parasitology, Vol. XXV, p. 127.