[From PARASITOLOGY, Vol. 43, Nos. 3 & 4, November 1953]

PRINTED IN GREAT BRITAIN

A KEY TO THE ETHIOPIAN SPECIES OF THE GENUS *POLYPLAX* (ANOPLURA), WITH DESCRIPTIONS OF TWO NEW SPECIES

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(With 12 Figures in the Text)

We believe that the publication of a new key to the species of the genus *Polyplax*, so soon after that contained in Ferris's recent monograph (Ferris, 1951), is justified since it includes two new species and three species, *praomydis* Bedford, *subtaterae* Bedford and *cummingsi* Ferris, which appear to require some re-definition as Ferris placed all three in synonymy.

While sympathizing with Ferris's reaction against the work of many specialists in this group, we believe that the principle can be carried too far and may lead to the ignoring of constant, though slight, differences, which will separate two closely related species or indicate the presence of two subspecies of a single species. It is, of course, very often impossible to decide on the status of a population in the absence of breeding experiments. In all such cases we proposed to consider them good species when the differences are clear-cut, even though slight. The cases of *subtaterae* and *cummingsi* fall, perhaps, into this category.

We wish to thank Miss Theresa Clay of the British Museum (Natural History), London, Mr G. H. E. Hopkins of the Zoological Museum, Tring, Dr René du Toit of the Onderstepoort Research Laboratories, Pretoria, Dr F. L. Werneck, Instituto Oswaldo Cruz, Rio de Janeiro for assistance readily given, and Dr F. Zumpt of this Institute for granting us permission to carry out this work and for help and advice.

I. KEY TO THE ETHIOPIAN SPECIES OF THE GENUS *POLYPLAX*

1 (36) Thoracic sternal plate present **2**

2 (19) Thoracic sternal plate with a narrow, handle-like anterior process **3**

3 (6) Head in both sexes slender, 1·6–1·8 times longer than wide.
Pre-antennal area rounded; antennae set well back from the anterior margin, and not modified in the male. Third paratergal plate with a dorsal seta of about twice the length of the plate. Male genitalia with long parameres reaching to the tip of the pseudopenis **4**

4 (5) Females possess the following combination of characters: tergites 2–3 with setae as follows: 2+6, 6; sternite 2, 5+2; sternites 4–6 each with 7+6 setae. Males possess the following chaetotaxy on sternites 2–6: 6+4, 4+4, 7, 7, 7. (Fig. 12.) Hosts: *Otomys irroratus* Brants from Barotseland, Transvaal, Kenya, Natal; *O. tropicalis* Thomas from Transvaal; *O. angoniensis* Wroughton from Kenya.
otomydis Cummings

5 (4) Females possess the following combination of characters: tergites 2–3 with setae as follows: 2+4, 4; sternite 2, 5+[4+2 weak lateral setae]; sternites 4–6: 5+[4+(2)], [5–6]+[4+(2)], [5–6]+[4+(2)]. Males possess the following chaetotaxy on sternites 2–6: 5+4, 5+4, 6, 6, 6. (For male genitalia see Fig. 11.) Hosts: *Dasymys incomtus* Sund. from Natal and East Africa; *D. nudipes* Peters from Barotseland; *Aethomys chrysophilus* De Winton from Natal.
cummingsi Ferris

6 (3) Head in both sexes more or less broad being from 1–1·4 times longer than broad **7**

7 (8) Setae on all paratergites longer than the plate that bears them, dorsal and ventral setae of about equal length.
Sternal plate oval with prominent 'handle'. Thorax considerably longer than the head and bearing a submarginal row of short setae anterior to the spiracle on the dorsum. Male unknown. Host: '*gros rats*' from Abyssinia.
praecisa (Neumann)

8 (7) Setae on paratergal plates of various lengths **9**

9 (10) Paratergal plate 3, but not 4, with the dorsal seta very long.
Paratergal plates 4–6 with setae which are about as long as the plate bearing them. Head more or less truncate in front of the antennae. Posterior part of the sternal plate oval. Dorsum of thorax with a row of short submarginal setae anterior to the spiracle. Hosts: *Tatera vicina* Peters from East Africa.
taterae Ferris

10 (9) Paratergal plate 3 with or without a long dorsal seta, but paratergal plate 4 with a long seta **11**

11 (18) Paratergal plates 3 and 4 each with a long seta. Other setae on plates 3–6 much shorter **12**

12 (13) Ventral side of the abdomen with 2 setae between the paratergal plates and sternite of segments 5–6.
Dorsum of thorax with 4 submarginal setae anterior to the long setae. Tergal and sternal plates weakly developed in both sexes. Thoracic sternal plate is triangular with broadly rounded corners. The male has short, thorn-like setae on tergites 4–7 as well as the usual longer setae. Hosts: *Tatera schinzi* Noack from Rhodesia, Ngamiland, Swaziland, Bechuanaland, Barotseland, South West Africa, Orange Free State; *T. böhmi* (Noack) from East Africa; *T. bransfii* Smith from Transvaal, Basutoland, Bechuanaland, Barotseland; *T. afra* Gray from Cape Province; *T. liodon* Thomas from Barotseland. **biseriata** Ferris

13 (12) Ventral side of the abdomen with but a single seta between the paratergal plate and the sternite of segments 3–6 **14**

14 (15) Dorsum of thorax with no submarginal setae anterior to the thoracic spiracle.
The third antennal segment of the male not strikingly modified. Sternal plate quite slender, anterior process weak, anterior margin rounded, lateral margins somewhat concave, posterior end blunt—whole posterior part not oval. Tergite 2 bears 2+10 setae in the male and 2+8 in the female. Tergites 3–6 bear about 12–16 setae in the male, and 10–12 in the female. Host: *Gerbillus pyramidium* Geoffroy from Sudan. **gerbilli** Ferris

15 (14) Dorsum of thorax with at least a single, short, submarginal seta anterior to the thoracic spiracle. The third antennal segment strongly modified in the male **16**

16 (17) Sternal plate with the posterior part broad, roughly triangular, with rounded corners, small anterior process, anterior margin more or less straight and at right angles to the long axis of the plate, posterior end blunt (Fig. 3).
Basal cell of the male antennae elongate, longer than broad (Fig. 2). Tergite 2 with 5+14 setae in the male and 4+12 in the female. Tergites 3–6 with about 15–17 setae in both sexes. Host: *Gerbillus paeba* Smith from South West Africa. **rose-innesi** n.sp.

17 (16) Sternal plate with the posterior part more slender, and the whole oval in shape, the anterior margin sharply rounded and running broadly into the anterior process; the sides of the posterior part convex.
Basal cell of the male antenna as long as broad and not at all elongate. Tergite 2 with 6+12 setae in the male and 4+8 in the female. Tergites 3–6 with about 20 setae each in both sexes. Host: *Tatera liodon* Thomas from Uganda. **subtaterae** Bedford

18 (11) Paratergal plate 4 with a long seta, and paratergal plate 3 with two short setae only.
Dorsal and ventral setae of each of paratergal plates 5 and 6 of different lengths, all shorter than the length of the plates (Fig. 10). Third antennal segment strongly modified in the male (Fig. 6). Dorsum of thorax with one seta anterior to the spiracle. Host: *Desmodillus auricularis* Smith from South-West Africa. **hopkinsi** n.sp.

19 (2) Thoracic sternal plate without an anterior process **20**

20 (21) Paratergal plates of segments 3–6, 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 broader and more blunt process.
Sternal plate triangular with rounded corners. Pseudopenis of male bent back in the form of a hook, the parameres exceptionally small. Paratergal plates 7 and 8 are the only ones bearing setae longer than the plates themselves. Hosts: *Rattus tulbergi* Thomas from East Africa; *Rattus coucha* Smith from Rhodesia; '*several rats*' from Transvaal. **waterstoni** Bedford

21 (20) Paratergites with short posterior angles **22**

22 (25) Paratergal plates of an unusual form: plates 3–6 large with dorsal margin nearly straight and ventral margin almost semicircular; the posterior margin deeply emarginate or not **23**

23 (24) Tergites and sternites of the abdomen occupying the greater part of the abdominal width.
Posterior margin of paratergal plates 3–6 deeply emarginate. Host: *Rhabdomys pumilio* Sparrman from Transvaal, Kenya and South West Africa. **arvicanthis** Bedford

24 (23) Tergites and sternites of the abdomen are narrow, occupying not more than half of the abdominal width.
Posterior margin of the paratergal plates 3–6 only slightly emarginate. Hosts: *Arvicanthis abyssinicus* Rüppel from Uganda; *Otomys tropicalis* Thomas from Uganda; *Oenomys hypoxanthus* Pucheran from Uganda. **abyssinica** Ferris

25 (22) Paratergal plates of usual form with more or less straight dorsal and ventral margins **26**

26 (27) Abdominal tergal and sternal plates very short, being shorter than the interstices between the plates. Paratergal plates 3–6 each bearing two equal-sized setae, which are shorter than the plate bearing them. Sternal plate triangular with broadly rounded corners, and rounded anterior margin. Male with strongly modified third antennal segment. Male genitalia with parameres reaching tip of the pseudopenis. Hosts: *Saccostomus campestris* Peters from Natal and South-West Africa.
jonesi Kellog & Ferris

27 (26) Abdominal tergal and sternal plates well developed, being much longer than the interstices between the plates **28**

28 (31) All paratergal plates bear setae which are at least as long as the plates bearing them **29**

29 (30) Head slender, about twice as long as broad in both sexes.
Antennae set well back on the head; pre-antennal area acutely rounded; sternal plate shield-shaped; male with the antennae weakly modified. Male genitalia with basal plate widely expanded posteriorly; pseudopenis Y-shaped; parameres almost reaching to the tip of the pseudopenis. Hosts: *Acomys cahirinus* Desmarest from Egypt; *A. hystrella* Heller from Uganda; *A. percivali* Dollman from East Africa. **oxyrrhynchus** Cummings

30 (29) Head about as long as broad in both sexes.
A slender species with a relatively small head, much shorter than the thorax. Paratergal plates very slender. Sternal plate shield-shaped with a very short, broad anterior process. Male has antennal third segment strongly modified. Male genitalia has basal plate with almost parallel sides, large parameres which reach the tip of the pseudopenis. Hosts: *Lophuromys aquilus* True from East Africa; *L. sikapusi* Temminck from Uganda; *Lophuromys* sp. from Nyasaland; *Thamnomys ibeanus* Osgood from East Africa. **phthisica** Ferris

31 (28) Not all paratergal plates bear setae which are at least as long as the plates bearing them **32**

32 (35) Both setae of paratergal plate 4 much shorter than the length of this plate **33**

33 (34) Males with the third antennal segment strongly modified; head truncate anterior to the antennae; setae on sternites 2–6 are 5+4, 5+6, 6, 6, 5 and on the second tergite, 2+8; parameres of the genitalia about as long as the pseudopenis. Females with setae on the second sternite (4–5)+(3–4) and on the second tergite 2+6.
Hosts: *Rattus rattus* L. and *R. norvegicus* Berkenhout—records from all over the world.
spinulosa (Burmeister)

34 (33) Males with the third antennal segment barely modified; head rounded in front of the antennae; setae on sternites 2–6 are (3–4)+4, (3–4)+(4–6), (4–5), 4, (3–4) and on the second tergite 2+6. Parameres of the genitalia much shorter than the pseudopenis. Females with the setae on the second sternite (2–4)+4 and on the second tergite 2+4.
Hosts: *Aethomys namaquensis* Smith from Transvaal, Rhodesia, Swaziland, Barotseland, South-West Africa; *A. chrysophilus* De Winton from South-West Africa. **praomydis** Bedford

35 (32) Dorsal setae of paratergal plate 4 at least as long as the plate itself and very much longer than the ventral seta.
Sternal plate triangular with broadly rounded corners. Male genitalia with parameres much shorter than the pseudopenis; male has the third antennal segment strongly modified. Hosts: *Mus musculus* L.—many records including South Africa. **serrata** (Burmeister)

36 (1) Thoracic sternal plate absent.
Very slender species; abdominal tergites well developed in both sexes and bearing stout, clavate setae. Paratergal plates 3–8 with pairs of long setae. Male antennae strongly modified. Male genitalia with parameres reaching the tip of the pseudopenis. Hosts: *Acomys cahrinus* Desmarest from Egypt; *A. hystrella* Heller from Uganda; *A. percivali* from East Africa. **brachyrrhynchus** Cummings

II. NOTES AND DESCRIPTIONS OF NEW SPECIES

Polyplax rose-innesi n.sp.

Male. Length 1·04 mm. Antennae are set close to the anterior margin of the head, the pre-antennal part of which is truncate. Post-antennal angle quite pronounced, the lateral margins of the hind-head nearly straight and parallel. Occipital region not greatly constricted. Antennae as in Fig. 2. The head is about as long as wide. The thorax is about as long as the head, the lateral margins convex; the sternal plate is shown in Fig. 3. Dorsum of thorax with a short submarginal seta anterior to the spiracle. The claws of the hind-legs are coarse and those of the anterior two pairs much finer. The abdomen is not particularly slender. Paratergal plates (Fig. 5) with the second paratergal plate broad and divided, the ventral piece bearing the longer of the two setae. Paratergal plates 3 and 4 each bear long dorsal setae. Male genitalia shown in Fig. 4; the pseudopenis is hook-like and articulates with the parameres.

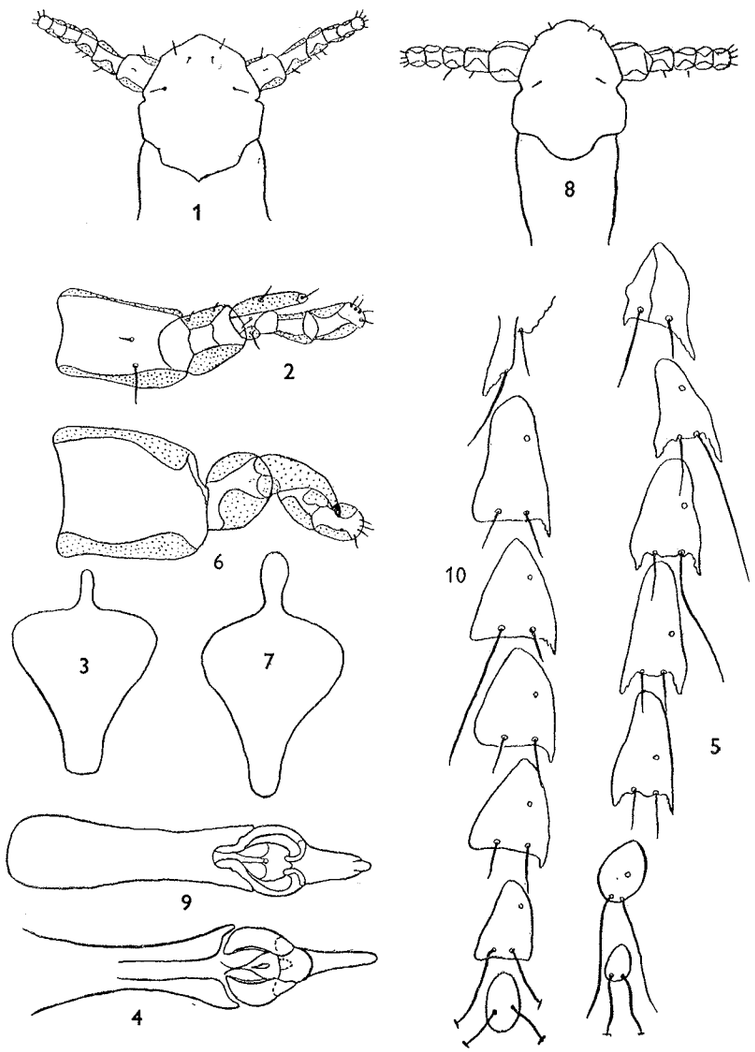
The tergites and sternites are wide but short. The chaetotaxy* of these plates is as follows:

t1	t2	t3	t4	t5	t6	t7	t8
2	5+14	17	21	20	18	16	4

st2	st3	st4	st5	st6	st7	st8
16	18	17	11	12	8	2

Female. Length 1·23–1·45 mm. Head as in Fig. 1; thorax as long as head, and bears a submarginal seta anterior to the spiracle on the dorsum.

* It should be noted that the chaetotaxy of tergites and sternites of *Polyplax* species is never wholly constant. It is often a useful character, however.



Figs. 1–5. *Polyplax rose-innesi* n.sp.

Fig. 1, head of female; fig. 2, antenna of male; fig. 3, sternal plate; fig. 4, male genitalia; fig. 5, left paratergal plates.

Figs. 6–10. *Polyplax hopkinsi* n.sp.

Fig. 6, male antenna; fig. 7, sternal plate; fig. 8, head of female; fig. 9, male genitalia; fig. 10, right paratergal plates.

Chaetotaxy of abdomen as follows:

t1	t2	t3	t4	t5	t6	t7	t8
2	4+12	15	16+17	15+16	17+15	13+10	2

st2	st3	st4	st5	st6	st7
18	10+13	12+13	12+13	12+12	9+8

Material. Holotype 1 ♂, paratypes 6 ♀♀. Leg. R. Rose-Innes (Plague Research Laboratory, Johannesburg), Brandberg, South-West Africa, 27 July 1951.

Host. Gerbillus paeba Smith.

Types in the collection of the South African Institute for Medical Research.

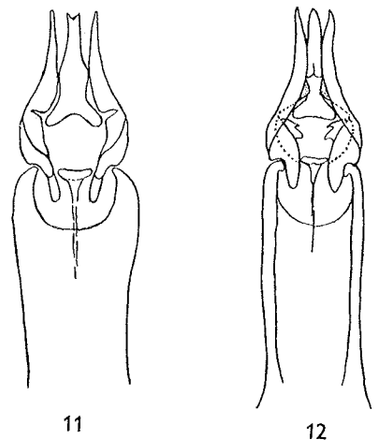


Fig. 11. *Polyplax cummingsi* Ferris. Male genitalia.
Fig. 12. *P. otomydis* Cummings. Male genitalia.

Polyplax hopkinsi n.sp.

Male. Length 1·1 mm. The head is about as long as broad, truncate in front of the antennae which are well set forward. Post-antennal angles prominent, lateral posterior margins of the head straight and nearly parallel, occipital region distinctly constricted. The antennae are shown in fig. 6. Thorax about as long as the head and of usual form with sides convex. Sternal plate as in Fig. 7. The hind claw is blunt, the other two quite slender. A short seta occurs just anterior to the spiracles on the dorsum.

Abdomen not very slender. The tergal and sternal plates are wide but short, their chaetotaxy is as follows:

t1	t2	t3	t4	t5	t6	t7	t8
2	2+10	15	18	14	14	12	4

st2	st3	st4	st5	st6	st7
4+7	9+10	12	13	12	4

Female. Length 1·2–1·4 mm. The head as in Fig. 8. Thorax bears a short submarginal seta anterior to the spiracle on the dorsum. Abdominal tergal and sternal plates wide but short. The chaetotaxy is not clear on the specimens available.

Material. Holotype 1 ♂, paratypes 3 ♀♀, 1 ♂. Leg. R. Rose-Innes. Holotype at 12 miles south of Otjinene, South-West Africa, 25 November 1950. Paratypes 1 ♂, 3 ♀♀ on Luderitz-Aus road, South-West Africa, 15 March 1950.

Hosts. Desmodillus auricularis Smith.

Types in the collection of the South African Institute for Medical Research, Johannesburg.

Note. Mr G. H. E. Hopkins has kindly confirmed the determination of this species and we take pleasure in naming it after him.

Polyplax subtaterae Bedford 1936

After examining a male and two female paratypes of *subtaterae*, and specimens of *taterae* from East Africa off *Tatera vicina*, we consider the species to be distinct. The characters given in the key will separate them.

In the Onderstepoort collection is a male bearing the same data as does the paratype series, but this specimen is somewhat different in that it possesses a submarginal row of setae on the dorsum of the thorax anterior to the spiracle, instead of the single seta possessed by the paratype series. It does, however, have the long dorsal setae on both the 3rd and 4th paratergal plates.

Polyplax taterae Ferris 1923

Polyplax taterae mombassae Werneck = *taterae taterae* Ferris n.syn.

Werneck (1940) was apparently misled by Ferris's erroneous description of the setae on paratergal plate 3 (Ferris, 1923). Ferris has since corrected his earlier error (Ferris, 1951).

I have seen this species off *Tatera vicina* from East Africa.

Polyplax praomydis Bedford 1929

Ferris (1951), after seeing a male of the type series of *praomydis*, synonymized it with *P. spinulosa* Burm., despite the fact that in *praomydis* the male has a slightly modified antenna, differences in abdominal chaetotaxy and differences in the male genitalia and the females show differences in abdominal chaetotaxy. We have seen paratypes of *praomydis* and much other material from the same host. We have, therefore, no hesitation in reinstating *praomydis*.

Polyplax biseriata Ferris 1923

It is interesting to note that *Tatera liodon* from Simakumba, Barotseland were carrying *Polyplax biseriata* Ferris and not *P. subtaterae* Bedford. This

appears to be a case of the geographical distribution of the parasites being independent of the distribution of the host.

Polyplax cummingsi Ferris 1916

We hold the opinion that the characters given in the key are adequate grounds for considering this species to be distinct from *P. otomydis* Cummings.

Dasymys is a rodent living in the same habitat as does *Otomys*, and thus offering excellent opportunity for a transfer of parasites. This is apparently what has occurred in the case of *Polyplax cummingsi*.

Polyplax otomydis Cummings 1912

The lice from the genera *Parotomys*, *Myotomys* and *Liotomys* appear to show small constant differences from *Polyplax otomydis*. A study of these lice will be made when adequate material is to hand.

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(*MS. received for publication* 16. I. 1953.—Ed.)