

Anoplura from South African Hosts. Part II.

BY

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Order ANOPLURA.—Leach.

Sub-order SIPHUNCULATA.—Meinert.

Genus *Haematopinus*.—Leach.

H. taurotragi.—Cummings.

H. taurotragi, Cummings, Bull. Ent. Res., Vol. 5, Pt. 2, pp. 155—159, f. 1—2 (1914).

Three females and three males of this species were sent by Mr. Hill, of Maritzburg, taken from an Eland (*Taurotragus oryx*) in the Drakensburg, Natal.

Genus *Linognathus*.—Enderlein.

1. *Linognathus stenopsis*.—Burmeister.

Pediculus stenopsis, Burm., Gen. Rhyn., No. 3 (1838).

L. africanus, Kellogg and Paine, Bull. Ent. Res., Vol. 2, Pt. 2, p. 146, Pl. 4, f. 1, 5 (1911).

A number of females were forwarded to the Laboratory for identification by Mr. W. Perry, Sheep Inspector, who took them off a sheep at Kuruman, Cape Province. Although this species is a common parasite on goats it has only been recorded from sheep on one other occasion, when Kellogg and Paine recorded it from specimens taken off a sheep by J. J. Simpson at Abeokuta, Southern Nigeria, under the name *L. africanus*.

2. *Linognathus tibialis*.—Piaget.

H. tibialis, Piaget, Les Pédiculines, p. 646, Pl. 52, f. 8 (1880). Several females taken off an Impala (*Aepyceros melampus*) in the Rustenburg District, Tr. (W. Powell).

3. *Linognathus tibialis* var. *euchore*.—Waterston.

L. tibialis var. *euchore*, Waterston, Ann., S. African Mus., Vol. x., Pt. ix., p. 275 (1914).

Several females taken off an Impala (*Aepyceros melampus*) along with the above specimens; also several females taken from a Steen-

buck (*Raphiceros campestris*) in the Rustenburg District, Tr. (W. Powell).

Through the kindness of Dr. Péringuey, who kindly allowed me to examine the collection of Anoplura in the South African Museum, I have been able to compare these specimens with the type female, and found that they agree perfectly, except that the gonopods are very slightly different in shape. However, I think it is advisable to place them here until I have had an opportunity of comparing the males.

3. *Linognathus unguulatus*.—Piaget.

H. unguulatus, Piaget, Les Pédiculines, Suppl. p. 144 Pl. XV, f. 7 (1885).

Several females taken off a Duiker (*Cephalophus grimmii*) in the Rustenburg District, Tr., 5/8/1917 (Powell).

This species has previously been recorded from *Cephalophus natalensis*, *C. nigrifrons* and *Cephalophus sp.*

Genus *Linognathoides*.—Cummings.

This genus contains five species recorded from Muridae (Rats and Mice) and Sciuridae (Squirrels). To these I am now adding a sixth, reported to have been taken off an undetermined species of mongoose (Viverridae) at Bloemfontein, O.F.S., on the 2/6/1914, by Mr. J. C. Faure. There can be little doubt, however, that they were collected from a Ground Squirrel (*Geosciurus capensis*), which Mr. Haagner, Director of the Pretoria Zoo, informs me is very common in the Bloemfontein district, and which might be easily mistaken for a mongoose by anyone not familiar with these animals.* Mr. Ferris, of the Stanford University, California, writes me that he has examined numerous Viverridae for parasites, and only found *Trichodectes* on them. Likewise, I have only found *Trichodectes* on several species of mongooses which I have examined. This new species can be easily distinguished by the presence of a transverse chitinized plate on the ventral surface of the first abdominal segment, the male genitalia, and the female genital plate, etc.

Linognathoides faurei. nov. sp.

Plate 1, figs. 2, a, b; plate 7, fig. 3.

Female.—The head resembles that of the male in shape, which is shown in fig. 2. It is brown in colour, except round the margins of the antennae where it is pale. The temporal margins are slightly darker, and there is a dark spot on each side of the forehead in front, and another, darker still, in each ocular emargination. On the pre-antennal area there are two hairs on each side of the rostrum, one slightly longer close to these on each side, and another a little further back just inside the margin on the ventral surface. On the lateral margins there are four hairs on each side, one of which is situated on the ventral surface, a short distance from the margin. Between the antennae there is a hair on each side of the middle line on the ventral surface. Behind the antennae, on the dorsal surface,

*Since this paper went to press I have received two females taken off *Xerus (Geosciurus) capensis* by Mr. Austen Roberts at Bothaville, O.F.S., on the 21.5.20.

there is a minute hair on each side within the lateral margin at a short distance behind the antennae, and another in each ocular emargination. On the temples there is a longish hair near the anterior margin, and another similar hair and a long bristle situated further back close together. The antennae resemble those of the male, except that the distal anterior angle of the third segment does not project, and there is no spine. The mouth-parts resemble those of *L. spermophila*, Cummings (*vide* Bull. Ent. Res. Vol. V, Pt. 2, 1914).

The thorax is brown in colour, and gradually broadens out posteriorly. Just inside the spiracle on the mesonotum there is a long bristle. The sternal plate is well defined and is figured on Plate 1.

Legs.—The claws of the anterior pair are bifid at the apex.

The abdomen is elongated-oval in shape, and without tergal and sternal plates, except that there is a narrow, brown, transverse plate on the ventral surface of the first segment. The sutures between the segments are indistinct, and are not visible in specimens mounted in canada balsam. On the dorsal surface there are two rows of hairs on segment 1: on segment 2 there appears to be only one row, and two rows on each of the segments 3 to 8. Segment 9 is brown in colour, with four hairs situated on each side posteriorly in a longitudinal line. On each segment there is a narrow bare patch between the hairs on the middle area and those on the pleural area.

On the ventral surface there is one row of hairs on the first segment, and two rows on each of the segments 2 to 7; those on segment 2 forming a more or less dense patch on each side. On segment 8 there are about five minute hairs in the middle of the genital plate. On the apical segment there are three or four hairs on each side on the posterior margin, and above these there is a strong spine with a hair on each side, the inner one being minute.

The genital plate is shaped as in fig. 3 on plate 7. At its apex there are two long claw-like projections, one of which is longer than the other. The gonopods each bear a bristle and two minute hairs on their posterior margins.

The pleural plates are present on the second to eighth segments, and immediately beneath the seventh plate there is a small round plate with eight hairs (see Plate 1, fig. 2a).

Male.—The male differs from the female in being smaller; having the third segment of the antennae produced at its distal anterior margin with a spine, and in the chaetotaxy of the abdomen. On the dorsal surface of the abdomen there is only one row of hairs on the segments 1 to 8. Those of the first row may, however, belong to the thorax. On segment 9 there are three hairs on each side, and two or three small ones in the middle. The apex is produced into a rectangular flap with several hairs on its margin.

On the ventral surface there is a single row of hairs on segments 1 to 6. On segment 7 there are five hairs in the middle and one on each side. On segment 8 there are two hairs—one on each side of the basal plate. On the sides of the apical segment the pleurae are produced into two long claw-like processes, one on each side, converging inwards, but not meeting at the apex. On each of these processes there are five hairs.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.48	.33	.45	.31
Thorax .. ..	.21	.53	.18	.5
Abdomen }	1.46	1.06	1.11	.86
Total	2.15 mm.	—	1.74 mm.	—

SUBORDER MALLOPHAGA.

Genus *Menopon*.—Nitzsch.1. *Menopon gallinae*.—Linné.*Pediculus gallinae*, Linné, Syst. Nat. p. 613 (1758).*M. pallidum*, Nitzsch in Burm., Handt, 2, p. 440 (1838).

Numerous females and males collected from domestic fowls at Onderstepoort (G.A. H.B.), and at Maritzburg, Natal (A. L. Hill). A few females and males were also received from Mr. Hill taken off a dog of his. He informed the writer that his dog had been in the habit of sleeping in a fowl house, and had become badly infected with these parasites. About a week later, when he again examined his dog, he found that the majority of them were dead.

2. *Menopon francolinus*, nov. sp.

(Plate 5, fig. 1; plate 2, fig. 2.)

Female.—Head pale yellowish-brown, with a slightly darker spot on each side of the forehead; wider than long. Forehead slightly pointed in front, with three long bristles and two short hairs on each side in front of the ocular emargination. Ocular emargination deep. On the dorsal surface, above the ocular emargination and at a short distance from the lateral margin, there is a long bristle, and almost in a line with this, but nearer the median line there is a short one. At a short distance from the occipital margin, on the dorsal surface, there are six bristles, of which the lateral one on each side is short. On the ventral surface there are six hairs on each side of the gular region. Occipital margin slightly convex, without a band. Palpi short. Antennae with the third segment constricted at the base. Mandibles dark.

Thorax same colour as head. *Prothorax* with rounded lateral angles: at each angle there is a short spine, and below this a long bristle; below this again there is another short spine. At each end of the transverse line there is a short spine. On the posterior margin there are twelve long bristles of equal length.

Metathorax with a row of 14 bristles on the posterior margin, and two minute spines at the latero-posterior angles: on each side,

at a short distance from the margin, there are three spines situated one above the other. On the metasternum there are 5 bristles on each side between the fore and mid coxae, and 4 between the mid and hind coxae.

Legs normal; hind femora with a longitudinal patch of about 14 hairs on the ventral surface.

Abdomen elliptical, pale, with yellowish-brown transverse bands and pleurites, the latter of which are hard to distinguish except those of segments 7 and 8, which are dark brown in colour. Segments 1 to 7 with lateral margins more rounded than what they are in the figure, which was drawn from a mounted specimen. Tergites 1 to 7 each with a row of about 25 to 30 long bristles of equal length. 8th tergite emarginated posteriorly, with 10 long bristles, and about 6 minute hairs. 9th tergite with a narrow, dark, slightly curved band on each lateral margin, and a short curved band on each side of the middle line at the apex. On each side, just below the middle of the segment, there is a long bristle. Pleurae with several short hairs and one very long bristle. Sternites 1 to 8 with two rows of hairs in the middle, and a patch of short hairs crowded together on each side; between these patches and the pleurites there is a clear space destitute of hairs. 9th sternite with several short and longish bristles in the middle. On sternites 8 and 9 there is a longitudinal yellowish-brown band on each side of the median line, which is very narrow on the 8th and broadens out abruptly on the 9th into a triangular spot. Lip of opening to the genital chamber closely set, except in the middle, with short spines.

Male.—Abdomen elliptical; 9th segment the longest, rounded behind; dorsal surface bare except for one long bristle on each side just below the middle; ventral surface of 9th segment with numerous bristles of medium length and three long ones on each side.

Genitalia as in fig. 2 on plate 2.

MEASUREMENTS.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.38	.51	.33	.51
Prothorax .. ..	.2	.41	.2	.4
Metathorax .. ..	.18	.51	.18	.48
Abdomen	1.36	.73	1.31	.66
Total	2.12 mm.	—	2.02 mm.	—

Described from a number of females and males taken off specimens of the Crowned Francolin (*Francolinus sephaena*, Smith), in the Rustenburg District, Tr. (W. Powell), and a few from the Northern Red-necked Pheasant (*Pternistes swainsoni*, Smith), in the same district.

3. *Menopon powelli*, sp. nov.

(Plate 2, fig. 1.)

Female.—*Head* wider than long; forehead rounded with 5 hairs of different lengths on each side in front of the ocular emargination; above the ocular emargination at a short distance from the lateral margin there are two short hairs and a long bristle. *Temples* projecting, with 3 or 4 long bristles and several short hairs. *Occiput* straight, with 4 long hairs and a small dark spot on each side. *Palpi* with the last two segments projecting beyond the margin of the head. *Antennae* with the 3rd segment constricted at the base. *Mandibles* dark brown, situated well forward on the head.

On the ventral surface on each side of the median line there are: a hair just below the mandible, beneath this there are two more, one below the other, the median one being the shortest, and four longish hairs in a longitudinal line on the throat.

Prothorax narrower than the head; lateral angles produced, with 3 short bristles at each angle, situated one above the other; just beneath these there is a long bristle, and mid-way between this bristle and the lateral one on the posterior margin there is a slightly shorter bristle: on the posterior margin there are 10 long bristles. Just inside the lateral angle at each end of the transverse band there is a short hair.

Metathorax with a row of about 16 hairs on the posterior margin, and two small spines at the latero-posterior angles; on each side near the lateral margin there is a row of short hairs running parallel with the margin. *Metasternum* with numerous hairs between the coxae.

Legs normal; hind femora with a patch of short bristles on the ventral surface.

Abdomen elliptical, with dark brown transverse bands and pleurae; lateral angles of segments hardly projecting. On the dorsal and ventral surfaces of each segment, except the last, there are three rows of hairs, those of the first and second row being less numerous in the middle of the dorsal surface, and sometimes appearing there as a single row; those of the third row being the longest; on the ventral surface the hairs become more numerous and form a denser patch at a short distance from the pleurites; between these patches and the pleurites there is a narrow space destitute of hairs. The apical segment is covered, except at the base, with strong hairs; on the ventral surface there are two long hairs on each side of the median line near the anterior margin. Lip of the opening to the genital chamber situated at a short distance from the posterior margin, with a row of minute hairs on its border. *Pleurites* with three rows of hairs, the third row consisting of 5 long ones.

Male.—The apical abdominal segment is rounded behind, with only a few small hairs on its dorsal surface; second half of ventral surface covered with hairs, of which four—two on each side of the median line near the apex—are very long. The genitalia are conspicuous, but hard to define. In all other respects the male resembles the female, except that it is much smaller.

MEASUREMENTS.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.33	.55	.31	.52
Prothorax .. ..	.23	.43	.18	.5
Metathorax .. ..	.2	.58	.19	.5
Abdomen	1.33	.94	1.1	.66
Total	2.09 mm.	—	1.78 mm.	—

Described from a number of females and males taken off specimens of the Northern Red-necked Pheasant (*Pternistes swainsoni*, Smith), and a few from the Crowned Francolin (*Francolinus sephaena*, Smith) in the Rustenburg District, Transvaal (W. Powell).

4. *Menopon africanum*.—Kellogg and Paine.

M. africanum, K. and P., Bull. Ent. Res., Vol. 2, Pt. 2, pp. 149-150, Pl. v., f. 3 (1911).

The collection contains a large number of females and males off the following hosts:—

(1) Spur-winged Gocse (*Plectropterus gambensis*), Rustenburg District, 1917 (W. Powell).

(2) Domestic Ducks, Maritzburg, Natal (A. L. Hill), and Onderstepoort (G.A.H.B.)

(3) White-backed Duck (*Thalassornis leuconotus*).

(4) Red-billed Teal (*Anas erythrorhyncha*).

(5) White-faced Duck (*Dendrocygna viduata*).

(6) Knob-billed Duck (*Sarkidiornis melanotus*).

(7) S. African Sheldrake (*Casarca cana*).

(8) Moorhen (*Gallinula chloropus*).

(9) White-breasted Duiker (*Phalacrocorax lucidus*)*

Rustenburg District, Transvaal, 1917 (Mr. Powell).

The presence of this species on the last two-named hosts is due to straggling.

This species was described from 3 females and one immature specimen taken from a Spur-winged Goose at Khoe Felos, Sudan, by Mr. H. H. King.

In this species the chaetotaxy of the thorax and abdomen varies slightly.

Kellogg and Paine state that there are 18 stout spiny hairs on the posterior margin of the prothorax, there being alternately a short and then a long one. The specimens in the collection from the same host differ in having only 14 alternately long and short hairs on the posterior margin, and also in size. However, in one

* This host was probably wrongly identified; it was doubtless taken off a Grebe. In any case the specimens must be regarded as stragglers.

female from the same host, which is presumably immature as it is smaller and lighter in colour, there are twenty on the posterior margin, the alternate short hairs being replaced by short spines. In the specimens from the remainder of the hosts, except those taken from a domestic duck at Maritzburg, there are 14 to 15, usually 14, hairs and short spines on the posterior margin of the prothorax. In one female taken from the domestic duck at Maritzburg there are 16 hairs, and 15 in the male; of these only the second from the lateral margin is spiny. The short alternate hairs on the posterior margins of the metathorax and abdominal segments also vary—some being more spiny than others, but to a less extent than on the prothorax. There can be no doubt that the three females upon which Kellogg and Paine drew up their description were slightly immature. From the above observations we can conclude that there are more hairs on the posterior margin of the thorax in immature females than what there are in mature specimens, and that in the former the hairs are shorter and spiny, also that the specimens from ducks are a distinct variety, for which I propose the name *transvaalensis*.

On the ventral surface between the first pair of coxae there is a chitinated serrated V-shaped plate, the teeth of which are few in number (usually three on each side) and situated posteriorly, and between the mid and hind coxae there is a larger pentagonal-shaped plate with short bristles, and another smaller semicircular one, also clothed with bristles, beneath it. On the ventral surface of each abdominal segment, except the last, there are three rows of hairs, those of the median segments becoming more numerous and forming a patch near the lateral margin. Between these hairs and the pleuritis, there is on each segment a narrow bare patch.

The following Table gives the measurements of females, males and immature female from *P. gambensis*, also those given by Kellogg and Paine:—

	Female.		Male.		Immature Female.		Type Female.	
	Length	Width	Length	Width	Length	Width	Length	Width
Head ..	.36	.68	.35	.65	.3	.56	.38	—
Prothorax ..	.23	.5	.21	.48	.21	.48	.36	—
Metathorax..	.25	.63	.23	.55	.23	.55	.36	.52
Abdomen ..	1.43	.96	1.15	.76	1.2	.81	1.06	.8
Total ..	2.27 mm.	—	1.94 mm.	—	1.94 mm.	—	1.8 mm.	—

This species is closely allied to *M. tumidum*, which was described by Piaget from specimens taken off a *P. gambensis* in the Leiden Museum, but can be distinguished from it by the presence of only one row of hairs instead of two on the dorsal surface of each abdominal segment, and three instead of two rows on the ventral surface of the segments; also by the absence of hairs on the posterior margin of the prothorax in *M. tumidum*.

5. *Menopon bucerotis*.—Kellogg.

M. bucerotis, K. Wiss, *Ergebn., schwed., zool. Exp. Kilimandjaro*, 3, Abt. 15, p. 52, Pl. 7, f. 12 (1910).

Several females and males taken off specimens of the Trumpeter Hornbill (*Bycanistes bucinator*) at Maritzburg, Natal (A. L. Hill).

To Mr. Ferris I am indebted for kindly comparing one of the females with a co-type female in the Stanford University collection. This species was described from specimens taken off a *Bycanistes cristatus*.

6. *Menopon lophoceros*, *nov. sp.*

(Plate 1, fig. 1; plate 3, fig. 1.)

Several females and males taken off the following hosts in the Rustenburg District, Tvl., by Mr. Powell.

- (1) Yellow-billed Hornbill (*Lophoceros leucomelas*).
- (2) Red-billed Hornbill (*Lophoceros erythrorhynchus*).
- (3) South African Grey Hornbill (*Lophoceros epirohinus*).

This new species is closely allied to *M. bucerotis*, K. from which it can be distinguished by the male genitalia and chaetotoxy of the metathorax and first seven abdominal segments. In *bucerotis* the spines on the lateral margins of the metathorax and abdominal segments are stronger and slightly more numerous than what they are in this new species.

Female.—*Head* wider than long. Forehead much narrower in front than behind, with 3 hairs on each side in front, and 4 bristles, of which two are very long, above the ocular emargination. Temples rounded, with six long bristles and one long and one short hair. Occiput slightly concave, with a band, and 4 long bristles and six minute hairs. Palpi long, last two segments projecting beyond the lateral margins of head. *Antennae* with the third segment constricted at the base. On the ventral surface there are three minute hairs on each side of the middle line beneath the mandibles, and five short hairs on each side on the throat.

Prothorax with a hair at each angle, another one beneath it, and beneath this again but situated inside the margin, there is another hair; on the posterior margin there are 8 long hairs. The transverse line (inter-scapular bar) does not quite reach the scapulars on either side; just beneath the apex of the former there is a fine hair.

Metathorax with a row of about 17 hairs on the posterior margin and six short spiny hairs at the latero-posterior angles; on each side of the second half there are two short hairs situated one above the other within the lateral margins, and another nearer the middle. On the metasternum there are two short longitudinal dark lines between the mid coxae; and between the third coxae there is a four-sided plate which is narrower behind, and has 3 hairs on each side within the latero-anterior angles.

Legs: the coxae are well separated and the first pair are elongated-oval with a long hair at their apices. Hind femora with a patch of short bristles on the ventral surface, those nearest the posterior margin are longer and stronger than the others.

Abdomen with a series of hairs on the posterior margins of the first seven segments, and three or four short spiny hairs near the latero-posterior angles; eighth segment with two hairs in the middle of the posterior margin and two on each side; ninth segment with two long bristles on each lateral margin and a row of short hairs on each side on the posterior margin. On the ventral surface there is a row of about 11 hairs on the posterior margin of the first segment; the remainder of the segments, except the last, are clothed with numerous short hairs, those on the posterior margins being slightly longer than the rest. Between these hairs and the pleurites there is a narrow bare space. On segments 4 to 6 the hairs form a dense patch on either side at a short distance from the pleurites. Ninth segment with one or two long bristles on each side near the anterior margin, and a row of fine short hairs on the posterior margin. On each side there is a brown spot, and extending across the segment there is a narrow transverse band. On each side of the band there is a row of fine hairs, those on the anterior side being the longer.

Male.—The male resembles the female in shape. Apical abdominal segment with a transverse row of fine hairs in the middle of the dorsal segment; on each side there are two long bristles, and one long bristle and a hair on each side within the posterior margin; the ventral surface is sparsely clothed with short hairs and four long bristles inside the posterior margin.

The genitalia are shown on Plate 3.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.33	.6	.25	.53
Prothorax .. ..	.21	.43	.2	.38
Metathorax .. ..	.26	.71	.18	.55
Abdomen	1.56	1.15	1.11	.85
Total ..	2.36 mm.	—	1.74 mm.	—

7. *Menopon impar* var. *poicephalus*, nov. var.

The collection contains a single female and male taken off a Meyer's Parrot (*Poicephalus meyeri*) at Rooi Kuil, Tvl., 8/4/16 (W. Powell).

This new variety is very closely related to the var. *scalaris*, Piaget, taken off an African Grey Parrot (*Psittacus erithacus*). The female differs from it in the dimensions of the head and body, length of palpi, chaetotaxy of the prothorax and apical abdominal segment, and by the presence on the dorsal surface of the head of a transverse row of six longish hairs near the posterior margin.

Female.—*Palpi* with the last two and a half segments projecting beyond the border of the head.

Prothorax with 4 minute spines at the lateral angles, one long bristle situated at a short distance below these, and a shorter bristle

in the middle of the lateral margin; on the posterior margin there are six long bristles and six short hairs, two of which are situated close together near the latero-posterior margin. Apical abdominal segment pointed posteriorly, with longish bristles of equal length situated close together on the margin of the posterior half; on each side of the middle there are two long bristles, and on the anterior half of each lateral margin there are four or five short, thick bristles. Lip of genital opening bordered with a row of alternate long and short hairs.

Male.—The head and thorax resemble those of the female, except that the forehead is slightly shorter, thereby appearing more rounded in front. The abdomen is elliptical in shape. Segments 1 to 8 of equal length, each with a transverse band and two rows of hairs on the dorsum, and three rows on the venter. There are no lateral lines on the first segment as in the female. Ninth segment rounded, entirely brown, with a transverse row of bristles in front, and numerous short and long bristles on the margin; ventral surface with numerous short bristles and two long admedian bristles on each side. Genitalia conspicuous but hard to define, extending forwards to the fourth segment.

MEASUREMENTS.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.48	.61	.46	.58
Prothorax .. ..	.26	.5	.23	.47
Metathorax .. ..	.43	.66	.27	.58
Abdomen	1.51	.85	1.36	.66
Total ..	2.68 mm.	—	2.32 mm.	—

Menopon (Menacanthus) crateropus, nov. sp.

(Plate 4, fig. 1.)

Several females taken off a Pied Babbler (*Crateropus bicolor*) and a Jardine's Babbler (*Crateropus jardinei*), along with several females and males of a new species of *Myrsidea*, in the Rustenburg District, Transvaal, 1917 (W. Powell).

Mr. Ferris has very kindly compared one of the females with the type female of *M. praecursor*, Kellogg for me, and informs me that the only difference he can find between them is that this new species has a somewhat projecting sternal plate on the ventral surface of the prothorax between the first pair of coxae, which is entirely lacking in *praecursor* (compare figs. 1 and 2 on plate 4).

This is interesting, since *M. praecursor*, Kellogg (New Mallophaga, 3, p. 46, Pl. 4, f. 8, 1899) was described from specimens taken off an American Woodpecker, *Melanerpes uropygialis*.

Female.—*Head* almost twice as broad as long, crescentic, pale yellowish-brown in colour. Forehead with a short hair on each side in front, and five longer ones on the sides, the median one of which is the longest. Temples narrow, rounded, with about 5 long and 3 minute hairs. Occipital margin slightly concave, with six long hairs. Antennae with the third segment constricted at the base. On the dorsal surface on each side of the middle line there is a long and a short hair situated close together at a short distance above the ocular emargination, and another longish hair above these. On the ventral surface there are two strong, straight, chitinized spines arising from the labium and projecting backwards. On each side of the mentum between the spines there are four small hairs. On the gular region there are three longish hairs on each side. On the outer margin of these hairs on each side, there is a dark band, which divides into two behind the posterior hair, one branch going round this hair to meet its fellow of the opposite side, and the other branch extending backwards under the scapulars on the prothorax.

Prothorax brown at the sides, paler in the middle, with a spine at each angle: beneath this there is a long hair, and beneath this again another short spine. The posterior margin is rounded with 10 long hairs. The interscapular bar extends almost to the scapulars, the space between being occupied by a small spine.

Metathorax is not quite so long as the prothorax, pale yellowish-brown in colour; posterior margin with about 14 long hairs and two small spines at the angles; on each side within the lateral margin there are four small spines, one above the other. *Metasternum* sparsely clothed with short hairs. Extending round the anterior margins of the mid coxae there is a dark band.

Legs.—Same colour as abdomen. Femora and tibiae equal in length. Hind femora with about 10 short hairs on the ventral surface.

Abdomen elliptical, broadest at the 5th segment; pale yellowish-brown in colour, with brown pleuritis and transverse bands on the ventral surface of the segments. The first segment is the shortest, the ninth the longest, and the second is longer than the rest. On the dorsal surface there is a row of hairs and two short spines near the apex on the posterior margins of each of the segments 1 to 8. 9th segment with several hairs on the margin. On the ventral surface there are six short hairs on the posterior margin of the first segment; segments 2 to 8 with numerous hairs arranged, more or less, in 3 rows, those on the posterior margin being the longest, but they are not so long as those on the dorsal surface. Ninth segment with two long bristles on each side near the anterior margin, and a row of five hairs round the posterior margin. The lip of opening to genital chamber straight, closely set with fine hairs. Pleurae of segments 2 and 3 with about 7 short spines on the posterior margins; those of segments 3 to 7 with several short hairs and two or three spines; those of segment 8 with 3 long hairs.

MEASUREMENTS.

	Length.	Width.
Head	·35	·66
Prothorax	·23	·48
Metathorax	·18	·63
Abdomen	1·23	·93
Total	1·99 mm.	—

Genus Colpocephalum.—Nitzsch.1. *Colpocephalum caudatum*.—Giebel.

C. caudatum, Giebel, Ins. Epiz., p. 261 (1874).
Females and males taken off a White-backed Vulture (*Pseudogyps africanus*, Salvad) in the Rustenburg District, Tvl. (W. Powell); also two females and two males taken off a Griffon Vulture (*Gyps kolbei*, Daud) in the Pretoria District, 12/12/98 (C. J. Swierstra).

2. *Colpocephalum subpachygaster*.—Piaget.

C. subpachygaster, Piaget, Les Pédiculines, p. 517, Pl. 43, f. 2 (1880).

Several females and males taken off a Cape Barn Owl (*Strix flammea maculata*) along with specimens of *Philopterus rostratus*, Nitzsch, at Onderstepoort; also one female from a Cape Eagle Owl (*Bubo capensis*, Sm.), Pietermaritzburg, Natal (A. L. Hill). Waterston has also recorded this species taken off *Bubo capensis* in South Africa.

3. *Colpocephalum semicinctum*.—Rudow.

C. semicinctum, Rud., Ziet f. ges. Nat., 27, p. 475 (1866).
One female taken off a Pied Crow (*Corvus scapularis*, Daud) shot at Lambert's Bay, C.P., 29/9/17, and two females from the same host shot at Beira, East Africa, Sept., 1906. These specimens were taken off skins in the Transvaal Museum, Pretoria.

Genus Trinoton.—Nitzsch.1. *Trinoton femoratum*.—Piaget.

T. femoratum, P., Les Pédiculines, p. 593, Pl. 49, f. 4 (1880).
One female and one male of this distinct species were sent by Mr. Hill for identification; they were taken off a Greater Flamingo (*Phoenicopterus roseus*) at Durban. This species was described by Piaget from specimens taken off a *Phoenicopterus antiquorum* in the Zoological Gardens at Rotterdam.

Genus Trichodectes.—Nitzsch.*Trichodectes* spp. from goats.

In the last report I recorded *T. caprac*, Gurtl, and *T. limbatus*, Gervais, from goats. Since then more material has been collected

from these animals by Mr. Hill at Maritzburg and myself at Onderstepoort, and I find that there is another species amongst them. This third species was collected from both Angora and Boer goats. It agrees with Kellogg and Nakayama's description of *T. painei* which was described from a single male and female collected in Baja, California. The male was taken off a crow, *Corvus semicinclus* from Cerros Island, and the female off an Oyster Catcher (*Haematopus frazeri*) from San Martins Island. As Kellogg and Nakayama remark, "there is undoubtedly error in these attributions, either in the record-keeping or by abnormal straggling. . . ." This species is closely allied to *T. caprae* from which the males can be easily separated by the male genitalia, which are entirely different, those of *T. painei* somewhat resembling *T. bovis*, L., especially in the shape of the parameres, and by the second abdominal segment, the posterior margin of which is broadly emarginated in the middle, whereas in *T. caprae* it is almost straight. The females only differ, so far as I can see, in the shape of the antennal bands. In the specimens I take to be *T. caprae* the bands are slightly wider in front. Kellogg and Nakayama states that *T. painei* can also be distinguished from *T. limbatus* (meaning *T. caprae*) by the great length of the tarsal claws, but I cannot detect any difference between them. The male genitalia of *T. caprae*, *T. painei* and *T. bovis* are depicted on plate 6.

*The following is the list of the species of *Trichodectes* found on goats:—

1. *T. laculus*, Schömmmer, Über d. Mallophagen, p. 26 (1913), *Capra hircus*.
2. *T. caprae* Gurlt, Mag. f. ges. Thierheilk, 9, p. 3, Pl. 1, f. 2, (1843), *C. hircus*.
Syns. *T. climacium*, Nitz. in Giebel, Zeit. f. ges. Nat. 18, p. 292 (1861).
T. climax, Nitz. in Gervais, Hist. Ins. Apt. 3, p. 313, Pl. 48, f. 3 (1847).
T. solidus, Rudow, Zeit. f. ges., Nat. 27, p. 112, Pl. 7, f. 2 (1866).
3. *T. hermsi*, Kellogg and Nakayama, Psyche, 22, p. 34 (1915), *C. angoriensis*.
4. *T. limbatus*, Gervais, Hist. Ins. Apt. 3, p. 313, Pl. 48, f. 4 (1847), *C. angoriensis*.
Syns. *T. crassipes*, Rudow, Zeit. f. ges. Nat. 27, p. 3, Pl. 7, f. 1 (1866).
T. major, Piaget, Pédiculines, Suppl., p. 86 (1885).
T. penicillatus, Piaget, Pédiculines, p. 406, Pl. 32, f. 10 (1880).
5. *T. painei*, Kellogg and Nakayama, Psyche 21, p. 90, f. 1, (1914).
T. hermsi, Kellogg and N. is undoubtedly the same as *T. limbatus*, G. as has been suggested by M. C. Hall (Proc. Ent. Soc. Wash, Vol. 17, p. 186, 1916), and Mr. Ferris informs me that he thinks *T. pilosus*, Giebel, may also be the same.

* Taken from "The Genera and Species of Mallophaga," by L. Harrison.

2. *Trichodectes subrostratus*.—Nitzsch

T. subrostratus, Nitzsch in Burmeister, Handb., 2, p. 436 (1838). Three females and a single male sent by Mr. Hill taken off a domestic cat at Pietermaritzburg, Natal.

3. *Trichodectes lineatus*, nov. sp.

(Plate 5, fig. 2.)

Female.—Head light yellowish-brown, paler behind and in front of the mandibles, with uncoloured trabeculae-like processes and reddish-brown bands and mandibles.

Forehead elongated, emarginated in front, with about 9 fine hairs on each side, and a transverse line of 9 minute pustulated hairs on the dorsal surface mid-way between the mandibles and the anterior margin, and one on each side below the marginal one, and five more on each side within the margin of each trabecula-like process. On the ventral surface there are three on each side on the anterior margin, four on each side in a line above the base of the mandibles, and one admedian hair in a line with these. On the dorsal surface of the hind head there is a semicircular row of 6 minute pustulated hairs in the middle, and about 9 on each temple; venter bare.

Antennae: 1st segment the shortest, narrow; 2nd nearly as long as the third. Antennal sinuses shallow. Temples with an extremely narrow marginal band, more pronounced behind. Occiput with a marginal band. Occipital bands straight and long, joining the antennal bands in front. Similar bands are also present on the ventral surfaces. The antennal bands become very narrow towards the latero-anterior margin, and then suddenly broaden out again into a large square which is interrupted in the middle by a narrow space. Internal bands on the ventral surface straight, connected to the antennals at their base, and extending forward for 2/3rds the length of the forehead; at their apices there is a small hair.

Thorax.—Same colour as head. Pronotum with four minute pustulated hairs on each side. Metathorax with a row of similar hairs on the posterior margin, the lateral ones being slightly longer.

Abdomen.—Very elongated and narrow, white in colour, with a brown transverse band on the dorsal surface of each segment except the last. Similar bands are also present on the ventral surface of segments 2 to 5, but they are shorter and wider than those on the dorsum: on segment 1 there is a small median band, and on segments 6 and 7 there is a large triangular plate and a small elongated-oval lateral spot on the latter. On the posterior margins of the bands there is a row of minute pustulated hairs. Last segment bilobed at the apex, with two short hairs on each lobe.

Male.—Head very narrow at the temples, broader at the angles of the sinuses. The occipital bands are curved. *Antennae* long, 1st segment as long as the second and third together, with a longitudinal row of fine hairs on the dorsum; 3rd segment longer than the second, broader at the apex than at the base, with two small spines on the inner surface. Last segment and genitalia as in Plate 2, fig. 3.

MEASUREMENTS.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.54	.35	.53	.27 (at temples).
Prothorax ..	.1	.31	.1	.25
Metathorax ..	.11	.36	.11	.3
Abdomen ..	1.4	.4	1.16	.35
Total length	2.15 mm.	—	1.90 mm.	—

Described from 2 females and 3 males taken off a Steenbuck (*Rhaphiceros campestris*) in the Rustenburg District, Tvl., 29/9/17 (W. Powell). This species somewhat resembles other species found on deer and antelopes, but can be distinguished by its narrow and elongated form.

Genus *Goniodes*.—Nitzsch.

1. *Goniodes aegypticus*.—Kellogg and Paine.

Goniodes minor, Piaget, Les Pédiculines, p. 256, Pl. 21, f. 3, (1880), nec. Piaget, p. 248.

Goniocotes aegypticus, Kellogg and Paine, Bull Ent., Res., Vol. 2, Pt. 2, p. 148, Pl. 5, f. 2, (1911).

Goniodes piageti, Johnston and Harrison, Proc. Roy. Soc., Qsld. 24, p. 19 (1912).

Several females and males taken off specimens of the Laughing Dove (*Turtur senegalensis*) and the Damara Turtle Dove (*Turtur capicola damarensis*) at Rooi Kuil, Tvl., 1916 (W. Powell).

Waterston has recorded this species from South Africa from the Cape Turtle Dove (*Turtur capicola*) and the Cape Fruit Dove (*Vinago delalandi*).

2. *Goniodes hilli*, nov. sp.

(Plate 5, fig. 3.)

Female.—Head slightly wider than long, rounded in front with three minute hairs on each side. The marginal band on the forehead is very narrow in front, gradually widening out towards the base of the antennae, in front of which it turns inwards; it is slightly darker than the ground colour of the head. On the dorsal surface in front there are two small hairs on each side, and one similar hair on each side on the ventral surface. Just above the base of the antennae there is a hair on the dorsal surface, and another hair inside the lateral margin a short distance below the eye. *Antennae*: the second joint is the longest, the first is nearly as long as the second; the fourth is the shortest, and the third and fifth are equal. *Eye* small, without a hair. The angles of the temples are acute with two long hairs. Occiput straight, with a dark brown band extending laterally in a narrow, wavy line. Occipital bands slightly darker than the ground colour of the head which is light brown.

Prothorax short, widening posteriorly, with a hair at each latero-posterior angle. Colour light brown, sides slightly darker.

Metathorax longer and wider than the prothorax, projecting backwards in the middle almost on to the posterior margin of the first abdominal segment, with two hairs at each latero-posterior angle, and two, one long and one short, on the posterior margin on each side. It is brown in colour, but pale behind.

Legs short; the hind pair hardly extending beyond the lateral margin of abdomen.

Abdomen widest at the second segment, with brown lateral bands and pale brown lateral blotches. On the dorsal surface there is a longish hair on each side of the middle line on the posterior margin of the first segment, and one on the fifth and sixth, just inside the lateral bands. On the latero-posterior angles of segments two to seven there are two hairs. The eighth segment is brown, with one longish and two short hairs near the apex on each lateral margin, and 3 short hairs on each side on the posterior margin. Hairs are apparently lacking on the ventral surface, except that there are two spines on each side of the seventh segment.

Male.—The antennae resemble those of *G. aegypticus* and *G. damicornis*. The distal posterior angle of the third segment projects somewhat, and the fourth and fifth segments, especially the former, are very small. The eye is larger than that of the female and has a hair. There is a prickle on the temporal angles in addition to the two long hairs. On the posterior margin of the first abdominal segment there are two small hairs on each side of the median line, and one on segments two to six; these latter are very indistinct, and probably also present in the female. On the dorsal surface of the seventh segment there are two brown spots near the anterior margin, one on each side of the middle, and three longer ones on the posterior margin, the middle one of which is concave behind. The apical segment is rounded, with a narrow chitinous band and four hairs on the posterior margin of the ventral surface. The genitalia extend forward to the fourth segment, and resemble those of *G. aegypticus*.

MEASUREMENTS.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.4	.45	.35	.4
Prothorax ..	.1	.26	.09	.23
Metathorax ..	.23	.26	.2	.31
Abdomen ..	.75	.7	.56	.61
Total ..	1.48 mm.	—	1.20 mm.	—

Described from two females and two males taken off a Red-eyed Turtle Dove (*Turtur semitorquatus*) at Pietermaritzburg, Natal by Mr. Hill.

This new species is allied to *G. aegypticus* and *G. damicornis*, both of which are parasitic upon pigeons. From these it can be

distinguished by its small size, shape of the head and metathorax, and by the abdominal bands.

Genus Goniocotes.—Burmeister.

1. *Goniocotes nigromaculatus.*—Mjöberg.

G. nigromaculatus, Mjöberg, Arkiv f. Zool. 6; p. 106, f. 62 (1910). Several females and males taken off a domestic fowl at Pretoria North, Transvaal, 30/10/16 (G.A.H.B.)*; also one female taken off a Crowned Francolin (*Francolinus sephaena*) in the Rustenburg District, Tvl. (W. Powell), and one female from a Crowned Guineafowl (*Numida coronata*) at Bridgewater, Tvl. (W. Powell).

This species was described by Mjöberg from a single female taken off a *Numida mitrata* (?) in Madagascar.

The specimens in the collection agree perfectly with Mjöberg's description, except that there is a long bristle at each latero-posterior angle of the prothorax, and a dark brown band between the fore and mid coxae; whereas according to Mjöberg there is a dark band between the mid and hind coxae, but this is most probably an error.

The abdominal sutures are very indistinct and only visible on the sides; whereas Mjöberg does not mention these in his description, but in his figure—which is only a rough sketch of the thorax and abdomen—the sutures are very distinct between all the segments.

Mjöberg says the head is much wider than long, but gives the following dimensions: length, .362 mm.; breadth, .362 mm. The head of a female in the collection measures .38 mm. in length and .43 mm. in breadth across the temples.

The male which we figure, resembles the female, except that there is but one hair on each side of the median line on the first tergite only, whereas in the female there is one on each of the tergites 1 to 7; also by the presence of a hair near the inner margin of each lateral blotch.

The following are the dimensions of the male:—

	Length.	Width.
Head .. ..	.32	.40
Prothorax .. ..	.08	.23
Metathorax .. ..	.14	.36
Abdomen .. ..	.53	.58
Total length ..	1.07 mm.	—

* Some of these specimens were recently forwarded to Mr. Ferris, of the Stanford University, California, who informs me that they may very well be *G. nigromaculatus*, but if they are, that species is a synonym of *G. halogaster* var. *maculatus*, Taschenberg. Harrison links the var. *maculatus* as a synonym of *G. halogaster*, which is a common parasite on fowls in Europe and other parts of the world.

Genus Philopterus.—Nitzsch.

1. *Philopterus gonothorax.*—Giebel.

Docophorus gonothorax, Giebel, Zeit. f. ges. Nat. 37, p. 450, (1871). *Pediculus lavi*, O. Fabr., Faun. Groen, p. 219 (1780), nec. Degeer, 1778.

Several females and males taken off a Southern Black-backed Gull (*Larus dominicanus*) shot at Lamberts Bay, C.P., 1917. These specimens were collected off a skin in the Transvaal Museum.

2. *Philopterus cursor.*—Nitzsch.

P. cursor, Nitzsch in Burm., Handb., 2, p. 426 (1838).

More specimens of this common parasite of owls have been collected by Mr. Powell, who took them off a Giant Eagle Owl (*Bubo lacteus*), in the Rustenburg District, Tvl.

3. *Philopterus ceblebrachys.*—Nitzsch.

Docophorus ceblebrachys, Nitzsch in Denny, Anoplur. Brit., p. 92, Pl. 1, f. 3, (1842).

Several specimens, both females and males, taken off the same host individual as the preceding species.

This species has been found on the Snowy Owl (*Nyctea nivya*) on several occasions in Europe, and Kellogg has recorded it from the same host in America.

4. *Philopterus rostratus.*—Nitzsch.

D. rostratus, Nitzsch in Burmeister, Handb., 2, p. 427 (1838).

Several females and males taken off a Cape Barn Owl (*Strix flammea maculata*) at Onderstepoort, 3/4/18 (G.A.H.B.).

5. *Philopterus meropis.*—Denny.

D. meropis, Denny Anopl. Brit., p. 101, Pl. 4, f. 4, (1842).

Two females taken off a White-fronted Bee-eater (*Melittophagus bullockoides*, A. Sm.) in the Rustenburg District, Tvl., 1/10/17 (W. Powell).

6. *Philopterus senegalensis.*—Rudow.

D. senegalensis, Rudow, Beitrage, p. 10 (1869).

Two females collected on a Red-shouldered Glossy Starling (*Lamprocolius phoenicopterus*, Sw.) at Pietermaritzburg, Natal (A. L. Hill), and several females and males from a Lesser Red-shouldered Glossy Starling (*L. phoenicopterus* var. *bispecularis*) at Cumberland, Tvl. (W. Powell).

7. *Philopterus subflavescens.*—Geoffrey.

Pediculus subflavescens, Geoffrey, Hist., Abr. Ins., 2, p. 599 (1762).

D. communis, Nitzsch, in Burmeister, Handb., 2, p. 425 (1838).

Specimens of this type of *Philopterus* have been collected on the following hosts:—

- (1) Greater Puff-back Shrike (*Dryoscopus ferrugineus*), Port Alfred, C.P.
- (2) Dusky Flycatcher (*Alcedo adustus*), Pietermaritzburg, N.
- (3) Cape Sparrow (*Passer arcuatus*), Onderstepoort, Tvl.

8. *Philopterus ornatus*.—Nitzsch.

D. ornatus, Nitzsch, Zeit. f. ges. Nat., 27, p. 116 (1866).

Two females and two males taken off a Black-headed Oriole (*Oriolus larvatus*) at Pietermaritzburg, Natal (A. L. Hill).

Genus *Ibidoecus*.—Cummings.

Ibidoecus plataleae.—Denny.

Docophorus plataleae, Denny, Anopl. Brit., p. 100, Pl. 4, f. 9 (1842).

Two females and two males taken off a Spoonbill (*Platalea alba*, Scop.) in the Pretoria District, Tvl., 10/12/1897 (C. J. Swierstra). This species was described from numerous specimens taken off a White Spoonbill (*Platalea leucorodia*) which was killed at Yarmouth, Norfolk, in 1829.

Genus *Degeeriella*.—Neumann.

1. *Degeeriella actophila*.—Kellogg and Chapman.

Nirmus actophila, Kell. and Chap., New Mallophaga, 3, p. 79, Pl. 6, f. 4 (1899).

Several females taken off a skin of the Curlew Sandpiper (*Tringa subarquata*) in the Transvaal Museum, Pretoria. This bird was shot at Lamberts Bay, C.P., 1917.

The Transvaal Museum possesses two females taken off a Little Stint (*Tringa minuta*) in the Pretoria District (C. J. Swierstra).

This species was described from specimens taken off a Sanderling (*Calidris arenaria*), in California.

2. *Degeeriella zonaria*.—Nitzsch.

Nirmus zonaria, Nitzsch, in Giebel, Ins. Epiz., p. 166 (1874).

Several females collected on the skin of a *Tringa subarquata* in the Transvaal Museum.

The Transvaal Museum also possesses a single female from a *Tringa minuta*, in the Pretoria District (C. J. Swierstra).

In addition to this and the preceding species, a third species, namely *D. brevipis*, Piaget (Les Pédiculines, p. 179, Pl. 15, f. 3, 1890), has been described from *Tringa subarquata*.

3. *Degeeriella macrocephala*.—Waterston.

N. macrocephala, Waterston, Ann., S.A. Mus., Vol. 10, p. 284, Pl. 25, f. 2, 5 (1914).

A number of females and males taken off three specimens of the White-fronted Sandplover (*Aegialitis marginata*), at Port Alfred, C.P., July, 1918 (G.A.H.B.).

This species was described from specimens taken off the following hosts: *Aegialitis pecuria*, *A. tricoloris* and *A. marginata*.

4. *Degeeriella decipiens*.—Nitzsch.

N. decipiens, Nitzsch, in Giebel, Ins. Epiz., p. 162, Pl. 15, f. 4 (1874).

A single female and male taken off the skin of an Avocet (*Recurvirostra avocetta*, Linné), in the Transvaal Museum. The bird was shot at Philipstown, C.P., 26/12/12.

Waterston has recorded this species, along with *D. testudinaria*, Children (*D. pilea*, Nitzsch), and *D. signata*, Piaget, from the same host in South Africa.

5. *Degeeriella colymbina*.—Scopoli.

Pediculus colymbina, Scopoli, Ent. Carn., p. 384 (1763).

D. fuscomarginata, Denny, Anoplur. Brit., p. 136, Pl. 10, f. 1 (1842).

Several specimens, both females and males, were sent by Mr. Powell, who collected them in the Rustenburg District, Tvl., along with specimens of *Menopon africanum var transvaalensis*, Bed. and *Pseudomenopon pacificum*, Kellogg. These specimens were reported to have been taken off a White-breasted Duiker (*Phalacrocorax lucidus*, Licht), but as *D. colymbina* and *P. pacificum* are parasites of Grebes, and as no cormorant parasites were found, there can be little doubt that the host was wrongly identified, and that their true host was a Grebe, of which three species are found in South Africa, namely, *Podiceps cristatus* (Crested Grebe), *P. nigricollis* (Eared Grebe), and *P. capensis* (Cape Dabchick).

6. *Degeeriella fusca*.—Nitzsch.

Nirmus fusca, Nitzsch in Denny, Anoplur. Brit., p. 118, Pl. 9, f. 8 (1842).

Since the last report was written more specimens of this common species have been received taken off a Jackal Buzzard (*Bufo jakal*), in the Pretoria District, Tvl. (C. J. Swierstra), and from the following birds in the Rustenburg District, Tvl.: Sea Eagle (*Haliastur vocifer*), Gabar Goshawk (*Micronisus aabar*), South African Kestrel (*Cerchneis rupicola*), and three females from a Brubru Bushshrike (*Nilaus brubru*, Lath). The occurrence of this species on the last named host is due to straggling.

We think that there can be no doubt that all the specimens from the above hosts, along with those previously recorded in the first part of this paper should be referred to Nitzsch's *D. fusca*, as that species now stands.

In some of these specimens the shape of the head varies to a marked degree, and differences are also to be found in the number of hairs on the dorsal surface of the abdominal segments 1 to 7, the colouration, and in the measurements. No doubt differences are also to be found in the male genitalia, but these we have not dissected owing to insufficient material from each host.

The differences noted above are sufficient to warrant some of these specimens being split up into varieties of the type if not distinct species. In doing this it is very likely that some of the 14 names, which Harrison, in his *Genera and Species of Mallophaga*, has recently sunk as synonyms of this species, will have to reappear again as valid. However, the sinking of these names by him was only done provisionally, since he asserted in the same paper that the *D. fusca* group is not a single species, but is capable of being separated, by careful work, into a number of separate species.

As the time for this is not yet ripe we will conclude our discussion on this species by giving tables of the abdominal chaetotaxy, measurements, etc., of the specimens we have before us.

TABLE OF ABDOMINAL CHAETOTAXY.

	Number of hairs on dorsal segments.						
	1.	2.	3.	4.	5.	6.	7.
1. <i>Astur tachiro</i>	6	6	6	4	4	4	4
2. <i>Cerchneis naumanni</i>	6	6	6	6	5	4	4
3. <i>Elanus caeruleus</i>	6	6	6	6	5	4	4
4. <i>Micronisus gabar</i>	6	6	6	7	5	4	4
5. <i>Buteo jakal</i>	8	8	8	8	6	6	6
6. <i>Cerchneis rupicola</i>	8	8	8	8	6	6	6
7. <i>Nilaus brubru</i>	8	8	8	8	8	8	6
8. <i>Haliaetus vocifer</i>	8	8	8-9	8	8	8-9	6

TABLE OF MEASUREMENTS (millimetre-scales), etc.

Host.	Females.			Males.			Remarks.
	Length of head.	Width of head.	Total length.	Length of head.	Width of head.	Total length.	
1. <i>Astur tachiro</i> ..	.48	.36	1.96	—	—	—	Colour reddish-brown. Head as in fig. 5.
2. <i>Cerchneis naumanni</i> ..	.5	.38	1.98	—	—	—	Colour reddish-brown. Head as in fig. 5.
3. <i>Elanus caeruleus</i> ..	.53	.4	2.2	.5	.37	1.88	Colour reddish-brown. Head as in fig. 5.
4. <i>Micronisus gabar</i> ..	.56	.43	2.01	.53	.4	1.88	Colour reddish-brown. Head as in fig. 4.
5. <i>Buteo jakal</i> ..	.56	.45	2.16	.54	.41	2.06	Colour reddish-brown. Head as in fig. 3.
6. <i>Cerchneis rupicola</i> ..	.58	.45	2.25	.51	.39	1.83	Colour dark reddish-brown. Head as in fig. 3.
7. <i>Nilaus brubru</i> ..	.56	.43	2.26	—	—	—	Colour dark reddish-brown. Head as in fig. 3, except that it is slightly narrower in front.
8. <i>Haliaetus vocifer</i> ..	.6	.45	2.55	.56	.41	2.15	Colour dark reddish-brown. Head as in fig. 3, except that it is slightly narrower in front.

7. *Degeeriella hypoleucum*.—Nitzsch.

Nirmus hypoleucum, Nitzsch in Denny, Anoplur. Brit., p. 141, Pl. 6, f. 8 (1842).

Lipeurus hypoleucum, Piaget, Les Pédiculines, Suppl., p. 66, Pl. 7, f. 3 (1885).

Esthiopterum hypoleucum, Harrison, Parasitology, Vol. 9, No. 1, p. 136 (1916).

A single male taken off a European Nightjar (*Caprimulgus europaeus*) in the Rustenburg District, Tvl. (W. Powell).

The male resembles the female. The third segment of the antenna has no appendage, and is about the same length as the first; the second segment is the longest, and the fourth and fifth are the shortest and sub-equal in length.

8. *Degeeriella erythropteri*.—Piaget.

Nirmus erythropteri, Piaget, Les Pédiculines, Suppl., p. 28, Pl. 3, f. 8 (1885).

Two females and two males taken off a Little Bee-Eater (*Melittophagus meridionalis*), and a single female taken off a White-fronted Bee-Eater (*Melittophagus bullockoides*) in the Rustenburg District, Tvl. (W. Powell).

This species was described from a male taken from a *Melittophagus pusillus*.

9. *Degeeriella argula*.—Nitzsch.

Nirmus argula, Nitzsch in Burm., Handb., 2, p. 430 (1838).

Several females and males taken off an African Rook (*Corvus capensis*) at Onderstepoort, Tvl., along with numerous specimens of an undetermined species of *Phlopterus*.

Genus Esthiopterum.—Harrison (1916).

1. *Esthiopterum colius*, nov. sp.

Female.—*Head* pale in colour, with black antennal bands which do not extend round the anterior margin, a black spot round the eyes and brown occipital bands and mouth-parts. It is longer than wide, rounded in front, temples rounded; occiput slightly emarginate. On the preantennal area there are three hairs on each side in front, and on the dorsal surface there is a hair on each side within the lateral margin at 2/3 distant from the antenna. On the ventral surface on each side of the middle line there are: a hair a short distance above the mandibles, two at the sides in a line with this one, a longer one above these occupying almost the same position as the one on the dorsal surface, and another one midway between this one and the anterior margin. On the temples there is a long hair and a short one just above it. Eye large, with a hair. Antennae pale; the first and second joints are the longest and are sub-equal in length; the second and third are the shortest, and are also sub-equal; the fifth is very slightly longer than either the third or fourth.

Thorax pale, with dark markings. *Pronotum* short, with a hair on each side, and a narrow black band on the posterior margin on each side, and a similar band on each lateral margin. The *mesonotum* is separated from the metanotum by black bands similar to those on the posterior margin of the pronotum. *Metanotum* with a black lateral band and a brown triangular spot in the middle on the posterior margin. On each side of the triangular spot there are six hairs arranged in pairs as follows: two long ones situated close together a short distance from the spot, two more, a long and short one, situated close together mid-way between the two long hairs and the lateral margin, and two short hairs at the lateral angle.

On the mesosternum there is a hair on each side of the median line, and a similar hair on each side in the middle of the metasternum.

Legs same colour as body with brown markings as shown in the figure. The ungues of all the legs are unequal, one being longer and much stouter than the other.

Abdomen white, with black lateral spots and brown median markings on the dorsal surface as shown in the figure.

On the dorsal surface of segment 1 there is a transverse row of six hairs, and two more above these; on each side of the segments 2—6 there is a row of eight hairs; on segment 7 there are four median hairs, and on segment 8 there is a long and minute hair at the sides. At the latero-posterior angles of each of the segments 2—8 there are two long hairs. The ninth segment is small and bilobed at the apex. On the ventral surface of segments 1—8 there is a small brown spot on each side of the middle line. There is also a transverse row of hairs on the first six segments similar to those on the dorsum. On segment eight there is a row of seven hairs situated close together on each side, and a transverse row of 8 small, fine hairs between them.

Male.—The male differs from the female in being smaller, in the shape of the antennae, and in the abdominal markings. The first segment of the antennae is the longest, and the second segment is longer than the three apical segments; the third segment has an appendage.

The innermost hair on either side of the triangular spot on the metasternum is not so long as the one next to it. The markings on the dorsal surface of the abdomen are as follows: The lateral spot on the first segment differs from that of the female in being very narrow and extending forward in a straight line to join the admedian spot in front; the transverse band is absent. On segments 2 to 7 there are lateral spots similar to those in the female, but no other markings are present. On segment 8 there is a narrow transverse band, and on the apical segment there is a semicircular band similar to that in the female. On the ventral surface the spots on segments 1 to 6 are larger than what they are in the female. On segments 6 to 8 there is a median longitudinal band. The male genitalia are depicted on Plate 7, fig. 2.

MEASUREMENTS.

	Female.		Male.	
	Length.	Width.	Length.	Width.
Head .. ..	.46	.36	.35	.26
Prothorax .. ..	.11	.26	.1	.2
Mesothorax .. ..	.2	.28	.16	.21
Metathorax .. ..		.5		.31
Abdomen	1.16	.65 (2nd & 3rd seg.)	.81	.28 (2nd seg.)
Total	1.93 mm.	—	1.42 mm.	—

Described from several females and males taken off three specimens of the Red-faced Mousebird (*Colius indicus*, Lath) at Onderstepoort, Transvaal.

This new species approaches *E. radiatus*, Neumann (Arch. Parasite, xv, p. 378, f. 23, 1912), which was described from specimens taken off an undetermined host. These two species can be easily distinguished from each other by the shape of the head and abdominal markings, etc.

2. *Esthiopterum longicorne*.—Piaget.

Lipeurus longicornis, Piaget, Les Pédiculines, p. 329, Pl. 28, f. 3 (1880).

Several females and males taken off a White-breasted Duiker (*Phalacrocorax lucidus*, Licht) at Port Alfred, C.P., 18/8/18 (G.A.H.B.).

3. *Esthiopterum fuliginosus*.—Taschenberg.

L. fuliginosus, Tasch, Nova Acta, 44, p. 156, Pl. 4, f. 3 (1882).

L. testaceum, Tasch, Nova Acta, p. 135, Pl. 5, f. 3 (1882).

Four males collected from a skin of a Cape Hen (*Majaques aequinoctialis*, Linn), in the Transvaal Museum. This bird was shot at Lamberts Bay, C.P.

These I have compared with specimens in the South African Museum labelled "*Naubates fuliginosus*, Det. by L. Harrison."

This species was described from specimens taken off a Wandering Albatross (*Diomedea exulans*) and a Yellow-billed Mollymawk (*Thalassogeron chlororhyncha*).

Waterston has recorded it from South Africa taken on *D. exulans*, the Mollymawk (*D. melanophrys*) and *M. aequinoctialis*, and it has also been recorded from Cape Pigeon (*Daption capensis*).

4. *Esthiopterum giganticola*.—Kellogg.

L. giganticola, Kellogg, New Mallophaga, I, p. 105, Pl. 5, f. 6 (1896).

Males and females taken off a skin of the Shy Albatross (*Thalassogeron layardi*, Salv), in the Transvaal Museum. The bird was shot by Mr. Roberts at Lamberts Bay, C.P. These I have also compared with specimens in the South African Museum labelled "*Perineus giganticola*, K. Det. by L. Harrison."

Reclivity

Naubates

Neumann

(N)

As I have not been able to find the descriptions of either of the new genera in which this and the preceding species are now included, I have retained them in *Esthiopterum*, although I am convinced that they cannot remain here.

Genus *Pectinopygus*.—Mjöberg.

Pectinopygus, Mjöberg, Arkiv., f. Zoologi, VI., p. 95 (1910).

1. *Pectinopygus bassanae*.—O. Fabricius.

Pediculus bassanae, O. Fabr., Faun. Groen., p. 218 (1780).

Lipcurus staphylinoides, Denny, Anopl. Brit., p. 180, Pl. 15, f. 2 (1842).

L. pullatus, Nitzsch in Giebel, Ziet. f. ges. Nat., XXVIII., p. 387 (1866).

Several specimens, both females and males, taken off a Cape Gannet (*Sula capensis*) shot at Knysna, C.P., 1899. These specimens were collected from a skin in the Transvaal Museum. This species was described from specimens taken off the European Gannet (*Sula bassana*). It has also been recorded from *S. alba* and *S. fusca*.

EXPLANATION OF PLATES.

PLATE 1.

Fig. 1.—*Menopon lophocerus*, nor. sp. ♀.

Fig. 2.—*Linognathoides faurei*, nor. sp. ♂.

(a) Pleural plates of female of *L. faurei*, nor. sp.
(b) Sternal plate of same.

PLATE 2.

Fig. 1.—*Menopon powelli*, nor. sp. ♀.

Fig. 2.—♂ genitalia of *M. francolinus*, nor. sp.

Fig. 3.—♂ genitalia of *Trichodectes lineatus*, nor. sp.

PLATE 3.

Fig. 1.—♂ genitalia of *Menopon lophocerus*, nor. sp.

Fig. 2.—♂ genitalia of *Menopon bucerotis*, Kellogg.

PLATE 4.

Fig. 1.—Sternal plate of *Menopon crateropus*, nor. sp.

Fig. 2.—Thorax of *Menopon praecursor*, Kellogg, ventral surface.

Fig. 3.—Head of *Degeeriella fusca*, ♀, from *Buteo jackal*.

Fig. 4.—Head of *D. fusca*, ♀, from *Micronisus gabar*.

Fig. 5.—Head of *D. fusca*, ♀, from *Elanus caeruleus*.

PLATE 5.

Fig. 1.—*Menopon francolinus*, nor. sp. ♀.

Fig. 2.—*Trichodectes lineatus*, nor. sp. ♀.

Fig. 3.—*Goniodes hilli*, nor. sp. ♀.

Fig. 4.—*Goniodes nigromaculatus*, Mjöberg, ♂.

PLATE 6.

Fig. 1.—♂ genitalia of *Trichodectes caprae*, Gurlt.

Fig. 2.—♂ genitalia of *T. painei*, Kellogg and Nakayama.

Fig. 3.—♂ genitalia of *T. bovis*, Linné.

PLATE 7.

Fig. 1.—*Esthiopterum colius*, nor. sp., ♀.

Fig. 2.—*Esthiopterum colius*, nor. sp., ♂ genitalia.

Fig. 3.—*Linognathoides faurei*, nor. sp., genital plate of ♀.

♀ denotes female.

♂ denotes male.

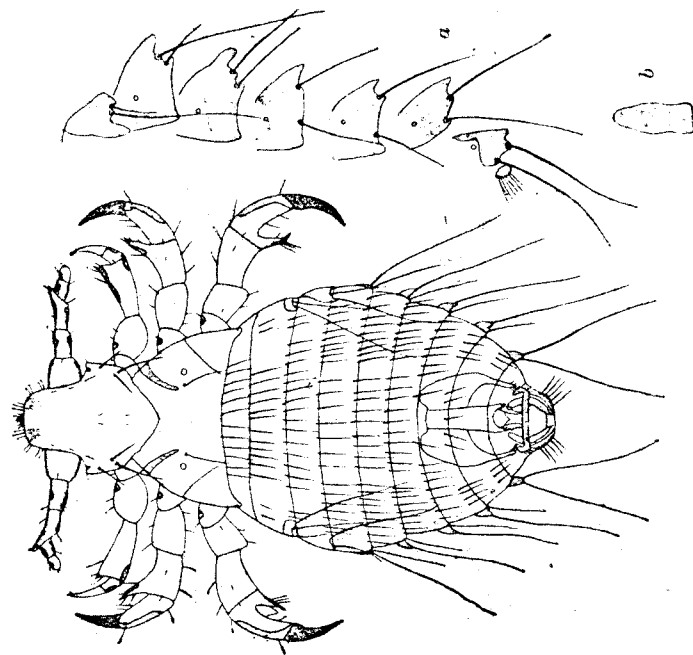


FIG. 2.

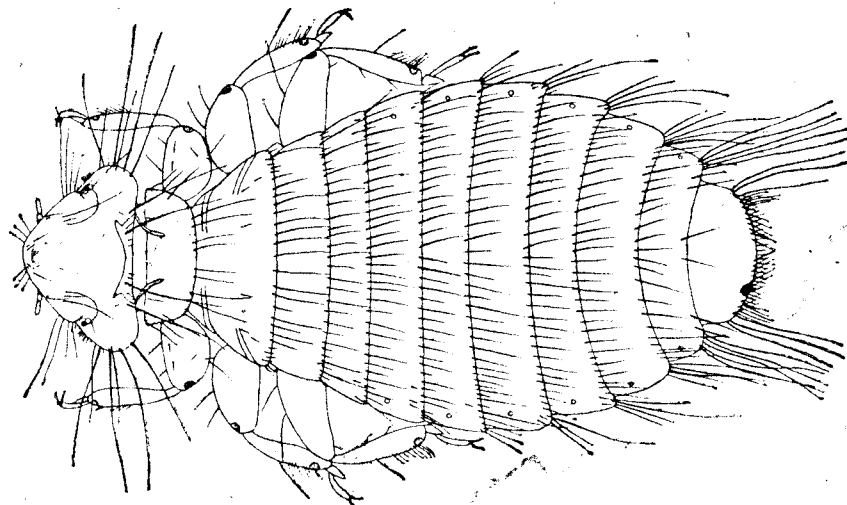


FIG. 1.

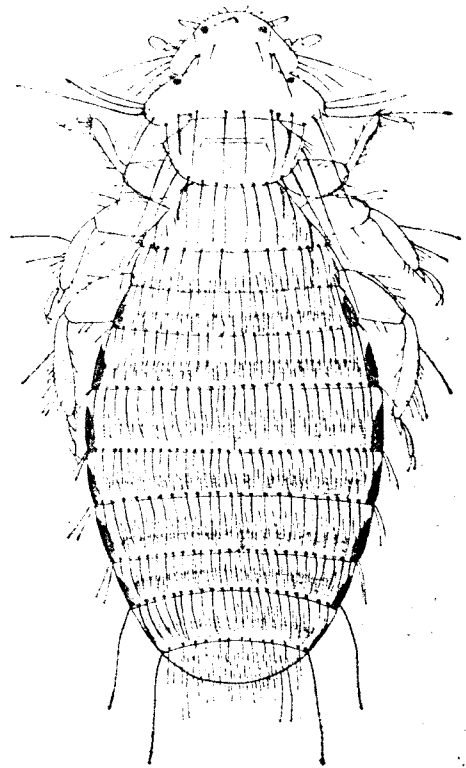


FIG. 1.

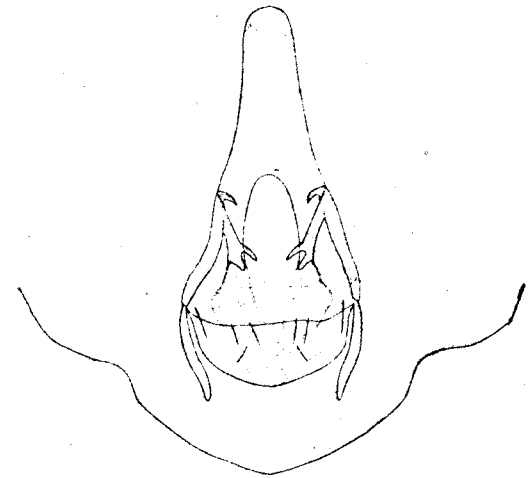


FIG. 1.

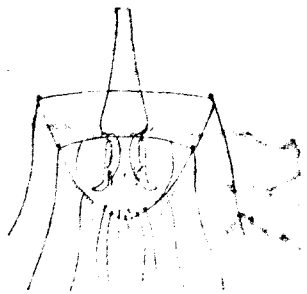


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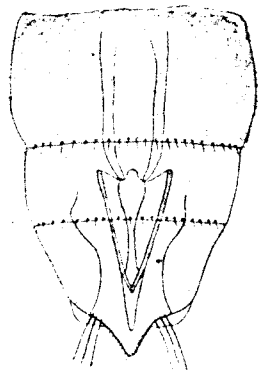


FIG. 3.

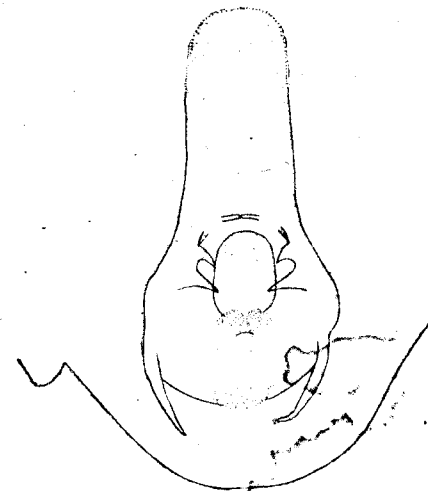


FIG. 2.

PLATE 4.

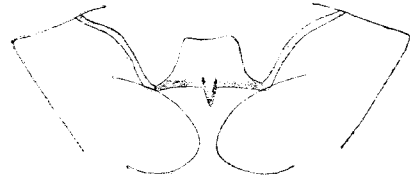


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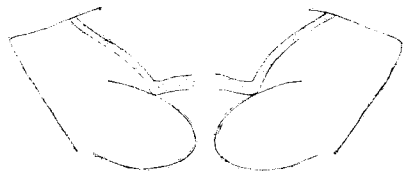


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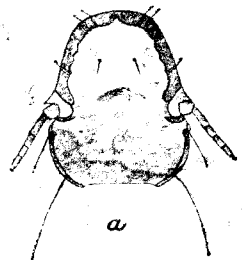


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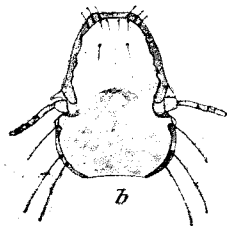


FIG. 4.

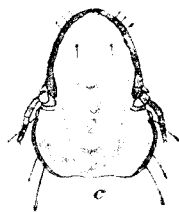


FIG. 5.

PLATE 5.

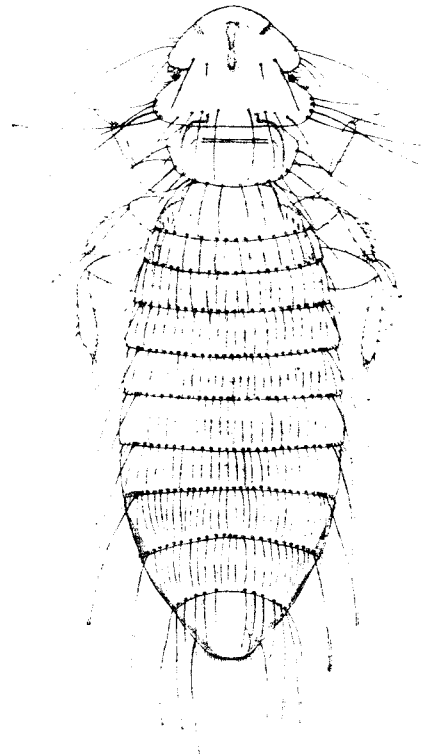


FIG. 1

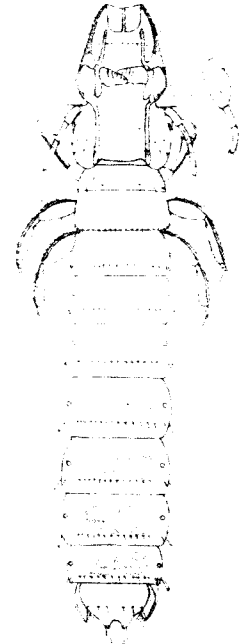
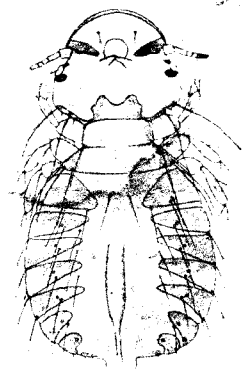
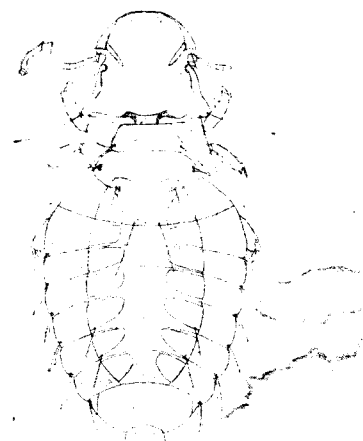


FIG. 2.



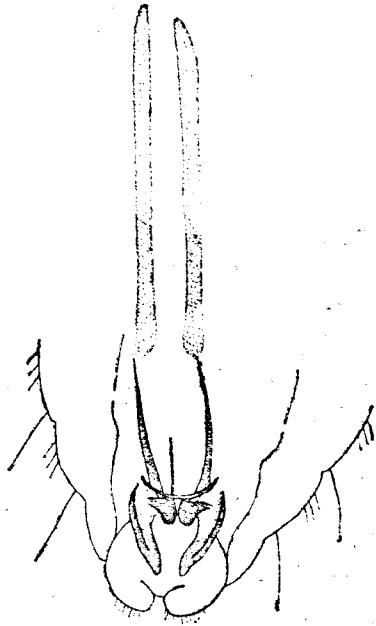


FIG. 1.

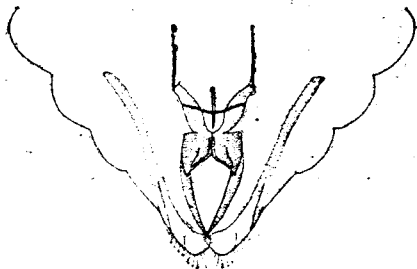


FIG. 2.



FIG. 3.

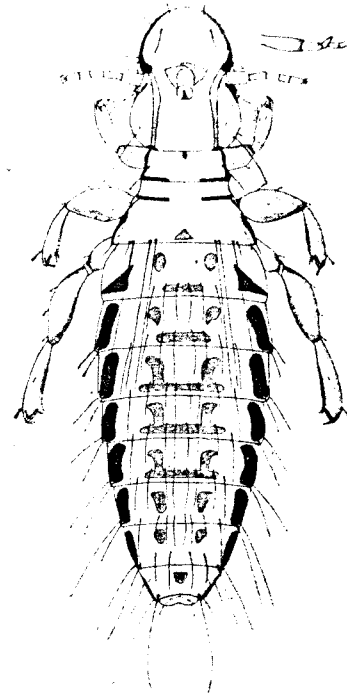


FIG. 1.

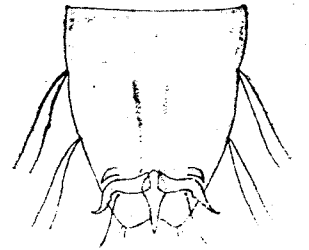


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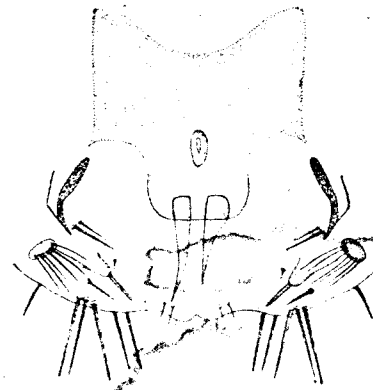


FIG. 3.