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Anoplura (*Siphunculata and Mallophaga*) from South African Hosts.

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THE present paper is based mainly on a collection of Anoplura belonging to the South African Museum and submitted to the author by Dr. R. F. Lawrence for identification. The majority of the species were collected by Dr. Lawrence in Ovamboland, South-West Africa, in 1922-23, and a few by Mr. White at Capetown. In addition to these, there are also described or recorded a few species in the collections of the Division of Veterinary Research and of Mr. Lawrence Hill, of Pietermaritzburg.

We wish to express our thanks to Mr. C. G. Walker for the great care he has taken in drawing the figures reproduced in this paper, with the exception of figures 2 to 5 and 20 and 21, which were drawn by the author.

Sub-order SIPHUNCULATA.

Genus LEMURPHTHIRUS Bedford.

Lemurphthirus Bedford, *Parasit.*, XIX, ii, p. 263 (1927).

1. LEMURPHTHIRUS GALAGUS Bedford.

L. galagus Bedford, *Parasit.*, XIX, ii, pp. 263-264 (1927). (Figure 1.)

Two males (one slightly immature) taken off a lemur, *Galago moholi*, in South-West Africa. This species was described from a single female taken off the same host in the Transvaal.

Description of Male.—Head as in the female. Second joint of antennae shorter than that of female, with a short spine on the inner margin; third joint with two slightly stronger spines, one at the distal post-axial angle and the other behind it.

Thorax and *legs* as in the female.

Abdomen elongated; tergites i to vii each with a very narrow median, transverse dark band and four long bristles, with a short spine between the outer pairs and one long bristle inside each spiracle. Tergite viii with two long bristles in the middle and two long spiracular bristles on each side. Apical tergite with a small plate on each side on the posterior margin with two short hairs. First sternite with a longish bristle on each side of the meson; second to eighth

sternites with similar bands and bristles as on the dorsum, the spines between the bristles being slightly smaller than those on the dorsum. On the second sternite the band is broad and there are an additional two bristles above the transverse row. Pleurites as in the female, only present on the second segment. Spiracles present on the third to eighth segments. Male genitalia as in Fig. 1.

Measurements.

	Length.	Width.
Head	0.25	0.25
Thorax	0.28	0.26
Abdomen	0.68	0.41
Total	1.21 mm.	

Genus LINOGNATHUS Enderlein.

Linognathus Enderl., *Zool. Anz.*, XXIX, p. 194 (1905).

1. LINOGNATHUS VITULI (Linnaeus).

One immature specimen found on a fly, *Musca lasiophthalma*, at Camps Bay, Capetown, in May, 1928.

2. LINOGNATHUS GORGONUS nov. nom.

L. ferrisi Bedford, *Trans. Roy. Soc. S. Afr.*, XIV, iv, pp. 351, 352, Fig. 5, 6 (1927), *nec* Fahrenholz, 1919.

As Dr. Maurice C. Hall has very kindly pointed out to me, my *L. ferrisi* is preoccupied by *L. ferrisi* Fahrenholz, 1919. I now, therefore, propose the name *gorgonus* for the species parasitic upon *Gorgon taurinus* (blue wildebeest).

Genus EULINOGNATHUS Cummings.

Eulinognathus Cummings, *Ann. Mag. Nat. Hist.* (viii), xvii, p. 90 (1916).

1. EULINOGNATHUS DENTICULATUS Cummings.

E. denticulatus Cummings, *Ann. Mag. Nat. Hist.* (viii), xvii, pp. 90-94, f. 1 (1916).

Three females taken off *Pedetes caffer* Pall. (springhare).

Genus LINOGNATHOIDES Cummings.

Linognathoides Cummings, *Bull. Ent. Res.*, V, p. 159 (1914).

Ferris (*Stanford Univ. Publ.*, II, iv, p. 237, 1923) has recently sunk this genus as a snyonym of *Neoheamatopinus* Mjöberg, but as the following species was described as a *Linognathoides* and its generic position is doubtful I am retaining it here.

1. Linognathoides faurei Bedford.

L. faurei Bedford, *Seventh and Eighth Repts. Dir. Vet. Res.*, Un. S. Afr., pp. 710-712, Pl. 1, f. 2; Pl. 7, f. 3 (1920).

Three females taken off *Geosciurus capensis* Kerr (ground-squirrel).

Genus Polyplax Enderlein.

Polyplax Enderlein, *Zool. Anz.*, XXVIII, pp. 139, 142, 223 (1904).

Polyplax (Enderl.) Ferris, *Stanf. Univ. Publ., Biol. Sci.*, II, iv, p. 183 (1923).

1. Polyplax spinulosa (Burmeister).

Pediculus spinulosus Burm., "Rhynchota," *Gen. Ins.*, p. 8 (1839).

Polyplax spinulosa (Burm.) Ferris, *Stanf. Univ. Publ., Biol. Sci.*, II, iv, pp. 187-191, f. 119, 120 (1923).

Females and males collected by the writer off a rat, *Thallomys moggi* Roberts, along with specimens of *Hoplopleura affinis* (Burm.) at Onderstepoort in March, 1927.

2. Polyplax praomydis nov. sp.
(Fig. 2-5.)

Female.—Total length, 1.74 mm. Length of head 0.24 mm.; thorax (along middle line), 0.15 mm.; abdomen, 1.35 mm. Breadth of head, 0.15 mm.; thorax, 0.25 mm.; abdomen (4th and 5th segments), 0.46 mm.

Head (Fig. 2) longer than wide, acutely rounded in front of the antennae. On the dorsum there are two small hairs in front, and four a short distance behind the anterior margin, the lateral ones being close to the base of the antennae. Behind the antennae there is a transverse suture, and three minute hairs on each side in front of the suture. Lateral margins of hind-head almost parallel with one minute hair. At each latero-posterior angle there is a long bristle and two short ones above it, and on each side of the meson in the occipital area there is a minute hair. On the venter there is a row of four short hairs in front of the antennae, and a longer pair between the antennae. Antennae set a short distance back from the anterior margin; first segment of normal size with a strong short bristle on the dorsum.

Thorax shorter than the head, with the lateral margins convex, posterior margin concave. On the posterior margin of the mesothorax there is a very short spine just within the spiracle, and a much longer bristle slightly nearer the meson. Sternal plate as in Fig. 4.

Abdomen elongated, widest at the fourth and fifth segments. Tergite i with two hairs; tergite ii with one row of four hairs; tergite iii with one plate and one row of six hairs; tergites iv-vi each with two rows of seven to eight hairs, tergite vii with seven to eight hairs in the first row and six in the second. Sternite ii with two rows of hairs, three to five in the first row and four in the second; sternite iii with four to five hairs in the first row and six in the second; sternites iv-vi each with seven hairs in the first row and six in the

second; sternite vii with five to seven hairs in the first row and six in the second. Gonopods normal, each with two short hairs and one long bristle.

Pleural Plates.—Those of the second segment divided, each with a short seta; plates of the third to sixth segments triangular, each with two short setae, the outer setae on the third segment are slightly shorter than the inner, and on the fourth to sixth segments the outer setae are slightly longer than the inner ones; plates on the seventh and eighth segments small, each with the usual two long setae.

Male.—Total length, 1.16 mm. Length of head, 0.23 mm.; thorax, 0.13 mm.; abdomen, 0.8 mm. Breadth of head, 0.15 mm.; thorax, 0.21 mm.; abdomen, 0.36 mm.

Tergite i as in the female; tergite ii with one row of six hairs, the one on each side of the median pair being shorter than the others; tergites iii to vii each with one plate and one row of eight to nine hairs, those on each side of the middle pair being shorter than the rest; tergite viii with one row of four hairs. Sternite ii with two rows of hairs, three to four in the first row and four in the second; sternite iii with two plates and two rows of hairs, the anterior with three to four hairs and the posterior with four to six; sternites iv to vii each with one plate and one row of four hairs; sternite viii with two admedian hairs.

Genitalia as in Fig. 5; the basal plate is narrow, the parameres are short and the pseudopenis elongated.

Described from several females and males taken from a *Praomys namaquensis monticularis* Jameson (family Muridae) at Onderstepoort by the writer on the 1st August, 1927.

Holotype: a female.

This new species belongs to the *spinulosa* group, and can be easily distinguished from the other members by the pleural plates and shape of the head, which closely resembles that of *P. otomydis* Cumms.

3. Polyplax waterstoni Bedford.

P. waterstoni Bedford, *Sixth and Seventh Repts. Dir. Vet. Res.*, Un. S. Afr., pp. 715-6, f. 1, 2, 4, 5 (1919).

P. waterstoni (Bedford) Ferris, *Stanf. Univ. Publ.*, II, iv, p. 193-6, f. 121, 122 (1923).

Several females and males taken off *Mastomys coucha* A. Smith (multimammate mouse) by the writer at Onderstepoort and Sycamore in the Transvaal in 1927.

4. Polyplax cummingsi Ferris.

P. cummingsi Ferris, *Ann. Durban Mus.*, I, pp. 240-3, f. 25, 26a (1916).

P. cummingsi Ferris, *Stanf. Univ. Publ.*, II, iv, pp. 213-5, f. 136, 137 (1923).

Several females and males collected by the writer off *Aethomys chrysophilus* de Wint. (African rat) at Sycamore, eastern Transvaal, on the 27th October, 1927.

Genus Hoplopleura Enderlein.

Hoplopleura Enderlein, *Zool. Anz.* XXVIII, p. 221-223 (1904).
Hoplopleura (Enderl.) Ferris, *Stanf. Univ. Publ., Biol. Sci.*, II, ii, p. 59 (1921).

1. Hoplopleura affinis (Burmeister).

Pediculus affinis Burm., "Rhynchota," *Gen. Ins.*, p. 10 (1839).
Hoplopleura affinis (Burm.) Ferris, *Stanf. Univ. Publ., Biol. Sc.*, II, ii, pp. 75-79, f. 42, 43 (1921).

Males and females taken by the writer off a rat, *Thallomys moggi* Roberts, at Onderstepoort in March, 1927. This is a very variable species. The above specimens mainly differ from Ferris' description in the absence of hairs between the sclerites and pleurites on all the tergites and sternites and in size, the females measuring 1.47 mm. and the males 1.08 mm. in length, whereas Ferris states that the female measures 1.1 mm. and the male 0.95 mm.

2. Hoplopleura enormis enormis Kellogg and Ferris.

H. enormis Kell. and Ferris, *Ann. Durban Mus.*, I, p. 155, pl. 16, f. 4-4e (1915).
H. enormis enormis (K. and F.) Ferris, *Stanf. Univ. Publ.*, II, ii, pp. 94-95, f. 57 (1921).

Several females and one male collected by the writer off *Lemniscomys spinalis* Thos. (bushveld striped mouse) at Sycamore on the 3rd November, 1927. Originally described from specimens taken off *Arvicanthis dorsalis* = *L. spinalis* in Zululand.

3. Hoplopleura biseriata Ferris.

H. biseriata Ferris, *Stanf. Univ. Publ.*, II, ii, pp. 103, 104, f. 64a (1921).

Two females taken off *Tateroma angolae*, a gerbille, in South-West Africa. This species was described from a single female taken off *Malacothrix typicus typicus* A. Smith (typical large-eared mouse) at Bothaville, Orange Free State.

Genus Bathyergicola nov. gen.

Eyes absent. Antennae five-jointed, not sexually dimorphic. Thorax slightly wider than head, rounded posteriorly, without a sternal plate. Fore and mid legs equal in size, hind legs slightly larger; tibiae produced into a thumb-like process opposite the claw. Abdomen oval, each segment except the last with a row of long hairs on the dorsum and venter; tergal and sternal plates absent; pleural plates present on the second to sixth segments.

Hosts.—Rodents known as "mole rats" belonging to the family Bathyergidae.

Geno-type: *Bathyergicola hilli* nov. sp.

1. Bathyergicola hilli nov. sp.

(Figs. 6, 7, 7a, and 8.)

Female.—*Head* (Fig. 6) elongated, with the antennae situated a short distance behind anterior margin; forehead rounded in front with prominent prae-antennal angles; on the anterior margin there are four minute hairs, and two similar hairs behind them on the dorsum; post-antennal area with lateral margins sub-parallel; on each margin there are three short hairs, one above the other, and a long bristle at the latero-posterior angle; on the ventral surface there is a hair on each side just below the base of the antenna; occipital area entering a V-shaped groove in the thorax. Antennae with the first joint the largest; second joint slightly larger than each of the three apical joints, which are sub-equal in size.

Thorax with a short hair on each side in front, and one long bristle on each side of the meson behind. Ungues of fore and mid legs equal, much smaller than those of hind legs.

Abdomen ovate, the first to seventh segments each with a row of long hairs on the dorsum and venter; eighth tergite and sternite with two long hairs on the posterior margin; ninth tergite bare except for four minute hairs behind the posterior margin; ninth sternite with a patch of about nine long bristles and one spine on each below the gonopod, which is elongated and indistinct. Pleural plates similar, weakly developed, each with a long bristle and a short spine as shown in Fig. 7a. Seventh and eighth segments with two long bristles at each latero-posterior angle.

Male.—Differs from the female as follows: The eighth tergite has a row of four hairs; ninth tergite with about half a dozen small spines in the middle in front and a few minute hairs on each side beneath them; on the posterior margin there are six hairs and several minute ones close together. Male genitalia and genital plate as shown in Figure 8.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.3	0.16	0.27	0.18
Thorax	0.13	0.25	0.13	0.25
Abdomen	1.03	0.83	1.01	0.68
Total ...	1.46 mm.		1.41 mm.	

Holotype: a female.

Described from two females and two males taken off *Georychus hottentotus* at Pietermaritzburg, Natal, on the 22nd June, 1922, by Mr. Lawrence Hill, after whom we have much pleasure in describing this species.

2. Bathyergicola lawrensis nov. sp.

(Figs. 7b, 9, 10.)

Female.—Head (Fig. 9) elongated, forehead rounded in front, with a narrow transverse brown band on the dorsum in front and a similar band on each side above the base of the antenna; on the

venter there is a short longitudinal band on each side of the mouth-parts. On the dorsum of the prae-antennal area there is a transverse row of four short hairs in front of the transverse band and a minute one on each side above the lateral band; on the venter there are several minute hairs in the middle and four short hairs on each side, the two middle ones placed close together. Lateral margins of post-antennal area very slightly rounded with five hairs, one above the other, the last being the longest. On the dorsum there is a minute hair on each side between the antennae, two short ones close together some distance below each, and another minute hair midway between these and the posterior margin; on the venter there is a short hair on each side between the antennae. Occipital area rounded. Antennae with a brown transverse band on each segment, the first being the largest, and the second is slightly larger than each of the remaining joints.

Thorax wider than head, with a long hair on each side of the meson in front of the posterior margin, which projects backwards in the middle on to the abdomen.

Abdomen ovate, first tergite with three irregular rows of long hairs in the middle and about ten long and short ones on each side; second to eighth tergites each with a single row of long hairs in the middle and one or two on each side; apical tergite with a narrow semi-circular brown band; first to seventh sternites each with a single median row of long hairs, and three or four similar hairs on each side; eighth sternite with a small patch of hairs in the middle; apical sternite with five hairs on each between the gonopods, and a tuft of hairs beneath each gonopod, which is long and narrow. Pleural plates on second segment each consisting of a small tooth-like lobe; the plates on the third to sixth segments resemble each other in shape and size (see Fig. 7b). Stigmata present on the third to eighth segment.

Measurements.

	Length.	Width.
Head	0.45	0.28
Thorax	0.16	0.46
Abdomen	1.5	1.36
Total	2.11 mm.	

Described from four females taken off *Bathyergus maritimus* Gmel., a mole rat occurring in the Cape Province. It is quite possible this species may ultimately have to be transferred to a new genus.

Genus Lepidophthirus Enderlein.

Lepidophthirus Enderlein, *Zool. Anz.*, XXVIII, pp. 43, 137 (1904).

1. Lepidophthirus macrorhini Enderlein.

L. macrorhini Enderlein, *Zool. Anz.*, XXVIII, pp. 46, 47, f. 1-5 (1904).

A number of males, females, and immature specimens taken off a giant seal (*Macrorhinus leoninus*) captured off the coast near Capetown (coll. R. F. Lawrence). This species was described from specimens taken off the same host on Kerguelen Island.

Sub-order MALLOPHAGA.

Family MENOPONIDAE Mjöberg.

Genus MENOPON Nitzsch.

Menopon Nitzsch, *Germar's Mag.*, iii, p. 299 (1818).

1. MENOPON TUMIDUM Piaget.

Menopon tumidum Piaget, *Pédicul., Suppl.*, p. 151, pl. 16, f. 5 (1885).

Menopon africanum Kellogg and Paine, *Bull. Ent. Res.*, p. 149, pl. 5, f. 3 (1911).

Menopon africanum transvaalensis Bedford, *Seventh and Eighth Reps. Dir. Vet. Res.*, Un. S. Afri., p. 716 (1920).

Several males and females taken off *Alopochen aegypticus* L. (Egyptian goose) at Tamanzu, South-West Africa, in March, 1923, and one female and one male from *Poecilonetta erythrorhyncha* Gm. (red-billed duck) in South-West Africa.

After having examined specimens from various geese and ducks, including *Plectropterus gambensis*, we have come to the conclusion that *M. africanum* Kellogg and Paine, which was described from specimens taken off *P. gambensis* in the Sudan, is a synonym of *M. tumidum* Piaget, described from males and females taken off the same host. Piaget's description and figure differ mainly from Kellogg and Paine's in the presence in the female of two rows of hairs on the dorsum of each abdominal segment instead of only one row. We know that Piaget was not always reliable in describing and figuring the chaetotaxy of these insects, and as the males possess two rows of hairs on the dorsum of each abdominal segment, except the first two, we consider it highly probable that he had a male in front of him when he drew the chaetotaxy of the abdomen of the female he figured.

2. MENOPON POWELLI Bedford.

Menopon powelli Bedford, *Seventh and Eighth Repts. Dir. Vet. Res.*, Un. S. Afr., pp. 714, 715, pl. 2, Fig. 1 (1920).

Several males and females collected from *Chaetopus adspersus* Waterh. (red-billed noisy francolin) and *Pternistis afer* Mull. (Angora red-necked francolin) on the Kunene River, S.W.A., in March, 1923.

Genus NUMIDICOLA Ewing.

Numidicola Ewing, *Journ. Wash. Acad. Sc.*, XVII, iv, p. 90 (1927).

1. NUMIDICOLA ANTENNATA (Kellogg and Paine).

Menopon antennatum Kellogg and Paine, Bull. Ent. Res., II, p. 150, pl. 5, f. 1 (1911).

Two females and one male taken off *Numida papillosa* (guinea-fowl) on the Kunene River, S.W.A., in March, 1923. It has also been recorded (*Fifth and Sixth Repts. Dir. Vet. Res.*, Un. of S. Afri., p. 718, 1919) taken off *Numida coronata* in the Transvaal, but the

skin of the bird from which the specimens were collected is in the Transvaal Museum and proves to be *N. papillosa transvaalensis* (Transvaal guinea-fowl).

Genus COLPOCEPHALUM Nitzsch.

Colpocephalum Nitzsch, *Germar's Mag.*, iii, p. 298 (1818).

1. COLPOCEPHALUM VITTATUM Rudow.

Colpocephalum vittatum Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 469 (1866).

Three females and one male taken off *Ardeola ralloides* Scop. (squacco heron) on the Kunene River, S.W.A., in March, 1923. A second species, *C. zonatum*, has also been described by Rudow (*Zeit. f. ges. Nat.*, XXXIV, p. 391, 1869), taken off the same host.

Genus HELEONOMUS Ferris.

Heleonomus, Ferris, *Canad. Ent.*, p. 305, Sept., 1916.

This genus includes six species found on cranes.

1. HELEONOMUS MIANDRIUM (Kellogg).

Colpocephalum miandrium (part) Kellogg, *Rept. Kilimand. Exped.*, No. 15, iv, p. 53 (1908).

One male and one female taken off *Balearica regulorum* Benn. (crowned crane) on the Kunene River, S.W.A., in March, 1923. The female described by Kellogg has since been named *H. confusus* by Ferris (*Canad. Ent.*, p. 307, Sept., 1916). Kellogg's specimens were taken off *B. regulorum gibbericeps* in East Africa.

Genus BUCEROPHAGUS nov. gen.

Head wider than long; forehead gradually narrowing from the base to the apex, the ventral portion projecting slightly beyond the dorsum in front; antennal sinuses deep; mandibles situated well forward; on the ventral surface above the middle there is a small plate as shown in Figure 11. Mesonotum separated from metanotum. Abdomen elongate-oval in the female, oval in the male, with well-developed tergal and sternal plates and pleurites. Male genitalia apparently characteristic, as shown in Figure 12. Hind femora with a patch of about 45 hairs on the venter, and five strong short hairs on the posterior margin; similar hairs also present on posterior margins of mid-femora.

Genotype: *Bucerophagus africanus* nov. sp.

Colpocephalum productum Nitzsch, found on *Buceros abyssinicus*=*Bucorvus abyssinicus* Bodd., should also be included in this genus. Owing to the incomplete description given, it is impossible to state to what extent it differs from the new species described here, but judging from Giebel's figures of the male and female of *productum* the two appear to be distinct.

BUCEROPHAGUS AFRICANUS nov. sp.
(Figs. 11, 11a, 12.)

FEMALE.—Head and thorax light brown with darker markings of the same colour; legs pale with dark marginal bands; abdomen pale with dark brown bands and pleurites.

Head as shown in Figure 11.

Thorax.—The prothorax is winged with seven hairs of various length on each side, and eight long hairs on the posterior margin; transverse band on dorsum long and narrow with a long hair at each end. Mesonotum gradually broadening from base to apex, with a row of eight long hairs on the posterior margin. Metanotum same shape as mesonotum, and consisting of three plates, a broad median one and two narrow lateral plates, the former being separated from the latter by a narrow line; on the lateral margins of the median plate there are four hairs, and on the posterior margin of the metanotum there is a row of 14 long hairs and a short or minute hair between each long one. On the ventral surface there is a well marked median plate between the mid and hind coxae (see Figure 11a). Above this plate there is a short longitudinal plate on each side of the middle line, and above each of these a small patch of short hairs.

Legs.—The coxae are sparsely clothed with short hairs, and coxae i also have a longish hair at the inner posterior angle; fore and mid coxae widely separated.

Abdomen elongate-oval, being broadest at the fourth segment. The tergites each with a brown transverse band and a row of thirty longish hairs on the posterior margin, the outer hair on each side being considerably longer than the others; above each outer hair there are two or three short hairs and above these the spiracle; on the apical tergite the plate covers the entire segment, and there are several short and long hairs on the posterior and lateral margins. On each sternite there is a brown transverse band covered with short hairs, the hairs being more numerous on each side, especially on the fourth and fifth sternites. The sternal plates are shorter than the tergal plates, the latter separated from the pleurites, which are beset with short hairs and longer ones on the posterior margins, by a narrow pale line.

Male.—The male resembles the female, except that the abdomen is not so elongated, and is widest at the fifth segment. The apical tergite has a transverse row of about fourteen hairs in the middle, and four longer ones on each side on the posterior margin. On the apical sternite there are ten long hairs forming two rows on each side, and about six short hairs between them in the middle. Genitalia as in Figure 12.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.45	0.58	0.43	0.56
Pronotum ...	0.26	0.5	0.26	0.5
Mesonotum ...	0.11	0.5	0.11	0.5
Metanotum ...	0.16	0.71	0.15	0.66
Abdomen	2.05	1.15	1.48	1.03
Total ...	3.03 mm.		2.43 mm.	

Holotype: a female.

Described from females and males taken off specimens of *Bucorvus schlegeli* Roberts (South African ground-hornbill) in the

Zoological Gardens, Pretoria, in March, 1922; at Mafa, South-West Africa, in February, 1923, and in the gardens at Groot Schuur, Capetown, in November, 1923. The bird in the zoological gardens at Pretoria came from Rhodesia.

Genus Trinoton Nitzsch.

Trinoton Nitzsch, *Germar's Magazin*, iii, p. 300 (1818).

1. Trinoton aculeatum Piaget.

T. aculeatum Piaget, *Pédiculines*, *Suppl.*, p. 136, pl. 15, f. 1 (1885).

Females and males taken off *Sarkidiornis melanotus africanus* Eyt. (knob-billed duck) at Oncka, S.W.A., in March, 1923, also from *Dendrocygna viduata* L. (white-faced duck) at Tamanzu, S.W.A., in March, 1923.

2. Trinoton anserinum (Fabr.).

Pediculus anserinus Fabr., *Syst. Antl.*, p. 345 (1805).

Females and males taken off *Alopochen aegyptiacus* L. (Egyptian goose) at Tamanzu, S.W.A., in March, 1923, and two immature specimens from *Plectropterus gambensis* Linné (spurwing goose) on the Kunene River in March, 1923.

3. Trinoton querquedulae (Linné).

Pediculus querquedulae Linné, *Syst. Nat.*, p. 621 (1758).

Males and females collected off *Sarkidiornis melanotus africanus* Eyt. (knob-billed duck) at Oncka, S.W.A., in March, 1923.

Genus Pseudomenopon Mjöberg.

Pseudomenopon Mjöberg, *Arkiv. f. Zoologi*, VI, p. 50 (1910).

1. Pseudomenopon rostratulae Bedford.

Pseudomenopon rostratula Bedford, *Fifth and Sixth Repts. Dir. Vet. Res.*, Un. S. Afr., pp. 722-723, pl. II, f. 9 (1919).

Two females taken off *Rostratula benghalensis* (painted snipe).

This species was described from specimens taken off the same host in the Rustenburg District, Transvaal.

Family Laemobothriidae Mjöberg.

Genus Laemobothrion Nitzsch.

Laemobothrion Nitzsch, *Germar's Magazin*, III, p. 301 (1818).

1. Laemobothrion titan Piaget.

Laemobothrion titan Piaget, *Pédiculines*, p. 578, pl. 49, f. 1 (1880).

Laemobothrion africanum Kellogg, *Schwed. Zool. Exp. Kilimanjaro*, p. 47, pl. 7, f. 6 (1910).

Laemobothrion gypsis Kellogg, *Ent. News*, XVII, p. 63 (1906).

Four females, one male, and one immature specimen taken from *Buteo vulpinus* Gloger (*B. desertorum*) (steppe buzzard) at Kaoko,

Otavi, S.W.A., in March, 1926. In the Veterinary Research Laboratory collection there are specimens taken off the following hosts: *Gyps coprotheres* Forst. (*G. kolbei*) (Cape vulture), Rustenburg District, Transvaal, 4th October, 1917; *Pseudogyps africanus fullebornei* Erl. (southern white-backed vulture). Rustenburg District, 10th August, 1917; *Pterolestes rufofuscus* Forst. (jackal buzzard); *Nisaetus spilogaster* Bp. (African hawk-eagle), Rustenburg District, 3rd October, 1917; *Milvus aegyptius parasitus* Daud. (Cape kite), Pietermaritzburg, Natal, 2nd January, 1910 (coll. L. Hill); and *Pandion haliaetus* L. (osprey). We have also seen specimens from *Pteroaetus verreauxi* Less. (black eagle), Mtabamhlopi, Natal, 17th October, 1921 (coll. L. Hill). We have no hesitation in sinking both *L. africanum* Kellogg and *L. gypsis* Kellogg as synonyms of *titan*. The former was described from specimens taken off *Pseudogyps africanus* in East Africa, and the latter from specimens taken off *Gyps coprotheres* in the Transvaal. The immature forms of *titan* have the temples rounded instead of angulated, and the specimens from which Kellogg drew up his description of *africanum* were certainly immature. Kellogg stated that the main difference between *gypsis* and *titan* was to be found in the abdominal markings, but these markings vary according to the age of the specimens. Too great a care cannot be exercised in describing highly clitinized species, such as species of *Laemobothrion*, *Trinoton*, *Dennyus*, and certain species of *Esthiopterum*, such as *E. diomedeae* Fabr., etc., as these species vary tremendously according to age; not only are the immature forms very distinct from the adults, but young adults may also appear quite distinct from fully matured adults. Not only do these species vary according to age, but the time they are left in a clearing media may also affect their general appearance.

2. Laemobothrion tinnunculi (Linné).

Pediculus tinnunculi Linné, *Syst. Nat.*, p. 612 (1758).

One male taken off *Cerchneis rupicola* Daud. (Cape kestrel) at Haenertsburg, Transvaal, 15th July, 1926 (Lawrence Hill).

Family Trichodectidae Burmeister.

In the majority of species of Trichodectidae the metanotum is divided, and in some species, notably *Trichodectes interruptofasciatus* Kell. and Ferris and *T. ovalis* Bedford, the posterior division appears to belong to the abdomen, and in describing the latter and other species of Trichodectidae (*Thirteenth and Fourteenth Repts. Dir. Vet. Educ. and Res.*, *pp.* 841-857, 1928) we erroneously referred to this portion of the thorax as the first abdominal tergite.

Cummings (*Proc. Zool. Soc.*, London, p. 283, 1916) states that in *Euthrichophilus setosus* and *E. coëndu* the male genitalia are quite of the same type, and that another type is formed by *Trichodectes latus*, *T. crassus*, and *T. pinguis*, and still another type may be seen in the male genitalia of *Trichodectes gastrodes* Cummings, *T. mephitidis* Osborn, *T. geomydis* Osborn, and *T. interruptofasciatus* Kell. and Ferris. The male copulatory apparatus will probably ultimately be found to be of generic importance in this family, although it must be admitted that at least in a few closely

allied species it differs markedly. Another important generic character is the shape of the head and chitinous bands on the forehead.

Genus TRICHODECTES Nitzsch.

Trichodectes Nitzsch, *Germar's Magazin*, III, p. 294 (1818).

1. TRICHODECTES COOLEYI nov. sp.
(Fig. 13.)

FEMALE.—*Head* wider than long, the anterior margin rounded, without a median notch. Antennal bands dark, enlarged in front of the trabecula-like processes, which are prominent, and also in front where they are separated by a narrow clear space. Antennal sinuses shallow. Ocular projections prominent. Temples rounded with a narrow marginal band; the bands being joined together by a broader basal band. On the anterior margin there are four hairs on each side, the two front ones being the longest. On the dorsum there are eight hairs as in the male (Fig. 13). On the venter there is a broadish dark band extending backwards and outwards on each side of the forehead; between each band and the margin there is a row of three short hairs. On the gular region there is a chitinized plate which is almost as long as it is broad. Occipital bands indistinct. Antennae with the basal joint the shortest; second and third segments subequal.

Prothorax very short and broad, with a transverse brown band which is constricted in the middle; on the posterior margin there is a minute hair on each side of the meson.

Metathorax broader than the prothorax, with a short hair on each side and two minute ones above it.

Abdomen pale, oval, widest at the third and fourth segments; sutures for the most part indistinct; spiracles extremely small, present on the second to fourth segments. On the lateral margins of the second to eighth tergites and sternites there are one or two inconspicuous short hairs. On the apical tergite there is a very narrow brown transverse plate, and below it a transverse row of six short hairs, and two more below them on the posterior margin. On the apical sternite there is a short hair on each side of the meson below the middle of the segment. The gonopods are very narrow, slightly curved, and do not project beyond the margin.

MALE (Figure 13).—The male resembles the female, except that the antennae are slightly longer, and the abdomen is of a different shape and has a narrow chitinized transverse band on the fourth, fifth, and sixth sternites; also a short, narrow, transverse band at the latero-anterior angles of the abdomen.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.28	0.36	0.26	0.31
Prothorax ...	0.06	0.26	0.05	0.2
Metathorax ...	0.08	0.31	0.06	0.25
Abdomen ...	0.66	0.61	0.54	0.48
Total ...	1.08 mm.		0.91 mm.	

Holotype: a male.

Described from males and females taken off a suricate (*Suricata suricatta hamiltoni*) shot in the Pretoria District by Prof. R. A. Cooley on the 18th September, 1928.

This species is quite distinct from other species known to occur on animals belonging to the family Viverridae. It will probably ultimately have to be placed in another genus, but for the time being we are obliged to place it in *Trichodectes* as we have not had an opportunity of comparing it with *T. canis* Degeer, the type of the genus.

2. Trichodectes ovalis Bedford.

T. ovalis Bedford, *Thirteenth and Fourteenth Repts. Dir. Vet. Res.*, S. Afr., II, pp. 481, 482, pl. II, f. 4, pl. III, f. 7 (1928).

Three females taken off *Ictonyx striatus* (stink muishond) in S.W.A. We have also seen specimens collected on the same host in Natal by Mr. Lawrence Hill. This species was described from specimens taken off *Poecilogale albinucha* at Onderstepoort, near Pretoria.

Genus Tricholipeurus nov. gen.

Head.—Long and narrow; forehead with lateral margins straight or almost so, wider behind than in front. Frontal sinus narrow, emarginated, with two plates separated by a narrow clear space: antennal bands extending forward to the latero-anterior angles; on the ventral surface of forehead a pair of narrow admedian bands extending backwards in a straight line either from the latero-anterior angles or base of marginal plate to the mandibles, where they turn outwards. Temples with lateral margins either almost straight or slightly convex, slightly wider in the female than in the male. Occipital bands elongated, almost straight and parallel; similar bands present on venter. Occiput with a marginal band connecting the occipital bands together. Antennal sinuses shallow in the female, wide in the male. Antennae 3-jointed in both sexes; first joint of male elongated, as long as or longer than the second and third together; third joint of male with two small spines on the inner surface near the apex.

Thorax not winged, widening very gradually from base to apex. Pronotum short with a pair of stigmata at the latero-posterior angles. Between the fore and mid coxae a transverse acetabular bar running in from the side.

Abdomen elongated and narrow, usually with crenulated margins. Segments with a transverse brown band and a row of minute pustulated hairs on the dorsum and venter. (The males of *T. trabeculae* and *T. reduncae* possess two transverse bands on each of the tergites ii to vi.) Stigmata large, present on segments ii to vii.

Species found on antelopes.

Genotype: *Tricholipeurus aepycerus* nov sp.

This genus also includes *T. cornutus* Gerv., *T. lineatus* Bedford, *T. bedfordi* Hill, and *T. reduncae* nov. sp.

1. TRICHOLIPEURUS AEPYCERUS nov. sp.
(Figs. 14, 15, 18.)

MALE.—*Head* (Fig. 15) light brown, paler in front and behind the mandibles, with reddish-brown bands and mandibles. Forehead with about nine hairs on each lateral margin, and a transverse row of ten minute pustulated hairs on the dorsum, two on each side below the lateral ones, and two more on each side near the base of the trabecula-like process. Between the antennae there are two more on each side. On each temple there are seven to eight minute pustulated hairs, and in the middle of the hind head there is a transverse row of six. On the ventral surface there are three on each side of the forehead, and four more on each side above the base of the mandibles. Trabecula-like processes triangular. Temples with a narrow marginal band, the band being wider and darker in front of the eye. Signature on gular region triangular. First segment of antennae broad, longer than the second and third together, which are of approximately equal length; third joint with a row of very minute spines along the inner edge.

Thorax same colour as head, with a narrow lateral dark band.

Pronotum with two minute pustulated hairs on each side of the meson, four on each side on the posterior margin, and one on each lateral margin. *Metanotum* with a row of 23 similar hairs on the posterior margin. The acetabular bars extend back and widen out between the mid coxae. Above the hind coxae there is a small pustulated hair on each side of the middle.

Legs with the mid tibiae longer and narrower than the fore and hind tibiae.

Abdomen elongated and narrow with crenulated lateral margins; white in colour with a brown transverse band and a row of minute pustulated hairs on the dorsal and ventral surfaces of each segment; tergite i with a narrow marginal band; tergites ii to vii with a short comma-shaped chitinous bar in front of each spiracle; close to these bars and nearer the middle there is a short, forked, chitinous spot. Spiracles large. Tergite viii with six hairs above the row on the posterior margin. Apical tergite with a narrow marginal band fringed with minute hairs on the posterior margin, and with six hairs in the middle. On the last three sternites there is a narrow longitudinal band on each side of the genitalia. Male genitalia as in Figure 14.

FEMALE.—*Head* as in the male, except that the hind head is slightly wider. First joint of antennae slightly broader than the last two, as long as the second; third joint the longest.

Thorax and legs as in the male.

Abdomen without forked, chitinous spots on the tergites; tergite viii with two short pustulated hairs in the middle, and two more close together on each side between them and the lateral margin; apical segment bilobed with four hairs on each lobe; venter as shown in Figure 18.

Measurements.

	Male. Length.	Male. Width.	Female. Length.	Female. Width.
Head	0.6	0.42	0.61	0.48 at temples.
Prothorax ...	0.07	0.32	0.07	0.34
Metathorax ...	0.14	0.35	0.14	0.4
Abdomen ...	1.49	0.56	1.58	0.65
Total ...	2.3 mm.		2.4 mm.	

Holotype: the male.

Described from one male and one female taken off *Aepyceros melampus* (impala), Kunene River, S.W.A., March, 1923. It can be distinguished from *T. lineatus* Bedford and *T. bedfordi* Hill by the male genitalia, the large stigmata on the abdomen and comma-shaped markings above them, and also by the tibiae. In *lineatus* the mid and hind tibiae are narrow and equal in length, the mid being very slightly narrower than the hind tibiae. In *bedfordi* the mid and hind tibiae are equal in length and width, and shorter and broader than in *lineatus*.

TRICHOLIPEURUS TRABECULAE nov. sp.

(Figs. 17a, 17c, 19.)

MALE.—*Head* light brown, paler in front of the mandibles, with reddish-brown bands and mandibles. Frontal plates with rounded outer margins. Forehead with three or four minute hairs on each lateral margin, and on the dorsum there are about 10 minute pustulated hairs between each antennal band and frontal plate, a transverse row of six below the plates, and six more on each side above the base of the antennae. Between the antennae there are two more on each side. On each temple there are about fourteen minute pustulated hairs, and in the middle of the hind head there is a transverse row of nine similar hairs. On the ventral surface there are several very minute pustulated hairs in the area between each antennal and admedian band, two larger ones on the latter band where it turns outwards, and one at the base of each antenna. Trabecula-like processes with an acute angle at their apices. First segment of antennae about twice as long as broad, about same length as the second and third together; apical joint very slightly longer than second, with a row of very minute spines along inner margin. Temples with a narrow marginal band, the band being wider and darker in front of the eye. Signature on gular region triangular.

Thorax same colour as head with a narrow lateral band.

Pronotum with two minute pustulated hairs on each side of the meson, four on each side on the posterior margin, and one on each lateral margin.

Metathorax with a narrow transverse band, which is interrupted in the middle where it turns forward, and a row of sixteen hairs on the posterior margin. The acetabular bars extend backwards and widen out between the mid coxae. Above the hind coxae there is a small pustulated hair on each side of the meson.

Legs with the mid and hind tibiae short and broad, the latter very slightly broader than the former.

Abdomen elongated with crenulated lateral margins; white in colour with dark brown bands. Tergite i with one transverse band and a row of short pustulated hairs. Tergite ii to vi each with two transverse bands and a row of hairs between them, the anterior bands being more highly chitinized at their antero-lateral margins, and the posterior bands are smaller. Tergites vii and viii each with one transverse band; tergite ix with a very narrow band on the posterior margin and a few short hairs. Pleural plates indistinct, with a few pustulated hairs. Stigmata of medium size. Sternites each with one transverse band and one row of hairs, except on the first. Sternites vi and vii also with a narrow longitudinal band on each side of the middle.

FEMALE.—*Head* wider at the temples than in the male. Trabecula-like processes normal. First joint of antennae the shortest, slightly broader than the last two, which are sub-equal in length. Thorax and legs as in the male. Abdomen with a transverse band and one row of hairs on each dorsal and ventral segment, except the last. Apical sternite with two plates as shown in Fig. 19. The pleurites more distinct than in the male.

Measurements.

	Male.		Female.	
	Length.	Width.	Length.	Width.
Head	0.41	0.32	0.42	0.36 at temples.
Prothorax ...	0.08	0.25	0.10	0.28
Metathorax ...	0.10	0.27	0.11	0.31
Abdomen ...	0.93	0.38	1.00	0.45
Total ...	1.52 mm.		1.63 mm.	

Holotype: a male.

Described from two males and two females taken off *Redunca fulvorufula* (mountain reedbuck), Mfongosi, Zululand. This species has erroneously been recorded under the name *T. cornutus* Gerv., but it is very distinct; the latter being more closely allied to *T. aepycerus*. From *T. lineatus* Bedf., *T. aepycerus*, and *T. bedfordi* the females of *trabeculae* can be distinguished by the apical sternite, and the males by the shape of the trabeculae, presence of two transverse bands on the median tergites, and also by the male genitalia.

Tricholipeurus reduncae nov. sp.

(Figs. 16, 17, 17b.)

This species is very closely allied to *trabeculae*, from which it can be distinguished as follows:—

(1) Head of female broader, being about as broad as long.

(2) Bands darker, especially the transverse bands on the abdomen.

(3) Pleurites well developed and stigmata, especially in the male, larger (compare Figs. 17 b and c, both drawn to same scale).

(4) Male genitalia longer and endomeres slightly different in shape (Figure 17).

In the male the posterior bands on tergites ii to vi are darker than the anterior bands, the fifth and sixth being interrupted in the middle.

Measurements.

	Male.		Female.	
	Length.	Width.	Length.	Width.
Head	0.40	0.35	0.41	0.40
Prothorax ...	0.10	0.3	0.1	0.30
Metathorax ...	0.11	0.31	0.11	0.38
Abdomen ...	1.00	0.45	1.11	0.63
Total ...	1.61 mm.		1.73 mm.	

Holotype: a male.

Three males and several females taken off *Redunca arundinum* Bod. (reedbuck) by the author at Emakosini, N. Zululand, on the 29th October, 1924. These specimens have also been erroneously recorded under the name *T. cornutus* Gerv.

Genus Bovidoecus nov. gen.

Head either very slightly broader than long, or almost as broad as long. Forehead rounded, either very slightly convex or concave in front, with a narrow marginal band which is slightly wider in front and interrupted in the middle by a very narrow pale area, except in *limbatus*. Temples rounded. On the venter of the forehead there is a pair of admedian bands, each extending backwards and outwards from the anterior margin to the lateral margins. Occipital bands project forwards and then outwards to the latero-posterior margins of forehead; similar bands present on the venter. (In *limbatus* these bands are absent.) Occiput with a marginal band. Antennal sinuses shallow in the female, wider in the male. Antennae situated either in the middle of the head or well forward (*limbatus*); 3-jointed, basal joint similar in both sexes, except in *ovis* it is slightly larger in the male, much shorter than second and third joints together; third joint of male with a pair of very small spines on the inner surface near the apex.

Thorax narrower than head. Prothorax with rounded lateral margins. Metathorax wider in front than behind; lateral margins rounded anteriorly. Between the fore and mid coxae a transverse acetabular bar running in from the side.

Abdomen ovate. Segments with a transverse brown band and a row of small pustulated hairs on the dorsum and venter; also a few similar hairs sometimes present above the row and at the sides

between the pleurites and bands. (In *limbatus* the hairs are very numerous.) Stigmata present on segments ii to vii. Pleurites well developed. Species found mainly on Bovidae, also on equines.

Genotype: *T. bovis* Linné.

In this genus must also be included *T. caprae* Gurlt., *T. painei* Kellogg and Nakayama, *T. ovis* Linné, *T. equi* Linné, *T. peregrinus* Tasch., and *T. limbatus*. The relationship of the last named to the other species appears to be the same as is the relationship between *Syrrhaptoecus brevifrons* Waterston and the other known species of *Syrrhaptoecus*. *T. harrisoni* Cummings found on *Connochaetes gnu* (black wildebeest) may be distinct, but should be included here for the present. The apex of the abdomen of the male is very different, and the male genitalia appear to be of a distinct type.

Genus Felicinia nov. gen.

Small species (males 0.92—1.35 mm.; females 1.15—1.56 mm.) *Head* about as long as broad; forehead conical, slightly emarginated in front, antennal bands broad, separated in front by a clear space, and projecting backwards for a short distance on each side of the median area. Trabecula-like processes prominent. Antennal sinuses shallow in the female, usually broader in the male. Temples rounded with a narrow marginal band. Occipital bands dark at their bases, and becoming indistinct in the middle of the head; similar bands present on the venter extending forwards to the latero-posterior margins of the forehead. First joint of antennae either equal in both sexes (*subrostratus* and *acutirostris*) or larger in the male than in the female; third joint of male either with or without a pair of minute spines on the inner margin near the apex. Signature on gular region triangular.

Prothorax narrower than the head with rounded lateral margins and a pair of stigmata at the latero-posterior angles.

Metathorax about as wide as the head and shorter than the prothorax with rounded lateral margins. Between the fore and mid coxae a transverse acetabular bar running in from the side and joined together in the middle; each bar also has a branch extending backwards a short distance between the mid coxae.

Abdomen differs in shape in both sexes; in the female it is oval, and the last segment is bilobed at the apex; in the male it is either rounded or pointed posteriorly. Tergites i to vii each with a transverse brown band, these bands being duplicated on the median segments in some males. The median sternites each with a row of minute pustulated hairs and with or without a band. Pleurites only developed on the first to third segments. Stigmata present on the second to fourth segments.

Species found on Felidae and Viverridae.

Genotype: *T. subrostratus* Nitzsch.

In this genus must also be included: *T. acutirostris* Stobbe, *T. cynictis* Bedf., *T. calogaleus* Bedf., *T. rammei* Stobbe, *T. mungos* Stobbe, *T. inaequalis* Piaget, and *T. viverriculae* Stobbe.

Family Philopteridae Burmeister.

Genus Goniodes Nitzsch.

Goniodes Nitzsch, *Germar's Magazin*, III, p. 293 (1818).

1. Goniodes numidae Mjöberg.

G. numidae Mjöberg, *Arkiv. f. Zoologi*, vi, p. 103, f. 60, 61 (1910).

Two females taken off *Numida papillosa* (guinea-fowl), Kunene River, S.W.A., March, 1923. We have also recorded it taken off *Numida coronata* at Bridgewater, Transvaal, but the skin of the bird from which the specimens were collected is in the Transvaal Museum, and proves to be *Numida papillosa transvaalensis* Neum.

2. Goniodes scleroptilus nov. sp.

(Fig. 20.)

Two females and one male taken off *Scleroptila gariepensis pallidior* Neum. (Ovambo partridge) on the Kunene River, S.W.A., in March, 1923.

This new species resembles *G. dispar* Nitzsch, *G. flaviceps* Rudow, and *G. assimilis* Piaget in the shape of the head, thorax, and abdomen. *G. dispar*, found on *Perdix perdix* (European partridge), can be distinguished by the lateral bands on the abdomen not having an appendage in front. In *G. assimilis*, which was described from specimens taken off *Chaetopus capensis* (Cape noisy francolin), only the lateral bands on the last segment have an appendage, and in *G. flaviceps*, found on *Perdix rubra* (European red-legged partridge), and *G. scleroptilus* the bands on all the segments have an appendage. In *G. flaviceps* these bands terminate in a circular spot, whereas in *G. scleroptilus* the spots are rectangular and lie beneath the bands. Male genitalia as in Figure 20.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.85	1.1	0.71	0.93
Prothorax ...	0.13	0.5	0.11	0.42
Metathorax ...	0.33	0.71	0.3	0.6
Abdomen ...	1.5	1.48	1.03	1.18
Total ...	2.81 mm.		2.15 mm.	

3. Goniodes pternistis nov. sp.

(Fig. 21.)

Several males and females taken off *Pternistis swainsoni* A Smith (Swainson's red-necked francolin) in the Zoological Gardens Pretoria, on the 4th November, 1925. This species is very closely allied to *G. scleroptilus*, the males being distinguished by the genitalia, and the females by the absence of a transverse row of small spines on the ventral surface of the seventh abdominal segment. The

female of *G. flaviceps* also possesses a row of similar spines on the seventh sternite, but in this species they are arranged in a semi-circular line and number about eight, whereas in *G. scleroptilus* there are about fourteen spines arranged in an almost straight line in front of the posterior margin.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.86	1.15	0.71	0.93
Prothorax ...	0.13	0.48	0.11	0.4
Metathorax ...	0.33	0.7	0.28	0.56
Abdomen ...	1.5	1.45	1.00	1.18
Total ...	2.82 mm.		2.10 mm.	

Genus Goniocotes Burmeister.

Goniocotes Burmeister, *Handb. der Ento.*, II, p. 43 (1838).

1. Goniocotes gallinae Retz.

One female taken off *Numida papillosa* (guinea-fowl), Kunene River, S.W.A., March, 1923. It has also been recorded by us taken off *Numida coronata* in the Transvaal, but the bird proved to be *N. papillosa transvaalensis* Neum.

2. Goniocotes gigas Taschenberg.

G. gigas Taschenberg, *Zeit. f. ges. Nat.*, LII, p. 104, Pl. 1, f. 10 (1897).

Males and females taken off *Numida papillosa* (guinea-fowl), Kunene River, S.W.A., March, 1923. We have also recorded it found on *N. coronata* at Bridgewater, Transvaal, the host proving to be *N. papillosa transvaalensis* Neum. It is a common parasite on the domestic fowl.

Genus Lipeurus Nitzsch.

Lipeurus Nitzsch, *Germar's Magazin*, III, p. 292 (1818).

1. Lipeurus lawrensis nov. sp.
(Figs. 22, 23, 23a, 24.)

Male.—*Head* (Figure 22) elongated, rounded in front; pale brown in colour with dark brown markings and black bands; on the venter of the forehead there are four hairs situated a short distance behind the anterior margin, and one on each side below them. Signature on gular region long and narrow and dark brown in colour.

Thorax pale with dark brown lateral margins. *Pronotum* narrower than the head with sides almost parallel, and a longish hair at each latero-posterior angle. Metanotum broader than the

pronotum, the anterior third being narrower than the posterior two-thirds, with a narrow, dark, median, longitudinal band extending backwards from the middle on to the first tergite; at each latero-posterior angle there is a hair, and a short distance from each and slightly nearer the middle there are four long hairs in a small pale area. Sternal plate as in Figure 22a.

Abdomen with markings and hairs on the dorsum as shown in Figure 23. Sternites i-iii each with a brown sternal plate, and a transverse row of six hairs near the middle. On sternites iv to viii the plates are fused together, the plates on the fourth and fifth sternites each have six hairs, on the seventh there are two long pustulated hairs, and on the eighth there are three long hairs on each side of the meson. Genitalia with elongated basal plate extending forward to the third segment. Figure 23 shows the apex of the abdomen before mounting, and Figure 23a after mounting.

Female.—Shorter but slightly wider than the male. Head and thorax as in the male. Antennae with the first joint short and narrow, the second joint the longest, the third slightly longer than either of the two apical joints.

Abdomen with markings and hairs on the dorsum as shown in Figure 24. Sternal plates smaller than those of the male and not fused together, except those on sternites vi and vii; each plate with a median row of four hairs. On sternites v to viii there is a narrow longitudinal band on each side between the plates and lateral margins; the bands being broadest on the seventh sternite where they are forked in front.

Measurements.

	Male.		Female.	
	Length.	Width.	Length.	Width.
Head	0.78	0.55	0.83	0.58
Prothorax ...	0.25	0.45	0.23	0.46
Metathorax ...	0.46	0.7	0.45	0.72
Abdomen ...	2.45	0.8	2.11	0.95
Total ...	3.94 mm.		3.62 mm.	

Holotype: the male.

Described from one male, one female, and one immature specimen taken off a guinea-fowl, *Numida papillosa*, on the Kunene River, S.W.A., in March, 1923. Three other species have been described from guinea-fowl, namely, *L. numidae* Denny, *L. differens* Piaget, and *L. numidianus* Mjöberg, but this new species can easily be distinguished from these, *inter alia*, by the abdominal markings.

2. Lipeurus pternistis nov. sp.

(Figs. 25, 25a, 26.)

Female.—*Head* (Fig. 25) elongated, rounded in front, pale brown in colour with brown markings and dark brown marginal bands; on the venter of forehead there are four hairs situated a

short distance behind the anterior margin, and two more, one on each side, below them. Signature on gular region about twice as long as broad.

Thorax pale with dark brown lateral margins. *Pronotum* narrower than the head with sides almost parallel, and a long hair at each latero-posterior angle. *Metathorax* broader than prothorax, the anterior third being narrower than the posterior two-thirds; at each latero-posterior angle there is a hair, and on the posterior margin there are two pairs on each side, each pair situated in a small pale area. Sternal plate as in Figure 25a.

Abdomen with markings and hairs on the dorsum as shown in Figure 26. Sternites i to v each with a transverse row of six hairs in the middle. Sternite vi with a short, median, brown, transverse band and a pale brown longitudinal blotch on each side of it; on the posterior margin of the band there is a pair of short admedian hairs. Sternite vii with a longitudinal chitinous plate on each side between the meson and lateral margins, each plate terminating in a long dark brown point which projects on to the eighth sternite; between the plates there are two longish hairs in front and several minute ones behind; apical sternites with several minute hairs and a short thick one on each side below the plates on the seventh sternite.

Male.—*Head* and *thorax* as in the female. Antennae with the first joint about twice as long as the second and nearly twice as broad; second joint longer than the third and nearly as long as the fourth and fifth together; third joint with an appendage.

Abdomen narrower than in the female. Tergites i to vi each with a complete transverse plate, which is narrowest in the middle, and a short, narrow plate beneath it; the anterior plates are brown in the middle and pale at the sides, and the posterior plates dark brown in colour, those on tergites i, v, and vi being interrupted in the middle. The anterior plate on the first tergite has two hairs in front and a row of six behind, and on the second to sixth segments each anterior plate has a row of four hairs on the posterior margin. Tergites vii and viii each with a complete transverse plate, that on the seventh with a row of four hairs, and on the eighth the plate is wide with two short hairs in front; beneath the plate there are one long and two short hairs on each side. Plate on apical tergite pale in the middle. Sternite i with a small pale brown band in the middle which has a row of four hairs. Sternites ii to vi each with a pale brown transverse band and a row of four to six hairs. On sternites vii and viii there is a median longitudinal band which joins the band on the sixth sternite; on the seventh sternite the band has a long pustulated hair on each side. Pleurites dark brown. Male genitalia indistinct; basal plate short.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.55	0.4	0.51	0.36
Prothorax ...	0.11	0.28	0.11	0.26
Metathorax ...	0.18	0.43	0.18	0.38
Abdomen ...	1.26	0.63	1.18	0.45
Total ...	2.10 mm.		1.98 mm.	

Holotype: a female off *P. swainsoni*.

Described from two females and two males taken off *Pternistis swainsoni* A. Smith (Swainson's red-necked francolin) in the Zoological Gardens, Pretoria, on the 4th November, 1925, also two females taken off *Pternistis afer* Mull. (Angola red-necked francolin), Kunene River, S.W.A., in March, 1923. This new species appears to be closely allied to *L. heterogrammicus* Nitzsch found on *Perdix perdix* (European partridge), from which it can be distinguished by the abdominal markings.

Genus Philopterus Nitzsch.

Philopterus Nitzsch, *Germar's Magazin*, III, p. 288 (1818).
Docophorus Nitzsch, *ibid.*, III, p. 289 (1818).

1. Philopterus rostratus (Nitzsch).

Docophorus rostratus Nitzsch in Burmeister, *Handb.*, II, p. 427 (1838).

Females and males from *Typo alba affinis* (Cape barn owl), Ondonga, S.W.A., March, 1923. It has also been recorded taken off the same host in the Transvaal, and from *Bubo africanus africanus*.

Genus Anatoecus Cummings.

Anatoecus Cummings, *Proc. Zool. Soc.*, London, p. 653 (1916).

1. Anatoecus icterodes (Nitzsch).

Docophorus icterodes Nitzsch in Burm., *Handb.*, ii, p. 424 (1838).
Anatoecus icterodes (Nitzsch) Cummings, *Proc. Zool. Soc.*, Lond., pp. 655-657, f. 7B, 10, 12 (1916).

Scopoli's name *dentatus* should be discarded and the above name used for the common species found on ducks.

One female and one male taken off *Dendrocygna bicolor* L. (whistling duck) at Tamanzu, S.W.A., March, 1923; also one female from *Paecilonitta erythrorhyncha* Gm. (red-billed teal).

Genus Neophilopterus Cummings.

Neophilopterus Cummings, *Proc. Zool. Soc.*, London, p. 660 (1916).

1. Neophilopterus abdimius nov. sp.
(Figs. 27, 28, 29.)

Female (Fig. 27).—*Head* very slightly broader at the temples than long. Signature medianly excised in front and with a strong dark chitinous process at each latero-posterior angle. Just inside each angle there is a longish hair, and on the venter there is an admedian hair in the middle. Clypeus with two hairs at each latero-posterior angle, two on the venter on each side above the angle, and one more above these. Behind the clypeus there is a hair on each side on the

venter and one on the dorsum near the base of the antennae. Eye conspicuous, with a hair. Antennae with the first joint about as broad as long, second joint the longest, third, fourth, and fifth subequal in length, the last two being slightly darker than the rest. Temples rounded with four long and two short hairs on the lateral margins, and a minute hair in the middle. In the area between the temples there are three minute hairs on each side on the dorsum. Occipital bands dark brown, slightly curved and joining the antennal bands near the trabecula-like processes. Occipital margin almost straight.

Thorax dark brown except for a clear median space. Pronotum with a longitudinal chitinous bar on each side of the middle and two hairs at each latero-posterior angle. Metanotum with very dark lateral margins; a spine and hair at each latero-posterior angle, and three long hairs close together on each side on the posterior margin. Between the fore and mid coxae there is a strong acetabular bar which continues forwards and backwards a short distance near the middle. Between the mid and hind coxae there is a narrow bar which continues backwards to the base of the metasternum. Mid coxae with a hair on the posterior margin. Between the mid coxae there is a long admedian hair, and two more beneath it.

Abdomen oval, each segment with two tergal plates on each side, the inner pairs separated in the middle by a clear space except on the eighth segment, and with two median transverse rows of hairs, except on the eighth segment, and two or three hairs at each latero-posterior margin. On the venter there is a single row of median hairs on the first six segments. Apical segments as shown in Fig. 29.

MALE.—Head and thorax as in the female. The inner tergal plates are not so large as in the female, and the last tergite has a narrow longitudinal plate on each side of the middle line, and a lateral plate which extends backwards in a narrow line. Male genitalia and genital plate as shown in Fig. 28.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	0.78	0.85	0.75	0.76
Prothorax ...	0.21	0.55	0.2	0.51
Metathorax ...	0.23	0.7	0.21	0.63
Abdomen ...	1.53	1.15	1.08	0.96
Total ...	2.75 mm.		2.24 mm.	

Holotype: a female.

Described from three females and two males taken off *Sphenorhynchus abdimi* Lcht. (white-bellied stork) at Andoni, S.W.A., in March, 1923.

This new species appears to be closely allied to *N. unifasciatus* Piaget, *N. indicus* Piaget, and *N. episcopi* Kellogg. From the first two it can be distinguished by the tergal plates being markedly larger, and from *N. episcopi* by the genital plate of the female.

Genus Ibidoecus Cummings.

Ibidoecus Cummings, *Proc. Zool. Soc.*, London, p. 663 (1916).

1. Ibidoecus threskiornis nov. sp.

(Figs. 30, 31.)

Female.—Head considerably broader than long. Forehead light brown, of moderate length; each signatural plate long, widest in the middle and terminating posteriorly in a strong dark chitinous process, in front of the middle on the ventral surface there is one longish hair. Clypeal bands well developed, each with three lateral hairs on the dorsum, two in front and one behind, and a longish hair close to the basal one but nearer the middle; on the venter there is a similar hair occupying the same position and also a lateral hair beyond the middle. On the dorsum there is a short hair above the base of the antenna, two more lateral hairs close together some distance above it, and one close to each chitinous process. Eye conspicuous, with a hair. Temples rounded, dark brown, with four long pustulated hairs on the lateral margins and a short pustulated hair in the middle. Area between the temples slightly paler in colour, with a row of four pustulated hairs, the inner pair being minute.

Prothorax much narrower than the head, almost parallel-sided and rectangular, with a dark brown rectangular plate on each side and four short hairs on the posterior margin. *Metathorax* with lateral margins rounded, a dark brown plate on each side, and a row of pustulated hairs on the posterior margin, which is very slightly rounded. Between the fore and mid coxae there is a strong acetabular bar which turns upwards for a short distance between the former. Between the mid and hind coxae there is a short bar on each side which broadens out at both ends. Fore coxae each with one hair, mid and hind coxae each with two hairs. Between the mid coxae there are two short hairs, and two longer ones between the hind coxae.

Abdomen oval; tergites one to six each with a lateral plate which is darker near the meson, and with two median transverse rows of hairs; on the first tergite there are two hairs above the rows. Seventh tergite with similar plates, but only one row of hairs. Eighth tergite with a complete transverse plate and a row of hairs set close together beneath it, the row being interrupted in the middle. On the ventral surface there is one median row of hairs and a round plate between the middle and lateral margin on the second to sixth segments. Apical sternites as shown in Fig. 31.

Male.—Head and thorax as in the female. First tergite as in the female, except that there are two plates on each side, the inner pair being small; second to seventh tergites each with one irregular row of hairs. The tergal plates on the last three segments appear to be double, and on the last tergite occupy practically the whole of the segment; the middle pair having a fringe of hairs on their posterior margins. Genital plates and genitalia as shown in Fig. 30.

Measurements.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head	1.01	1.15	0.9	1.05
Prothorax ...	0.33	0.71	0.31	0.66
Metathorax ...	0.38	1.06	0.33	0.98
Abdomen ...	2.00	1.65	1.43	1.35
Total ...	3.72 mm.		2.97 mm.	

Holotype: a female.

Described from a number of females and males taken off *Threskiornis aethiopica* Lath. (sacred ibis) at Emakosini, Zululand, on the 29th October, 1924. This new species can be distinguished, *inter alia*, by the genital plates and male genitalia.

Genus Degeeriella Neumann.

Degeeriella Neum., *Bull. Soc. Zool.*, France, XX, p. 59 (1906).

Nirmus Nitzsch, *Germar's Magazin*, III, p. 291 (1818), *nec* Hermann, 1804.

1. Degeeriella colymbina (Scopoli).

Pediculus colymbina Scop., *Ent. Carn.*, p. 384 (1763).

Two females taken off *Proctopus nigricollis gurneyi* Roberts (Cape eared grebe) at Tamanzu, S.W.A., in March, 1923; also several specimens occurring as stragglers on other water fowl.

2. Degeeriella fusca (Nitzsch).

Nirmus fuscus Nitzsch in Denny, *Anoplur. Brit.*, p. 118, pl. 9, f. 8 (1842).

Females and males taken off *Pteroaetus verreauxi* Less. (black eagle) by Dr. R. F. Lawrence. No locality given.

Genus Syrrhaptoecus Waterston.

Syrrhaptoecus Waterston, *Proc. Zool. Soc.*, London, ii, pp. 337, 338 (1928).

This genus includes thirteen species found on sand-grouse (Pteroclidae).

1. Syrrhaptoecus digonus Waterston.

S. digonus Waterston, *Proc. Zool. Soc.*, London, ii, p. 345, f. 3a, 8b, 10c (1928).

One male and one female taken off *Pterocles namaquus* Gm., Kunene River, S.W.A., March, 1923. This species was described from specimens taken off the same sand-grouse at Klipfontein, Little Namaqualand; Deelfontein, C.P.; and in the Rustenburg District,

Transvaal. A second species, *S. brevifrons* Waterston (*Proc. Zool, Soc.*, London, ii, pp. 339-342, f. 1b. 7, 1928), has also been found on *P. namaquus*.

Genus Acidoproctus Piaget.

Acidoproctus Piaget, *Tijd. v. Ent.*, vi, p. 178 (1878).

This genus includes six species found on Anatidae.

1. Acidoproctus stenopygus (Nitzsch).

Lipeurus stenopygos Nitzsch in Giebel, *Ins. Epiz.*, p. 179, pl. 8, f. 6, 7 (1874).

Several males and females taken off *Alopochen aegyptiacus* L. (Egyptian goose) at Tamanzu, S.W.A., in March, 1923. It has also been recorded from *Plectropterus gambensis* (spur-winged goose) in the Transvaal and Sudan. Rudow has described *A. rostratus* from *Alopochen aegyptiacus*, which Harrison sunk as a synonym of *A. marginatus* Piaget. The latter was described from a female straggler collected on a gull, and is in our opinion undoubtedly an immature specimen of *A. bifasciatus*, which occurs on ducks and has been found on several species in S. Africa.

Genus Esthiopterum Harrison.

1. Esthiopterum asymmetricum (Rudow).

Lipeurus asymmetricus Rudow, *Zeit. f. ges. Nat.*, XXXV, p. 312 (1870).

Lipeurus gambensis Piaget, *Pédicul., Suppl.*, p. 64, pl. 7, f. 1 (1885).

Several males and females taken off *Alopochen aegyptiacus* L. (Egyptian goose) at Tamanzu, S.W.A., March, 1923, and off *Plectropterus gambensis* L. (spur-winged goose) on the Kunene River, S.W.A., March, 1923. *E. asymmetricum* was described from specimens taken off the first-named host, and *E. gambense* from specimens off the second-named host; we consider them to be the same.

2. Esthiopterum obscurum (Rudow).

Lipeurus obscurus Rudow, *Zeit. f. ges. Nat.*, XXXVI, p. 125 (1870).

Males and females taken off *Thalassarche melanophrys* Boie (mollymawk) at Capetown, March, 1923.

3. Esthiopterum gurlti (Taschenberg).

Lipeurus gurlti Taschenberg, *Nova Acta*, XLIV, p. 151, pl. 5, f. 6 (1882).

Lipeurus lugubris Taschenberg, *ibid.*, p. 153, pl. 6, f. 9 (1882).

Males and females taken off *Daption capensis* (Cape sea-pigeon) at Capetown in November, 1923.

4. Esthiopterum gruis (Linné).

Pediculus gruis Linné, *Syst. Nat.*, p. 613 (1758).

Lipeurus ebraeus Denny, *Anoplur. Brit.*, p. 179, pl. 13, f. 5 (1842).

Lipeurus hebraeus Nitzsch in Giebel, *Ins. Epiz.*, p. 226, pl. 16, f. 5, 6 (1874).

L. hebraeus (Nitzsch) Piaget, *Pédiculines*, p. 326, pl. 27, f. 2 (1880).

L. hebraeus (Nitzsch) Taschenberg, *Nova Acta*, XLIV, p. 130, pl. 4, f. 4, 4a (1882).

A single female taken off *Balearica regulorum* Benn. (crowned crane), Kunene River, S.W.A., March, 1923. This species has been described from specimens taken off *Grus communis* = *G. grus* (European crane) and *G. pavonina* = *Balearica pavonina*.

Genus Harrisoniella nov. gen.

Species lipeuroid, large (females 9 mm., males 8.5 mm. in length). Head longer than wide, broader in the female than in the male. Clypeal signature broader than long, rounded in front and pointed posteriorly; pale brown with transverse striae along anterior margin, dark brown behind. Prothorax with sides parallel. Metathorax more than twice the length of prothorax. Sternal plate well developed, elongated. Abdomen of female with lateral plates on each tergite separated in the middle by a narrow space; tergites of male with a complete transverse plate; lateral margins dark in both sexes. Sternites of male and female each with a dark median transverse band. Male copulatory apparatus elongated, the basal plate long and narrow, about the same length as the remainder of the apparatus.

Genotype: *Esthiopterum diomedeae* (Fabricius).

1. Harrisoniella diomedeae (Fabricius).

Pediculus diomedeae Fabr., *Syst. Ent.*, p. 808 (1775).

Lipeurus ferox Giebel, *Zeit. f. ges. Nat.*, XXIX, p. 195 (1867).

L. ferox Giebel, *Ins. Epiz.*, p. 235 (1874).

L. ferox (Giebel) Piaget, *Pédiculines*, p. 333 (1880).

L. ferox (Giebel) Taschenberg, *Die Mallophagen*, p. 145, pl. 5, f. 1, 1a (1882).

L. ferox (Giebel) Kellogg, *New Mallophaga*, i, p. 127, pl. 9, f. 1, 2 (1896).

L. densus (Giebel) Kellogg, *ibid.*, p. 114, pl. 7, f. 1, 2 (1896).

One female and two immature specimens taken off *Thalassarche melanophrys* Boie (mollymawk) at Capetown, July, 1923.

Genus Docophoroides Giglioli.

Docophoroides Giglioli, *Quart. Journ. Micr. Sci.*, IV, p. 21 (1864).

Eurymetopus Taschenberg, *Nova Acta*, Halle, XLIV, p. 182 (1882).

This genus includes five species occurring on Diomedeidae.

1. Docophoroides harrisoni Waterston.

D. harrisoni Waterston, *Ent. Month. Mag.* (3), iii, p. 99 (1917).

A number of females, males, and immature forms taken off *Thalassarche melanophrys* Boie (mollymawk) at Capetown in July, 1923. This species was described from specimens taken off the same host in South Africa.

2. Docophoroides murphyi (Kellogg).

Eurymetopus murphyi Kellogg, *Brooklyn Sci. Bull.*, II, iv, pp. 87-89, pl. 16, f. 4, 5 (1914).

(Figs. 32, 33c, 34.)

Two females taken off *Macronectes giganteus* Gm. (giant petrel) at Capetown in November, 1923. This species was described from one male and several females taken off *Thalassarche melanophrys* Boie (mollymawk), *Nealbatrus chlororhynchus* Gm. (yellow-billed mollymawk), and *Macronectes giganteus* in the South Atlantic.

Both sexes of this species can easily be distinguished by the shape of the clypeal signature (Fig. 32), it being much narrower than in the other species, and the females also by the shape of the plates on each side of the meson on sternites ii-v, the median plate on sternites vi to viii (see Figure 34), and by the shape of the lateral plates on the ninth sternite (compare Figures 33 a-d). In *harrisoni* the lateral plates on sternite ii are short, and on sternites iii to v they are elongated. In *brevis* the lateral plates are elongated on sternites ii to iv, and on the fifth sternite there is a long median transverse plate. In both *simplex* and *murphyi* the plates on sternites ii to iv are short and oval in shape, and on sternite v they are slightly longer.

EXPLANATION OF FIGURES.

Fig. 1.—*Lemurphthirus galagus* Bedford, male genitalia.
,, 2.—*Polyplax praomydis* Bedford, head of female.
,, 3.—*Polyplax praomydis* Bedford, pleural plates of female.
,, 4.—*Polyplax praomydis* Bedford, sternal plate.
,, 5.—*Polyplax praomydis* Bedford, male genitalia.
,, 6.—*Bathyergicola hilli* Bedford, head of female.
,, 7.—*Bathyergicola hilli* Bedford, apical sternite of female; (*a*) third pleural plate of same; (*b*) third pleural plate of *Bathyergicola lawrensis* Bedford.
,, 8.—*Bathyergicola hilli* Bedford, male genitalia.
,, 9.—*Bathyergicola lawrensis*, Bedford, head of female.
,, 10.—*Bathyergicola lawrensis* Bedford, apical sternite of female.
,, 11.—*Bucerophagus africanus* Bedford, dorsum and venter of head of female; (*a*) sternal plate.
,, 12.—*Bucerophagus africanus* Bedford, male genitalia.
,, 13.—*Trichodectes cooleyi* Bedford, male.

FIG. 14.—*Tricholipeurus aepycerus* Bedford, male genitalia.

,, 15.—*Tricholipeurus aepycerus* Bedford, head of male.

,, 16.—*Tricholipeurus reduncae* Bedford, head of male.

,, 17.—*Tricholipeurus reduncae* Bedford, male genitalia; (*a*) endomeres of *T. trabeculae* Bedford (drawn to same scale as 17); (*b*) abdominal spiracle of *T. reduncae* Bedford; (*c*) same of *T. trabeculae* Bedford [drawn to same scale as (*b*)].

,, 18.—*Tricholipeurus aepycerus* Bedford, apical sternite of female.

,, 19.—*Tricholipeurus trabeculae* Bedford, apical sternites of female.

,, 20.—*Goniodes scleroptilus* Bedford, male genitalia.

,, 21.—*Goniodes pternistis* Bedford, male genitalia.

,, 22.—*Lipeurus lawrensis* Bedford, head of male; (*a*) sternal plate.

,, 23.—*Lipeurus lawrensis* Bedford, dorsum of abdomen of male; (*a*) apex of abdomen of mounted specimen.

,, 24.—*Lipeurus lawrensis* Bedford, dorsum of abdomen of female.

,, 25.—*Lipeurus pternistis* Bedford, head of female; (*a*) sternal plate.

,, 26.—*Lipeurus pternistis* Bedford, dorsum of abdomen of female.

,, 27.—*Neophilopterus abdimius* Bedford, female.

,, 28.—*Neophilopterus abdimius* Bedford, male genitalia.

,, 29.—*Neophilopterus abdimius* Bedford, apical sternites of female.

,, 30.—*Ibidoecus threskiornis* Bedford, male genitalia.

,, 31.—*Ibidoecus threskiornis* Bedford, apical sternites of female.

,, 32.—*Docophoroides murphyi* Kellogg, forehead of female.

,, 33.—Right lateral plate on ninth sternite of: (*a*) *Docophoroides harrisoni* Waterston; (*b*) *D. simplex* (Waterston); (*c*) *D. murphyi* (Kellogg); (*d*) *D. brevis* (Dufour).

,, 34.—*Docophoroides murphyi* (Kellogg), plates on sternites vi to ix of female.

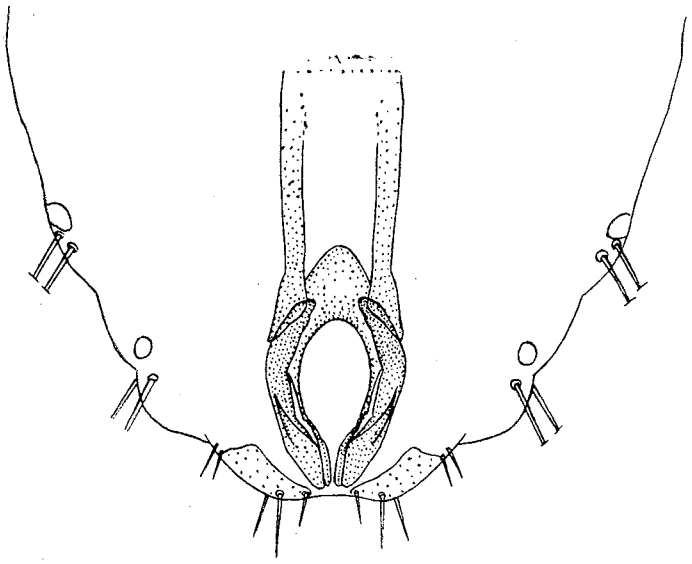


FIG. 1.

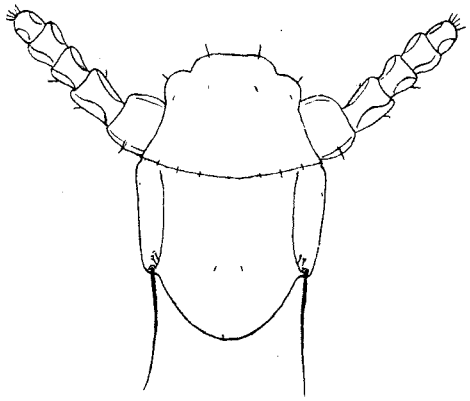


FIG. 2.

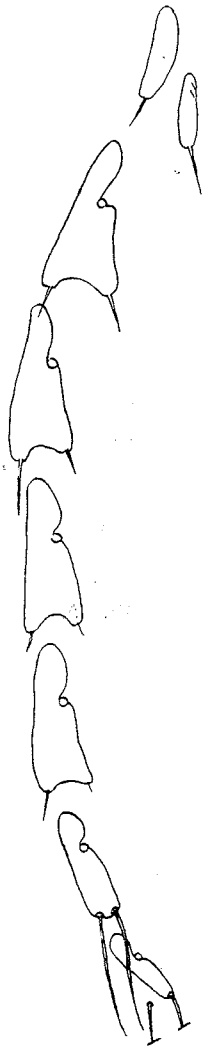


FIG. 3.

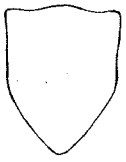


FIG. 4.

FIG. 5.

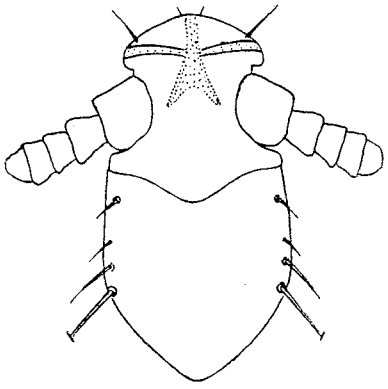


FIG. 6.

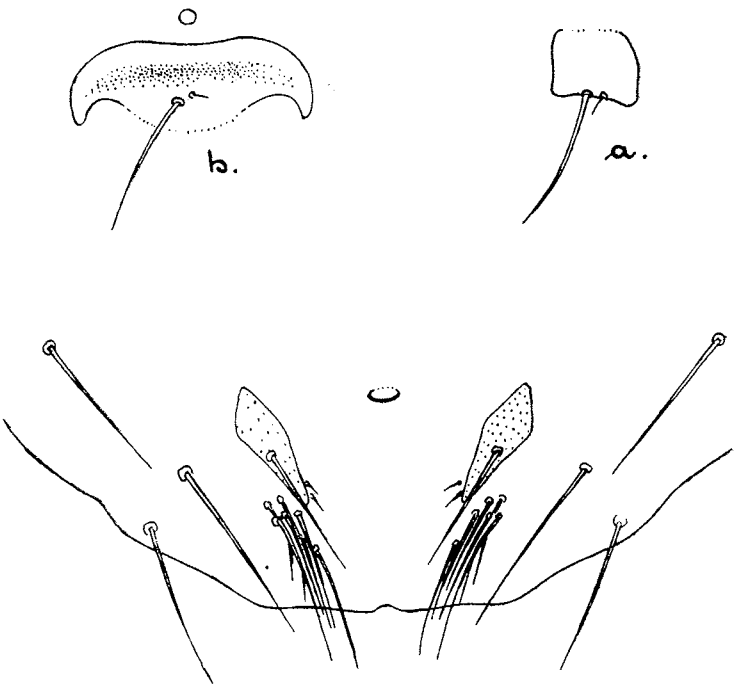


FIG. 7.

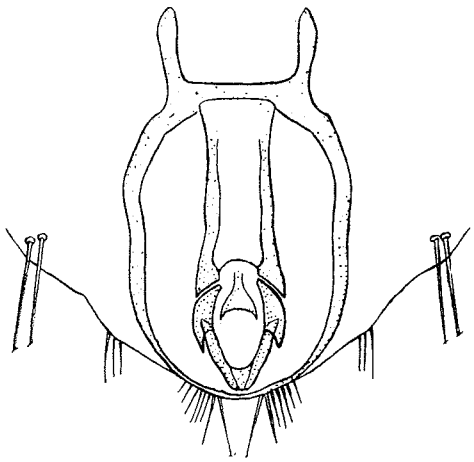


FIG. 8.

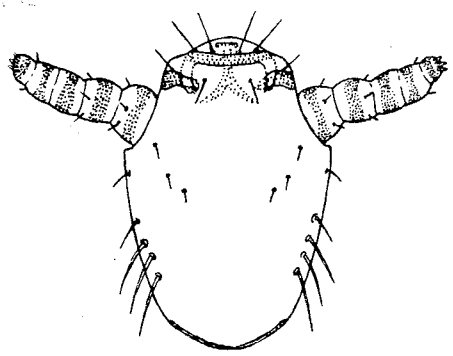


Fig. 9.

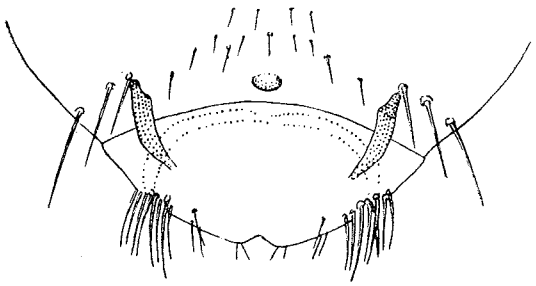


Fig. 10.

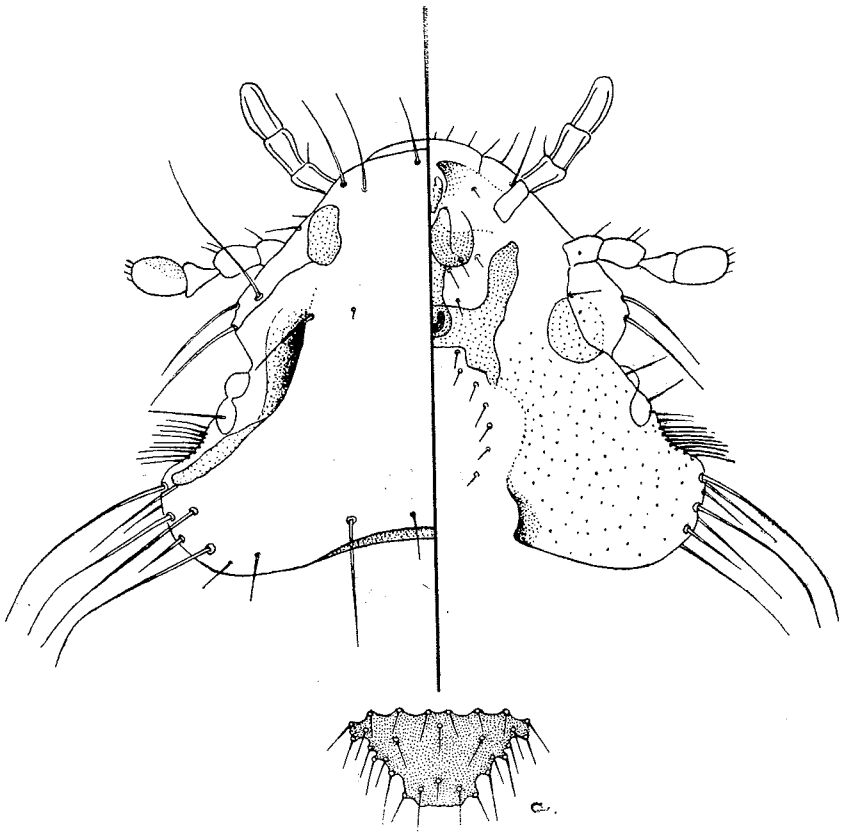


FIG. 11.

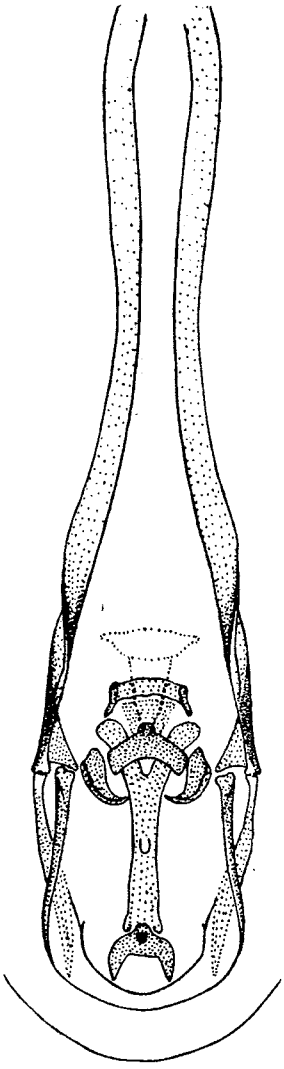


Fig. 12.

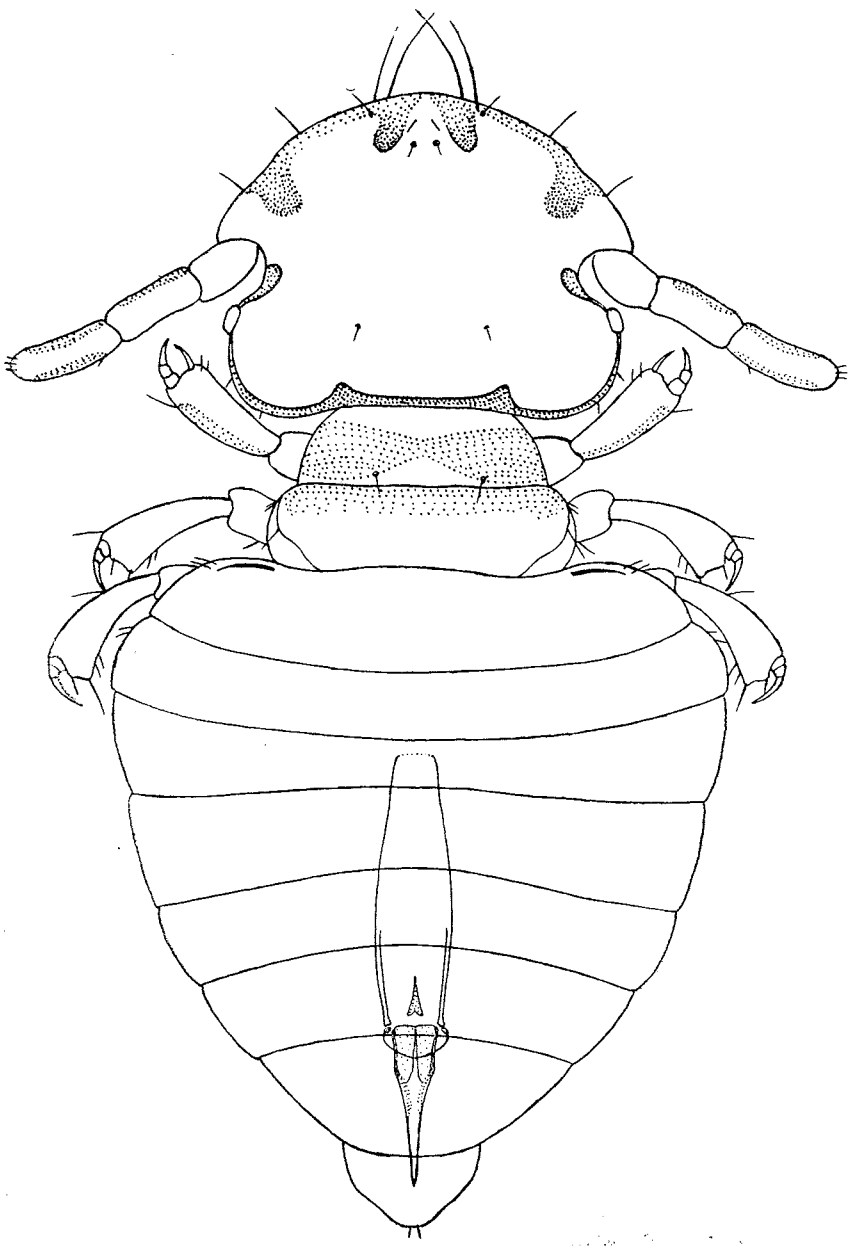
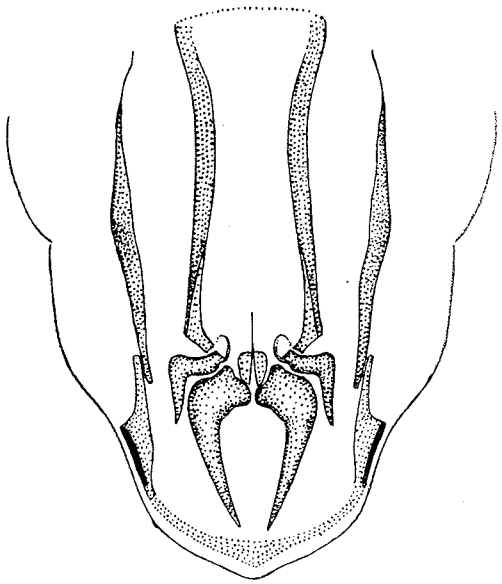


FIG. 13.



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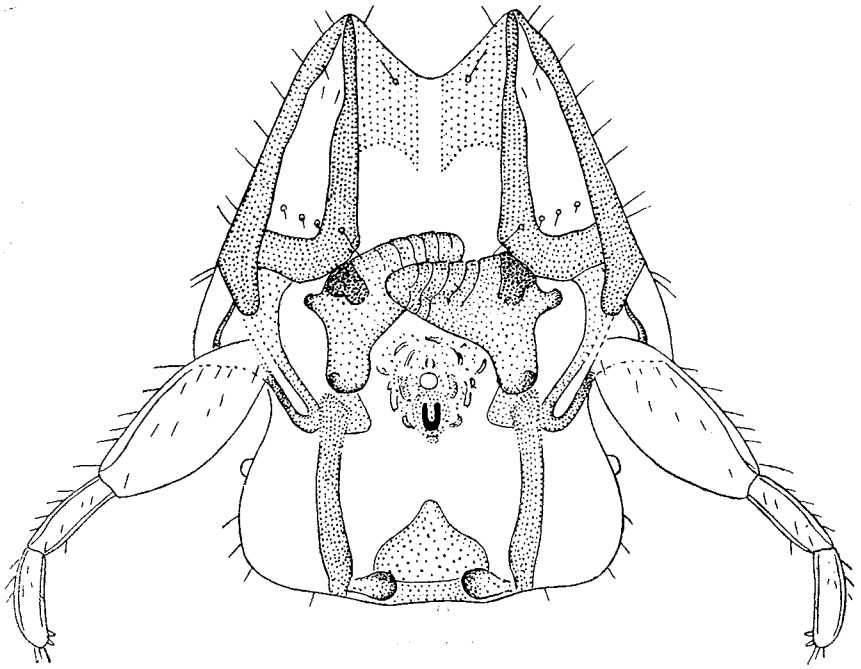

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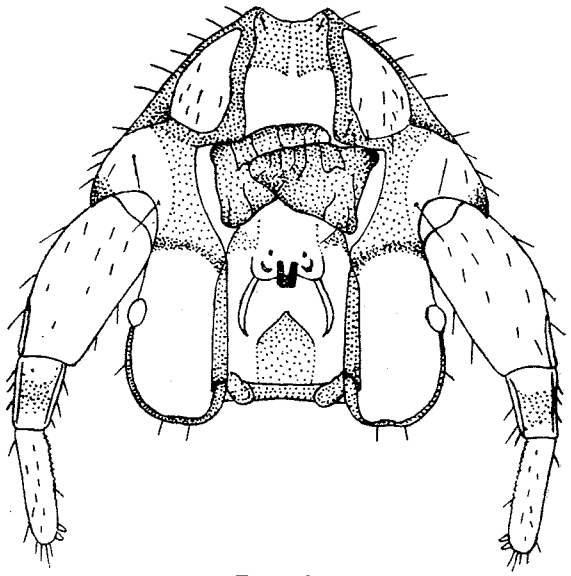

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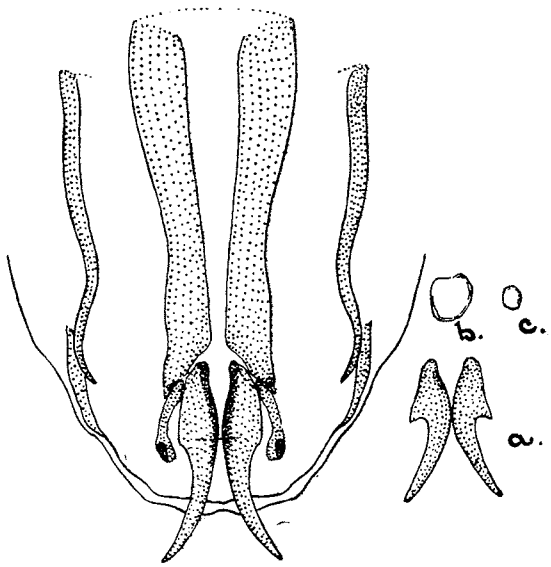

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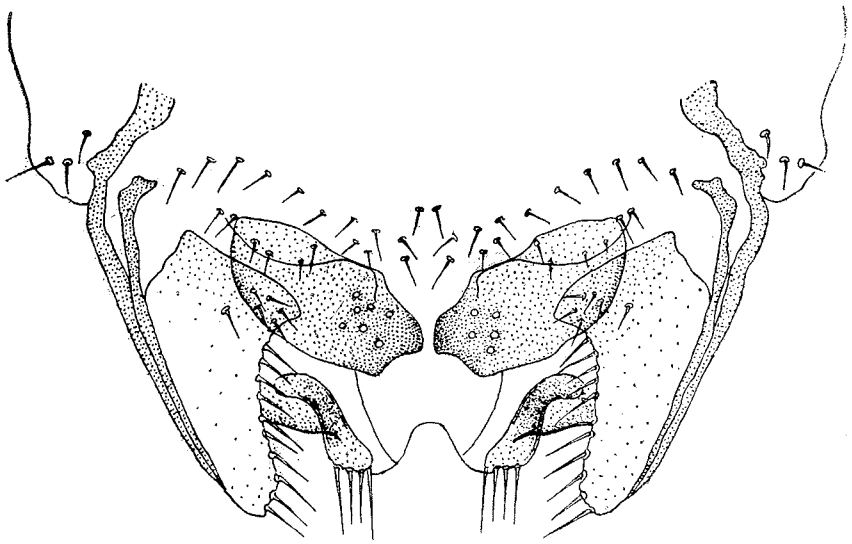

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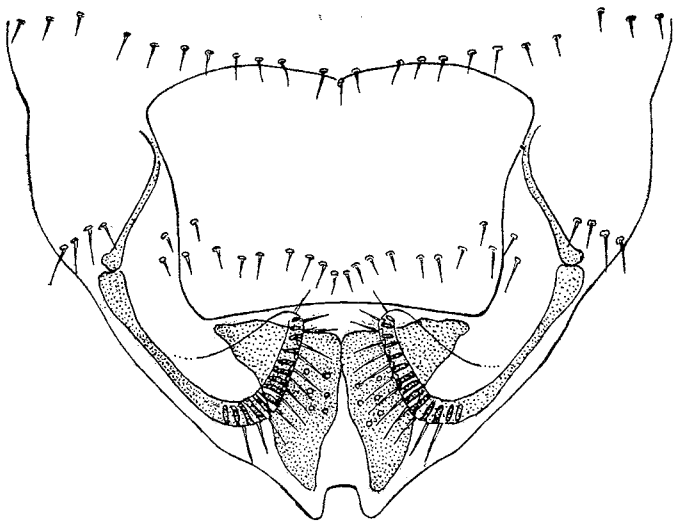


FIG. 19.

Fig. 20

Fig. 21.

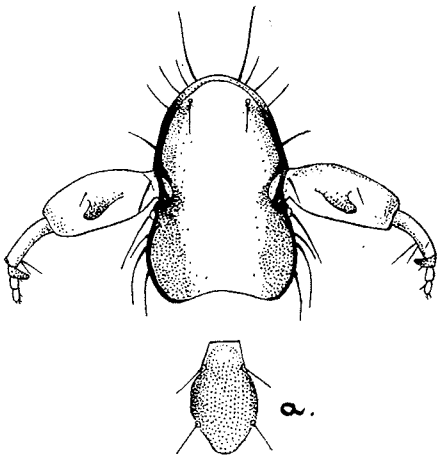


FIG. 22.

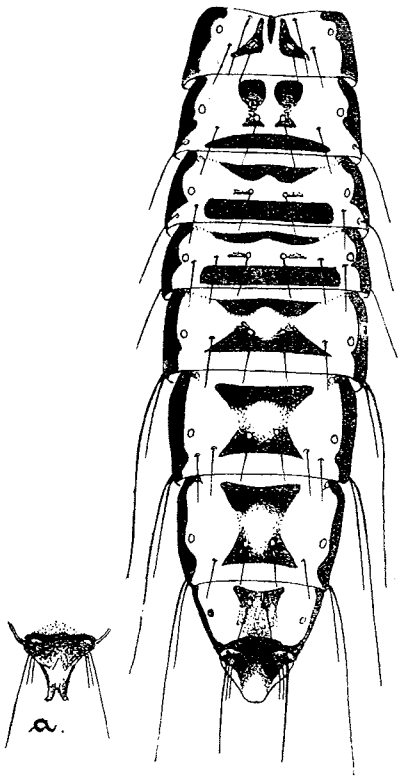


Fig. 23.

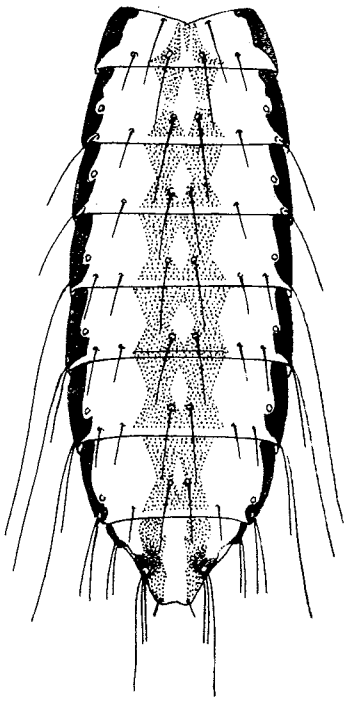


Fig. 24.

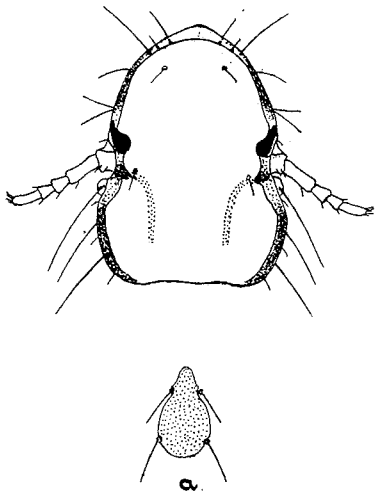


Fig. 25.

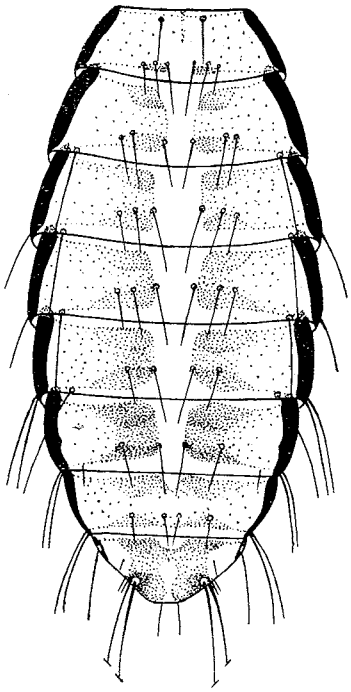
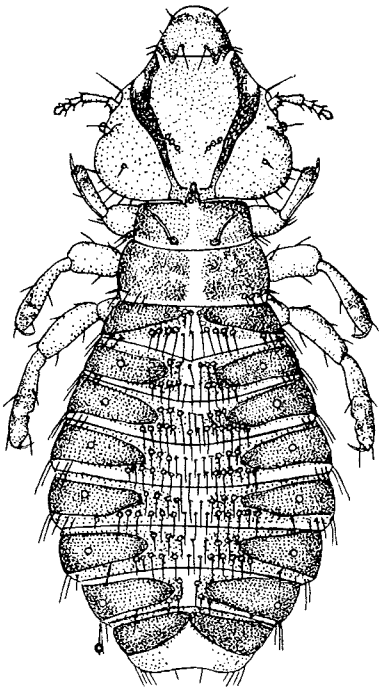


Fig. 26.



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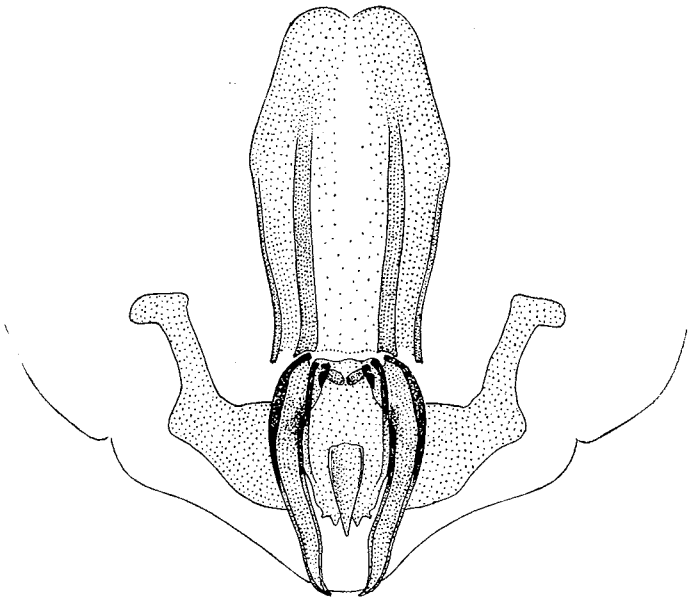
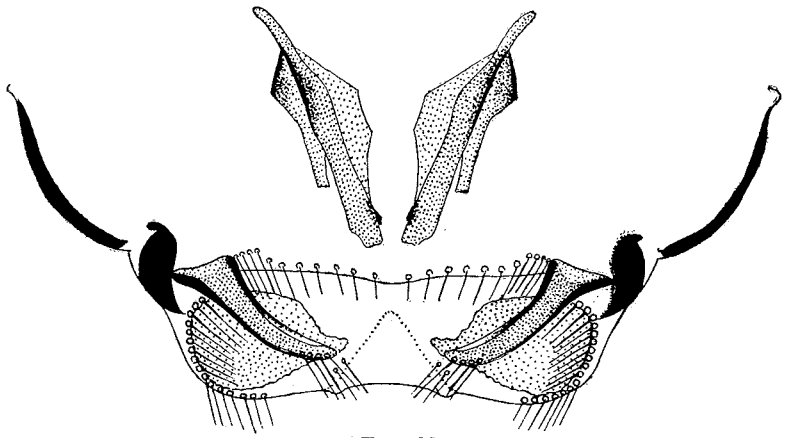


FIG. 28.



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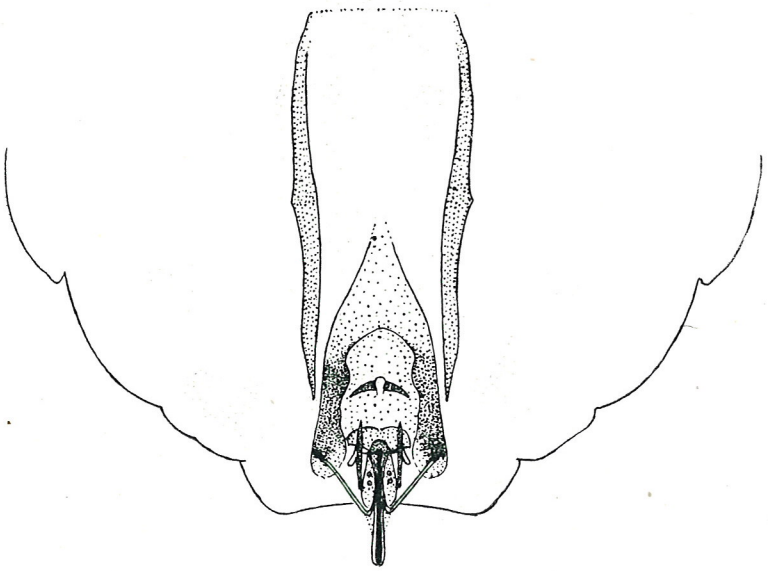

FIG. 30.

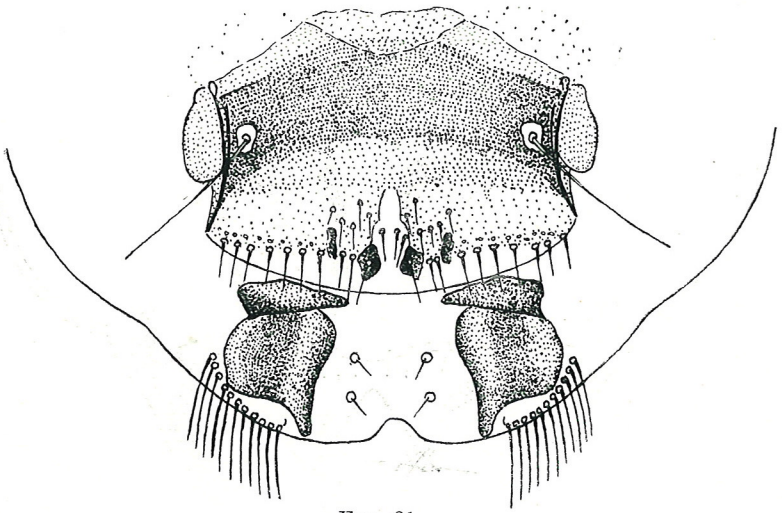

FIG. 31.

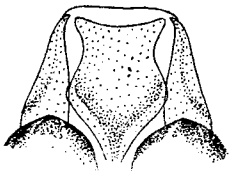

FIG. 32.

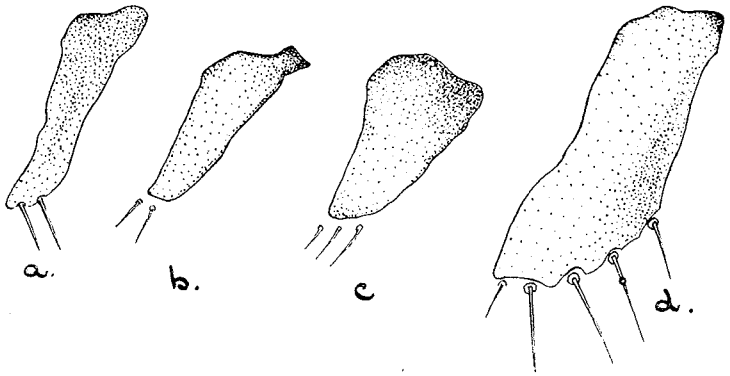

Fig. 33.

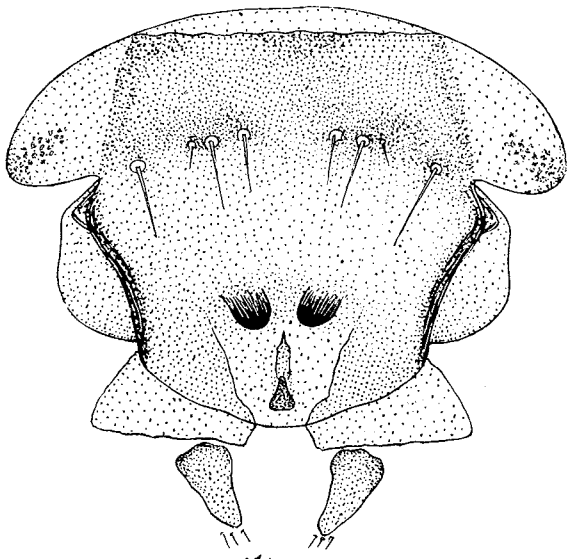

Fig. 34.