

A Synoptic Check-List and Host-List of the Ectoparasites found on South African Mammalia, Aves, and Reptilia.
(Second Edition.)

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INDEX.

	PAGE.
Introduction	224
Introduction to first edition	224
Technique.—Collecting	225
Preserving	226
Mounting	226
Order Acarina.—Mites	229
Ticks	275
Order Dermaptera.—Family Hemimeridae	308
Order Anoplura.—Sub-order Mallophaga	309
Sub-order Rhyncophthirina	398
Sub-order Siphunculata	398
Order Hemiptera.—Family Cimicidae	415
Order Diptera.—Family Hippoboscidae	416
Family Streblidae	426
Family Nycteribiidae	428
Order Siphonaptera	429
Hosts-lists, introduction	463
Ectoparasites found on man and domestic animals	464
Ectoparasites found on domestic birds	469
Ectoparasites found on South African mammals	470
Ectoparasites found on South African birds	488
Ectoparasites found on South African reptiles	512
Table of diseases transmitted by South African ectoparasites	513
List of References.—Acarina	515
Dermaptera	517
Anoplura	517
Hemiptera	520
Diptera	520
Siphonaptera	521
Mammals	523
Birds	523



INTRODUCTION.

SINCE the first edition appeared in Part I of the 11th and 12th Reports of the Director of Veterinary Education and Research, 1927, not only have a number of new species of ectoparasites been described and numerous known species recorded from fresh hosts, but many important changes have been made in the classifications of these Arthropods. Moreover, when the first edition was in the Press the writer was absent in England, with the result that a large number of errors are to be found therein. It has therefore been considered advisable to publish a second edition, and it is to be hoped that in this edition errors will be conspicuous by their absence.

In the introduction to the first edition it was pointed out that the check and host lists were very far from being complete. There are undoubtedly a vast number of species still waiting to be discovered, and a great deal of collecting will have to be undertaken before our knowledge of the ectoparasites can be considered anything like complete.

As an incentive to collecting and increasing our knowledge of these parasites, brief notes on how to collect, preserve and mount them have been included in this edition.

To Professor Cooley the author is indebted for a list of the ticks, together with their hosts, that were collected by him in South Africa. These were identified by Mr. Warburton. The author is also indebted to both Dr. Ingram and Mr. De Meillon for unpublished records of the fleas in the collection of the South African Institute for Medical Research, Johannesburg.

INTRODUCTION TO FIRST EDITION.

Before commencing to write this paper, it was realized only too fully that any check list or host list of the external parasites occurring on South African mammals, birds, and reptiles written at the present time would be very far from being complete. It was, however, considered advisable to place on record our present knowledge of these parasites, not only with a view to bringing it up to date as far as possible, but also to encourage the collection of parasites by zoologists, ornithologists, and others, who periodically have grand opportunities of obtaining material. Every year the country is being thrown open more extensively to settlers, and, as civilization advances, wild animals and birds decrease in numbers. It is quite possible that within a short period some of our mammals and birds may become extinct—if not altogether, certainly in some districts—and it would be very interesting and important to have a knowledge of the parasites before their hosts disappear, and they with them.

The distribution of a permanent parasite, i.e. a parasite which is entirely dependent upon its host for its existence, such as a bird-louse or parasitic mite, usually coincides with the distribution of its host, or may, if it possesses more than one host, as is frequently the case, overlap it. For instance, both the bird-louse (*Esthiopterum struthionis*) and the feather mite (*Pterolichus bicaudatus*) of the South African ostrich have also been found on the American ostrich

(*Rhea americana*), and the former has also been recorded from the North African ostrich (*Struthio camelus*). On the other hand, parasites, such as ticks, fleas, and some parasitic mites which do not live the whole of their existence on their hosts, are usually restricted in their range, owing to climatic conditions, unfavourable breeding grounds, etc. Temporary parasites are, as a rule, less particular in the selection of their hosts than permanent parasites, and many of them may be found on a number of animals which are in no way related to each other. Therefore, the distribution of a temporary parasite may also overlap the distribution of some of its hosts.

In this paper I have not hesitated to include all permanent parasites found on migratory birds, irrespective of whether the parasites were collected in this country or not, except that American records have not been included,* because, as a rule, most birds migrate from north to south or vice versa. In every instance where the parasite has been collected in this country the locality has been given. On the other hand, only temporary parasites have been included when they have been actually found or recorded as taken in South Africa.

TECHNIQUE.**COLLECTING.**

Many species of ectoparasites may be found on any part of their host's body, whereas others confine themselves to certain parts. Small parasites are best collected either with a pair of fine forceps or a camel's hair brush that has been dipped in ether or alcohol.

Numerous species have been recorded from hosts upon which they could not live, and these records are mainly due to the fact that the parasites had been allowed to wander from their true hosts on to foreign hosts, either in collecting bags or on the skinning tables. When a small mammal or bird is therefore trapped or shot, it should be immediately placed in a white linen bag and the opening tightly tied with string, or wrapped up in paper so that the parasites cannot escape. The best way to collect fleas and mites from a small mammal is to sprinkle a few drops of ether on it. Hippoboscid flies parasitic upon birds should be collected in the same way as they are very active and leave their hosts almost immediately the birds are killed.

Fleas and other parasites may also be bred from the nests of small mammals and birds. The nests should be kept either in glass jars with a piece of paper tied over the opening, or in glass-topped boxes lined with white paper. The name of the mammal or bird should be recorded on a label stuck on the jar or box. Nests of birds should be taken immediately after the young have flown. Fleas may continue hatching up to two months after the nests have been collected. They may be collected off the sides of the jar or box with a camel's hair brush dipped in ether. The nests should be slightly damped occasionally with water. Lice may also be collected from skins of mammals and birds in museums.

* Other than parasites found on seabirds.

PRESERVING.

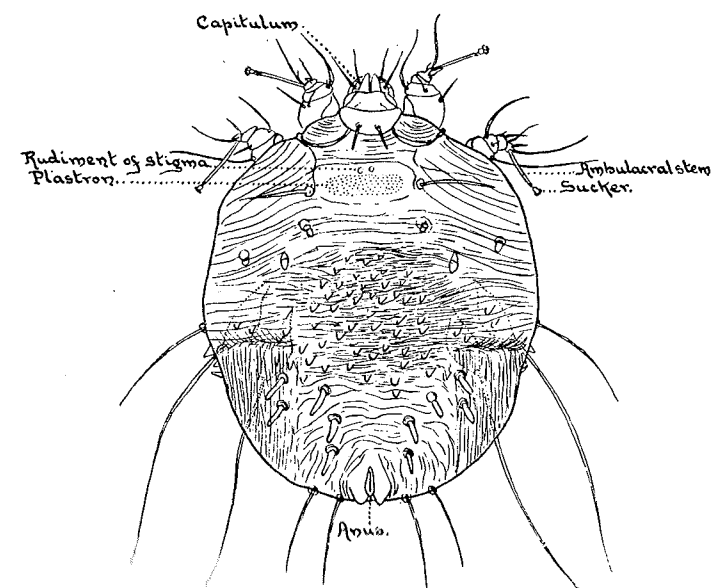
All ectoparasites, including the winged Hippoboscidae (except *Hippobosca*) and Streblidae, should be preserved in 70 per cent. alcohol, and the name of the host, locality and date written on a piece of paper in pencil and placed in the tube along with the parasites.

To preserve ticks in their natural colours, the following formula recommended by Mönnig (*Rep. Dir. Vet. Serv. and Anim. Indust.*, XVI, pp. 199-200, 1930) may be used:—A solution of 4 per cent. formaldehyde (10 per cent. commercial formalin) is placed in a tube, a few drops of chloroform added and the tube shaken. If all the chloroform dissolves more is added and the shaking repeated until the solution is saturated. If an excess of chloroform is present, the solution is poured off from it. The live ticks should be dropped into this and the tube firmly stoppered and made air-tight. The tubes should not be opened for three months. If an excess of chloroform is used the ticks become paler, and if there is too little chloroform they turn darker.

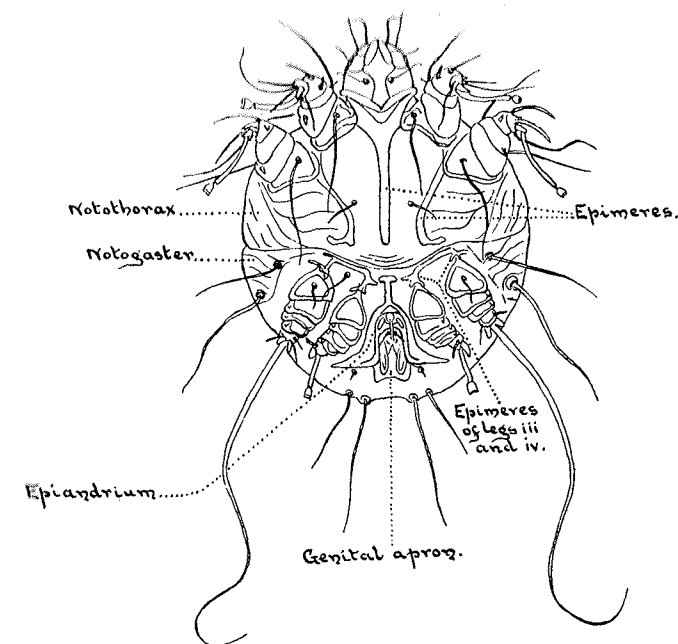
MOUNTING.

To prepare lice for mounting, first heat them in a 10 per cent. solution of caustic potash. Small specimens should be heated for about 10 minutes, and large specimens, such as *Laemobothrion*, about 20 minutes. This is best done by placing them in a small glass tube containing the caustic potash, and placing this in a metal container, containing water and a little cotton wool to prevent the tube from falling over, over a bunsen burner. After heating transfer the specimens to water. When in the water the specimens should be pricked with a fine entomological pin, and then very gently pressed with the head of a pin to expel the contents that have not been dissolved by the potash. After washing for 15 minutes transfer to 70 per cent. alcohol for 15 minutes, then to absolute alcohol for 15 minutes, and finally to oil of cloves for 10 minutes. After removing the specimens from the oil, place them on paper (not blotting paper) to remove as much of the oil as possible. Then place each specimen, venter up, on a cover-glass that has been smeared with a thin layer of thick Canada balsam and spread out the legs and antennae with a pin. The balsam will keep the legs and antennae in position. Place the cover-glass on a slide on which has been placed some thin balsam. On no account apply pressure to the cover-glass. Finally, heat gently over a spirit lamp to remove any air bubbles that may appear, and also to harden the balsam. A label with the name of the parasite, the host, locality, date, etc., should be stuck on the slide beside the mount.

Cimicidae and Diptera Pupipara should be mounted in the same way, except that the wings of winged forms must be removed before placing the specimens in caustic potash. After immersing the wings in oil of cloves they should be mounted in balsam on the same slide as the body. To avoid distortion of the body bits of broken glass may be used to support the cover-glass.

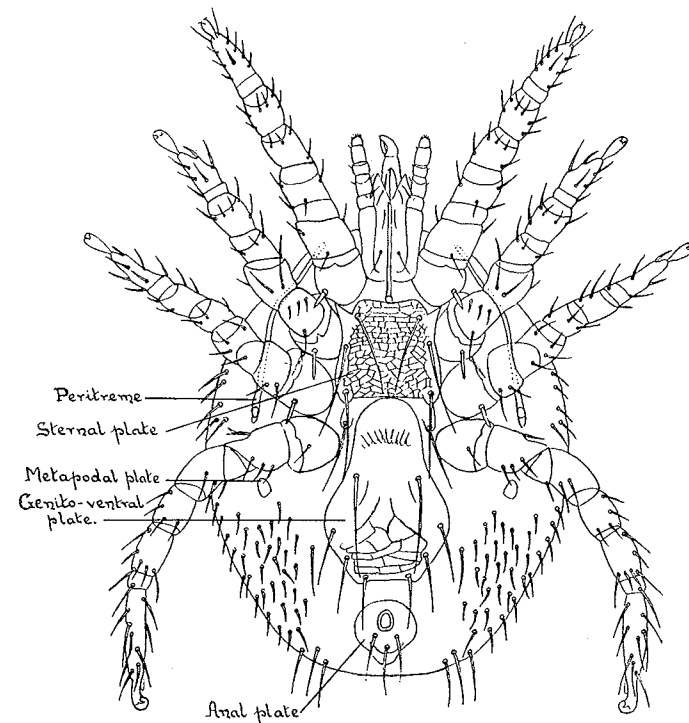
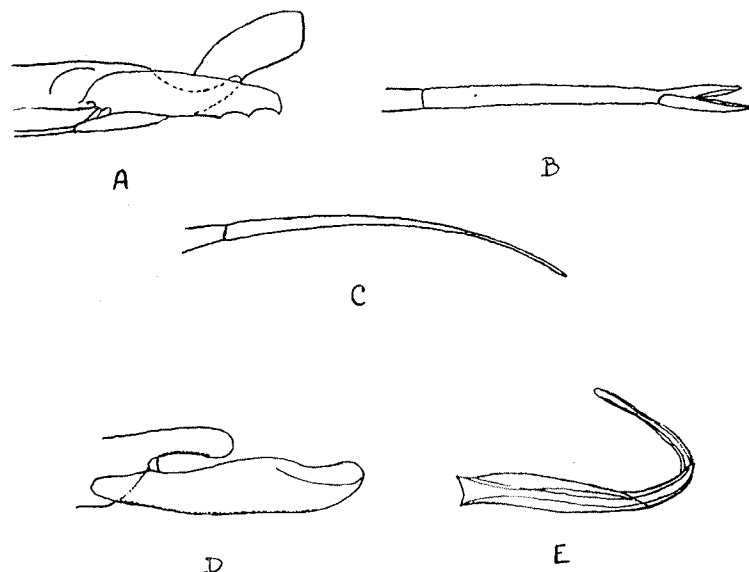


A. B. M. Whitnall del.

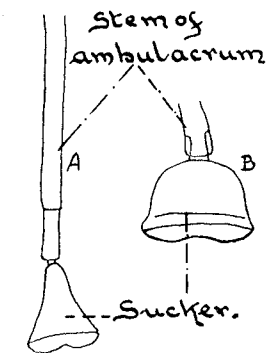
Fig. 1. *Sarcoptes scabiei*, dorsum of female.

A. B. M. Whitnall del.

Fig. 2. *Sarcoptes scabiei*, venter of male.

Fig. 3. *Laelaps giganteus* Berlese, venter of female.Fig. 4. Chelicerae of A, *Myonyssoides capensis*, ♀; B, *Liponyssus bacoti*, ♀; C, *Dermanyssus gallinae*, ♀; D, *Myonyssoides capensis*, ♂; E, *Laelaps muricola*, ♂ (after Hirst).

Acari may be mounted in either glycerine jelly, liquido faure or résin mastic. If either the last named media are used the specimens can be mounted direct from absolute alcohol, and no heating is required. Chitinous species may be mounted in balsam in the same way as lice.

Fig. 5. Distal ends of legs of A, *Psoroptes*, and B, *Chorioptes*.

Ticks should not be mounted, except the unengorged larvae and nymphs. These may be mounted in either liquido-faure or résin mastic.

Fleas should be cleared by placing them in a glass tube containing 10 per cent. caustic potash for 19 hours. Then wash in two or three changes of water for 15 minutes; transfer to 70 per cent. alcohol for 15 minutes, then heat in carbolic acid (100 gm. carbolic acid + 10 c.c. water) for 20 minutes. Finally mount in balsam and heat very gently over a spirit lamp.

Order ACARINA.

The Acarina, which includes the mites and ticks, belongs to the class Arachnida. With the exception of the ticks, they are usually minute, and may be distinguished by their having the abdomen unsegmented and broadly united to the cephalothorax, there being frequently no suture between the two. In the superfamily Tarsanemoidea, however, many species show a body segmentation. Eyes may be present or absent. The mouth-parts are variable; they are auctorial, but frequently capable of biting and piercing. Respiration by means of tracheae or by the general surface of the body. The integument is either soft or leathery, and chitinous plates are frequently present. The legs usually terminate in suckers, hairs or claws. The larvae possess three pairs of legs, and the nymphs and adults four pairs, except in a number of adults of Tarsanemoidea one or two pairs are usually rudimentary or absent, and the plant gall mites (Eriophyidae) possess only two pairs of legs. A large number of species are parasitic upon vertebrates and invertebrates, both land and aquatic animals being attacked. Others are parasitic upon plants, and a number live on organic matter. The majority of species that are parasitic upon animals live either on or in the skins of their hosts, and a few are known to live in the

tissues and lungs. A large number of species that are parasitic upon birds live either on or in the feathers of their hosts. A few are known to be parasitic upon mammals only in their larval stage, and in their nymphal and adult stages are predaceous.

KEY TO THE SUBORDERS CONTAINING PARASITIC SPECIES.

1. Tracheae absent 2
Tracheae present; if spiracles are absent the abdomen is usually segmented 3
2. Body not vermiform; legs composed of more than 3 joints ASTIGMATA, p. 230.
Body vermiform; legs rudimentary, composed of only 3 joints; species parasitic in the hair follicles of mammals BRACHYPODA, p. 267.
3. Tracheae opening at or near the bases of the chelicerae; adults free living; larvae frequently parasitic PROSTIGMATA, p. 268.
Tracheae not opening at or near the bases of the chelicerae 4
4. Spiracles absent or present, if present they vary in number and position and are situated ventrally; abdomen usually showing segmentation; females frequently with a pair of clavate sensory organs (pseudostigmata) on the cephalothorax between the first and second pairs of legs HETEROSTIGMATA
Spiracles two in number, usually situated laterally, rarely dorsally, if the former on the sides of the body, either behind the posterior pair of legs or between the third and fourth pairs; larvae of some species have three pairs of spiracles situated laterally MESOSTIGMATA, p. 271.

Suborder ASTIGMATA.

Superfamily SARCOPTOIDEA.

Key to the Families (after Ewing).

1. Either maxillae or some of the legs modified into hair clasping organs. Parasitic upon mammals LITROPHORIDAE, p. 267.
Without any specialized apparatus for clasping the hairs of mammals. Parasitic upon mammals, birds or insects 2
2. Body strongly depressed; sexual dimorphism sometimes very strongly pronounced. Living among the feathers of birds ANALGESIDAE, p. 240.
Body rarely strongly depressed; soft bodied mites. Not living in or on the feathers of birds 3
3. Parasitic exclusively on insects CANESTRINIDAE
Inhabiting the living tissues of vertebrates 4
4. Vulva longitudinal; mouth-parts fused, forming a sucking tube. Parasitic in the tissues of birds CYTOLEICHIDAE, p. 239.
Vulva transverse; mouth-parts free. Parasitic either on or in the skins of mammals and birds ... SARCOPTIDAE, p. 231.

Family SARCOPTIDAE.

The mites included in this family are very small, whitish, and round or oval in shape. They are usually considered to be without tracheal tubes, but Hirst has recently discovered such to be present in the genus *Otodectes*. The majority of the species are parasitic upon mammals, living either on or in the skin, but a few are found on birds.

Key to the Genera.

1. Species very small; legs III and IV very short, either not projecting or hardly projecting beyond margin of body; ♂ without posterior lobes and anal suckers on abdomen 2
Species larger; legs III and IV of ♀ and immature stages longer, projecting beyond margin of body; in the ♂ legs IV much shorter than legs III; ♂ with posterior lobes and anal suckers on abdomen; pubescent ♀ with copulatory knobs at apex of abdomen 4
2. Anal opening dorsal; tarsal suckers present on legs I and II of ♀, and legs I, II and IV of ♂ ... *Notoedres*, p. 231.
Anal opening terminal, not dorsal 3
3. Tarsal suckers absent on all the legs of ♀, present on all the legs of ♂; ♀ with a pair of longitudinal chitinous bars on the dorsum in front; only a few hairs at most present on dorsum *Chemidocoptes*, p. 232.
Tarsal suckers present only on legs I and II of ♀, and legs I, II and IV of ♂; longitudinal bars absent on dorsum of ♀; dorsum with sharp-pointed scales and rod-like setae *Sarcoptes*, p. 233.
4. Tarsal suckers borne on a short, unsegmented peduncle 5
Tarsal suckers borne on a long, 3-segmented peduncle *Psoroptes*, p. 237.
5. Tarsal suckers present on legs I, II and IV of ♀; posterior lobes of ♂ well developed with spatulate setae on posterior margins *Chorioptes*, p. 238.
Tarsal suckers present only on legs I and II of ♀; posterior lobes of ♂ much less salient, the hairs not spatulate *Otodectes*, p. 239.

Genus NOTOEDRES Railliet.

Notoedres Railliet, *Zool.*, ed. 2, p. 660 (1893).

Notoedrus Canestrini, *Prosp. Acarof.*, VI, p. 724 (1894).

This genus contains two species that have been found in Europe, namely, *N. cati* on cats and also occasionally on dogs, with the variety *cuniculi* on rabbits, and *N. notoedres* on *Rattus rattus* and *R. norvegicus*. Both species are very small and burrow into the skin of their hosts.

1. *Notoedres cati cati* (Hering).

Sarcoptes cati Hering, *N. Act. Ac. Leop.*, XVIII, ii, p. 605, Pl. 44, f. 9-10 (1838).

Sarcoptes minor Fürstenberg, *Krätzm.*, p. 215, Pl. VIII (1861).

Notoedres cati (Hering) Can. and Kram., *Demod. und Sarc.*, p. 11 (1899).

Notoedres cati (Hering) Oudemans, *Archiv. Néerland. Sci. Exact et Natur.* (111B), IV, pp. 147-159, p. 3-8 (1926).

This variety we found on a cat at Onderstepoort on the 20th September, 1927. It usually attacks the face and ears, but in addition to these parts the tail of the animal was also attacked.

2. *Notoedres cati cuniculi* (Gerlach).

Sarcoptes cuniculi Gerlach, *Krätze*, Pl. 3, f. 20, 21 (1857).

Sarcoptes minor var. *cuniculi* Railliet, *Zool.*, ed. 2, p. 66 (1895).

Notoedres cuniculi (Gerlach) Can. and Kram., *Demod. und Sarc.*, p. 11 (1899).

Notoedres cuniculi (Gerlach) Oudemans, *Archiv. Néerland. Sci. Exact et Natur.* (111B), iv, pp. 159-164 (1926).

This variety is occasionally found on domestic rabbits in this country. It usually attacks the face, especially round the eyes, and occasionally also the ears. The legs and genital regions may also become infected in advanced cases. Hirst (1922) states that this variety is probably identical with *N. cati*, but that it is difficult to transmit *cati* to rabbits.

3. *Notoedres notoedres* (Méigen).

Sarcoptes notoedres var. *muris* Méigen, *Paras.*, p. 172 (1880).

Notoedrurus muris Canestrini, *Prosp. Acarof.*, VI, p. 754 (1894).

This species has been found on *Rattus rattus* (black rat), Maseru, Basutoland (coll. F. A. Verney). It chiefly affects the ears, but in advanced cases the face, feet, tail and genital regions become infected.

GENUS CNEMIDOCOPTES Fürstenberg.

Cnemidocoptes Fürstenberg, *Mt. Ver. Vorpomm. und Rüg. in Greifsw.*, ii, p. 56 (1870).

Dermatoryctes Ehlers, *Zeitsch. f. wiss. Zool.*, XXIII, p. 251 (1873).

This genus contains about six species parasitic upon birds.

Genotype: *Knemidokoptes viviparus* = *Sarcoptes mutans*.

1. *Cnemidocoptes mutans* (Robin).

Sarcoptes mutans Robin, *Bull. Soc. Moscou*, XXXIII, p. 184 (1860).

Sarcoptes anacanthos Delafond and Bourg., *Mém. prés. Ac. France*, XVI, p. 291 (1862).

Knemidokoptes viviparus Fürstenberg, *Mt. Ver. Vorpomm.*, II, p. 56 (1870).

Cnemidocoptes mutans (Robin) Can. and Kram., *Demod. und Sarc.*, p. 16 (1899).

This species is parasitic upon fowls and produces symptoms known as "scaly leg"; it is a common disease in South Africa. The mites usually commence to attack their hosts beneath the scales just above the toes, and gradually work their way up the feet, causing the scales to become displaced. Occasionally the comb and neck are also attacked. This species can be distinguished from *C. gallinae* by the transverse striae on the dorsum being interrupted in the median area so as to form raised scale-like sculpturings; also there is only a single pair of long setae at the apex of the abdomen, whereas in *C. gallinae* there are three pairs of short setae in addition to the pair of long ones.

2. *Cnemidocoptes gallinae* (Railliet).

Sarcoptes lacris var. *gallinae* Railliet, *Bull. Soc. Zool. France*, XI, p. 132 (1887).

Cnemidocoptes gallinae (Raill.) Can. and Kram., *Demod. und Sarc.*, p. 15 (1899).

This species lives embedded in the tissues or scales at the base of the quills on the body and wings of fowls, also occasionally on the neck and head, causing the feathers to fall out. This complaint is known as "depluming itch"; it is not very common in South Africa.

GENUS SARCOPTES Latreille.

Sarcoptes Latreille, *Gen. Crust. Ins.*, I, p. 151 (1806).

Eusarcoptes Railliet, *Zool.*, ed. 2, p. 640 (1893).

The mites belonging to this genus are parasitic upon a number of animals, including the domestic animals. They burrow into the skins of their hosts, producing symptoms known as "mange". A number of authorities regard the acari occurring on different species of animals as distinct species, whereas others, including Hirst, consider them to be varieties of a single species. We hold the latter view for the following reasons:—

The chief characters used for differentiating these acari are: the size, the presence or absence of minute setae on the bodies, and the shape of the scales on the dorsum. Size cannot be considered to be a specific character, because plants increase in size to a much greater extent when grown in some soils than in others, and it is only reasonable to expect these parasites to increase in size to a greater extent on some species of animals than on others. Moreover, it is necessary to clear and mount these small acari before examining them, and although no pressure should be applied to the cover mounts, the mount alone may change the shape and size of various parts. The short setae on the bodies may vary in number and may eventually prove to be specific characters, but as they are very fragile and minute they may be either easily rubbed off or overlooked.

especially if the specimens are not properly cleared. Ticks are much larger and more highly chitinized than these small mites, but it is remarkable to what extent various drawings that have been published of the same species differ, especially drawings of the immature stages.

The lesions may also vary on different species of animals. In some cases that we have examined the lesions have been very severe and the acari scarce, and in others the reverse has been the case. In many cases no doubt the lesions are mainly produced by either bacteria or a fungus, the acari infection only being the primary cause. In Sinkobo, a common and severe skin disease of cattle in Central Africa, the lesions are caused by a fungus and possibly also bacteria, but either *Psoroptes* or *Demodex* are usually the primary cause.

Finally, the mites can usually be easily transmitted from one species of animal to another under suitable conditions, although it must be admitted in some cases they are difficult to transmit. This, however, is only to be expected, because it should be easier to transmit a strain of *Sarcoptes* that has constantly been transmitted from one species of animal to another than a strain that has lived on a single host species for a great number of generations.

A number of experiments have been undertaken at this laboratory from 1913 onwards to ascertain whether mange could be transmitted from one species of domestic animal to another. The results of these experiments, which were carried out by keeping animals in close contact with one another (unless otherwise stated) are recorded below, together with the results of other experiments and observations that have been undertaken and recorded in Europe.

Cameron (*Parasit.*, XVII, iii, pp. 278-283, 1925) records infection experiments with *Sarcoptes* of cattle by keeping a horse and two sheep in close contact with infected bulls, and also by placing acari and their ova on the healthy animals. He also records placing acari on two white rabbits, two white rats, a cat, and on himself, but all these experiments gave negative results. One of the bulls used for these experiments became spontaneously cured, and this was attributed to the animal having been kept in a pen and exposed to sunlight (there being no overhead shelter), although the animals became cured during the winter in Canada.

Other authorities have also carried out similar experiments and failed to transmit the disease, the cause of their failures being no doubt due to the fact that the clean animals were well fed and in very healthy condition, and not to the fact that the parasites could not have been transmitted to the species of animals tested, or to the animals being kept in the sun. Recently I infected two horses with mange from an infected horse, and they were both turned out to graze on the veld. For two or three months their lesions spread rapidly, then they commenced to improve in condition owing to improvement of the veld, and the disease disappeared without treatment. These animals were kept under observation for a year after the lesions had disappeared and they remained healthy. I could also cite similar cases with other animals.

Mange is much more prevalent in South Africa during the winter months than during the summer, and this I attribute to the general improvement in the health of the animals during the summer. In the winter the rainfall is very low, and the vegetation on the veld becomes very dry, with the result that the animals fall off in condition and become very liable to mange infection.

1. *Sarcoptes scabiei bubulus* (Oudemans) Figs. 1 and 2.

Sarcoptes scabiei var. *bovis* Cameron, *Parasit.*, XVI, pp. 256-265, f. 1-6 (1924).

Acarus bubulus Oudemans, *Tijds. Ent.*, LXIX, p. 19 (1926).

Acarus bubulus Oudemans, *Archiv. Néerland. Sci. Exact. et Natur.*, pp. 232-259, f. 45-85 (1926).

Common and widely distributed on cattle in the Union. I have transmitted it to a horse, pig and goat, but failed to transmit it to one dog and six sheep. A number of cases of human beings becoming infected with this variety have been recorded in Europe.

2. *Sarcoptes scabiei caprae* Fürstenburg.

Sarcoptes caprae Fürstenburg, *Krätzm.*, p. 214, f. 7 (1861).

Common and widely distributed on both Angora and Boer goats in the Union. I have transmitted it to a horse, calf and sheep, but only a very small percentage of sheep appeared to be susceptible. Shilston (1916) also transmitted it to pigs, cattle and a sheep. It only occurs on the faces of Merino sheep where there is no wool. One of our natives became infected after handling a dead infected goat. It has also been transmitted to pigs and man in Europe.

3. *Sarcoptes scabiei equi* Raspail (1834).

Sarcoptes equi Gerlach, *Krätze*, p. 72, Pl. 2, f. 8-10 (1857).

Sarcoptes scabiei var. *equi* (Gerl.), Buxton, *Parasit.*, XIII, pp. 115-144, f. 1-22, Pl. 7 (1921).

Common and widely distributed on horses throughout the Union. I have transmitted it to two calves and a goat, but failed to transmit it to a pig, dog, rat, and three sheep. A number of cases of human beings becoming infected with this variety have been recorded in Europe.

4. *Sarcoptes scabiei megnini* nom. nov.

Sarcoptes scabiei var. *ovis* Mégnin, *Insect., Arachn., Crustac.*, p. 168 (1880), nec Hering, 1838.

Sarcoptes ovis (Mégn.), Can and Kram., *Demod. und Sarc.*, p. 13 (1899).

This variety has been found on hairy sheep in South Africa, but it is by no means common. On these animals the infection occurs on the body and legs, as well as on the head and face. I have succeeded in transmitting it to Merino sheep, goats, and a calf. It appears to be easier to transmit this variety to Merino sheep than the variety *caprae*.

5. *Sarcoptes scabiei precox* Canestrini.

Sarcoptes scabiei var. *cuniculi* Neumann, *Revue vétérinaire, mars* (1892), nec. *S. cuniculi* Gerlach, 1857.

Sarcoptes precox Canestrini, *Prosp. Acarof.*, VI, p. 750 (1894).

This is a common parasite of domestic rabbits in South Africa. The infection commences either at the tip of the nose or on the legs, and then spreads to the face, ears, and sometimes on to the body. This variety has been transmitted to the guinea-pig in Europe, but Neumann failed to transmit it to cattle, horses, sheep, and dogs.

6. *Sarcoptes scabiei suis* Gerlach.

Sarcoptes suis Gerlach, *Krätze*, p. 137, Pl. 3, f. 15, 16 (1857).
Sarcoptes suis (Gerl.), Can. and Kram., *Demod. und Sarc.*, p. 14 (1899).

Occurs on pigs, but is not very common. I have transmitted it to a calf, which only remained infected about two months, also to a goat. It has been transmitted to man in Europe.

7. *Sarcoptes scabiei strepsiceros* Bedford.

We have received a portion of skin of a *Strepsiceros strepsiceros* (Cape Koodoo) from the Grahamstown District, Cape Province, grossly infected.

8. *Sarcoptes scabiei* var.

In August, 1916, I received a skin of a hartebeest from the Rustenburg District, Transvaal, badly infected with mange. On the 13th August a portion of the skin was tied onto the back of a goat. On the 18th the skin was removed, and the goat was showing signs of infection. During September the goat showed marked signs of infection on the back and acari were fairly numerous. In October the infection began to decrease. On the 9th November the goat was only very slightly infected, and by the 8th December it had entirely recovered. As the parasites lived on the goat for several generations the transmission must be regarded as positive.

9. *Sarcoptes scabiei* var.

A piece of skin of a *Gorgon taurinus* (blue wildebeest), was received from Mr. R. Daly in July, 1930, and found to be infected with *Sarcoptes*. The animal was shot at Maasstroom in the Northern Transvaal and was reported to be infected on the head and shoulders.

10. *Sarcoptes scabiei* var.

Pieces of skin of a *Raphiceros campestris* (steenbuck) were received from the Magistrate at Kuruman, Cape Province, on the 14th January, 1929, and were found to be infected with *Sarcoptes*. The animal was shot in the Kalahari, and it was reported that other game had been noticed which appeared infected.

11. *Sarcoptes scabiei* var.

A piece of skin of a silver jackal (*Vulpes chama*) heavily infected with parasites, was received from Mr. R. Paine, the Government Veterinary Officer at Grahamstown, Cape Province, in September, 1930.

In addition to the above, *Sarcoptes scabiei canis* Gerlach and *Sarcoptes scabiei leonis* Canestrini have been recorded from dogs and a lion in Europe. The latter was found on a lion in a menagerie in France.

Genus *Psoroptes* Gervais.

Psoroptes Gervais, *Ann. Sci. Nat.* (2), XV, p. 9 (1841).

Dermatodectes Gerlach, *Krätze*, p. 29 (1857).

Dermatocoptes Fürstenburg, *Krätzm.*, p. 220 (1861).

This genus contains several species which live either on the skin or in the ears of various animals, causing intense irritation and producing symptoms commonly known as "scab".

(Genotype: *Sarcoptes equi* Hering.)

1. *Psoroptes bovis* (Gerlach).

Dermatodectes bovis Gerlach, *Krätze*, p. 114, Pl. 5 (1857).

Psoroptes communis var. *bovis* Railliet, *Zool.*, ed. 2, p. 669 (1893).

Psoroptes bovis (Gerlach), Can. and Kram., *Demod. und Sarc.*, p. 16 (1899).

Scab in cattle usually commences at the base of the tail or, less frequently, on the neck or withers, and gradually extends, if not checked, to neighbouring parts of the body. It is widely distributed in the Union, but is nowhere common. Specimens have also been received from Angola and South West Africa.

2. *Psoroptes caprae*.

This variety occurs in the ears of goats; it is widely distributed throughout the Union.

3. *Psoroptes cuniculi* (Delafond).

Dermatodectes cuniculi Delafond, 1859 (*vide* Railliet, *Zool.*, ed. 2, p. 671, 1893).

Psoroptes communis var. *cuniculi* Railliet, *Zool.*, ed. 2, p. 671 (1893).

Psoroptes cuniculi (Delafond), Can. and Kram., *Demod. und Sarc.*, p. 17 (1899).

A common parasite in the ears of domestic rabbits in South Africa. In some cases crusts are formed, entirely filling up the ear cavities, and the mites may even spread to the face, neck, body, and limbs. They are also able to live on the bodies of sheep for periods up to seventeen days, but acari of the second generation die before reproducing.

4. **Psoroptes equi** (Hering).

Sarcoptes equi Hering, *N. Act. Ac. Leop.*, XVIII, ii, p. 585, Pl. 43, f. 1, 2 (1838).

Dermatocoptes communis Fürstenburg, *Krätze*, p. 220, Pl. 12-15 (1861).

Psoroptes equi (Hering), Can. and Kram., *Demod. und Sarc.*, p. 17 (1899).

According to Oudemans (*Tijdschr. v. Ent.*, XL, p. 260, 1897) the name of this species should be *Psoroptes exulcerans* (Linné), *nec. P. equi* Hering.

Scrapings containing this variety have been received from Mr. G. McIntyre taken from a horse at George, Cape Province, on the 14th July, 1928; also specimens from the Government Veterinary Officer, Dundee, Natal, taken off a horse on the 5th September, 1929. It chiefly affects the neck, withers, rump, and base of the tail of its host.

5. **Psoroptes ovis** (Hering).

Sarcoptes ovis Hering, *N. Act. Ac. Leop.*, XVIII, ii, p. 594, Pl. 44, f. 3, 4 (1838).

Psoroptes communis var. ovis Railliet, *Zool.*, ed. 2, p. 670 (1893).

Psoroptes ovis (Hering), Can. and Kram., *Demod. und Sarc.*, p. 17 (1899).

Psoroptes communis var. ovis (Hering), Bedford, *Repts.*, Dir. Vet. Res., Un. S. Afr., III-IV, pp. 101-102, f. 1-5 (1915).

This is an extremely common parasite of sheep in South Africa. The acari live on the skin of their hosts, causing scabs and crusts to be formed and the wool to drop off. Infection usually commences on the body, and may gradually spread all over the woolly parts of the animals, and even in the ears and orbital fossae.

6. **Psoroptes natalensis** Hirst.

Psoroptes natalensis Hirst, *Ann. Mag. Nat. Hist.* (9), IV, p. 524 (1919).

This species was described from specimens taken off cattle at Richmond, Natal, and we have received specimens taken off the same hosts in various parts of the Union. Hirst (1922) states that Mégnin's specimens (from a buffalo from Cochin-China) determined by him as *P. longirostris* = *P. communis* are this species. The male differs from that of *P. communis* in having two of the setae on each of the abdominal lobes distinctly flattened and blade-like near their distal extremities. This species is found on the same parts of the body as *P. bovis*.

Genus CHORIOPTES Gervais.

Symbiotes Gerlach, *Krätze*, p. 30 (1857), *nec* Redtenbacher, 1849.

Chorioptes Gervais, *Zool. méd.*, I, p. 463 (1859).

Dermatophagus Fürstenburg, *Krätze*, p. 217 (1861).

The mites belonging to this genus produce symptoms known as Chorioptic or Symbiotic mange. Species are found on horses, cattle, sheep, and goats in Europe, but *caprae* is the only one that has so far been recorded from the Union. The mites live on the skins of their hosts, and infection is usually restricted either to the feet or base of the tail in cattle, but in some cases may spread to the neck, back, belly, etc.

1. **Chorioptes caprae** Gervais and Beneden.

Chorioptes caprae Gervais and Beneden, *Zool. Méd.*, I, p. 463 (1859).

Chorioptes caprae (Gerv. and Bened.), Can. and Kram., *Demod. und Sarc.*, p. 18 (1899).

Hutcheon (1895) recorded this variety as being common on Angora goats in this country, and stated that it was frequently transmitted to Boer goats. Scrapings from the legs of two Angora goats (received from Mr. A. Matthew, Government Veterinary Officer, Bedford, Cape Province), contained specimens of this species.

Genus OTODECTES Canestrini.

Otodectes Canestrini, *Psorp. Aracof.*, VI, p. 726 (1894).

This genus contains but a single species (*Otodectes cynotis* Hering), of which there are three varieties known to occur in the ears of dogs, cats, and ferrets in Europe. The species has not yet been recorded from the Union, but probably occurs here in the ears of dogs and cats.

Family CYTOLEICHIDAE.

This is a small family containing two genera. The species are minute and are found in various situations in their hosts, such as the subcutaneous tissues. The genus *Laminosioptes* contains a single species (*L. cysticola* Vizioli) which occurs in fowls in Europe, but has not yet been recorded from the Union. It can be distinguished by the elongate form of its body and the presence of a line between the cephalothorax and abdomen. Infected fowls have cysts of various sizes in the subcutaneous tissues. Only dead mites are found in the cysts, the living ones being found in the tissues.

Genus CYTOLEICHUS Mégnin.

Cytolichus Mégnin, *J. Anat. et Physiol.*, XV, p. 150 (1879).

Cytodites Railliet, *Zool.*, ed. 2, p. 678 (1893).

In this genus the body is oval and there is no demarcation between the cephalothorax and abdomen; the legs terminate in a small sucker whereas in *Laminosioptes* the two front pairs end in a claw and the two hind pairs in a claw and suckerless peduncle.

1. **Cytolichus nudus** (Vizioli).

Sarcoptes nudus Vizioli, *Giorn. Anat. Fisiol.*, I, p. 257 (1870).

Cytolichus sarcoptoides Mégnin, *J. Anat. et Physiol.*, XV, p. 150, Pl. 8 (1879).

Cytoleichus nudus (Viz.) Can. & Kram., Demod. und Sarc., p. 9 (1899).

Cytoleichus nudus (Viz.) Hirst, Mites Injur. to Dom. Anim., p. 59, f. 16 (1922).

This species is a common parasite of fowls in South Africa, and it has also been recorded from turkeys and pheasants in Europe. The mites live in the air-sacs and respiratory tract, and have also been found in the heart, liver and kidneys of fowls.

Family ANALGESIDAE.

Trouessart (1916) divided this family into four sections, the sections being regarded as subfamilies.

KEY TO THE SUBFAMILIES.

1. Integument strongly chitinized; body usually elongate. Species living on or in the feathers of birds 2
Integument not strongly chitinized; body generally very short and circular. Species living on the skins of birds
EPIDERMOPTINAE, p. 266.
2. Abdomen of ♀ bilobed posteriorly. Species mainly living on the wing feathers, also on the feathers of the back and flanks PROCTOPHYLLODINAE, p. 262.
Abdomen of ♀ not bilobed posteriorly 3
3. Males usually with either both pairs of forelegs enlarged, but rarely the third or fourth pair. Females with two or more dorsal plates. Species living on the wing feathers PTEROLICHINAE, p. 240.
Males may be much larger than the females and with the third or fourth pair of legs enormously developed. Tarsi of first two pairs of legs usually with a triangular tubercle on the ventro-external aspect. Females resembling the deuto-nymphs. Species living on the feathers other than the wing feathers
ANALGESINAE, p. 259.

Subfamily PTEROLICHINAE.

This is a large subfamily comprising thirty-five genera.

Key to the South African Genera.

1. Epimera i united to sternum in both sexes 2
Epimera i free in ♀, free or united in ♂ 13
2. Third and fourth pairs of legs submedial 3
Third and fourth pairs of legs marginal 5
3. Body short, scarcely longer than broad ... *Freyana*, p. 242.
Body more or less elongate 4
4. Abdomen with some lancet or leaf-like setae
Halleria, p. 243.

- Setae on abdomen normal; second and third joints of first two pairs of legs dilated *Microspalaw*, p. 244.
5. Third pair of legs of ♂ enormously developed 6
Third pair of legs of ♂ not enormously developed 8
 6. ♂: posterior margin of abdomen either rounded or with two short lobes *Pteronyssus*, p. 258.
♂: posterior margin of abdomen bilobed, deeply emarginated between the lobes 7
 7. ♂: Lobes on posterior margin of abdomen connected by a hyaline membrane *Buchholzia*, p. 257.
♂: Lobes on posterior margin of abdomen not connected by a hyaline membrane *Giebelia*, p. 257.
 8. ♀: abdomen with a conical prolongation posteriorly; ♂ with third pair of legs dilated ... *Columellaia*
♀: abdomen without a conical prolongation posteriorly; ♂ with third pair of legs normal or dilated 9
 9. ♂ with third and fourth pairs of legs almost equal 10
♂ with fourth pair of legs longer and broadened than third pair *Syringobia*, p. 255.
 10. All the legs slender 11
All the legs short, their joints as long as broad
Sammonica, p. 252.
 11. Abdomen of ♂ deeply incised posteriorly 12
Abdomen of ♂ almost rounded posteriorly
Plutarchia, p. 256.
 12. Thoracic groove well developed, with fold of integument of cephalothorax in that of abdomen ... *Thecarthra*, p. 251.
Fold of thoracic groove normal *Anoplomat*, p. 252.
 13. Epimera i free in ♀, with a sharp-pointed sternum between their proximal ends 14
Epimera i free in ♀, without a sharp-pointed sternum between their proximal ends; one pair of vertical setae on cephalothorax 16
 14. Cephalothorax with one median vertical seta 15
Vertical seta on cephalothorax absent ... *Avenzoaria*, p. 248.
 15. Epimera i of ♂ free, similar to ♀ *Chauliacia*, p. 251.
Epimera i of ♂ joined to sternum *Eustathia*, p. 251.
 16. Epimera i of ♂ free, similar to ♀ 17
Epimera i of ♂ joined to sternum 23
 17. Anterior dorsal plate only 18
Two dorsal plates 20

18. Body elongate 19
 Body short and round *Sphaerogastra*, p. 255.
19. Anal suckers absent or very small ... *Dermoglyphus*, p. 254.
 Anal suckers normal *Paralges*, p. 257.
20. All the legs equally developed 21
 Fourth pair of legs of ♂ more developed than the third pair 22
21. Notogastric plate of ♀ forming a hollow filled with plaited tissues, reinforced on the abdominal margins
Gabucinia, p. 250.
 Notogastric plate of ♀ well developed, not forming a hollow *Pterolichus*, p. 244.
22. Fourth pair of legs of ♂ without an ambulacrum, but with a strong claw *Xoloptes*, p. 254.
 Fourth pair of legs of ♂ with an ambulacrum
Pseudalloytes, p. 253.
23. ♂: third pair of legs thick, fourth pair small; ♀: with horseshoe-shaped epigynium ... *Bdellorhynchus*, p. 253.
 ♂: third and fourth pairs of legs equally developed; ♀: without an epigynium *Falculifer*, p. 253.

Genus FREYANA Haller.

Freyana Haller, *Zeit. f. wiss. Zool.*, XXX, p. 81 (1877).

Genotype: *Dermaleichus anatina* C. L. Koch.

Key to the South African Species.

1. Legs long and slender 2
 Legs short, thick-set; abdomen of ♂ lobed ... *F. marginata*.
2. Scutum porose *F. pectinata*.
 Scutum not porose 3
3. Apex of abdomen of ♂ bilobed, each lobe divided into three small lobes *F. oblonga*.
 Apex of abdomen of ♂ not bilobed 4
4. Apex of abdomen entirely rounded *F. gracilipes*.
 Apex of abdomen of ♀ only entirely rounded ... *F. pelargica*.

1. *Freyana gracilipes* Trouessart and Mégnin.

F. gracilipes Trt. & Mégn., *Naturaliste*, p. 395, f. 2 (1884).

F. (Eufreyana) gracilipes (T. & M.) Can. & Kram., *Demod. und Sarc.* p. 31 (1899).

Recorded taken off *Ephippiorhynchus senegalensis* (saddle-bill stork).

2. *Freyana marginata* Trouessart.

F. marginata Trt., *Bull. Soc. Étude. sci. Angers.*, XVI, p. 96 (1886).

F. (Eufreyana) marginata (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 33 (1899).

Described from specimens taken off *Rhynchops flavirostris* (African skimmer).

3. *Freyana oblonga* Trouessart and Neumann.

F. oblonga Trt. & Neu., *Bull. sci.*, France-Belgique, XIX, p. 334 (1888).

F. (Eufreyana) oblonga (Trt. & Neu.) Can. & Kram., *Demod. und Sarc.*, p. 31 (1899).

Described from specimens taken off hadadah ibis, *Hagedashia hagedash* (= *Ibis hagedash*).

4. *Freyana pectinata* Trouessart.

F. (Eufreyana) pectinata Trouessart, *Bull. Soc. Étud. sci. Angers*, XVI, p. 95 (1886).

F. (Eufreyana) pectinata (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 31 (1899).

Described from specimens taken off *Scopus umbretta* Gm.

5. *Freyana pelargica* Trouessart and Neumann.

F. pelargica Trt. and Neu., *Naturaliste*, p. 396 (1884).

F. (Eufreyana) pelargica (Trt. & Neu.), Can. & Kram., *Demod. und Sarc.*, p. 31 (1899).

Recorded taken from *Ciconia ciconia* (white stork) and black stork, *Melanopelargus niger* (= *C. nigra*).

Genus HALLERIA Trouessart and Mégnin.

Halleria Trt. & Mégnin, *Bull. Soc. Angers*, XIV, p. 40 (1885).

Genotype: *Halleria hirsutirostris* Trouessart and Mégnin.

Key to the Species.

1. Hind legs short, not reaching hind margin of body
H. hirsutirostris.
- Hind legs long, reaching hind margin of body
H. ceratorhina.

1. *Halleria ceratorhina* Trouessart.

F. (Halleria) ceratorhina Trt., *Bull. Soc. Étud. sci. Angers*, XVI, p. 99 (1886).

F. (H.) ceratorhina (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 34 (1899).

Described from specimens taken off wood ibis, *Ibis ibis* (= *Tantalus ibis*).

2. **Halleria hirsutirostris** Trouessart and Mégnin.

F. (Halleria) hirsutirostris Trt. & Mégn., *Bull. Soc. Etud. sci. Angers*, XIV, p. 41, f. 6 (1885).

F. (H.) hirsutirostris (Trt. & Mégn.) Can. & Kram., *Demod. und Sarc.*, p. 33 (1899).

Described from specimens taken off greater flamingo, *Phoenicopterus major* (= *P. antiquorum*).

Genus *MICROSPALAX* Trouessart and Mégnin.

Microspalax Trt. & Mégnin, *Journ. Microgr.*, VIII, p. 152 (1884).

This genus includes a few species found on Hydrobatidae, Diomedidae and domestic turkey.

Genotype: *Microspalax manicata* Trouessart and Mégnin.

1. **Microspalax chanayi** Trouessart.

Freyana (M.) chanayi Trt., *Journ. Microgr.*, IX, p. 114 (1885).

♂, ♀. *Freyana (M.) chanayi* (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 36 (1899).

Recorded taken off turkeys in Europe.

2. **Microspalax manicata major** Trouessart and Neumann.

F. (Microspalax) manicata major Trt. & Neu., *Bull. sci., France-Belgique*, XIX, p. 336 (1886).

F. (M.) manicata major (T. & N.) Can. & Kram., *Demod. und Sarc.*, p. 35 (1899).

Described from specimens taken off *Daption capensis* (Cape sea-pigeon).

Genus *PTEROLICHUS* Robin.

Pterolichus Robin, *Comp. ren. heb. Séanc. Mém. Soc. Biol.*, LXVI, p. 786 (1868).

Genotype: *Pterolichus obtusus* Robin. Type host: *Perdix rubra*.

1. **Pterolichus bicaudatus** (Gervais).

Tyroglyphus bicaudatus Gervais, in Walkenaer, *Hist. nat. Ins.*, Apt., iii, p. 262 (1844).

P. (Eupterolichus) bicaudatus (Gerv.) Can. & Kram., *Demod. und Sarc.*, p. 46 (1899).

This species is found on the South African ostrich. It has also been recorded from the American ostrich (*Rhea americana*).

2. **Pterolichus buchholzi** (Canestrini).

Dermaleichus buchholzi Can., *Att. Real. Ist. Veneto Sci., Lett. ed. Art.* (5), V, p. 64 (1878).

P. (Eupterolichus) buchholzi (Can.) Can. & Kram., *Demod. und Sarc.*, p. 52 (1899).

Recorded taken off grey plover, *Squatarola squatarola* (= *Charadrius squatarola*) and *Limosa limosa* (black-tailed godwit).

2A. **Pterolichus buchholzi fascigera** Mégnin and Trouessart.

P. buchholzi fascigera Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 428 (1884).

P. (E.) buchholzi fascigera (Még. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 52 (1899).

Recorded taken off *Arenaria interpres* (turnstone), redshank, *Totanus totanus* (= *T. calidris*), and knot, *Calidris canutus* (= *Tringa canutus*).

2B. **Pterolichus buchholzi securicata** Mégnin and Trouessart.

P. buchholzi securicatus Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 428 (1884).

P. (E.) buchholzi securicatus (Még. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 53 (1899).

Described from specimens taken off curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*).

3. **Pterolichus charadrii** (Canestrini).

Dermaleichus charadrii, Can., *Att. Real. Ist. Ven. Sci., Lett. ed. Art.* (5), V, p. 48 (1878).

P. (Eupterolichus) charadrii (Can.) Can. & Kram., *Demod. und Sarc.*, p. 39 (1899).

Recorded from *Charadrius hiaticula* (ringed plover) and other Charadriiformes.

4. **Pterolichus ciconiae** Canestrini and Berlese.

Pterolichus ciconiae Can. & Berl., *Att. Soc. Veneto-Trent.*, Padova, VII, p. 145 (1880).

P. (Eupterolichus) ciconiae (Can. & Berl.) Can. & Kram., *Demod. und Sarc.*, p. 47 (1899).

Described from specimens taken off white stork, *Ciconia ciconia* (= *C. alba*).

5. **Pterolichus columbi major** Mégnin and Trouessart.

P. columbi major Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 429 (1884).

P. (Eupterolichus) columbi major (Még. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 53 (1899).

Recorded taken off African crested grebe, *Podiceps infus-cata* (= *P. cristata*).

6. **Pterolichus cuculi** Mégnin and Trouessart.

P. cuculi Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 332 (1884).

P. (Eupterolichus) cuculi (Még. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 47 (1899).

Described from specimens taken off European cuckoo (*Cuculus canorus*) and other birds. A slight variety has been found on the European bee-eater (*Merops apiaster*).

7. **Pterolichus minor** Mégnin and Trouessart.

P. minor Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 216 (1884).

P. (Eupterolichus) minor (Mégn. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 40 (1899).

Described from specimens taken off *Falco subbuteo* (hobby).

8. **Pterolichus marginatus** Trouessart.

P. marginatus Trt., *Bull. Soc. Étud. sci. Angers.*, XVI, p. 104 (1886).

P. (Eupterolichus) marginatus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 42 (1899).

Described from specimens taken off hadadah ibis, *Hagadashia hagedash* (= *Ibis hagedash*).

9. **Pterolichus martini** Trouessart.

P. martini Trt., *Jour. Microgr.*, Paris, IX, p. 116 (1885).

P. (Eupterolichus) martini (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 39 (1899).

Described from specimens taken off *Sterna hirundo* (common tern).

10. **Pterolichus ninnii** (Canestrini).

Dermaleichus ninnii Can., *Atti. Real. Ist. Ven. Sci., Lett. ed. Art.* (5) V, p. 56 (1878).

P. (Eupterolichus) ninnii (Can.) Can. & Kram., *Demod. und Sarc.*, p. 49 (1899).

Described from specimens taken off *Numenius arquatus* (curlew).

11. **Pterolichus nisi** (Canestrini).

Dermaleichus nisi Can., *Atti. Real. Ist. Ven. Sci., Lett. ed. Art.* (5) V, p. 54 (1878).

P. (Eupterolichus) nisi (Can.) Can. & Kram., *Demod. und Sarc.*, p. 46 (1899).

Recorded taken off Montagu's harrier, *Pygargus pygargus* (= *Circus pygargus*) and *Pernis apivorus* (honey buzzard).

12. **Pterolichus numenii** (Canestrini).

Dermaleichus numenii Can., *Atti. Real. Ist. Ven. Sci., Lett. ed. Art.* (5) V, p. 61 (1878).

P. (Eupterolichus) numenii (Can.) Can. & Kram., *Demod. und Sarc.*, p. 50 (1899).

Described from specimens taken off wimbrel, *Phaeopus phaeopus* (= *Numenius phaeopus*).

13. **Pterolichus pavonis** Oudemans.

Pterolichus pavonis Oudms., *Ent. Bericht.*, No. 21, p. 210 (1905).

Described from specimens taken off *Pavo cristatus* (peacock). The female differs from that of *P. obtusus* Rob. in having a much broader posterior plate on the dorsum.

14. **Pterolichus phoenicopteri** Mégnin and Trouessart.

P. phoenicopteri Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 384 (1884).

P. (Eupterolichus) phoenicopteri (Mégn. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 52 (1899).

Described from specimens taken off greater flamingo, *Phoenicopterus major* (= *P. antiquorum*).

15. **Pterolichus porzanae** (Canestrini).

Dermaleichus porzanae Can., *Atti. Real. Ist. Ven. Sci., Lett. ed. Art.* (5) V, p. 49 (1878).

P. (Eupterolichus) porzanae (Can.) Can. & Kram., *Demod. und Sarc.*, p. 51 (1899).

Described from specimens taken off *Ortygometra porzana* (spotted crane).

16. **Pterolichus rallorum** Robin.

P. rallorum Robin. *Jour. Anat. et Physiol.*, XIII, p. 414 (1877).

P. (Eupterolichus) rallorum (Rob.) Can. & Kram., *Demod. und Sarc.*, p. 50 (1899).

Described from specimens taken off corn-crake, *Crex crex* (= *Rallus crex*).

17. **Pterolichus rebergi gracilis** Mégnin and Trouessart.

P. rebergi gracilis Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 383, f. 49 (1884).

P. (Eupterolichus) rebergi gracilis (Mégn. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 51 (1899).

Described from specimens taken off *Himantopus himantopus* (black-winged stilt).

18. **Pterolichus rubidus** (Trouessart).

P. rubidus, Trt., *Bull. Soc. Étud. sci. Angers*, XVI, p. 110 (1886).

P. (Eupterolichus) rubidus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 52 (1899).

Described from specimens taken off yellow-billed molly-mawk, *Nealbatrus chlororhynchus* (= *Diomedea chlororhyncha*).

- 18A. **Pterolichus rubidus petalifera** Trouessart.
P. rubidus petalifera Trt., *Bull. Soc. ent. France*, p. 291 (1898).
P. (E.) rubidus petalifera (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 52 (1899).
 Described from specimens taken off the same host as the type.
19. **Pterolichus sculpturatus** Hirst.
P. sculpturatus Hirst., *Ann. Mag. Nat. Hist.* (9), V, No. 31, p. 121 (1920).
 Described from specimens taken off ostriches at Onderstepoort, Transvaal. This species lives both on and inside the quills.
20. **Pterolichus serrativentris** Trouessart.
P. serrativentris, Trt., *Bull. Soc. Étud. sci. Angers*, XVI, p. 108 (1886).
P. (Eupterolichus) serrativentris (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 44 (1899).
 Described from specimens taken off *Leptoptilus crumeniferus* (marabou stork).
21. **Pterolichus squatarolae** (Canestrini).
Dermaleichus squatarolae Can., *Atti. Real. Ist. Ven. Sci., Lett. ed Art.* (5), V, 9, 47 (1878).
P. (Eupterolichus) squatarolae (Can.) Can. & Kram., *Demod. und Sarc.*, p. 39 (1899).
 Described from specimens taken off *Squatarola squatarola* (grey plover).
22. **Pterolichus vexillarius minuta** Mégnin and Trouessart.
P. vexillarius minuta Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 431, f. 52 (1884).
P. (Eupterolichus) vexillarius minuta (Mégn. & Trt.) Can. & Kram., *Demod. und Sarc.*, p. 54 (1899).
 Described from specimens taken off crowned hornbill, *Rhynchaceros melanoleucus* (= *Tockus melanoleucus*), and *T. erythrorhynchus* (red-billed hornbill).

Genus AVENZOARIA Oudemans.

Avenzoaria Oudemans, *Ent. Berichten*, No. 21, p. 209 (1905).

This genus comprises twelve species found on Scolopacidae.

Genotype: *Dermaleichus totani* Canestrini.

1. **Avenzoaria asiatica** (Oudemans).
 ♂, ♀, ○. *Pterolichus asiaticus* Oudms., *Ent. Bericht.*, No. 20, p. 194 (1904).
 ♂, ♀, ○. *Avenzoaria asiatica* Oudms., *Tijd. v. Ent.*, LIII, p. 226, Pl. 12, f. 39-51 (1910).
 Described from specimens taken off dusky sandpiper, *Erythroscelis fuscus* (= *Totanus fuscus*), India.

2. **Avenzoaria australis** (Oudemans).

♂. *Pterolichus australis* Oudms., *Ent. Bericht.*, No. 20, p. 194 (1904).

♂. *Avenzoaria australis* Oudms., *Tijd. v. Ent.*, LIII, p. 214, Pl. 11, f. 30-32 (1910).

Described from specimens taken off dusky sandpiper, *Erythroscelis fuscus* (= *Totanus fuscus*), India.

3. **Avenzoaria bengalensis** (Oudemans).

♂, ♀, ○. *Pterolichus bengalensis* Oudms., *Ent. Bericht.*, No. 20, p. 193 (1904).

♂, ♀, ○. *Avenzoaria bengalensis* Oudms., *Tijd. v. Ent.*, LIII, p. 206, Pl. 9, f. 8, 9; Pl. 10, f. 10-14 (1910).

Described from specimens taken off *Totanus totanus* (redshank), Bengal, India.

4. **Avenzoaria calidridis** (Oudemans).

♂, ○. *Pterolichus calidridis* Oudms., *Ent. Bericht.*, No. 19, p. 172 (1904).

♂, ○. *Avenzoaria calidridis* Oudms., *Tijd. v. Ent.*, LIII, p. 210, Pl. 10, f. 15-19 (1910).

Described from specimens taken off *Totanus totanus* (redshank), France.

5. **Avenzoaria grallatoris** (Oudemans).

○, L. *Pterolichus grallatoris* Oudms., *Ent. Bericht.*, No. 19, p. 172 (1904).

○, L. *Avenzoaria grallatoris* Oudms., *Tijd. v. Ent.*, LIII, p. 217, Pl. 11, f. 20-26 (1910).

Described from specimens found in the spools of the large quills of *Totanus totanus* (redshank), France.

6. **Avenzoaria indica** (Oudemans).

♂. *Pterolichus indicus* Oudms., *Ent. Bericht.*, No. 20, p. 193 (1904).

♂. *Avenzoaria indica* Oudms., *Tijd. v. Ent.*, LIII, p. 222, Pl. 11, f. 33-36 (1910).

Described from specimens taken off *Totanus totanus* (redshank), Bengal, India.

7. **Avenzoaria limicolae** (Oudemans).

○. *Pterolichus limicolae* Oudms., *Ent. Bericht.*, No. 19, p. 172 (1904).

○. *Avenzoaria limicolae* Oudms., *Tijd. v. Ent.*, LIII, p. 220, Pl. 11, f. 27-29 (1910).

Described from specimens found in the spools of the large quills of *Totanus totanus* (redshank), France.

8. **Avenzoaria limosae** (Buchholz).
Dermaleichus limosae Buchh., *Bemerk.*, p. 26, Pl. 2, f. 12, 13 (1869).
P. (Eupterolichus) limosae (Buchh.) Can. & Kram., *Demod. und Sarc.*, p. 49 (1899).
 Recorded taken off *Erythroscelis fuscus* (dusky sandpiper) and other species of Scolopacidae.
- 8A. **Avenzoaria limosae selanura** (Méglin and Trouessart).
Pterolichus limosae selanurus Mégn. & Trt., *Journ. Microgr.* Paris, VIII, p. 337 (1884).
P. (Eupterolichus) limosae selenura (M. & T.) Can. & Kram., *Demod. und Sarc.*, p. 49 (1899).
 Described from specimens taken off bar-tailed godwit, *Vetola lapponica* (= *Limosa lapponica*).
9. **Avenzoaria totani** (Canestrini).
Dermaleichus totani Can., *Atti. Real. Ist. Ven. Sci., Lett. ed. Art.* (5), V, p. 60 (1878).
P. (Eupterolichus) totani (Can.) Can. & Kram., *Demod. und Sarc.*, p. 49 (1899).
Avenzoaria totani (Can.) Oudms., *Tijd. v. Ent.*, LIII, p. 197 (1910).
 Described from specimens taken off redshank, *Totanus totanus* (= *T. calidris*); ruff, *Philomachus pugnax* (= *T. pugnax*) and little stint, *Pisobia minuta* (= *Tringa minuta*).
10. **Avenzoaria tringae** (Oudemans).
 ♂, ♀. *Pterolichus totani* Berlese, *Acari, Myrio. et Scorp.* in Italia, Padova, fasc. 38, No. 2 (1887), *nec* Canestrini, 1878.
Pterolichus tringae Oudms., *Ent. Bericht.*, No. 19, p. 171 (1904).
 ♂, ♀. *Avenzoaria tringae* Oudms., *Tijd. v. Ent.*, LIII, p. 199 (1910).
 Recorded by Berlese from redshank, *Totanus totanus* (= *T. calidris*); ruff, *Philomachus pugnax* (= *T. pugnax*) and little stint, *Pisobia minuta* (= *Tringa minuta*).

GENUS GABUCINIA Oudemans.

Gabucinia Oudemans, *Ent. Bericht.*, p. 224 (1905).
 Genotype: *Pterolichus delibatus* Robin.

1. **Gabucinia delibata** (Robin).
P. delibatus Robin, *Jour. Anat. et Physiol.*, XIII, p. 416 (1877).
P. (Eupterolichus) delibatus (Rob.) Can. & Kram., *Demod. und Sarc.*, p. 43 (1899).
 This species has been recorded taken off *Corvultur albicollis* (white-necked raven); pied crow, *Corvus albus* (= *C. scapularis*), and other species of Corvidae, also from Vulturidae.

GENUS EUSTATHIA Oudemans.

Eustathia Oudemans, *Ent. Bericht.*, p. 218 (1905).
 Genotype: *Pterolichus cultrifer* Robin.

1. **Eustathia cultrifer** (Robin).
P. cultrifer Robin, *Jour. Anat. et Physiol.*, XIII, p. 408, Pl. 22, f. 8 (1877).
P. (Eupterolichus) cultrifer (Rob.) Can. & Kram., *Demod. und Sarc.*, p. 54 (1899).
 Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*).

GENUS CHAULIACIA Oudemans.

Chauliacia Oudemans, *Ent. Bericht.*, p. 218 (1905).
 Genotype: *Pterolichus securiger* Robin.

- Chauliacia securiger** (Robin).
P. securiger Robin, *Jour. Anat. et Physiol.*, XIII, p. 406, Pl. 22, f. 9 (1877).
P. (Eupterolichus) securiger (Rob.) Can. & Kram., *Demod. und Sarc.*, p. 55 (1899).
 Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*).

GENUS THECARTHRA Trouessart.

Thecarthra Trouessart, *Bull. Soc. ent., France*, p. 420 (1896).
 Genotype: *Pterolichus theca* Méglin and Trouessart.

1. **Thecarthra bouveti** (Méglin and Trouessart).
Pterolichus bouveti Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 435 (1884).
Thecarthra bouveti (M. & T.) Can. & Kram., *Demod. und Sarc.*, p. 72 (1899).
 Described from specimens taken of *Charadrius hiaticula* (ringed plover). Recorded by Oudemans (1906) from quills of *Totanus totanus* (redshank).
2. **Thecarthra longitarsa** (Méglin and Trouessart).
Pterolichus longitarsus Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 436 (1884).
Thecarthra longitarsa (M. & T.) Can. & Kram., *Demod. und Sarc.*, p. 71 (1899).
 This species has been recorded from grey plover, *Squatarola squatarola* (= *S. helvetica*).
3. **Thecarthra setigera** (Méglin and Trouessart).
Pterolichus setiger Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 435 (1884).

Thecarthra setigera (Mégn. & Trt.) Can. & Kram., Demod. und Sarc., p. 73 (1899).

Described from specimens taken off bar-tailed godwit, *Vetola lapponica* (= *Limosa rufa*).

4. **Thecarthra simplex tyroglyphina** (Trouessart and Neumann).

Pterolichus simplex tyroglyphinus Trt. & Neu., *Bull. sci., France Belgique*, XVI, p. 337 (1888).

Thecarthra simplex tyroglyphina (Trt. & Neu.) Can. & Kram., Demod. und Sarc., p. 72 (1899).

Described from specimens taken off white-winged tern, *Chlidonias leucoptera* (= *Hydrochelidon leucoptera*).

5. **Thecarthra theca** (Mégnin and Trouessart).

Pterolichus theca Mégn. & Trt., *Jour. Microgr.*, Paris, VIII, p. 434 (1884).

Thecarthra theca (Mégn. & Trt.) Can. & Kram., Demod. und Sarc., p. 73 (1884).

Recorded taken off Caspian tern, *Hydroprogne tschegrava* (= *Sterna caspia*), and *Stercorarius parasiticus* (white-necked skua).

6. **Thecarthra trouessarti** Berlese.

T. trouessarti Berl., *Acari, Myrio. et Scorp. in Italia*, Padova, fasc. 83, No. 2 (1897).

T. trouessarti (Berl.) Can. & Kram., Demod. und Sarc., p. 72 (1899).

Described from specimens taken off turnstone, *Arenaria interpres* (= *Strepsilas interpres*).

Genus ANOPLONOTUS Trouessart.

Anoplontus Trouessart, *Bull. Soc. Zool. de France*, XL, viii-x, p. 214 (1916).

Genotype: *Pterolichus semaphora* Trouessart.

1. **Anoplontus semaphorus** (Trouessart).

Pterolichus semaphora Trt., *Bull. Soc. Étud. sci., Angers*, XVI, p. 111 (1886).

Thecarthra semaphora (Trt.) Can. & Kram., Demod. und Sarc., p. 71 (1899).

Described from specimens taken off *Sterna hirundo* (common tern).

Genus SAMMONICA Oudemans.

Sammonica Oudemans, *Ent. Bericht.*, p. 192 (1904).

Genotype: *Syringobia ovalis* Trouessart. Type host: *Totanus flavipes* (Gm.).

1. **Sammonia interfolia** (Mégnin and Trouessart).

Pterolichus interfolia Mégn. & Trt., *Journ. Microgr.*, VIII, p. 433, f. 53b, c (1884).

♂, ♀. *Thecarthra interfolia* (M. & T.) Can. & Kram., Demod. und Sarc., p. 72 (1899).

Recorded by Oudemans (*Tijd. v. Ent.*, XLIX, p. 261, 1906) taken off *Totanus totanus* (redshank). The type host is *Totanus hypoleucus*.

Genus PSEUDALLOPTES Trouessart and Mégnin.

Pseudalloptes Trt. & Mégn., *Journ. Microgr.*, VIII, p. 531 (1884).

Genotype: *Pseudalloptes bisubulatus* Robin.

1. **Pseudalloptes pyriventris** Trouessart.

P. (Pseudalloptes) pyriventris Trouessart, *Bull. Soc. Angers*, XVI, p. 113 (1886).

P. (Pseudalloptes) pyriventris (Trt.) Can. & Kram., Demod. und Sarc., p. 60 (1899).

Described from specimens taken off *Scopus umbretta* (hammerhead).

1A. **Pseudalloptes pyriventris vegetans** Trouessart.

P. (Pseudalloptes) pyriventris var. *vegetans* Trouessart, *Bull. Soc. Étud. sci., Angers*, XXVIII (1899).

P. (Pseudalloptes) pyriventris var. *vegetans* (Trt.) Can. & Kram., Demod. und Sarc., p. 61 (1899).

Described from specimens taken off *Scopus umbretta* (hammerhead).

Genus FALCULIFER Railliet.

Falcifer Trouessart, *Journ. Microgr.*, IX, p. 69 (1885), nec. Meg. v, Mühlf. 1821 (Coleopt.).

Falculifer Railliet, *Rec. de Médec. vétér.* p. 6 (1896).

Genotype: *Dermaleichus rostratus* Buchholz.

1. **Falculifer rostratus** (Buchholz).

Dermaleichus rostratus Buchh., *Bemerk.*, p. 14, f. 1 (1869).

♂, ♀. *F. rostratus* (Buchh.) Can. & Kram., Demod. und Sarc., p. 68 (1899).

Recorded taken off domestic pigeons and other pigeons in Europe.

Genus BDELLORHYNCHUS Trouessart.

Bdellorhynchus Trouessart, *Journ. Microgr.*, Paris, IX, p. 109 (1885).

This genus includes two species.

Genotype: *Bdellorhynchus polymorphus* Trouessart.

Key to the Species.

1. First pair of legs with very long antenna-like setae
B. polymorphus.
 First pair of legs without such setae *B. psalidurus*.

1. ***Bdellorhynchus polymorphus*** Trouessart.
B. polymorphus Trouessart, *Jour. Microgr.*, Paris, IX, p. 110, f. 7 (1885).
B. polymorphus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 70 (1899).
 Described from specimens taken off *Spatula clypeata* (European shoveller) and other species of Anatidae.
2. ***Bdellorhynchus psalidurus*** Trouessart.
B. psalidurus Trt., *Bull. Soc. Etud. sci. Angers*, XVI, p. 118 (1886).
B. psalidurus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 70 (1899).
 Described from specimens taken off Egyptian goose, *Alopochen aegyptiacus* (= *Chenalopez aegyptiacus*).

Genus XOLOPTES Canestrini.

Xoloptes Canestrini, *Atti. Soc. Veneto. Trent.*, Padova, VI, p. 7 (1879).

This is a small genus comprising four species.

Genotype: *Pterolichus claudicans* Robin. Type host: *Coturnix*.

1. ***Xoloptes didactylus*** Trouessart.
X. didactylus Trouessart, *Jour. Microgr.*, Paris, IX, p. 113 (1885).
X. didactylus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 67 (1899).
 Described from specimens taken off white stork, *Ciconia ciconia* (= *C. alba*).

Genus DERMOGLYPHUS Mégnin.

Dermoglyphus Mégnin, *Journ. Anat. et Physiol.*, XIII, p. 654 (1877)
 Genotype: *Dermalichus elongatus* Mégnin.

Key to the Species.

1. ♂: posterior margin of body with one long seta on each side *D. minor*.
 ♂: posterior margin of body with three long setae on each side 2
 2. Abdomen of ♂ rounded behind *D. elongatus*.
 Abdomen of ♂ slightly emarginated behind ... *D. diplectrum*.

1. ***Dermoglyphus diplectrum*** Trouessart.

D. diplectrum Trouessart in Berlese, *Acari, Myr. et Scorp. in Ital. fasc.* 80, No. 7 (1896).

♂. ♀. *D. diplectrum* (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 76 (1899).

Described from specimens taken off curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*).

2. ***Dermoglyphus elongatus*** Mégnin.

Dermalichus elongatus Mégn., *Journ. Anat. et Physiol.*, XIII, p. 392 (1877).

♂, ♀. *Dermoglyphus elongatus* (Mégn.) Can. & Kram., *Demod. und Sarc.*, p. 75 (1899).

This species has been recorded taken off domestic fowls in Europe. It lives inside the quills of the feathers.

3. ***Dermoglyphus minor*** (Nörner).

Analges minor Nörn., *Verh. Ges. Wien*, XXXII, p. 387, Pl. 19, f. 1-10 (1882).

♂, ♀. *Dermoglyphus minor* (Nörn.) Can. & Kram., *Demod. und Sarc.*, p. 75 (1899).

Recorded taken off domestic fowls, guinea-fowl and turkeys in Europe. It lives inside the quills of the feathers.

Genus SPHAEROGASTRA Trouessart.

Sphaerogastra Trouessart in Berlese, *Acari, Myr. et Scorp. in Ital. Crypt.* I, p. 41 (1897).

Genotype: *Sphaerogastra thylacodes* Trouessart.

1. ***Sphaerogastra thylacodes*** Trouessart.

S. thylacodes Trouessart in Berlese, *Acari, Myr. et Scorp. in Ital. fasc.* 88, No. 4, p. 41 (1897).

S. thylacodes (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 77 (1899).

Described from specimens taken off greenshank, *Glottis nebularius* (= *Totanus glottis*) and curlew sandpiper, *Erolia testacea*.

Genus SYRINGOBIA Trouessart and Neumann.

Syringobia Trt. & Neu., *Bull. sci. France Belgique*, XIX, p. 344 (1888).

Genotype: *Syringobia chelopus* Trouessart and Neumann.

Key to the South African Species.

1. Second joint of fourth pair of legs without spurs
S. calceata.
 Second joint of fourth pair of legs with spurs
S. chelopus.

1. **Syringobia calcarata** Oudemans.

S. calcarata Oudms., *Ent. Bericht.*, I, No. 20, p. 193 (1904).

♂. *S. calcarata* Oudms., *Zool. Jahrbüch.*, XXVI, p. 584, Pl. 33, f. 41-43 (1908).

Described from specimens taken off dusky sandpiper, *Erythroscelis fuscus* (= *Totanus fuscus*).

2. **Syringobia calceata** Trouessart

S. calceata Trt., *Bull. Soc. ent. France*, p. 320 (1898).

S. calceata (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 74 (1899).

♂, ♀, ○, L. *S. calceata* (Trt.) Oudemans, *Zool. Jahrbüch.*, XXVI, v, p. 574, Pl. 33, f. 20-40 (1908).

Described from specimens taken off green sandpiper, *Tringa erythropus* (= *Totanus ochropus*).

3. **Syringobia calidridis** Oudemans.

○. *S. calidridis* Oudms., *Ent. Bericht.*, I, No. 19, p. 173 (1904).

○. *S. calidridis* Oudms., *Zool. Jahrbüch.*, XXVI, v, p. 587, Pl. 33, f. 48-50 (1908).

Described from specimens taken off *Totanus totanus* (redshank).

4. **Syringobia chelopus** Trouessart and Neumann.

S. chelopus Trt. & Neu., *Bull. sci. France-Belgique*, XIX, p. 344, Pl. 23, f. 1, 2 (1888).

S. chelopus (Trt. & Neu.) Can. & Kram., *Demod. und Sarc.*, p. 74 (1899).

♂, ♀, ○, L. *S. chelopus* (Trt. & Neu.) Oudemans, *Zool. Jahrbüch.*, XXVI, v, p. 566, Pl. 33, f. 1-19 (1908).

Described from specimens found in the feathers of redshank, *Totanus totanus* (= *T. calidris*).

5. **Syringobia totani** Oudemans.

○. *S. totani* Oudms., *Ent. Bericht.*, I, No. 19, p. 173 (1904).

○. *S. totani* Oudms., *Zool. Jahrbüch.*, XXVI, v, p. 586, Pl. 33, f. 44-47 (1908).

Described from specimens taken off *Totanus totanus* (redshank).

Genus PLUTARCHIA Oudemans.

Plutarchusia Oudemans, *Ent. Bericht*, I, No. 19, p. 173 (1904).

Plutarchia Oudemans.

1. **Plutarchia chelopus** (Trouessart).

Syringobia chelopus série anormale Trouessart, *Ann. Soc. Ent. France*; *Bull. Ent.* (9 & 23 May, 1894).

Plutarchusia chelopus Oudms., *Ent. Bericht.*, I, No. 19, p. 173 (1904).

♂, ♀, ○, L. *Plutarchia chelopus* Oudms., *Tijd. v. Ent.*, XLIX, p. 250, Pl. 10, f. 30-35; Pl. 11, f. 36-39 (1906).

Described from specimens taken off *Totanus totanus* (redshank).

Genus PARALGES Trouessart.

Paralges Trouessart, *Journ. Microgr.*, IX, p. 112 (1885).

Genotype: *Paralges pachycnemis* Trouessart.

1. **Paralges deformis** (Trouessart and Neumann).

Paralges deformis Trt. and Neu., *Bull. Sci. France-Belgique*, XIX, p. 346 (1888).

Dermoglyphus deformis Can. & Kram., *Demod. und Sarc.*, p. 76 (1899).

Described from specimens taken off grey lourie, *Crinifer concolor* (= *Schizorhis concolor*).

Genus BUCHHOLZIA Trouessart.

Buchholzia Trouessart, *Bull. Soc. Zool. de France*, XL, viii-x, p. 217 (1916).

Genotype: *Analges fuscus* Nitzsch.

1. **Buchholzia fuscus** (Nitzsch).

Analges fuscus Nitz. in Ersch and Grub., *Allg. Enc. Wissenschaft. u. Kün.* I, p. 252 (1818).

Pteronyssus fuscus (Nitz.) Can. & Kram., *Demod. und Sarc.*, p. 84 (1899).

Described from specimens taken off osprey, *Pandion haliaetus* (= *Aquila haliaetus*).

Genus GIEBELIA Trouessart.*

Giebelia Trouessart, *Bull. Soc. Zool. de France*, XL, viii-x, p. 217 (1916).

Genotype: *Dermaleichus puffini* Buchholz.

1. **Giebelia puffini** (Buchholz).

Dermaleichus puffini Buchh., *Bemerk. über die Art. der Gatt., Dermaleichus*, p. 37 (1869).

Pteronyssus puffini (Buchh.) Can. & Kram., *Demod. und Sarc.*, p. 84 (1899).

Recorded taken off *Dromas ardeola* (crab plover) and other birds.

* *Nec Giebelia* Kellogg, 1896 (Mallophaga).

Genus PTERONYSSUS Robin.

Pteronyssus Robin, *Comp. Séan. Acad. Sci.*, Paris, LXVI,
p. 786 (1868).

Genotype: *Pteronyssus striatus* Robin. Type host: *Fringilla caelebs*.

1. *Pteronyssus gracilipes* Trouessart and Neumann.

P. gracilipes Trt. & Neu., *Bull. Sci., France-Belgique*, XIX,
p. 353 (1888).

P. gracilipes Can. & Kram., *Demod. und Sarc.*, p. 82 (1899).

Described from specimens taken off redshank, *Totanus totanus* (= *T. calidris*).

2. *Pteronyssus integer* Trouessart and Neumann.

P. integer Trt. & Neu., *Bull. Sci. France-Belgique*, XIX,
p. 352, Pl. 24, f. 5 (1888).

P. integer (Trt. & Neu.) Can. & Kram., *Demod. und Sarc.*,
p. 82 (1899).

Described from specimens taken off spotted flycatcher, *Muscicapa striata* (= *M. grisola*), a migrant to South Africa.

3. *Pteronyssus nuntiaeveris* Berlese.

P. nuntiaeveris Berl., *Acari, Myr. et Scorp.*, Ital., fasc. 26,
No. 5 (1884).

P. nuntiaeveris (Berl.) Can. & Kram., *Demod. und Sarc.*, p. 82
(1899).

Described from specimens taken off European sandmartin, *Riparia riparia* (= *Cotyle riparia*).

4. *Pteronyssus obscurus* Berlese.

P. obscurus Berlese, *Acari, Myr. et Scorp.*, Ital., repert and
fasc. 18, No. 3 (1884).

P. obscurus (Berl.) Can. & Kram., *Demod. und Sarc.*, p. 80
(1899).

Recorded taken off *Chelidonaria urbica* (house martin) and European sandmartin, *Riparia riparia* (= *Cotyle riparia*).

5. *Pteronyssus pallens* Berlese.

P. pallens Berlese, *Acari, Myr. et Scorp.* Ital. fasc. 24, No. 8
(1884).

P. pallens (Berl.) Can. & Kram., *Demod. und Sarc.*, p. 81
(1899).

Described from specimens taken off *Acrocephalus arundinaceus* (great reed warbler), a migrant to South Africa.

6. *Pteronyssus truncatus* Trouessart.

P. truncatus Trt., *Bull. Soc. Étud. sci. Angers*, XIV, p. 49
(1885).

P. truncatus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 81
(1899).

This species has been recorded taken off *Sternus vulgaris* in Europe and off *Lamprotornis sp.* in Senegal. It probably occurs on the European starling at Capetown, and may also occur on the South African species of *Lamprotornis*, of which there are two, and possibly other starlings as well.

Subfamily ANALGESINAE.

This subfamily comprises twelve genera.

Key to the South African Genera.

- | | |
|--|-----------------------|
| 1. ♂: Third pair of legs broader than fourth pair | 2 |
| ♂: Third pair of legs narrower than fourth pair; the first and second pairs normal, the latter without falciform tarsus | 3 |
| 2. ♂: Third pair of legs with a caruncle; anal sucker well developed | MÉGNINIA, p. 259. |
| ♂: Third pair of legs without a caruncle ... | ANALGES, p. 260. |
| 3. ♂: Fourth pair of legs with an ambulacral caruncle | PTERALLOPTES, p. 261. |
| ♂: Fourth pair of legs without a caruncle | XOLALGES, p. 261. |

Genus MÉGNINIA Berlese.

Mégninia Berlese, *Acari, Myr. et Scorp.*, Ital., fasc. 4, No. 5 (1881).

Genotype: *Dermalichus cubitalis* Mégnin.

1. *Mégninia aestivalis* Berlese.

M. aestivalis Berlese, *Acari, Myr. et Scorp.*, Ital., fasc. 25,
No. 10 (1883).

M. aestivalis (Berl.) Can. & Kram., *Demod. und Sarc.*, p. 98
(1899).

Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*).

1A. *Mégninia aestivalis subintegra* Berlese.

M. aestivalis var. *subintegra* Berl., *Acari, Myr. et Scorp.*,
Ital. fasc. 26, No. 1 (1883).

M. aestivalis var. *subintegra* (Berl.), Can. & Kram., *Demod. und Sarc.*, p. 99 (1899).

Recorded taken off *Chelidonaria urbica* (house martin) and European sandmartin, *Riparia riparia* (= *Cotyle riparia*) in Italy.

2. *Mégninia columbae* (Buchholz).

Dermaleichus columbae Buchh., *Bemerk.*, p. 36, Pl. 3, f. 22
(1869).

♂, ♀. *Mégninia columbae* (Buchh.) Can. & Kram., *Demod. und Sarc.*, p. 95 (1899).

Recorded taken off domestic pigeons and other pigeons in Europe.

3. **Mégninia cubitalis** (Mégnin).
Dermaleichus cubitalis Mégn., *Journ. Anat. et Physiol.*, XIII, p. 504, Pl. 27 (1877).
Mégninia cubitalis (Mégn.) Can. & Kram., *Demod. und Sarc.*, p. 94 (1899).
 Recorded taken off turkeys in Europe.
4. **Mégninia gallinulae** (Buchholz).
Dermaleichus gallinulae Buchh., *Bemerk. über Art. der Gat. Derma.*, p. 28 (1869).
Mégninia gallinulae (Buch.) Can. & Kram., *Demod. und Sarc.*, p. 98 (1899).
 Recorded taken off *Ortygometra porzana* (spotted crane) in Europe.
- 4A. **Mégninia gallinulae major** Berlese.
M. gallinulae var. *major* Berl., *Acari, Myr. et Scorp.*, Ital., fasc. 26, No. 8 (1883).
M. gallinulae var. *major* (Berl.) Can. & Kram., *Demod. und Sarc.*, p. 98 (1889).
 Described from specimens taken off *Ortygometra porzana* (spotted crane).
5. **Mégninia ibidis** Trouessart.
M. ibidis Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 51 (1885).
M. ibidis (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 93 (1899).
 Described from specimens taken off glossy ibis, *Plegadis falcinellus* (= *Ibis falcinellus*).
6. **Mégninia pavonis** Oudemans.
Mégninia pavonis Oudms., *Ent. Bericht.*, No. 21, p. 210 (1905).
 Described from specimens taken off *Pavo cristatus* (peacock).
 Genus ANALGES Nitzsch.
Analges Nitzsch in Ersch and Gruber, *All. Enc. Wissensch. u. Kün.* I (1818).
 Genotype: *Acarus chelopus* Hermann.
1. **Analges bidentatus** Giebel.
Analges bidentatus Giebel, *Zeit. Naturw.*, XXXVII, p. 496 (1871).
Analges bidentatus (Gie.) Can. & Kram., *Demod. und Sarc.*, p. 87 (1899).
 Recorded taken off the migrant, *Acrocephalus arundinaceus* (great reed warbler) and other Passerines in Europe.

2. **Analges bifidus** (Nitzsch).
Acarus bifidus Nitzsch in Ersch. & Gruber, *All. Enc. Wissensch. u. Kün.*, I, p. 250 (1818).
Analges bifidus (Nitz.) Can. & Kram., *Demod. und Sarc.*, p. 90 (1899).
 Recorded taken off domestic pigeons in Europe.
 Genus PTERALLOPTES Trouessart and Mégnin.
Pteralloptes Trt. and Mégn., *Compt. rend. hebdom. Séan. Acad. des Sci. Paris*, V, 98, p. 156 (1884).
Analloptes Trouessart, *Bull. Soc. Étud. Sci. Angers*, XIV, p. 59 (1885).
 Genotype: *Dermaleichus stellaris* Buchholz.
1. **Pteralloptes mégnini falcinelli** (Trouessart).
Analloptes mégnini falcinelli Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 60 (1885).
Pteralloptes mégnini falcinelli (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 104 (1899).
 Described from specimens taken off glossy ibis, *Plegadis falcinellus* (= *Ibis falcinellus*).
2. **Pteralloptes stellaris** (Buchholz).
Dermaleichus stellaris Buchh., *Bemerk.*, p. 51, Pl. 6, f. 37, 38 (1869).
Analloptes stellaris (Buchh.) Berlese, *Acari, Myr. et Scorp.* Ital. fasc. 38, No. 1 (1886).
Pteralloptes stellaris (Buchh.) Can. & Kram., *Demod. und Sarc.*, p. 103 (1899).
 Described from specimens taken off *Botaurus stellaris* (bittern).
3. **Pteralloptes trifolium** (Trouessart).
Analloptes trifolium Trt., *Bull. Soc. Étud. Sci. Angers*, XXVIII, p. 32 (1899).
Pteralloptes trifolium (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 103 (1899).
 Described from specimens taken off long-tailed widowbird, *Diatropura procne* (= *Chera procne*).
 Genus XOLALGES Trouessart.
Xolalges Trouessart, *Bull. Soc. Étud. Sci. Angers*, XIV, p. 61 (1885).
 The following species is the genotype:—
1. **Xolalges scaurus** (Trouessart).
X. scaurus Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 42 (1885).
X. scaurus Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 42 (1885).
 Described from specimens taken off *Cuculus canorus* (European cuckoo).

Subfamily PROCTOPHYLLODINAE.

This subfamily comprises nine genera.

Key to the South African Genera.

Males.

1. Third and fourth pairs of legs subequal in thickness ... 2
Third and fourth pairs of legs unequal in thickness ... 4
2. Abdomen bilobed, the lobes united ... *Trouessartia*, p. 264.
Abdomen bilobed, the lobes free ... 3
3. Penis long and slender ... *Pterodectes*, p. 264.
Penis very small ... *Pterophagus*, p. 265.
4. Third pair of legs more dilated than fourth pair
Allanalges, p. 263.
Fourth pair of legs more dilated than third pair
Alloptes, p. 262.

Females.

1. Abdominal lobes articulated with abdomen ... 2
Abdominal lobes not articulated with abdomen ... 3
2. Epigynium horseshoe-shaped ... *Pterodectes*, p. 264.
Epigynium absent ... *Pterophagus*, p. 265.
3. Abdominal lobes very elongated ... 4
Abdominal lobes short ... *Alloptes*, p. 262.
4. Third and fourth pairs of legs equally developed
Allanalges, p. 263.
Fourth pair of legs slightly longer and broader than third pair ... *Trouessartia*, p. 264.

Genus ALLOPTES Canestrini.

Alloptes Canestrini *Atti. Soc. Veneto-Trent. Sci. Nat.*, Pavoda, VI, p. 34 (1879).

This genus contains about thirty-four species.

Genotype: *Dermaleichus crassipes* Canestrini.

1. *Alloptes bisetatus* Haller.

A. bisetatus Haller, *Zeit. für Wissensch. Zool.*, XXXVI, p. 377, Pl. 25, f. 1, 2 (1881).

A. bisetatus (Hall.) Can. & Kram., *Demod. und Sarc.*, p. 114 (1899).

Recorded taken off *Sterna hirundo* (common tern) and sandwich tern, *Thalasseus sandvicensis* (= *Sterna cantiaca*).

2. *Alloptes crassipes* (Canestrini).

Dermaleichus crassipes Can., *Atti. Real. Ist. Veneto Sci.*, Lett. ed Art. (5), V. p. 68 (1878).

Alloptes crassipes (Can.) Can. & Kram., *Demod. und Sarc.*, p. 113 (1899).

Recorded taken off black-tailed godwit, *Limosa limosa* (= *L. melanura*) and ruff, *Philomachus pugnax* (= *Tringa pugnax*).

2A. *Alloptes crassipes conura* Trouessart.

A. crassipes var. *conura* Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 68 (1885).

A. crassipes var. *conura* (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 113 (1899).

This variety has been found on the same hosts as the type.

2B. *Alloptes crassipes myosura* Trouessart.

A. crassipes var. *myosura* Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 69 (1885).

A. crassipes var. *myosura* (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 113 (1899).

Described from specimens taken off *Dromas ardeola* (crab plover).

3. *Alloptes cypseli* Canestrini and Berlese.

A. cypseli Can. & Berl., *Atti. Soc. Veneto-Trent. Sci. Nat.*, VII, p. 147, Pl. 19, f. 3, 4 (1881).

A. cypseli (C. & B.) Can. & Kram., *Demod. und Sarc.*, p. 114 (1899).

Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*).

4. *Alloptes discosurus* Trouessart.

A. discosurus Trt., *Bull. Soc. Étud. Sci. Angers*, XVI, p. 142 (1886).

A. discosurus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 112 (1899).

Described from specimens taken off Peter's finfoot, *Podica petersi* (= *P. senegalensis*).

5. *Alloptes gambettae* Oudemans.

Alloptes gambettae Oudms., *Ent. Bericht.*, No. 20, p. 195 (1904).

Described from a ♂ taken off *Totanus totanus* (redshank), India.

Genus ALLANALGES Trouessart.

Allanalges Trouessart, *Bull. Soc. Étud. Sci. Angers*, XVI, p. 137 (1886).

Genotype: *Pterocolus analgoides* Trouessart.

1. *Allanalges analgoides* (Trouessart).

Pterocolus analgoides Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 76 (1885).

Allanalges analgoides (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 116 (1899).

Described from specimens taken off *Merops apiaster* (European bee-eater).

2. **Allanalges podagricus** Trouessart.

A. podagricus Trt., *Bull. Soc. Étud. Sci. Angers*, XVI, p. 137 (1886).

A. podagricus Can. & Kram., *Demod. und Sarc.*, p. 115 (1899).

Described from specimens taken off southern emerald cuckoo, *Chrysococcyx intermedius sharpei* (= *C. smaragdineus*).

Genus TROUESSARTIA Canestrini.

Pterocolus Haller, 1878, *nec Schoenherr*, 1833.

Trouessartia Canestrini, in Can. and Kram., *Demod. und Sarc.*, p. 119 (1899).

Genotype: *Dermaleichus corvinus* C. L. Koch.

1. **Trouessartia appendiculata appendiculata** (Berlese).

Pterocolus appendiculatus Berl., *Acari, Myr. et Scorp. in Ital.* (V), No. 27 (1884).

Trouessartia appendiculata (Berl.) Can. & Kram., *Demod. und Sarc.*, p. 121 (1899).

Recorded taken off European sandmartin, *Riparia riparia* (= *Cotyle riparia*) and European swift, *Micropus apus* (= *Cypselus apus*).

1A. **Trouessartia appendiculata minutipes** (Berlese).

Pterocolus appendiculatus var. *minutipes* Berl., *Acari, Myr. et Scorp. in Ital.*, fasc. 26, No. 4 (1884).

Trouessartia appendiculata var. *minutipes* Can. & Kram., *Demod. und Sarc.*, p. 121 (1899).

Described from specimens taken off house martin, *Chelidonia urbica* (= *Chelidon urbica*).

2. **Trouessartia corvina rosteri** (Berlese).

Pterocolus corvina var. *rosteri* Berl., *Acari, Myr. et Scorp. in Ital.*, fasc. 26, No. 2 (1883).

Trouessartia corvina var. *rosteri* Can. & Kram., *Demod. und Sarc.*, p. 121 (1899).

This variety has been found on *Sturnus vulgaris* (starling) in Europe, and probably occurs on this host at Capetown, C.P.

Genus PTERODECTES Robin.

Pterodectes Robin, *Comp. rend. Séan. et Mém. Soc. de Biol.*, LXVI, p. 786 (1868).

Twenty-five species are included in this genus.

Genotype: *Pterodectes rutilus* Robin.

1. **Pterodectes bilobatus** Robin.

P. bilobatus Robin, *Comp. rend. Séan. et Mém. Soc. de Biol.*, LXVI, p. 786 (1868).

P. bilobatus (Rob.) Can. & Kram., *Demod. und Sarc.*, p. 124 (1899).

Described from specimens taken off European tree pipit, *Spipola trivialis* (= *Anthus trivialis*).

2. **Pterodectes gynurus** (Trouessart).

Alloptes gynurus Trt., *Bull. Soc. Étud. Sci., Angers*, XVI, p. 145 (1886).

Pterodectes gynurus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 125 (1899).

Described from specimens taken off Egyptian goose, *Alopochen aegyptiacus* (= *Chenalopea aegyptiacus*).

3. **Pterodectes megacaulus** (Trouessart).

P. megacaulus Trt., *Bull. Soc. Étud. Sci., Angers*, XIV, p. 80 (1885).

P. megacaulus (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 125 (1899).

Described from specimens taken off greater double-collared sunbird, *Notiocinnyris afer* (= *Nectarinia afra*).

4. **Pterodectes ortyometrae** (Canestrini).

Dermaleichus ortyometrae Can., *Atti. Real. Ist. Veneto Sci. Lett. ed Art* (V), p. 58 (1878).

Pterodectes ortyometrae (Can.) Can. & Kram., *Demod. und Sarc.*, p. 122 (1899).

Recorded taken off *Ortyometra porzana* (spotted crane).

4A. **Pterodectes ortyometrae furcifer** (Trouessart).

Pterocolus ortyometrae var. *furcifer* Trt., *Bull. Soc. Étud. Sci. Angers*, XIV, p. 73 (1885).

Pterodectes ortyometrae var. *furcifer* (Trt.) Can. & Kram., *Demod. und Sarc.*, p. 122 (1899).

Described from specimens taken off two-banded courser, *Smutsornis africanus* (= *Cursorius bicinctus*).

5. **Pterodectes rutilus** Robin.

P. rutilus Robin, *Compt., rend. Séan. Mém. Soc. Biol.*, LXVI, p. 786 (1868).

P. rutilus (Robin.) Can. & Kram., *Demod. und Sarc.*, p. 124 (1899).

Described from specimens taken off house martin, *Chelidonia urbica* (= *Hirundo urbica*).

Genus PTEROPHAGUS Robin and Mégnin.

Pterophagus Robin & Mégnin, *Journ. Anat. et Physiol.*, XIII, p. 652 (1877).

This genus contains a single species.

1. **Pterophagus strictus** Mégnin.

P. strictus Mégnin, *Journ. Anat. et Physiol.*, XIII, p. 653, Pl. 37, f. 1-5 (1877).

♂, ♀. *P. strictus* (Mégn.) Can. & Kram., *Demod. und Sarc.*, p. 128 (1899).

This species occurs on domestic pigeons, and has also been recorded from other pigeons in Europe.

Subfamily EPIDERMLOPTINAE.

Key to the South African Genera (after Canestrini and Kramer).

1. Suckers massive *Heteropsorus*.
Suckers normal; small; legs of ♂ and ♀ evenly developed ... 2
2. Legs with claws *Epidermoptes*.
Legs without claws *Rivoltasia*.

Genus HETEROPSORUS Trouessart and Neumann.

Heteropsorus Trt. and Neu., *Bull. Soc. Étud. Sci., Angers*, XVII, p. 137 (1887).

This genus comprises a single species.

1. **Heteropsorus pteroptopus** Trouessart and Neumann.

H. pteroptopus Trt. & Neu., *Bull. Soc. Étud. Sci. Angers*, XVII, p. 137, Pl. 2, f. 1 (1887).

H. pteroptopus (T. & N.) Can. & Kram., *Demod. und Sarc.*, p. 129 (1899).

Recorded taken off *Acrocephalus arundinaceus* L. (great reed warbler). The type host is *Cyanecuta succica*.

Genus EPIDERMLOPTES RIVOLTA.

Epidermoptes (part) Rivolta, *Giorn. Anat. Fisiol.*, VIII, i (1876).

This genus contains a single species. It is minute, weakly chitinized, and lives on the skin of its host.

1. **Epidermoptes bilobatus** Rivolta.

E. bilobatus Rivolta, *Giorn. Anat. Fisiol.*, VIII, i (1876).

E. bilobatus (Riv.) Can. & Kram., *Demod. und Sarc.*, p. 129 (1899).

This species was described from specimens taken off the domestic fowl in Europe. It probably occurs in South Africa.

2. **Epidermoptes pterolichus uncinatus** (Mégnin).

P. uncinatus Mégnin, *Journ. Anat. et Physiol.*, XIII, p. 420 (1877).

P. (Eupterolichus) uncinatus (Mégn.) Can. & Kram., *Demod. und Sarc.*, p. 45 (1899).

Described from specimens taken off paradise widow-bird *Steganura paradisea* (= *Vidua paradisea*).

Genus RIVOLTASIA Canestrini.

Rivoltasia Canestrini, *Prosp. Acarof.*, VI, p. 823 (1894).

This is a small genus comprising three species and one variety. The following is the genotype:—

1. **Rivoltasia bifurcata** (Rivolta).

Epidermoptes bifurcatus Rivolta, *Giorn. Anat. Fisiol.*, VIII, p. 247 (1876).

Rivoltasia bifurcata (Riv.) Can. & Kram., *Demod. und Sarc.*, p. 130 (1899).

This minute, weakly chitinized species has been found living on the skin of the domestic fowl in Europe. It probably occurs in South Africa.

Family LISTROPHORIDAE.

This family includes a number of species living in the fur of various animals. At least two known species probably occur in South Africa, namely, *Listrophorus gibbus* Pagenstecher, and *Campylochirus caviae* Hirst (= *Chirodiscoides caviae*), which live respectively in the fur of rabbits and guinea-pigs.

Suborder BRACHYPODA (VERMIFORMIA).

Superfamily DEMODICOIDEA.

Family DEMODICIDAE.

The mites included in this family are extremely small and very elongate. They live in the sebaceous sacs and hair-follicles of various kinds of mammals.

Genus DEMODEX Owen.

Demodex Owen, *Lect. invert. An.*, p. 252 (1843).

Demodex (Owen) Hirst, *Stud. on Acari*, No. 1, p. 12 (1919).

Hirst in his monograph of this genus lists 16 species. One species, *Demodex folliculorum* (Simon), is a common parasite of man in Europe, and probably also occurs in this country.

1. **Demodex bovis** Stiles.

D. folliculorum var. *bovis* Stiles, *Canad. Ent.*, XXIV, p. 286 (1892).

D. bovis (Stiles) Hirst, *Stud. on Acari*, No. 1, p. 28, Pl. 1, f. 6; Pl. 2, f. 7, 8; Pl. 5, f. 25, 26; Pl. 6, f. 30 (1919).

This species has been recorded from cattle in Europe, America and the Belgian Congo. We have received specimens taken from cattle in Northern Rhodesia, Tanganyika and Angola. It probably occurs in the Union.

2. **Demodex canis** Leydig.

D. canis Leydig, *Arch. Naturg. Jahrg.* i, XXV, p. 345 (1859).

D. canis (Leydig) Hirst, *Stud. on Acari*, No. i, p. 23, Pl. 1, f. 4, 5 (1919).

This species has been found in dogs at Onderstepoort, near Pretoria.

3. **Demodex caprae** Railliet.

D. folliculorum var. *caprae* Railliet, *Zool. Méd. Agric.* 2nd Ed., p. 638 (1895).

D. caprae (Railliet) Hirst, *Stud. on Acari*, No. 1, p. 38 (1919).

This species has been found in a goat at Pretoria.

4. **Demodex phylloides** Csokor.

D. phylloides Csokor, *Oest. Vierteljahrschr. f. Veterinärk.* LI, p. 133 (1879).

D. folliculorum var. *suis* Railliet, *Zool. Ed.* 2, p. 637 (1895).

D. phylloides (Csokor) Hirst, *Stud. on Acari*, No. 1, p. 27, Pl. 5, f. 22, 24 (1919).

This species has been found in pigs at Onderstepoort, near Pretoria.

Suborder PROSTIGMATA.

Superfamily TROMBIDOIDEA.

Key to the Families.

1. Chelicerae usually either styletiform or needle-like, not falcate CHEYLETIDAE.

Chelicerae falcate, not needle-like TROMBIDIIDAE.

Family CHEYLETIDAE.

The mites belonging to this family are either predaceous or parasitic. The palpi are well developed and move in a horizontal direction, and in the predaceous species they are armed with either comb-like structures or strong, curved setae.

Genus CHEYLETIELLA Canestrini (1886).

1. **Cheyletiella parasitivorax** (Mégnin) 1878.

This species has been found on domestic rabbits at Onderstepoort. It is said to be predaceous on *Listrophorid* mites, and is the only species of the genus known to occur on mammals.

Genus SYRINGOPHILUS Heller, 1880.

This genus includes a few species living inside the quills of birds. The body is very elongated. The legs are all similar, and possess a pair of comb-like pulvilli and two claws.

1. **Syringophilus bipectinatus** Heller, 1880.

S. bipectinatus (Heller) Hirst, *Mites Injur. to Domest. Anim.*, p. 74, f. 41a, 42a (1922).

This species has been found in the quills of domestic fowls in both Europe and North America.

2. **Syringophilus columbae** Hirst, 1920.

S. columbae Hirst, *Mites Injur. to Domes. Animal.*, p. 75, f. 41b, 42b (1922).

Described from specimens found in the quills of domestic pigeons.

3. **Syringophilus helleri** Oudemans.

♀, ♂, L. *S. helleri* Oudms., *Ent. Bericht.*, No. 20, p. 190 (1904).

Described from specimens taken off green sandpiper, *Tringa erythropus* (= *Totanus ochropus*) in Europe.

4. **Syringophilus totani** Oudemans.

♀, ♂. *S. totani* Oudms., *Ent. Bericht.*, No. 19, p. 171 (1904).

Described from specimens taken off *Totanus totanus* (red-shank).

Genus CHELETOIDES Oudemans.

Cheletoides Oudemans, *Ent. Bericht.*, No. 18, p. 163 (1904).

Similar to *Cheletes*, but with only one palpal comb and with one anterior dorsal shield.

Genotype: *Cheletes nörneri* Poppe.

1. **Cheletoides uncinata** (Heller, 1880).

This species has been found in the quills of *Pavo cristatus* (peacock).

Genus CHELETOPSIS.

1. **Cheletopsis anax** Oudemans.

♂, ♀, ♂. *C. anax* Oudms., *Ent. Bericht.*, No. 19, p. 170 (1904).

Described from specimens taken off *Totanus totanus* (red-shank).

2. **Cheletopsis animosa** Oudemans.

♂, ♀. *C. animosa* Oudms., *Ent. Bericht.*, No. 19, p. 170 (1904).

Described from specimens taken off *Totanus totanus* (red-shank).

3. **Cheletopsis basilica** Oudemans.

♀. *C. basilica* Oudms., *Ent. Bericht.*, No. 19, p. 170 (1904).

Described from specimens taken off *Totanus totanus* (red-shank).

CHECK-LIST AND HOST-LIST OF SOUTH AFRICAN ECTOPARASITES.

4. **Cheletopsis impavida** Oudemans.

♂, ♀, ○. *C. impavida* Oudms., *Ent. Bericht.*, No. 19, p. 170 (1904).

Described from specimens taken off *Totanus totanus* (red-shank).

Genus SARCOPTERINUS Railliet, 1893.

1. **Sarcopterinus nidulans** (Nitzsch, 1818).

This species has been recorded from a number of birds, including pigeons. It lives in colonies in the follicles of the feathers, and gives rise to tumours or cysts in the skin.

Family TROMBIDIIDAE.

This family includes the harvest mites. They are the largest mites known, and are usually of a brilliant scarlet colour. The adults and nymphs are free living and predaceous, but their larvae are invariably parasitic upon insects and other arthropods and vertebrates.

Genus TROMBICULA Berlese.

The adults can be distinguished by having the body greatly constricted in front of the middle, and the larvae have only five setae on the dorsal plate in addition to the pseudostigmatic organs which are flagelliform and pectinate, and each chelicera bears only one dorsal tooth. Several species are known to be parasitic in their larval stage upon man and various animals. One species, probably *T. autumnalis* (Shaw), has been found on sheep and horses in the Transvaal; also on cattle and horses at Stellenbosch, C.P. (J. F. Dunning).

Genus LEEUWENHOEKIA Oudemans.

Leeuwenhoekia Oudemans, *Ent. Ber.*, p. 137 (1911).

The larvae have six setae on the dorsal plate in addition to the pseudo-stigmatic organs.

1. **Leeuwenhoekia polydiscum** (Oudemans).

Heterothrombidium polydiscum Oudemans, *Ent. Ber.*, p. 105 (1910).

Described from specimens taken off *Hipposideros caffer* at Durban, Natal.

Genus MICROTROMBIDIUM Haller.

1. **Microtrombidium minutissimum** Oudemans.

Microtrombidium minutissimum Oudemans, *Ent. Ber.*, p. 104 (1910).

Described from specimens taken off *Hipposideros caffer* at Durban, Natal.

Genus TYPHLOTHROMBIUM Berlese.

Typhlothrombium Berlese, *Redia*, p. 358 (1910).

1. **Typhlothrombium nanus** Oudemans.

Typhlothrombium nanus Oudemans, *Ent. Ber.*, p. 105 (1910).

Described from specimens taken off *Hipposideros caffer* at Durban, Natal.

Suborder MESOSTIGMATA.

Key to the Superfamilies.

1. Hypostome small or absent, never with recurved teeth; tracheae usually opening through chitinous tubes or peritremes; sternal plate usually present

PARASITOIDEA

Hypostome large and provided with recurved teeth; tracheae opening through a chitinous plate; sternal plate usually absent IXODOIDEA, p. 275.

Superfamily PARASITOIDEA.

Key to the Families.

1. Chelicerae with the apices incurved and provided with teeth, and the fixed arm usually with a seta at the apex; body usually well covered with chitinous plates; anal plate, if present, usually united with ventral plate in both sexes PARASITIDAE, p. 273.

Chelicerae usually without teeth and fixed arm always without seta; body usually only partly covered on dorsum and venter with chitinous plates; anal plate nearly always present and distinct from ventral plate in ♀♀. DERMANYSSIDAE, p. 271.

Family DERMANYSSIDAE.

This family includes a number of species. They are all parasitic upon mammals, birds and reptiles.

Key to the South African Genera.

1. Stigmata situated dorsally. Parasitic upon birds
Rhinonyssus. 2
- Stigmata situated laterally
2. Chelicerae, at least in ♀, with teeth, and with movable arm; dorsal plate undivided; anal plate very large with numerous setae *Myonyssoides*.
3. Chelicerae of ♀ shear-like, with both arms present; anal plate usually egg-shaped; dorsal plate of ♀ entire; sternal plate with 3 pairs of setae *Liponyssus*.
- Chelicerae of ♀ long and needle-like; anal plate not egg-shaped with anal opening on its posterior part; dorsal plate of ♀ entire *Dermanyssus*.

Subfamily RHINONYSSINAE.

Genus RHINONYSSUS Trouessart.

1. *Rhinonyssus coniventris* Trouessart.

Rhinonyssus coniventris (Trouess.) Hirst, *Proc. Zool. Soc. Lond.*, p. 361, f. 6, 7 (1921).

Recorded by Hirst (1921) taken in the nasal cavities of turnstone, *Arenaria interpres* (= *Strepsilas interpres*), a migrant to South Africa.

2. *Rhinonyssus echinipes* Hirst.

Rhinonyssus echinipes Hirst, *Proc. Zool. Soc. Lond.*, p. 359, f. 3, 4 (1921).

Described from specimens collected in the nasal cavities of ringed plover, *Charadrius hiaticula* (= *Aegialitis hiaticula*) in the Shetland Isles. The host is a migrant to South Africa.

Subfamily IXODORHYNCHINAE.

Genus *Myonyssoides* Hirst.

Myonyssoides Hirst, *Proc. Zool. Soc. Lond.*, Pt. 1, p. 49 (1925).

This genus includes a single species.

1. *Myonyssoides capensis* Hirst (Fig. 4A and D).

Myonyssoides capensis Hirst, *Proc. Zool. Soc. Lond.*, Pt. 1, p. 49, f. 1 (1925).

Described from numerous specimens taken off *Cryptomys hottentotus* (Hottentot mole-rat) at Grahamstown, C.P.

Subfamily LIPONYSSINAE.

Genus LIPONYSSUS Kolenati (1859).

1. *Liponyssus bacoti* (Hirst) Fig. 4B.

♀. *Leiognathus bacoti* Hirst, *Bull. Ent. Res.*, IV, p. 122 (1913).

♀, ♂. *Leiognathus bacoti* Hirst, *ibid.*, V, p. 225, f. 12, 13 (1914).

Recorded by Hirst (1925) as attacking man at Pretoria and Weenen, Natal. It is normally parasitic on rats, and is widely distributed in the warmer parts of the world. It was originally described from Egypt.

2. *Liponyssus bursa* Berlese (1888).

This species, known as the "tropical read mite", is a serious pest of poultry in South Africa. They are blood-suckers and attack their hosts chiefly at night. In "The External Parasites of Poultry, with Measures for their Control" this parasite was erroneously recorded under the name of *Dermanyssus gallinae*.

Subfamily DERMANYSSINAE.

Genus DERMANYSSUS Dugés (1834).

This genus includes five species, two being found on birds and three on rats.

1. *Dermanyssus gallinae* (Redi), 1674 (Fig. 4c).

Recorded by Hirst (1925) attacking man at Capetown. This species is a common red mite of poultry and cage birds in Europe and North America.

Family PARASITIDAE.

This family, formally known as *Gamasidae*, includes a very large number of species found in all parts of the world. A large number of them are free-living mites, but many species are parasitic on vertebrates and invertebrates.

Key to the Subfamilies.

1. Spiracles dorso-lateral in position; legs short, stout and with large caruncles; larval stage passed inside the body of ♀. Parasitic mainly on bats *Spinturnicinae*.
- Spiracles ventro-lateral in position; legs more slender, with moderate caruncles; first pair of legs with either claws or caruncle and usually ambulatory in function
Parasitinae.

Subfamily SPINTURNICINAE.

This family includes a number of species belonging to the genera *Ancystropus* Kolenati, *Spinturnix* Heyden and *Periglischrus* Kolenati. The majority of the species have been found on bats in Europe and Africa, but no species has so far been recorded from South Africa.

Subfamily PARASITINAE.

Key to the South African Genera.

1. Second pair of legs enlarged and calcarate in both sexes.
Androlaelaps.
- Second pair of legs not calcarate in either sex 2
2. Setae on fixed digit of chelicerae very long and filiform
Haemolaelaps.
- Setae on fixed digit of chelicerae not so; genito-ventral plate with four pairs of setae, not extending to anal plate; second pair of legs not greatly enlarged, *Laelaps*.

Genus ANDROLAELAPS Berlese.

Androlaelaps Berlese, *Zool. Anz.*, XXVII, p. 14 (1903).

1. *Androlaelaps* sp.

Ingram (1927) records specimens from *Pedetes caffer* (springhare), Bainsvlei, Kroonstad District, O.F.S.

Genus HAEMOLAE LAPS.

1. *Haemolaelaps capensis* Hirst.

Haemolaelaps capensis Hirst, *Jour. Zool. Res., Lond.*, I, ii, p. (1916).

Described from specimens taken off Hottentot mole-rat, *Cryptomys hottentotus* (= *Georychus hottentotus*) from Cape Province.

2. *Haemolaelaps* sp.

Recorded by Ingram (1927) from *Tatera lobengulae* (gerbille), in the Frankfort, Kroonstad and Heilbron Districts, O.F.S.; also from *Geosciurus capensis* (ground squirrel) at Rendezvous, O.F.S.; and from *Pedetes caffer* (springhare), Bainsvlei, O.F.S.

Genus LAELAPS Koch.

Hirst gives a key to the females in the *Proc. Zool. Soc., Lond.*, Pt. 1, p. 53 (1925).

1. *Laelaps giganteus giganteus* Berlese (Fig. 3).

Laelaps giganteus Berlese, *Redia*, XIII, pp. 129-131 (1918).

Laelaps giganteus (Berl.) Hirst, *Proc. Zool. Soc. Lond.*, Pt. 1, pp. 66, 67, f. 13 (1925).

Recorded by Hirst (1925) from bushveld striped mouse, *Lemniscomys spinalis* (= *Arvicanthis dorsalis*), Mfongosi, Zululand. It has also been recorded taken off various rodents in Uganda, Kenya Colony, Nigeria and Liberia.

1A. *Laelaps giganteus bakeri* Hirst.

Laelaps giganteus var. *bakeri* Hirst, *Proc. Zool. Soc. Lond.*, Pt. 1, pp. 67-69, f. 14 (1925).

Recorded by Hirst (1925) taken off striped mouse, *Rhabdomys pumilio* (= *Arvicanthis pumilio*) at Bothaville, O.F.S., and Grahamstown, C.P.; also from *Rattus rattus rattus* in Kenya Colony, and from various rodents in Uganda and Algeria.

2. *Laelaps muricola* Trägårdh (Fig. 4E).

Laelaps muricola Träg., *Wirs. Ergebn. Schwed. Zool. Exp. Kilimand.*, III, pp. 54-57 (1910).

Laelaps muricola (Träg.) Hirst, *Proc. Zool. Soc. Lond.*, Pt. 1, pp. 63-64, f. 11 (1925).

Hirst (1925) records specimens taken in South Africa off multimammate mouse, *Mastomys coucha* (= *Mus coucha*) and *M. coucha silaceus*, Grahamstown, C. P. Ingram (1927) recorded it from *Tatera lobengulae* (gerbille), Frankfort, Kroonstad and Heilbron Districts, O.F.S.; *Rhabdomys pumilio* (striped mouse), Standerton, Transvaal, and *Mastomys coucha*. It has also been found on various rodents in Uganda, Kenya Colony, N. Nyasa, Gold Coast, Nigeria and Abyssinia.

3. *Laelaps parvulus* Hirst

Laelaps parvulus Hirst, *Proc. Zool. Soc., Lond.*, Pt. 1, pp. 54-55, f. 3 (1925).

Hirst (1925) records specimens taken in South Africa off bushveld striped mouse, *Lemniscomys spinalis* (= *Arvicanthis dorsalis*); also from *Otomys irroratus* (African water rat) at Grahamstown, C.P.

4. *Laelaps vansomereni* Hirst

Laelaps vansomereni Hirst, *Proc. Zool. Soc. Lond.*, Pt. 1, pp. 55-56, f. 4 (1925).

Hirst (1925) records specimens taken off African rat, *Aethomys chrysophilus* (= *Mus chrysophilus*) at Mfongosi, Zululand; also from rodents in Uganda and Kenya Colony.

Superfamily IXODOIDEA (Ticks).

Ticks are sub-divided into two families, the *Argasidae*, which includes the fowl ticks and tampans, and the *Ixodidae* or true ticks. These may be differentiated as follows:—

Family ARGASIDAE.—Integument of body more or less leathery, without a hard shield (scutum). Sexual dimorphism slight, the males only being distinguishable from the females by the shape of the sexual opening. Head situated on the anterior portion of the ventral surface, and not projecting beyond the anterior margin of the body, except in the larvae. Eyes usually absent; when present, four in number and situated laterally on the supra-coxal folds. Pulvillus absent or rudimentary.

Family IXODIDAE.—Scutum present on the dorsal surface of the body, forming a small round or oval plate behind the head in the females, nymphs, and larvae, and covering the entire upper surface in the males. Head situated on the anterior margin, and always plainly visible when viewed from above. Eyes absent or present; when present, two in number, situated on the lateral margin of the scutum. Pulvillus always present.

Family ARGASIDAE Canestrini.

In the past this family has comprised two genera, *Argas* and *Ornithodoros*, the former only distinguishable from the latter in having the margin of the body differing in structure from the rest of the integument. As this character cannot be considered of generic importance, we have been compelled to sink *Ornithodoros* as a synonym of *Argas*. In 1908 Nuttall, Warburton, Cooper and Robinson stated that they were by no means sure that the family Argasidae contained more than one genus, *Argas*, and since then one or two new species have been described which support their view. In *Ornithodoros* the integument varies in different species and in some, such as *O. pérengueyi*, it more closely resembles the integument of species of *Argas* than that of other species of *Ornithodoros*, such as *moubata*, etc. Moreover, the shape of the body and other characters of *O. pérengueyi* also convince one that it is more closely related to certain species of *Argas* than it is to *O. moubata*, etc.

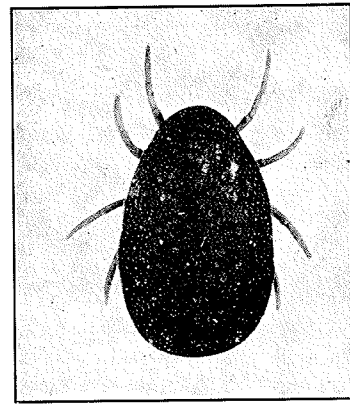


Fig. 6. *Argas persicus* (Oken),
dorsum of female.

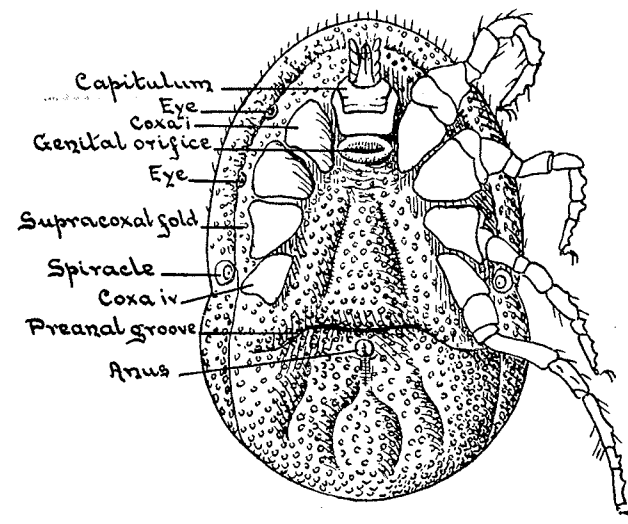


Fig. 7. *Argas savignyi* Aud., venter of female.

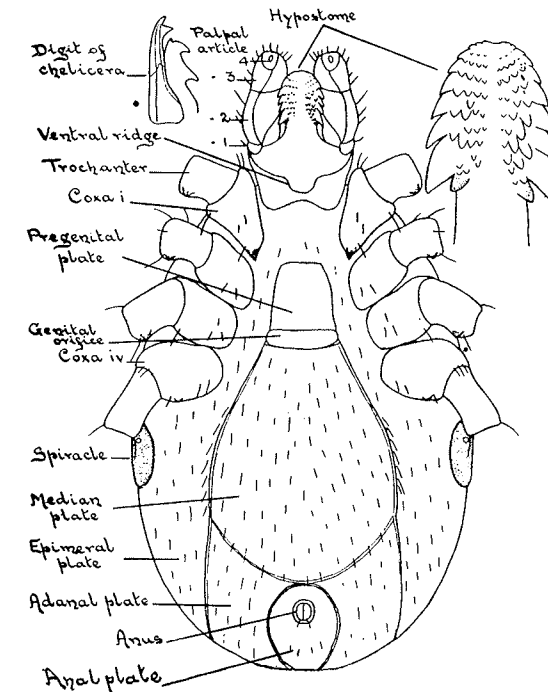


Fig. 8. *Ixodes pilosus* Koch, venter of male.

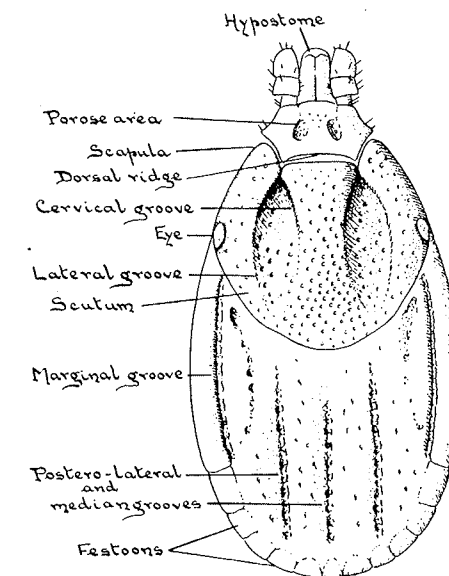


Fig. 9. *Rhipicephalus appendiculatus*, Neu.,
dorsum of female.

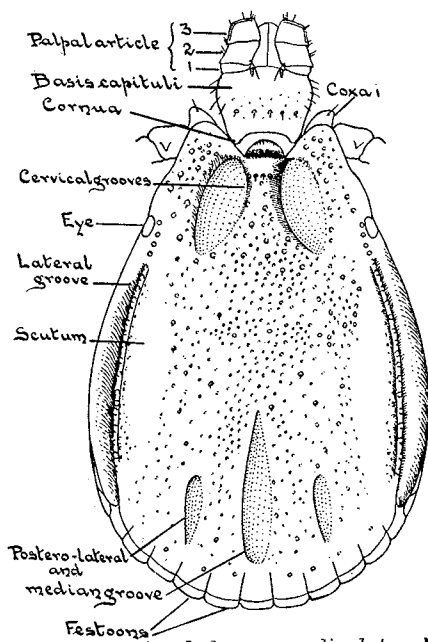


Fig. 10. *Rhipicephalus appendiculatus* Neu., dorsum of male.

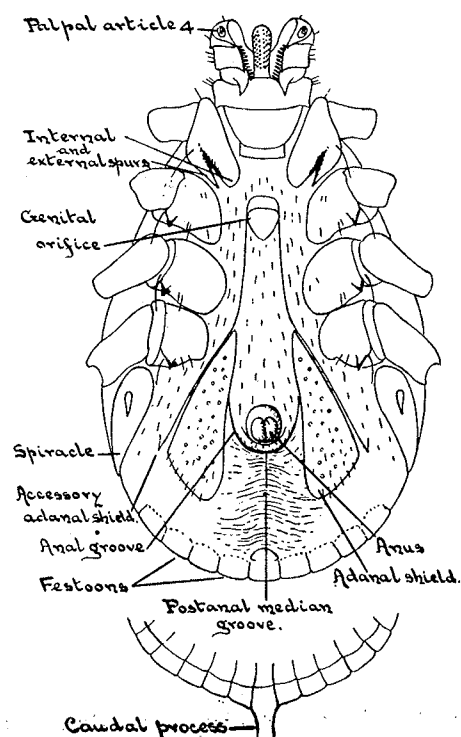


Fig. 11. *Rhipicephalus appendiculatus* Neu., venter of male.

Genus ARGAS Latreille.

Argas Latreille, *Précis Caract. Ins.*, p. 178 (1796).
Ornithodoros Koch, *Arch. f. Naturg.*, X, i, p. 219 (1844).
Argas (Latr.) Nutt., Warb., Cooper & Robinson, Ticks: Mon. Ixod., I, p. 4 (1908).
Ornithodoros (Koch) Nutt., Warb., Cooper & Robinson, *ibid.*, p. 39 (1908).

Ornithodoros of numerous authors.

This genus is cosmopolitan and contains about thirty-two species, ten of these having been recorded from South Africa.

Key to the South African Species.

1. Integument not mammillated; eyes absent 2
 Integument mammillated, usually without discs; eyes present or absent 7
2. Body circular, the anterior margin pointed in the adults
 A. vespertilionis (Latr.).
 Body oblong 3
3. Integument of adults with numerous small pits, of nymph with numerous small spines; margins similar to rest of body *A. mégnini* Dugès.
 Integument without small pits, but symmetrically arranged discs (largish depressions) present; spines absent 4
4. Anterior margin of body rounded 5
 Anterior margin of body sub-conical 6
5. Margin of body formed of a border of quadrangular plates
 A. persicus (Oken).
 Margin of body formed of a series of irregular wrinkles
 A. transgaripepinus White.
6. Integument with numerous striae, the arrangement of the striae on the margins differing from those on the rest of the body; indistinct discs on dorsum; venter and posterior margin of dorsum wrinkled. *A. striatus* Bedf.
 Integument finely wrinkled, the margins being similar to the rest of the body; discs larger and more numerous
 A. pérengueyi (Bedf. & Hewitt).
7. Body broad and rounded in front 8
 Body narrower, sub-conical in front; eyes absent
 A. capensis (Neu.).
8. Body with hemispherical granulations * 9
 Body with flat contiguous granulations; eyes present
 A. pavimentosus (Neu.).
9. Eyes absent *A. moubata* Murray.
 Eyes present *A. savignyi* Aud.

* In fully distended adults of *A. moubata* the granulations are flat.

1. **Argas talaje capensis** (Neumann), "The penguin tick".

Ornithodoros talaje var. *capensis* Neu., *Mém. Soc. Zool. France*, XIV, p. 258 (1901).

O. talaje var. *capensis* (Neu.) Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, p. 61, f. 58, 89 and Pl. 3 (1908).

O. talaje var. *capensis* (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 88, Pl. 1, figs. r, s; Pl. 3, figs. a-e (1908).

This tick is found in the nests of *Spheniscus demersus* (jackass penguin) on islands off the Cape Province coast. It readily attacks both man and fowls when opportunities offer.

2. **Argas mégnini** Dugès, "The spinose ear tick".

Argas mégnini Dugès, *Natureza*, V, p. 195 (1883).

Ornithodoros mégnini (Dugès) Nutt., Warb., Cooper & Robins., *Mon. Ixod.*, I, pp. 71, 103, f. 102-112 (1908).

Ornithodoros mégnini (Dugès), Bedford, *Rep. Dir. Vet. Res.*, II, p. 343, Pl. 37 (1912).

This is an American tick which has established itself throughout the dry districts of the Cape Province and the Orange Free State. It also occurs in parts of Natal and has recently been found in the Transvaal. Larvae and nymphs are only found in the ears of their hosts. They are chiefly parasitic upon cattle, sheep and goats, but also attack man, horses, donkeys, mules, dogs, cats and ostriches. The adults do not feed.

3. **Argas moubata** Murray, "The eyeless tampan tick".

Argas moubata Murray, *Econ. Ent. Apt.*, p. 182 (1877).

Ornithodoros savignyi var. *caecus* Neumann, *Mém. Soc. Zool. France*, XIV, p. 256 (1901).

Ornithodoros moubata (Murray), Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, pp. 46, 96, f. 58, 66-80 (1908).

Ornithodoros savignyi var. *caecus* (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 86, Pl. 1, figs. a-e; Pl. 3, figs. g, h (1908).

This species has been recorded from the Cape Province, Transvaal, Bechuanaland, South-West Africa, Angola, Rhodesia, Portuguese East Africa, Congo, Somaliland, Kenya Colony, Tanganyika Territory, Zanzibar and Abyssinia. It is parasitic on man and also attacks domestic animals, rabbits, rats, mice and fowls. Adults and nymphs have also been taken off 44 tortoises (*Testudo oculifera* and *T. verreauxii*), Niekerk's Hope, Kimberley, C.P. (coll. J. H. Power). It is the transmitting agent of *Treponema duttoni*, the organism which causes African relapsing fever or tick fever in man. It has also been proved experimentally to transmit *Treponema gallinarum* to fowls.

4. **Argas pavimentosus** (Neumann).

Ornithodoros pavimentosus Neu. *Mém. Soc. Zool. France*, XIV, p. 257 (1901).

Ornithodoros pavimentosus (Neu.) Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, p. 62, f. 90-92 (1908).

Ornithodoros savignyi var. *pavimentosus* (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 87, Pl. 3, figs. f-h (1908).

This species, which is parasitic upon man, has only been found in South-West Africa. The type was collected at Bethany.

5. **Argas pérengueyi** (Bedford and Hewitt), "The swallow tick".

Ornithodoros pérengueyi Bedf. & Hewitt, *S. Afr. Journ. Nat. Hist.*, V, i, p. 259, Pl. 19, f. 1-3 (1925).

Described from adults and one nymph taken at Nqamakwe, C.P. They were collected by the Rev. L. S. Byrde, who reported on them as infesting a native church. I have since taken adults and immature forms in the nests of *Petrochelidon spilodera* (South African cliff swallow) at Onderstepoort.

6. **Argas persicus** (Oken), "The fowl tick" (Fig. 6).

Rhynchoprion persicum Oken, *Isis*, p. 1567, Pl. 19, f. 1-4 (1818).

Argas persicus (Oken) Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, pp. 8, 81, Pl. 1, f. 3 & f. 1-26 (1908).

Argas persicus (Oken) Howard, *Ann. Tvl. Mus.*, I, ii, p. 76, Pl. 1, figs. f-i; Pl. 2, figs. c-n (1908).

This tick is very common throughout the country, and is the most serious pest the poultry-keeper has to contend with. It has also been recorded from Southern Rhodesia, Mozambique, Belgian Congo, Egypt, Sudan, Algeria, Mauritius, Russia, Turkestan, Persia (type locality), India, China, the southern part of North America, South America and Australia. It is parasitic upon fowls, ducks, geese, turkeys, pigeons, canaries and ostriches. Howard (1908) has also recorded it from secretary bird (*Sagittarius serpentarius*) and specimens have also been taken off wild guinea-fowl (*Numida papillosa transvaalensis*) at Pienaars River, Transvaal. It has frequently been known to attack man in Persia, but rarely does so in South Africa. The ticks live mainly in the cracks and crevices of woodwork of fowl-houses and runs, and under the bark of trees. They mainly attack their hosts at night, except the larvae, which remain on their hosts for several days to feed. The fowl tick is the chief transmitting agent of the fowl spirochaete (*Treponema gallinarum*), which is usually fatal to birds.

7. **Argas savignyi** Audouin, "The tampan tick" (Fig. 7).

Argas savignyi Aud., *Deser. Egypte*, ed. 2, XXII, p. 426, Pl. 9, f. 5 (1827).

Ornithodoros savignyi (Aud.) Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, p. 42, Pl. 2 and f. 58, 59-65, 70, 71 (1908).

Ornithodoros savignyi (Aud.) Howard, *Ann. Trvl. Mus.*, I, ii, p. 83 (1908).

This tick is widely distributed in Africa, it having been recorded from the Cape Province, Transvaal, Bechuanaland, South-West Africa, Rhodesia, Portuguese East Africa, Tanganyika Territory, Congo, Somaliland, Abyssinia and Nubia. It is found in desert tracts in the shade of trees and rocks, and also in native huts. It is parasitic upon man and fowls, and has also been reported to feed on dogs, horses, sheep, goats, cattle, pigs and rabbits. Two adults were found by the Verney-Lang Expedition to the Kalahari on sandy ground at Damara Pan, 1930.

8. **Argas striatus** Bedford.

Argas striatus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVIII, p. 221, f. 1-2 (1932).

Described from three females found in the nest of *Philetairus socius* (sociable weaver), Kenhardt, C.P.

9. **Argas transgariëpinus** White.

Argas transgariëpinus White in Methuen, *Life in S. Afr.*, p. 318, Pl. 2, f. 4 (1846).

Argas kochi Neumann, *Mém. Soc. Zool. France*, XIV, p. 254 (1901).

A. transgariëpinus (White) Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, p. 29, f. 36, 37 (1908).

A. transgariëpinus (White) Howard, *Ann. Trvl. Mus.*, I, ii, p. 81 (1908).

Described from three females which were probably collected north of the Orange River. The type of *A. kochi*, a ♂, was collected in Basutoland. The host is unknown.

10. **Argas vespertilionis** (Latreille), "The bat tick".

Carios vespertilionis Latr., *Précis Caract. Ins.*, p. 177 (1796).

A. vespertilionis (Latr.) Nutt., Warb., Cooper & Robins., Ticks: Mon. Ixod., I, p. 34, Pl. 1, f. 4, 5 and figs. 48-57 (1908).

A. vespertilionis (Latr.) Howard, *Ann. Trvl. Mus.*, I, ii, p. 79, Pl. 1, figs. h-p; Pl. 2, figs. p-w (1908).

Recorded from various species of bats in South Africa, Egypt, Tunis, England and France. Howard (1908) recorded it from *Miniopterus natalensis* (= *M. schreibersi*), Pretoria, and we have taken two larvae off *Eptesicus capensis* at Onderstepoort. It has frequently been known to attack human beings living in houses frequented by bats, and we have received a specimen taken off a cat at Vryburg, C.P. In Tunis it has been demonstrated to transmit a spirillum, *Treponema vespertilionis*, to bats.

Family IXODIDAE.

Key to the Genera.

1. Integument of body leathery, having a definite pattern and resembling that of Argasidae; scutum resembling the rest of body-integument, especially parts thereof; palpi short, the joints flexible, the third and fourth cylindrical, the latter being terminal; eyes absent; anal groove curving in front of anus *Nuttalliella*, p. 284.
- Integument of body without a definite pattern; scutum not resembling rest of body-integument; palpi long or short, joints not flexible, the fourth situated ventrally at the distal end of the third segment 2
2. Anal grooves surrounding the anus in front 3
- Anal grooves surrounding the anus behind (in *Boophilus* and *Margaropus* the anal groove is faint or obsolete) 4
3. Inornate, eyes and festoons absent; males with a pregenital, median, anal, two adanal and two epimeral plates on the venter *Ixodes*, p. 284.
4. Hypostome and palpi short 5
- Hypostome and palpi long 10
5. Eyes absent *Haemaphysalis*, p. 288.
- Eyes present 6
6. Festoons present 7
- Festoons absent 9
7. Males with coxae iv much larger than coxae i to iii, no plates or shields on ventral surface of male 8
- Males with coxae iv not larger than coxae i to iii, a pair of adanal shields and usually a pair of accessory adanal shields on ventral surface of male. Species usually inornate, basis capituli generally hexagonal dorsally *Rhipicephalus*, p. 291.
8. Species ornate, basis capituli rectangular dorsally *Dermacentor*, p. 290.
- Species inornate, basis capituli hexagonal dorsally with prominent lateral angles. Coxae iv of male with two long spines *Rhipicentor*, p. 291.

9. Inornate; coxae i with a small spine. Male with median plate projecting backwards on either side of the anus, and with a caudal protrusion when engorged. Fourth pair of legs of male dilated *Margaropus*, p. 299.
 Inornate; coxae i bifid. Male with a pair of adanal and accessory shields, and a caudal protrusion. Fourth pair of legs normal *Boophilus*, p. 300.
10. Eyes present 11
 Eyes absent or rudimentary 12
11. Festoons absent or present. Males with a pair of adanal shields and two posterior abdominal protrusions, accessory adanal shields absent or present ... *Hyalomma*, p. 301.
 Species usually ornate; festoons present. Male without adanal shields, but small plaques may be present on the venter near the festoons *Amblyomma*, p. 303.
12. Species occurring almost exclusively on Reptilia
Aponomma, p. 307.

Genus NUTTALLIELLA Bedford.

Nuttalliella Bedford, *Parasit.*, XXIII, ii, p. 231 (1931).

This genus comprises a single species.

1. *Nuttalliella namaqua* Bedford.

Nuttalliella namaqua Bedford, *Parasit.*, XXIII, ii, p. 231, Pl. 10 and fig. 1 (1931).

Described from a single fully engorged female collected under a stone at Kamieskroon, Little Namaqualand, by Dr. R. F. Lawrence.

Genus IXODES Latreille.

Ixodes Latreille, *Précis des caractères génériques des insectes, disposés dans un ordre naturel*, p. 179 (1795).

Ixodes Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 116, f. 115-119 (1911).

This genus is widely distributed and comprises a number of species, seven of which have been found in South Africa.

Genotype: *Acarus ricinus* Linné.

Key to the South African Species.

Adults.

1. Anal grooves sub-parallel or divergent 2
 Anal grooves horseshoe-shaped or closed or nearly so behind 3
2. Anal grooves sub-parallel *I. rubicundus*.
 Anal grooves slightly divergent; legs longer and more slender; ♂ unknown *I. simplex*.

3. Anal grooves horseshoe-shaped 4
 Anal grooves closed or almost closed behind 6
4. Coxa i to iv of ♀ with sharp external spur, coxi i also with sharp internal spur; ♂ unknown *I. daveyi*.
 Coxae i to iv of ♀ without such spurs 5
5. Scutum of ♀ much longer than broad (1.26 × 0.8 mm.); ♂ unknown *I. nairobiensis*.
 Scutum of ♀ only very slightly longer than broad *I. pilosus*.
6. Anal grooves circular; tarsi iv of ♂ humped some distance from apex *I. rarus*.
 Anal grooves ending in a point behind; tarsi iv of ♂ tapering *I. ugandanus*.

1. *Ixodes daveyi* Nuttall.

I. daveyi Nuttall, *Parasit.*, VI, ii, p. 133, f. 2 (1913).

A single ♀ recorded by Bedford and Hewitt (1925) taken off a pink-billed weaver (*Quelea sanguinirostris lathamii*) at Onderstepoort, Transvaal. This species was described from a single ♀ also taken off a bird, a plantain-eater (*Gallinix johnstonii*), on the northern ridge of Ruwenzori, Uganda. Bequaert (*Rev. de Zool. et Botan. Afr.*, XX, iii, p. 214, 1931) records a ♀ from a warbler, *Cisticola natalensis kapietra* in the Belgian Congo.

2. *Ixodes pilosus* Koch, "Sheep paralysis tick" (Fig. 8).

I. pilosus Koch, *Arch. f. Naturg.*, X, i, p. 233 (1844).

I. pilosus var. *howardi* Neu. *Trans. Roy. Soc. S. Afr.*, I, p. 125 (1908).

I. pilosus (Koch) Howard, *Ann. Trvl. Mus.*, I, ii, p. 94 (1908).

I. pilosus var. *howardi* (Neu) Howard, *ibid.*, p. 95, Pl. 4, figs. a-k (1908).

I. pilosus (Koch) Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 221, f. 217-221 (1911).

I. pilosus var. *howardi* (Neu.) Nutt. & Warb., *ibid.*, ii, p. 226 (1911).

This tick has been found in various localities in the Cape Province, Transvaal, Orange Free State, Natal and Zululand. It is probably only common in grass districts near the coast. Lounsbury (1900) records it from cattle, horses, goats and pigs. Mally (1904) on sheep. Howard (1908) from man, cat, dog, leopard, bushbuck, hedgehog (*Atelerix frontalis*) and bat (*Rhinolophus geoffroyii augur*)*, Dönitz (1910) from a civet cat at Umtali, and Nuttall and Warburton from a duiker. Females have been taken off *Tragelaphus sylvaticus* (bushbuck), Black Umfolosi, Zululand (coll. J. Dickson); a ♀ off *Felis ocreata caffra* (Cape wild cat), Worcester, C.P. (coll. P. L. le Roux); a ♀ off *Atelerix frontalis*, Pretoria District (coll. G.A.H.B.),

* Specimen from bat probably *I. simplex* Neu.

and a female off *Nototragus melanotis* (grysbok), Bredasdorp, C.P. (coll. R. F. Lawrence). Specimens recorded from one or two hosts in first edition prove to be *I. rubicundus*. Recorded by Nuttall (1916) from hartebeest and grysbok, N. Rhodesia; *Felis capensis hindei* Wr., Kenya Colony; dogs, reedbuck, oribi and roan antelope, Nyasaland, and from Tanganyika Territory. Bequaert (Rep. Harv.-Afr. Exped. Liberia and Belg. Congo, p. 799, 1931) recorded it from a duiker, *Cephalophus melanorheus schüsteri*, Tanganyika Territory.

This species is capable of producing paralysis in sheep, goats and cattle.

3. *Ixodes nairobiensis* Nuttall.

I. nairobiensis Nuttall, *Parasit.*, VIII, iii, p. 299, f. 4 (1916).

I. elongatus, Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 493, Pl. 1, f. 1, 2 (1929).

Described by Nuttall from a ♀ found on a dog at Nairobi, Kenya Colony, and by Bedford from a ♀ found on *Mastomys coucha* (multimammate mouse), Onderstepoort. We have also received a ♀ from Mr. L. Hill taken off a warthog, Lake Naivasha, Kenya Colony.

4. *Ixodes rasmus* Neumann.

I. rasmus, Neumann, *Mem. Soc. Zool. France*, XII, p. 137, f. 12-14 (1899).

I. (I.) rasmus Neumann, *Ixod.*, *Das Tierreich.*, p. 26 (1911).

I. rasmus (Neu.) Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 228, f. 224-226 (1911).

A ♀ and nymphs taken off *Procavia* sp. (rock rabbit), Mtabamhlope, Natal; also a ♀ off *Herpestes caffer* (large grey mongoose), Pietermaritzburg, Natal (coll. L. Hill), and a ♀ off *Myonax cauii* (slender mongoose), Tzaneen, Transvaal (coll. B. De Meillon). Specimens have also been taken off impala, *Aepyceros melampus* (coll. R. A. Cooley). Neumann (1899) described a ♂ and ♀ from *Hyrax* sp., Congo, and in 1911 recorded it from *Herpestes ichneumon*, *Cephalophus leucogaster* and dog, and gave the following localities: Cameroons, Togo and Tanganyika Territory. Nuttall and Warburton (1911) recorded it from cattle, Uganda, and from leopard, man and dog in Ashanti. Nuttall (1916) recorded it from man, Abyssinia; *Felis capensis hindei* Wr., Kenya Colony; wild pigs and *Mavis* sp., Cameroon; goat, Belgian Congo; leopard, S. Rhodesia; dog, Gold Coast, and from Spanish Guinea. It has also been recorded from the Belgian Congo by Bequaert (1931) on *Dendrohyrax adolfi-friederici* Brauer, by Schouteden (1927) on *Okapia johnstoni* Sclater, and by Schwetz (1927) on *Aulacodus swinderianus* Temm.

5. *Ixodes rubicundus* Neumann.

I. rubicundus Neumann, *Arch. Parasit.*, VIII, p. 460, f. 2 (1904).

I. rubicundus (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 97, Pl. 4, figs. 1 (a, b) (1908).

I. rubicundus (Neu.) Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 204, f. 197, 198 (1911).

Described from specimens found on sheep in the eastern Cape Province. It is common in the Middelburg District, C.P., where I have found adults on horses, cattle, sheep, goats, dogs and vaal rhebok (*Pelea capreolus*), and the immature stages on Cape red hare (*Pronolagus crassicaudatus*) and elephant shrew. Adults have also been found on sheep and cattle near Johannesburg and on *Damaliscus dorcas* (bontebok), *Raphiceros campestris* (steenbok) and *Nototragus melanotis* (grysbok), Bredasdorp, C.P. (coll. R. F. Lawrence). Nuttall (1916) has recorded it from dogs, Broken Hill, N. Rhodesia. It is capable of producing paralysis in sheep, goats, cattle and vaal rhebok.

6. *Ixodes simplex* Neumann.

♀, ♂. *I. simplex* Neumann, *Arch. de Parasit.*, X, p. 197 (1906).

♀. *I. simplex* (Neu.) Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 207, f. 199 (1911).

One female, two nymphs and a larva taken off a bat, *Myotis tricolor*, in a cave at Irene, near Pretoria, 25th October, 1931 (coll. G. A. H. B.). The specimen recorded by Howard (1908) as *I. pilosus howardi* from *Rhinolophus geoffroyii augur* was probably this species. It was described from one female and one nymph taken off *Rhinolophus ferrum-equinum* (Schreb.), Shanghai, and one female from *Vespertilio* sp., Gaboon, French Congo.

7. *Ixodes ugandanus* Neumann.

I. ugandanus Neumann, *Arch. Parasit.*, X, p. 198 (1906).

I. ugandanus Neumann, *Ixod.*, *Das Tierreich.*, p. 25 (1911).

I. ugandanus (Neu.) Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 230, f. 227, 228 (1911).

Specimens have been taken off *Thryonomys swinderianus variegatus* (Natal cane-rat), Umfolosi Reserve, Zululand (coll. P. L. le Roux); also off same host in Zululand (coll. H. H. Curson). It was described by Neumann from a ♂ and ♀ taken off a cane-rat in Uganda, and he also recorded it from Tanganyika Territory. Nuttall and Warburton (1911) record specimens from a large rodent and sheep in West Africa.

Genus HAEMAPHYSALIS Koch.

Haemaphysalis Koch, *Arch. f. Naturg.*, X, i, p. 237 (1844).

Haemaphysalis Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 119, f. 120 (1911).

This genus is very widely distributed and contains a number of species, the majority having been found in Asia.

Genotype: *Haemaphysalis concinna* Koch (Designated by Neumann, 1901).

Key to the South African Species.

MALES.

1. Coxal spurs normal 2
Coxa iv with a long needle-like spur *H. aciculifer*.
2. Palpal article iii without a spur on dorsum 3
Palpal article iii with a spur on dorsum; lateral grooves very short *H. parvata*.
3. Scutum short-oval 4
Scutum elongate, much longer than broad 5
4. Palpal article ii strongly salient laterally *H. hoodi*.
Palpal article ii not salient laterally *H. silacea*.
5. Palpal article iii with a ventral retrograde spur *H. leachii*.
Palpal article iii without a spur on venter *H. cooleyi*.

FEMALES.

1. Palpal article iii without a spur on dorsum 2
Palpal article iii with a spur on dorsum; scutum about as broad as long *H. parvata*.
2. Scutum about as broad as long 3
Scutum much longer than broad 5
3. Palpal article iii with a ventral retrograde spur 4
Palpal article iii with a spur on venter *H. hoodi*.
4. Palpal article iii slightly salient laterally *H. aciculifer*.
Palpal article iii not salient laterally *H. silacea*.
5. Palpal article iii with a ventral retrograde spur *H. leachii*.
Palpal article iii without a spur on venter *H. cooleyi*.

1. *Haemaphysalis aciculifer* Warburton.

H. aciculifer Warburton, *Parasit.*, VII, p. 125 (1913).

H. aciculifer (Warb.) Nutt. & Warb., *Ticks: Mon. Ixod.*, iii, p. 411, f. 345, 346 (1915).

One ♂ taken off *Redunca arundinum* (reedbuck) in northern Zululand, 29th October, 1924 (coll. G. A. H. B.).

This species was described from a ♂ and ♀ found on the antelope, *Cobus thomasi*, in Uganda. Nuttall and Warburton (1915) also received a ♀ taken off a reedbuck in the Gold Coast.

2. *Haemaphysalis cooleyi* Bedford.

H. cooleyi Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 494, Pl. 2, f. 3 A-D (1929).

Described from adults and nymphs taken off *Procapra coombsi* (Transvaal dassie) near Onderstepoort; also from nymphs taken off *Pedetes caffer* (springhare) at Pienaars River, Transvaal.

3. *Haemaphysalis hoodi* Warburton and Nuttall.

♂, ♀. *H. hoodi* Warb. & Nutt., *Parasit.*, II, i, p. 62, f. 7, 8 (1909).

♂, ♀, ♀, I. *H. africana* Howard, *Ann. Trvl. Mus.*, pp. 219-223, Pl. 34 (1909).

♂, ♀, ♀, I. *H. hoodi* (Warb. & Nutt.) Nutt. & Warb., *Ticks: Mon. Ixod.*, iii, p. 483, f. 423-426 (1915).

Two females and two males recorded by Bedford and Hewitt (1925) taken off a redwing starling (*Amydrus morio*) at Pietermaritzburg, Natal.

This species was described from numerous females, males and one nymph taken off fowls at Bathurst, Gambia. Nuttall and Warburton (1915) also recorded it from a plantain-eater, *Gymnoschizorhis leopardi* Shelley, Kenya Colony; the ears of partridges in Nyasaland; guinea-fowl (*Numida meleagris* Linné), Gold Coast, and a Senegal coucal (*Centropus senegalensis*), Sierra Leone. Howard (1909) recorded it from a Burchell's coucal (*Centropus burchelli*), Portuguese East Africa.

4. *Haemaphysalis leachii* (Audouin), "The dog tick".

Ixodes leachii Audouin in Savigny, *Dese de l'Egypte*, Pl. 9, f. 9 (1826).

Haemaphysalis leachi (Aud.) Howard, *Ann. Trvl. Mus.*, I, ii, p. 160, Pl. 16, figs. a-m (1908).

Haemaphysalis leachi (Aud.) Nutt. & Warb., *Ticks: Mon. Ixod.*, iii, p. 460, Pl. 12, 13 and figs. 398-410 (1915).

This species is common and widely distributed in Africa, and also occurs in Asia and Australia. Howard (1908) records it from the following hosts in South Africa: Dog, cat, cattle (rare), jackal; lion; leopard; black-footed cat, *Micropelis felis* (= *Felis nigripes*); civit cat (*Civettictis civetta*); hedgehog (*Atelerix frontalis*), and nymphs on striped mouse, *Rhabdomys pumilio* (= *Arvicanthus pumilio*) and a tortoise. Nuttall and

Warburton (1915) recorded it from *Suricata suricatta* (= *S. tetradactyla*) Deelfontein, C.P., and Ingram (1927) from *Tatera lobengulæ* (gerbille). We have found it on *Rattus rattus* (black rat), *Otomys irroratus* (African water rat) and *Mastomys coucha* (multimammate mouse) at Onderstepoort. Adults have been taken off *Atelesia frontalis* at Petrusburg, O.F.S., and in the Pretoria District; *Protelis cristatus* (aardwolf), Umkomaas Valley, Natal; *Vulpes chama* (silver fox), Petrusburg, O.F.S.; *Genetta tigrina* in the Albany District, C.P.; *Calogale caurii* (slender mongoose), and *Genetta felina*, Rustenburg District, Transvaal; *Cynictis penicillata* (yellow mongoose), Pretoria District; *Mellivora capensis* (Cape badger), Gibson District, S.W.A. (coll. Dr. Schmidt); *Lepus capensis* (Cape hare), *Ictonyx striatus* (stink muishond) and *Geosciurus capensis* (ground squirrel), Glen, O.F.S. (coll. R. Bigalke); *Pronolagus crassicaudatus rupestris* (Cape red hare) in the Middelburg District, C.P. Nymphs have been collected off *Rattus rattus frugivorus* (arboreal black rat) at Bothaville, O.F.S., and off *Pedetes caffer* (springhare) at Petrusburg.

This tick is the principal transmitting agent of canine piroplasmiasis or biliary fever to dogs in South Africa.

5. **Haemaphysalis parmata** Neumann.

♂, ♀. *H. parmata* Neu., *Arch. Parasit.*, IX, p. 228 (1905).

♂, ♀, ♀, L. *H. parmata* (Neu.) Nutt. & Warb., *Ticks: Mon. Ixod.*, iii, p. 418, f. 350-353 (1915).

Specimens have been taken off *Tragelaphus sylvaticus* (bushbuck) in Zululand (coll. H. H. Curson). Nuttall and Warburton (1915) recorded it from the following hosts: Cattle and bushbuck in Uganda; Jackson's hartebeest in Kenya Colony; antelope and buffalo in the Belgian Congo; cattle and harnessed antelope in Sierra Leone, and cattle, goat, sheep and pig in the Cameroon.

6. **Haemaphysalis silacea** Robinson.

♀. *H. silacea* Robinson, *Parasit.*, IV, iv, p. 478 (1911).

♀. *H. silacea* (Robins.) Nutt. & Warb., *Ticks: Mon. Ixod.*, iii, p. 416, f. 439 (1915).

♀, ♂. *H. silacea* (Robins.) Bedf. & Hew., *S. Afr. Journ. Nat. Hist.*, V, i, p. 260, Pl. 19, f. 4-6 (1925).

Described by Robinson from females collected on an ox at Gunubie Park, East London, Cape Province. Bedford and Hewitt (1925) recorded males and females taken off an ox at Riebeek East, Cape Province.

Genus DERMACECTOR Koch.

Dermacentor Koch, *Arch. f. Naturg.*, X, i, p. 235 (1844).

Dermacentor Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 120, f. 121 (1911).

This genus contains a number of species, the majority being found in America. Only two species have been recorded from Africa.

1. **Dermacentor rhinocerotis** (De Geer), "The rhinoceros tick".

Acarus rhinocerotis De Geer, *Mém. Hist. Ins.*, VII, p. 160, Pl. 38, f. 5, 6 (1778).

D. rhinocerotis (De Geer) Howard, *Ann. Trvl. Mus.*, I, ii, p. 157, Pl. 16, figs. o, p. (1908).

D. rhinocerotis (De Geer) Neu., *Ixod.*, *Das Tierreich*, p. 102 (1911).

This species has been recorded taken off rhinoceros at Durban, Natal, in the Cape Province, Mozambique, Zambesi and Zanzibar. In the Onderstepoort collection there are two males taken off a black rhinoceros (*Diceros bicornis*) in the Hluhluwe Game Reserve, Zululand, by D. T. Mitchell, and two males collected by Captain Taylor from the same host in Rhodesia.

Genus RHIPICENTOR Nuttall and Warburton.

Rhipicentor Nutt. & Warb., *Proc. Phil. Soc. Cambridge*, XIV, p. 398 (1908).

Rhipicentor Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 121, f. 123, 124 (1911).

This genus includes two species.

Genotype: *Rhipicentor bicornis* Nuttall and Warburton.

1. **Rhipicentor nuttalli** Cooper and Robinson.

Rhipicentor nuttalli Cooper & Robins., *Proc. Camb. Phil. Soc.*, XIV, p. 462, fig. (Feb., 1908).

Rhipicentor vicinus Neumann, in Howard, *Ann. Trvl. Mus.*, I, ii, p. 155, Pl. 7, figs. f-i (Aug., 1908).

Rhipicentor vicinus Neumann, *ibid.*, I, ii, p. 170 (Aug., 1908).

Described by Neumann from specimens taken off hedgehog, *Atelesia frontalis* (= *Erinaceus frontalis*) at Pienaar's River and Pretoria. We have taken specimens off the same host at Onderstepoort, and two females off dogs in the same locality. A female has been taken off a koodoo (*Strepsiceros strepsiceros*) at Omarura, South-West Africa.

Genus RHIPICEPHALUS Koch.

Rhipicephalus Koch, *Arch. Naturg.*, X, p. 238 (1844).

Rhipicephalus (Koch) Nutt. & Warb., *Ticks: Mon. Ixod.*, ii, p. 122 (1911).

This genus contains a number of species, the majority occurring in Africa. Some of them are very important on account of the rôle they play in the transmission of diseases to domestic animals. The majority of the species are difficult to identify, especially the females, owing to structural features being few, and the great range of individual variation, both in size and structure.

Key to the South African Species.

MALES.

1. Eyes hemispherical, orbited 2
Eyes flat 4
2. Legs brown; coxae i projecting in front, prominent when viewed dorsally; punctations on scutum numerous, but not coalescing *R. oculatus*.
Legs not brown; coxae i not prominent when viewed dorsally; punctations on scutum coalescing, making the scutum appear shagreened 3
3. Legs yellowish-red in colour, not banded *R. evertsi*.
Legs yellowish-red in colour with pale bands
R. evertsi mimeticus.
4. Lateral grooves absent; basis capituli with lateral margins rounded 5
Lateral grooves present; basis capituli usually with prominent lateral angles 6
5. Scutum brown with one to nine pale spots, and a few large scattered punctations *R. maculatus*.
Scutum without pale spots, the punctations numerous, large and equal; coxae i prominent when viewed dorsally
R. sp.
6. Adanal shields with posterior margins straight or convex, not strongly pointed posteriorly 7
Adanal shields with posterior margins either concave or with a median prolongation 13
7. Basis capituli with prominent lateral angles; coxae i not prominent when viewed dorsally 8
Basis capituli with lateral margins rounded; coxae i prominent when viewed dorsally; scutum with fine and a few large punctations, mainly distributed in the middle; on the inside of the lateral grooves there is an area free of punctations. Fully fed ♂♂ with a long caudal process *R. appendiculatus*.
8. Scutum sub-triangular, with a number of fine punctations and a few large scattered ones *R. deltoideus*.
Scutum oval 9
9. Scutum shiny, with a few large punctations 10
Punctations on scutum more numerous, spread over the surface 11
10. Punctations on scutum unequal, those on the posterior half being particularly large and deep *R. punctatus*.
Large punctations on scutum equal, more or less arranged in longitudinal lines, a number of very fine indistinct punctations may also be present *R. simus*.
11. Scutum with punctations unequal, scattered over the surface, with three posterior grooves; adanal plates triangular or subtriangular *R. sanguineus*.
Punctations on scutum very numerous 12

12. Scutum with large, subequal punctations 13
Scutum with numerous fine punctations and a few large ones *R. follis*.
13. Scutum with a distinct pseudo-scutum similar to that of the female, punctations not contiguous and less numerous on the lateral margins *R. sulcatus*.
Scutum without a pseudo-scutum, punctations more or less contiguous and numerous on lateral margins
R. capensis.
14. Adanal shields with the posterior margins produced into a point in the middle *R. theileri*.
Adanal shields with the posterior margins concave 15
15. Adanal shields bifid, the postero-external angles longer than the postero-internal angles 16
Adanal shields with the postero-external angles short and rounded, the internal angles very long and pointed; coxae i prominent when viewed dorsally *R. duttoni*.
16. Scutum with a few scattered large punctations and numerous fine ones *R. tricuspis*.
Scutum with large punctations arranged more or less in longitudinal lines, fine punctations hardly visible
R. lunulatus.

FEMALES.

1. Female unknown *R. follis*.
Females known 2
2. Eyes hemispherical, orbited; scutum with numerous closely set punctations 3
Eyes flat, not orbited 5
3. Legs yellowish-red 4
Legs brown *R. oculatus*.
4. Legs not banded *R. evertsi*.
Legs with pale bands *R. evertsi mimeticus*.
5. Scutum brown with a largish yellowish-white area posteriorly, and with a few largish punctations; dorsum of abdomen with patches of white clavate scales
R. maculatus.
Scutum brown, without pale markings 6
6. Scutum without lateral grooves, shiny, with a few large scattered punctations in front, less numerous behind
R. punctatus.
Scutum with lateral grooves, usually well developed, and with more numerous punctations 7
7. Lateral grooves not extending to anterior margin of scutum; punctations unequal, not very numerous *R. theileri*.
Lateral grooves extending to anterior margin of scutum 8
8. Scutum longer than wide 9
Scutum about as wide as long 12

9. Punctations on scutum unequal 10
 Punctations on scutum equal or subequal 11
10. Basis capitulum half the width of scutum ... *R. sanguineus*.
 Basis capitulum three-quarters the width of scutum, with
 very long and pointed lateral angles *R. deltoideus*.
11. Punctations on scutum equal, largish and numerous on median
 area and very scarce on lateral margins; lateral grooves
 shallow, without punctations *R. sp.*
 Punctations on scutum subequal, deep, contiguous in the
 deep lateral grooves, small and less numerous on lateral
 margins, except round the eyes where they are closely
 set *R. sulcatus*.
12. Punctations on scutum large, contiguous *R. capensis*.
 Punctations on scutum separated 13
13. Fine punctations on scutum very apparent
R. appendiculatus.
 Fine punctations on scutum scarcely visible 14
14. Punctations on scutum uniformly distributed over the
 surface; joints of legs slightly dilated *R. duttoni*.
 Punctations less numerous on lateral margins; joints of legs
 normal 15
15. Scutum with lateral margins convex behind the eyes
R. simus.
 Scutum with lateral margins concave behind the eyes
R. tricuspis.

In addition to the above species Howard (p. 130, 1908) has recorded *R. bursa* Canestrini and Fanzago from South Africa, but judging from his descriptions and figures the specimens were most probably *R. capensis*. *R. bursa*, which is closely allied to *R. follis* Dönitz, occurs in southern Europe and North Africa.

1. **Rhipicephalus appendiculatus** Neumann, "The brown tick"
 (Figs. 9-11).
 ♂, ♀. *R. appendiculatus* Neu., *Mém. Soc. Zool. France*, XIV, p. 270
 (1901).
 ♂, ♀. *R. nitens* Neu., *Arch. de Parasit.*, VIII, p. 462 (1904).
R. appendiculatus (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii,
 p. 128, Pl. 8, fig. d; Pl. 9, fig. d; Pl. 10, fig. d; Pl. 11,
 figs. b, d, g, i, k (1908).
R. nitens (Neu.) Howard, *ibid.*, I, ii, p. 131 (1908).
R. appendiculatus (Neu.) Nuttall, *Bul. Ent. Res.*, VI, iv,
 p. 323, 344, f. 18-21 (1916).

This tick is common in parts of the Union, and has also been recorded from Rhodesia, Portuguese East Africa and the Belgian Congo. It has been found on cattle, horses, mules, sheep, goats, *Nyala angasi* (nyala) and *Tragelaphus sylvaticus* (bushbuck) in the Mkusi Reserve, Zululand (coll. D. T. Mitchell and H. H. Curson); *Aepyceros melampus* (impala), Kruger

National Park, Transvaal (coll. A. D. Thomas); *Strepsiceros strepsiceros* (Cape Koodoo), 30 miles north of Messina, Transvaal (coll. R. A. Cooley); *Kobus ellipsiprymnus* (waterbuck), Northern Transvaal; *Paraxerus cepapi* (yellow-footed squirrel), Klaserie, Transvaal, *Lepus zuluensis* (Zululand hare), Pretoria District (coll. R. A. Cooley), and *L. capensis* (Cape hare). Howard (1908) has also recorded it from dog, *Lycaon pictus* (Cape hunting dog), *Syncerus caffer* (Cape buffalo) and man. It is the chief transmitting agent of East Coast fever to cattle, and also conveys redwater and *Piroplasma mutans* to cattle.

2. **Rhipicephalus capensis** Koch, "The Cape brown tick".

♂. *R. capensis* Koch, *Arch. f. Naturg.*, X, p. 238 (1844).

♂, ♀. *R. capensis* (Koch) Howard, *Ann. Tvl. Mus.*, I, ii,
 p. 123, Pl. 8, fig. c; Pl. 9, fig. c; Pl. 10, fig. b
 (1908).

This species is not common in South Africa. Adults have been taken on grass at Onderstepoort (coll. G. A. H. B.); also off cattle at Sycamore, Transvaal (coll. G. A. H. B.) and *Lepus saxatilis* (great hare), Glen, O.F.S. (coll. R. Bigalke). Howard (1908) recorded it from cattle, goat, horse, dog and *Varanus saurus* and gave the following localities: Namaqualand, Cape Province and Transvaal. It is a transmitting agent of East Coast fever to cattle.

3. **Rhipicephalus deltoideus** Neumann.

R. deltoideus Neu., *Tijdschr. v. Ent.*, LIII, p. 13, Pl. 1,
 f. 3-7 (1910).

Described from males and females taken off unknown host in Basutoland. Bequaert (Rep. Harv.-Afr. Exped. Liberia and Belg. Congo, ii, p. 807, 1930), records taking specimens off a hare in the Belgian Congo.

4. **Rhipicephalus duttoni** Neumann, "Dutton's brown tick".

♂. *R. duttoni* Neu., *Ann. Trop. Med. & Parasit.*, I, i, p. 115,
 f. 22, 23 (1907).

♂. *R. duttoni* (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 127
 (1908).

Originally described from a male taken off a bovine in the Belgian Congo. Howard (1908) recorded a few specimens found in the Northern Transvaal; also from Mozambique.

5. **Rhipicephalus evertsi** Neumann, "The red tick".

♂, ♀. *R. evertsi* Neu., *Mem. Soc. Zool. France*, X,
 p. 405, f. 36 (1897).

♂, ♀, ♂, L. *R. evertsi* (Neu.) Howard, *Ann. Tvl. Mus.*, I,
 ii, p. 119, Pl. 8, figs. a, i, k; Pl. 9, fig. a;
 Pl. 10, fig. a; Pl. 11, figs. a, e (1908).

This species, which is a two-host tick, is very common in the Union, and has also been recorded from South-west Africa, Mozambique, Rhodesia, Tanganyika Territory and the Belgian Congo. Both adults and immature forms have been found on horses, donkeys, mules, cattle, sheep and goats. Adults have also been found on dogs; *Hippotigris burchelli wahlbergi* (Wahlberg's zebra), Umfolosi Reserve, Zululand (coll. G. A. H. B.); *Gorgon taurinus* (blue wildebeest), Umfolosi, Zululand (coll. C. C. Kent); *Ozanna nigra* (sable antelope), Acorn Hoek, Transvaal (coll. R. A. Cooley); *Damaliscus albifrons* (blesbok), Pretoria District (coll. H. O. Mönnig); *Equinus equinus* (roan antelope), *Strepsiceros strepsiceros* (Cape koodoo), *Aepyceros melampus* (impala) and *Raphiceros campestris* (steenbuck), about 30 miles north of Messina, Transvaal (coll. R. A. Cooley); *Sylviacapra grimmi* (Cape duiker), Acorn Hoek, Transvaal (coll. R. A. Cooley); *Antidorcas marsupialis* (springbok), Onderstepoort (coll. G. A. H. B.); *Tragelaphus sylvaticus* (bushbuck), *Kobus ellipsiprymnus* (waterbuck), northern Transvaal; *Syncerus caffer* (buffalo), Umfolosi Reserve, Zululand, and *Thryonomys swinderianus variegatus* (Natal cane rat), Nylstroom, Transvaal. Nymphs on *Damaliscus dorcas* (bontebok), *Raphiceros campestris* (steenbok) and *Nototragus melanotis* (grysbok), Bredasdorp, C.P. (coll. R. F. Lawrence). Howard (1908) also recorded specimens from giraffe, eland and reedbuck. Nymphs have been taken off *Papio griscipes* (chacma baboon), Grahamstown, C.P. (coll. R. Paine); *Lepus zuluensis* (Zululand hare), Hartbeestpoort, near Pretoria (coll. G. A. H. B.) and *Lepus capensis* (Cape hare), Fort Beaufort, C.P. (coll. C. P. Lounsbury).

This tick has been proved to transmit East Coast fever and redwater to cattle, spirillosis to cattle, horses and sheep, and biliary fever to horses, mules and donkeys.

5A. **Rhipicephalus evertsi mimeticus** Dönitz.

R. evertsi var. *mimetica* Dönitz, Die Zecken Südafri., p. 475 (1910).

R. evertsi var. *albigeniculatus* Warburton in Nuttall, Bull. Ent. Res., VI, iv, p. 327 (1916).

Recorded by Bedford and Hewitt (1925) taken off horses, cattle and a koodoo (*Strepsiceros strepsiceros*) at Omaruru, South-west Africa (coll. Dr. Schmidt). Males have also been taken off eland (*Taurotragus oryx*) from South-West Africa in the Zoological Gardens, Johannesburg (coll. G. Martinaglia). This variety was described by Dönitz from specimens collected in South-west Africa, and Nuttall (1916) recorded it from cattle in the Lower Congo.

6. **Rhipicephalus follis** Dönitz.

R. follis Dönitz, Die Zecken Südafri., p. 481, Pl. 14B, f. 12; Pl. 16A, f. 3 (1910).

Described from a male collected in South Africa. Host unknown.

7. **Rhipicephalus lunulatus** Neumann.

♂. *R. lunulatus* Neu., Arch. de Parasit., XI, p. 215, f. 1 (1907).

♂, ♀. *R. lunulatus* (Neu.) Howard, Ann. Tvl. Mus., I, ii, p. 126, Pl. 8, fig. g; Pl. 9, fig. g; Pl. 10, fig. g (1908).

Recorded by Howard (1908) taken off dogs and hedgehog, *Atelerix frontalis* (= *Erinaceus frontalis*) in the Zoutpansberg District, Transvaal. It was originally described from specimens taken off a horse in the Belgian Congo.

8. **Rhipicephalus maculatus** Neumann.

♂, ♀. *R. maculatus* Neu., Mém. Soc. Zool. France, XIV, p. 273 (1901).

♂. *R. cinctus* Neu., *ibid.*, XIV, p. 275 (1901).

♂, ♀. *R. maculatus* (Neu.) Warburton, Parasit., V, i, pp. 15-19, f. 10, 11 (1912).

Recorded by Bedford and Hewitt (1925) taken off a buffalo (*Syncerus caffer*) and a white rhinoceros (*Ceratotherium simum*) in the Umfolosi Game Reserve, Zululand; also from a black rhinoceros (*Diceros bicornis*) and a koodoo (*Strepsiceros strepsiceros*) in the Hluhwe Game Reserve, Zululand, and from a black rhinoceros at Mduna River, Zululand. The writer has taken adult specimens on himself in the Umfolosi Game Reserve, and specimens have been taken in the same reserve off zebra (*Hippotigris burchelli wahlbergi*) and a duiker (*Sylvia capra grimmi*) by C. C. Kent and P. L. le Roux; also at Hlabesa, Zululand, off Natal warthog (*Phacochoerus sundivalli*) by D. T. Mitchell. The type was recorded from a beetle, *Platymeris horrida* collected in the Cameroons, and specimens have also been taken on grass and on a buffalo in Kenya Colony.

9. **Rhipicephalus oculatus** Neumann, "The eyed tick".

R. oculatus Neu., Mém. Soc. Zool. France, XIV, p. 274 (1901).

R. oculatus (Neu.) Howard, Ann. Tvl. Mus., I, ii, p. 122, Pl. 8, fig. b; Pl. 9, fig. b; Pl. 10, fig. c (1908).

This species is a common parasite on hares. Adults have been taken off *Lepus zuluensis* (Zululand hare) in various localities in the Transvaal (coll. R. A. Cooley); off *Lepus capensis* (Cape hare), Middelburg, C.P. (coll. C. P. Lounsbury), *L. capensis ochropus* at Bloemfontein and Glen, O.F.S. (coll. R. A. Cooley); *L. sawatalis* (great hare), Kleinpoort, Albany District, C.P. (sent by J. Hewitt); *Aepyceros melampus* (impala), Transvaal (coll. R. A. Cooley); *Strepsiceros strepsiceros* (Koodoo), Omaruru, South-West Africa (coll. G. Schmidt); *Taurotragus oryx* (eland), from South-West Africa, in the Zoological Gardens, Johannesburg (coll. G. Martinaglia); sheep at Ficksburg, C.P.; goat and horse at Pretoria, and off cattle in various localities. Howard (1908) also recorded it from cattle,

but it is rare on these animals. Neumann (1911) recorded it from cattle, *Giraffa schillingsi* and *Gazella granti*, and gave the following localities: Damaraland, Kenya Colony and Tanganyika Territory.

10. **Rhipicephalus punctatus** Bedford.

♂, ♀, ○. *R. punctatus* Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 495, Pl. 3, f. 4B, D, 5B (1929).

Described from specimens taken off *Procavia coombsi* (Transvaal dassie), Onderstepoort, and dassie, Omaruru, South-West Africa (coll. G. Schmidt). Adults have also been taken off sheep, Victoria West, C.P.

11. **Rhipicephalus sanguineus** (Latreille).

Ixodes sanguineus Latr., *Gen. Crust. et Ins.*, I, p. 157 (1806).

R. sanguineus (Latr.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 124, Pl. 8, fig. e; Pl. 9, fig. e; Pl. 10, figs. e, k (1908).

R. sanguineus (Latr.) Nuttall, *Bull. Ent. Res.*, VI, iv, p. 328, f. 25-28 (1916).

This species is widely distributed in Africa, but is not very common in the Union and South-West Africa. It also occurs in Asia, Central America, West Indies and Australia. It is mainly parasitic upon dogs, and has been proved by Christophers in India to convey biliary fever to these animals. It is very common on dogs in the kennels at Onderstepoort, but has not been found on these animals elsewhere in the neighbourhood. Howard (1908) recorded it from cattle, sheep, cat and sometimes man; also from lion, jackal, genet, hare, hedgehog, lynx, pangolin and *Kobus ellipsiprymnus* (waterbuck). Adults have also been taken off *Raphiceros campestris* (steenbuck) in the Zoological Gardens, Pretoria (coll. R. Bigalke) and off *Lepus capensis* (Cape hare). Neumann has recorded it from goats; also from *Canis megalotis* and *Strix ascalaphus* (eagle owl) in Egypt, and from other animals.

12. **Rhipicephalus simus** C. L. Koch, "Black-pitted tick".

♂. *R. simus* Koch, *Arch. f. Naturg.* X, i, p. 238 (1844).

♂, ♀, ○, L. *R. simus* (Koch) Howard, *Ann. Tvl. Mus.*, I, ii, p. 132, Pls. 8-10, fig. f; Pl. 11, figs. c, f, h (1908).

This species is widely distributed in Africa, and has also been recorded from Turkestan and Borneo. Adults have been taken off dogs, cattle, horses, sheep, goats, Natal warthog (*Phacochoerus sundevalli*), duiker (*Sylviacapra grimmi*) and hyaena, Umfolosi Game Reserve, Zululand (coll. G.A.H.B., P. L. le Roux and C. C. Kent); *Strepsiceros strepsiceros* (koodoo), Kruger National Park, Transvaal (coll. A. D. Thomas); hedgehog (*Atelerix frontalis*), Pretoria District (coll. G.A.H.B.); slender mongoose (*Myonax caurii*), Tzaneen, Transvaal (coll. B. de Meillon); Natal cane-rat (*Thryonomys swinderianus*

variegatus), Nylstroom, Transvaal, and scaly ant-bear (*Smutsia temminckii*), Livingstone, Northern Rhodesia. One larva has been found on Albany rock mouse (*Praomys namaquensis grahami*), Grahamstown, C.P. (coll. J. Hewitt). Howard (1908) also recorded it from the above domestic animals and from bush pig (*Koiiopotamus choeropotamus*), Cape hunting-dog (*Lycaon pictus*), lion, hare and hedgehog. This species has been proved to transmit East Coast fever and *Anaplasma marginale* to cattle.

13. **Rhipicephalus sulcatus** Neumann.

♂, ♀. *R. sulcatus* Neu., *Bull. Mus. Hist. Nat. Paris*, p. 352, f. 1, 2 (1908).

Specimens have been taken off red hare (*Pronolagus randensis*), Silverton, Pretoria District (coll. R. A. Cooley). This species was described from adults collected in the Congo. Bequaert has recorded it from buffalo in the Belgian Congo.

14. **Rhipicephalus theileri** Bedford and Hewitt.

♂, ♀. *R. theileri* Bedf. & Hewitt, *S. Afr. Journ. Nat. Hist.*, V, p. 263, Pl. 20, f. 7-9 (1925).

Described from specimens taken off ground squirrel, *Geosciurus capensis* (= *Xerus capensis*) at Glen, O.F.S. Males have also been taken off hedgehog (*Atelerix frontalis*) and silver fox (*Vulpes chama*) at Petrusburg, O.F.S.

15. **Rhipicephalus tricuspis** Dönitz.

♂, ♀. *R. tricuspis* Dönitz, *Sitz.-Ber. Ges. naturf. Freunde*, p. 146, f. 7-9 (1906).

♂, ♀. *R. tricuspis* Dönitz, *Die Zecken Südafr.*, p. 479, Pl. 16B, f. 13 (1910).

♂, ♀. *R. tricuspis* (Dönitz) Nuttall, *Bull. Ent. Res.*, VI, iv, p. 332, f. 31, 32 (1916).

Recorded by Dönitz from Lehututu-Kong, Kalahari and Kamaggas, Klein-Namaqualand; also taken off cattle in Tanganyika Territory. Nuttall (1916) recorded it taken off a rabbit in the Belgian Congo.

16. **Rhipicephalus** sp.

Numerous adults attached to the ears of *Nyala angasi*, False Bay, Zululand, 14th February, 1930 (coll. G. Martinaglia).

Genus MARGAROPUS Karsch.

Margaropus Karsch, *Mt. Münch. ent. Ver.*, III, p. 96 (1879).

Margaropus Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 123, f. 128, 129 (1911).

The genus only comprises the following species:—

1. **Margaropus winthemi** Karsch, "The Argentine tick".

M. winthemi Karsch, *Mt. Münch. ent. Ver.*, III, p. 96 (1879).

M. lounsburyi Neumann, *Arch. de Parasit.*, XI, p. 218 (1907).

M. lounsburyi (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 111, Pl. 7, f. a-e (1908).

This is a South American tick which must have been introduced into South Africa, possibly during the Boer War. It is common in many parts of the Orange Free State and Basutoland, and also occurs in the Graaff-Reinet District, Cape Province. Specimens have also been received taken off a horse at Impendhle, Natal, August, 1928. It is mainly parasitic upon horses, but is occasionally found on cattle.

Genus *BOOPHILUS* Curtis.

Boophilus Curtis, *J. comp. Med. veter. Arch.*, XII, p. 313 (1891).

Boophilus Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 124, f. 130, 131 (1911).

This genus includes about four species.

Genotype: *Boophilus bovis* Curtis = *Ixodes annulatus* Say.

Key to the South African Species.

1. Hypostome of ♀ and ♂ with six rows of teeth, adanal shields of ♂ prolonged into strong, conical points
B. decoloratus.

Hypostome of ♀ and ♂ with eight rows of teeth; adanal shields of ♂ variable, either square at posterior ends or slightly pointed *B. microplus*.

1. ***Boophilus decoloratus*** (Koch), "The Blue tick".

Rhipicephalus decoloratus Koch, *Arch. Naturg.*, X, p. 239 (1844).

Margaropus annulatus decoloratus (Koch) Neu., *Das Tierreich. Ixod.*, p. 48 (1911).

Margaropus annulatus var. decoloratus (Koch) Howard, *Ann. Tvl., Mus.* I, ii, p. 107, Pl. VI, figs. a-o (1908).

This species is common in most parts of southern Africa, but is rare in Zululand and does not occur in some of the very arid localities. It is chiefly parasitic on cattle, horses, donkeys and mules, but also occurs on sheep, goats and occasionally on dogs. Specimens have also been taken off the following hosts in the Transvaal: *Gorgon taurinus* (blue wildebeest), Waterberg District (coll. G.A.H.B.); *Strepsiceros strepsiceros* (Cape koodoo) and *Aepyceros melampus* (impala), about 30 miles north of Messina (coll. R. A. Cooley); also off the latter host at Koedoesrand (coll. W. F. Avere) and Maasstroom (coll. B. de Meillon) in the northern Transvaal; *Damaliscus albifrons* (blesbok), Pretoria District; *Ozanna nigra* (sable antelope), Acorn Hoek; *Kobus ellipsiprymnus* (waterbuck), and *Hippotigris burchelli* (zebra); also off *Lepus zuluensis*, Pretoria District. The adults are usually found on the body and head of their hosts and the immature forms are often very plentiful in the ears. It is a one-host tick, and is a transmitting agent of the organisms producing redwater and gallsickness in cattle and spirochaetosis in cattle, sheep and horses in this country.

2. ***Boophilus microplus*** (Canestrini).

Haemaphysalis micropla Canestrini, *Atti. Soc. Veneto-Trent. Sic. Nat. Padova*, XI, i (1887), pp. 104, 110, Pl. 9, f. 3, 3 a-d, 5, 5 a-b (1888).

Rhipicephalus annulatus caudatus Neu., *Mém. Soc. Zool. France*, X, p. 413, f. 42 (1897).

Margaropus annulatus var. australis Fuller, *Queensl. Agric. Jour. Brisbane*. IV, v, p. 389-394, figs. (1899).

Margaropus annulatus var. australis (Fuller) Howard, *Ann. Tvl. Mus.*, I, ii, p. 110, Pl. 6, figs. p-s (1908).

Boophilus microplus (Can.) Bequaert, *Med. Rep. Rice-Harvard Exped. Amazon*, p. 169, f. 1, 2 (1926).

This species is widely distributed and occurs in South America, Asia, Australia and South Africa. Lounsbury and Howard (1908) record it from the south-eastern districts of the Cape Province, where it is very common on cattle. It has also been proved to convey redwater to cattle.

Genus *HYALOMMA* Koch.

Hyalomma Koch, *Arch. f. Naturg.*, X, i, p. 220 (1844).

Hyalomma Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 125, f. 132, 133 (1911).

This genus comprises four or five species.

Genotype: *Acarus aegyptius* Linnaeus.

Key to the South African Species.

1. Scutum of ♂ and ♀ reddish-brown to black in colour; eyes prominent; black; coxae i deeply bifid 2
Scutum of ♂ and ♀ yellowish-brown to yellowish-white with deep brown lines and punctations; eyes small, whitish; coxae i conical *H. hippopotamense*.
2. Punctations on scutum of ♂ unequal, but distinct; of ♀ coarse and unequal *H. aegyptium aegyptium*.
Punctations on scutum of ♂ coalescing, making the shield appear shagreened; of ♀ fine
H. aegyptium impressum.

1. ***Hyalomma aegyptium aegyptium*** (Linnaeus), "The bont-leg tick".

Acarus aegyptius Linné, *Syst. Nat.*, ed. X, p. 615 (1758).

H. aegyptium aegyptium (L.) Neu., *Das Tierreich. Ixod.*, p. 50 (1911).

H. aegyptium (L.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 99, Pl. 5, figs. e, f, n (1908).

This tick is widely distributed throughout Africa, and also occurs in southern Europe and Asia. It is rare in South Africa, except in the northern Transvaal, Swaziland and South-West

Africa. The adults are parasitic on cattle, horses, donkeys, mules, sheep, dogs and rarely on cats. Howard (1908) also records them from giraffe, camel, reedbuck, wild boar and man. Adults have also been taken off *Gorgon taurinus* (blue wildebeest), Waterberg District, northern Transvaal (coll. G.A.H.B.); *Equinus equinus* (roan antelope) north of Messina, Transvaal (coll. R. A. Cooley); *Taurotragus oryx* (eland) from South-West Africa, Zoological Gardens, Johannesburg (coll. G. Martinaglia), and *Phaechochoerus aethiopicus* (African warthog) Kazungula, Bechuanaland (coll. H.M. Webb). Specimens have also been taken off *Burhinops capensis* (Cape thick-knee), Pienaar's River, Transvaal (coll. R. A. Cooley).

1A. **Hyalomma aegyptium impressum** Koch, "The South African bont-leg tick".

Hyalomma impressum Koch, *Arch. Naturg.*, X, p. 221 (1844).

H. aegyptium var. *impressum* Neu., *Mém. Soc. Zool. France*, XIV, p. 314 (1901).

H. aegyptium var. *impressum* (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 102, Pl. 5, figs. a-d, g-m, o, p (1908).

This tick is very common and widely distributed in South Africa. The adults are parasitic on cattle, equines, sheep, goats, dogs, cats, ostriches, man and duiker (*Sylviacapra grimmi*), Umfolosi Reserve, Zululand (coll. P. L. le Roux). Immature specimens have been taken off *Lepus zuluensis* (Zululand hare) in the Pretoria District; *L. capensis*, Fort Beaufort, C.P. (coll. C. P. Lounsbury) *L. capensis ochropus*, Bloemfontein and Glen, O.F.S. (coll. R. A. Cooley); *Rattus rattus* (black rat), Onderstepoort (coll. G.A.H.B.) and *Atelerix frontalis* (hedgehog), Pretoria District (coll. G.A.H.B.) also off the following birds: Domestic fowls; thick-billed lark, *Calendula magnirostris* (= *C. crassirostris*); ostriches (Howard, 1908); turkey, Bloemfontein (coll. A. J. Canham); *Bubo africanus* (Cape spotted eagle owl) and *Caffrorinis caffra* (Cape robin), Onderstepoort (coll. G.A.H.B.).

2. **Hyalomma hippopotamense** (Denny).

♂. *Ixodes hippopotamense* Denny, *Ann. Mag. Nat. Hist.*, XII, p. 312, Pl. 17, f. 1 (1843).

♀. *Ixodes bimaculatus* Denny, *ibid.*, XII, p. 372, Pl. 17, f. 2 (1843).

♂, ♀. *Hyalomma hippopotamense* (Denny) Howard, *Ann. Tvl. Mus.*, I, ii, p. 104, Pl. 4, fig. m (1908).

♂, ♀. *Hyalomma hippopotamense* (Denny) Dönitz, *Die Zecken Südafr.*, p. 455, Pl. 15, f. 1, 2, Pl. 16, f. 5 (1910).

Recorded taken off *Hippopotamus amphibius* in South and East Africa.

Genus AMBLYOMMA Koch.

Amblyomma Koch, *Arch. f. Naturg.*, X, i, p. 223 (1844).

Amblyomma Nuttall & Warburton, *Ticks: Mon. Ixod.*, ii, p. 26, f. 134, 135 (1911).

Amblyomma Robinson, *ibid.*, iv, pp. 1-10 (1926).

This genus is widely distributed and comprises eighty-seven species.

Genotype: *Amblyomma cajennense* (Fabricius).

Key to the South African Species.

MALES.

- | | |
|--|------------------------|
| 1. Marginal groove continuous | 2 |
| Marginal groove incomplete or absent | 6 |
| 2. Festoons appearing like overlapping folds, pale, except the second and each side of the median one, which is particoloured; rest of scutum mainly pale with a few dark markings | <i>A. crenatum</i> . |
| Festoons normal | 3 |
| 3. Festoons entirely dark; rest of scutum dark with coppery-red areas bordered with metallic green. In preserved specimens the dark areas tend to become brownish, and the pale areas yellowish | <i>A. variegatum</i> . |
| Festoons not entirely dark | 4 |
| 4. Festoons all pale coloured, except the external ones which are dark; rest of scutum pale greenish or yellowish, with narrow dark lines and spots | <i>A. hebraeum</i> . |
| Festoons particoloured; rest of scutum with dark spots and stripes on a yellowish or reddish-yellow ground, which in old specimens may become more or less obliterated | 5 |
| 5. Scapular angles rounded; postero-median stripe on scutum much dilated at its anterior extremity | <i>A. marmoratum</i> . |
| Scapular angles pointed; postero-median stripe on scutum only slightly dilated at its anterior extremity | <i>A. nuttalli</i> . |
| 6. Scutum with dark reddish-brown markings on a dull yellow ground, punctations mainly fine with a few large ones; eyes flat | <i>A. petersi</i> . |
| Scutum dark brown with small pale areas only on lateral margins; eyes hemispherical, orbited | <i>A. latum</i> . |

FEMALES.

- | | |
|---|------------------------|
| 1. Coxa iv with one spur | 2 |
| Coxa iv with two spurs; eyes small, hemispherical, orbited | <i>A. latum</i> . |
| 2. Eyes flat or slightly convex, not orbited | 3 |
| Eyes hemispherical, orbited | <i>A. variegatum</i> . |

CHECK-LIST AND HOST-LIST OF SOUTH AFRICAN ECTOPARASITES.

3. Festoons with postero-internal angles salient; scapular angles sharply pointed *A. crenatum*.
Festoons with postero-internal angles not salient 4
4. Scutum very large (4.2 × 5.15 mm.), with very numerous fine punctations and a few large ones on latero-anterior areas *A. petersi*.
Scutum medium (about 3 × 3 mm.), fine punctations not very numerous 5
5. Scutum with a few fine punctations only on posterior half, larger and more numerous in front *A. hebraeum*.
Scutum with a few very large punctations scattered over the entire surface, interspersed with fine ones 6
6. Scutum with pale median area broadly rounded posteriorly
A. marmoreum.
Scutum with pale median area pointed posteriorly
A. nuttalli.

1. **Amblyomma crenatum** Neumann, "The ruffled tick".

- ♀. *A. crenatum* Neu., *Mém. Soc. Zool. France*, XII, p. 214, f. 52 (1899).
♂. *A. subluteum* Neu., *ibid.*, p. 263 (1899).
♂, ♀. *A. crenatum* (Neu.) Howard, *Ann. Trvl. Mus.*, I, ii, p. 145, Pl. 12, fig. i (1908).
♂, ♀. *A. crenatum* (Neu.) Robinson, *Ticks: Mon. Ixod.*, iv, p. 75, f. 32, 33 (1926).

Originally described from a female taken off *Rhinoceros*, Cape of Good Hope.

2. **Amblyomma hebraeum** Koch, "The bont tick".

- ♂. *Amblyomma hebraeum* Koch, *Arch. f. Naturg.* X, i, p. 225 (1844).
♂, ♀, ♂, L. *A. hebraeum* (Koch), Howard, *Ann. Trvl. Mus.*, I, ii, p. 136, Pl. 12, figs. a-h (1908).
♂, ♀. *A. hebraeum* var. *eburneum* Howard, *ibid.*, I, ii, p. 139 (1908), *nec Gerstäcker*, 1873.
♂, ♀. *A. hebraeum* (Koch) Robinson, *Mon. Ixod.*, iv, p. 104, t.f. 3, Pl. 1, f. 1, 2 4; Pl. 3, f. 1, 2 (1926).

This species is widely distributed in the Union, but occurs more frequently on the low veld than on the high veld. It has also been recorded from Mozambique, Bechuanaland (Jack, 1928) and Tanganyika Territory. It is parasitic upon cattle, horses, donkeys, mules, sheep, goats and dogs. Howard (1908) has also recorded it from man, *Giraffa camelopardalis*, *Lycaon pictus* (Cape hunting dog), buffalo and elephant. Adults and nymphs have been taken off *Sylviacapra grimmi* (duiker), adults off *Syncerus caffer* (buffalo) and nymphs of *Thryonomys swinderianus variegatus* (Natal cane-rat) in the Umfolosi Reserve, Zululand (coll. P. L. le Roux). Adults have also been taken off domestic pig, Klasserie, Transvaal (coll. R. A. Cooley); *Nyala angasi* (nyala), Ubombo Flats, Zululand (coll. D. T. Mitchell);

both the black rhinoceros and white rhinoceros, *Phaechoeris sundevalli* (Natal warthog) and *Gorgon taurinus* *Phaechoeris sundevalli* (Natal warthog) and *Gorgon taurinus* (blue wildebeest), Umfolosi, Zululand (coll. A. B. M. Whitnall and C. C. Kent). Larvae occasionally get on to man and have also been taken off *Micropelis nigripes* (black-footed cat), Thornkloof, Albany District, C. P. (sent by J. Hewitt), and nymphs off *Lepus zuluensis*, Hartbeestpoort, near Pretoria (coll. G.A.H.B.) and off *Mungos mungo* (banded mongoose), Umfolosi Reserve, Zululand (coll. P. L. le Roux). Immature forms are also occasionally found on birds, including fowls and ostriches. It is the transmitting agent of heartwater to cattle, sheep and goats in South Africa. The bites of the adult ticks also frequently cause swellings, which lead to suppuration:

3. **Amblyomma latum** (Koch).

- ♂. *Hyalomma latum* Koch, *Arch. f. Naturg.*, X, i, p. 221 (1844).
♀. *Hyalomma devium* Koch, *ibid.*, X, i, p. 222 (1844).
♂, ♀. *Amblyomma sylvaticum* (De Geer) Neumann, *Mém. Soc. Zool. France*, XII, p. 274 (1899).
♂, ♀. *A. sylvaticum* (De Geer) Bedf. & Hewitt, *S. Afr. Journ. Nat. Hist.* V, i, p. 265, Pl. 20, f. 10, 11 (1925).
♂, ♀. *A. latum* Robinson, *Ticks: Mon. Ixod.*, IV, p. 151, f. 69, 70 (1926).

Reported taken from a tortoise, Cape of Good Hope. Bedford and Hewitt (1925) recorded it taken off a tortoise, *Testudo angulata* at Essendene in the Alexandria District, C.P., and from the same host at Malmesbury, C.P.; also from tortoises and a mole-snake (*Pseudaspis cana*) at Port Elizabeth, C.P.

4. **Amblyomma marmoreum** Koch.

- ♂. *Amblyomma marmoreum* Koch, *Arch. f. Naturg.* X, i, p. 224 (1844).
♂, ♀, ♂, L. *Amblyomma marmoreum* (Koch) Howard, *Ann. Trvl. Mus.*, I, ii, p. 142, Pl. 12, figs. m, n; Pl. 13, figs. c-k (1908).
♂, ♀. *Amblyomma marmoreum* (Koch) Robinson, *Ticks: Mon. Ixod.*, iv, p. 86, f. 38, 39 (1926).

This tick has been recorded from the Cape Province, Transvaal, Upper Zambesia, Zanzibar, Kenya Colony, Uganda, Nyasaland, Tanganyika Territory, Belgian Congo, Senegal, Algeria and Sudan. It is common on tortoises in the Transvaal, and has been found on rhinoceros in various parts of Africa. Neumann (1911) recorded it taken off *Genetta pardina*, and Robinson (1926) from a tortoise, *Testudo leopardinus** in South Africa. Adults have also been taken off *Testudo pardalis* in the Pietersburg District, Transvaal. Larvae and nymphs are reported to feed readily on ox and goat, and on some kinds of birds and lizards (Howard, 1908).

* No such species known; probably *Testudo pardalis*.

5. *Amblyomma nuttalli* Dönitz.

♂, ♀. *Amblyomma nuttalli* Dönitz, *Sitzungsber. der Gesellsch. naturforsch. Freunde*, No. 8, p. 469, f. 4 (1909).

♂, ♀. *Amblyomma nuttalli* (Dönitz) Robinson, *Ticks: Mon. Ixod.*, iv, p. 90, f. 40, 41 (1926).

This species has been recorded by Robinson (1926) taken off tortoise, Varanus or Emys and hedgehog from the following countries: Southern Rhodesia, Uganda, Tanganyika Territory, Cameroons, Southern Nigeria and Gold Coast. Specimens have been bred on *Testudo pardalis* at Onderstepoort from adults taken off a tortoise in the Zoological Gardens, Pretoria, and males have been taken off *Python sebae*, Zululand (coll. A. D. Thomas).

6. *Amblyomma petersi* Karsch.

♂. *Amblyomma petersi* Karsch, *Monatsber. Kak. Wisensch. Berlin*, p. 336, Pl. 1, f. 4 (1873).

♀. *Amblyomma aureum* Neumann, *Mém. Soc. Zool. France*, XIV, p. 254, f. 56 (1899).

♂. *Amblyomma foai* Neumann, *ibid.*, XIV, p. 262 (1899).

♂, ♀. *Amblyomma petersi* (Karsch) Robinson, *Ticks: Mon. Ixod.*, iv, p. 260, f. 128, 129 and Pl. 4, f. 1 (1926).

Recorded by Bedford and Hewitt (1925) taken off *Ceratotherium simum* (white rhinoceros), Umfolosi Game Reserve, Zululand; *Diceros bicornis* (black rhinoceros), Hhuhluwe Game Reserve and Mduna River, Zululand; also off a rhinoceros at Punda Milia, Kenya Colony. It is mainly a parasite of rhinoceros, and has also been found on grass and on *Antilope oreas*. It has been recorded from the following countries: Mozambique, Zanzibar, Madagascar, Tanganyika Territory, Kenya Colony, Uganda, Nyasaland and Liberia.

7. *Amblyomma variegatum* (Fabricius).

♂. *Acarus variegatus* Fabr. *Ent. syst., Suppl.*, p. 353 (1794).

♂. *Amblyomma venustum* Koch, *Arch. f. Naturg.*, X, i, p. 224 (1844).

♂, ♀. *Amblyomma variegatum* (Fabr.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 140, Pl. 12, figs. k, l; Pl. 13, figs. a, b (1908).

♂, ♀. *Amblyomma variegatum* (Fabr.) Robinson, *Ticks: Mon. Ixod.*, iv, p. 101, f. 4 and Pl. 2, f. 1-4 (1926).

Recorded by Howard (1908) from the Transvaal and Cape Province, but Mr. Lounsbury informs me that the specimens from the latter locality were bred by him from adults obtained from Rhodesia. Specimens have been taken off the following hosts in the Transvaal: Cattle, goat at Acorn Hoek and dogs at Klasserie (coll. R. A. Cooley). It is very widely distributed in Africa, and Robinson (1926) also recorded it from South-West Africa and Portuguese East Africa. It has been found on cattle,

sheep, horse, donkey, dog, cat, goat, camel, zebra, elephant, rhinoceros, wart-hog, buffalo, waterbuck, eland, congoni, Jackson's hartebeest, sable antelope, reedbuck, bushbuck and man. Adults have also been taken off three spurwing geese (*Plectropterus gambensis*), Mazabuka, Northern Rhodesia (coll. P. L. le Roux). This species is capable of transmitting heartwater to cattle, sheep and goats in Kenya Colony.

Genus APONOMMA Neumann.

Aponomma Neumann, *Mém. Soc. Zool. France*, XII, p. 180 (1899).

Aponomma Nuttall and Warburton, *Ticks: Mon. Ixod.*, iv, p. 126 (1911).

Neumaniella Lahille.

This genus contains about thirteen species parasitic on reptiles in various parts of the world.

Key to the South African Species.

Aponomma globulus (Lucas) is not included in the key.

1. Scutum uniformly reddish-brown 2
Scutum of ♂ with nine and of ♀ with three metallic green spots *A. exornatum*.
2. Anal groove absent; scutum of ♂ and body of ♀ broader than long *A. transversale*.
Anal groove present; scutum of ♂ and body of ♀ not broader than long *A. laeve capensis*.

1. *Aponomma exornatum* (Koch).

Amblyomma exornatum Koch, *Arch. Naturw.*, X, p. 231 (1844).

Ixodes flavomaculatus Lucas, *Ann. Soc. ent. France*, (2) IV, p. 56, Pl. 1, f. 1 (1846).

Ixodes varani Lewis, *Journ. Quekett Club*, (2) V, p. 10, Pl. 1 (1892).

♂, ♀, ♂, L. *Aponomma exornatum* (Koch) Howard, *Ann. Tvl. Mus.*, I, ii, p. 148, Pl. 14, fig. a-i; Pl. 15, fig. a-c, f (1908).

This tick is very common on the iguana (*Varanus niloticus*) in South Africa. Howard (1908) has also recorded it from *Python sebae* and a dog (abnormal host). Males have also been taken off *Varanus albigularis*, Pretoria. It is widely distributed in Africa, having also been recorded from Tanganyika Territory, Madagascar, Congo, Senegal and Algeria.

2. *Aponomma globulus* (Lucas).

♀. *Ixodes globulus* Lucas, *Ann. Soc. ent. France*, (3), VIII, p. 538 (1860).

♀. *Aponomma globulus* (Lucas) Neumann, *Das Tierreich, Ixod.*, p. 97 (1911).

Described from female taken off *Python sebae* in South Africa.

3. Aponomma laeve capensis Neumann.

♂, ♀. *Aponomma laeve* var. *capense* Neu., *Mém. Soc. Zool. France*, XIV, p. 291 (1901).

♂, ♀, ○, L. *Aponomma laeve* var. *capense* (Neu.) Howard, *Ann. Tvl. Mus.*, I, ii, p. 150, Pl. 15, figs. d, e, g, h, i (1908).

Described by Neumann from specimens taken off *Ophidia* (genus ?), Cape of Good Hope. Howard (1908) recorded it from mamba (*Dendraspis angusticeps*), Transvaal and other snakes. Males have also been taken off ringhals (*Sepedon haemachates*), Ntambanana, Zululand (coll. G.A.H.B.) and a female off Cape cobra (*Naja flava*), Port Elizabeth (coll. Fitz Simmons).

4. Aponomma transversale (Lucas).

Ixodes transversalis Lucas, *Rev. Zool.*, VII, p. 49 (1844).

Neumaniella transversale (Lucas) Howard, *Ann. Tvl. Mus.*, I, ii, p. 154, Pl. 16, figs. n (a-d) (1908).

Recorded found in the eye-sockets of *Python sebae*, South Africa.

Order DERMAPTERA.

Family HEMIMERIDAE.

This is a small family containing only two known species, both belonging to the genus *Hemimerus*. They have been found on the giant rat (*Cricetomys gambianus*) in various parts of Africa, but it is not known whether they are parasitic or not. The species are apterous, without eyes. Thoracic nota large. Abdomen elongate, with a pair of long, feebly chitinized, unjointed, hairy cerci at the apex. Legs with the coxae small, widely separated; tarsi three-jointed. Females viviparous.

Genus HEMIMERUS Walker.

1. Hemimerus talpoides Walker.

Hemimerus talpoides (Walker) Carpenter, *Ent. Mo. Mag.* (2), XX, pp. 254-257, Pl. 4, f. 1-4 (1909).

Hemimerus talpoides (Walker) Jordan, *Nov. Zool.*, VI, (1909).

A number of specimens have been collected from *Cricetomys gambianus* in the Zoological Gardens at Pretoria (coll. A. K. Haagner). This species was described from specimens taken off the same host in Sierra Leone.

The second species, *H. hansenii* Sharp, has been recorded from the same host in Cameroon, Uganda and Mocambique (?).

Order ANOPLURA.

This order includes the biting and sucking lice. They are small, apterous insects, 1 to 10 mm. in length, and live as permanent ectoparasites on birds and mammals. Antennae short, three to five-jointed. Eyes present or absent; ocelli absent. Mouth-parts adapted for either biting or sucking. Thoracic segments may be either

distinct or fused. Legs short, tarsi one to two-jointed. Abdomen usually consisting of nine segments, but the number vary; tergal and sternal sclerites frequently present; cerci absent.

The females attach their eggs or nits to either the hairs or feathers of the hosts, and in the case of *P. humanus corporis* of man to the clothing.

The immature forms resemble the adults, except that they are smaller and less highly chitinous.

Key to the Suborders.

1. Mandibles present 2
Mandibles absent; mouth-parts terminal, formed for sucking, thorax unsegmented; tarsi 1-jointed; claws single. Parasitic on mammals *Siphunculata*, p. 398.
2. Head not produced into a proboscis; mouth-parts ventral; maxillary palpi four-jointed or absent; prothorax usually free (always in South African species); meso and meta-thorax frequently fused; tarsi one or two-jointed; claws single or paired; parasitic on birds and mammals

Mallophaga.

Head produced into a proboscis, with mouth-parts at apex; mandibles small; prothorax small, free; meso and meta-thorax fused; claws single. Parasitic on elephants

Rhyncophthirina, p. 398.

Suborder MALLOPHAGA.

In 1908 Kellogg listed 1,250 species, and in 1916 the described species were catalogued by Harrison, who listed 1,520 as valid. Since then a number of new species has been described. They are mainly parasitic on birds, but a number are found on mammals.

Of the two superfamilies, Harrison (1916) regarded the Amblycera as being more primitive than the Ischnocera, but we consider that the former are more specialized than the latter for the following reasons: Firstly, the species of Amblycera resemble the Siphonaptera, which are considered specialized ectoparasites, in possessing grooves on the head for the protection of the antennae and, secondly, a number of the species are also specialized in possessing either patches of setae or combs of minute spines on some of the abdominal sternites and hind femora. Those on the sternites being no doubt used by the insects for cleaning their hind legs; those on the hind femora for cleaning the mid legs, the mandibles no doubt being used to clean their fore-legs. Moreover, the most primitive species (*nov. gen. et sp.*) I have seen is of the *Lipeurus* type. Unfortunately its host is unknown.

It is also interesting to note that species of the *Lipeurus* type are only known to be parasitic on the older types of birds, including the Struthionies. Those of the *Degeeriella* and *Philopterus* types are common on the more recent types of birds, including the Passerines, and are also parasitic on the ancient forms, with the exception of Struthionies, Galliformes and Columbiformes. The species of Menoponidae are likewise found on the majority of birds, except Struthionies, and also occur on marsupials.

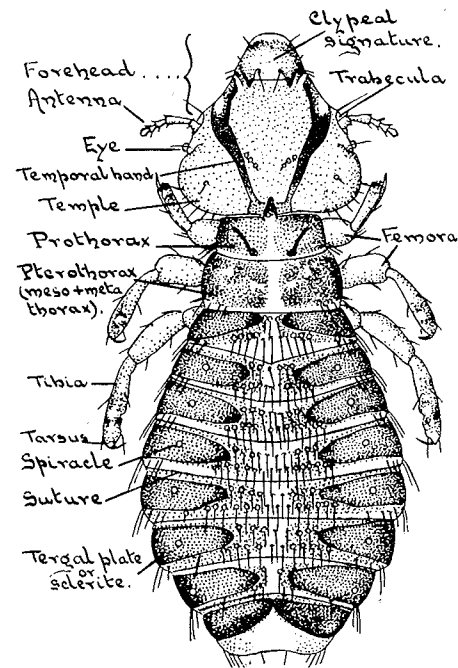


Fig. 12. *Neophilopterus abdimius* Bedford, female.

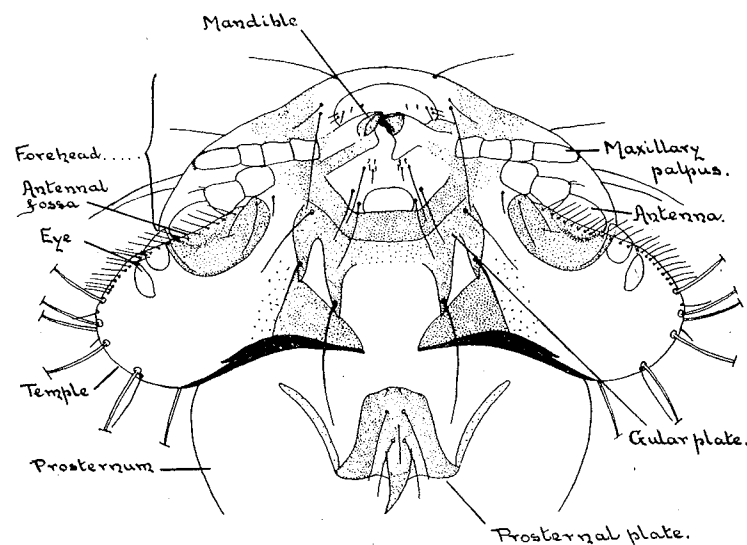


Fig. 13. *Machaerilaemus urocolius* Bedford, venter of head and prosternum of female.

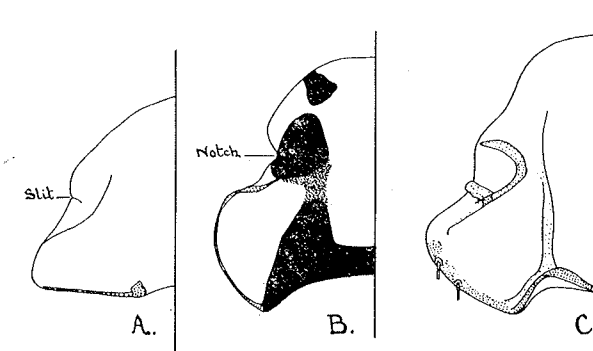


Fig. 14. Outlines of one side of head of: A, *Menopon gallinae* (Linné); B, *Colpocephalum zebra* Nitzsch; C, *Dennyus* sp.

Key to the Superfamilies.

1. Antennae filiform and always exposed; maxillary palpi wanting ... *Ischnocera*.
Antennae swollen towards their apices and when in repose largely concealed in grooves; maxillary palpi present
Amblycera, p. 367.

Superfamily ISCHNOCERA.

The species belonging to this superfamily are mainly found either attached to the feathers of birds or to the hairs of mammals.

Key to the South African Families.

1. Tarsi with two claws; prothoracic spiracles absent; antennae five-jointed in both sexes. Parasitic on birds
Philopteridae.
Tarsi with one claw; prothoracic spiracles present; antennae of ♂ three-jointed, of ♀ three to five-jointed. Parasitic on mammals ... *Trichodectidae*, p. 356.

Family PHILOPTERIDAE.

Harrison (1916) divided this family into six subfamilies, but we agree with Ewing (1929) that they should be discarded for the present.

Key to the South African Genera.

1. Head symmetrical. Not on Struthionies ... 2
Head asymmetrical, the incassations on lateral margins of forehead different on the two sides; right mandible with a large basal process. On ostriches
Struthiolipeurus, p. 314.
2. Forehead with 4 to 6 or more circular incassations on the lateral margins. On Falconiformes
Falcolipeurus, p. 315.
- Forehead without such incassations ... 3

3. Forehead rounded with a narrow marginal band; clypeal suture and plate (signature) absent ... 4
Forehead rarely rounded, without a complete or almost complete marginal band; clypeal suture and plate usually present; anterior margin of clypeus frequently hyaline 12
4. Temples rounded ... 5
Temples angulate ... 10
5. Antennae different in both sexes; the first joint of ♂ larger than in the ♀, first and third joints of ♂ with or without an appendage ... 6
Antennae similar in both sexes ... 9
6. Pterothorax shorter than prothorax with lateral margins rounded. Third joint of ♂ antenna without appendage. On bustards ... *Otidococcus*, p. 318.
Pterothorax longer than prothorax; third joint of ♂ antenna with an appendage (except in *L. waterstoni*) ... 7
7. Parameres of ♂ genitalia curved, projecting outwards. On Coliidae and Ploceidae ... *Colilipeurus*, p. 317.
Parameres of ♂ genitalia not projecting outwards ... 8
8. Basal plate of ♂ genitalia very short and broad; parameres fused. On bustards ... *Otilipeurus*, p. 317.
Basal plate of ♂ genitalia not very short and broad; parameres not fused. On Galliformes ... *Lipeurus*, p. 316.
9. Tergal sclerites I to VII interrupted in the middle. On sandgrouse ... *Syrrhaptococcus*, p. 318.
Tergal sclerites complete. Chiefly on Falconiformes *Degeeriella (sens. str.)*, p. 319.
10. Temples produced backwards into spine-tipped angular processes. On penguins ... *Austrogoniodes*, p. 332.
Temples not produced backwards into spine-tipped processes. On Galliformes and Columbidae ... 11
11. Third segment, and sometimes the first, of ♂ antenna with an appendage ... *Goniodes*, p. 329.
First and third segments of ♂ antenna without an appendage *Goniocotes*, p. 331.
12. Species elongated, narrow; trabeculae small or absent ... 13
Species short and broad; trabeculae usually large and movable ... 20
13. Antennae different in both sexes, the first joint of ♂ larger than in the ♀; first and third joints of ♂ with or without an appendage ... 15
Antennae similar in both sexes ... 14
14. Forehead deeply notched in front. On Anatidae *Acidoproctus*, p. 333.
Forehead not notched in front. On various birds *Degeeriella (sens. lato)*, p. 319.

15. Large species (8.5-9 mm.); clypeal plate broader than long; first joint of ♂ antenna with an appendage; trabeculae absent. On Diomedeidae ... *Harrisoniella*, p. 333.
Species smaller; clypeal plate not broader than long; first joint of ♂ antenna usually without an appendage; trabeculae usually present ... 16
16. Forehead with a chitinous transverse band behind clypeal suture ... 17
Forehead without such a band ... 19
17. Chitinous band behind clypeal suture entire; ♂ genitalia symmetrical. On Hydrobatidae ... *Pseudonirmus*, p. 334.
Chitinous band behind clypeal suture interrupted in the middle, where each half turns backwards ... 18
18. Forehead longer than hind head. On Hydrobatidae and Diomedeidae ... *Naubates*, p. 334.
Forehead shorter than hind head. On gannets, cormorants, frigate, tropic and snake birds; also pelicans *Pectinopygus*, p. 335.
19. Clypeus with two pairs of spines on dorsum, one being flattened and porrect, and the other recurved. On pigeons ... *Columbicola*, p. 341.
Clypeus without such spines. On various birds *Esthiopterum*, p. 337.
20. Forehead with a membranous flap projecting beyond the lateral margins of the head and very conspicuous in the ♂ ... 21
Forehead without laterally projecting membranous flap ... 22
21. Antennae different in both sexes. On Hydrobatidae *Trabeculus*, p. 343.
Antennae similar in both sexes. On Hydrobatidae *Giebelia*, p. 343.
22. Antennae different in both sexes ... 23
Antennae similar in both sexes ... 24
23. ♀: inner margin of pleura of eighth abdominal segment with a process bearing two or more spines; ♂ second and third antennal segments normal. On Rallidae *Rallicola*, p. 341.
♀: inner margin of pleura of eighth abdominal segment without spine-bearing processes; ♂: first three antennal segments very elongated. On Diomedeidae *Docophoroides*, p. 344.
24. Clypeal plate divided, consisting of two oblong plates. On ibises and spoonbills ... *Ibidococcus*, p. 345.
Clypeal plate not divided ... 25

25. Clypeal plate with a backward-projecting process at each latero-posterior angle; tergal sclerites duplicated; interrupted in the middle. On Ciconiidae
Neophilopterus, p. 345.
Clypeal plate without processes at the latero-posterior angles 26
26. Tergal sclerites complete and fused with the pleurites in both sexes. On Scolopacidae * *Dollabella*, p. 347.
Tergal sclerites interrupted in the middle 27
27. Hyaline area of clypeus with a deep median notch. On water birds *Incidifrons*, p. 346.
Clypeus without a median notch dividing the hyaline area ... 28
28. Clypeal region expanded, with free margin hyaline throughout 29
Clypeal region without an expanded hyaline margin 30
29. Clypeal region rounded in front; a pair of small peg-like spines dorsally behind clypeal suture. On Anatidae
Anatoecus, p. 346.
Clypeal region emarginate in front, and with a tuft of three or more setae dorsally on each lateral band. Chiefly on cuckoos *Cuculoecus*, p. 347.
30. Forehead irregularly rounded; trabeculae reduced, immovable, not reaching apex of first antennal segment. On owls *Eustrigiphilus*, p. 347.
Forehead more or less rectangular with lateral margins somewhat emarginated; trabeculae larger and usually movable. On various birds, including owls
Philopterus, p. 348.

Genus STRUTHIOLOPEURUS Cummings.

Struthiolipeurus Cummings, *Proc. Zool. Soc. Lond.*, p. 679 (1916).

Genotype: *Lipeurus asymmetricus* Piaget = *Esthiopterum rhae* Harrison.

1. *Struthiolipeurus struthionis* (Gervais).

Lipeurus struthionis Gerv., *Aptères*, III, p. 354, Pl. 9, f. 2 (1847).

Lipeurus quadrimaculatus Piaget, *Pédiculines*, p. 298, Pl. 24, f. 8 (1880).

Esthiopterum struthionis (Gerv.) Harrison, *Parasit.*, IX, i, p. 142 (1916).

Bedford (1919) recorded this species taken off *Struthio australis* (southern ostrich) at Onderstepoort. It was described by Piaget from specimens taken off *Struthio camelus* and *Rhea americana* in the Zoological Gardens at Rotterdam.

*A few species at present included in the genus *Philopterus* will be found to run down to here. They are, however, not parasitic on Scolopacidae.

Genus FALCOLIPEURUS Bedford.

Falcolipeurus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, *Un. S. Afr.*, XVII, p. 290 (1931).

This genus contains thirteen species found on Falconiformes.

Genotype: *Lipeurus secretarius* Giebel.

1. *Falcolipeurus africanus* Bedford.

Falcolipeurus africanus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, *Un. S. Afr.*, XVII, p. 291, f. 9, 12, 15 (1931).

Described from specimens taken off *Pseudogyps africanus fullebornei* (southern white-backed vulture) in the Rustenburg District, Transvaal.

2. *Falcolipeurus lineatus* Bedford.

Falcolipeurus lineatus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, *Un. S. Afr.*, XVII, p. 292, f. 10, 13, 16 (1931).

Described from specimens taken off *Terathopius ecaudatus* (bateleur eagle) in the Rustenburg District, Transvaal; also a ♂ and ♀ (possibly stragglers) from *Gyps coprotheres* (Cape vulture) in the same district.

3. *Falcolipeurus monilis* (Nitzsch).

Lipeurus monilis Nitzsch in Giebel, *Zeit. f. ges. Nat.*, XVII, p. 519 (1861).

Lipeurus frater Giebel, *Ins. Epiz.*, p. 210 (1874).

Described by Giebel (1874) from specimens taken off *Neophron percnopterus* (Egyptian vulture). The type host is *N. monachus*.

4. *Falcolipeurus quadripustulatus* (Nitzsch).

Lipeurus quadripustulatus Nitzsch, in Burmeister, *Handb.*, II, p. 434 (1838).

Lipeurus quadripustulatus (N.) Giebel, *Ins. Epiz.*, p. 208, Pl. 17, f. 5 (1874).

Recorded by Piaget (1880) from *Gyps rüppelli* (Rüppell's vulture). The type host is *Vultur cinereus*.

5. *Falcolipeurus secretarius* (Giebel).

Lipeurus secretarius Giebel, *Ins. Epiz.*, p. 213 (1874).

Lipeurus secretarius (Giebel) Piaget, *Pédiculines*, p. 292, Pl. 24, f. 2 (1880).

Falcolipeurus secretarius (Giebel) Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, *Un. S. Afr.*, XVII, p. 291, f. 8, 11, 14 (1931).

Recorded by Waterston (1914) taken off the type host, *Sagittarius serpentarius* (secretary bird) in South Africa. It has also been taken off the same host in the Rustenburg District.

Genus LIPEURUS Nitzsch.

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

This genus includes about forty-seven species found on Galliformes and South American tinamous.

Genotype: *Pediculus caponis* Linné.

1. *Lipeurus caponis* (Linné).

Pediculus caponis Linné, *Syst. Nat.*, p. 614 (1758).

Lipeurus variabilis Nitzsch in Burmeister, *Handb.*, II, p. 434 (1838).

Lipeurus variabilis (Nitz.) Piaget, *Pédiculines*, p. 364, Pl. 29, f. 4 (1880).

Recorded by Bedford (1919) taken off a domestic fowl at Pietermaritzburg, Natal.

2. *Lipeurus gallipavonis* (Geoffroy).

Pediculus gallipavonis Geoff., *Hist. Abr. Ins.*, p. 600 (1762).

Lipeurus polytrapezius Nitzsch, in Burmeister, *Handb.*, II, p. 434 (1838).

Lipeurus polytrapezius (Nitz.) Piaget, *Pédiculines*, p. 367, Pl. 29, f. 6 (1880).

Specimens have been taken off a domestic turkey at Pietermaritzburg, Natal (coll. L. Hill).

3. *Lipeurus heterographus* Nitzsch.

L. heterographus Nitz., in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 381 (1866).

L. obscurus Giebel, *Ins. Epiz.*, p. 220 (1874).

L. heterographus (Nitz.) Piaget, *Pédiculines*, p. 360, Pl. 29, f. 2 (1880).

A common parasite of the domestic fowl in South Africa.

4. *Lipeurus lawrensis* Bedford.

L. lawrensis Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 521, f. 22-24 (1929).

Described from a ♂ and ♀ taken off a guinea-fowl, *Numida papillosa*, on the Kunene River, South-West Africa.

5. *Lipeurus pternistis* Bedford.

L. pternistis, Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, p. 522, f. 25, 25A, 26 (1929).

Described from specimens taken off *Pternistis swainsoni* (Swainson's red-necked francolin) in the Zoological Gardens, Pretoria, and *Pternistis afer* (Angola red-necked francolin) Kunene River, South-West Africa.

6. *Lipeurus tropicalis* Peters.

Lipeurus tropicalis Peters, *Ent. News*, XLIII, vii, p. 195, f. 1, 2 (1931).

One ♂ taken off domestic fowl at Onderstepoort (coll. G.A.H.B.). Described by Peters from specimens taken off domestic fowls in Bahama Islands, Caicos Islands, Venezuela and Liberia; also recorded by him from five species of wild guinea-fowls from Africa.

7. *Lipeurus waterstoni* Bedford.

L. waterstoni Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, XVI, p. 165, f. 8 a-d (1930).

Described from specimens taken off *Scleroptila gariensis pallidior* (Ovambo partridge)*, Kunene River, South-West Africa.

Genus COLILPEURUS Bedford.

Colilipeurus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVI, p. 167 (1930).

This genus includes three species found on Coliidae and Ploceidae. Their presence on a weaver bird was most probably due to straggling.

Genotype: *Esthiopterum colius* Bedford.

1. *Colilipeurus colius* (Bedford).

Esthiopterum colius Bedford, *Rept. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 731, Pl. 7, f. 1, 2 (1920).

Described from specimens taken off *Urocolius indicus transvaalensis* (Transvaal red-faced coly). Specimens have also been taken off *U. indicus lacteifrons* (Damara red-faced coly), Khan River, South-West Africa (coll. R. D. Bradfield). The transverse abdominal markings shown in the figure are ventral, not dorsal. They are absent in the specimens from Khan River, which are probably slightly immature.

Genus OTILPEURUS Bedford.

Otilipeurus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVII, p. 287 (1931).

This genus comprises three species found on Otidae.

Genotype: *Lipeurus turmalis* Nitzsch.

1. *Otilipeurus kori* Bedford.

O. kori Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVII, p. 289, f. 6, 7a (1931).

Described from a ♀ and ♂ taken off *Choriotis kori* (giant bustard) in the Rustenburg District, Transvaal.

* Mr. Roberts has examined the skin and informs me that it is *Scleroptila jugularis*.

Genus OTIDOECUS Bedford.

Otidoecus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVII, p. 285 (1931).

This genus contains a single species.

1. *Otidoecus dimorphus* Bedford.

O. dimorphus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVII, p. 285, f. 4, 5, 7b (1931).

Described from specimens taken off *Choriotis kori* (giant bustard) at Kwambonambi, Zululand.

Genus SYRRHAPTOECUS Waterston.

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

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

1. *Syrrhaptoecus brevifrons* Waterston.

Syrrhaptoecus brevifrons Waterston, *Proc. Zool. Soc., Lond.*, ii, pp. 339-342, f. 1b, 7 (1928).

This species was described from specimens taken off *Pterocles namaquus* (Namaqua sand-grouse) in the Rustenburg District, Transvaal, 3rd September, 1917; also from *Eremialector quadricinctus* Temm. in the Sudan, and off *Eremialector coronatus* Licht., Muscat.

2. *Syrrhaptoecus declivis* Waterston.

Syrrhaptoecus declivis Waterston, *Proc. Zool. Soc., Lond.*, ii, p. 348, f. 5b, 9e (1928).

Described from males and females taken off double-banded sand-grouse, *Nyctiperdia bicinctus* (= *Eremialector bicinctus*) from Angola.

3. *Syrrhaptoecus digonus* Waterston.

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

Described from specimens taken off *Pterocles namaquus* (Namaqua sand-grouse) at Klipfontein, Little Namaqualand; Deelfontein, C.P., and in the Rustenburg District, Transvaal. Recorded by Bedford (1929) taken off the same host on the Kunene River, S.W.A., March, 1923.

4. *Syrrhaptoecus uncinus* Waterston.

Syrrhaptoecus uncinus Waterston, *Proc. Zool. Soc., Lond.*, ii, p. 350, f. 4b, 8d, 10a (1928).

Described from specimens taken off *Eremialector gutturalis* (yellow-throated sand-grouse) and *var. saturator* Hart. from S. Abyssinia and T.T. Simba. The variety *saturator* does not occur in South Africa.

Genus DEGEERIELLA Neumann.

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

Degeeriella Neumann, *Bull. Soc. Zool. France*, XX, p. 59 (1906). Harrison (1916) catalogued 266 species, but this genus will eventually be split up into a number of genera.

Genotype: *Nirmus discocephalus* Nitzsch.

1. *Degeeriella actophila* (Kellogg and Chapman).

Nirmus actophilus Kell. & Chap., *New Mallophaga*, III, p. 78, Pl. 6, f. 4 (1899).

Recorded by Bedford (1920) from curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*), Lamberts Bay, Cape Province, and *Pisobia minuta* (little stint) in the Pretoria District, Transvaal. It was described from specimens taken off *Calidris arenaria* in California.

2. *Degeeriella alpha* (Kellogg).

Nirmus triangulatus var. *alpha* Kell., *Brooklyn Sci. Bull.*, II, iv, p. 84 (1914).

Recorded from southern skua, *Catharacta skua antarcticus* (= *Megalestris antarctica*) in the South Tropical Atlantic, and from broad-billed blue petrel, *Cymochorea leucorhoa* (= *Oceanodroma leucorhoa*) in the North Tropical Atlantic. Both hosts occur on the South African coast.

3. *Degeeriella apiastri* (Denny).

Nirmus apiastri Denny, *Anoplur. Brit.*, p. 133, Pl. 10, f. 4 (1842).

Nirmus apiastri Piaget, *Pédiculines*, p. 158, Pl. 13, f. 11 (1880).

Described from specimens taken off *Merops apiaster* (European bee-eater).

4. *Degeeriella assimilis* (Piaget).

Nirmus assimilis Piaget, *Proc. Ent. Soc. Lond.*, p. XXIII (1890).

Described from specimens taken off Caspian plover, *Eupodella asiatica* (= *Aegialitis asiatica*), a migrant to South Africa.

5. *Degeeriella bicurvata* (Piaget).

Nirmus bicurvatus Piaget, *Pédiculines*, p. 159, Pl. 13, f. 18 (1880).

Described from specimens taken off paradise widowbird, *Steganura paradisea* (= *Vidua paradisea*), in the Leyden Museum.

6. *Degeeriella bipunctata* (Rudow).

Nirmus bipunctatus Rudow, *Zeit. f. ges. Nat.*, XXXV, p. 466 (1879).

Described from specimens taken off pied crow, *Corvus albus* (= *C. scapulatus*).

7. **Degeeriella brevipes** (Piaget).
Nirmus brevipes Piaget, *Pédiculines*, p. 179, Pl. 15, f. 3 (1880).
 Described from specimens taken off curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*).
8. **Degeeriella brunnea** (Nitzsch).
Nirmus brunneus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 373 (1866).
 Described from specimens taken off *Dromas ardeola* (crab plover), a migrant to South Africa.
9. **Degeeriella cingulata** (Nitzsch).
Nirmus cingulatus, Nitzsch, in Denny, *Anoplur. Brit.*, p. 146, Pl. 11, f. 3 (1842).
N. cingulatus (Nitz.) Piaget, *Pédiculines*, p. 187, Pl. 16, f. 9 (1880).
 Described by Denny from specimens taken off black-tailed godwit, *Limosa limosa* (= *L. melanura*). Piaget (1880) also recorded it from the sanderling, *Crocethia alba* (= *Calidris arenaria*) and little stint, *Pisobia minuta* (= *Tringa minuta*). All these hosts are migrants to South Africa.
10. **Degeeriella colymbina** (Scopoli).
Pediculus colymbinus Scopoli, *Ent. Carn.*, p. 384 (1763).
Nirmus fuscomarginatus Denny, *Anoplur. Brit.*, p. 136, Pl. 10, f. 1 (1842).
Nirmus fuscomarginatus (Denny) Piaget, *Pédiculines*, p. 202, Pl. 16, f. 6 (1880).
 Recorded by Bedford (1920) as reported to have been taken off *Phalacrocorax lucidus* in the Rustenburg District, Transvaal, but it was undoubtedly taken off a grebe. Also recorded by Bedford (1929) from *Proctopus nigricollis gurneyi* (Cape eared grebe), Tamanzu, South-West Africa.
 This species was described by Denny taken off *Podiceps auritus* in Ireland, and Piaget (1880) recorded it from *Podiceps cristatus* (crested grebe), to which an allied species occurs in South Africa.
11. **Degeeriella complexiva** (Kellogg and Chapman).
Nirmus complexivus Kell. & Chap., *New Mallophaga*, III, p. 75, Pl. 6, f. 3 (1899).
 Described from specimens taken off sanderling, *Crocethia alba* (= *Calidris arenaria*), a migrant to South Africa.
12. **Degeeriella cruciata** (Burmeister).
Nirmus cruciatus Burmeister, *Handb.* II, p. 429 (1838).
 Described from specimens taken off red-backed shrike, *Enneoctonus collaris* (= *Lanius collaris*), a migrant to South Africa.

13. **Degeeriella decipiens** (Nitzsch).
Nirmus decipiens Nitzsch, in Denny, *Anoplur. Brit.*, p. 125, Pl. 6, f. 7; Pl. 11, f. 2 (1842).
Nirmus decipens (Nitz.) Piaget, *Pédiculines*, p. 180, Pl. 15, f. 4 (1880).
 Waterston (1914) has recorded it taken off the type host, *Recurvirostra avocetta* (avocet), Philipstown, Cape Province. We have also taken it off *Crocethia alba* (sanderling), Swakopmund, South-West Africa (Tvl. Mus. No. 13538).
14. **Degeeriella emarginata** (Kellogg and Chapman).
Nirmus emarginatus Kell. & Chap., *Journ. New York Ent. Soc.*, X, p. 159 (1902).
 Described from specimens taken off *Anous stolidus* (common noddy), a migrant to South Africa.
15. **Degeeriella erythropteri** (Piaget).
Nirmus erythropteri Piaget, *Pédicul.*, Suppl., p. 28, Pl. 3, f. 8 (1885).
 Recorded by Bedford (1920) taken off little bee-eater, *Melittophagus pusillus meridionalis* (= *M. meridionalis*) and white-fronted bee-eater, *Coccolarynx bullockoides* (= *M. bullockoides*) in the Rustenburg District, Transvaal. They are, however, distinct species. The type, a male, was taken off *M. pusillus*.
16. **Degeeriella fulvofasciata** (Grube).
Nirmus fulvofasciatus Grube, *Mid. Sib. Reise*, p. 475, Pl. 31, f. 1 (1851).
 Described from specimens taken off Terek sandpiper, *Terekia cinerea* (= *Tringa cinerea*), a migrant to South Africa.
17. **Degeeriella furva** (Nitzsch).
Nirmus furvus Nitzsch, in Burmeister, *Handb.* II, p. 427 (1838).
Nirmus similis Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 374 (1866).
Nirmus naumanni Giebel, *Ins. Epiz.*, p. 163 (1874).
Nirmus furvus (Nitz.) Piaget, *Pédiculines*, p. 169, Pl. 14, f. 3 (1880).
 Recorded by Piaget (1880) from the greenshank, *Glottis nebularius* (= *Totanus glottis*) and other birds. It has also been recorded from *Himantopus himantopus* (black-winged stilt) and great sandpiper, *Pagoa leschenaultii* (= *Charadrius geoffroyi*).

18. *Degeeriella fusca* (Nitzsch).

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

Nirmus vittatus Giebel, *Ins. Epiz.*, p. 127 (1874).

Nirmus fuscus (Nitz.) Piaget, *Pédiculines*, p. 130, Pl. 10, f. 9 (1880).

Recorded from numerous accipitrines under different names, some of which will ultimately prove to be valid. It has been recorded taken from the following hosts in South Africa: By Waterston (1914) from *Pterolestes rufofuscus* (= *Buteo jakal*), *Nisaetus spilogaster* (= *Eutomaetus spilogaster*), *Hieraetus pennatus* (= *E. pennatus*); *Milvax musicus* (= *M. canorus*), and *Pseudocircus macrourus* (= *Circus macrurus*). By Bedford (1919, 1920, 1929) from *Aerospiza tachiro* (= *Astur tachiro*), *Elanus caeruleus*, *Tichornis naumanni* (= *Cerchneis naumanni*), *Micronisus gabar*, *Cucuma vocifer* (= *Haliaetus vocifer*), *Pterolestes rufofuscus* and *Pteroaetus verreauxi*. It has also been recorded from the following South African birds in other countries: *Gyps rüppelli*, *Circus aeruginosus*, *Neonisus melano-leucus*, *Milvus aegyptius* and *Milvus migrans* (= *M. ater*).

19. *Degeeriella gracilis* (Nitzsch).

Nirmus gracilis Nitzsch, in Burmeister, *Handb.* II, p. 429 (1838).

Nirmus elongatus Denny, *Anoplur. Brit.*, p. 140, Pl. 7, f. 4 (1842).

Nirmus gracilis (Nitz.) Piaget, *Pédiculines*, p. 15, Pl. 13, f. 10 (1880).

Described from specimens taken off house martin, *Chelidonaria urbica* (= *Delichon urbica*). Waterston (1914) has also recorded it from *Hirundo rustica* (European swallow).

20. *Degeeriella gloriosa* (Kellogg and Kuwana).

Nirmus gloriosus Kell. & Kuw. *Proc. Wash. Acad. Sci.*, IV, p. 467, Pl. 29, f. 1 (1902).

Described from specimens taken off *Anous stolidus* (common noddy).

21. *Degeeriella hebes* (Kellogg).

Nirmus hebes Kellogg, *New Mallophaga*, I, p. 101, Pl. 5, f. 3 (1896).

Recorded taken off *Anous stolidus* (common noddy). The type host is *Sterna maxima*.

22. *Degeeriella hemichroa* (Nitzsch).

Nirmus hemichrous Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 372 (1866).

Described from specimens taken off *Himantopus himantopus* (black-winged stilt).

23. *Degeeriella hiaticulae* (Müller).

Pediculus hiaticulae Müller in Fabr., *Faun. Groen.*, p. 220 (1780).

Nirmus fissus Burmeister, *Hand.*, II, p. 427 (1838).

Nirmus bicuspis Giebel, *Ins. Epiz.*, p. 155, Pl. 5, f. 11, 12 (1874).

Nirmus bicuspis (Gie.) Piaget, *Pédiculines*, p. 184, Pl. 15, f. 7 (1880).

Described from specimens taken off *Charadrius hiaticula* (ringed plover). Piaget (1880) also recorded it from *Recurvirostra avosetta* (avocet). Both hosts are migrants to South Africa.

24. *Degeeriella holophaea* (Nitzsch).

Nirmus holophaeus Nitzsch, in Burmeister, *Handb.*, II, p. 427 (1838).

Nirmus holophaeus (Nitzsch) Piaget, *Pédiculines*, p. 171, Pl. 14, f. 4 (1880).

Specimens have been taken off the type host, the ruff, *Philomachus pugnax* (= *Machetes pugnax*) at Onderstepoort. Giebel (1874) also recorded it from the Knot, *Calidris canutus* (= *Tringa canuta*) and *Areñaria interpres* (turnstone), but the specimens were probably either stragglers or were incorrectly identified.

25. *Degeeriella hoplopteri* (Mjöberg).

Nirmus hoplopteri Mjöberg, *Arkiv. f. Zool.*, VI, p. 157 (1910).

Recorded by Bedford (1919) taken off blacksmith plover, *Hoplopterus armatus* (= *H. speciosus*) at Bridgewater, Transvaal. It was described from specimens taken off *Hoplopterus spinosus* in the Sudan.

26. *Degeeriella hospes* (Nitzsch).

Nirmus hospes Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 371 (1866).

Described from specimens taken off grey plover, *Squatarola squatarola* (= *Vanellus squatarolus*).

27. *Degeeriella hypoleuca* (Nitzsch).

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

Lipeurus hypoleucus (Nitz.) Piaget, *Pédiculines*, Suppl. p. 66, Pl. 7, f. 3 (1885).

Esthiopterum hypoleucum (Nitz.) Harrison, *Parasit.*, IX, p. 136 (1916).

A single male recorded by Bedford (1920) taken off the type host, *Caprimulgus europaeus* (European night-jar) in the Rustenburg District, Transvaal.

28. **Degeeriella kilimanjarensis** (Kellogg).

Nirmus kilimanjarensis Kellogg, *Schwed. Exp. Kilimanjaro*, p. 46, Pl. 7, f. 3 (1910).

Described from specimens taken off Cape dabeck, *Podiocephalus capensis* (= *Colymbus capensis*) in East Africa.

29. **Degeeriella latirostris** (Burmeister).

Nirmus latirostris Burmeister, *Handb.*, II, p. 429 (1838).

Nirmus cuculi Denny, *Anoplur. Brit.*, p. 120, Pl. 10, f. 11 (1842).

Nirmus fenestratus Nitzsch, *Zeit. f. ges. Nat.*, XXVII, p. 117 (1866).

Nirmus fenestratus (Nitz.) Piaget, *Pédiculines*, p. 146, Pl. 12, f. 3 (1880).

Described from specimens taken off *Cuculus canorus* (European cuckoo). It has also been taken off *Notococcyx solitarius* (red-chested cuckoo) at Pietermaritzburg, Natal (coll. L. Hill).

30. **Degeeriella leucocephala** (Nitzsch).

Nirmus leucocephalus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 365 (1866).

Described from specimens taken off white-necked raven, *Corvultur albicollis* (= *Corvus albicollis*).

31. **Degeeriella lingulata** (Waterson).

Nirmus lingulatus Waterston, *Ann. S. Afr. Mus.*, X, p. 286 (1914).

Described from numerous specimens taken off white-headed gull, *Bruchigavia novae-hollandiae hartlaubi* (= *Larus hartlaubi*) in Table Bay.

32. **Degeeriella macrocephala** (Waterson).

Nirmus macrocephalus Waterst. *Ann. S. Afr. Mus.*, X, p. 284, Pl. 25, f. 2, 5 (1914).

Described from numerous specimens taken off the following hosts in South Africa: White-fronted sandplover, *Leucopoliis marginatus* (*Aegialitis marginatus*); Kittlitz's sandplover, *L. pecuaria* (= *A. pecuaria*), and three-banded sandplover, *Afroreclusus tricollaris* (= *Aegialitis tricollaris*). Also recorded by Bedford (1920) from *L. marginatus*, Port Alfred, Cape Province.

33. **Degeeriella melanophrys** (Nitzsch).

Nirmus melanophrys Nitz., in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 369 (1866).

Docophorus upupae Denny, *Anoplur. Brit.*, p. 92, Pl. 8, f. 1 (1842), nec Schrank, 1803.

Nirmus melanophrys Piaget, *Pédiculines*, p. 149, Pl. 12, f. 7 (1880).

Recorded by Waterston (1914) from *Upupa africana* (African hoopoe), Philipstown, Cape Province; also by Bedford (1919) taken from the same host at Pietermaritzburg, Natal. This species was described from specimens taken off *Upupa epops* (North African hoopoe).

34. **Degeeriella munda** (Nitzsch).

Nirmus mundus Nitzsch in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 366 (1866).

Described from specimens taken off European golden oriole, *Oriolus oriolus* (= *O. galbula*), a migrant to South Africa.

35. **Degeeriella nebulosa** (Burmeister).

Nirmus nebulosus Burmeister, *Handb.*, II, p. 429 (1838).

Nirmus nebulosus (Burm.) Piaget, *Pédiculines*, p. 155, Pl. 13, f. 4 (1880).

Recorded by Waterston (1914) taken off the type host, *Sturnus vulgaris* (European starling) in South Africa.

36. **Degeeriella normifer** (Grube).

Nirmus normifer, Grube, *Mid. Sib. Reise*, II, p. 478, Pl. 1, f. 8 (1851).

Nirmus triangulatus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVII, p. 378 (1866).

Nirmus triangulatus (Nitz.) Piaget, *Pédiculines*, p. 201, Pl. 16, f. 5 (1880).

Recorded by Piaget (1880) from the large white-necked skua, *Coprotheres pomarinus* (= *Lestris pomarina*). Also recorded by Kellogg (1908) from *Stercorarius parasiticus* (white-necked skua). The type host is *Lestris richardsoni* which does not occur in South Africa.

37. **Degeeriella numenii** (Denny).

Nirmus numenii Denny, *Anoplur. Brit.*, p. 144, Pl. 9, f. 6 (1842).

Described from specimens collected in England off *Numenius arquatus* (curlew) a migrant to South Africa.

38. **Degeeriella nycthemera** (Nitzsch).

Nirmus nycthemerus Nitzsch, in Burmeister, *Handb.*, II, p. 428 (1838).

Nirmus nycthemerus (Nitz.) Giebel, *Ins. Epiz.*, p. 174, Pl. 5, f. 8 (1874).

Described from specimens taken off little tern, *Sterna albifrons* (= *Sterna minuta*).

39. **Degeeriella obscura** (Burmeister).

Nirmus obscurus Burmeister, *Handb.*, II, p. 427 (1838).

Nirmus obscurus (Burm.) Giebel, *Ins. Epiz.*, p. 163, Pl. 6, f. 2, 3 (1874).

Described from specimens taken off wood sandpiper, *Rhyacophilus glareola* (= *Totanus glareola*). We have taken it off the same host at Onderstepoort.

40. **Degeeriella ochropi** (Denny).
Nirmus ochropi Denny, *Anoplur Brit.*, p. 134, Pl. 11, f. 12 (1842).
 Described from specimens taken off green sandpiper, *Tringa erythropus* (= *Totanus ochropus*), a migrant to South Africa.
41. **Degeeriella opisthotoma** (Kellogg).
Nirmus opisthotomus Kellogg, *Schwed. Exp. Kilimanjaro*, p. 46, Pl. 7, f. 4 (1910).
 Described from specimens taken off *Himantopus himantopus* (black-winged stilt) in East Africa.
42. **Degeeriella phaeopi** (Denny).
Nirmus phaeopi Denny, *Anoplur. Brit.*, p. 144, Pl. 10, f. 7 (1842).
Nirmus phaeopodis Giebel, *Ins. Epiz.*, p. 166 (1874).
Nirmus inaequalis Piaget, *Pédiculines*, p. 176, Pl. 15, f. 1 (1880).
 Described by Denny from specimens taken off whimbrel, *Phaeopus phaeopus* (= *Numenius phaeopus*), and by Piaget from *Numenius arquatus* (curlew). Both hosts are migrants to South Africa.
43. **Degeeriella phlyctopyga** (Nitzsch).
Nirmus phlyctopygus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XVII, p. 526 (1861).
Nirmus phlyctopygus (Nitz.) Giebel, *Ins. Epiz.*, p. 128 (1874).
 Described from specimens taken off *Pernis apivorus* (honey buzzard), a migrant.
44. **Degeeriella quadrangularis** (Rudow).
Nirmus quadrangularis Rudow, *Beitrag.*, p. 18 (1869).
 Described from specimens taken off pied crow, *Corvus albus* (= *Corvus scapulatus*).
45. **Degeeriella quadrisetacea** (Piaget).
Nirmus quadrisetaceus Piaget, *Pédiculines*, p. 668, Pl. 55, f. 5 (1880).
 Described from specimens taken off the painted snipe, *Rostratula benghalensis* (= *Rhynchaea variegata*). Specimens have been taken off the same host in the Rustenburg District. Transvaal (coll. W. Powell).
46. **Degeeriella rufa** (Nitzsch).
Nirmus rufus Nitzsch, in Burmeister, *Handb.*, II, p. 430 (1838).
Nirmus rufus (Nitz.) Piaget, *Pédiculines*, p. 131 (1880).
 This species has been recorded by both Piaget (1880) and Mjöberg (1910) from *Falco subbuteo* (hobby), a migrant. Specimens have also been taken off *Melanocircus maurus* (black harrier), Stellenbosch, C.P.
47. **Degeeriella sacra** (Giebel).
Nirmus sacer Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 375 (1866).
Nirmus sacer Giebel, *Ins. Epiz.*, p. 171 (1874).
 Described from specimens taken off glossy ibis, *Plegadis falcinellus* (= *Ibis sacra*), a migrant from Europe.
48. **Degeeriella scalaris** (Piaget).
Nirmus scalaris Piaget, *Pédiculines*, p. 190, Pl. 17, f. 2 (1880).
 Described from specimens taken off the ruff, *Philomachus pugnax* (= *Machetes pugnax*). Specimens have been taken off the same host at Onderstepoort (G.A.H.B.).
49. **Degeeriella scolopacis** (Denny).
Nirmus scolopacis Denny, *Anoplur. Brit.*, p. 149, Pl. 11, f. 8 (1842).
Nirmus truncatus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 375 (1866).
Nirmus tristis Giebel, *Ins. Epiz.*, p. 168 (1874).
Nirmus truncatus (Nitz.) Piaget, *Pédiculines*, p. 178, Pl. 15, f. 2 (1880).
 Specimens have been taken off *Capella nigripennis* (Ethiopian snipe) at Onderstepoort (G.A.H.B.). It was described by Denny and others from specimens taken off *Scolopax galinago* (European snipe).
50. **Degeeriella sellata** (Burmeister).
Nirmus sellatus Burmeister, *Handb.*, II, p. 428 (1838).
Nirmus selliger Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 376 (1866).
Nirmus selliger (Nitz.) Piaget, *Pédiculines*, p. 197, Pl. 16, f. 2 (1880).
 Piaget (1880) has recorded this species taken from *Sterna hirundo* (common tern) and the sandwich tern, *Thalasseus sandvicensis* (= *Sterna cantiaca*) in the Zoological Gardens at Rotterdam. Both birds are migrants to South Africa.
51. **Degeeriella signata** (Piaget).
Nirmus signatus Piaget, *Pédiculines*, p. 186, Pl. 15, f. 8 (1880).
 Described from specimens taken off *Recurvirostra avosetta* (avocet) in the Zoological Gardens at Rotterdam. Waterston (1914) has recorded it taken off the same host in South Africa.
52. **Degeeriella stictochroa** (Nitzsch).
Nirmus stictochrous Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 374 (1866).
Nirmus stictochrous (Nitz.) Piaget, *Pédiculines*, p. 193 (1880).
 Described from specimens taken off *Dromas ardeola* (crab plover), a migrant.

53. *Degeeriella strepsilaris* (Denny).

Nirmus strepsilaris Denny, *Anoplur. Brit.*, p. 135, Pl. 11, f. 4 (1842).

Nirmus subcingulatus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 372 (1866).

Described by both Denny and Giebel from specimens taken off turnstone, *Arenaria interpres* (= *Strepsilas interpres*), a migrant to South Africa.

54. *Degeeriella subcuspidata* (Nitzsch).

Nirmus subcuspidatus Nitzsch, in Burmeister, *Handb.*, II, p. 430 (1838).

Nirmus subcuspidatus Piaget, *Pédiculines*, p. 148, Pl. 12, f. 5 (1880).

Ferris (1916) has recorded it taken off the type host, *Coracias garrulus* (European roller) in South Africa.

55. *Degeeriella tenuis* (Nitzsch).

Nirmus tenuis Nitzsch, in Burmeister, *Handb.*, II, p. 430 (1838).

Nirmus tenuis (Nitz.) Denny, *Anoplur. Brit.*, p. 148, Pl. 11, f. 9 (1842).

Described by both Burmeister and Denny from specimens taken off European sandmartin, *Riparia riparia* (= *Hirundo riparia*), a migrant.

56. *Degeeriella testudinaria* (Children).

Nirmus testudinarius Child., *App. Back's Land Exp.*, p. 538 (1836).

Nirmus biseriata Child., *ibid.*, p. 538 (1836).

Nirmus pileus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVII, p. 373 (1866).

Nirmus pileus Piaget, *Pédiculines*, p. 182, Pl. 15, f. 6 (1880).

Recorded by Waterston (1914) taken off *Recurvirostra avosetta* (avocet), Philipstown, C.P. We have also taken it off *Crocethia alba* (sanderling), Swakopmund, South-West Africa (Tvl. Mus. No. 13538). It was described by Children from specimens taken of *R. americana* and by Giebel and Piaget from *R. avosetta*.

57. *Degeeriella umbrina* (Nitzsch).

Nirmus umbrinus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 371 (1866).

Nirmus umbrinus (Nitz.) Giebel, *Ins. Epiz.*, p. 171 (1874).

Recorded by Bedford (1919) taken off hammerhead, *Scopus umbretta bannermani* (= *S. umbretta*) in the Rustenburg District, Transvaal, and at Pietermaritzburg, Natal. The type was taken off *S. umbretta*.

58. *Degeeriella varia* (Nitzsch).

Nirmus varius Nitzsch, in Burmeister, *Handb.*, II, p. 430 (1838).

Nirmus varius (Nitz.) Piaget, *Pédiculines*, p. 139, Pl. 11, f. 8 (1880).

Nirmus varius (Nitz.) Kell. & Paine, *Bull. Ent. Res.*, II, p. 147, Pl. 5, f. 5, 5a (1911).

Recorded by Waterston (1914) taken off black crow, *Heterocorax capensis* (= *Corvus capensis*) in South Africa. Also recorded by Bedford (1920) from the same host under the name of *D. arguta* (Nitzsch). Kellogg and Paine (1911) recorded it from *Corvultur albicollis* (white-necked raven) in Southern Nigeria.

59. *Degeeriella vulgata* (Kellogg).

Nirmus vulgatus Kellogg, *New Mallophaga*, II, p. 496, Pl. 57, f. 5 (1896).

Recorded by Waterston (1914) taken off Cape sparrow, *Passer melanurus* (= *P. arcuatus*) at Capetown, C.P.; also from *Amadina erythrocephala* (red-headed finch) at Philipstown, C.P. It was described by Kellogg from a number of Passeriformes in the United States.

60. *Degeeriella zonaria* (Nitzsch).

Nirmus zonarius Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 374 (1866).

Nirmus zonarius (Nitz.) Giebel, *Ins. Epiz.*, p. 166 (1874).

Recorded by Waterston (1914) and Bedford (1920) taken off curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*) in South Africa; also by the latter from one of the type hosts, the little stint, *Pisobia minuta* (= *Tringa minuta*) in the Pretoria District.

Genus GONIODES Nitzsch.

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

This genus contains about sixty species found on Galliformes, Columbiformes and South American tinamous.

Genotype: *Pediculus pavonis* Linné.

1. *Goniodes aegypticus* (Kellogg and Paine).

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

Goniocotes aegypticus Kellogg & Paine, *Bull. Ent. Res.*, II, ii, p. 148, Pl. 5, f. 2 (1911).

Goniodes piageti Johnston & Harrison, *Proc. Roy. Soc. Qsld.*, XXIV, p. 19 (1912).

Waterston (1914) recorded this species from South Africa taken off *Vinago delalandi* (Cape green pigeon) and Cape turtle dove, *Afropelia capicola* (= *Turtur capicola*). Bedford (1920)

recorded it taken off *A. capicola damarensis* (Damara turtle dove) and laughing dove, *Stigmatopelia senegalensis* (= *Turtur senegalensis*) in the Transvaal. A ♀ has also been taken off *Dialiptila phaeonota* (Cape rock pigeon), Ugab River, South-West Africa (coll. R. D. Bradfield).

2. **Goniodes assimilis** Piaget.

Goniodes assimilis Piaget, *Pédiculines*, p. 248 (1880).

Described from specimens taken off Cape noisy francolin, *Chaetopus capensis* (= *Francolinus capensis*) in the Zoological Gardens at Rotterdam.

3. **Goniodes dissimilis** Nitzsch.

Goniodes dissimilis, Nitzsch, in Denny, *Anoplur. Brit.*, p. 162, Pl. 12, f. 6 (1842).

Goniodes dissimilis (Nitz.) Piaget, *Pédiculines*, p. 268, Pl. 22, f. 3 (1880).

Specimens have been taken off domestic fowls at Pietermaritzburg, Natal (coll. L. Hill).

4. **Goniodes fimbriatus** Neumann.

Goniodes fimbriatus Neu., *Arch. Parasit.*, XV, p. 629, f. 19, 20 (1913).

Described from specimens taken off unknown hosts at Konakry and Mocambique.

5. **Goniodes hilli** Bedford.

Goniodes hilli Bedf., *Rep. Dir. Vet. Res.*, Un. S. Afr., VII & VIII, p. 724, Pl. 5, f. 3 (1920).

Described from specimens taken off red-eyed turtle dove, *Streptopelia semitorquata* (= *Turtur semitorquatus*) at Pietermaritzburg, Natal.

6. **Goniodes meliagridis** (Linnaeus).

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

Goniodes styliifer Nitzsch, in Burmeister, *Handb.*, II, p. 432 (1838).

Goniodes styliifer (Nitz.) Piaget, *Pédiculines*, p. 264, Pl. 22, f. 1 (1880).

Goniodes styliiferum Taschenberg, *Die Mallophagen*, p. 47 (1882).

A common parasite on the domestic turkey in South Africa.

7. **Goniodes numidae** Mjöberg.

Goniodes numidae Mjöberg, *Arkiv. f. Zool.*, VI, p. 103, f. 60, 61 (1910).

Described from specimens taken off *Numidà ptilorhyncha* in the Sudan. Bedford (1919) has recorded it from *Numida coronata*, Bridgewater, Transvaal, but the skin is in the Transvaal Museum and proves to be *N. papillosa transvaalensis*. Also recorded by Bedford (1929) from *N. papillosa*, Kunene River, South-West Africa.

8. **Goniodes parviceps** Piaget.

Goniodes parviceps Piaget, *Pédiculines*, p. 277, Pl. 23, f. 2 (1880).

A parasite of *Pavo cristatus*, but not yet recorded from this bird in South Africa.

9. **Goniodes pavonis** (Linnaeus).

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

Goniodes falcicornis Nitzsch, in Burmeister, *Handb.*, II, p. 432 (1838).

Goniodes falcicornis (Nitz.) Piaget, *Pédiculines*, p. 275, Pl. 23, f. 1 (1880).

Recorded by Waterston (1914) taken from *Pavo cristatus* in South Africa.

10. **Goniodes pternistis** Bedford.

Goniodes pternistis Bedf., *Ann. Rep. Dir. Vet. Serv.*, Un. S. Afr., XV, p. 520, f. 21 (1929).

Described from specimens taken off *Pternistis swainsoni* (Swainson's red-necked francolin) in the Zoological Gardens, Pretoria.

11. **Goniodes scleroptilus** Bedford.

Goniodes scleroptilus Bedf., *Ann. Rep. Dir. Vet. Serv.*, Un. S. Afr., XV, p. 520, f. 20 (1929).

Described from specimens taken off *Scleroptila garipeensis pallidior* (Ovambo partridge)*, Kunene River, South-West Africa.

Genus GONIOCOTES Burmeister.

Goniocotes Burmeister, *Handb. der Ent.* II, p. 431 (1838).

This genus contains about fifty species found on Galliformes, Columbiformes and South American tinamous.

Genotype: *Goniocotes hologaster* Nitzsch.

1. **Goniocotes bidentatus** (Scopoli).

Pediculus bidentatus Scopoli, *Ent. Carn.*, p. 285 (1763).

Goniocotes compar Nitzsch in Burmeister, *Handb.*, II, p. 431 (1838).

Goniocotes compar (Nitz.) Piaget, *Pédiculines*, p. 234, Pl. 19, f. 10 (1880).

Recorded by Bedford (1919) taken off domestic pigeons at Onderstepoort, Transvaal, and Pietermaritzburg, Natal.

2. **Goniocotes hologaster** Nitzsch.

Goniocotes hologaster Nitzsch, in Burmeister, *Handb.*, II, p. 431 (1838).

* Mr. Roberts has examined the skin and informs me that it is *Scleroptila jugularis*.

Goniocotes hologaster var. *maculatus* Taschenberg, *Die Mallophagen*, p. 76, Pl. 3, f. 3 (1882).

Goniocotes nigromaculatus Mjöberg, *Arkiv. f. Zool.*, VI, p. 106, f. 62 (1910).

Goniocotes nigromaculatus (Mjöb.) Bedf., *Rep. Dir. Vet. Res.*, Un. S. Afr., VII & VIII, p. 726, Pl. 5, f. 4 (1920).

Recorded by Bedford (1920) from domestic fowl, Pretoria North; bush partridge, *Dendroperdia sephaena* (= *Francolinus sephaena*) and *Numida coronata* in the Transvaal. The skin of the last-named bird is in the Transvaal Museum and proves to be *N. papillosa transvaalensis*. Also recorded by Bedford (1929) from *N. papillosa*, Kunene River, South-West Africa. One ♀ taken off *Pternistis castaneiventer krebsi* (Drakensberg red-necked francolin), Zoo, Pretoria.

3. *Goniocotes gigas* Taschenberg.

Goniocotes hologaster Denny, *Anoplur. Brit.*, p. 153, Pl. 12, f. 4 (1842), nec Nitzsch, 1838.

Goniocotes gigas Taschenberg, *Zeit. f. ges. Nat.*, LII, p. 104, Pl. 1, f. 10 (1879).

Goniocotes abdominalis Piaget, *Pédiculines*, p. 238, Pl. 20, f. 9 (1880).

Recorded by Bedford (1919) from domestic fowls at Onderstepoort and at Pietermaritzburg, Natal; also from *Numida coronata*, Bridgewater, Transvaal, the host proving to be *N. papillosa transvaalensis*. Also recorded by Bedford (1929) from *N. papillosa*, Kunene River, South-West Africa.

4. *Goniocotes rectangulatus* Nitzsch.

Goniocotes rectangulatus Nitzsch, in Giebel, *Zeit. f. ges. Nat.* XXVIII, p. 389 (1866).

Goniocotes rectangulatus (Nitz.) Piaget, *Pédiculines*, p. 230, Pl. 19, f. 5 (1880).

A parasite of *Pavo cristatus*, but not yet recorded from this bird in South Africa.

Genus AUSTRAGONIODES Harrison.

Austrogoniodes Harrison, *Parasit.*, VII, p. 398 (1915).

This genus includes four species found on *Spheniscidae*. They were formerly placed in the genera *Goniodes* and *Goniocotes*.

1. *Austrogoniodes bifasciatus* (Piaget).

Goniocotes bifasciatus Piaget, *Pédiculines*, Suppl., p. 47, Pl. 5, f. 6 (1885).

Recorded by Waterston (1914) taken off the type host, *Spheniscus demersus* (jackass penguin) in South Africa.

Genus ACIDOPROCTUS Piaget.

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

Akidoproctus Piaget, *Pédiculines*, p. 208 (1880).

This genus includes five species found on Anatidae.

Genotype: *Acidoproctus marginatus* Piaget.

1. *Acidoproctus marginatus* Piaget.

Acidoproctus marginatus Piaget, *Tijd. v. Ent.*, XXI, p. 179, Pl. 12, fig. c (1878).

Acidoproctus bifasciatus Piaget, *ibid.*, XXI, p. 181, Pl. 12, fig. G (1878).

Akidoproctus marginatus Piaget, *Pédiculines*, p. 209, Pl. 17, f. 4 (1880).

Akidoproctus bifasciatus Piaget, *ibid.*, p. 210, Pl. 17, f. 5 (1880).

It is unfortunate that *marginatus* has priority over *bifasciatus* as it was described from an immature specimen, a straggler found on a gull, *Larus spinicauda*. This name is not mentioned by J. Dwight in his monograph "The Gulls (Laridae) of the World" (*Bull. Amer. Mus. Nat. Hist.*, LII, iii, pp. 63-401, (1925)). *A. bifasciatus* was also described from a straggler—a ♀ found on *Dromas ardeola*. Recorded by Bedford (1919) taken off the following hosts in the Rustenburg District, Transvaal: *Dendrocygna viduata* (white-faced duck); *Sarkidiornis melanotus* (knob-billed duck); *Casarca cana* (South African sheldrake); red-billed duck, *Paeclonitta erythrorhyncha* (= *Anas erythrorhyncha*); *Thalassornis leuconotus* (white-backed duck) and *Plectropterus gambensis* (spur-winged goose).

2. *Acidoproctus rostratus* (Rudow).

Ornithobius rostratus Rudow, *Beitrag z. Kenntn. d. Malloph.*, p. 46 (1869).

Nirmus stenopygus Nitzsch, in Giebel, *Ins. Epiz.*, p. 179, Pl. 8, f. 6, 7 (1874).

Akidoproctus stenopygus (Nitz.) Kellogg & Paine, *Bull. Ent. Res.*, II, p. 148, Pl. 5, f. 6, 6a, b (1911).

Described by Rudow from immature specimen taken off *Alopochen aegyptiacus*, and by Giebel from *Anas rufina*. Recorded by Kellogg and Paine (1911) taken off *Plectropterus gambensis* (spur-winged goose) in the Sudan, and by Bedford (1919 and 1929) from the same host in the Rustenburg District, Transvaal, and from *A. aegyptiacus*, Tamanzu, South-West Africa.

Genus HARRISONIELLA Bedford.

Harrisoniella Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 529 (1929).

This genus includes a single species.

1. **Harrisoniella diomedea** (Fabricius).

- Pediculus diomedae* Fabr., *Syst. Ent.*, p. 808 (1775).
Lipeurus ferox Giebel, *Zeit. f. ges. Nat.*, XXIX, p. 195 (1867).
L. ferox (Gie.) Taschenberg, *Nova Acta*, XLIV, p. 145, Pl. 5, f. 1, 1a (1882).
L. ferox (Gie.) Kellogg, *New Mallophaga*, I, p. 127, Pl. 9, f. 1, 2 (1896).
L. densus (Gie.) Kellogg, *ibid.*, p. 114, Pl. 7, f. 1, 2 (1896).

Recorded by Waterston (1914) taken off *Diomedea exulans* (wandering albatross) in South Africa; also by Bedford (1929) from the type host, *Thalassarche melanophrys* (mollymawk), Capetown, C.P.

Genus PSEUDONIRMUS Mjöberg.

Pseudonirmus Mjöberg, *Arkiv. f. Zool.*, VI, p. 149 (1910).
 This genus includes two species found on Hydrobatidae.

Genotype: *Degeeriella charcoti* Neumann.

1. **Pseudonirmus gurlti** (Taschenberg).

- Lipeurus gurlti* (Taschenberg) *Nova Acta*, XLIV, p. 151, Pl. 5, f. 6 (1882).
Lipeurus lugubris Taschenb. *ibid.*, XLIV, p. 153, Pl. 6, f. 9 (1882).

Recorded by Bedford (p. 528, 1929) taken off the type host, *Daption capensis* (Cape sea-pigeon) at Capetown.

Genus NAUBATES Bedford.

Naubates Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVI, p. 167 (1930).

This genus contains three species found on Hydrobatidae and Diomedidae.

Genotype: *Lipeurus fuliginosus* Taschenberg.

1. **Naubates fuliginosus** (Taschenberg).

- Lipeurus fuliginosus* Taschenb., *Nova Acta.*, XLIV, p. 156, Pl. 4, f. 3 (1882).
Lipeurus testaceus Taschenb., *ibid.*, p. 135, Pl. 5, f. 3 (1882).
Naubates fuliginosus (Tasch.) Bedf., *Rep. Dir. Vet. Serv. & Anim. Indust.*, XVI, p. 168, f. 9, 11, 15, 16a (1930).

Type hosts of *fuliginosus*: *Diomedea exulans* (wandering albatross) and *Nealbatrus chlororhynchus* (yellow-billed mollyhawk); *testaceus*: Cape sea-pigeon, *Daption capensis* (= *Procellaria capensis*). Waterston (1914) has recorded it from the following hosts in South Africa: *D. exulans*; mollymawk, *Thalassarche melanophrys* (= *D. melanophrys*); *Oceanites oceanicus* (sooty petrel), and *Procellaria aequinoctialis* (Cape hen). Kellogg (1914) has also recorded it from the following

hosts in the South Atlantic: giant petrel, *Macronectes giganteus* (= *Ossifraga gigantea*); great grey petrel, *Adamastor cinerea* (= *Priofinus cinereus*); soft-plumaged petrel, *Pterodroma mollis* (= *Oestrelata mollis*); brown petrel, *P. incerta* (= *O. incerta*), and *Sterna paradisea* (arctic tern). Its occurrence on the last-named host was due to straggling.

2. **Naubates harrisoni** Bedford

N. harrisoni Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, XVI, p. 168, f. 12, 14, 16b (1930).

Described from ♂♂ and a ♀ taken off *Ardenna gravis* (great shearwater) at Capetown, C.P.

3. **Naubates pterodromi** Bedford.

N. pterodromi Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, XVI, p. 170, f. 10, 13 (1930).

Described from ♀♀ taken off *Pterodroma macroptera* (Cape parson) at Capetown, C.P.

Genus PECTINOPYGUS Mjöberg.

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

This genus includes several species found on birds belonging to the families Phalacrocoracidae, Anhingidae, Sulidae, Fregatidae, Phaetontidae and Pelecanidae.

Genotype: *Pediculus bassanae* O. Fabricius.

1. **Pectinopygus acutifrons** (Rudow).

Lipeurus acutifrons Rudow, *Zeit. f. ges. Nat.*, XXXV, p. 138 (1870).

Nirmus capensis Rudow, *ibid.*, p. 469 (1870).

Nirmus dispar Piaget, *Pédiculines*, p. 174, Pl. 14, f. 7 (1880).

Waterston (1914) has recorded it taken off the type host, Cape cormorant, *Pseudocarbo capensis* (= *Phalacrocorax capensis*) in Table Bay. Specimens have also been taken off *Anacarro neglecta* (bank cormorant), Dyers Island, C.P.

2. **Pectinopygus afer** (Kellogg).

Lipeurus afer Kellogg, *Schwed. Zool. Exp. Kilimanjaro*, p. 47, Pl. 7, f. 5 (1910).

Described from specimens taken off reed cormorant, *Microcarbo africana* (= *Phalacrocorax africanus*) in East Africa. Waterston (1914) has recorded it taken from the same host in Table Bay. Specimens have also been taken off *Microcarbo coronata* (crowned cormorant), Swakopmund, South-West Africa (coll. R. D. Bradfield).

3. **Pectinopygus bassanae** (O. Fabricius).

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

Lipeurus staphylinoides Denny, *Anoplur. Brit.*, p. 180, Pl. 15, f. 2 (1842).

Lipeurus pullatus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 387 (1866).

Lipeurus pullatus (Nitz.) Piaget, *Pédiculines*, p. 339, Pl. 27, f. 9 (1880).

Lipeurus pullatus (Nitz.) Cummings, *Proc. Zool. Soc. Lond.*, p. 691, f. 36 (1916).

Type host: *Sula bassanae* Linné (European gannet). Recorded by Waterston (1914) from malagash, *Sulita capensis* (= *Sula capensis*), Capetown, C.P., but it is probably a distinct species.

4. **Pectinopygus forficulatus** (Nitzsch).

Lipeurus forficulatus Nitzsch, *Zeit. f. ges. Nat.*, XXVIII, p. 386 (1866).

Lipeurus forficulatus (Nitz.) Taschenb., *Nova Acta.*, p. 156, Pl. 4, f. 3 (1882).

Lipeurus forficulatus (Nitz.) Cummings, *Proc. Zool. Soc. Lond.*, p. 682, f. 27-35 (1916).

Recorded by Giebel (1874) and Taschenberg (1882) from *Pelecanus onocrotalus* (European pelican). Also recorded by Bedford (1919) taken off pink-backed pelican, *Neopelecanus rufescens* (= *Pelecanus rufescens*) in the Zoological Gardens, Pretoria.

5. **Pectinopygus gracilicornis** (Piaget).

Lipeurus gracilicornis Piaget, *Pédiculines*, p. 309, Pl. 25, f. 6 (1880).

Described from specimens taken off *Fregata minor* (frigate bird).

6. **Pectinopygus longicornis** (Piaget).

Lipeurus longicornis Piaget, *Pédiculines*, p. 334, Pl. 27, f. 3 (1880).

Type hosts: *Phalacrocorax carbo* and *P. cristatus*. Recorded by Waterston (1914) and Bedford (1920) taken off *Phalacrocorax lucidus* in South Africa.

7. **Pectinopygus majus** (Kellogg) 1899 nec Piaget, 1880.

Lipeurus gracilicornis var. *majus* Kell., *New Mallophaga*, III, p. 30 (1899).

Type host: *Fregata aquila*. Recorded by Kellogg (1914) taken off *Fregata ariel* and tropic bird, *Leptophaeton lepturus* (= *Phaethon lepturus*) in the South Atlantic. The latter species occurs on the South African coast, but the occurrence of this parasite on this host is probably due to straggling.

8. **Pectinopygus setosus** (Piaget).

Lipeurus setosus Piaget, *Pédiculines*, p. 335, Pl. 27, f. 4 (1880).

Type host: *Phalacrocorax sulcirostris*. Recorded by Piaget (1885) taken off reed cormorant, *Microcarbo africana* (= *Graculus africanus*) and Cape snake-bird, *Anhinga rufa levaillantii* (= *Plotus levaillantii*) in the Leyden Museum.

Genus ESTHIOPTERUM Harrison.

Esthiopterum Harrison, *Parasit.*, IX, p. 129 (1916).

This genus includes nearly two hundred and fifty species formerly placed in the genus *Lipeurus*.

Genotype: *Pediculus gruis* Linné.

1. **Esthiopterum angusticeps** (Piaget).

Lipeurus angusticeps Piaget, *Pédiculines*, p. 306, Pl. 25, f. 4 (1880).

Described from specimens taken off great grey petrel, *Adamastor cinereus* (= *Procellaria cinerea*) in the Leyden Museum.

2. **Esthiopterum anseris** (Linnaeus).

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

Lipeurus jejunus Nitzsch, in Denny, *Anoplur. Brit.*, p. 177, Pl. 15, f. 4 (1842).

Lipeurus jejunus Piaget, *Pédiculines*, p. 348, Pl. 30, f. 8 (1880).

Recorded by Bedford (1919) taken off domestic goose at Pietermaritzburg, Natal. Piaget (1880) recorded it from several geese, including the Egyptian goose, *Alopochen aegyptiacus* (= *Anser aegyptiacus*).

3. **Esthiopterum ardeae** (Linnaeus).

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

Lipeurus leucopygus Nitzsch, in Burmeister, *Handb.*, II, p. 434 (1838).

Lipeurus leucopygus (Nitz.) Piaget, *Pédiculines*, p. 318, Pl. 6, f. 4 (1880).

Recorded by Bedford (1919) taken off the type host, *Ardea cinerea* (grey heron) in the Rustenburg District, Transvaal.

4. **Esthiopterum asymmetricum** (Rudow).

Lipeurus asymmetricus Rudow, *Zeit. f. ges. Nat.*, XXXV, p. 132 (1870).

Lipeurus gambensis Piaget, *Pédiculines, Suppl.*, p. 64, Pl. 7, f. 1 (1885).

Described by Rudow from specimens taken off Egyptian goose, *Alopochen aegyptiacus* (= *Anser aegyptiacus*), and by Piaget from specimens taken off *Plectropterus gambensis* (spur-winged goose). Bedford (1919 and 1929) has recorded it taken off the former host in South-West Africa, and off the latter host in the Rustenburg District, Transvaal.

5. **Esthiopterum capitatum** (Piaget).

Lipeurus capitatus Piaget, *Pédiculines, Suppl.*, p. 63, Pl. 6, f. 9 (1885).

Recorded by Kellogg and Ferris (1915) and Bedford (1919) taken off the type host, *Hagedashia hagedash* (hadada ibis) at Mfongosi, Zululand.

6. **Esthiopterum ciconiae** (Linnaeus).

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

Lipeurus versicolor Nitzsch, in Burmeister, *Handb.*, II, p. 434 (1838).

Lipeurus maculatus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 383 (1866).

Lipeurus fissomaculatus Giebel, *Ins. Epiz.*, p. 225 (1874).

Lipeurus versicolor (Nitz.) Piaget, *Pédiculines*, p. 315, Pl. 27, f. 2 (1880).

Lipeurus variegatus Neumann, *Arch. Parasit.*, XV, p. 381, f. 27, 28 (1912).

Recorded by Waterston (1914) taken off the type host—white stork, *Ciconia ciconia* (= *C. alba*). It was described by Giebel in 1866 from black stork, *Melanopelargus niger* (= *Ciconia nigra*), and in 1874 from marabou stork, *Leptoptilus crumeniferus* (= *Mycteria crumenifera*).

7. **Esthiopterum crassicornis** (Scopoli).

Pediculus crassicornis Scopoli, *Ent. Carn.*, p. 383 (1763).

Lipeurus squalidus Nitzsch in Denny, *Anoplur. Brit.*, p. 176, Pl. 14, f. 5 (1842).

Lipeurus squalidus (Nitz.) Piaget, *Pédiculines*, p. 344, Pl. 30, f. 5 (1880).

Piaget (1880) has recorded this species from several ducks, including *Anas domestica* and European shoveller, *Spatula clypeata* (= *Anas clypeata*). Bedford (1919) has recorded it from *Paecilonitta erythrorhyncha* (red-billed teal) in the Rustenburg District, Transvaal. Specimens have also been taken off *Notonetta capensis* (Cape wigeon), Swakopmund, S.W.A. (coll. R. D. Bradfield).

8. **Esthiopterum diversum** (Kellogg).

Lipeurus diversus Kellogg, *New Mallophaga*, I, p. 123, Pl. 8, f. 3, 4 (1896).

Lipeurus limitatus Kellogg, *ibid.*, p. 124, Pl. 9, f. 5, 6 (1896).

Type host of *diversus*: *Puffinus opisthomelas*.

Recorded by Waterston (1914) taken off Cape hen, *Procellaria aequinoctialis* (= *Majaqueus aequinoctialis*) and *Oceanites oceanicus* (sooty petrel) in South Africa. Kellogg (1914) recorded specimens taken off the following hosts in the South Atlantic; great grey petrel, *Adamastor cinereus* (= *Proifinus cinereus*); brown petrel, *Pterodroma incerta* (= *Oestrelata incerta*); soft-plumed petrel, *Pterodroma mollis* (= *Oestrelata mollis*); mollymawk, *Thalassarche melanophrys* (= *Diomedea melanophrys*); arctic tern, *Sterna macrura* (= *S. paradisea*) and *Puffinus anglorum*. All these hosts occur on the South African coast, except the last named.

9. **Esthiopterum emarginatum** (Piaget).

Lipeurus emarginatus Piaget, *Pédiculines*, p. 328, Pl. 28, f. 2 (1880).

Described from a male taken off green sandpiper, *Tringa erythropus* (= *Totanus ochropus*), a migrant from Europe.

10. **Esthiopterum genitale** (Piaget).

Lipeurus genitales Piaget, *Pédiculines*, Suppl., p. 58, Pl. 6, f. 5 (1885).

Described from specimens taken off *Leptoptilus crumeniferus* (marabou stork).

11. **Esthiopterum giganticola** (Kellogg).

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

Lipeurus confidens Kellogg, *ibid.*, III, p. 26, Pl. 3, f. 1 (1899).

Lipeurus miriceps Kell. & Kuw., *Proc. Wash. Acad. Sci.*, IV, p. 480 (1902).

Type host of *giganticola*: *Diomedea albatrus*; of *confidens*: *D. nigripes*; of *miriceps*: *D. sp.* Recorded taken in South Africa by Waterston (1914) and Bedford (1920) off Layard's albatross, *Diomedella cauta layardi* (= *Thalassogeron layardi*); also by Waterston (1914) off wandering albatross (*Diomedea exulans*); mollymawk, *Thalassarche melanophrys* (= *D. melanophrys*), and yellow-billed mollymawk (*Nealbatrus chlororhynchus*).

12. **Esthiopterum lepidum** (Nitzsch).

Lipeurus lepidus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 383 (1866).

Lipeurus signatus Piaget, *Pédiculines*, p. 310, Pl. 25, f. 7 (1880).

Type host: *Anastromus coromanelicus*. Piaget described it from specimens taken off *Anastromus lamelligerus* (open-bill stork).

13. **Esthiopterum leucoproctum** (Nitzsch).

Lipeurus leucoproctus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 384 (1866).

Lipeurus leucopygus var. *minor* Piaget, *Pédiculines*, p. 320 (1880).

Described from specimens taken off purple heron, *Pyrtherodia purpurea* (= *Ardea purpurea*).

14. **Esthiopterum modestum** (Giebel).

Lipeurus modestus Giebel, *Ins. Epiz.*, p. 210 (1874).

Lipeurus grandis Piaget, *Pédiculines*, p. 323, Pl. 26, f. 7 (1880).

Lipeurus laculatus Kell. & Chap., *New Mallophaga*, iii, p. 93, Pl. 7, f. 1 (1899).

- Described by Giebel from specimens taken off the large white-necked skua, *Coprotheres pomarinus* (= *Lestris pomarina*). Kellogg (1914) recorded specimens taken off the southern skua, *Catharacta skua antarcticus* (= *Megalestris antarctica*) in the South Tropical Atlantic.
15. **Esthiopterum nigrolimbatus** (Giebel).
Lipeurus nigrolimbatus Giebel, *Ins. Epiz.*, p. 233 (1874).
Lipeurus mutabilis Piaget, *Pédiculines*, p. 324, Pl. 27, f. 1 (1880).
Lipeurus celer Kellogg, *New Mallophaga*, i, p. 117, Pl. 7, f. 5, 6 (1896).
Lipeurus varius Kellogg, *ibid.*, p. 116, Pl. 7, f. 3, 4 (1896).
 Described by both Giebel and Piaget from specimens taken off *Daption capensis* (Cape sea-pigeon). Kellogg's specimens were found on the exotic bird, *Fulmaris glupischa*.
16. **Esthiopterum obscurum** (Rudow).
Lipeurus obscurus Rudow, *Zeit. f. ges. Nat.*, XXXVI, p. 125 (1870).
Lipeurus melanocnemis Giebel, *Ins. Epiz.*, p. 233 (1874).
Lipeurus tricolor Piaget, *Pédiculines*, p. 363, Pl. 30, f. 4 (1880).
Lipeurus lepturus Enderl., *Deutsch. Süd. polar Exp.*, X, p. 453 (1909).
Lipeurus gaini Neumann, *Deux Exp. Antarct. Fr.*, p. 192 (1913).
 Described by Rudow, Giebel and Neumann from specimens taken off *Macronectes giganteus* (giant petrel), and by Piaget from the sooty albatross, *Phoebetria palpebrata* (= *P. fuliginosa*). Kellogg (1914) has recorded it from *Thalassarche melanophrys* (mollymawk) and *Nealbatrus chlororhynchus* (yellow-billed mollymawk) in the South Atlantic.
17. **Esthiopterum parviceps** (Piaget).
Lipeurus parviceps Piaget, *Pédiculines*, p. 321, Pl. 26, f. 6 (1880).
 Described from specimens taken off *Sterna hirundo* (common tern).
18. **Esthiopterum rotundatum** (Piaget).
Lipeurus rotundatus Piaget, *Tijd. v. Ent.*, XXXI, p. 159, Pl. 4, f. 2 (1888).
 Described from specimens taken off Peter's finfoot, *Podica petersi* (= *P. senegalensis*).
19. **Esthiopterum stellare** (Denny).
Lipeurus stellaris Denny, *Anoplur. Brit.*, p. 178, Pl. 15, f. 3 (1842).
 Described from specimens taken off *Botaurus stellaris* (bittern).

20. **Esthiopterum subsignatum** (Giebel).

Lipeurus subsignatus Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 384 (1866).

Lipeurus subsignatus (Gie.) Piaget, *Pédiculines*, p. 320, Pl. 26, f. 5 (1880).

Described from specimens taken off greater flamingo, *Phoenicopterus major* (= *P. antiquorum*).

21. **Esthiopterum sudanicum** (Mjöberg).

Lipeurus sudanicus Mjöberg, *Arkiv. f. Zool.*, VI, p. 85 (1910).

Described from specimens taken off red-eyed turtle-dove, *Streptopelia semitorquata* (= *Turtur semitorquatus*) in the Sudan. Bedford (1919) has recorded it taken off the laughing dove, *Stigmatopelia senegalensis aequatorialis* (= *Turtur senegalensis*) and Damara turtle dove, *Afropelia capicola damarensis* (= *T. capicola damarensis*) in the Transvaal.

Genus COLUMBICOLA Ewing.

Columbicola Ewing, *A Manual of External Parasites*, pp. 116 & 190 (1929).

Genotype: *Esthiopterum columbae* (Linné).

1. **Columbicola columbae** (Linnaeus).

Pediculus columbae Linné, *Syst. Nat.*, p. 614 (1758).

Lipeurus baculus Nitzsch in Giebel, *Zeit. f. ges. Nat.*, XXVII, p. 379 (1866).

Lipeurus baculus (Nitz.) Piaget, *Pédiculines*, p. 303, Pl. 25, f. 2 (1880).

This species is a common parasite on domestic pigeons in South Africa. Waterston (1914) has recorded it taken off *Vinago delalandei* (Cape fruit pigeon) at Port St. Johns, Cape Province, and Bedford (1919) from laughing dove, *Stigmatopelia senegalensis aequatorialis* (= *Turtur senegalensis*) and Damara turtle dove, *Afropelia capicola damarensis* (= *T. capicola damarensis*) in the Transvaal.

Genus RALLICOLA Johnston & Harrison.

Oncophorus Piaget, *Pédiculines*, p. 213 (1880), *nec* Rudow (1870).

Rallicola Johnston & Harrison, *Proc. Linn. Soc. N.S. Wales*, XXXVI, p. 324 (1911).

This genus includes seventeen species, the majority having been found on Rallidae.

Genotype: *Nirmus attenuatus* Nitzsch.

1. **Rallicola cuspidata** (Scopoli).

Nirmus cupidatus Scopoli, in Denny, *Anoplur. Brit.*, p. 130, Pl. 6, f. 2 (1842).

Oncophorus minutus Piaget, *Pédiculines*, p. 215, Pl. 18, f. 2 (1880) *nec* Nitzsch, 1866.

Harrison (1916) sunk both *N. fulicae* Denny and *N. minutus* Nitzsch as synonyms of *cuspidata*, but these include two species. Both occur on several species of Rallidae and may be found on the same hosts. It is difficult to be absolutely certain, without examining Denny's specimens, which one should be referred to the insect he described as *N. cuspidatus* and which one to his *N. fulicae* *. In the one species, which I refer to *cuspidatus*, the first joint of the ♂ antenna is only slightly longer than that of the ♀ and about as broad, and there is no appendage on the third joint. In the other species, *fulicae*, the first joint of the ♂ antenna is much broader and nearly as long as the four following joints, and the third joint has a very small appendage. Piaget (p. 216, 1880) was therefore incorrect in stating: "Giebel en exagère na longueur en disant qu'elle égale à peu près celle des 4 autres articles". Other differences are to be found in the ♂ genitalia. *R. cuspidata* was described by Scopoli from specimens taken off *Fulica atra*, by Denny from *Gallinula chloropus* and *Rallus aquaticus*, and by Piaget from species of *Gallinula*. Specimens have also been taken off *Gallinula chloropus brachyptera* (African moorhen), *Porphyriops angulata* (lesser moorhen) and *Lupha cristata* (red-knobbed coot) in the Rustenburg District, Transvaal (coll. W. Powell).

2. *Rallicola fulica* (Denny).

Nirmus fulicae Denny, *Anoplur. Brit.*, p. 125, Pl. 9, f. 2 (1842).

Nirmus minutus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 375 (1866).

Nirmus minutus (Nitz.) Giebel, *Ins. Epiz.*, p. 170, Pl. 5, f. 7 (1874).

Described by both Denny and Giebel from specimens taken off *Fulica atra*, also by Giebel from *Gallinula chloropus*. Specimens have been taken off *Gallinula chloropus brachyptera* (African moorhen) and *Lupha cristata* (red-knobbed coot) in the Rustenburg District, Transvaal (coll. W. Powell). See remarks under *R. cuspidata*.

3. *Rallicola mystax* (Giebel).

Nirmus mystax Giebel, *Ins. Epiz.*, p. 301 (1874).

Described from specimens taken off *Ortygometra porzana* (spotted crane), a migrant from Europe.

* I am indebted to Mr. Gordon B. Thompson of the British Museum (Nat. History) for kindly comparing the type ♂ of *N. fulicae* Denny with Piaget's *O. minuta*. He informs me that they are distinct, and that in *N. fulicae* the first joint of the antenna is long and the third joint has a small appendage. Unfortunately he states that Denny's *N. cuspidatus* is missing from the collection. However, the names of *cuspidata* can stand as Denny was apparently able to distinguish the two species.

4. *Rallicola ortygometae* (Schrank).

Pediculus ortygometae Schrank, *Ins. Aust.*, p. 503 (1781).

Nirmus attenuatus Nitzsch, in Denny, *Anoplur. Brit.*, p. 134, Pl. 10, f. 2 (1842).

Oncophorus attenuatus (Nitz.) Piaget, *Pédiculines*, p. 214, Pl. 18, f. 1 (1880).

Described from specimens taken off corn crane, *Crex crex* (= *Crex pratensis*), a migrant to South Africa.

5. *Rallicola turbinata* (Piaget).

Oncophorus turbinatus Piaget, *Tijd. v. Ent.*, XXIII, p. 233, Pl. 8, f. 10 (1888).

Described from specimens taken off saddle-bill stork, *Ephippiorhynchus senegalensis* (= *Mycteria senegalensis*).

Genus GIEBELIA Kellogg.

Giebelia Kellogg, *New Mallophaga*, I, p. 137 (1896).

This genus contains three species found on petrels.

Genotype: *Giebelia mirabilis* Kellogg.

1. *Giebelia hexakon* Waterston.

Giebelia hexakon Waterst., *Ann. S. Afr. Mus.*, X, p. 291 (1914).

Described from specimens taken off Cape hen, *Procellaria aequinoctialis* (= *Majaqueus aequinoctialis*) in South Africa. Specimens have also been taken off *Ardenna gravis* (great shearwater) at Capetown (coll. R. F. Lawrence).

Genus TRABECULUS Rudow.

Trabeculus Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 466 (1866).

Oncophorus Rudow, *ibid.*, XXXV, p. 475 (1870).

Mackayia Waterston, *Scottish Naturalist*, p. 251 (1912).

This genus contains two species.

Genotype: *Trabeculus schillingi* Rudow.

1. *Trabeculus schillingi* Rudow.

T. schillingi Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 467 (1866).

Oncophorus schillingi (Rud.) Piaget, *Pédiculines*, p. 221 (1880).

Mackayia heteracanthus Waterston, *Scott. Nat.*, p. 258 (1912).

Mackayia heteracanthus Waterston, *Ann. S. Afr. Mus.*, X, p. 292, Pl. 25, f. 8; Pl. 26, f. 13, 16, 18 (1914).

Described by Rudow from specimens taken off soft-plumaged petrel, *Pterodroma mollis* (= *Procellaria mollis*). Waterston (1914) recorded it taken from giant petrel, *Macronectes giganteus* (= *Procellaria gigantea*) and *Oceanites oceanicus* (sooty petrel) in South Africa. Specimens have also been taken off *Pterodroma macroptera* (Cape parson) at Capetown (coll. R. F. Lawrence).

Genus DOCOPHOROIDES Giglioli.

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

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

Taschenbergius Neumann, *Bull. Soc. Zool. France*, XX, p. 59 (1906).

Taschenbergiella Neumann, *Deux. Exp. Ant., France*, p. 195 (1913).

This genus includes five species found on Diomedidae and Hydrobatidae, four of which have been recorded from South Africa. For differences in the females see Bedford (1929).

Genotype: *Phlopterus brevis* Dufour.

1. *Docophoroides brevis* (Dufour).

Phlopterus brevis Dufour, *Ann. Soc. Ent.*, IV, p. 676, Pl. 21, f. 3 (1834).

Lipeurus taurus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 385 (1866).

Lipeurus taurus (Nitz.) Giebel, *Ins. Epiz.*, p. 234 (1874); Piaget *Pédiculines*, p. 332, Pl. 31, f. 3 (1880); Taschenberg, *Nova Acta*, p. 183, Pl. 5, f. 8, 8a (1882).

This species has been recorded by Waterston (1914) taken off the following hosts in the Cape: *Diomedea exulans* (wandering albatross); yellow-billed mollymawk, *Nealbatrus chlororhynchus* (= *Thalassogeron chlororhynchus*), and Cape hen, *Procellaria aequinoctialis* (= *Majaqueus aequinoctialis*).

2. *Docophoroides harrisoni* (Waterston).

Eurymetopus harrisoni Waterston, *Ent. Mo. Mag.* (3), III, p. 99 (1917).

Described from specimens taken off mollymawk, *Thalassarche melanophrys* (= *Diomedea melanophrys*) in South Africa. Recorded by Bedford (1929) taken off the same host at Capetown in July, 1923. We have also received specimens taken off *Diomedella cauta layardi* (Layard's albatross) at Dyers Island.

3. *Docophoroides murphyi* (Kellogg).

Eurymetopus murphyi Kellogg, *Brooklyn Sci. Bull.*, II, p. 87, Pl. 16, f. 4, 5 (1914).

Recorded by Bedford (1929) taken off *Macronectes giganteus* (giant petrel) at Capetown, C.P., November, 1923. This species was described from specimens taken off the following hosts in the South Atlantic: Mollymawk, *Thalassarche melanophrys* (= *Diomedea melanophrys*); *Macronectes giganteus* (= *Ossi-fraga gigantea*) and yellow-billed mollymawk, *Nealbatrus chlororhynchus* (= *Thalassogeron nealbatrus chlororhynchus*).

4. *Docophoroides simplex* (Waterston).

Eurymetopus simplex Waterston, *Ann. S. Afr. Mus.*, X, p. 303 (1914).

Described from specimens taken off mollymawk, *Thalassarche melanophrys* (= *Diomedea melanophrys*) and Cape hen, *Procellaria aequinoctialis* (= *Majaqueus aequinoctialis*). We have also received specimens taken off *D. melanophrys* at Dyers Island.

Genus IBIDOECUS Cummings.

Ibidoeccus Cummings, *Proc. Zool. Soc. Lond.*, p. 663 (1916).

This genus contains six species found on ibises and spoonbills.

Genotype: *Docophorus plataleae* Denny.

1. *Ibidoeccus plataleae* (Denny).

Docophorus plataleae Denny, *Anoplur. Brit.*, p. 100, pl. 4, f. 9 (1842).

D. sphenophorus Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 361 (1866).

D. sphenophorus (Nitz.) Piaget, *Pédiculines*, p. 89, Pl. 7, f. 5 (1880).

Recorded by Bedford (1920) taken off *Platalea alba* (African spoonbill) in the Pretoria District, Transvaal. It was described by Denny from specimens taken off *Platalea leucorodia*, which was killed at Yarmouth, Norfolk, in 1829.

2. *Ibidoeccus threskiornis* Bedford.

I. threskiornis Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 526, f. 30, 31 (1929).

Described from ♀♀ and ♂♂ taken off *Threskiornis aethiopica* (sacred ibis) at Emakosini, Zululand.

Genus NEOPHILOPTERUS Cummings.

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

This genus contains six species found on storks.

Genotype: *Docophorus tricolor* Nitzsch.

1. *Neophilopterus abdimius* Bedford (Fig. 12).

N. abdimius Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 524, f. 27-29 (1929).

Described from ♀♀ and ♂♂ taken off *Sphenorhynchus abdimi* (white-bellied stork) at Andoni, South-West Africa.

2. *Neophilopterus episcopi* (Kellogg).

Docophorus episcopi Kell., *Schwed. Exp. Kilimanjaro*, p. 44, Pl. 7, f. 2 (1910).

Described from specimens taken off *Dissoura episcopus* (woolly-necked stork), *Ephippiorhynchus senegalensis* (saddle-bill stork) and great white heron, *Casmerodius albus* (= *Herodias alba*).

3. **Neophiloaterus incompletus** (Nitzsch).

Docophorus incompletus Nitzsch, in Denny, *Anoplur. Brit.*, p. 105, Pl. 6, f. 5 (1842).

D. incompletus (Nitz.) Piaget, *Pédiculines*, p. 96, Pl. 8, f. 3 (1880).

N. incompletus (Nitz.) Cumms., *Proc. Zool. Soc. Lond.*, p. 660, f. 13 (1916).

Specimens have been taken off the type host, *Ciconia ciconia* (white stork) at Pietermaritzburg, Natal (coll. L. Hill).

4. **Neophiloaterus tricolor** (Nitzsch).

Docophorus tricolor Nitzsch, in Burmeister, *Handb.*, II, p. 424 (1838).

D. tricolor (Nitz.) Piaget, *Pédiculines*, p. 83, Pl. 6, f. 5 (1880).

Described from specimens taken off black stork, *Melanopelargus niger* (= *Ciconia nigra*), a migrant to South Africa. Cummings (1916) has figured the ♂ genitalia.

Genus INCIDIFRONS Ewing.

Incidifrons Ewing, *A Manual of External Parasites*, p. 189 (1929).

This genus includes a few parasites found on Rallidae, but no species has so far been recorded from South African rails.

Genotype: *Docophorus pertusus* Nitzsch.

Genus ANATOECCUS Cummings.

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

This genus includes seven species found on ducks, geese and swans.

Genotype: *Docophorus icterodes* Nitzsch.

1. **Anatoecus icterodes** (Nitzsch).

Docophorus icterodes Nitzsch, in Burmeister, *Handb.*, II, p. 424 (1838).

D. icterodes (Nitz.) Piaget, *Pédiculines*, p. 114, Pl. 10, f. 1 (1880).

A. icterodes (Nitz.) Cumms., *Proc. Zool. Soc. Lond.*, p. 655, f. 7b, 10, 12 (1916).

Recorded by Bedford (1919) taken off *Dendrocygna viduata* (white-faced duck) and *Thalassornis leuconotus* (white-backed duck) in the Rustenburg District, Transvaal, and from a domestic duck at Pietermaritzburg, Natal; also by Bedford (1929) from *Dendrocygna bicolor* (whistling duck), Tamanzu, South-west Africa, and *Paecilonitta erythrorhyncha* (red-billed teal). As it is not certain that Scopoli's *Pediculus dentatus* applies to this species, it has been discarded.

2. **Anatoecus ferrugineus** (Giebel).

Docophorus ferrugineus Giebel, *Ins. Epiz.*, p. 114 (1874).

A. ferrugineus (Gie.) Cumms., *Proc. Zool. Soc. Lond.*, p. 657, f. 7a, 11 (1) (1916).

Recorded by Bedford (1919) taken off *Sarkidiornis melanotus africanus* (knob-billed duck) in the Rustenburg District, Transvaal. The type was taken from European shoveller, *Spatula clypeata* (= *Anas clypeata*).

Genus DOLLABELLA Cummings.

Dollabella Cummings, *Proc. Zool. Soc. London*, p. 675 (1916).

Genotype: *Docophorus testudinarius* Denny.

1. **Dollabella testudinaria** (Denny).

Docophorus testudinarius Denny, *Anoplur. Brit.*, p. 96, Pl. 1, f. 6 (1842).

Docophorus testudinarius (Denny) Piaget, *Pédiculines*, p. 83, Pl. 6, f. 5 (1880).

Dollabella testudinarius (Denny) Cumms., *Proc. Zool. Soc. Lond.*, p. 675, f. 23 (1916).

Described from specimens taken off *Numenius arquatus* (curlew). Cummings (1916) recorded it from *Phaeopus phaeopus* (whimbrel). Both hosts are migrants to South Africa.

Genus EUSTRIGIPHILUS Ewing.

Eustrigiphilus Ewing, *Proc. Ent. Soc. Wash.*, XXVIII, vi, p. 148 (1926).

This genus comprises three or four species found on owls.

Genotype: *Docophorus ceblebrachys* Nitzsch.

1. **Eustrigiphilus ceblebrachys** (Nitzsch).

Docophorus ceblebrachys Nitzsch, in Denny, *Anoplur. Brit.*, p. 81, Pl. 2, f. 8 (1842).

Docophorus ceblebrachys (Nitz.) Piaget, *Pédiculines*, p. 29, Pl. 1, f. 8 (1880).

Recorded by Bedford (1920) taken off giant eagle owl, *Nyctaeus lacteus* (= *Bubo lacteus*) in the Rustenburg District, Transvaal. The type host is *Nyctea nivea*.

Genus CUCULOECUS Ewing.

Cuculoecus Ewing, *Proc. Ent. Soc. Wash.*, XXVIII, vi, p. 148 (1926).

This genus includes a few species parasitic on cuckoos and bee-eaters. Those found on bee-eaters will ultimately have to be placed in a new genus.

Genotype: *Docophorus coccygi* Osborn.

1. **Cuculoecus latifrons** (Nitzsch).

Docophorus latifrons Nitzsch, in Denny, *Anoplur. Brit.*, p. 97, Pl. 1, f. 4 (1842).

Docophorus latifrons (Nitz.) Piaget, *Pédiculines*, p. 36, Pl. 2, f. 7 (1880).

Described from specimens taken off *Cuculus canorus* (European cuckoo), a migrant to South Africa.

2. **Cuculoecus meropis** (Denny).

Docophorus meropis Denny, *Anoplur. Brit.*, p. 101, Pl. 4, f. 4 (1842).

Docophorus bifrons Nitzsch, *Zeit. f. ges. Nat.*, XXVII, p. 116 (1866).

Docophorus bifrons (Nitz.) Piaget, *Pédiculines*, p. 32, Pl. 7, f. 1 (1880).

Specimens have been taken off the type host, *Merops apiaster* (European bee-eater) and *Melittophagus pusillus meridionalis* (little bee-eater) at Onderstepoort, Transvaal (coll. G.A.H.B.); also off *Coccolarynx bullockoides* (white-fronted bee-eater) in the Rustenburg District, Transvaal.

Genus PHILOPTERUS Nitzsch.

Philopterus Nitzsch, *Germa's Magazin*, III, p. 288 (1818).

Docophorus Nitzsch, *ibid.*, III, p. 289 (1818).

This genus, which will have to be split up, contains over 200 species found on various birds.

Genotype: *Pediculus ocellatus* Scopoli.

1. **Philopterus acanthus** (Giebel).

Docophorus acanthus Giebel, *Ins. Epiz.*, p. 101 (1874).

Docophorus acanthus (Gie.) Piaget, *Pédiculines*, p. 34, Pl. 6, f. 6 (1880).

Mjöberg (1910) has recorded this species from the following birds: Bar-tailed godwit, *Vetola lapponica* (= *Limosa lapponica*) and whimbrel, *Phaeopus phaeopus* (= *Numenius phaeopus*), both migrants to South Africa. The type host is *Haematopus ostralegus*.

2. **Philopterus antennatus** (Piaget).

Docophorus antennatus Piaget, *Pédiculines*, p. 101, Pl. 8, f. 6 (1880).

Described from specimens taken off *Dromas ardeola* (crab plover), a migrant to South Africa.

3. **Philopterus aquilinus** (Denny).

Docophorus aquilinus Denny, *Anoplur. Brit.*, p. 81, pl. 2, f. 7 (1842).

Described from specimens taken off *Aquila* spp. and honey buzzard, *Pernis apivorus* (= *Falco apivorus*), a migrant to South Africa.

4. **Philopterus auratus** (Nitzsch).

Docophorus auratus Nitzsch, in Burmeister, *Handbuch*, II, p. 424 (1838).

Docophorus auratus (Nitz.) Piaget, *Pédiculines*, p. 78, Pl. 5, f. 8 (1880).

Recorded by Giebel (p. 108, 1874) taken from double snipe, *Capella media* (= *Scolopax major*), a migrant; also from the type host, *Scolopax rusticola*.

5. **Philopterus atlanticus** (Kellogg).

Docophorus atlanticus Kellogg, *Brooklyn Sci. Bull.*, II, iv, p. 81, Pl. 16, f. 1 (1914).

Described from specimens taken off white-necked skua, *Stercorarius parasiticus* (= *S. crepidatus*) in the North Tropical Atlantic, and from Artic tern, *Sterna macrura* (= *S. paradisica*) in the South Atlantic. Both these hosts occur on the South African coast.

6. **Philopterus capistratus** Neumann.

Philopterus capistratus Neu., *Arch. Parasit.*, XV, p. 375, f. 20 (1912).

Recorded by Bedford (1919) taken off brown-hooded kingfisher, *Chelicutona albiventris* (= *Halcyon albiventris*) at Mooivlei, Transvaal, and at Pietermaritzburg, Natal. It was described from specimens taken off *Halcyon semicaeruleus*.

7. **Philopterus cephalus** (Denny).

Docophorus cephalus Denny, *Anoplur. Brit.*, p. 81, Pl. 2, f. 8 (1842).

Described from specimens taken off white-necked skua, *Stercorarius parasiticus* (= *Lestris parasiticus*), and large white-necked skua, *Coprotheres pomarinus* (= *Lestris pomarinus*).

8. **Philopterus conicus** (Denny).

Docophorus conicus Denny, *Anoplur. Brit.*, p. 90, Pl. 5, f. 2 (1842).

Docophorus fuliginosus Kellogg, *New Mallophaga*, i, p. 80, Pl. 3, f. 2 (1896).

Recorded from several species of Charadriidae, including *Squatarola squatarola* (grey plover), a migrant to South Africa. Denny described it from specimens taken off *Charadrius pluvialis*.

9. **Philopterus cornutus** (Piaget).

Docophorus pachypus var. *cornuta* Piaget, *Pédiculines*, p. 21 (1880).

Recorded from *Pernis apivorus* (honey buzzard), a migrant to South Africa. Piaget described it from specimens taken off *Falco bidentatus*.

10. **Philopterus cursor** (Nitzsch).

Docophorus cursor Nitzsch, in Burmeister, *Handb.*, II, p. 426 (1838).

- Docophorus cursor* (Nitz.) Piaget, *Pédiculines*, p. 24, Pl. 1, f. 5 (1880).
- Philoaterus cursor* (Nitz.) Cummings, *Proc. Zool. Soc. Lond.*, p. 644, f. 1 (1916).
- Waterston (1914) recorded this species from *Bubo capensis* (Cape eagle owl) and spotted eagle owl, *Bubo africanus* (= *B. maculosus*) in South Africa. Bedford (1919, 1920) also recorded it from *Bubo africanus*, Onderstepoort, and from *Bubo capensis*; giant eagle owl, *Nyctaeus lacteus* (= *B. lacteus*), and Woodford's bush owl, *Syrnium woodfordi* (= *Strix woodfordi*) in the Rustenburg District, Transvaal. A ♀ has been taken off *Phas-maptynx capensis* (Cape marsh owl) in the Pretoria District.
11. **Philoaterus duplicatus** (Piaget).
Docophorus duplicatus Piaget, *Tijd. v. Ent.*, XXXIII, p. 223, Pl. 8, f. 1 (1888).
Docophorus cerylinus Mjöberg, *Arkiv. f. Zool.*, VI, p. 119, f. 67, 68 (1910).
 Recorded by Bedford (1919) taken off the type host, *Ceryle rudis* (pied kingfisher) at Mooivlei, Transvaal.
12. **Philoaterus elongatus** (Piaget).
Docophorus elongatus Piaget, *Pédiculines*, Suppl., p. 15, Pl. 2, f. 4 (1885).
 Described from specimens taken off *Rhynchops flavirostris* (African skimmer) in the Leyden Museum.
13. **Philoaterus exisus** (Nitzsch).
Docophorus exisus Nitzsch, in Burmeister, *Handb.*, II, p. 425 (1838).
Docophorus hirundinis "Shrank" Piaget, *Tijd. v. Ent.*, XIV, p. 134, Pl. 7, f. 13 (1871).
Docophorus exisus (Nitz.) Piaget, *Pédiculines*, p. 64, Pl. 4, f. 6 (1880).
 Recorded by Waterston (1914) taken off *Hirundo rustica* (European swallow), and by Bedford (1919) from the type host, the house martin, *Chelidonaria urbica* (= *Chelidon urbica*) in South Africa.
14. **Philoaterus fusiformis** (Denny).
Docophorus fusiformis Denny, *Anoplur. Brit.*, p. 84, Pl. 1, f. 2 (1842).
Docophorus canuti Denny, *ibid.*, p. 84, Pl. 3, f. 5 (1842).
Docophorus fusiformis (Denny) Piaget, *Pédiculines*, p. 86, Pl. 6, f. 7 (1880).
 Described by Denny from specimens taken off little stint, *Pisobia minuta* (= *Tringa minuta*) and Knot, *Calidris canutus* (= *Tringa canutus*). Piaget (1880) described it from curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*). All these hosts are migrants to South Africa.
15. **Philoaterus glareolae** (Giebel).
Docophorus glareolae Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 361 (1866).
Docophorus nitzschi Giebel, *ibid.*, p. 361 (1866).
Docophorus cordiceps Giebel, *Ins. Epiz.*, p. 103 (1874).
 Described by Giebel under all three names from specimens taken off wood sandpiper, *Rhyncophilus glareola* (= *Totanus glareola*). Harrison (1916) sunk *P. cordiceps* Piaget as a synonym of *P. temporalis* Giebel, but it is a synonym of *P. frater* Giebel.
16. **Philoaterus gonothorax** (Giebel).
Pediculus lari Fabr., *Faun. Groen.*, p. 219 (1780) nec Degeer, 1778.
Docophorus gonothorax Giebel, *Zeit. f. ges. Nat.*, XXXVII, p. 450 (1871).
Docophorus congener Giebel, *Ins. Epiz.*, p. 111 (1874).
Docophorus lari (D.) Piaget, *Pédiculines*, p. 111, Pl. 9, f. 7 (1880).
D. lari var. *magna* Piaget, *ibid.*, p. 112 (1880).
D. lari var. *breviappendiculata* Piaget, *ibid.*, p. 112 (1880).
 Waterston (1914) recorded this species from the following hosts in South Africa: Mollymawk, *Thalassarche melanophrys* (= *Diomedea melanophrys*); *Larus dominicanus* (Cape black-backed-gull), and white-headed gull, *Bruchigavia novae-hollandiae hartlaubi* (= *Larus hartlaubi*).
17. **Philoaterus humeralis** (Denny).
Docophorus humeralis Denny, *Anoplur. Brit.*, p. 88, Pl. 5, f. 7 (1842).
 Described by Denny from specimens taken off *Numenius arquatus* (curlew). He also recorded it from *Phaeopus phaeopus* (whimbrel). Both hosts are migrants to South Africa.
18. **Philoaterus lanii** (Fabricius).
Pediculus lanii Fabr., *Ent. Syst.*, Suppl., p. 570 (1798).
Docophorus fuscicollis Nitzsch, in Burmeister, *Handb.*, II, p. 425 (1838).
Docophorus trigonophorus Giebel, *Ins. Epiz.*, p. 87 (1874).
D. communis var. *fuscicollis* (N.) Piaget, *Pédiculines*, p. 56 (1880).
 Described from specimens taken off red-backed shrike, *Enneoctonus collurio* (= *Lanius collurio*), a migrant to South Africa.
19. **Philoaterus laricola** (Nitzsch).
Docophorus laricola Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 363 (1866).

Docophorus laticaudatus Rudow, *Beitrag*, p. 12 (1869).

Docophorus laricola (N.) Piaget, *Pédiculines*, p. 109, Pl. 9, f. 5 (1880).

Described by Piaget from specimens taken off little tern, *Sternula albifrons* (= *Sterna minuta*) and *Sterna hirundo* (common tern). Harrison (1916) for some unknown reason sunk *laricola* as a synonym of *melanocephalus*.

20. **Philoaterus leptomelas** (Giebel).

Docophorus leptomelas Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 358 (1866).

Described from specimens taken off *Corvultur albicollis* (white-necked raven).

21. **Philoaterus limosae** (Denny).

Docophorus limosae Denny, *Anoplur. Brit.*, p. 86, Pl. 4, f. 2 (1842).

Docophorus limosae (Denny) Piaget, *Pédiculines*, p. 79, Pl. 6, f. 1 (1880).

Described from specimens taken off black-tailed godwit, *Limosa limosa* (= *L. melanurus*), a migrant.

22. **Philoaterus macropus** (Giebel).

Docophorus macropus Giebel, *Ins. Epiz.*, p. 301 (1874).

Described from specimens taken off *Caprimulgus europaeus* (European nightjar), a migrant.

23. **Philoaterus major** (Waterston).

Docophorus nirmoides Piaget, *Pédiculines*, p. 104, Pl. 9, f. 2 (1880), *nec.* Nitzsch, 1861.

Docophorus nirmoides var. *major* Waterston, *Ent. Month. Mag.*, p. 62 (1912).

Described by Piaget from specimens taken off *Numenius arquatus* (curlew), a migrant. It was described by Waterston from specimens taken off *Scolopax gallinago*.

24. **Philoaterus melanocephalus** (Nitzsch).

Docophorus melanocephalus Nitzsch, in Burmeister, *Handb.*, II, p. 426 (1838).

D. lobaticeps Giebel, *Ins. Epiz.*, p. 109 (1874).

D. melanocephalus (N.) Piaget, *Pédiculines*, p. 109, Pl. 9, f. 5 (1880).

Recorded by Waterston (1914) taken off swift tern, *Thalasseus bergii* (= *Sterna bergii*) in South Africa. It has also been taken off the same host at Swakopmund, South-West Africa (coll. R. D. Bradfield) and *Sterna hirundo* (common tern) at Port Alfred, C.P. (coll. G.A.H.B.). Piaget (1880) described it from sandwich tern, *Thalasseus sandvicensis* (= *S. cantiaca*).

25. **Philoaterus milvi** (Mjöberg).

Docophorus milvi Mjöberg, *Arkiv. f. Zool.*, VI, p. 109, f. 63 (1910).

Described from specimens taken off *Milvus aegypticus* (yellow-billed kite) at Cairo. It has been collected on the same host in Zululand by H. H. Curson.

26. **Philoaterus naumanni** (Giebel).

Docophorus naumanni Giebel, *Ins. Epiz.*, p. 100 (1874).

Described from specimens taken off grey plover, *Squatarola squatarola* (= *Venellus squatarola*), a migrant to South Africa.

27. **Philoaterus nisi** (Denny).

Docophorus nisi Denny, *Anoplur. Brit.*, p. 109, Pl. 3, f. 11 (1842).

Docophorus gonorhynchus Giebel, *Zeit. f. ges. Nat.*, XVII, p. 526 (1861).

Docophorus gonorhynchus (G.) Piaget, *Pédiculines*, p. 20, Pl. 1, f. 3 (1880).

Recorded from *Circus aeruginosus* (European marsh harrier). The type host is *Accipiter nisus*.

28. **Philoaterus ornatus** (Nitzsch).

Docophorus ornatus Nitzsch, *Zeit. f. ges. Nat.*, XXVII, p. 116 (1866).

D. communis var. *ornatus* (N.) Piaget, *Pédiculines*, p. 51, Pl. 4, f. 2 (1880).

Described from specimens taken off European golden oriole, *Oriolus oriolus* (= *O. galbula*), a migrant. Bedford (1920) recorded it from *Oriolus larratus* (black-headed oriole), Pietermaritzburg, Natal.

29. **Philoaterus ovatus** (Giebel).

Docophorus ovatus Giebel, *Ins. Epiz.*, p. 98 (1874).

Described from specimens taken off *Botaurus stellaris* (bittern).

30. **Philoaterus platyclypeatus** (Piaget).

Docophorus platyclypeatus Piaget, *Tijd. v. Ent.*, XIV, p. 133, Pl. 7, f. 12 (1871).

Docophorus platyclypeatus Piaget, *Pédiculines*, p. 100, Pl. 8, f. 4 (1880).

Described from specimens taken off *Anastomas lamelligerus* (open-bill stork).

31. **Philoaterus platygaster** (Denny).

Docophorus platygaster Denny, *Anoplur. Brit.*, p. 83, Pl. 2, f. 5 (1842).

Docophorus semivittatus Giebel, *Ins. Epiz.*, p. 102 (1874).

Docophorus semivittatus (Gie.) Piaget, *Pédiculines*, p. 82, Pl. 6, f. 4 (1880).

Described by Denny from specimens taken off *Charadrius hiaticula* (ringed plover) and other birds. Waterston (1914) recorded it under the name of *D. cordiceps* Piaget taken from the following hosts in South Africa: White-fronted sandplover, *Leucopoliis marginatus* (= *Aegialitis marginata*); Kittlitz's sandplover, *Leucopoliis pecuaria* (= *A. pecuaria*), and three-banded sandplover, *Afroechus tricollaris* (= *Aegialitis tricollaris*).

32. **Philoaterus platyrhynchus** (Nitzsch).

Docophorus platyrhynchus Nitz., in Giebel, *Zeit. f. ges. Nat.*, XVII, p. 525 (1861).

Docophorus dilatatus Rudow, *Beitrag*, p. 14 (1869).

Docophorus eurygaster Giebel, *Ins. Epiz.*, p. 69 (1874).

Docophorus leucogaster Giebel, *ibid.*, p. 300 (1874).

Type host of *platyrhynchus*: *Astur palumbarius*; of *dilatatus* and *eurygaster*: *Buteo lagopus*, and of *leucogaster*: jackal buzzard, *Pterolestes rufofuscus* (= *Buteo jakal*). Recorded by Waterston (1914) taken off the last named host in South Africa.

33. **Philoaterus pustulosus** (Nitzsch).

Docophorus pustulosus Nitz., in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 363 (1866).

Docophorus euryrhynchus Giebel, *Ins. Epiz.*, p. 112 (1874).

Docophorus pustulosus (N.) Piaget, *Pédiculines*, p. 106, Pl. 9, f. 4 (1880).

Described by both Giebel (1874) and Piaget (1880) from specimens taken off large white-necked skua, *Coprotheres pomarinus* (= *Lestris pomarina*). *P. pustulosus* was described from specimens taken off *Lestris parasitica*.

34. **Philoaterus pygaspis** (Nitzsch).

Docophorus pygaspis Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 310 (1866).

Docophorus pilosus Piaget, *Pédiculines*, p. 116, Pl. 10, f. 4 (1880).

Docophorus phoenicopterus Mjöberg, *Arkiv. f. Zool.*, VI, p. 127 (1910).

Described from specimens taken off *Phoenicopterus anti-quorum* and *P. roseus*, both names being synonyms of *P. major* (greater flamingo).

35. **Philoaterus quinque maculatus** (Piaget).

Docophorus quinque maculatus Piaget, *Pédiculines*, Suppl. p. 9, Pl. 1, f. 10 (1885).

Described from specimens taken off house martin, *Chelidonaria urbica* (= *Hirundo urbica*).

36. **Philoaterus rostratus** (Nitzsch).

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

Docophorus rostratus (N.) Denny, *Anoplur. Brit.*, p. 87, Pl. 2, f. 4 (1842).

Docophorus rostratus (N.) Piaget, *Pédiculines*, p. 27, Pl. 1, f. 7 (1880).

Recorded by Waterston (1914) from Cape spotted eagle owl, *Bubo africanus* (= *B. maculosus*), and by Bedford (1920) from Cape barn owl, *Tyto alba affinis* (= *Strix flammea maculata*).

37. **Philoaterus rotundus** (Rudow).

Docophorus rotundus Rudow, *Beitrag.*, p. 11 (1869).

Docophorus rotundus (Rud.) Piaget, *Pédiculines*, p. 85 (1880).

Described from specimens taken off whimbrel, *Phaeopus phaeopus* (= *Numenius phaeopus*), a migrant to South Africa.

38. **Philoaterus semisignatus** (Nitzsch).

Docophorus semisignatus Nitzsch, in Burmeister, *Handb.*, II, p. 424 (1838).

Docophorus albidus Piaget, *Pédiculines*, p. 48, Pl. 3, f. 6 (1880).

Described by Piaget from specimens taken off pied crow, *Corvus albus* (= *C. scapulatus*) in the Leyden Museum.

39. **Philoaterus senegalensis** (Rudow).

Docophorus senegalensis Rudow, *Beitrag.*, p. 10 (1869).

Docophorus senegalensis (Rud.) Piaget, *Pédiculines*, p. 70 (1880).

Recorded by Bedford (1920) from *Lamprocolius phoenicopterus* (red-shouldered glossy starling), Pietermaritzburg, Natal, and from *L. phoenicopterus bispecularis* (lesser red-shouldered starling), Cumberland, Transvaal. The type was found on *L. nitens*.

40. **Philoaterus spathulatus** (Giebel).

Docophorus spathulatus Giebel, *Ins. Epiz.*, p. 73 (1874).

Docophorus penicillatus Piaget, *Pédiculines*, p. 22 (1880).

Described by Piaget from specimens taken off *Milvus aegyptius* (yellow-billed kite) and the type host, the black kite, *Milvus migrans* (= *M. ater*).

41. **Philoaterus sturni** (Schrank).

Pediculus sturni Schrank, *Beiträge z. Naturg.*, p. 118, f. 11-14 (1776).

Docophorus leontodon Nitz., in Burmeister, *Handb.*, II, p. 425 (1838).

Docophorus pastoris Denny, *Anoplur. Brit.*, p. 77, Pl. 4, f. 3 (1842).

Docophorus leontodon (N.) Piaget, *Pédiculines*, p. 66, Pl. 5, f. 1 (1880).

This species occurs on *Sturnus vulgaris* (European starling), but has not yet been recorded from South Africa.

42. **Philoaterus subflavescens** (Geoffroy).

Pediculus subflavescens Geoff., *Hist. Abs. Ins.*, II, p. 599 (1762).

Docophorus communis Nitzsch, in Burmeister, *Handb.*, II, p. 425 (1838).

Docophorus communis (N.) Piaget, *Pédiculines*, p. 54, Pl. 4, f. 5 (1880).

This species has been recorded from numerous passerine birds under different names (see Harrison 1916), a number of which will ultimately prove to be valid. Bedford (1920) has recorded it from the following hosts in South Africa: Cape ferruginous bush-shrike, *Laniarius ferrugineus* (= *Dryoscopus ferrugineus*); *Alseonax adustus* (Cape dusky flycatcher), and Cape black-headed sparrow, *Passer melanurus* (= *P. arcuatus*). It has also been recorded from the following birds in Europe, all of which are migrants to South Africa: Spotted flycatcher, *Muscicapa striata* (= *M. grisola*); icterine warbler, *Hippolais coelebs* (= *Sylvia hippolais*); common whitethroat, *Sylvia curruca*, and European sedge warbler, *Muscipeta schoenobaena* (= *Sylvia phragmitis*).

43. **Philoaterus sulcatus** (Piaget).

Docophorus sulcatus Piaget, *Tijd. v. Ent.*, XXXI, p. 149, Pl. 3, f. 2 (1888).

Described from specimens taken off little bittern, *Ixobrychus minutus* (= *Ardetta minuta*).

Family TRICHODECTIDAE Burmeister.

This family comprises a number of species parasitic chiefly on Carnivora, Equidae, Bovidae and Procaviidae.

Key to the South African Genera.

1. Claws of mid and hind legs spinose-serrate on their inner margins. On Procaviidae *Dasyonyx*, p. 359.
Claws of the legs simple 2
2. Head nearly twice as broad as long, with long, pointed processes on the posterior margins in both sexes. On Procaviidae *Eurytrichodectes*.
Head at most only slightly broader than long 3
3. Forehead triangular or subtriangular, with or without a median notch in front 4
Forehead not triangular or subtriangular 6
4. Forehead subtriangular, with a median notch 5
Forehead triangular. On Felidae and Viverridae
Felicola, p. 365.

5. Tergites with median transverse sclerites. On Procaviidae
Procavicola, p. 357.
Tergites without transverse sclerites, with the exception of a transverse plate on tergite viii of ♀. On aardwolf
Protelicola, p. 365
6. Forehead rounded, or with anterior margin flattened or slightly concave 7
Species usually elongated; forehead long and narrow, with the anterior margin either emarginated or deeply notched 10
7. Abdominal spiracles present on segments ii to iv. On Viverridae *Suricatoecus*, p. 365.
Abdominal spiracles present on segments ii to vii 8
8. Abdominal tergites with transverse median sclerites 9
Abdominal tergites without transverse median sclerites; forehead very short and broad. On Canidae, etc.
Trichodectes, p. 364.
9. Parameres of male genitalia forming a pseudopenis; small, slender species. On Procaviidae ... *Procaviphilus*, p. 360.
Parameres of male genitalia not forming a pseudopenis. On Bovidae and Equidae *Bovicola*, p. 361.
10. Anterior margin of forehead with a deep U-shaped notch. On antelopes *Damalinea*, p. 364.
Anterior margin of forehead emarginated. On antelopes
Tricholipeurus, p. 363.

Genus PROCVICOLA Bedford.

Procavicola Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

This genus comprises twelve species found on Procaviidae.

Genotype: *Trichodectes sternatus* Bedford.

1. **Procavicola emarginata** (Bedford).

Trichodectes emarginatus Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 845, Pl. 2, f. 5 (1928).
Procavicola emarginata Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from a ♂ taken off *Heterohyrax ruddi* (Wr.) Zoutpansberg District, Transvaal. Males and females have also been taken off the same host, Macequece, Portuguese East Africa.

2. **Procavicola heterohyracis** Bedford.

Procavicola heterohyracis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from males and females taken off *Heterohyrax granti* (Wr.) Blyda River, Mariepskop, northern Transvaal.

3. *Procavicola lindfieldi* (Hill).

Trichodectes lindfieldi Hill, *Parasit.*, XIV, p. 65, Pl. 2, f. 4-6 (1922).

Trichodectes lindfieldi (Hill) Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 845 (1928).

Procavicola lindfieldi (Hill) Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described by Hill from specimens reported to have been taken off *Procavia capensis*, Ntabamhlope, Natal, but the host is probably a new species. Specimens have also been taken off *Heterohyrax ruddi* (Wr.), N'jelele River, Zoutpansberg District, Transvaal, and Macequece, Portuguese East Africa; *Heterohyrax granti* (Wr.), Blyda River, Mariepskop, Transvaal, and *Procavia natalensis* Rbts., Piggs Peak, Swaziland; Knysna and Kleinpoort, near Grahamstown, in the Cape Province, and Deepdale, Natal.

4. *Procavicola natalensis* Bedford.

Procavicola natalensis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from specimens taken off *Procavia natalensis* Rbts., Piggs Peak, Swaziland; Deepdale, Natal; Knysna and Kleinpoort, near Grahamstown, Cape Province.

5. *Procavicola neumanni* (Stobbe).

Trichodectes univirgatus var. *neumanni* Stobbe, *Ent. Rundschau*, XXX, p. 112 (1913).

Trichodectes sternatus Ferris, *Rep. Harvard-Afr. Exped. Afr. Rep. Liberia and Belg. Congo*, ii, p. 1033, f. 21-22 (1930), nec Bedford, 1928.

Procavicola neumanni (Stobbe) Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Recorded by Stobbe from *Dendrohyrax* sp. in the Berlin Museum. I also refer the following to this species: Specimens recorded by Ferris (1930) from *Dendrohyrax adolfi-friederici*, Lulenga, Belgian Congo, and specimens from *Dendrohyrax arborea* (A. Sm.), Port St. Johns, C.P. (coll. G.A.H.B.).

6. *Procavicola parva* Bedford.

Procavicola parva Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from specimens taken off *Procavia* sp., Lamberts Bay, C.P.

7. *Procavicola pretoriensis* Bedford.

Procavicola pretoriensis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from specimens taken off *Procavia coombi* Rbts., Onderstepoort, also from same host, Weltevreden, Parys, O.F.S.

8. *Procavicola sternata* (Bedford).

Trichodectes sternatus Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 845, Pl. 4, f. 9; Pl. 5, f. 12 (1928).

Procavicola sternata Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from specimens reported to have been taken off *Procavia capensis*, Ntabamhlope, Natal, but the host is probably a new species.

9. *Procavicola subparva* Bedford.

Procavicola subparva Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from specimens taken off *Procavia* sp., Mount Fletcher, Cape Province.

10. *Procavicola univirgata* (Neumann).

Trichodectes univirgatus Neu., *Arch. de Parasit.*, XV, p. 612, f. 6 (1913).

Trichodectes univirgatus (Neu.) Ferris, *Rep. Harvard-Afr. Exped. Afr. Repub. Liberia and Belg. Congo*, ii, p. 1030, f. 17-18 (1930).

Procavicola univirgata (Neu.) Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described by Neumann from specimens taken off *Hyrae* sp., Congo. All dassies were formally placed in the genus *Hyrae*, which is a synonym of *Procavia*. Ferris (1930) recorded it from *Dendrohyrax adolfi-friederici*, Lulenga, Belgian Congo, and specimens have been taken off *Dendrohyrax arborea* (A. Smith), Port St. Johns, C.P. (coll. G.A.H.B.).

GENUS DASYONYX Bedford.

Dasyonyx Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

This genus comprises seven species found on Procaviidae.

Genotype: *Dasyonyx validus* Bedford.

1. *Dasyonyx oculatus* (Bedford).

Trichodectes oculatus Bedford, *Rep. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 847, Pl. 4, f. 10; Pl. 6, f. 14 (1928).

Dasyonyx oculatus Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from a ♂ taken off *Heterohyrax ruddi* (Wr.), Zoutpansberg District, Transvaal.

2. *Dasyonyx ovalis* Bedford.

Dasyonyx ovalis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from males and females taken off *Procavia coombi* Rbts., Weltevreden, Parys, O.F.S.

3. **Dasyonyx transvaalensis** Bedford.

Eutrichophilus diacanthus Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 848, Pl. 2, f. 6 (1928), nec Ehrenberg, 1828.

Dasyonyx transvaalensis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described by Bedford (1928) from a single female taken off *Procavia coombsi* Rbts., Rooikrans, Transvaal. Both sexes have been taken off the same host at Onderstepoort, and a female off *Heterohyrax granti* (Wr.), Blyda River, Mariepskop, northern Transvaal.

4. **Dasyonyx waterbergensis** Bedford.

Dasyonyx waterbergensis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from males and females taken off *Procavia waterbergensis* Brauer, Otjiwarongo, South-West Africa.

Genus PROCAVIPHILUS Bedford.

This genus comprises five species found on Procaviidae (dassies).

Genotype: *Procaviphilus ferrisi* Bedford.

1. **Procaviphilus granulatus** (Ferris).

Trichodectes granulatus Ferris, *Rept. Harvard-Afr. Exped. Afr. Repub. Liberia and Belg. Congo*, ii, p. 1029, t.f. 16 A-D (1930).

Procaviphilus granulatus (Ferris) Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described by Ferris from a single female taken off *Dendrohyrax adolfi-friederici*, Lulenga, Belgian Congo. Three females taken off *Dendrohyrax arborea* (A. Smith), Port St. Johns, C.P. (coll. G.A.H.B.).

2. **Procaviphilus robertsi** (Bedford).

Trichodectes robertsi Bedford, *Rept. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 846, Pl. 1, f. 2 (1928).

Procaviphilus robertsi Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described in 1928 from a single male taken off *Heterohyrax ruddi* (Wr.), Zoutpansberg District, Transvaal. Both sexes have since been taken off the same host, N'jelele River, Zoutpansberg District, Transvaal, and Macequece, Portuguese East Africa.

3. **Procaviphilus sclerotis** Bedford.

Procaviphilus sclerotis Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Males and females taken off *Heterohyrax granti* (Wr.), Blyda River, Mariepskop, northern Transvaal.

4. **Procaviphilus serraticus** (Hill).

Trichodectes serraticus Hill, *Parastiology*, XIV, p. 67, Pl. 2, f. 7-9 (1922).

Procaviphilus serraticus (Hill) Bedford, *Proc. Zool. Soc. Lond.*, 1932 (in press).

Described from males and females taken off *Procavia capensis*, Mtabamhlope, Natal, but the host will probably prove to be a new species. A male recorded by Bedford (1928) from *Procavia coombsi* Rbts. may be *P. sclerotis* Bedf. Specimens have also been taken off *Procavia natalensis* Rbts., Knysna and Grahams-town, Cape Province; also off *Procavia sp.*, Lamberts Bay, C.P.

Genus BOVICOLA Ewing.

Bovicola Ewing, *Manual of Ext. Parasit.*, pp. 123, 193 (1929).

Bovidoecus Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 518 (Oct., 1929).

This genus contains several species parasitic on Bovidae and Equidae.

Genotype: *Trichodectes caprae* Gurlt.

1. **Bovicola bovis** (Linnaeus).

Pediculus bovis Linnaeus, *Syst. Nat.*, p. 611 (1758).

Trichodectes scalaris Nitzsch, in Burmeister, *Handbuch*, II, p. 436 (1838).

Trichodectes scalaris (N.) Piaget, *Pédiculines*, p. 396, Pl. 33, f. 2 (1880).

The females of this species are common on cattle in South Africa, but the males are extremely rare. Bedford has figured the ♂ genitalia (1920, Pl. 6, f. 3).

2. **Bovicola caprae** (Gurlt).

Trichodectes caprae Gurlt, *Mag. f. ges. Tierheilk*, IX, p. 3, Pl. 1, f. 2 (1843).

T. climax Nitzsch, in Gervais, *Hist. Ins. Apt.*, III, p. 313, Pl. 48, f. 3 (1847).

T. solidus Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 112, Pl. 7, f. 2 (1866).

T. climax (N.) Piaget, *Pédiculines*, p. 391, Pl. 32, f. 1 (1880).

Both females and males are common on goats in South Africa. Bedford has figured the ♂ genitalia (1920, Pl. 6, f. 1).

3. **Bovicola equi** (Linnaeus).

Pediculus equi Linnaeus, *Syst. Nat.*, p. 612 (1758).

Trichodectes parumpilosus Piaget, *Pédiculines*, p. 397, Pl. 32, f. 5 (1880).

The females are common on domestic equines in South Africa, but I have not seen a male.

4. **Bovicola harrisoni** (Cummings).

Trichodectes harrisoni Cumms., *Proc. Zool. Soc. Lond.*, p. 276, f. 13-16 (1916).

Described from males and females taken off *Connochaetes gnu* (white-tailed gnu), Zoological Gardens, London. Specimens have been taken off the same host at Clocolan, O.F.S.

5. **Bovicola limbatus** (Gervais).

Trichodectes limbatus Gervais, *Hist. Ins. Apt.*, III, p. 313, Pl. 48, f. 4 (1847).

T. crassipes Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 3, Pl. 7, f. 1 (1866).

T. pennicillatus Piaget, *Pédiculines*, p. 406, Pl. 32, f. 10 (1880).

T. climax var. *major*, Piaget, *Pédiculines*, Suppl., p. 86 (1885).

T. hermsi Kellogg & Makayama, *Psyche*, XXII, p. 34 (1915).

Both sexes of this species are common on Angora goats in South Africa.

6. **Bovicola ocellata** (Piaget).

Trichodectes parumpilosus var. *ocellata* Piaget, *Pédiculines*, p. 398 (1880).

Described from specimens taken off the zebra, *Hippotigris burchelli*.

7. **Bovicola ovis** (Linnaeus).

Pediculus ovis Linnaeus, *Syst. Nat.*, p. 611 (1758).

Pediculus sphaerocephalus von Olfers, *De Veget. et. Anim. Corpor. in Anim. Reper. Comm.*, p. 85 (1816).

Trichodectes sphaerocephalus Piaget, *Pédicul.*, p. 393, Pl. 32, f. 2 (1880).

Both sexes of this species have been found on sheep in South Africa, but they are not very common.

8. **Bovicola painei** (Kellogg and Nakayama).

Trichodectes painei Kell. & Nak., *Psyche*, XXI, p. 90, f. 1 (1914).

Both sexes are common on goats in South Africa. The ♂ differs from that of *B. caprae* in having the posterior margin of the second tergite broadly emarginated in the middle. The ♂ genitalia, figured by Bedford (1920, Pl. 6, f. 2) are also different.

9. **Bovicola peregrina** (Taschenberg).

Trichodectes peregrinus Tasch., *Nova Acta*, XLIV, p. 218, Pl. 7, f. 10 (1882).

Ferris (1916, p. 251) records it from fat-tailed sheep, South-West Africa. It was described from specimens taken off *Mycteria crumenifera* in the Zoological Gardens, Hamburg.

Genus TRICHOLOPEURUS Bedford.

Tricholipeurus Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 514 (1929).

This genus comprises several species found on antelopes and deer.

Genotype: *Tricholipeurus aepycerus* Bedford.

1. **Tricholipeurus aepycerus** Bedford.

T. aepycerus Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 515, f. 14, 15, 18 (1929).

Described from a ♂ and ♀ taken off *Aepyceros melampus* (impala), Kunene River, South-west Africa, but the host was probably *A. petersi* (Angola impala). A new species has been found on *A. melampus*.

2. **Tricholipeurus antidorcus** Bedford.

T. antidorcus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVII, p. 283, f. 1-3 (1931).

Described from males and females taken off *Antidorcas marsupialis* at Onderstepoort.

3. **Tricholipeurus bedfordi** (Hill).

Trichodectes bedfordi Hill, *Parasit.*, XIV, i, p. 63, Pl. 2, f. 1-3 (1922).

Described from numerous males and females taken off *Philantomba (Cephalophus) monticola* (blue duiker), Ngome Forest, Mt. Ngwibi, Natal.

4. **Tricholipeurus lerouxi** Bedford.

L. lerouxi Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVI, p. 163, f. 7 (1930).

Described from two females taken off *Sylviacapra grimmi* (duiker) near the Umfolosi River, Zululand.

5. **Tricholipeurus lineatus** (Bedford).

Trichodectes lineatus, Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 723, Pl. 5, f. 2 (1920).

Described from specimens taken off *Raphiceros campestris* (steenbuck) in the Rustenburg District, Transvaal.

6. **Tricholipeurus reduncae** Bedford.

T. reduncae Bedford, *Ann. Rep. Dir. Vet. Res., Un. S. Afr.*, XV, p. 517, f. 16, 17, 17b (1929).

Described from males and females taken off *Redunca arundinum* (reedbuck) at Emakosini, N. Zululand. They were recorded under the name of *Trichodectes cornutus* Gervais in the first edition.

7. *Tricholipeurus trabeculae* Bedford.

T. trabeculae Bedford, *Ann. Rep. Dir. Vet. Res., Un. S. Afr.*, XV, p. 516, f. 17a, 17c, 19 (1929).

Described from males and females taken off *Redunca fulvorufula* (mountain reedbuck), Mfongosi, Zululand. They were erroneously recorded by Ferris (1916a) and Bedford (1919) under the name of *Trichodectes cornutus* Gervais.

Genus DAMALINIA Mjöberg.

Damalinia Mjöberg, *Arkiv. f. Zoologi*, VI, p. 69 (1910).

This genus includes two species found on antelopes.

Genotype: *Trichodectes crenelatus* Piaget.

1. *Damalinia crenelata* (Piaget).

Trichodectes crenelatus Piaget, *Pédiculines*, p. 402, Pl. 32, f. 8 (1880).

Described from specimens taken off blesbok, *Damaliscus albifrons* (= *Antilope albifrons*). Specimens have also been taken off the same host from the Pretoria District at Onderstepoort, and one immature male from *Damaliscus dorcas* (bontebok), Bredasdorp, C.P. (coll. R. F. Lawrence).

2. *Damalinia theileri* Bedford.

Damalinia theileri Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 849, Pl. 6, f. 15, Pl. 7, f. 16 (1928).

Described from a female taken off blue wildebeest (*Gorgon taurinus*) in the Zoutpansberg District, northern Transvaal. Both sexes have since been taken off the same host in the Pretoria Zoo (coll. G.A.H.B.).

Genus TRICHODECTES Nitzsch.

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

Until recently the majority of the species belonging to the family Trichodectidae were placed in this genus. It should probably only include species parasitic on carnivores belonging to the families Canidae, Procyonidae, and possibly also the Mustelidae.

Genotype: *Ricinus canis* De Geer.

1. *Trichodectes canis* (De Geer).

Ricinus canis De Geer, *Mem. d'hist. Ins.*, VII, p. 81, Pl. 4, f. 16 (1778).

Trichodectes latus Nitzsch, in Burmeister, *Hand. der Ent.*, p. 436 (1838).

Trichodectes latus (Nitz.) Piaget, *Pédiculines*, p. 384, Pl. 31, f. 6 (1880).

This species has been recorded taken off domestic dogs in Europe, America and Australia, but has so far not been recorded from these animals in Africa.

2. *Trichodectes ovalis* Bedford.

Trichodectes ovalis Bedford, *Repts. Dir. Vet. Educ. & Res., Un. of S. Afr.*, XIII-XIV, p. 841, Pl. 1, f. 1, 3; Pl. 6, f. 13 (1928).

Trichodectes ovalis Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from males and females taken off *Poecilogale albinucha* at Onderstepoort. Bedford (1929) also recorded it from *Ictonyx striatus* in South-West Africa and Natal.

3. *Trichodectes vosseleri* Stobbe.

Trichodectes vosseleri Stobbe, *Sitz.-Ber. Ges. nat. Freunde*, VIII, p. 371, f. 2 (1913).

Described from a male and female taken off *Potamochoerus demunis*, Tanganyika Territory. Specimens have also been taken off *Mellivora capensis* (ratel), Knysna, C.P., and Kleinpoort, Albany District, C.P. There can be no doubt that either an error was made in recording the host of the types, or the specimens were stragglers.

Genus SURICATOECUS Bedford.

Suricatoecus Bedford, *Parasit.*, XXIV, 1932 (in press).

Only the following species is included in this genus.

1. *Suricatoecus cooleyi* (Bedford).

Trichodectes cooleyi Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 513, f. 13 (1929).

Suricatoecus cooleyi Bedford, *Parasit.*, 1932 (in press).

Described from males and females taken off *Suricata suricatta hamiltoni* in the Pretoria District, Transvaal.

Genus PROTELICOLA Bedford.

Protelicola Bedford, *Parasit.*, XXIV, 1932 (in press).

Only the following species is included in this genus:—

1. *Protelicola intermedia* Bedford.

Protelicola intermedia Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from males and females taken off *Proteles cristatus* (aardwolf), Umkomaas Valley, Natal.

Genus FELICOLA Ewing.

Felicola Ewing, *A Manual of External Parasites*, pp. 122, 192 (1929).

Felicinia Bedford, *Ann. Rept. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 519 (1929).

Felicola Bedford, *Parasit.*, XXIV, 1932 (in press).

This genus includes a number of species parasitic on Felidae and Viverridae. For key to the African species see Bedford (1932).

Genotype: *Trichodectes subrostrata* Nitzsch.

1. **Felicola acutirostris** (Stobbe).

Trichodectes acutirostris Stobbe, *Sitz.-Ber. Ges. nat. Freunde*, VIII, p. 378, f. 7 (1913).

Felicola acutirostris (Stobbe) Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from specimens taken off water mongoose, *Atilax paludinosus* (= *Herpestes galera*), Pemba. Specimens have also been taken off the same host, Vredendal, Olifants River.

2. **Felicola caffra** (Bedford).

Trichodectes caffra Bedford, *Repts. Dir. Vet. Res., Un. S. Afr.*, V-VI, p. 724, Pl. 3, f. 10, 11 (1919).

Felicola caffra Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from a male and female taken off *Felis ocreata caffra* (Cape wild cat), Blockspruit, Rustenburg District, Transvaal.

3. **Felicola calogalea** (Bedford).

Trichodectes calogaleus Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 843, Pl. 2, f. 4; Pl. 3, f. 7 (1928).

Felicola calogalea Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from males and females taken off slender mongoose, *Myonax cauxi* (= *Calogale cauxi*) in the Rustenburg District, Transvaal, and from *M. pulverulentus* (= *Calogale pulverulentus*), Kenkelbosch, C.P. Specimens have also been taken off *Myonax nigratus*, Otjitundua, Kaokoveld, South-West Africa.

4. **Felicola cynictis** (Bedford).

Trichodectes cynictis Bedford, *Repts. Dir. Vet. Educ. & Res., Un. S. Afr.*, XIII-XIV, p. 844, Pl. 3, f. 8 (1928).

Felicola cynictis Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from males and females taken off *Cynictis penicillata* (yellow mongoose), Onderstepoort, Transvaal, and Bothaville, O.F.S.

5. **Felicola genetta** (Bedford).

Trichodectes genetta Bedford, *Repts. Dir. Vet. Res., Un. S. Afr.*, V-VI, p. 725, Pl. 4, f. 12-13 (1919).

Felicola genetta Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from a male and two immature females taken off *Genetta felina ludia* (Transvaal small-spotted genet), Jericho, Transvaal. Females, which I take to be the same, have been taken off *Genetta tigrina* (large-spotted genet), Pietermaritzburg, Natal.

6. **Felicola helogale** Bedford.

Felicola helogale Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from two females and one immature male taken off *Helogale parvula brunnula* (pigmy mongoose), N'jelele River, northern Transvaal.

7. **Felicola rammei** (Stobbe).

Trichodectes rammei Stobbe, *Sitz.-Ber. Ges. nat. Freunde*, VIII, p. 377, f. 6 (1913).

Felicola rammei (Stobbe) Bedford, *Parasit.*, XXIV, 1932 (in press).

Described by Stobbe from specimens taken off water mongoose, *Atilax paludinosus* (= *Herpestes galera*), Tanganyika Territory. They were possibly stragglers, or the host may have been misidentified. Specimens which I regard as probably this species have been taken off *Herpestes caffer* (Cape ichneumon), Pietermaritzburg, Natal, and Ferris (1930) records numerous specimens he considers to be this species from *Galerella brunneo-ochracea*, Belgian Congo.

8. **Felicola rostrata** Bedford.

Felicola rostrata Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from numerous specimens taken off *Ichneumia albicauda* (white-tailed mongoose), Umfolosi River, Zululand.

9. **Felicola setosa** Bedford.

Felicola setosa Bedford, *Parasit.*, XXIV, 1932 (in press).

Described from males and females taken off *Paracynictis selousi* (Selous' mongoose), Mokeetsi, Transvaal.

10. **Felicola subrostrata** (Nitzsch).

Trichodectes subrostratus Nitz., in Burmeister, *Handb. der Ent.*, II, p. 436 (1838).

Trichodectes subrostratus (Nitz.) Piaget, *Pédiculines*, p. 389, Pl. 31, f. 9 (1880).

Felicola subrostrata (Nitz.) Bedford, *Parasit.*, XXIV, 1932 (in press).

Recorded by Bedford (1920) taken off domestic cat, Pietermaritzburg, Natal.

Superfamily AMBLYCERA.

The majority of the species belonging to this superfamily are very active and may be found running about on the bodies of their hosts. One or two species have been found living in the quills of the wing-feathers of birds. The species of Gyropidae infesting guinea-pigs are found attached to the hairs of their hosts.

Key to the South African Families.

1. Tarsi of all the legs with two claws 2
Tarsi of mid and hind legs either with a single claw or clawless. On guinea-pigs *Gyropidae*, p. 394.

2. Antennae lying in grooves at the sides of the head; abdomen constricted at the junction of the thorax and the different segments *Menoponidae*.
 Antennae situated in capsules which open ventrally; abdomen not conspicuously constricted at the junction of the thorax and the different segments 3
3. The lateral margins of forehead swollen, the ocular emarginations therefore distinct, labrum without protrusible membranous flap *Laemobothriidae*, p. 395.
 The lateral margins of forehead not swollen, the ocular emarginations therefore indistinct or absent; labrum usually with membranous flap projecting beyond lateral margin of forehead *Ricinidae*, p. 397.

Family MENOPONIDAE Mjöberg.

Key to the South African Subfamilies and Genera.

1. Antennae usually 4-jointed, rarely 3 or 5-jointed; setae of thorax seldom spine-like; ♂ genitalia without accessory sac. On birds (subfamily *Menopininae*) 2
 Antennae 5-jointed; some of the setae, especially on thorax, spine-like; ♂ genitalia with accessory sac. On Australian marsupials and dog. (Subfamily *Boopinae*)
Heterodoxus, p. 394.
2. Venter of hind femora and sternites without combs of spines, but patches of setae are frequently present 3
 Venter of hind femora and sternites iii or iii and iv with combs of minute spines 23
3. Ocular emarginations either shallow or absent; forehead without a notch in front of the eyes, but a slit is often present 4
 Ocular emarginations deep 18
4. Temples with lateral margins rounded 5
 Temples angulate; ocular emarginations absent; prothorax as large as the head. On fulmar and petrels
Ancistrona, p. 371.
5. Forehead with a pair of large spine-like processes situated on venter beneath bases of palpi (two pairs may be present in *Menacanthus* (sens. lato) 6
 Forehead without such processes 8
6. Oesophageal glands present (absent in *numidae*); tergites with one or two rows of setae. On Galliformes
Neumannia, p. 378.
 Oesophageal glands absent 7
7. Species elongate; forehead narrow in front; tergites with two rows of setae. On Galliformes ... *Eomenacanthus*, p. 378.
 Species broader; forehead broadly rounded in front; tergites with one or two rows of setae ... *Menacanthus*, p. 378.
8. Gular region of head with a well-developed gular plate 9
 Gular region without a plate, or if present faintly indicated 10

9. Gular plate trilobed, the median lobe the largest. On rails, grebes and painted snipe *Pseudomenopon*, p. 377.
 Gular plate squarish, with one or two pairs of lateral spine-like processes *Machaerilaemus*, p. 377.
10. Antennae elongated, the apical joint long and slender, about as long as, or longer than, the two penultimate joints together; ocular emarginations indistinct; on Galliformes 11
 Antennae not elongated, the apical joint short and broad ... 13
11. Forehead without a slit in front of the eyes. On Numididae ... 12
 Forehead with a slit in front of the eyes
Menopon (sens. str.), p. 372.
12. Species long and slender; prothorax less than twice as wide as long; tergites with numerous setae
Somaphantus, p. 371.
 Species not long and slender; prothorax more than twice as wide as long; tergites with a single row of setae
Numidicola, p. 371.
13. Forehead with a slit in front of the eyes; meso and metanotum fused 14
 Forehead without a slit; meso and meta-notum divided by a suture 15
14. ♂ genitalia with basal plate short and broad; endomerical plate with backward projecting curved hooks on each side; oesophageal sclerite and glands absent. On hornbills *Allomenopon*, p. 376.
 ♂ genitalia otherwise *Menopon* (sens. lato), p. 372.
15. Head more than twice as broad as long 16
 Head less than twice as broad as long 17
16. Eyes present; posterior margin of temples with a backward projecting process; venter of hind femora and sternites v-vii with patches of closely set setae. On swift
Eurcum, p. 380.
 Eyes absent; temples rounded, without processes; hind femora and sternites without patches of setae. On Hirundinidae
Hirundoecus, p. 380.
17. Anterior femora dilated, about as broad as, or broader than, long; sternite ii without asters of spines; oesophageal sclerite small or absent. On swifts ... *Dennyus*, p. 380.
 Anterior femora longer than broad; sternite ii usually, but not always, with asters of heavy spines. Metanotum or tergite i of ♀♀ sometimes produced posteriorly; oesophageal sclerite present. Mainly on passerines
Myrsidea, p. 381.
18. Forehead without a slit or notch in front of the eyes 19
 Forehead with a notch in front of the eyes 21

19. Forehead very broad in front; ocular emarginations very deep, the posterior margins of forehead straight, meeting the temples at right angles. On sandgrouse
Neomenopon, p. 382.
Forehead narrow in front; ocular emarginations not so deep ... 20
20. Thorax very large, the mesonotum unusually so; femora and tibiae short, dilated; basal plate of ♂ genitalia elongated, rod-like. On Anatidae and Phoenicopteridae
Trinoton, p. 382.
Thorax not abnormally large; the mesonotum small; femora and tibiae long and narrow; basal plate of ♂ genitalia large and broad. On hornbills ... *Chapinia*, p. 384.
21. Abdomen with a narrow transverse chitinous sclerite on each segment, except the last, indistinct on segments iv-viii. On spoonbill ... *Eucolpocephalum*, p. 384.
Abdomen without narrow transverse chitinous sclerites on the segments ... 22
22. Venter of hind femora and sternite iv with brushes of setae, the setae shorter than those of the general chaetotaxy of the sternites. On cranes ... *Heleonomus*, p. 384.
Venter of hind femora and certain sternites with brushes of setae which are as long as those of the general chaetotaxy. On Charadriiformes ... *Actornithophilus*, p. 385.
23. Forehead with a slit in front of the eyes ... 24
Forehead with a notch in front of the eyes ... 25
24. Combs present on sternite iii only; prothoracic spiracles absent; abdominal spiracles small, without setae on their posterior margins; mandibles one or two-toothed; tibiae of ♂ without a thumb-like spur at their apices; basal plate of ♂ genitalia, long, rod-like. On parrots
Psittacomenopon, p. 387.
Combs present on sternites iii and iv; prothoracic spiracles present; abdominal spiracles large, with small setae on their posterior margins; mandibles two or three-toothed; tibiae of ♂ with a thumb-like spur at their apices; basal plate long, rod-like. On pelicans ...
Tetrophthalmus, p. 387.
25. Combs present on third and fourth sternites; sexes not dimorphic. On Cuculiformes, Coraciiformes, and Strigiformes ... *Cuculiphilus*, p. 388.
Combs present on third sternite only ... 26
26. Abdomen similar in both sexes ... 27
Abdomen dimorphic in both sexes
Colpocephalum (sens str.), p. 388.
27. On Falconiformes ... *Kurodaia*, p. 388.
Not on Falconiformes ... *Colpocephalum* (sens lato), p. 388.

Subfamily MENOPONINAE.

Genus ANCISTRONA Westwood.

Ancistrona Westwood, *Thes. Ent. Oxon.*, p. 197 (1874).

This genus includes but a single species.

1. *Ancistrona vagelli* (Fabricius).

Pediculus vagelli Fabr., *Mant. Ins.*, p. 369 (1787).

Ancistrona procellariae Westw., *Thes. Ent. Oxon.*, p. 197, Pl. 37, f. 4 (1874).

Ancistrona gigas Piaget, *Tijd. v. Ent.*, XXVI, p. 152, Pl. 9, f. 1 (1883).

Ancistrona gigas, Piaget, *Pédicul.*, Suppl., p. 117, Pl. 12, f. 8 (1885).

Recorded by Waterston (1914) taken off *Oceanites oceanicus* (sooty petrel) in the Cape Province. Westwood (1874) described it from specimens taken off *Daption capensis* (Cape sea-pigeon). Kellogg (1914) recorded it from brown petrel, *Pterodroma incerta* (= *Oestrelata incerta*) and soft-plumaged petrel, *Pterodroma mollis* in the South Atlantic. Both these birds occur on the South African coast. Specimens have been taken off *Neonectris griseus* (sooty shearwater), Capetown, C.P. (coll. R. F. Lawrence).

Genus SOMAPHANTUS Paine.

Somaphantus Paine, *Smithsonian Misc. Coll.*, LXI, No. 23, p. 1 (1914).

This genus has not yet been recorded from South Africa, but will probably be found on guinea-fowls. It includes a single species, *S. lusius* Paine, found on *Numida ptilorhyncha*.

Genus NUMIDICOLA Ewing.

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

This genus includes two species found on guinea-fowls.

Genotype: *Numidicola longicornis* Ewing.

1. *Numidicola antennata* (Kellogg and Paine).

Menopon antennatum Kell. & Paine, *Bull. Ent. Res.* II, p. 150, Pl. 5, f. 1 (1911).

Described from specimens taken off *Numida mitrata* in the Sudan. Bedford (1919) recorded it from *Numida coronata* in the Transvaal and from a guinea-fowl in Natal. The skin of the former is in the Transvaal Museum and proves to be *Numida papillosa transvaalensis*.

Genus MENOPON Nitzsch.

Menopon Nitzsch, *Germa's Magazin*, III, p. 299 (1818)

This genus, which will have to be split up, comprises at present about a hundred and eighty species.

Genotype: *Pediculus gallinae* Linné.

1. **Menopon albidum** Giebel.
Menopon albidum Giebel, *Ins. Epiz.*, p. 280 (1874).
Described from specimens taken off *Neophron percnopterus* (Egyptian vulture).
2. **Menopon albipes** Giebel.
Menopon albipes Giebel, *Zeit. f. ges. Nat.*, XLVII, p. 250 (1876).
Described from specimens taken off white-crowned wattled plover, *Xiphidiopterus albiceps* (= *Lobivanellus albiceps*).
3. **Menopon ambiguum** Nitzsch.
Menopon ambiguum Nitzsch, in Giebel, *Ins. Epiz.*, p. 295 (1874).
Described from specimens taken off whimbrel, *Phaeopus phaeopus* (= *Numenius phaeopus*), a migrant to South Africa.
4. **Menopon brevipalpe** Piaget.
Menopon brevipalpe Piaget, *Pédiculines*, p. 498, Pl. 40, f. 5 (1880).
Recorded by Waterston (1914) taken off Cape cormorant, *Pseudocarbo capensis* (= *Phalacrocorax capensis*) in South Africa. Piaget described it from specimens taken off *Phalacrocorax carbo*.
5. **Menopon circinatum** Piaget.
Menopon circinatum Piaget, *Tijd. v. Ent.*, XXXIII, p. 249, Pl. 10, f. 4 (1888).
Described from specimens taken of large white-necked skua, *Coprotheres pomarinus* (= *Stercorarius pomarinus*).
6. **Menopon coarctatum** (Scopoli).
Pediculus coarctatus Scopoli, *Ent. Carn.*, p. 382 (1763).
Pediculus collarionis Schrank, *Fauna Boica*, p. 187 (1803).
Menopon fuscocinctum Denny, *Anoplur. Brit.*, p. 219, Pl. 21, f. 4 (1842).
Menopon camelinum Nitzsch in Giebel, *Ins. Epiz.*, p. 288, Pl. 15, f. 3 (1874).
Described by Scopoli, Schrank and Denny from specimens taken off red-backed shrike, *Enneoctonus collario* (= *Lanius collario*), a migrant to South Africa.

7. **Menopon crocatum** Nitzsch.
Menopon crocatum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 392 (1866).
Menopon crocatum (Nitz.) Giebel, *Ins. Epiz.*, p. 295 (1874).
Described from specimens taken off *Numenius arquatus* (curlew), a migrant to South Africa.
8. **Menopon eulassium** Kellogg.
Menopon eulassium Kellogg, *Schwed. Exp. Kilimanjaro*, p. 54, Pl. 7, f. 11 (1910).
Described from specimens taken off reed cormorant, *Microcorax africana* (= *Phalacrocorax africanus*) in East Africa.
9. **Menopon exile** Nitzsch.
Menopon exile Nitzsch, *Zeit. f. ges. Nat.*, XXVII, p. 121 (1866).
Described from specimens taken off European wheatear, *Oenanthe oenanthe* (= *Saricola oenanthe*), a migrant to South Africa.
10. **Menopon francolinus** Bedford.
Menopon francolinus Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII and VIII, p. 712, Pl. 2, f. 2: Pl. 5, f. 1 (1920).
Described from specimens taken off bush partridge, *Dendroperdix sephaena* (= *Francolinus sephaena*), and Swainson's red-necked francolin, *Pternistis swainsoni* in the Transvaal.
11. **Menopon fuscofasciatum** Piaget.
M. fuscofasciatum Piaget, *Pédiculines*, p. 492, Pl. 40, f. 9 (1880).
Described from specimens taken off large white-necked skua, *Coprotheres pomarinus* (= *Lestris pomarina*). Piaget (1880) also recorded it from sandwich tern, *Thalasseus sandvicensis* (= *Sterna cantiaca*).
12. **Menopon gallinae** (Linnaeus), Fig. 14A.
Pediculus gallinae Linné, *Syst. Nat.*, p. 613 (1758).
Menopon pallidum Nitzsch, in Burmeister, *Handbuch*, II, p. 440 (1838).
Menopon gallinae (L.) Ferris, *Parasit.*, XVI, i, p. 57, f. 1 A-D (1924).
A common parasite of the domestic fowl in South Africa.
13. **Menopon inaequale** Piaget.
Menopon inaequale Piaget, *Pédiculines*, p. 443, Pl. 35, f. 1 (1880).
Described from specimens taken off red-backed shrike, *Enneoctonus collario* (= *Lanius collario*), a migrant to South Africa. It is probably a synonym of *M. coarctatum* (Scopoli).

14. **Menopon intermedium** Piaget.
Menopon intermedium Piaget, *Pédiculines*, p. 497, Pl. 40, f. 4 (1880).
 Described from specimens taken off frigate bird, *Fregata minor* (= *Atagen minor*).
15. **Menopon lutescens** Nitzsch.
Menopon lutescens Nitzsch, in Burmeister, *Handbuch*, II, p. 440 (1838).
Menopon lutescens (N.) Piaget, *Pédiculines*, p. 477, Pl. 39, f. 4 (1880).
 Specimens have been taken off the ruff, *Philomachus pugnax* at Onderstepoort (coll. G.A.H.B.). It was described from specimens taken off *P. pugnax* (= *Machetes pugnax*) and other Charadriiformes.
16. **Menopon madagascariense** Mjöberg.
M. madagascariense Mjöberg, *Arkiv. f. Zool.*, VI, p. 34, f. 22 (1910).
 Recorded by Bedford (1919) taken off *Scopus umbretta bannermani* (hammerhead) in the Transvaal and Natal. It was described from specimens taken off *Scopus umbretta* in Madagascar.
17. **Menopon meyeri** Giebel.
Menopon meyeri Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 392 (1866).
Menopon meyeri Giebel, *Ins. Epiz.*, p. 296 (1874).
 Described from specimens taken off bar-tailed godwit, *Vetola lapponica* (= *Limosa rufa*), a migrant to South Africa.
18. **Menopon micrandum** Nitzsch.
Menopon micrandum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 392 (1866).
Menopon micrandum (N.) Giebel, *Ins. Epiz.*, p. 295 (1874).
 Described from specimens taken off *Recurvirostra avosetta* (avocet), a migrant to South Africa.
19. **Menopon nigropleurum** Denny.
N. nigropleurum Denny, *Anoplur. Brit.*, p. 224, Pl. 20, f. 1 (1842).
 Described from specimens taken off the ruff, *Philomachus pugnax* (= *Machetes pugnax*); redshank, *Totanus totanus* (= *T. calidris*), and curlew (*Numenius arquata*). All these hosts are migrants to South Africa.
20. **Menopon pachyus** Piaget.
Menopon pachyus Piaget, *Tijd. v. Ent.*, XXXIII, p. 161, Pl. 4, f. 4 (1888).
 Described from specimens taken off *Sterna hirundo* (common tern).
21. **Menopon parvulum** Piaget.
Menopon parvulum Piaget, *Pédiculines*, p. 444, Pl. 35, f. 4 (1880).
 Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*), a migrant to South Africa.
22. **Menopon pellucidum** Rudow.
Menopon pellucidum Rudow, *Zeit. f. ges. Nat.*, XXXIV, p. 400 (1869).
 Described from specimens taken off Cape cormorant, *Pseudocarbo capensis* (= *Phalacrocorax capensis*).
23. **Menopon phaeostomum** Nitzsch.
M. phaeostomum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 391 (1866).
M. phaeostomum (N.) Piaget, *Pédiculines*, p. 466, Pl. 38, f. 1 (1880).
 Recorded by Waterston (1914) taken off the type host, *Pavo cristatus* (peacock) in South Africa.
24. **Menopon powelli** Bedford.
Menopon powelli Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII-VIII, p. 714, Pl. 2, f. 1 (1920).
 Described from specimens taken off *Pternistis swainsoni* (Swainson's red-necked francolin) and bush partridge, *Dendroperdia sephaena* (= *Francolinus sephaena*) in the Rustenburg District, Transvaal. Bedford (1929) also recorded it from *Chaetopus adpersus* (red-billed noisy francolin) and *Pternistis afer* (Angola red-necked francolin) on the Kunene River, South-West Africa. A ♀ has also been taken off *Pternistis castaneiventer krebsi* (Drakensberg red-necked francolin), in the Zoological Gardens, Pretoria (coll. G.A.H.B.).
25. **Menopon pustulosum** Nitzsch.
Menopon pustulosum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 393 (1866).
Menopon pustulosum (N.) Piaget, *Pédiculines*, p. 490, Pl. 41, f. 3 (1880).
 Recorded by Waterston (1914) taken off malagas, *Sulita capensis* (= *Sula capensis*) in South Africa. The type host is *Sula alba*.
26. **Menopon sigmoidale** Picaglia.
Menopon sigmoidale Picaglia, *Atti. Soc. Ital. Sc. Nat.*, XXVIII, p. 6 (1885).
 Described from specimens taken off *Phalacrocorax lucidus* (South African cormorant).
27. **Menopon strepsilae** Denny.
Menopon strepsilae Denny, *Anoplur. Brit.*, p. 226, Pl. 21, f. 8 (1842).
 Described from specimens taken off a turnstone, *Arenaria interpres* (= *Strepsilas collaris*), a migrant to South Africa.

28. **Menopon tumidum** Piaget.

M. tumidum Piaget, *Pédiculines, Suppl.*, p. 151, Pl. 16, f. 5 (1885).

M. africanum Kell. & Paine, *Bull. Ent. Res.*, II, p. 149, Pl. 5, f. 3 (1911).

M. africanum transvaalensis Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 716 (1920).

Recorded by Bedford (1920) taken off the following hosts in the Transvaal: *Plectropterus gambensis* (spur-winged goose); *Sarkidiornis melanotus africanus* (knob-billed duck); *Dendrocygna viduata* (white-faced duck), *Casarca cana* (South African shelduck); red-billed duck, *Paecilonitta erythrorhyncha* (= *Anas erythrorhyncha*), and domestic ducks. Also recorded by Bedford (1929) from *Alopochen aegyptiacus* (Egyptian goose), Tamanzu, South-West Africa.

29. **Menopon virgo** Giebel.

Menopen virgo Giebel, *Ins. Epiz.*, p. 288 (1874).

Described from specimens taken off *Coracias garrulus* (European roller), a migrant to South Africa.

Genus ALLOMENOPON Bedford.

Allomenopon Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVI, p. 153 (1930).

The species included in this genus are parasitic on hornbills.

Genotype: *Menopon bucerotis* Kellogg.

1. **Allomenopon bucerotis** (Kellogg).

Menopon bucerotis Kell., *Schwed. Exp. Kilimanjaro*, p. 54, Pl. 7, f. 12 (1910).

Menopon bucerotis (Kell.) Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 717, Pl. 3, f. 2 (1920).

Described from specimens taken off crested hornbill, *Baryrhynchus cristatus* (= *Bycanistes cristatus*) in East Africa. Bedford (1920) recorded specimens from *Bycanistes bucinator* (trumpeter hornbill) in Natal.

2. **Allomenopon lophocerum** (Bedford).

Menopon lophocerus Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 717, Pl. 1, f. 1; Pl. 3, f. 1 (1920).

Described from specimens taken off the following hosts in the Rustenburg District, Transvaal: South African grey hornbill (*Lophoceros epirohinus*); southern red-billed hornbill, *Tockus erythrorhynchus rufirostris* (= *Lophoceros erythrorhynchus*), and yellow-billed hornbill, *Xanthorhynchus leucomelas* (= *L. leucomelas*).

Genus PSEUDOMENOPON Mjöberg.

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

This genus comprises a few species parasitic on rails, grebes and painted snipe.

Genotype: *Menopon tridens* Nitzsch.

1. **Pseudomenopon rostratulae** Bedford.

Pseudomenopon rostratula Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, V & VI, p. 722, Pl. 2, f. 9 (1919).

Described from several females and males taken off painted snipe, *Rostratula benghalensis* (= *R. capensis*) in the Rustenburg District, Transvaal. Bedford (1929) also recorded two females taken off the same host in South-West Africa.

2. **Pseudomenopon tridens** (Nitzsch).

Menopon tridens Nitzsch, in Burmeister, *Handbuch*, II, p. 440 (1838).

Menopon scopulacorne Denny, *Anoplur. Brit.*, p. 221, Pl. 18, f. 9 (1842).

Menopon tridens pacificum Kell., *New Mallophaga*, I, p. 116 (1896).

Pseudomenopon tridens (N.) Ferris, *Parasit.*, XVI, I, p. 63, f. 4, A-F (1924).

Recorded by Bedford (1919) taken off the following hosts in the Rustenburg District, Transvaal: African moorhen (*Gallinula chloropus brachyptera*); lesser moorhen, *Porphyriops angulata* (= *Gallinula angulata*), and knob-billed coot, *Lupha cristata* (= *Fulica cristata*). This species also occurs on *G. chloropus* and other rails in both Europe and America.

Genus MACHAERILAEMUS Harrison.

Machaerilaemus Harrison, *Parasit.*, VII, p. 389 (1915).

This genus includes four species found on passerines.

Genotype: *Machaerilaemus latifrons* Harrison.

1. **Machaerilaemus plocei** Bedford.

Machaerilaemus plocei Bedford, *Parasit.*, XII, ii, p. 168, Pl. 12, f. 1-3 (1920).

Described from a female and male taken off a waxbill at Onderstepoort. We have since taken it in the same locality off *Quelea sanguinirostris lathamii* (pink-billed quelea).

2. **Machaerilaemus urocolius** Bedford (Fig. 13).

Machaerilaemus urocolius Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, XVI, p. 157 (1930).

Described from specimens taken off *Urocolius indicus transvaalensis* (red-faced coly) at Ntambanana, Zululand, and at Onderstepoort. Specimens have also been taken off *U. indicus lacteifrons* (Damara red-faced coly), Khan River, South-West Africa (coll. R. D. Bradfield).

Genus NEUMANNIA Uchida.

Neumannia Uchida, *Journ. Coll. Agric. Tokyo*, IX, p. 2 (1926).

Genotype: *Neumannia okadai* Uchida.

1. *Neumannia numidae* (Giebel).

Menopon numidae Giebel, *Ins. Epiz.*, p. 292 (1874).

M. (Menacanthus) numidae (Gie.) Neu., *Arch. Parasit.* XV, iii, p. 357, f. 3 (1912).

Tergites each with two rows of setae. Sternites without brushes of setae.

Recorded by Bedford (1919) taken off domestic fowls at Onderstepoort, and from *Numidia coronata*, Elandsfontein, Pretoria District, Transvaal. The skin of the latter is in the Transvaal Museum and proves to be *Numida papillosa transvaalensis*.

2. *Neumannia pallidula* (Neumann).

Menopon (Menacanthus) pallidulum Neu. *Arch. Parasit.*, XV, p. 361, f. 7-9 (1912).

Tergites each with one row of setae.

Described from specimens taken off domestic fowl. It will probably be found on fowls in South Africa.

Genus EOMENACANTHUS Uchida.

Eomenacanthus Uchida, *Journ. Coll. Agric. Tokyo*, IX, p. 30 (1926).

Genotype: *Menopon biseriatum* Piaget = *M. stramineum* Nitzsch.

1. *Eomenacanthus stramineus* (Nitzsch).

Pediculus meleagridis Panzer, *Faun. Ins. Germ.*, p. 51, f. 20 (1793), *nec Linné* 1758.

Menopon stramineum Nitzsch, in Giebel, *Ins. Epiz.*, p. 291 (1874).

Menopon biseriatum Piaget, *Pédiculines*, p. 469, Pl. 37, f. 2 (1880).

M. (Menacanthus) biseriatum (P.) Neu., *Arch. Parasit.*, XV, p. 358, f. 4 (1912).

Sternites IV and V with brushes of setae.

A common parasite on domestic fowls and turkeys in South Africa.

Genus MENACANTHUS Neumann.

Menacanthus Neumann, *Arch. de Parasit.*, XV, iii, p. 353 (1912).

Several species found on birds belonging to various orders are at present included in this genus.

Genotype: *Menacanthus robustus* (Kellogg).

1. *Menacanthus corvus* Bedford.

Menacanthus corvus Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, XVI, p. 155, f. 1-3 (1930).

Described from specimens taken off *Corvus albus* Müll. (pied crow), Aliwal North, C.P., and from *Heterocorax capensis* Leht. (black crow) at Onderstepoort.

2. *Menacanthus crateropus* Bedford.

Menacanthus crateropus Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, p. 719, Pl. 4, f. 1 (1920).

Described from specimens taken off pied babbler, *Turdoides bicolor* (= *Crateropus bicolor*) and Jardine's babbler, *Turdoides jardineii* (= *Crateropus jardineii*) in the Rustenburg District, Transvaal.

3. *Menacanthus curuccae* (Schrank).

Pediculus curuccae Schrank, *Beyträge*, p. 113 (1776).

Menopon sinuatum Burmeister, *Hand.*, ii, p. 440 (1838).

Menopon minutum Nitzsch, in Giebel, *Ins. Epiz.*, p. 286, Pl. 15, f. 2 (1874).

Described from specimens taken off *Sylvia curruca* (common white throat), a migrant to South Africa.

4. *Menacanthus fulvofasciatus* (Piaget).

Menopon fulvofasciatum Piaget, *Pédiculines*, p. 417, Pl. 33, f. 3 (1880).

Recorded by Neumann (1912) taken off *Neophron percnopterus* (Egyptian vulture). It was described from specimens taken off *Buteo vulgaris*.

5. *Menacanthus giganteus* (Denny).

Menopon giganteum Denny, *Anoplur. Brit.*, p. 225, Pl. 21, f. 2 (1842).

Menopon latum Piaget, *Pédiculines*, p. 457, Pl. 37, f. 1 (1880).

Recorded by Bedford (1919) taken off a domestic pigeon at Onderstepoort, and from Cape turtle dove, *Afropelia capicola* (= *Turtur capicola*) at Blokspruit, Pretoria District, Transvaal.

6. *Menacanthus spiniferus* (Piaget).

Menopon spiniferum Piaget, *Pédiculines*, Suppl., p. 99, Pl. 10, f. 9 (1885).

Menopon (M.) spiniferum (Pia.) Neumann, *Archiv. de Parasit.*, XV, p. 363, f. 11 (1911).

Recorded by Bedford (1919) as *M. spinosus* (Piaget) taken off *Lamprocolius phoenictopterus bispecularis* (northern Cape glossy starling) at Jericho, Transvaal, and one ♀ from Layard's bulbul, *Loidorosa layardi* (= *Pycnonotus barbatus layardi*) at Pietermaritzburg, Natal. Specimens have also been taken off *Melaenornis ater* (black flycatcher) at Ntambanana, Zululand (coll. G.A.H.B.); Norwich canary and *Acridotheres tristis* (Indian minor) at Pietermaritzburg (coll. L. Hill).

Genus *HIRUNDOECUS* Ewing.

Hirundoecus Ewing, *Proc. U.S. Nat. Mus.*, LXXVII, Art. 20, p. 12 (1930).

This genus contains two species found on Hirundinidae.

Genotype: *Hirundoecus americanus* Ewing.

1. *Hirundoecus malleus* (Nitzsch).

Eureum malleus Nitzsch, in Burmeister, *Handbuch*, II, p. 441 (1838).

Eureum malleus (N.) Piaget, *Pédiculines*, Suppl., p. 139, Pl. 15, f. 3 (1885).

Described from specimens taken off *Hirundo rustica* (European swallow).

Genus *EUREUM* Nitzsch.

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

Eurem (Nitzsch) Ewing, *Proc. U.S. Nat. Mus.*, LXXVII, Art. 20, p. 10 (1930).

This genus includes a single species.

Genotype: *Eureum cimicoides* Nitzsch.

1. *Eureum cimicoides* Nitzsch.

Eureum cimicoides Nitzsch, in Burmeister, *Handb.*, II, p. 441 (1838).

Eureum cimicoides (N.) Denny, *Anoplur. Brit.*, p. 237, Pl. 22, f. 4 (1842).

Eureum cimicoides (N.) Piaget, *Pédiculines*, Suppl., p. 137, Pl. 15, f. 2 (1885).

Eureum cimicoides (N.) Ewing, *Proc. U.S. Nat. Mus.*, LXXVII, Art. 20, p. 10, f. 5 (1930).

Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*), a migrant to South Africa.

Genus *DENNYUS* Neumann.

Nitzschia Denny, *Anoplur. Brit.*, p. 230 (1842), nec Baer, 1827.

Dennyus Neumann, *Bull. Soc. Zool. France*, XX, p. 59 (1906).

Dennyus Ferris, *Canad. Ent.*, p. 309 (Sept. 1916).

Takamatsuia Uchida, *Journ. Coll. Agric. Tokyo*, IX, p. 32 (1926).

Dennyus Ewing, *Proc. U.S. Nat. Mus.*, LXXVII, Art. 20, p. 2 (1930).

This genus includes thirteen species found on swifts.

Genotype: *Nirmus truncatus* von Olfers.

1. *Dennyus minor* (Kellogg and Paine).

Nitzschia minor Kell. and Paine, *Rec. Ind. Mus.*, X, p. 242, Pl. 15, f. 10 (1914).

This species is very closely allied to *D. truncatus* and may prove to be a synonym of that species. It was described from immature specimens taken off an Indian swift, *Colletoptera affinis* (= *Cypselus affinis*) in India. I have taken both adults and immature specimens off the same host in Pretoria.

2. *Dennyus truncatus* (von Olfers).

Nirmus truncatus von Olfers, *De Vegetatives*, etc., p. 91 (1816).

Nitzschia burmeisteri Denny, *Anoplur. Brit.*, p. 230, Pl. 22, f. 5 (1842).

Nitzschia pulicaris Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XVIII, p. 304 (1861).

Nitzschia tibialis Piaget, *Pédiculines*, p. 576, Pl. 48, f. 5 (1880).

Described from specimens taken off European swift, *Micropus apus* (= *Cypselus apus*), a migrant to South Africa.

Genus *MYRSIDEA* Waterston.

Myrsidea Waterston, *Ent. Month. Mag.*, LI, p. 12 (1915).

Myrsidea Ferris, *Canad. Ent.*, p. 307, f. 10b, 14, Sept., 1916.

The majority of the species included in this genus were formerly placed in the genus *Menopon*. They occur for the most part upon *Passeriformes*, particularly the *Corvidae*, but also occur upon certain families of *Coraciiformes*.

Genotype: *Myrsidea victrix* Waterston.

1. *Myrsidea cucullaris* (Nitzsch).

Menopon cucullare Nitzsch, in Burmeister, *Handb.*, II, p. 439 (1838).

Menopon flavescens Piaget, *Pédiculines*, p. 439, Pl. 35, f. 9 (1880).

Described from specimens taken off *Sternus vulgaris* (starling) in Europe.

2. *Myrsidea nigra* (Kellogg and Paine).

Menopon nigrum Kellogg and Paine, *Bull. Ent. Res.*, II, p. 151, Pl. 5, f. 4 (1911).

Described from specimens taken off *Corvultur albicollis* (white-necked raven) in Southern Nigeria.

3. *Myrsidea obovata* (Piaget).

Menopon obovatum Piaget *Pédiculines*, p. 429, Pl. 34, f. 1 (1880).

Described from specimens taken off pied crow, *Corvus albus* (= *C. scapulatus*) in the Leyden Museum.

4. **Myrsidea ovata** (Piaget).

Menopon ovatum Piaget, *Pédiculines*, p. 430, Pl. 34, f. 6 (1880).

Described from specimens taken off pied crow, *Corvus albus* (= *C. scapulatus*).

5. **Myrsidea rustica** (Nitzsch).

Menopon rusticum Nitzsch, in Giebel, *Ins. Epiz.*, p. 288 (1874).

Described from specimens taken off *Hirundo rustica* (European swallow). Waterston (1914) has recorded it from the same host in South Africa, and Bedford (1919) from house martin, *Chelidonaria urbica* (= *Delichon urbica*) at Blokspruit, Pretoria District, Transvaal.

6. **Myrsidea sjoestedti** (Kellogg).

Colpocephalum sjoestedti Kellogg, *Schwed. Exp. Kilimanjaro*, p. 50, Pl. 7, f. 7 (1910).

Described from specimens taken off pied crow, *Corvus albus* (= *C. scapulatus*) and *Corvultur albicollis* (white-necked raven), in East Africa.

Genus NEOMENOPON Bedford.

Neomenopon Bedford, *Parasit.*, XII, ii, p. 170 (1920).

This genus contains a single species.

1. **Neomenopon pteroclurus** Bedford.

Neomenopon pteroclurus Bedford, *Parasit.*, XII, ii, p. 170, Pl. 13, f. 1, 2 (1920).

Described from females taken off Namaqua sand-grouse, *Pterocles namaquus* (= *Pteroclurus namaqua*) in the Rustenburg District, Transvaal.

Genus TRINOTON Nitzsch.

Trinoton Nitzsch, *German's Magazin*, III, p. 300 (1818).

Trinotum Burmeister, *Handb. der Ent.*, ii, p. 440 (1838).

Trinoton Piaget, *Les Pédiculines*, p. 587 (1880).

This genus contains ten species found on ducks, geese and swans.

Genotype: *Pediculus anserinus* Fabr.

1. **Trinoton aculeatum** Piaget.

Trinoton aculeatum Piaget, *Les Pédiculines*, Suppl., p. 136, Pl. 15, f. 1 (1885).

This species was described from specimens taken off *Dendrocygna viduata* in the Leyden Museum. Bedford (1919) has recorded it taken off the following hosts in the Rustenburg

District, Transvaal: *Dendrocygna viduata* (white-faced duck), *Sarkidiornis melanotus africanus* (knob-billed duck), *Casarca cana* (South African shelduck), and *Thalassornis leuconotus* (white-backed duck).

2. **Trinoton anserinum** (Fabricius).

Pediculus anserinus Fabricius, *Syst. Nat.*, p. 345 (1805).

Trinotum conspurcatum Nitzsch, in Burn., *Handb.*, II, p. 440 (1838).

Trinoton conspurcatum (Nitzsch) Piaget, *Pédiculines*, p. 588, Pl. 44, f. 2 (1880).

Trinoton continuum Piaget, *ibid.*, p. 591 (1880).

Trinoton anserinum (Fabr.) Ferris, *Parasit.*, XX, p. 226, f. 9 a-e (1928).

Recorded by Bedford (1919, 1929) taken off *Plectropterus gambensis* (spurwing goose) in the Rustenburg District, Transvaal; also off the same host on the Kunene River, S.W.A., and from *Alopochen aegyptiacus* (Egyptian goose) at Tamanzu, S.W.A. It has also been recorded from swans; the domestic goose and other geese in Europe, and from geese in America.

3. **Trinoton femoratum** Piaget.

Trinoton femoratum Piaget, *Pédiculines*, p. 593, Pl. 49, f. 4 (1880).

Recorded by Bedford (1920) taken off greater flamingo, *Phoenicopterus major* (= *P. roseus*) at Durban. It was described from specimens taken off *Phoenicopterus major* (= *P. antiquorum*) in the Zoological Gardens at Rotterdam.

4. **Trinoton querquedulae** (Linné).

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

Trinotum luridum Nitzsch, in Burm., *Handb.*, II, p. 441 (1838).

Trinoton lituratum Nitzsch, in Burm., *Handb.*, II, p. 441, (1838).

Trinoton luridum (Nitzsch) Piaget, *Les Pédicul.*, p. 591, Pl. 44, f. 3 (1880).

Trinoton lituratum (Nitzsch) Piaget, *ibid.*, p. 597, Pl. 49, f. 7 (1880).

Recorded by Bedford (1919) taken off the following species of ducks in the Rustenburg District, Transvaal: *Sarkidiornis melanotus africanus* (Knob-billed duck); *Casarca cana* (South African shelduck); red-billed teal, *Paccilonitta erythrorhyncha* (= *Anas erythrorhyncha*) and *Nyroca capensis* (South African pochard). I have also taken it off *Notanetta capensis* (Cape wigeon) at Onderstepoort on the 1st July, 1930. This species has also been recorded from various ducks both in Europe and America. All the figures of *T. lituratum* I have seen are immature specimens of this species.

Genus CHAPINIA Ewing.

Chapinia Ewing, *Journ. Wash. Acad. Sci.*, XVII, iv, p. 88 (1927).
Bucerophagus Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV,
 p. 509 (1929).

This genus comprises three species found on hornbills.

Genotype: *Chapinia robusta* Ewing.

1. *Chapinia africana* (Bedford).

Bucerophagus africanus Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 509, f. 11, 11a, 12 (1929).

Described from specimens taken off *Bucorvus schlegeli* (South African ground-hornbill) in the Zoological Gardens, Pretoria; at Mafa, South-West Africa, and in the gardens at Groot Schuur, Capetown. The bird in the Zoological Gardens at Pretoria came from Rhodesia.

Genus EUCOLPOCEPHALUM Bedford.

Eucolpocephalum Bedford, *Rep. Dir. Vet. Serv. and Anim. Indust., Un. S. Afr.*, XVI, p. 161 (1930).

This genus contains a single species.

1. *Eucolpocephalum robustum* Bedford.

E. robustum Bedford, *Rep. Dir. Vet. Serv. and Anim. Indust., Un. S. Afr.*, XVI, p. 161, f. 6 (1930).

Described from females and males taken off *Platalea alba* (African spoonbill) at Capetown.

Genus HELEONOMUS Ferris.

Heleonomus Ferris, *Canadian Entomologist*, p. 305 (Sept., 1916).

This genus contains six species found on Gruidae.

Genotype: *Colpocephalum truncatum* Piaget.

1. *Heleonomus confusus* Ferris.

Colpocephalum miandrium Kellogg, *Schwed. Exp. Kilimanjaro*, p. 53, Pl. 7, f. 10 (1910), ♀ only.

Heleonomus confusus Ferris, *Canad. Ent.*, p. 307 (Sept., 1916).

Described from specimens taken off *Balearica regulorum gibbericeps* in East Africa: There are specimens in the South African Museum, Capetown, taken off *B. regulorum* (crowned crane).

2. *Heleonomus harrisoni* (Bedford).

Colpocephalum harrisoni Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, p. 720, Pl. 2, f. 7 (1919).

Described from two females reported to have been taken off a bustard in Angola, but probably taken from a crane.

3. *Heleonomus miandrius* (Kellogg).

Colpocephalum miandrius Kellogg, *Schwed. Exp. Kilimanjaro*, p. 53 (1910), ♂ only.

Heleonomus miandrius (Kell.) Ferris, *Canad. Ent.*, f. 12, 13E (1908).

Recorded by Bedford (1929) taken off *Balearica regulorum* (crowned crane) on the Kunene River, South-West Africa. It was described from specimens taken off *B. regulorum gibbericeps* in East Africa.

Genus Actornithophilus Ferris.

Actornithophilus Ferris, *Canadian Entomologist*, p. 303 (Sept., 1916).

This genus includes a number of species found on Charadriiformes.

Genotype: *Colpocephalum uniseriatum* Piaget.

1. *Actornithophilus affine* (Nitzsch).

Colpocephalum affine Nitzsch, in Giebel, *Ins. Epiz.*, p. 276 (1874).

Recorded by Piaget (p. 561, 1880) taken off green sandpiper, *Tringa erythropus* (= *Totanus ochropus*). The type host is *Totanus maculatus*.

2. *Actornithophilus bicolor* (Piaget).

Colpocephalum bicolor Piaget, *Pédiculines*, p. 561, Pl. 47, f. 1 (1880).

Described from specimens taken off turnstone, *Arenaria interpres* (= *Strepsilas interpres*), a migrant to South Africa.

3. *Actornithophilus brachycephalus* (Giebel).

Colpocephalum brachycephalum Giebel, *Ins. Epiz.*, p. 278 (1874).

Described from specimens taken off large white-necked skua *Coprotheres pomarina* (= *Lestris pomarina*).

4. *Actornithophilus crassipes* (Piaget).

Colpocephalum crassipes Piaget, *Pédiculines*, p. 566, Pl. 46, f. 6 (1880).

Described from specimens taken off swift tern, *Thalasseus bergii* (= *Sterna bergii*) in the Leyden Museum.

5. *Actornithophilus epiphanes* (Kellogg and Chapman).

Colpocephalum epiphanes Kell. & Chap., *Journ. N.Y. Ent. Soc.*, X, p. 161, Pl. 14, f. 2 (1902).

Described from specimens taken off *Anous stolidus* (noddy).

6. *Actornithophilus latifasciatus* (Piaget).

Colpocephalum latifasciatum Piaget, *Pédiculines, Suppl.*, p. 130, Pl. 14, f. 2 (1885).

Described from specimens taken off *Rhynchops flavirostris* (African skimmer).

7. **Actornithophilus patellatus** (Piaget).

Colpocephalum patellatum Piaget, *Tijd. v. Ent.*, XXXIII, p. 254, Pl. 10, f. 8 (1888).

Described from specimens taken off *Numenius arquatus* (curlew), a migrant to South Africa.

8. **Actornithophilus piceus** (Denny).

Colpocephalum piceum Denny, *Anoplur. Brit.*, p. 212, Pl. 18, f. 4 (1842).

C. maurum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 395 (1866).

C. maurum (N.) Piaget, *Pédiculines*, p. 564, Pl. 47, f. 4 (1880).

Described from specimens taken off sandwich tern, *Thalasseus sandvicensis* (= *Sterna cantiaca*). It has also been recorded from swift tern, *Thalasseus bergii* (= *Sterna bergii*) and other species of terns.

9. **Actornithophilus pustulosus** (Piaget).

Colpocephalum pustulosum Piaget, *Pédiculines*, p. 559, Pl. 46, f. 8 (1880).

Described from specimens taken off the ruff and reeve, *Philomachus pugnax* (= *Machetes pugnax*). We have taken specimens off the same host at Onderstepoort.

10. **Actornithophilus spinulosus** (Piaget).

Colpocephalum spinulosum Piaget, *Pédiculines*, p. 563, Pl. 47, f. 3 (1880).

Described from specimens taken off black-tailed godwit, *Limosa limosa* (= *L. melanura*).

11. **Actornithophilus trilobatus** (Giebel).

Colpocephalum trilobatum Giebel, *Ins. Epiz.*, p. 275 (1874).

Described from specimens taken off little stint, *Pisobia minuta* (= *Tringa minuta*).

12. **Actornithophilus umbrinus** (Nitzsch).

Colpocephalum umbrinum Nitzsch, in Burmeister, *Handbuch*, II, p. 438 (1838).

C. cornutum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 395 (1866).

C. cornutum (N.) Giebel, *Ins. Epiz.*, p. 274 (1874).

Described from specimens taken off curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*). *C. cornutum* was described from specimens taken off the ruff and reeve, *Philomachus pugnax* (= *Machetes pugnax*). Both hosts are migrants to South Africa.

13. **Actornithophilus umbrosus** (Harrison).

Colpocephalum umbrinum Piaget, *Pédiculines*, p. 556, Pl. 46, f. 6 (1880), nec Nitzsch, 1838.

C. umbrosus Harrison, *Parasit.*, IX, i, p. 56 (1916).

Described from specimens taken off curlew sandpiper, *Erolia testacea* (= *Tringa subarquata*). Waterston (1914) has recorded it taken off the same host in South Africa.

14. **Actornithophilus uniseriatus** (Piaget).

Colpocephalum uniseriatum Piaget, *Pédiculines*, p. 562, Pl. 47, f. 2 (1880).

Described from specimens taken off *Recurvirostra avosetta* (avocet), a migrant to South Africa.

Genus TETROPHTHALMUS Grosse.

Piagetia Picaglia, *Attil. Soc. Nat. Modena, Rend. d. Adunanze*, II, p. 104 (1884), nec Ritsema, 1874.

Tetrophthalmus Grosse, *Zeit. f. wiss. Zool.*, XLII, p. 534 (1885).

Piagetiella Neumann, *Bull. Soc. Zool. France*, XX, p. 59 (1906).

This genus comprises ten species found on Pelecanidae.

Genotype: *Tetrophthalmus chilensis* Grosse.

1. **Tetrophthalmus africanus** Bedford.

T. africanus Bedford, *Parasit.*, XXIII, ii, pp. 236-242, f. 1C-6C (1931).

Described from specimens found on *Neopelecanus rufescens* (pink-backed pelican), in the Zoological Gardens, Pretoria.

2. **Tetrophthalmus subtitan** Bedford.

T. subtitan Bedford, *Parasit.*, XXIII, ii, pp. 236-242, f. 1B-6B (1931).

Described from a female and male taken off *Metapelecanus roseus* (eastern white pelican) at the junction of the Olifant and Limpopo Rivers, Mozambique.

3. **Tetrophthalmus titan** (Piaget).

Menopon titan Piaget, *Pédiculines*, p. 503, Pl. 40, f. 7 (1880).

T. titan (Piaget) Bedford, *Parasit.*, XXIII, ii, pp. 236-242, f. 1A-6A (1931).

Described from specimens taken off *Pelecanus onocrotalus* (European pelican), a rare visitor to South Africa.

Genus PSITTACOMENOPON Bedford.

Psittacomenopon Bedford, *Rep. Dir. Vet. Serv. & Anim. Indust.*, Un. S. Afr., XVI, p. 154 (1930).

The species included in this genus are all parasitic on Psittacidae (parrots).

Genotype: *Menopon poicephalum* Bedford.

1. **Psittacomenopon poicephalum** (Bedford).

Menopon impar var. *poicephalum* Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 718 (1920).

Described from a female and male taken off *Poicephalus meyeri damarensis* (Meyer's parrot), Rooikuil, Transvaal. Bedford (1930) also recorded specimens from *Poicephalus robustus* (Cape parrot), Haenertsburg, Transvaal.

Genus CUCULIPHILUS Uchida.

Cuculiphilus Uchida, *Journ. Coll. Agric. Tokyo*, IX, p. 47 (1926).

The species included in this genus are parasitic on Cuculidae (cuckoos).

Genotype: *Pediculus fasciatus* Scopoli.

1. **Cuculiphilus fasciatus** (Scopoli).

Pediculus fasciatus Scopoli, *Ent. Carn.*, p. 383 (1763).

Pediculus cuculi Fabricius, *Syst. Ent.*, p. 807 (1775).

Menopon phanerostigma Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 391, (1866).

Menopon phanerostigma (N.) Giebel, *Ins. Epiz.*, p. 290, Pl. 14, f. 8 (1874).

Described from specimens taken off *Cuculus canorus* (European cuckoo), a migrant to South Africa. Specimens have also been collected by L. Hill off the following hosts at Pietermaritzburg, Natal: *Oxylophus cafer* (striped-breasted cuckoo), *Notococcyx solitarius* (red-chested cuckoo) and *Lampromorpha cuprea* (bronze cuckoo).

Genus KURODAIA Uchida.

Kurodaia Uchida, *Journ. Coll. Agric. Tokyo*, IX, p. 50 (1926).

Genotype: *Colpocephalum haliaeeti* Denny.

1. **Kurodaia haliaeeti** (Denny).

Colpocephalum haliaeeti Denny, *Anoplur. Brit.*, p. 216, Pl. 19, f. 1 (1842).

Described from specimens taken off *Pandion haliaetus* (osprey).

Genus COLPOCEPHALUM Nitzsch.

Colpocephalum Nitzsch, *German's Magazin*, III, p. 298 (1818).

Ferrisia Uchida, *Journ. Coll. Agric. Tokyo*, IX, p. 43 (1926).

This genus, which will eventually be split up, contains over a hundred species found on various birds.

Genotype: *Colpocephalum zebra* Nitzsch.

1. **Colpocephalum abruptofasciatum** Mjöberg.

C. abruptofasciatum Mjöberg, *Arkiv. f. Zool.*, VI, p. 36, f. 23 (1910).

Described from specimens taken off *Milvus aegyptius* (yellow-billed kite) at Cairo. It has also been taken off the same host in Zululand.

2. **Colpocephalum angulaticeps** Piaget.

C. angulaticeps Piaget, *Pédiculines*, p. 569, Pl. 47, f. 8 (1880).

Described from specimens taken off *Fregata minor* (frigate bird).

3. **Colpocephalum bicinctum** Nitzsch.

C. bicinctum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XVII, p. 524 (1861).

C. bicinctum (N.) Giebel, *Ins. Epiz.*, p. 263 (1874).

Described from specimens taken off *Circus aeruginosus* (European marsh harrier).

4. **Colpocephalum caudatum** Giebel.

C. caudatum Giebel, *Ins. Epiz.*, p. 261 (1874).

C. caudatum (Gie.) Piaget, *Pédiculines*, p. 518, Pl. 43, f. 3 (1880).

Recorded by Bedford (1920) taken off Cape vulture, *Gyps coprotheres* (= *G. kolbei*) in the Pretoria District, Transvaal, and from *Pseudogyps africanus* (southern white-backed vulture) in the Rustenburg District, Transvaal. The type host is *Vultur indicus*.

5. **Colpocephalum cucullare** Giebel.

C. cucullare Giebel, *Ins. Epiz.*, p. 264 (1874).

C. caudatum var. *major* Piaget, *Pédiculines*, p. 519 (1880).

Recorded by Waterston (1914) taken off the type host, the secretary bird, *Sagittarius serpentarius* (= *Gypogeranus serpentarius*) in South Africa. In the Onderstepoort collection there are specimens taken off the same host in the Rustenburg District, Transvaal.

6. **Colpocephalum decimfasciatum** Boisduval and Lacordavie.

C. decimfasciatum Bois. and Lac., *Faun. Ent. Env. Paris*, p. 123 (1835).

C. impostunum Nitzsch, in Denny, *Anoplur. Brit.*, p. 214, Pl. 18, f. 1 (1842).

C. impostunum (Nitz.) Piaget, *Pédiculines*, p. 548, Pl. 45, f. 8 (1880).

Described from specimens taken off *Ardea cinerea* (common grey heron). Specimens have been taken off *Ardea melanocephala* (black-headed heron) in the Zoological Gardens, Durban. Piaget (p. 549, 1880), described a variety *major* (nec Piaget, p. 519, 1880) from little egret, *Egretta garzetta* (= *Ardea garzetta*) and European little bittern, *Ixobrychus minutus* (= *Ardea minuta*).

7. **Colpocephalum dissimile** Piaget.

C. dissimile Piaget, *Pédiculines*, p. 520, Pl. 43, f. 4 (1880).

Described from specimens taken off *Milvus aegyptius* (yellow-billed kite) in the Leyden Museum.

8. **Colpocephalum ephippiorhynchi** Mjöberg.

C. ephippiorhynchi Mjöberg, *Arkiv. f. Zool.*, VI, p. 43, Pl. 3, f. 9 (1910).

Described from specimens taken off *Ephippiorhynchus senegalensis* (saddle-bill stork) at Khartoum, Sudan.

9. **Colpocephalum eucarenum** Nitzsch.

C. eucarenum Nitzsch, in Burmeister, *Handbuch*, II, p. 439 (1838).

C. eucarenum (N.) Giebel, *Ins. Epiz.*, p. 276, Pl. 16, f. 1 (1874).

Described from specimens taken off *Pelecanus onocratalus* (European pelican). This bird has recently been found on the coast of Zululand.

10. **Colpocephalum ferrisi** Bedford.

C. ferrisi Bedford, *Rep. Dir. Vet. Serv. and Anim. Indust., Un. S. Afr.*, XVI, p. 159, f. 5a-d (1930).

Described from males taken off *Melanopelargus niger* (black stork), Nomgas, South-West Africa.

11. **Colpocephalum flavescens** Nitzsch.

C. flavescens Nitzsch, in Lyonet, *Mém. Mus.*, XVIII, p. 262, Pl. 12, f. 1 (1829).

C. flavescens Piaget, *Pédiculines*, p. 515, Pl. 42, f. 10 (1880).

This species has been recorded from various Falconiformes. Piaget (1880) recorded it from *Gyps rüppelli* (Rüppel's vulture), *Pernis apivorus* (honey buzzard) and peregrine falcon, *Rhynchodon peregrinus* (= *Falco peregrinus*). He (p. 119, 1885) also described a variety found on *Pandion haliaetus* (osprey).

12. **Colpocephalum furcatum** Rudow.

C. furcatum Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 472 (1866).

Described from specimens taken off soft-plumaged petrel, *Pterodroma mollis* (= *Procellaria mollis*).

13. **Colpocephalum heterosoma** Piaget.

C. heterosoma Piaget, *Pédiculines*, p. 572, Pl. 48, f. 3, 4 (1880).

Described from specimens taken off greater flamingo, *Phoenicopterus major* (= *P. antiquorum*).

14. **Colpocephalum longissimum** Rudow.

C. longissimum Rudow, *Zeit. f. ges. Nat.*, XXXIV, p. 398 (1869).

C. longissimum (Rud.) Giebel, *Ins. Epiz.*, p. 273 (1874).

Described from specimens taken off *Leptoptilus crumeniferus* (marabou stork).

15. **Colpocephalum nyctarde** Denny.

C. nyctarde Denny, *Anoplur. Brit.*, p. 215, Pl. 20, f. 9 (1842).

Described from specimens taken off night heron, *Nycticorax nycticorax* (= *Ardea nycticorax*).

16. **Colpocephalum occipitale** Nitzsch.

C. occipitale Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 394 (1866).

C. occipitale (N.) Piaget, *Pédiculines*, p. 547, Pl. 45, f. 7 (1880).

Described by Piaget from specimens taken off *Anastomus lamelligerus* (openbill stork). Giebel described it from specimens taken off *Anastomus coromandelicus*.

17. **Colpocephalum ocellatum** Rudow.

C. ocellatum Rudow, *Zeit. f. ges. Nat.*, XXXIV, p. 392 (1869).

C. ocellatum (Rud.) Giebel, *Ins. Epiz.*, p. 275 (1874).

Described from specimens taken off whimbrel, *Phaeopus phaeopus* (= *Numenius phaeopus*). It is most probably a species of *Actornithophilus*.

18. **Colpocephalum oreas** Kellogg.

C. oreas Kellogg, *Schwed. Exp. Kilimanjaro*, p. 51, Pl. 7, f. 8 (1910).

Described from specimens taken off *Ephippiorhynchus senegalensis* (saddlebill stork) and African great white heron, *Casmerodius albus melanorhynchus* (= *Herodias alba*) in East Africa. Their presence on the one bird was due to straggling, but on which bird is not certain. Both birds occur in South Africa.

19. **Colpocephalum pediculoides** Mjöberg.

C. pediculoides Mjöberg, *Arkiv. f. Zool.*, VI, p. 44, Pl. 2, f. 6 (1910).

Described from two specimens taken off a turnstone, *Arenaria interpres* (= *Strepsilas interpres*), a migrant to South Africa, and one specimen from *Falco tinnuculi*.

20. **Colpocephalum pingue** Kellogg.

C. pingue Kellogg, *New Mallophaga*, I, p. 144, Pl. 12, f. 5 (1896).

Recorded by Waterston (1914) taken off *Diomedea exulans* (wandering albatross) in the Cape Province. It was described from specimens taken off *Diomedea albatrus* and *D. nigripes*.

21. **Colpocephalum pygidiale** Mjöberg.

C. pygidiale Mjöberg, *Arkiv. f. Zool.*, VI, p. 46, Pl. 3, f. 8 (1910).

Recorded by Bedford (1919) taken off the type host, the sacred ibis, *Threskiornis aethiopica* (= *Ibis religiosa*) in the Rustenburg District, Transvaal. I have also taken specimens off the same host in northern Zululand.

22. **Colpocephalum quadripustulatum** Nitzsch.

C. quadripustulatum Nitzsch, in Burmeister, *Handbuch*, II, p. 438 (1838).

C. quadripustulatum (N.) Piaget, *Pédiculines*, p. 546, Pl. 45, f. 6 (1880).

Specimens have been taken off the type host, *Ciconia ciconia* (white stork) at Pietermaritzburg, Natal (coll. L. Hill). Piaget (1880) described specimens from *Ciconia ciconia* (= *C. alba*) and black stork, *Melanopelargus niger* (= *C. nigra*), the latter also occurring in South Africa.

23. **Colpocephalum semicinatum** Rudow.

C. semicinatum Rudow, *Zeit. f. ges. Nat.*, XXVII, p. 475 (1866).

C. semicinatum (Rud.) Piaget, *Pédiculines*, p. 528, Pl. 44, f. 1 (1880).

Recorded by Bedford (1920) taken off the type host, the pied crow, *Corvus albus* (= *C. scapulatus*) from Lamberts Bay, C.P., and at Beira, East Africa.

24. **Colpocephalum scopinum** Mjöberg.

C. scopinum Mjöberg, *Arkiv. f. Zool.*, VI, p. 47, f. 25, 26 (1910).

Recorded by Bedford (1919) taken off *Scopus umbretta bannermani* (hammerhead) at Pietermaritzburg, Natal. It was originally described from specimens taken off *Scopus umbretta* in Madagascar.

25. **Colpocephalum subflavescens** Piaget.

C. subflavescens Piaget, *Pédiculines*, p. 571, Pl. 48, f. 2 (1880).

Described from specimens taken off open-bill stork, *Ephippiorhynchus senegalensis* (= *Xenorhynchus senegalensis*).

26. **Colpocephalum subpachygaster** Piaget.

C. subpachygaster Piaget, *Pédiculines*, p. 517, Pl. 34, f. 2 (1880).

Recorded by Waterston (1914) taken off *Bubo capensis* (Cape eagle owl) in South Africa. Bedford (1919) recorded it from the same host at Pietermaritzburg, Natal, and from the Cape barn owl, *Tyto alba affinis* (= *Strix flammea maculata*). It was described from specimens taken off several species of owls.

27. **Colpocephalum subpenicillatum** Piaget.

C. subpenicillatum Piaget, *Pédiculines, Suppl.*, p. 123, Pl. 13, f. 6 (1885).

Recorded by Kellogg and Ferris (1915) and Bedford (1919) taken off the type host, the hadadah ibis, *Hagedashia hagedash* (= *Ibis hagedasch*) at Mfongosi, Zululand.

28. **Colpocephalum tricinctum** Nitzsch.

C. tricinctum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XVII, p. 524 (1861).

C. tricinctum (N.) Giebel, *Ins. Epiz.*, p. 263 (1874).

Described from specimens taken off black kite, *Milvus migrans* (= *M. ater*).

29. **Colpocephalum trochioxum** Nitzsch.

C. trochioxum Nitzsch, in Burmeister, *Handbuch*, II, p. 438 (1838).

C. trochioxum (N.) Piaget, *Pédiculines*, p. 550, Pl. 45, f. 9 (1880).

Described by Burmeister (1838) from specimens taken off little bittern, *Botaurus stellaris* (= *Ardea stellaris*). Piaget (1880) described it from specimens taken off the same host in the Zoological Gardens at Rotterdam, and from purple heron, *Pyrherodia purpurea* (= *Ardea purpurea*) in the Leyden Museum.

30. **Colpocephalum turbinatum** Denny.

C. turbinatum Denny, *Anoplur. Brit.*, p. 209, Pl. 21, f. 1 (1842).

C. longicaudatum Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 394 (1866).

C. longicaudatum (N.) Piaget, *Pédiculines*, p. 534, Pl. 44, f. 6 (1880).

Recorded by Bedford (1919) from specimens taken off a domestic pigeon at Pietermaritzburg, Natal.

31. **Colpocephalum veratrum** Kellogg.

C. veratrum Kellogg, *Schwed. Exp. Kilimanjaro*, p. 52, Pl. 7, f. 9 (1910).

Described from specimens taken off African great white heron, *Casmerodius albus melanorhynchus* (= *Herodias alba*) in East Africa.

32. **Colpocephalum vittatum** Rudow.

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

Recorded by Bedford (1929) taken off the type host, *Ardeola ralloides* (squacca heron) on the Kunene River, South-West Africa.

33. **Colpocephalum zebra** Nitzsch (Fig. 14B).

C. zebra Nitzsch, in Burmeister, *Handbuch*, II, p. 438 (1838).

C. zebra (Nitzsch) Ferris, *Parasit*, XVI, i, p. 59, f. 2 A-G (1924).

Recorded by Waterston (1914) taken off the type host, the white stork, *Ciconia ciconia* (= *C. alba*) in South Africa.

34. **Colpocephalum zonatum** Rudow.

C. zonatum Rudow, *Zeit. f. ges. Nat.*, XXXIV, p. 391 (1869).

Described from specimens taken off *Ardeola ralloides* (squacca heron).

Subfamily BOOPINAE.

This family contains twelve species found on Australian Marsupialia. One species also occurs on the domestic dog.

Genus *HETERODOXTUS* Le Souëf and Bullen.

Heterodoxus Le Souëf and Bullen, *Vict. Naturalist*, XVIII, p. 159 (1902).

This genus contains two species.

Genotype: *Heterodoxus macropus* Le Souëf & Bullen = *Menopon longitarsus* Piaget.

1. **Heterodoxus longitarsus** (Piaget).

Menopon longitarsus Piaget, *Pédiculines*, p. 504, Pl. 41, f. 7 (1880).

Heterodoxus macropus Le Souëf and Bullen, *Vict. Naturalist*, XVIII, p. 159, f. 11 (1902).

Menopon spiniger Enderlein, *Jenais. Denks.*, XIV, p. 80 (1909).

M. (Menacanthus) spinigerum "Enderl." Neu., *Arch. de Parasit.*, XV, p. 364, f. 12 (1912).

Heterodoxus armiferus Paine, *Ent. News.*, p. 362, f. A (1912).

Heterodoxus longitarsus (Pia.) Harr. and Johnst., *Parasit.*, VIII, p. 353, f. 10, 11 (1916).

This species is very common on dogs in South Africa. It has also been found on dogs in other parts of Africa, America, Malay Peninsula, Japan and Formosa, and on its true hosts, kangaroos and wallabies, in Australia.

Family GYROPIDAE Burmeister.

This family contains twenty-six species found principally on rodents in South America.

Key to the South African Subfamilies.

1. Maxillary palpi four-segmented; six pairs of abdominal spiracles present; tarsi with at least one claw
Gyropinae

Maxillary palpi two-segmented; five pairs of abdominal spiracles present; tarsal claws wanting ... *Gliricolinae*.

Subfamily GYROPINAE Ewing.

Genus *GYROPUS* Nitzsch.

Gyropus Nitzsch, *German's Magazin*, III, p. 303 (1818).

Gyropus Ewing, *Proc. U.S. Nat. Mus.*, LXIII, Art. 20, p. 12 (1924).

This genus contains seven species.

Genotype: *Gyropus ovalis* Nitzsch.

1. **Gyropus ovalis** Nitzsch.

Gyropus ovalis Nitzsch, in Burmeister, *Handbuch*, II, p. 443 (1838).

Gyropus ovalis (N.) Piaget, *Pédiculines*, p. 609, Pl. 50, f. 5 (1880).

Gyropus ovalis (N.) Ewing, *Proc. U.S. Nat. Mus.*, LXIII, Art. 20, p. 13, f. 6 (1924).

A common parasite of the guinea-pig (*Cavia cobaya*).

Subfamily GLIRICOLINAE Ewing.

Genus *GLIRICOLA* Mjöberg.

Gliricola Mjöberg, *Arkiv. f. Zool.*, VI, p. 18 (1910).

Gliricola Ewing, *Proc. U.S. Nat. Mus.*, LXIII, Art. 20, p. 31 (1924).

This genus contains two species and a variety.

Genotype: *Pediculus porcelli* Linné.

1. **Gliricola porcelli** (Linnaeus).

Pediculus porcelli Linné, *Syst. Nat.*, p. 611 (1758).

Gyropus gracilis Nitzsch, in Burmeister, *Handbuch*, II, p. 443 (1838).

Gyropus gracilis (N.) Piaget, *Pédiculines*, p. 611, Pl. 50, f. 6 (1880).

Gliricola porcelli (L.) Ewing, *Proc. U.S. Nat. Mus.*, LXIII, Art. 20, p. 33, f. 15, 17; Pl. 1, f. 8 (1924).

A common parasite of the guinea-pig (*Cavia cobaya*).

Family LAEMOBOTHRIDAE Mjöberg.

This family includes two genera.

Key to the Genera.

1. Clypeus emarginate in front and bearing several peg-like setae on or near its anterior margin. On water birds
Eulaemobothrion.
- Clypeus not emarginate in front and without peg-like setae. On Falconiformes *Laemobothrion*.

Genus LAEMOBOTHRION Nitzsch.

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

Laemobothrium Burmeister, *Handbuch der Ent.*, II, p. 441 (1838).

Genotype: *Laemobothrion giganteum* Nitzsch = *Pediculus tinnunculi* Linné.

1. *Laemobothrion percnopteri* (Gervais).

Laemobothrium percnopteri Gervais, *Aptères*, III, p. 321, Pl. 48, f. 6 (1847).

Laemobothrium gigas Nitzsch in Giebel, *Zeit. f. ges. Nat.*, XVII, p. 518 (1861).

Laemobothrium pallidum Giebel, *Ins. Epiz.*, p. 250 (1874).

Described from specimens taken off *Neophron percnopterus* (Egyptian vulture).

2. *Laemobothrion tinnunculi* (Linnaeus).

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

L. giganteum Nitzsch, in Burmeister, *Handbuch*, II, p. 441 (1838).

L. nigrolimbatum Giebel, *Ins. Epiz.*, p. 252 (1874).

L. laticolle Nitzsch in Denny, *Anoplur. Brit.*, p. 239, Pl. 23, f. 4 (1842).

For other synonyms see Harrison (1916). Waterston (1914) has recorded this species taken from *Falco subbuteo* (hobby) in South Africa, and Bedford (1929) a ♂ taken off *Cerchneis rupicola* (Cape Kestrel) at Haenertsburg, Transvaal. It has also been recorded from numerous Falconiformes, including *Circus aeruginosus* (European marsh harrier) and *Gyps rüppelli* (Rüppell's vulture). The type host is *Falso tinnunculus*.

3. *Laemobothrion titan* (Piaget).

Laemobothrium titan Piaget, *Pédiculines*, p. 578, Pl. 49, f. 1 (1880).

Laemobothrium gypsis Kellogg, *Ent. News*, XVII, p. 63, f. 1 (1906).

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

L. titan was described from a ♀ taken off black kite, *Milvus migrans* (= *M. aetolius*), *L. gypsis* from specimens taken off Cape vulture, *Gyps coprotheres* (= *G. kolbei*) in the Transvaal and *L. africanum* from immature specimens taken off *Pseudogyps africanus* (white-backed vulture) in East Africa. Bedford (1929) recorded specimens taken off the following hosts in South Africa: *Gyps coprotheres* (Cape vulture), *Pseudogyps africanus fullebornei* (southern white-backed vulture), *Pterolestes rufofuscus* (jackal buzzard) and *Nisaetus spilogaster* (African hawk-eagle) in the Rustenburg District, Transvaal; *Milvus aegyptius parasitus* (Cape kite), Pietermaritzburg, Natal; *Pteroaetus verreauxi* (black eagle), Mtabamhlope, Natal; *Buteo vulpinus* (steppe buzzard), Kaoko Otavi, South-West Africa, and from

Pandion haliaetus (osprey). Specimens have also been taken off *Circaetus pectoralis* (black-chested harrier-eagle), Hamanskraal, Transvaal (coll. M. Carlisle), and *Terathopius ecaudatus* (bateleur eagle), Hempton, Transvaal.

Genus EULAEMOBOTHRION Ewing.

Eulaemobothrion Ewing, *A Manual of External Parasit.*, p. 189 (1929).

Genotype: *Laemobothrion nigrum* Burmeister.

This genus comprises about twelve species found on Rallidae, Plegadidae, etc.

1. *Eulaemobothrion kelloggi* (Bedford).

Laemobothrium setigerum var. *africanum* Kellogg & Ferris, *Ann. Durban Mus.*, I, p. 147, Pl. 15, f. 1 (1915), nec Kellogg, 1910.

Laemobothrium kelloggi Bedford, *Rep. Dir. Vet. Res. Un. S. Afr.*, V & VI, p. 723 (1919).

Described from specimens taken off hadadah ibis, *Hagedashia hagedash* (= *Theristicus hagedasch*) at Mfongosi, Zululand.

Family RICINIDAE Neumann.

Genus RICINUS Degeer.

Ricinus Degeer, *Mém. pour serv. à l'hist. des insectes*, VII, p. 69 (1778).

Physostomum Nitzsch, *German's Mag.*, III, p. 302 (1818).

This genus contains thirty-five species found on passerine birds.

Genotype: *Ricinus fringillae* Degeer (1778), nec Scopoli, 1772. = *Physostomum nitidissimum* Nitzsch.

1. *Ricinus dolichocephalus* (Scopoli).

Pediculus dolichocephalus Scopoli, *Ent. Carn.*, p. 382 (1763).

Pediculus orioli Fabricius, *Gen. Ins.*, p. 309 (1776).

Physostomum sulphureum Nitzsch, in Burmeister, *Handbuch*, II, p. 442 (1838).

Physostomum sulphureum (N.) Giebel, *Ins. Epiz.*, p. 256, Pl. 18, f. 4 (1874).

Specimens of this species taken off *Oriolus larvatus larvatus* (black-headed oriole) at Pietermaritzburg, Natal, have been forwarded by Mr. L. Hill for identification. It was described from specimens taken off European golden oriole, *Oriolus oriolus* (= *O. galbula*), a migrant to South Africa.

2. *Ricinus longetarsatus* (Piaget).

Physostomum longetarsatum Piaget, *Tijd. v. Ent.*, XXXVIII, p. 101 (1895).

Described from specimens taken off *Lamprotornis* sp. in the Transvaal.

Suborder RHYNCOPTHIRINA.

This suborder contains a single species.

Family HAEMATOMYZIDAE Enderlein.

Genus HAEMATOMYZUS Piaget.

Haematomyzus Piaget, *Tijd. v. Ent.*, XII, p. 254 (1869).

Idolocoris "Walker" Richter, *Hardwick's Science Gossip*, p. 131 (1871).

Phantasmocoris F. Buchanan White, *ibid.*, p. 234 (1871).

1. **Haematomyzus elephantis** Piaget.

Haematomyzus elephantis Piaget, *Tijd. v. Ent.*, XII, p. 254 (1869).

Haematomyzus proboscideus Piaget, *Pédiculines*, p. 658, Pl. 54, f. 2-2h (1880).

Haematomyzus elephantis var. *sumatranus* Fahrenholz, *Zool. Anzeig.* XXXV, p. 714 (1910).

Haematomyzus elephantis (Pia.) Ferris, *Parasit.*, XXIII, i, pp. 112-127, f. 1-5 and Pls. 4, 5 (1931).

The type specimens were taken off a young African elephant. Bequaert (Rep. Harv.-Afr. Exp. Liberia and Belg. Congo, p. 997, 1931) recorded it from the same host in the Belgian Congo. It has also been recorded from *Elephas indicus* and *E. sumatranus*. I have taken numerous specimens off a young Indian elephant at Pretoria North.

Suborder SIPHUNCULATA.

About 200 described species are included in this suborder. They are all parasitic on mammals, and are chiefly found on rodents, ungulates and primates.

Key to the Families.

1. Abdomen thickly beset with either stout spines or with spines and scales. Parasitic on marine carnivores
ECHINOPHTHIRIIDAE.
- Abdomen either with spines or setae arranged in definite rows, or with chitinous points, giving the body a scaly appearance 2
2. Eyes absent; pleural plates sometimes vestigial or wanting. Not parasitic on primates
HAEMATOPINIDAE, p. 399.
- Eyes or eye tubercles present; pleural plates usually well developed. Parasitic on primates 3
3. Abdomen with normal segmentation and without lateral tubercles PEDICULIDAE, p. 412.
- Abdomen with segments III to V fused; first three spiracles close together; lateral tubercles present
PHTHIRIDAE, p. 414.

Family ECHINOPHTHIRIIDAE Enderlein.

Subfamily ANTARCTOPHTHIRIINAE Enderlein.

Genus LEPIDOPHTHIRUS Enderlein.

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

This genus comprises a single species. The antennae are four-jointed; thorax and abdomen beset with delicate scales and numerous spines; forelegs much smaller than mid and hind legs.

1. **Lepidophthirus macrorhini** Enderlein.

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

Bedford (1929) recorded numerous specimens taken off *Macrorhinus leoninus* (giant seal) captured off the coast near Capetown. It was described from specimens taken off the same host on Kerguelen Island.

Family HAEMATOPINIDAE Enderlein.

Key to the South African Subfamilies and Genera.

1. Fore legs smaller than one or both of the other pairs 2
Legs and claws subequal. Parasitic on ungulates. Subfamily HAEMATOPININAE *Haematopinus*, p. 411.
2. Fore legs smaller than mid and hind legs 3
Fore and mid legs equal in size, and much smaller than hind legs Subfamily ENDERLEINELLINAE 6
3. Anterior tarsi with a short, claw-like process in addition to the claw Subfamily HYBOPHTHIRINAE 7
Anterior tarsi without a claw-like process in addition to the claw 4
4. Abdomen with distinct pleural plates on some of the segments Subfamily HOPLOPLEURINAE 8
Pleural plates on abdomen either absent or very rudimentary 5
5. Abdomen with small chitinous points, giving it a scaly appearance, and with one pair of spiracles. Parasitic on elephant shrews. Subfamily NEOLINOGNATHINAE *Neolinognathus*, p. 407.
Abdomen clothed with normal setae and with six pairs of spiracles. Parasitic on ungulates and Leporidae
Subfamily LINOGNATHINAE 12
6. Second abdominal sternite without plates; five to seven pairs of pleural plates present. Parasitic on mole rats
Proenderleinellus, p. 400.
Second abdominal sternite with a pair of small sclerites, each with a backward-pointing chitinous process; three to five pairs of pleural plates present; parasitic on squirrels *Enderleinellus*, p. 401.

7. Seven pairs of pleural plates present. Parasitic on Cape ant bear *Hybophthirus*, p. 401.
Six pairs of pleural plates present. Parasitic on cane rats and rock rats *Scipio*, p. 402.
8. Rostrum surrounded by denticles; tergites with a single transverse row of truncate setae. Parasitic on spring hares *Eulinognathus*, p. 402.
Rostrum not surrounded by denticles; median tergites of ♀ with two or three transverse rows of setae 9
9. Median abdominal tergites and sternites of ♀ with two transverse rows of setae 10
Median abdominal tergites and sternites of ♀ usually with three transverse rows of setae, rarely three rows only on the third tergite and sternite 11
10. Pleural plates of second abdominal segment not divided. Parasitic on squirrels *Neohaematopinus*, p. 403.
Pleural plates of second abdominal segment divided. Parasitic on Muridae *Polyplax*, p. 403.
11. Second sternal plate of abdomen greatly enlarged, divided medially and overlapping most of the third sternite. Parasitic on dormice *Schizophthirus*, p. 406
Second sternal plate of abdomen smaller, not divided in the middle. Parasitic on Muridae ... *Hoplopleura*, p. 406
12. Abdomen with one row of setae on each segment 13
Abdomen with more than one row of setae on each segment. Parasitic on ungulates and dog ... *Linognathus*, p. 408.
13. Setae on abdomen arranged into two dorsal and two ventral longitudinal rows; last two joints of antennae fused together. Parasitic on Procaviidae
Prolinognathus, p. 408.
Setae on abdomen more numerous, not arranged into longitudinal rows; antennae five jointed. Parasitic on rabbits and hares *Haemodipsus*, p. 407.

Subfamily ENDERLEINELLINAE Ewing.

Genus PROENDERLEINELLUS Ewing.

Proenderleinellus Ewing, *Journ. Wash. Acad. Sci.*, XIII, No. 8, p. 148 (1923).

Bathyergicola Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 505 (1929).

This genus contains three species, two found on *Bathyergicidae* (mole rats), and the third (the genotype) was recorded from *Thryonomys gregor pusillus*, Kenya Colony. This last record was undoubtedly due to straggling.

Genotype: *Proenderleinellus africanus* Ewing.

1. *Proenderleinellus hilli* (Bedford.).

Bathyergicola hilli Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 506, f. 6, 7, 7a, 8 (1929).

Described from females and males taken off Hottentot mole rat, *Cryptomys hottentotus* (= *Georychus hottentotus*) at Pietermaritzburg, Natal.

2. *Proenderleinellus lawrensis* (Bedford).

Bathyergicola lawrensis Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 506, f. 7b, 9, 10 (1929).

Described from females taken off Cape dune mole, *Bathyergus suillus* (= *B. maritimus*), locality unknown.

Genus ENDERLEINELLUS Fahrenholz.

Enderleinellus Fahrenholz, *Zool. Anz.* XXXIX, p. 56 (1912).

Enderleinellus Ferris, *Contrib. Towards a Mon. Suck. Lice*, i, p. 7 (1919).

This genus is widely distributed and contains nineteen species found on Sciuridae (squirrels).

Genotype: *Enderleinellus nitzschi* Fahrenholz.

1. *Enderleinellus zonatus* Ferris.

E. zonatus Ferris, *Contrib. Towards a Mon. Suck. Lice*, i, p. 32, f. 18, 19 (1919).

Described from specimens taken off *Paraxerus palliatus ornatus* (Zululand squirrel), Ngoye Hills, Zululand; also from the following hosts in Kenya Colony; *Paraxerus palliatus suahelicus*, *P. jacksoni capitis* and *Parasciurus animosus*.

Subfamily HYBOPHTHIRINAE Ewing.

Genus HYBOPHTHIRUS Enderlein.

Hybophthirus Enderlein, *Denks. d. Med.-Naturw. Gesell. zu Jena*, XIV, p. 79 (1909).

Hybophthirus Ferris, *Contrib. Towards a Mon. Suck. Lice*, iii, p. 175 (1922).

This genus includes a single species.

1. *Hybophthirus notophallus* (Neumann).

Haematopinus notophallus Neu., *Jahrb. des Nassausischen Ver. für Naturkunde in Wiesbaden*, p. 2 (1909).

Hybophthirus orycteropodi Enderl., *Denks. d. Med.-Naturw. Gesell. zu Jena*, XIV, p. 79, Pl. 8, f. 1-3 (1909).

Hybophthirus notophallus (Neu.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iii, p. 176, f. 117, 118 (1922).

Recorded by Bedford (1919) taken off Cape ant bear, *Orycteropus afer* (= *O. capensis*) in the Zoological Gardens at Pretoria. It was originally described from specimens taken off the same host in South-West Africa. Waterston (1914) and others have also recorded it from the same host.

Genus SCIPIO CUMMINGS.

Scipio Cummings, *Bull. Ent. Res.*, III, p. 393 (1913).

Scipio Ferris, *Contrib. Towards a Mon. Suck. Lice*, iii, p. 170 (1922).

Three species are included in this genus, two being found on Thryonomidae and one on Petromyidae.

Genotype: *Haematopinus aulacodi* Neumann.

1. *Scipio aulacodi* (Neumann).

Haematopinus aulacodi Neu., *Arch. de Parasit.*, XIV, p. 403, f. 5-7 (1911).

Scipio aulacodi (Neu.) Ferris, *Ann. Durban Mus.*, III, p. 233, f. 16, 17B (1916).

Scipio aulacodi (Neu.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iii, p. 170, f. 113, 114A, B, E, G (1922).

Recorded from *Thryonomys* sp., Mfongosi, Zululand (Ferris), and cane rat, *T. swinderianus variegatus* (= *T. aulacodus*), Rustenburg District, Transvaal (Bedford, 1919). Originally described from *T. swinderianus*, Dahomey, and Cummings (1913) has recorded it from the same host in North-eastern Rhodesia.

2. *Scipio breviceps* Ferris.

Scipio breviceps Ferris, *Ann. Durban Mus.*, III, p. 234, f. 17A, 18-22 (1916).

Scipio breviceps Ferris, *Contrib. Towards a Mon. Suck. Lice*, iii, p. 173, 114C, D, F, H, 115, 116 (1922).

Originally described from specimens taken off *Thryonomys* sp., Mfongosi, Zululand. Bedford (1919) has recorded it from cane rat, *T. swinderianus variegatus* (= *T. aulacodus*), Rustenburg District, Transvaal. Mr. A. Roberts informs me that *T. swinderianus variegatus* is the only species and variety found in South Africa.

3 *Scipio* nov. sp.

A ♂ taken off *Petromys typicus tropicalis* (rock rat) Windhoek, South-West Africa (Tyl. Mus. No. 5683), and a ♀ taken off "nokey" (= rock rat) without locality. A ♀ has also been taken off *Petromys* nov. sp., Khan River, South-West Africa (coll. R. D. Bradfield).

Genus EULINOGNATHUS Cummings.

Eulinognathus Cummings, *Ann. Mag. Nat. Hist.* (8) XVII, p. 90 (1916).

Eulinognathus Ferris, *Proc. Calif. Acad. Sci.*, vi, No. 6, p. 168, (1916).

This genus contains three species, the hosts being African Poletidae (spring hares) and Dipodidae (jerboas) and American Octodontidae.

Genotype: *Eulinognathus denticulatus* Cummings.

1. *Eulinognathus denticulatus* Cummings.

E. denticulatus Cumm., *Ann. Mag. Nat. Hist.* (8) XVII, p. 90, f. 1 (1916).

This louse is common on the springhare (*Pedetes caffer*) in South Africa.

Genus NEOHAEMATOPINUS Mjöberg.

Neohaematopinus Mjöberg, *Arkiv. f. Zool.*, VI, p. 160 (1910).

Acanthopinus Mjöberg, *ibid.*, p. 160 (1910).

Linognathoides Cummings, *Bull. Ent. Res.*, III, p. 393 (1912).

Neohaematopinus Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 237 (1923).

This genus is widely distributed and includes seventeen species, the majority being found on Sciuridae (squirrels).

Genotype: *Haematopinus sciuropteri* Osborn.

1. *Neohaematopinus faurei* (Bedford).

Linognathoides faurei Bedford, *Rep. Dir. Vet. Res., Un. S. Afr.*, VII & VIII, p. 710, Pl. 1, f. 2, Pl. 7, f. 3 (1920).

This louse is common on the ground squirrel (*Geosciurus capensis*) in the Orange Free State. Ingram (1927) has recorded it on *Tatera lobengulae* (gerbille) and *Mastomys coucha* (multi-mammate mouse), but its presence on these rodents was undoubtedly due to straggling.

2. *Neohaematopinus heliosciuri* Cummings.

N. heliosciuri Cumm., *Bull. Ent. Res.*, III, p. 393, f. 1 (1912).

N. heliosciuri (Cumm.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 255, f. 164, 165A, E, H (1923).

Described by Cummings from specimens taken off *Paraxerus* (= *Heliosciurus*) *palliatu*s, Kenya Colony. Ferris (1923) also recorded it from the following hosts in Kenya Colony: *P. palliatu*s *sua*helicus, *P. jacksoni capitis* and *Parasciurus animosus*.

3. *Neohaematopinus sua*helicus Ferris.

*N. sua*helicus Ferris, *Contrib. Towards a Mon. Suck. Lice*, IV, p. 258, f. 165B, F, G (1923).

Described from specimens taken off *Paraxerus palliatu*s *ornatus* (Zululand squirrel), Ngoye Hills, Zululand; also from the following hosts in Kenya Colony: *P. palliatu*s *sua*helicus, *P. jacksoni capitis* and *Parasciurus animosus*.

Genus POLYPLAX Enderlein.

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

Polyplax Ferris, *Contrib. Towards a Mon. of the Suck. Lice*, iv, p. 183 (1923).

This genus is very widely distributed and comprises twenty-eight species found on Muridae (rats and mice) and two species on Sciuridae (squirrels).

Genotype: *Pediculus spinulosus* Burmeister.

1. **Polyplax arvicanthus** Bedford.

Polyplax arvicanthus Bedford, *Rept. Dir. Vet. Res., Un. S. Afr.*, V & VI, p. 716, Pl. 1, f. 3, 6 (1919). (Captions of figures labelled *P. arvicanthus*).

Polyplax arvicanthus (Bedf.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 227, f. 148, 149 (1923).

Described from specimens taken off striped mouse, *Rhabdomys pumilio* (= *Arvicanthus pumilio*) at Onderstepoort. Ferris (1923) has also recorded it from *Rhabdomys pumilio diminutis*, Kenya Colony.

2. **Polyplax biseriata** Ferris.

Polyplax biseriata Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 199, f. 125A, 126 (1923).

Described from specimens taken off *Tatera bohmi varia*, Kenya Colony; also a male and female from *Tatera lobengulae* (gerbille), Bothaville, Orange Free State.

3. **Polyplax calva** Waterston.

Polyplax calva Waterston, *Parasit.*, IX, p. 199, figs. (1917).

Polyplax calva (Waterst.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 234, f. 153, 154 (1923).

Described from specimens taken off *Cricetomys gambianus* (giant rat) at Accra. Ferris (1923) also recorded it from varieties of the same host from Kenya Colony.

4. **Polyplax cummingsi** Ferris.

Polyplax gracilis (Fahr.) Ferris, *Ann. Durban Mus.*, I, p. 240, f. 23c, 24 (1916), *nec Fahrenholz*, 1910.

Polyplax cummingsi Ferris, *ibid.*, I, p. 240, f. 25, 26A (1916).

Polyplax cummingsi Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 213, f. 136, 137 (1923).

Described from a ♀ taken off *Dasymys incomtus*, Mfongosi, Zululand. Also recorded as *P. gracilis* from *Aethomys* (= *Mus*) *chrysophilus* (African rat) at the same locality. Bedford (1929) also recorded it taken from the latter host at Sycamore, Transvaal, and Ferris (1923) recorded it from *Dasymys incomtus helukus*, Kenya Colony.

5. **Polyplax jonesi** Kellogg and Ferris.

Polyplax jonesi Kell. & Ferris, *Ann. Durban Mus.*, I, p. 151, Pl. 15, f. 3-3e (1915).

Polyplax jonesi (K. & F.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 216, f. 138, 139 (1923).

Described from specimens taken off *Saccostomys campestris* (Peter's pounced mouse), Mfongosi, Zululand.

6. **Polyplax otomydis** Cummings.

Polyplax otomydis Cumm., *Bull. Ent. Res.*, III, p. 395, f. 2 (1912).

Polyplax otomydis (Cumm.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 211, f. 134, 135 (1923).

Described by Cummings from specimens taken off *Otomys irroratus tropicalis*, Kenya Colony. It has also been recorded taken off the following rats in South Africa: The eastern Karroo rat, *Paratomys* (= *Otomys*) *luteolus* (Waterston, 1914); the water rat, *Otomys irroratus*, Mfongosi, Zululand (Kellogg and Ferris, 1915, and Ferris, 1916) and Onderstepoort (Bedford, 1919). Ferris (1923) also recorded it from *Otomys angoniensis classodon*, Kenya Colony.

7. **Polyplax praomydis** Bedford.

Polyplax praomydis Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 503, f. 2-5 (1929).

Described from specimens taken off *Praomys namaquensis monticularis* (rock mouse) at Onderstepoort.

8. **Polyplax spinulosa** (Burmeister).

Pediculus spinulosus Burmeister, " *Rhynchota* ", *Gen. Ins.* No. 8 (1839).

Polyplax spinulosa (Burm.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 187, f. 119, 120A, D, F, H (1923).

This species has been recorded from *Rattus norvegicus* (type host), *Rattus rattus*, *R. rattus alexandrinus* and other species of rats in various parts of the world. It is common on *R. rattus* and *R. rattus alexandrinus* at Onderstepoort, and has also been found on *R. norvegicus* (= *Mus decumanus*) at Pietermaritzburg, Natal. Bedford (1929) also recorded it from *Thallomys moggi*, Onderstepoort.

It is a transmitting agent of *Trypanosoma lewisi* (Kent) to rats, but the lice do not remain infected.

9. **Polyplax waterstoni** Bedford.

Polyplax waterstoni Bedford, *Rept. Dir. Vet. Res., Un. S. Afr.*, V & VI, p. 715, Pl. 1, f. 1, 2, 4, 5 (1919).

Polyplax waterstoni (Bedf.) Ferris, *Contrib. Towards a Mon. Suck. Lice*, iv, p. 193, f. 121, 122 (1923).

Described from specimens taken off two species of rats at Onderstepoort. Bedford (1929) recorded it from *Mastomys coucha* (multimammate mouse) at Onderstepoort and Sycamore in the Transvaal. Ferris (1923) also recorded it from *Epimys peromyscus*, Kenya Colony.

Genus SCHIZOPHTHIRUS Ferris.

Schizophtirus Ferris, Contrib. Towards a Mon. Suck. Lice, iii, p. 143 (1922).

This genus includes two species, one occurring on dormice (family Muscardinidae) in Europe, and the other on African dormice (family Graphiuridae).

Genotype: *Pediculus pleurophaeus* Burmeister.

1. *Schizophtirus graphiuri* Ferris.

S. graphiuri Ferris, Contrib. Towards a Mon. Suck. Lice, iii, p. 147, f. 93A, 96, 97 (1922).

Described from specimens taken off *Claviglis (Graphiurus) nanus*, Ntabamhlope, Natal; also from *Claviglis (Graphiurus) murinus isolatus* and *G. raptor*, Kenya Colony. Females from *Claviglis alticola*, Kastrol Nek, Wakkerstroom, Tvl. (Tvl. Mus. No. 2909).

Genus HOPOPLEURA Enderlein.

Hoplopleura Enderlein, Zool. Anz., XXVIII, p. 221 (1904).

Hoplopleura Ferris, Contrib. Towards a Mon. Sucking Lice, ii, p. 59 (1921).

This genus contains thirty-eight species found on Muridae (rats and mice), *Sciuridae* (squirrels), *Petauristidae* (flying squirrels) and Octodontidae (South American rodents).

Genotype: *Pediculus acanthopus* Burmeister.

1. *Hoplopleura affinis* (Burmeister).

Pediculus affinis Burmeister, "Rhynchota", Gen. Ins., p. 10 (1839).

Hoplopleura affinis (Burm.) Ferris, Contrib. Towards a Mon. Suck. Lice, ii, p. 75, f. 42, 43 (1921).

Recorded by Bedford (1929) taken off *Thallomys moggi* (Mogg's rat) at Onderstepoort. Originally described from specimens taken off a rat in Europe. Ferris (1921) recorded it from various rats in Europe, Asia and South America.

2. *Hoplopleura biseriata* Ferris.

H. biseriata Ferris, Contrib. Towards a Mon. Suck. Lice, ii, p. 103, f. 64A (1921).

Described from a ♀ taken off typical long-eared mouse, *Malacothrix typicus typicus* (= *Malacothrix sp.*), Bothaville, Orange Free State. Bedford (1929) recorded it from *Tatera* (= *Tateroma*) *angolae*, South-West Africa. Specimens have also been taken off *Tatera lobengulae* near Ramathlabama, Bechuanaland Protectorate (sent by B. de Meillon).

3. *Hoplopleura enormis enormis* Kellogg and Ferris.

H. enormis Kell. & Ferris, Ann. Durban Mus., I, p. 155, Pl. 16, f. 4-4e (1915).

H. enormis (Kell. & Ferris) Ferris, Contrib. Towards a Mon. Suck. Lice, ii, p. 94, f. 57, 58B-C, 59B (1921).

Described from specimens taken off bushveld striped mouse, *Lemniscomys spinalis* (= *Arvicanthis dorsalis*), Mfongosi, Zululand. Bedford (1929) recorded it taken off the same host at Sycamore, Transvaal. Ferris (1921) also recorded it from *Lemniscomys barbatus zebra*, Gondokoro, Africa.

4. *Hoplopleura intermedia* Kellogg and Ferris.

H. intermedia Kell. & Ferris, Ann. Durban Mus., I, p. 153, Pl. 16, f. 5-5D (1915).

H. intermedia (Kell. & Ferris) Ferris, Contrib. Towards a Mon. Suck. Lice, ii, p. 90, f. 54, 55B-D, 56B (1921).

Described from specimens taken off multimammate mouse, *Mastomys coucha* (= *Mus coucha*) Mfongosi, Zululand. It has also been taken off the same host at Onderstepoort. Ferris (1921) recorded it from the following hosts in Kenya Colony: *Dendromys mesomelas insignis*, *Rattus tullbergi peromyscus* and *Zelotomys hildegardae*.

Subfamily NEOLINOGNATHINAE Ewing.

Genus NEOLINOGNATHUS Bedford.

Neolinognathus Bedford, Ent. Mont. Mag. (3), VI, p. 88 (1920).

Neolinognathus Ferris, Contrib. Towards Mon. Suck. Lice, iii, p. 166 (1922).

This genus contains two described species found on Macroscelidae (elephant shrews), of which one has been recorded from the Union.

Genotype: *Neolinognathus elephantuli* Bedford.

1. *Neolinognathus elephantuli* Bedford.

N. elephantuli Bedford, Ent. Mont. Mag. (3), VI, p. 89, f. 1, 2 (1920).

N. elephantuli (Bedford) Ferris, Contrib. Towards Mon. Suck. Lice, iii, p. 166, f. 110, 111A-C, F (1922).

Originally described from females and males taken off Jameson's rock shrew, *Elephantulus myurus jamesoni* (= *E. rupestris jamesoni*) at Onderstepoort. Ferris (1922) has also recorded it from *Petrodromus tetradactylus*, Nyasaland, and *Nasilio brachyrhynchus delameri*, Kenya Colony.

Subfamily LINOGNATHINAE Enderlein

Genus HAEMODIPSUS Enderlein.

Haemodipsus Enderlein, Zool. Anz., XXVIII, pp. 139, 143 (1904).

Haematopinus (Polyplax) Neumann, Arch. de Parasit., XIII, p. 536 (1909).

This genus comprises two species found on Leporidae (hares and rabbits).

Genotype: *Pediculus lyriocephalus* Burmeister.

1. **Haemodipsus ventricosus** (Denny).

Haematopinus ventricosus Denny, Mon. Anoplur. Brit., p. 30, Pl. 25, f. 6 (1842).

Haemodipsus ventricosus (Denny) Kell. & Ferris, Anoplur. & Mall. N. Am. Mam., p. 28, f. 11; Pl. 2, f. 2; Pl. 4, f. 5; Pl. 5, f. 12 (1915).

Occurs on the domestic rabbit, but is not very common in South Africa. It has also been recorded from *Lepus spp.* in the United States.

Genus PROLINOGNATHUS Ewing.

Prolinognathus Ewing, A Manual of Extern. Parasites, pp. 136. 201 (1929).

This genus includes two species found on Procaviidae (dassies).

Genotype: *Pediculus caviae-capensis* Pallas.

1. **Prolinognathus caviae-capensis** (Pallas).

Pediculus caviae-capensis Pallas, *Spicilegia Zool.*, XII, p. 32, Pl. 3, f. 12, 13 (1767).

Linognathus caviae-capensis (Pallas) Cummings, *Bull. Ent. Res.*, IV, p. 37, f. 2, 3 (1913).

Described by Pallas from specimens taken off Cape dassie, *Procavia capensis* (Pallas). Specimens have also been taken off *Procavia sp.*, Lamberts Bay, C.P. (Tvl. Mus. No. 2148); *Procavia sp.*, Mtabamhlope, Natal; *Procavia coombi* at Onderstepoort and in the Rustenburg District, Transvaal; *Heterohyrax ruddi*, Macequece, Portuguese East Africa (Tvl. Mus. No. 6215), and *Procavia waterbergensis*, Otjiwarango, South-West Africa (Tvl. Mus. No. 5335).

Genus LINOGNATHUS Enderlein.

Trichaulus Enderl., *Zool., Anz.*, XXVII, pp. 139, 141 (1904).

Linognathus Enderl., *ibid.*, XXIX, p. 194 (1905).

This genus comprises about twenty-one species found on Bovidae, llamas and domestic dog.

Genotype: *Pediculus piliferus* Burmeister = *Pediculus setosus* Von Olfers.

1. **Linognathus africanus** Kellogg and Paine.

L. africanus Kell. & Paine, *Bull. Ent. Res.*, II, p. 146, Pl. 4, f. 1, 5 (1911).

Specimens have been taken off sheep at Kuruman, Cape Province. Also off sheep at Salisbury, S. Rhodesia and off a boer goat at Onderstepoort. It was originally described from specimens taken off sheep in Southern Nigeria.

2. **Linognathus angulatus** (Piaget).

Haematopinus angulatus Piaget, *Les Pédiculines*, Suppl., p. 144, Pl. 15, f. 7 (1885).

Recorded by Ferris (1916) and Bedford (1919) taken off *Cephalophus natalensis* (red duiker), Mfongosi, Zululand. Specimens have also been taken off *Sylvicapra grimmii transvaalensis* (Transvaal duiker), Rustenburg District, Transvaal, and *Philantomba monticola* (blue duiker), Pietermaritzburg, Natal (coll. L. Hill). It was originally described from *Cephalophus nigrifrons*.

3. **Linognathus brevicornis** (Giebel).

Haematopinus brevicornis Giebel, *Ins. Epiz.*, p. 43 (1874).

Described from specimens taken off *Giraffa camelopardalis*.

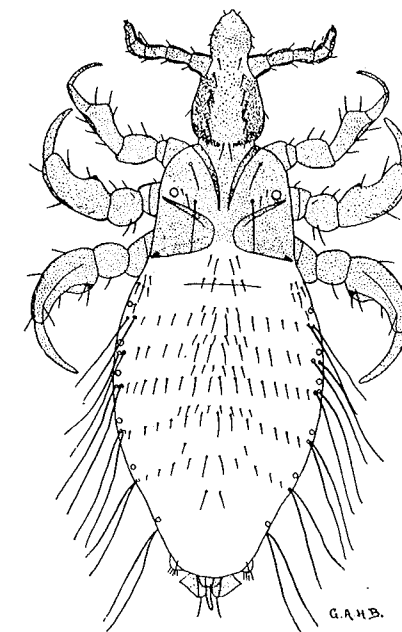


Fig. 15. *Linognathus gnu* Bedford, male.

4. **Linognathus fahrenheitzi** Paine.

Linognathus forficulus Kell. & Paine, *Bull. Ent. Res.*, II, p. 147, Pl. 4, f. 2-4 (1911), *nec* Rudow, 1869.

Linognathus fahrenheitzi Paine, *Psyche*, XXI, p. 117 (1914).

Recorded by Ferris (1916) and Bedford (1919) taken off *Redunca fulvorufula* (mountain reedbuck), Mfongosi, Zululand. It was originally described from specimens taken off *Redunca arundinum* (reedbuck) in Nyasaland.

5. **Linognathus** nov. sp.

♀ ♀ and ♂ taken off *Tragelaphus sylvaticus* (bushbuck) at Onderstepoort.

6. **Linognathus gnu** Bedford (Fig. 15).

Linognathus gnu, Bedford, *Trans. Roy. Soc. S. Afr.*, p. 349, f. 3, 4 (1927).

Linognathus ferrisi Bedford, *ibid.*, p. 351, f. 5, 6 (1927), *nec* Fahrenholz, 1919.

Linognathus gorgonus Bedford, *Ann. Rep. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 502 (1929).

L. gnu was described from a female taken off *Connochaetes gnu* (black wildebeest) at Clocolan, O.F.S., and *L. ferrisi* from a male taken off *Gorgon taurinus* (blue wildebeest), Zoutpansberg District, northern Transvaal. Both sexes have since been taken off *G. taurinus* at Maasstrom, northern Transvaal and in the Zoological Gardens, Pretoria.

7. **Linognathus pedalis** (Osborn).

Haematopinus pedalis Osborn, *Bull. 5 n.s., U.S. Dept. Agr., Div. Ent.*, p. 170, f. 99 (1896).

Haematopinus ovis Lugger, *Rept. Ent. State Exper. Stat., Minnesota*, p. 105, f. 75, 76 (1896).

Specimens have been received on two or three occasions taken off sheep in different parts of the Union. This species is usually found on the legs of its host.

8. **Linognathus setosus** (Von Olfers).

Pediculus setosus V. Olfers, *De Vegetat. et Anim. Corpor. in Corpor. Anim. Reper. Comm.*, I (1816).

Pediculus piliferus Burmeister, *Gen. Rhyn.*, No. 13 (1838).

Waterston (1914) has recorded this species taken off a dog at Capetown, and Bedford (1919) from a dog at Onderstepoort. Fernandes has also recorded it from a dog in Mozambique.

9. **Linognathus stenopsis** (Burmeister).

Pediculus stenopsis Burmeister, *Gen. Rhyn.*, No. 3 (1838).

Pediculus saccatus Gervais, *Aptérés*, III, p. 307 (1847).

Pediculus schistopygus Nitzsch, *Zeit. f. ges. Nat.*, XXIII, p. 31 (1864).

Haematopinus forficulus Rudow, *ibid.*, XXXIV, p. 169 (1869).

Haematopinus rupicaprae Rudow, *ibid.*, XXXIV, p. 170 (1869).

This species is a parasite of goats, but is not common in South Africa.

10. **Linognathus tibialis** (Piaget).

Haematopinus tibialis Piaget, *Les Pédiculines*, p. 646, Pl. 52, f. 8 (1880).

Linognathus tibialis var. *euchore* Waterston, *Ann. S. Afr. Mus.*, X, ix, p. 275, f. 1 (1914).

Recorded by Waterston (1914) from springbok, *Antidorcas marsupialis* (= *Antilope euchore*). Specimens have been taken off the same host at Onderstepoort.

11. **Linognathus taurotragus** Bedford.

Linognathus taurotragus Bedford, *Trans. Roy. Soc. S. Afr.*, XIV, iv, p. 347, f. 1, 2 (1927).

Described from specimens taken off *Taurotragus oryx* (eland) at Clocolan, O.F.S., August, 1920.

12. **Linognathus vituli** (Linnaeus).

Pediculus vituli Linné, *Syst. Natur.*, ed. X, p. 611 (1758).

Pediculus tenuirostris Burmeister, *Gen. Rhyn.*, No. 17 (1838).

Pediculus oxyrrynchus Nitzsch, *Zeit. f. ges. Nat.*, XXIII, p. 21 (1864).

This species is a common parasite on cattle, especially calves, in the Union. Bedford (1929) recorded an immature specimen found on a fly, *Musca lasiophthalma*, at Camps Bay, Capetown.

Subfamily HAEMATOPININAE Enderlein.

Genus HAEMATOPINUS Leach.

Haematopinus Leach, *Zool. Misc.*, III, p. 64, f. 146 (1817).

This genus comprises about ten species found on ungulates.

Genotype: *Pediculus suis* Linnaeus.

1. **Haematopinus asini** (Linnaeus).

Pediculus asini Linné, *Syst. Natur.*, ed. X, p. 612 (1755).

Pediculus macrocephalus Burmeister, *Gen. Rhyn.*, No. 18 (1838).

This species is common on horses, donkeys and mules in South Africa. Fernandes has recorded it from horses and mules in Mozambique, and Piaget (1880) from *Hippotigris burchelli* (Burchell's zebra) in the Zoological Museum, Hamburg.

2. **Haematopinus bufali** (De Geer).

Pediculus bufali De Geer, *Hist. de Ins.*, VII, p. 68, Pl. 1, f. 11, 12 (1778).

Pediculus phthiriopsis Gervais, *Aptérés*, III, p. 306 (1844).

Recorded from *Syncerus caffer* (African buffalo) in the Belgian Congo and Nyasaland. Specimens have been taken off the same host from N. Transvaal in the Zoological Gardens, Johannesburg (coll. G. Martinaglia).

3. **Haematopinus eurysternus** (Nitzsch).

Pediculus eurysternus Nitzsch., *German's Magazin*, III, p. 305 (1818).

A common species on cattle in the Union and Mozambique.

4. **Haematopinus latus** Neumann.

Haematopinus latus Neu., *Arch. d. Parasit.*, XIII, p. 505, f. 6-9 (1909).

Haematopinus incisus Harms, *Zool. Anz.*, p. 290 (1912).

Specimens have been taken off *Koirotopotamus choeropotamus* (bush-pig), Kleinpoort, Albany District, C.P. (sent by J. Hewitt; coll. W. Pannell). Ferris (1916) has recorded it from the same host, Ngxwala Hill, Ubombo, Zululand. It was originally described from specimens taken off *Potamochoerus africanus* in Nyasaland. *H. incisus* was described from specimens taken off *Potamochoerus sp.*

5. **Haematopinus phachochoeri** Enderlein.

Haematopinus phachochoeri Enderl., *Schwed. Exp. Kilimanjaro*, II, p. 7, fig. (1908).

Haematopinus peristictus Kell. & Paine, *Bull. Ent. Res.*, II, p. 145, Pl. 4, f. 3, 6 (1911).

This species is common on the Natal warthog (*Phachochoerus sundevalli*) in Zululand and on the West African warthog (*Phachochoerus aethiopicus*) in the Transvaal. It was originally described from specimens taken off *P. oeliani massaicus*, and has also been recorded from *P. affinis nyasae*. We have also received specimens reported to have been taken off *Koirotopotamus choeropotamus* (bush pig) in South-West Africa.

6. **Haematopinus suis** (Linnaeus).

Pediculus urius Moufet, *Theatrum Ins.*, p. 266 (1634).

Pediculus suis Linné, *Syst. Natur*, ed. X, p. 611 (1758).

This species is common on domestic pigs in the Union and Mozambique.

7. **Haematopinus taurotragi** Cummings.

H. taurotragi Cumm., *Bull. Ent. Res.*, V, p. 155, f. 1, 2 (1914).

This species was described from specimens taken off an eland (*Taurotragus oryx*) in the Knowsby Managerie in 1857. Specimens have been received taken off the same host in the Drakensberg Game Reserve, Natal, and from a Koodoo (*Strepsiceros strepsiceros*), Grahamstown, C.P.

Family PEDICULIDAE Leach.

This family contains about thirteen species found on primates. It is interesting to note that the parasites of the higher apes are more closely related to the parasite of man than they are to the parasites of monkeys.

Key to the Subfamilies and S. African Genera.

1. Fore legs much smaller than mid and hind legs; eyes wanting (vestigial in one exotic genus). Parasitic on lemurs
Subfamily PHTHIRPEDICULINAE ... *Lemurphthirus*.

Legs subequal, except in the male; the fore legs are sometimes more dilated than the others; eyes well developed.

Subfamily PEDICULINAE, 2

2. Abdomen with three pairs of pleurites; antennae 3- or obscurely 5-segmented. Parasitic on monkeys
Pedicinus.

Abdomen with seven pairs of pleurites; antennae longer, distinctly 5-segmented. Parasitic on man and apes
Pediculus.

Subfamily PHTHIRPEDICULINAE.

This subfamily includes two species. They should probably be placed in a separate family.

Genus LEMURPHTHIRUS Bedford.

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

This genus contains a single species.

1. **Lemurphthirus galagus** Bedford.

♀. *Lemurphthirus galagus* Bedford, *Parasit.*, XIX, ii, p. 263, f. 1, 2 (1927).

♂. *Lemurphthirus galagus* Bedford, *Ann. Rept. Dir. Vet. Serv., Un. S. Afr.*, XV, p. 501, f. 1 (1929).

Described from specimens taken off *Galago moholi* (Moholi night ape), Onderstepoort and South-West Africa.

Subfamily PEDICULINAE.

Genus PEDICINUS Gervais.

Pedicinus Gervais, *Aptères*, III, p. 301, Pl. 48, f. 1 (1844).

This genus includes five species found on monkeys.

Genotype: *Pediculus eurygaster* Burmeister.

1. **Pedicinus hamadryas** Mjöberg.

Pedicinus hamadryas Mjöberg, *Arkiv. f. Zool.*, VI, p. 172, f. 86, 87 (1910).

Described from specimens taken off *Papio sp.* (?) in the Zoological Museum, Hamburg. Specimens have been taken off *Papio griseipes* (chagha baboon) at Mooivlei, Transvaal, and at Mtabamhlope, Natal. (Det. by G. F. Ferris, who has compared them with the type.)

2. **Pedicinus longiceps** Piaget.

Pedicinus longiceps Piaget, *Pédiculines*, p. 632, Pl. 51, f. 7 (1880).

Specimens have been taken off *Cercopithecus aethiops* (vervet monkey) in the Rustenburg District, Transvaal, and at Nongoma, Zululand (det. by G. F. Ferris, who has compared them with the types taken off *Semnopithecus pruinosis* and *Cercopithecus cynomolgus*).

Genus *PEDICULUS* Linnaeus.

Pediculus Linné, *Syst. Natur.*, ed. X, p. 610 (1758).

This genus contains about six species parasitic on man and apes.

Genotype: *Pediculus humanus* Linnaeus.

1. *Pediculus humanus humanus* Linnaeus.

Pediculus humanus Linnaeus, *Syst. Nat.*, ed. X, p. 610 (1758).

P. humanus var. *corporis* De Geer, *Mem. Hist. Ins.*, VII, p. 67, Pl. 1, f. 7 (1778).

P. capitis Nitzsch, *German's Mag.*, III, p. 305 (1818).

P. vestimenti Nitzsch, *ibid.*, III, p. 305 (1818).

P. humanus (L.) Keilin & Nutt., *Parasit.*, XXII, i, pp. 1-10, Pl. 1-18 (1930).

For complete bibliography of this species see Nuttall (1917a). It is a common parasite of man in South Africa, being found on both the head and body of its host. The head lice (*humanus*) are smaller and more chitinous than body lice (*corporis*). Both Howlett (1917) and Keilin and Nuttall (1919) have demonstrated that typical *humanus* (= *capitis*) may be transformed experimentally after one or two generations into typical *corporis*, proving that they can only be recognized as distinct races. Ewing (p. 161, 1926) described the var. *nigritarum* Fabr. from an African negro, but did not compare it with the race *corporis*. The biology of this species has been worked out by Nuttall (1917 b). It has been proved to transmit typhus fever (*Rickettsia prowazeki*), trench fever (*Rickettsia quintana*) and relapsing fever (*Treponema obermeieri*) to man. For combating lousiness among soldiers and civilians see Nuttall (1918).

Family PHTHIRIDAE Ewing.

Genus *PHTHIRUS* Leach.

Phthirus Leach, *Edinburgh Encycl.*, IX, p. 77 (1815).

Phthirus Burmeister, *Handb. der Ent.*, II, p. 1 (1835).

This genus contains two species, one parasitic on man and the other on gorilla.

Genotype: *Pediculus pubis* Linné.

1. *Phthirus pubis* (Linnaeus).

Pediculus pubis Linnaeus, *Syst. Natur.*, ed. X, p. 611 (1758).

Phthirus inguinalis Leach, *Edinburgh Encycl.*, IX, p. 77 (1817).

Phthirus pubis (L.) Piaget, *Pédiculines*, p. 628, Pl. 51, f. 5 (1880).

For complete bibliography of this species see Nuttall (1917a). It is known as the "crab louse" and is a common parasite on man in South Africa. The biology of this species has been worked out by Nuttall (1918). It is not known to transmit disease.

Order HEMIPTERA (= RHYNCHOTA).

This order contains a very large number of insects called bugs, etc. The majority of the species live on plants. All those that have been found to be parasitic on mammals and birds in South Africa belong to the family Cimicidae.

Suborder HETEROPTERA.

Family CIMICIDAE.

Species ovoid and flattened; the head is short and broad; the rostrum lies in a groove on the ventral surface of the head and thorax; the hemelytra are very short, leaving most or all of the abdomen uncovered; ocelli absent; tarsi three-jointed. Metamorphosis incomplete, the young resembling the adults.

Genus *CIMEX* Linnaeus.

Body covered with fine, short setae, the lateral ones on pronotum shorter than the first segment of the antennae; antennae four-jointed, the apical joints slender. Prothorax semilunar in shape with its anterior angles considerably extended; the hemelytra lie over the metathorax. Legs slender, anterior tibiae more than twice as long, and the posterior tibiae three times as long, as the tarsi.

This genus includes the bed-bugs. They are nocturnal in habits, hiding by day in crevices of wood-work, etc., where they deposit their ova. The ova take about four to eight days, or longer, to hatch. There is one larval stage and three nymphal stages. The period from larva to adult takes about six to seven weeks during hot weather, and from nine to eleven weeks in cold weather. Egg-laying commences ten to fourteen days after the adult stage is reached.

1. *Cimex columbarius*.

This species has been found in a fowl-house at Arun Valley, Krag's Post, O.F.S. (Det. K. Jordan), and also in fowl-houses in the Pretoria District. In Europe it has also been found to be parasitic on domestic pigeons. It is most probably a synonym of *C. lectularius*, as has been suggested to me by Dr. Jordan.

2. *Cimex lectularius* Linné.

This species, known as the "bed bug", is a common parasite of man in South Africa. It has also been recorded from other parts of Africa, and from Europe, Asia and North America. Chatton and Blanc (1918) state that they have found this species to exist where only small rodents and cats could have supplied meals of blood. It is very closely allied to *C. hemipterus* (Fabr.) (Syn. *C. rotundatus* Signoret), a common tropical and sub-tropical bug, which probably also occurs in South Africa. For differences between the two species, see Patton and Cragg (1913).

3. *Cimex pipistrelli* Jenyns.

This species has been recorded found on bats in Europe, and also from a bat at Capetown. Pringault (1914) has proved this species to be transmitting agent of *Trypanosoma vesper-tilionis*.

Genus CACODMUS Stål.

Cacodmus Stål, *Enumeratio Hemipt*, p. 103 (1873).

Body covered with long setae, most of the lateral ones on pronotum longer than the first segment of the antennae; antennae four-jointed, the apical joints slender. Tibiae without pseudo-joints. Second segment of proboscis longer than fourth. This genus contains three species parasitic on bats in Africa.

Genotype: *Acanthia villosa* Stål.

1. *Cacodmus sparsilis* Rothschild.

C. villosus (Stål) Roths., *Ent. Mo. Mag.* (2) XXIII, p. 82 (1912) Partim.

C. villosus (Stål) Roths., *Ibid.*, (2) XXIV, p. 102 (1913) Partim.

C. sparsilis Roths., *Bull. Ent. Res.*, V, i, p. 41, f. 3 (1914).

Described from a female in the British Museum taken off Zulu great house bat, *Scotophilus nigrita dingani* (= *Vesper-tilio dingani*) at Durban, Natal.

2. *Cacodmus villosus* (Stål).

Acanthiavillosa Stål, *Öfv. Kongl. Svenska Vet. Akad. Forh.*, XII, p. 38 (1855).

C. villosus (Stål) Roths., *Ent. Mo. Mag.* (2) XXIII, p. 82 (1912) Partim.

C. villosus (Stål) Roths., *ibid.*, (2) XXIV, p. 102 (1913) Partim.

C. villosus (Stål) Roths., *Bull. Ent. Res.*, V, i, p. 41, f. 1, 4 (1914)

Recorded by Rothschild (1913) taken off *Eptesicus capensis* (Cape house bat) in South Africa. Bequaert (Rep. Harvard Afr. Exp. Rep. of Liberia and Belg. Congo, p. 823, 1930) records a male from *Pipistrellus muscivulus* Thomas, Belgian Congo.

Order DIPTERA.

DIPTERA PUIPIPARA.

Family HIPPOBOSCIDAE.

The flies included in this family are parasitic upon mammals and birds. They are flattened dorso-ventrally and may have a tough leathery integument. The head is sunk into an emargination of the thorax. Eyes present; ocelli present or absent. The palpi form a sheath to the proboscis. The antennae, which are inserted in a

depression, are two to three-jointed, with an arista which is always dorsal. Legs short and stout; claws strong and often toothed. Wings present or absent; some species shed their wings when they get on to a host. The females give birth at intervals to single larvae, which are unsegmented, whitish in colour, with a black cap at the posterior end which involves the spiracles. They are immobile, and after a few hours become either brown or black and transform into puparia. The head and mouth parts have been described by Jobling (*Parasit.*, XVIII, pp. 319-349, 1926).

Key to the South African Genera.

1. Wings well developed and functional 2
Wings rudimentary or wanting 9
2. Claws with the usual two points (heel and tip). Parasitic on mammals and ostriches 3
Claws with three teeth. Parasitic on birds 5
3. Head of normal form, not broadly impinging on the thorax, freely movable; ocelli absent; wings always present
Hippobosca, p. 418.
Head flat, broadly impinging on the thorax; wings usually becoming detached, leaving only a shred 4
4. Ocelli absent; palpi rudimentary or absent
Echestypus, p. 420.
Ocelli present; palpi well developed ... *Lipoptena*, p. 420.
5. Wings with the "second vein" (R2 and 3) confluent with costa slightly beyond tip of "first vein" (R1); three "cross veins" present; ocelli present
Ornithoza, p. 421.
Wings with neither the "second vein" (R2 and 3) nor "third vein" (R4 and 5) confluent with costa 6
6. Ocelli present (absent in male of *inocellata*); wings with three "cross veins", and therefore with an anal cell
Ornithomyia, p. 422.
Ocelli absent; wings with one or two "cross veins" 7
7. Scutellum with finger-like processes at the latero-posterior angles; wings with one "cross vein"; anal cell absent
Pseudolynchia, p. 423.
Scutellum without finger-like processes; wings with two "cross veins" 8
8. Clypeus much longer than broad, emarginated in front and hiding base of rostrum *Olfersia*, p. 423.
Clypeus short, broadly emarginated in front, not hiding base of rostrum *Lynchia*, p. 424.
9. Wings either present or broken off at the bases; if present rudimentary and functionless; halteres present 10
Wings vestigial, minute; halteres absent
Melophagus, p. 421.

10. Claws with the usual two points (heel and tip) 11
 Claws with three teeth 12
11. Ocelli absent; palpi rudimentary or absent
Echestypus, p. 420.
 Ocelli present; palpi well developed *Lipoptena*, p. 420.
12. Ocelli present or absent; wings entirely narrow and ribbon-like *Stenopteryx*, p. 426.
 Ocelli absent; wings usually extending beyond tip of abdomen, and except in one or two species in which they are blunt or abbreviated, pointed or attenuate at the tips, in several cases approximately the distal third being narrow and ribbon-like *Crataerina*, p. 425.

Genus HIPPOBOSCA Linné.

Hippobosca Linné, *Fauna Suecica*, Ed. II, p. 471 (1761).

Hippobosca Ferris, *Philip. Journ. Sci.*, XLIII, iv, p. 537 (1930).

Genotype: *Hippobosca equina* Linné.

Bequaert (1930) gives a key to the eight known species.

1. *Hippobosca capensis* Von Olfers.

Hippobosca capensis V. Olfers, "De Vegetavis et Animatis Corporibus in Corpor. Anim. Reper. Comm.", I, p. 101 (1816).

Hippobosca francilloni Leach, *Gen. Spec. Eprobosci. Ins.*, p. 8, Pl. 26, f. 8-10 (1817).

Hippobosca canina Rondani, *Ann. Mus. Civ. Genova*, XII, p. 164 (1878).

In the laboratory collection there are seven specimens taken off dogs in the Marico District, Western Transvaal (coll. E. M. Robinson); also two specimens taken off the same animals in the Cape Province.

2. *Hippobosca equina* Linné.

Hippobosca equina Linné, *Syst. Nat.*, Ed. 10, I, p. 607 (1758).

Hippobosca taurina Rondani, *Bull. Soc. Ent. Ital., Firenze*, XI, p. 25 (1879).

Hippobosca equina (L.) Austen, *Illust. Brit. Blood-suck. Flies*, p. 63, Pl. 31 (1906).

Hippobosca equina (L.) Massonat, *Ann. de l'Univ. de Lyon* (nouv. série) 1 Fasc. XXVIII, p. 235, f. 1-5 (1909).

Hippobosca equina (L.) Ferris, *Philip. Journ. Sci.*, XLIII, iv, p. 539, figs. (1930).

This species is parasitic upon horses and cattle in Europe. Austen (1909) states that there are specimens in the British Museum from the Cape of Good Hope, Algeria, Madeira, etc.

3. *Hippobosca maculata* Leach.

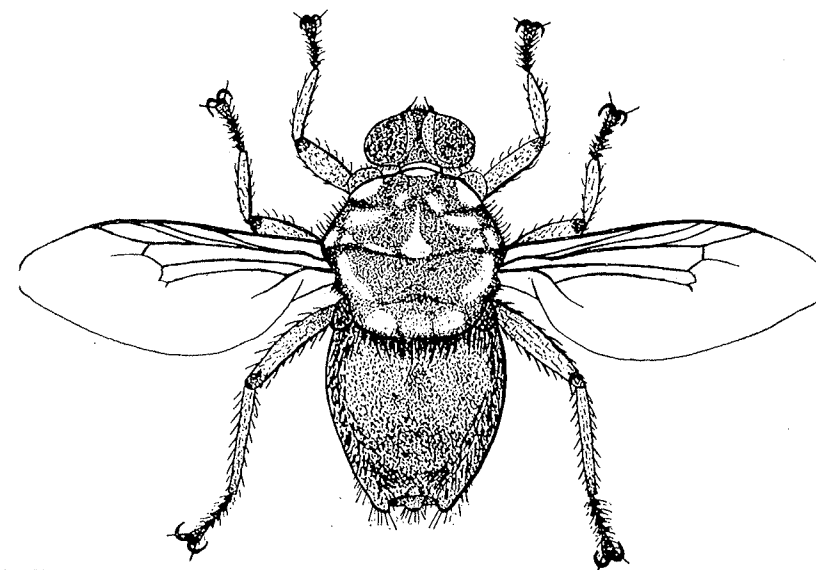
Hippobosca maculata Leach, "Gen. Spec. Eprobosci. Ins.", p. 7, Pl. 26, f. 1-3 (1817).

Hippobosca maculata (Leach) Austen, *Illust. Afr. Blood-suck. Flies*, p. 173, Pl. 13, f. 99 (1909).

Hippobosca maculata (Leach). Stekhoven, *Die Bloedzuig. Arthro. van Nederl. Oost Ind.*, I-II, p. 1, figs. (1923).

Hippobosca maculata (Leach) Ferris, *Philip. Journ. Sci.*, XLIII, iv, p. 544, figs. (1930).

This species is widely distributed in Africa, and also occurs in Europe, India, Ceylon and the East Indies. It is mainly parasitic upon cattle, but also attacks horses. Austen (1909) has recorded it from Lourenco Marques, and Howard (1912) states that it is common everywhere in Mozambique. In the laboratory collection there is one specimen labelled "Barberton, Transvaal, March, 1909".



A. B. M. Whitnall del.

Fig. 16. *Hippobosca rufipes* Von Olfers.

4. *Hippobosca rufipes* Von Olfers (Fig. 16).

Hippobosca rufipes v. Olfers, *De Vegetatives Animatis Corporibus in Corpor. Anim. Rep. Comm.*, I, p. 101 (1816).

Hippobosca rufipes (Von Olfers) Austen, *Illust. Afr. Blood-suck. Flies*, p. 176, Pl. 13, f. 100 (1909).

A very common parasite on cattle and horses in many parts of the Cape Province, Orange Free State, Transvaal, Natal and South-West Africa. It also occurs in Zululand, but is by no means common in that country. It is mainly found in arid country. We have frequently observed this fly to settle on man,

but it is doubtful whether they ever attempt to bite. They have also been observed, on one or two occasions, to settle on dogs and we have taken it on *Gorgon taurinus* (blue wildebeest) in the Waterberg District, Northern Transvaal.

5. **Hippobosca struthionis** Janson.

Hippobosca struthionis Janson in Ormerod, *Not. and Descript. of a few Injur. Farm and Fruit Insects of S. Afr.*, p. 56, f. 23 (1889).

Hippobosca struthionis (Janson) Austen, *Illust. Afr. Blood-suck. Flies*, p. 171, Pl. 13, f. 98 (1909).

This fly is a common parasite on ostriches in the Cape Province. On two occasions specimens have settled on me when motoring in different parts of the Cape Province, and I also took a specimen on myself in the Waterberg District, Northern Transvaal, on the 9th September, 1924.

Genus LIPOPTENA Nitzsch.

Lipoptena (Nitzsch) Ferris and Cole, *Parasit.*, XIV, ii, p. 180 (1922).

This genus comprises about a dozen species found on *Cervidae*, *Tragulidae* and *Bovidae* in Europe, Asia and America.

Genotype: *Pediculus cervi* Linné.

1. **Lipoptena cervi** (Linné).

Lipoptena cervi Austen, *Illust. Brit. Blood-suck. Flies*, p. 65, Pls. 33, 34, f. 1 (1906).

Lipoptena cervi (L.) Ferris and Cole, *Parasit.*, XIV, ii, p. 189, f. 5 (1922).

Austen (1906) records a specimen of this species taken in February, 1901, near Johannesburg, Transvaal, under circumstances pointing to the possibility that it had been introduced into South Africa with remounts during the Anglo-Boer War. It is a parasite of several species of deer in Europe.

2. **Lipoptena capensis** Walker.

Austen (1909) records this species in his list of blood-sucking Diptera found in Natal.

Genus ECHESTYPUS Speiser.

Echestypus Speiser, *Denkschr. med.-naturw. Ges.*, Jena XIII, p. 176 (1908).

This genus contains five described species.

1. **Echestypus binoculus** Speiser.

Echestypus binoculus Speiser, *Denkschr. med.-naturw. Ges.*, Jena, XIII, p. 176 (1908).

Described from specimens taken off *Raphiceros campestris* (steenbok) in South Africa. In the British Museum there are one female and one male taken off *Antidorcas marsupialis* (springbok) near Middelburg, C.P., May, 1910.

2. **Echestypus paradoxus** (Newstead).

Lipoptena paradoxus Newstead, *Ann. Trop. Med. & Parasit.*, 1, p. 91, f. 19, 20 (1907).

Echestypus paradoxus (Newstead) Ferris, *Parasit.*, XXII, iii, p. 278, f. 3, 4 (1930).

Described from females taken off an antelope at Kasongo, Belgian Congo.

In the laboratory collection there are numerous specimens taken off the following hosts: *Strepsiceros strepsiceros* (Cape koodoo) in the Pietersburg District, Transvaal, 2 August, 1913, and Zululand, 17 March, 1916 (coll. D. T. Mitchell); *Nyala angasi* (nyala) in the Ubombo Flats, Zululand, February, 1916 (coll. D. T. Mitchell); *Tragelaphus sylvaticus* Sparrm. (bushbuck) at Ntambanana, Zululand (coll. G.A.H.B.), Bechuanaland Protectorate (coll. B. De Meillon) and in Sekukuniland; *Redunca arundinum* Bodd. (reedbuck) at Emakosini, northern Zululand (coll. G.A.H.B.); *Sylviacarpa grimmii* (duiker), Umfolosi, Zululand. Recorded in error by me from *Redunca fulvorufula* Afz. (mountain reedbuck).

3. **Echestypus sepiaceus** (Speiser).

Lipoptena sepiaceus Speiser, *Zeitschr. f. Hym. u. Dipt.*, V, p. 353 (1905).

Austen (1909) records this species in his list of blood-sucking Diptera found in the Cape Province.

Genus MELOPHAGUS Latreille, 1804.

This genus contains a single species and two varieties.

1. **Melophagus ovinus** Linnaeus.

Melophagus ovinus (Linné) Austen, *Illust. Brit. Blood-suck. Flies*, p. 67, Pl. 34, f. 2 (1906).

Melophagus ovinus ovinus (Linné) Ferris & Cole, *Parasit.*, XIV, ii, p. 192, f. 8, 9 A-D (1922).

This species, known as the "sheep ked", is widely distributed throughout the world. It is a common parasite on sheep in South Africa, and is the transmitting agent of *Trypanosoma melophagium* Flu, which is non-pathogenic to sheep.

Genus ORNITHEZA Speiser.

Ornitheza Speiser, *Termes. Fuzet*, Budapest, XXV, p. 329 (1902).

Ornitheza (Speiser) Ferris, *Philip. Journ. Sci.*, XXVII, iii, p. 418 (1925).

1. **Ornitheza metallica** (Schiner) Fig. 17.

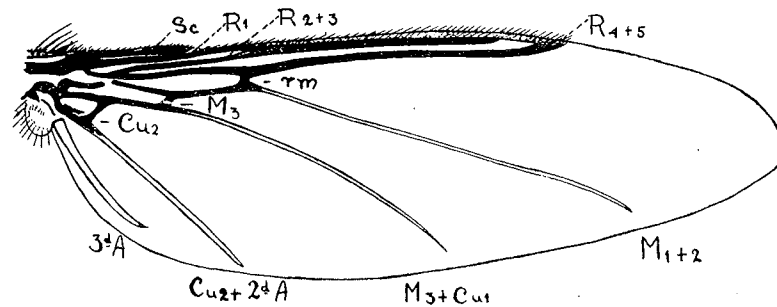
♀. *Ornitheza metallica* (Sch.) Ferris, *Phil. Journ. Sci.*, XXVII, iii, p. 419, f. 4, 5 (1925).

♂. *Ornitheza metallica* (Sch.) Ferris, *ibid.*, XXXIV, ii, p. 213, f. 6 (1927).

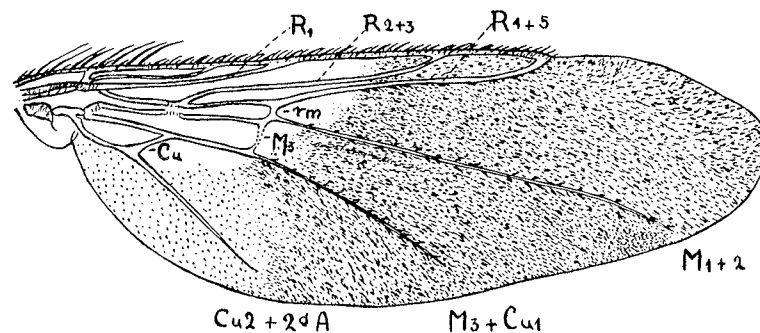
One ♀ taken off *Urocolius indicus transvaalensis* (Transvaal red-faced coly) at Onderstepoort. In this species the wings have an extra anal vein, the "third anal".

Genus of Echestypus?
see Bequaert, 1940
Psyche, vol. 47, pp. 2-3
pp. 85-104

Genus ORNITHOMYIA Latreille.

Ornithomyia Ferris, *Philip. Journ. Sci.*, XXXIV, ii, p. 211 (1927).Genotype: *Hippobosca avicularia* Linné.1. *Ornithomyia inocellata* Ferris (Fig. 18).*Ornithomyia inocellata* Ferris, *Parasit.*, XXII, iii, p. 275 (1930).Described from specimens taken off *Petrochelidon spilodera* Sund. (South African cliff swallow) at Onderstepoort.

A. B. M. Whitnall del.

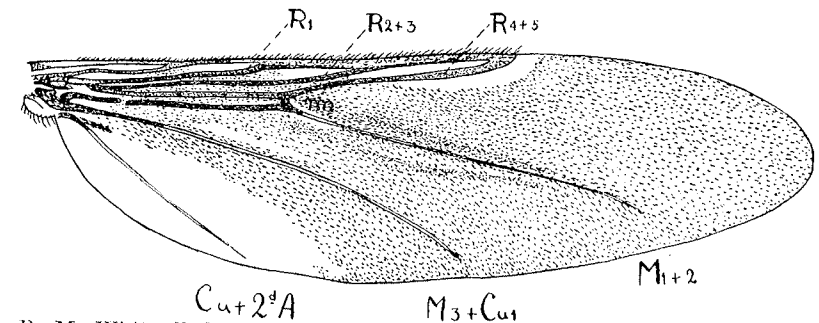
Fig. 17. Wing of *Ornithomyia metallica* (Sch.).

A. B. M. Whitnall del.

Fig. 18. Wing of *Ornithomyia inocellata* Ferris.2. *Ornithomyia platycera* Macquart.*Ornithomyia platycera* Macq., *Mem. Soc. Roy. des Sc. del'Agric. et des Arts de Lille*, p. 436 (1843).In the British Museum collection there are five specimens:—One from the Cape of Good Hope off *Oreocincla*, one from Natal, one from Central Africa, one from Kenya Colony, and one from Uganda off waterbuck.3. *Ornithomyia fur* Schin.4. *Ornithomyia laticornis* Macquart.

Austen (1909) records the last two species in his list of blood-sucking Diptera found in the Cape Province.

Genus PSEUDOLYNCHIA Bequaert.

Lynchia (Weyenberg) Ferris, *Philip. Journ. Sci.*, XXVII, iii, p. 415 (1925).*Pseudolynchia* Bequaert, *Psyche*, XXXII, p. 271 (1926).Genotype: *Olfersia maura* Bigot.1. *Pseudolynchia maura* (Bigot) Fig. 19.*Olfersia maura* Bigot, *Ann. Soc. Ent. France* (6), V, p. 237 (1885).*Lynchia maura* Speiser, *Zeitschr. Syst. Hym. u. Dipt.*, II, pp. 155, 163 (1902).*Olfersia capensis* Bigot.*Olfersia lividicolor* Bigot, *Ann. Soc. Ent. France*, XXXV, p. 238 (1885).*Lynchia brunnea lividicolor*, Patton & Cragg, *Textb. Med. Ent.*, p. 407 (1913).*Lynchia maura* (Bigot) Ferris, *Philip. Journ. Sci.*, XXVII, iii, p. 416, f. 2, 3 (1925).*Lynchia maura* (Bigot) Bequaert, *Med. Rep. Rice-Harvard Exped.*, p. 241 (1926).

A. B. M. Whitnall del.

Fig. 19. Wing of *Pseudolynchia maura* (Bigot).This species is widely distributed on pigeons in various parts of the world. It is a common parasite of domestic pigeons in the Pretoria District, and is the transmitting agent of *Haemoproteus columbae* Kruse as was first demonstrated by Edm. & Et. Sargent (*C. R. Soc. Biol.*, LXI, pp. 494-496, 1906); later by R. Gonder (*Repts. Dir. Vet. Res., Un. S. Afr.*, III & IV, pp. 625-632, 1915).

Genus OLFERSIA Wiedemann.

Olfersia Wiedemann, *Aussereurop. Zweifl. Ins.*, II, p. 605 (1830).*Feronia* Leach, *Gen. Spec. Eproboscideous Ins.*, p. 4 (1817).*Pseudolfersia* Coquillet, *Canad. Ent.*, XXXI, p. 336 (1899).*Olfersia* (Wied.) Ferris, *Philip. Journ. Sci.*, XXXIV, ii, p. 220 (1927).Genotype: *Feronia spinifera* Leach.

1. *Olfersia spinifera* (Leach).

Feronia spinifera Leach, *Mem. Wernerian Nat. Hist. Soc.*, II, p. 557, Pl. 26, f. 1-3 (1818).

Pseudolfersia spinifera (Leach) Austen, *Ann. Mag. Nat. Hist.* (7) XII, p. 265 (1903).

Olfersia spinifera (Leach) Ferris, *Philip. Journ. Sci.*, XXXIV, ii, p. 220, f. 10, 11 (1927).

Austen (1909) records this species in his list of blood-sucking Diptera found in the Cape Province. It has been recorded taken off *Fregata minor* Gmel. (= *F. aquila* Linné), frigate bird, in various parts of the tropics. *O. diomedae* (Coquillet) is probably a distinct species. Ferris & Cole (1922) have described and figured it under the name *Pseudolfersia spinifera* (Leach).

Genus LYNCHIA Weyenbergh.

Lynchia Weyenbergh, *Anal. Soc. Cientif. Argent.*, XI (1881).

Icosta Speiser, *Zeitschr. f. syst. Hym. u. Dipt.*, V, p. 358 (1905).

Ornithoponus Aldrich, *Ins. Inscit. Menstruus*, XI, p. 78 (1923).

Ornithoponus Ferris, *Philip. Journ. Sci.*, XXVIII, iii, p. 332 (1925).

Lynchia Bequaert, *Psyche*, XXXII (1925).

Lynchia Ferris, *Philip. Journ. Sci.*, XXXIV, ii, p. 223 (1927).

Olfersia of most authors.

Genotype: *Lynchia penelopes* Weyenbergh.

1. *Lynchia ardeae* (Macquart).

Olfersia ardeae Macq., *Suites à Buffon. Dipt.*, II, p. 640 (1835).

Olfersia ardeae (Macq.) Massonnat, *Ann. de l'Univer. de Lyon*, I, Sci. Méd., XXVIII, p. 309, Pl. 5, f. 43-46 (1909).

Ornithoponus ardeae (Macq.) Falcoz, *Faune de France*, 14, Dipt. Pupipares, p. 32, f. 30, 31 (1926).

Specimens have been taken off the following hosts in the Pretoria District, 1930: *Pyrroherodia purpurea* (purple heron), *Egretta garzetta* (little egret) and *Bubulcus ibis* (buff-backed egret). It has also been recorded by Falcoz (1926) from *Ardea cinerea* (common grey heron).

2. *Lynchia minor* (Bigot).

Austen (1909) records this species in his list of blood-sucking Diptera found in the Cape Province.

3. *Lynchia pilosa* (Macquart).

Olfersia pilosa Macq., *Mem. Soc. Lille*, 1841, p. 434 (1842).

One specimen taken off *Choriotis kori* Burch. (giant bustard) at Nongoma, Zululand, 26th July, 1921 (coll. H. H. Curson). In the British Museum collection there is a specimen taken

off white-quilled bustard, *Afrotis afroides* A. Sm. (= *Comptosia leucoptera*) in the Wolmaransstad District, Transvaal, 24th July, 1902 (coll. G. E. B. Hamilton); also two specimens taken off the greater bustard in Kenya Colony.

Genus CRATAERINA Von Olfers.

Crataerina von Olfers, *De Vegetativis et Animatis Corporibus in Corporibus Animatis Reperiundis. Commentarius*, Pars I, p. 101 (Berolini, 1816).

Anapera Meigen, *Syst. Besch. d. europ. zweiflüg. Insekt. (Diptera)*, p. 234 (1830).

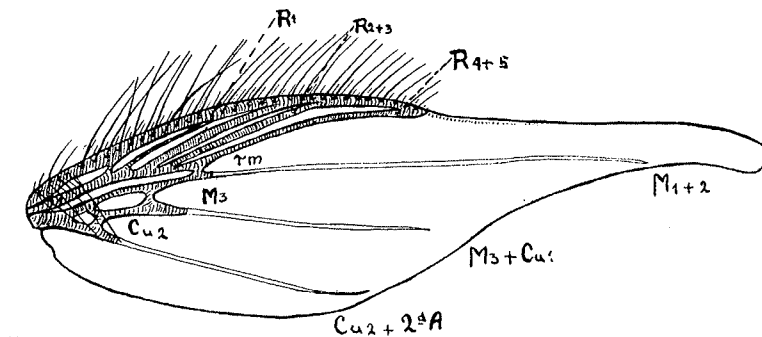
Chelidomyia Rondani, *Bull. Soc. Ent. Ital., Firenze*, XI, p. 10 (1879).

Crataerina Austen, *Parasit.*, XVIII, iii, p. 351 (1926).

Crataerina Ferris, *Philip. Journ. Sci.*, XLIII, iv, p. 547 (1930).

This genus includes seven species found on *Macropterygidae*.

Genotype: *Ornithomyia pallida* Latreille (= *Crataerina lonchoptera* von Olfers), parasitic upon *Micropus apus* Linné (European swift), migrant to South Africa.



A. B. M. Whitnall del.

Fig. 20. Wing of *Crataerina acutipennis* Austen.

1. *Crataerina acutipennis* Austen (Fig. 20).

Crataerina acutipennis Austen, *Parasit.*, XVIII, iii, p. 355, f. 1a (1926).

Crataerina acutipennis (Aust.) Ferris, *Philip. Journ. Sci.*, XLIII, iv, p. 549, f. 7b (1930).

Described from specimens collected in Pretoria; from swift's nest, Durban, Natal, and from *Micropus unicolor* Jardine and *Micropus murinus brehmorum* Hart, at Madeira and Canary Is. We have taken specimens from nests of the Indian swift, *Colletoptera affinis* (Grey), Union Buildings, Pretoria, 4th November, 1930, and Ferris (1930) has recorded a female taken off the same host in Ceylon.

Genus STENEPTERYX Leach.

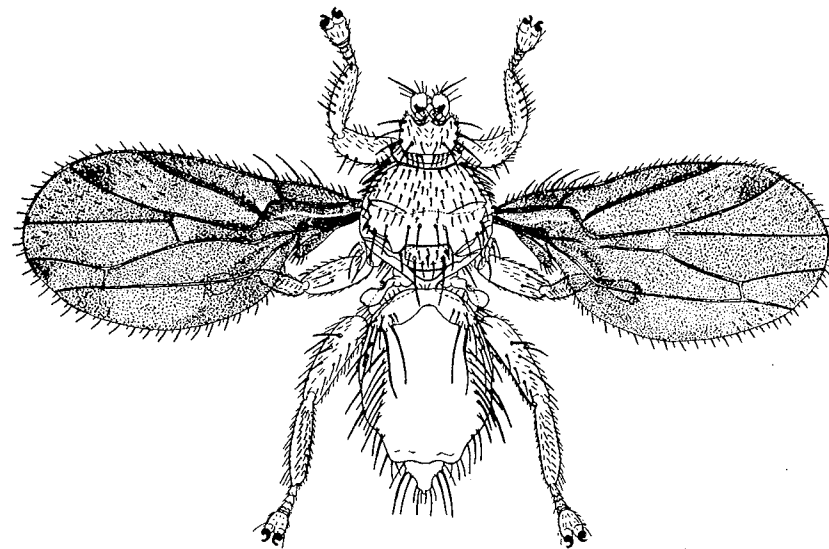
Stenepteryx Leach, *Mem. Wern. Nat. Hist. Soc.*, II, pp. 549, 551 (1818).

This genus includes a single species found on *Chelidonaria arbica* Linné (house martin) in Europe. It is possible that this insect hibernates throughout the winter in Europe in the pupa stage in its host's nest.

Genotype: *Hippobosca hirundinis* Linné.

Family STREBLIDAE.

The flies belonging to this family are parasitic upon bats, with the exception of *Streblium arium* Macquart, which is recorded from doves and parrots. They are small insects and usually possess wings (vestigial or absent in some exotic species). The head is not flexed on the dorsum of the thorax. Eyes when present small; ocelli absent. Antennae, situated in pits, two-jointed, with an arista. Palpi broader than long, leaf-like, projecting in front of the head, but not forming a sheath for the proboscis. Hind coxae enlarged; claws not distinctly toothed; pulvilli present.



A. B. M. Whitnall del.

Fig. 21. *Raymondia bedfordi* Ferris, dorsum of female.

The head and mouth parts have been described by Jobling (*Parasit.*, XXI, iv, pp. 417-445, f. 1-6 and Pls. 18-20, 1929).

Key to the South African Genera.

Head somewhat flattened, closely articulated to flattened thorax; eyes absent, coxae i widely separated

Raymondia.

Head and thorax highly convex; head freely movable; eyes one faceted; coxae i close together *Nycteribosca*.

Genus RAYMONDIA Frauenfeld.

Raymondia Frauenfeld, *Sitzungsber Akad. Wiss. Wien*, XVIII, p. 328 (1855).

Streblium Kolenati, *Die Parasiten der Chiroptera*. Bruenn (1856).

Raymondia Jobling, *Parasit.*, XXII, iii, p. 284 (1930).

This genus contains six species and one variety found in Africa and Asia.

Genotype: *Raymondia huberi* Frauenfeld.

1. *Raymondia bedfordi* Ferris (Fig. 21).

Raymondia bedfordi Ferris, *Parasit.*, XXII, iii, p. 281, f. 5, 6 (1930).

Raymondia quadriceps Jobling, *ibid.*, p. 295, f. 7, 8 (1930).

Described by Ferris from *Nycteris damarensis* Ptrs., Kaokoveld, South-West Africa. *R. quadriceps*, which is a synonym, was described from specimens taken off an undetermined bat from British Somaliland.

2. *Raymondia huberi* Frauenfeld.

Raymondia huberi Frauenfeld, *Sitzungsber. Akad. Wiss. Wien*, XVIII, p. 331, f. 2 a-g (1855).

Streblium africana Kolenati, *Die Parasiten der Chiroptern*. Dresden (1856).

Raymondia huberi huberi (Frauenf.) Jobling, *Parasit.*, XXII, iii, p. 298, f. 8, 10 (1930).

Recorded taken off *Hipposideros caffer* in Zululand; also off bats in British East Africa, Abyssinia and Egypt. We have taken it off an undetermined bat at Onderstepoort (det. Major E. E. Austen).

Genus NYCTERIBOSCA Speiser.

Nycteribosca Speiser, *Wiener Ento. Zeit.*, XVIII, p. 46 (1899).

This genus contains nine species, four being found on bats in Africa.

Genotype: *Brachytarsina amboinensis* Rondani.

1. *Nycteribosca africana* Walker.

We have taken specimens off an undetermined bat at Onderstepoort (det. Major E. E. Austen).

2. *Nycteribosca kollari* (Frauenfeld).

Raymondia kollari Frauenfeld, *Sitzungsber. Akad. Wiss. Wien*, XVIII, p. 329, f. 1a, b (1855).

Recorded by Ferris (1930) taken off *Rhinolophus geoffroyii* augur Anders, near Pretoria.

Family NYCTERIBIIDAE.

The insects belonging to this small family are parasitic upon bats. They are small, apterous, and possess elongated legs. When at rest the head is folded back and lies in a groove on the dorsum of the thorax. Eyes when present vestigial; ocelli absent. Antennae situated in pits, two-jointed, with an arista which is dorsal. On the latero-anterior margin of thorax there is usually a fan-shaped comb of stout setae (ctenidium) inserted in a hollow, and a ctenidium is usually also present on the first sternite. Rodhain and Bequaert (*Bull. Sc. Zool. de France*, XL, viii-x, pp. 248-262, 1916) have recorded observations on the biology of *Cyclopedicia greeffi* Karsch, a parasite of bats in the Belgian Congo.

The head and mouth parts have been described by Jobling (*Parasit.*, XX, pp. 254-272, 1928).

Key to the South African Genera.

1. Tibiae with two clear rings; each eye composed of a single facet *Eucampsipodia*.
- Tibiae without rings 2
2. Abdomen and legs with long brush-like setae; eyes distinct, composed of one facet *Penicillidia*.
- Abdomen and legs without brush-like setae; eyes absent
Nycteribia.

In the above genera ctenidia are present on the thorax and first sternite.

Genus EUCAMPSIPODA Kolenati.

Eucampsipoda Kolenati, *Die Parasiten der Chiroptern*, Dresden, p. 62 (1857).

A small genus comprising three or four species.

Genotype: *Nycteribia hyrtli* Kolenati.

1. *Eucampsipodia hyrtli* (Kolenati).

Nycteribia hyrtli Kolenati, *Die Parasit. d. Chiropt.* Brünn., p. 42 (1856).

Eucampsipodia hyrtli (Kolen.) Scott, *Ann. Mag. Nat. Hist.* (8) XIV, p. 228, Pl. 12, f. 18, 19 (1914).

Scott (1914) records this species taken off a bat in South Africa. It has also been found on bats in Egypt, Senegal, Comoro Islands, Sumatra, Burma, and Ceylon. Among the list of hosts recorded is the fruit bat, *Rousettus aegyptiacus*.

Genus PENICILLIDIA Kolenati.

Penicillidia Kolenati, *Horae Soc. ent. Ross.*, V, ii, p. 69 (1863).

This genus includes fifteen species, three of which have been recorded from Africa.

Genotype: *Penicillidia conspicua* Speiser (= *westwoodii* Kolen.).

1. *Penicillidia fulvida* (Bigot).

Nycteribia fulvida (Bigot), *Ann. Soc. ent. France*, V, v, p. 246 (1885).

Type locality: Cape of Good Hope. In the British Museum collection there is one male taken off *Vespertilio* in Natal by Dr. Krause; also one male from unknown locality. A ♀ and ♂ were sent by J. Hewitt taken off *Nycteris capensis* (Cape long-eared bat), Albany District, C.P. (coll. Austin Roberts), and a ♀ has been taken off *Miniopterus natalensis* in a cave at Irene, near Pretoria, 25th October, 1931 (coll. G.A.H.B.).

Genus NYCTERIBIA Latreille.

This genus is widely distributed and contains about forty-four species; seven of which have been recorded from Africa.

1. *Nycteribia schmidlii* Schiner.

N. schmidlii, Schiner, *Verh. zool.-bot. Ver. Wien*, V, iii, p. 151 (1853).

N. (Listropodia) schmidlii (Sch.) Falcoz, *Faune de France*, Dipt. Pupipares, p. 51, f. 73-76 (1926).

Specimen taken off *Miniopterus natalensis* A. Smith (Natal sociable bat) at Wonderboom, near Pretoria, on the 31st July, 1927. Dr. Scott informs me that they are slightly larger than specimens from Algeria and may be distinct. This species has also been recorded from various bats in Europe.

2. *Nycteribia scissa* Speiser.

N. (Acrocholidia) scissa Speiser, *Arch. f. Naturg.*, LXVI (1900).

Described from specimens taken off *Rhinolophus capensis* Licht (Cape long-eared bat) in South Africa.

3. *Nycteribia* sp.

One female taken off *Rhinolophus darlingi* at Onderstepoort. Dr. Scott informs me that it is close to but distinct from *N. vevata* West., a European species. He did not compare it with *N. scissa*. Also one female and one male, which may be the same, taken off *Rhinolophus geoffroyii augur* in a cave near Pretoria.

Order Siphonaptera.

This order, sometimes called *Aphaniptera*, includes the fleas. The adults are small, chitinous, apterous, laterally compressed insects; eyes may be present or absent; the antennae are short and stout, reposing in grooves, the mouth-parts are modified for piercing and sucking; the coxae are very large and the tarsi five-jointed. They are temporary ectoparasites of both mammals and birds. The eggs are ovoid and white or cream in colour. The larvae are whitish, vermiform in shape and possess a well-developed head, and three thoracic and ten abdominal segments; spiracles are present on the

thorax and first eight abdominal segments; both eyes and legs are absent; the antennae are single-jointed and the mandibles toothed. They are active, non-parasitic, and feed on organic matter among dust and dirt or in their host's nest or lair. Blood which has passed through the alimentary canal of adult fleas appears to be a necessary nutriment to some species. The pupae are enclosed in cocoons. About 500 species are known, of which 64 have been recorded from South Africa.

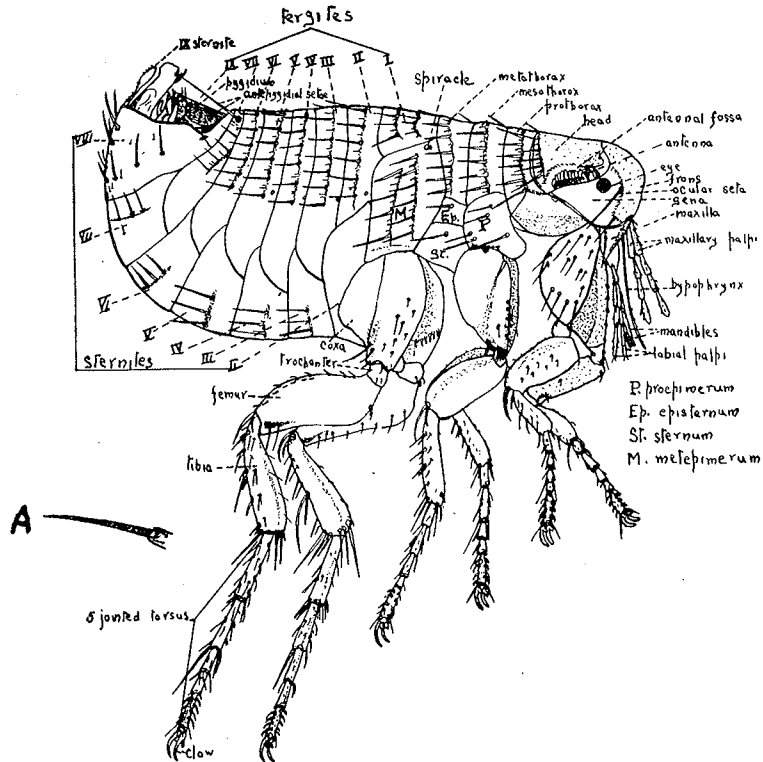


Fig. 22. *Xenopsylla cheopis* (Roths.), ♂. A, Antepygial seta of *X. brasiliensis* (Baker).

The fleas have been divided into a number of families, but only three are retained here. The families Dolichopsyllidae and Hystrichopsyllidae cannot be recognized because in the genus *Chiastopsylla* the head may or may not be divided by a dorsal incassation extending from the base of antenna to the vertex; moreover, in some species it is frequently difficult to determine whether the frons is divided from the occiput or not. The former family can also not be separated from the Pulicidae, because in the genus *Praopsylla* there is only one row of setae on tergites II to VII, and this genus is said to be closely allied to *Chiastopsylla*. The sub-families Ctenophthalminae, Uropsyllinae and Dolichopsyllinae likewise cannot be recognized because in the genus *Chiastopsylla* a genal comb may be either present or absent, and in some species it is very difficult to determine whether the head is provided with a frontal tubercle or not.

Key to the Families.

1. The three segments of the thorax together always longer than the first abdominal tergite; rostrum consisting of four or more segments; combs absent or present; abdomen of gravid females only slight, if at all, enlarged ... 2
2. Head without a pair of antero-ventral flaps on each side. Not on bats ... **Pulicidae**, p. 435
- Head with a pair of antero-ventral flaps (modified spines) on each side which project downwards opposite the mouth cavity. On bats ... **Ischnopsyllidae**, p. 461

Tungidae.

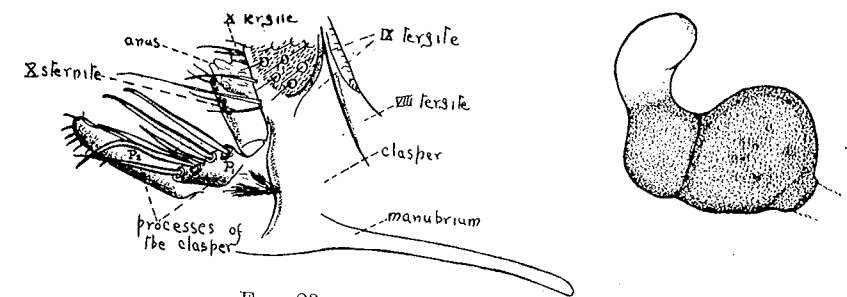
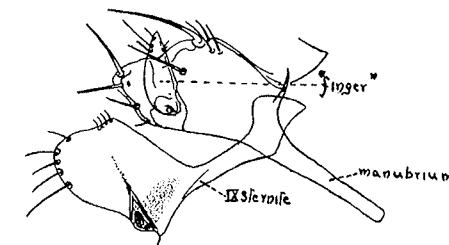


FIG. 23.

FIG. 24.

Fig. 23. Modified terminal abdominal segments of ♂ of *Xenopsylla brasiliensis*. (Baker).

Fig. 24. Receptacula seminis of ♀ of *Xenopsylla brasiliensis* (Baker).



A. B. M. Whitnall del.

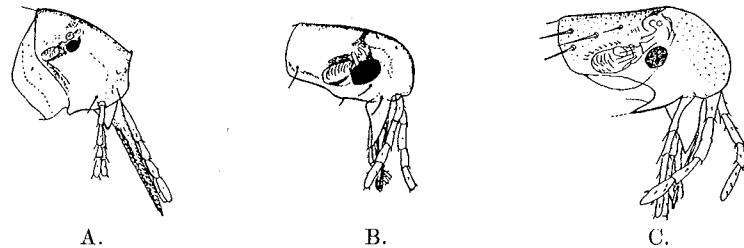
Fig. 25. Terminal abdominal segments of ♂ of *Chiastopsylla pitchfordi* Ingram.

Family TUNGIDAE.

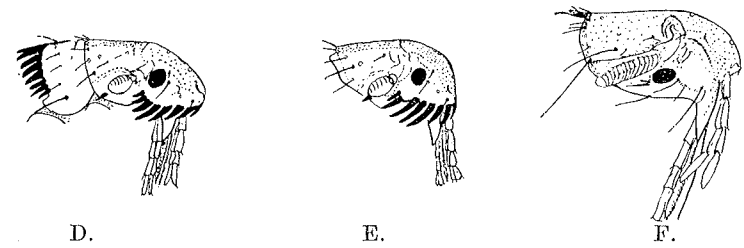
No less than four other names have been used for this family, including Sarcopsyllidae. It is a small family and includes only three genera. The species are known as chigoes or jigger fleas.

Key to the South African Genera.

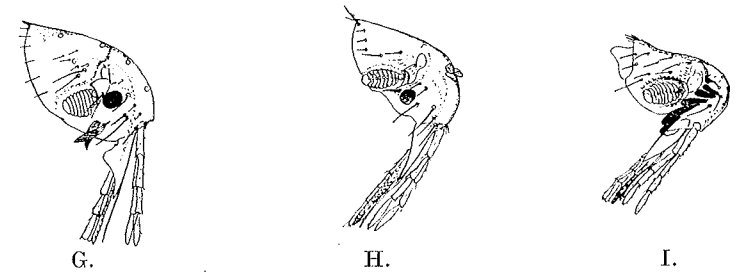
- Hind coxae with a patch of spines on inner side *Echidnophaga*.
- Hind coxae without such a patch of spines ... *Tunga*.



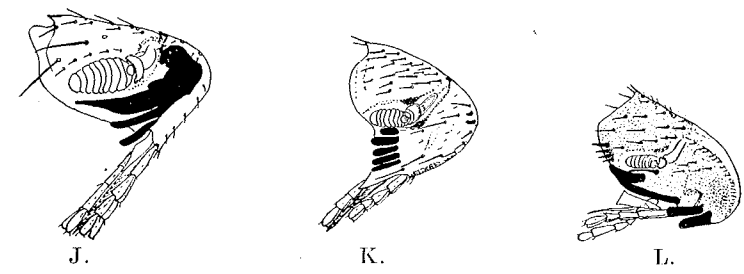
A, *Echidnophaga larina*; B, *Pulex irritans*; C, *Parodontis riggenbachi*.



D, *Ctenocephalides felis*, ♂, head and prothorax; E, *Ctenocephalides canis*, ♂; F, *Ceratophyllus fasciatus*.



G, *Chiastopsylla rossi*; H, *Listropsylla dorippae*; I, *Dinopsyllus lypusus*.



J, *Hypsophthalmus granti*; K, *Leptopsylla segnis*; L, *Araecopsylla scitulus*.
A. B. M. Whitnall del.

Fig. 26. Heads of South African fleas (not drawn to the same scale).

Genus *TUNGA* Jarocki.

Tunga Jarocki, *Zool., or General Descr. of Animals in accord. with the Latest System* (In Polish), pp. 50-52, Pl. 2, f. 10-13 (1838).
Dermatophilus Guerin, *Icon. Règne, Anim., Ins.*, p. 12 (1839).
Dermatophilus Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rep.*, VII, i, p. 65 (1906).

This genus includes three species, of which one, the jigger flea of man, occurs in South Africa.

Genotype: *Pulex penetrans* Linné.

1. *Tunga penetrans* (Linné).

Pulex penetrans Linné, *Syst. Nat.* ed. X, p. 614 (1758).

Dermatophilus penetrans (L.) Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rep.* VII, i, p. 67, f. F, Pl. 4, f. 28 (1906).

Recorded from man and several animals, including pig, in South America, West Indies, W. and E. Africa, and Madagascar. It is a common parasite of man in many localities along the coastal belt of Natal and Zululand. It penetrates the skin, and the feet are most subject to attack.

Genus *ECHIDNOPHAGA* Olliff.

Echidnophaga Olliff, *Proc. Linn. Soc.*, New South Wales (2), I, p. 172 (1886).

Echidnophaga Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rept.*, VII, i, p. 43 (1906).

This genus includes ten species, four of which have been found in South Africa.

Genotype: *Echidnophaga ambulans* Olliff.

Key to the South African Species (after Jordan and Rothschild).

1. Fifth tarsal segment on each side with five heavy setae
E. bradyta J. & R.
- Fifth tarsal segment on each side with three heavy setae and a smaller fourth 2
2. Fifth tarsal segment with one apical ventral seta
E. aethiops J. & R.
- Fifth tarsal segment with two apical ventral setae 3
3. Second seta of fifth tarsal segment midway between first and third *E. gallinacea* Westw.
- Second seta nearer the first than the third
E. larina J. & R.

1. *Echidnophaga aethiops* Jordan and Rothschild.

Echidnophaga aethiops Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rep.*, VII, i, p. 51 (1906).

Described from a female taken off a bat at Klipfontein, Namaqualand.

2. *Echidnophaga bradyta* Jordan and Rothschild.

Echidnophaga bradyta Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rep.*, VII, i, p. 47, pl. 2, f. 13; pl. 3, f. 23 (1906).

Described from specimens taken off the suricate, *Suricata suricatta* (= *S. tetradactyla*); ground squirrel *Geosciurus capensis* (= *Xerus capensis*) and stink muishond, *Ictonyx striata* (= *Zorilla striata*) at Deelfontein, C.P. Mitchell (1921) has recorded it from *G. capensis* and *Cynictis penicillata* (yellow mongoose) near Bothaville, O.F.S. Ingram (1927b) has recorded it from the following hosts: *C. penicillata* at Thopjies and Frankfort in the O.F.S.; *S. suricatta* at Blesboklaagte, Kroonstad District; *G. capensis* at Bultfontein and the Barrage, O.F.S. We have also taken females off *S. suricatta* in the Pretoria District.

3. *Echidnophaga gallinacea* (Westwood).

Sarcopsylla gallinacea Westwood, *Ent. Month Mag.*, XI, p. 246 (1875).

Echidnophaga gallinacea Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rep.*, VII, i, p. 52, pl. 1, f. 1; pl. 2, f. 14; pl. 3, f. 21; pl. 4, f. 27 (1906).

This species is very common on fowls, dogs and cats in South Africa. It has also been recorded from Europe, America, Asia, Fiji Islands, West and East Africa, and Madagascar. Jordan and Rothschild (1906) have recorded it from the following hosts in South Africa: Suricate, *Suricata suricatta* (= *S. tetradactyla*) and bay mongoose, *Myonax ratlanuchi* (= *Herpestes badius*) at Deelfontein, Cape Province; also from *Lepus capensis* at Port Nolloth and a hawk at Durban. Waterston (1914, 1915) has recorded it taken off *Philantomba monticola* (blue duiker) and Cape barn owl, *Typo alba affinis* (= *Strix flaminea*), also from black rat, *Rattus rattus* (= *Mus rattus*) at Grahamstown, Cape Province. Mitchell (1921) has recorded it taken off the following hosts near Bothaville, Orange Free State: ground squirrel, *Geosciurus capensis* (= *Xerus capensis*), *Cynictis penicillata* (yellow mongoose) and *Suricata suricatta* (suricate). Ingram (1927b) has recorded it from the following hosts: *C. penicillata* at Thopjies and Frankfort, O.F.S.; *S. suricatta* at Blesboklaagte, Kroonstad District, and Bultfontein, O.F.S.; *G. capensis* at the Barrage and Bultfontein, and *Rattus rattus* at East London. Dr. Ingram also received specimens taken off *Mastomys coucha* (multimammate mouse) at Rendezvous, Kroonstad District. We possess specimens taken off *Thos mesomelas* (black-backed jackal) at Vryburg, C.P., 28th June, 1916; *Rattus rattus frugivorus* (arboreal black rat) and *Passer melanurus* (Cape black-headed sparrow) at Onderstepoort; off *Pedetes caffer* (springhare) and *Vulpes chama* (silver fox) at Petrusburg, O.F.S. (coll. G.A.H.B.); *G. capensis*, Vryburg, C.P. (coll. P. L. le Roux); *Mungos mungo* (banded mongoose), Umfolosi Reserve, Zululand (coll. P. L. le Roux); *Eptesicus capensis gracilior* (Cape house bat), Sycamore, Tvl.,

and *C. penicillata*, Pretoria District. Specimens have also been taken off *Sulita capensis* (melagas) at Port Alfred, C.P., 25th July, 1923 (coll. J. Hewitt, det. J. Waterston); off man at Umbilo, Natal (coll. C. C. Kent) and at N'Changa, Northern Rhodesia (coll. G.A.H.B.), and from *Tatera lobengulae* (gerbille), Pitsani, Molopo, Bechuanaland Protectorate (B. De Meillon).

4. *Echidnophaga larina* Jordan and Rothschild. (Fig. 26A.)

Echidnophaga larina Jord. & Roths., *Thomp. Yates & Johnst. Labs. Rep.*, VII, i, p. 49, Pl. 1, f. 12; Pl. 2, f. 18; Pl. 3, f. 25 (1906).

Described from specimens taken off a dog in Somaliland; *Crocuta crocuta* (= *Hyaena crocuta*) and *Panthera pardus* (= *Felis leopardus*) in Abyssinia; also from the following hosts at Deelfontein, C.P.: Cape ant-bear, *Orycteropus afer* (= *O. capensis*); hedgehog, *Atelerix frontalis* (= *Erinaceus frontalis*); Cape porcupine, *Hystrix africae-australis* (= *H. cristatus*), and grey mongoose, *Myonax pulverulentus* (= *Herpestes pulverulentus*). Mitchell (1921) has recorded it from *Mastomys coucha* (multimammate mouse), Bothaville, O.F.S. It is common on *Phacochoerus sundevalli* (Natal warthog) in Zululand, and we also possess specimens taken off the following hosts: dog at Ntabanana, Zululand; *Lycaon pictus* (Cape hunting dog), Umfolosi, Zululand, 22nd August, 1928 (coll. Austin Roberts), and Zoological Gardens, Johannesburg, August, 1930 (coll. G. Martinaglia); also from eye-lids of cattle, Pretoria District, 16th August, 1928 (coll. A. Coles); horses, Maseru, Basutoland, August, 1928 (coll. F. A. Verney); *Felis ocreata caffer* (Cape wild cat), Worcester, C.P. (coll. P. L. le Roux); *Vulpes chama* (silver fox), Petrusburg, O.F.S.; *Proteles cristatus* (aardwolf), Umkomas Valley, Natal (coll. L. Hill), and one female off *Smatsia temminckii* (scaly ant-bear), Rustenburg District, Tvl. (coll. G.A.H.B.).

Family PULICIDAE.

Key to the Genera.

1. Tergites I-VII with a single row of setae and without spines; hind coxa with small spines on inner side; pronotal comb usually absent 2
- Tergites I-VII with at least two rows of setae, and spines usually present; hind coxa usually without spines on the inner side; pronotal comb present 8
2. Eyes vestigial; genal and pronotal combs absent
Praopsylla, p. 450.
- Eyes present 3
3. Mesopleura without internal rod-like ridge from base of the coxa upwards; genal and pronotal combs absent
Pulex, p. 437.
- Mesopleura with internal rod-like ridge from base of the coxa upwards 4

4. Genal and pronotal combs present ... *Ctenocephalides*, p. 446.
Genal and pronotal combs absent 5
5. Genal margin of head formed into a large acute process;
pronotum much longer than mesonotum
Pariodontis, p. 437.
Genal margin of head not formed into a large acute process;
pronotum shorter than mesonotum 6
6. Metepisternum fused with metasternum
Synosternus, p. 439.
Metepisternum separated from metasternum 7
7. Middle of outer surface of club of antenna segmented down
to ventral outline; hind coxa gradually narrowed pos-
teriorly from middle to apex, comb near apex
Procaviopsylla, p. 438.
Club of antenna not segmented on outer surface; hind coxa
with the posterior area expanded distally; comb nearer
to middle than to apex *Xenopsylla*, p. 440.
8. Eyes present 9
Eyes absent or vestigial 14
9. Frontal tubercle large, leaf-like; three to four pairs of
antepygidial setae; ♀ with a long projection between
the two sets; genal comb absent; tergites without apical
spines *Listropsylla*, p. 454.
Frontal tubercle either small or wanting; ♀ without a process
between the antepygidial setae, except in *Stivalius* ... 10
10. Pygidium very strongly convex, projecting backwards over
base of anal tergite; genal comb absent
Stivalius, p. 449.
Pygidium not strongly convex 11
11. Hind coxa with small spines on inner side; genal comb
present *Hyposphthalmus*, p. 459.
Hind coxa without spines 12
12. One pair of antepygidial setae; genal comb absent or present,
if present with two teeth crossing each other; small
species *Chiastopsylla*, p. 450.
Three pairs of antepygidial setae 13
13. Frontal region continuous with the occiput, there being no
dorsal incassation from the base of antenna to the vertex
of head; genal comb absent *Ceratophyllus*, p. 448.
Dorsal incassation present from the base of antenna to the
vertex of head; genal comb usually present
Dinopsyllus, p. 457.
14. Tibiae without a row of spines on posterior margin; genal
comb usually with three teeth; no spines on frons
Ctenophthalmus, p. 456.
Tibiae with a row of tooth-like spines on posterior margin;
genal comb present; small spines near front angles of
frons *Leptopsylla*, p. 460.

Genus PULEX Linné.

Pulex Linné, *Syst. Nat.*, X, p. 614 (1758).*Pulex* (Linné) Jord. & Roths., *Parasit.*, I, p. 5 (1908).

This genus contains two species.

Genotype: *Pulex irritans* Linné.1. *Pulex irritans* Linné (Fig. 26b).*Pulex irritans* Linné, *Syst. Nat.*, X, p. 614 (1758).*Pulex irritans* (Linné) Jord. & Roths., *Parasit.*, I, p. 7 (1908).

This species has been recorded from various parts of the world. It is a parasite of man, and has also been found on various animals, including the badger in Europe, dogs, cats, etc. It is fairly common on dogs at Onderstepoort, and we have also taken it off *Thos mesomelas* (black-backed jackal) at Vryburg, C.P., 28th June, 1916, and off man at Wellington, C.P. It has been taken off man in the Uitenhage District, Cape Province, and has been recorded to occur freely in Kaffir kraals at Kingwilliamstown, C.P. (Waterston, 1914). Jordan and Rothschild (1908) record it from caracal, *Caracal caracal* (= *Felis caracal*), Deelfontein, C.P. Ingram (1927b) has recorded taking single specimens off *Geosciurus capensis* (ground squirrel) and *Mastomys coucha* (multimammate mouse) at the Barrage, O.F.S. Waterston (1915) records it from *Proteles cristatus* (aard wolf) in South Africa. It is a transmitting agent of *Trypanosoma lewisi* to rats, and a secondary host of *Dipylidium caninum*, *Hymenolepis diminuta*, *Dipetalonema reconditum* and *D. perstans*, only the first named worm being known to occur in the Union.

Genus PARIODONTIS Jordan and Rothschild.

Pariodontis Jord. & Roths., *Parasit.*, I, p. 13 (1908).

This genus contains two species found on porcupines, one occurring in Asia, the other in Africa.

Genotype: *Pulex riggenbachi* Rothschild.1. *Pariodontis riggenbachi* (Rothschild). Fig. 26c.*Pulex riggenbachi* Roths., *Nov. Zool.*, XI, p. 611 (1904).*Pariodontis riggenbachi* Jord. & Roths., *Parasit.*, I, p. 14, Pl. 2, f. 1 (1908).

This species was described from specimens taken off *Hystrix cristatus* in Morocco, and from *H. africana-australis* (= *H. cristatus*) at Deelfontein, Cape Province. It is a common parasite on the Cape porcupine in South Africa, and has also been found in Angola, South-West Africa and East Africa.

Genus *PROCAVIOPSYLLA* Jordan.*Procaviopsylla* Jordan, *Nov. Zool.*, XXXII, p. 102 (1925).*Procaviopsylla* Jordan, *Verhandl. III. Intern. Ento-Kongr.*, Zürich, II, p. 604 (1926).

This genus is confined to Africa, and includes five species found on Procaviidae (dassies), and also accidentally on other mammals and on birds. The majority of the species were formerly included in the genus *Xenopsylla*. *P. isidis* Roths. has been recorded from South Africa, but it does not occur south of the Rift Valley

Genotype: *Pulex isidis* Rothschild.

Key to the Species (after Jordan).

1. Males: process P¹ of clasper not projecting beyond P² 2
Females: hind tibia with seven or eight notches bearing stout setae, inclusive of apical notch 4
2. Proboscis longer than maxillary palpus *P. divergens*.
Proboscis at most as long as maxillary palpus 3
3. Hind tibia with eight dorsal notches bearing stout setae
P. angolensis.
Hind tibia with seven dorsal notches bearing stout setae
P. creusae.
4. Hind tibia with eight dorsal notches bearing stout setae
P. angolensis.
Hind tibia with seven dorsal notches bearing stout setae ... 5
5. Proboscis reaching to apex of maxillary palpus ... *P. creusae*.
Proboscis reaching beyond apex of maxillary palpus
P. divergens.

1. *Procaviopsylla angolensis* Jordan.*Procaviopsylla angolensis* Jordan, *Nov. Zool.*, XXXII, p. 102, f. 12 (1925).*Procaviopsylla angolensis* Jordan, *Verhandl. III. Intern. Ento-Kongr.*, Zürich, II, p. 606 (1926).

Described from a female and males taken off *Procavia* sp. in Angola. I have taken specimens off *Procavia coombsi* Rbts. (Transvaal dassie) at Onderstepoort on the 22nd August, 1928, and have also received specimens from the same host in the Rustenburg District, Transvaal.

2. *Procaviopsylla creusae* (Rothschild).*Pulex creusae* Roths., *Nov. Zool.*, XI, p. 608, Pl. 8, f. 18; Pl. 9, f. 25 (1904).*Loemopsylla creusae* (Roths.) Jord. & Roths., *Parasit.*, I, p. 54, Pl. 2, f. 11; Pl. 4, f. 12 (1908).*Procaviopsylla creusae* (Roths.) Jord., *Verhandl. III. Intern. Ento-Kongr.*, Zürich, II, p. 605 (1926).

Described from specimens taken off Cape dassie, *Procavia capensis* (*sp. dub.*) and also accidentally off *Caracal caracal* (= *Felis caracal*) and *Spreo bicolor* (pied starling) at Deelfontein, C.P.; also off *Procavia capensis* (*sp. dub.*) at Wakkerstroom, Transvaal. Dr. Ingram has received specimens taken off a dassie at Middelkraal, C.P., and specimens have been taken off *Procavia natalensis*, Fir Glen, Albany District, C.P. (coll. A. Roberts), and *Procavia capensis*, Capetown, C.P. (coll. R. F. Lawrence).

3. *Procaviopsylla divergens* (Jordan and Rothschild).*Loemopsylla divergens* Jord. & Roths., *Parasit.*, I, p. 57, Pl. 2, f. 10; Pl. 6, f. 2 (1908).*Procaviopsylla convergens* Jord., *Nov. Zool.*, XXXII, p. 102 (1925).*Procaviopsylla divergens* (J. & R.) Jord., *Verhandl. III. Intern. Ento-Kongr.*, Zürich, II, p. 606 (1926).

Described from specimens taken off Cape dassie, *Procavia capensis* (*sp. dub.*), and also accidentally off *Caracal caracal* (= *Felis caracal*) at Deelfontein, Cape Province. Specimens have also been taken off *Procavia* sp. at Ntabamhlope, Natal on the 7th April, 1928.

Genus *SYNOSTERNUS* Jordan.*Synosternus* Jordan, *Nov. Zool.*, XXXII, p. 103 (1925).*Synosternus* Jordan, *Verhandl. III. Intern. Ento-Kongr.*, Zürich, II, p. 606 (1926).

This genus includes five species, one of which occurs in South Africa. They are mainly parasitic upon Rodentia and Erinaceidae, but stragglers are frequently found on Carnivora.

Genotype: *Pulex pallidus* Taschenberg.1. *Synosternus caffer* (Jordan and Rothschild).*Xenopsylla caffer* Jord. & Roths., *Ectoparasit.*, I, v, p. 293, f. 282-284 (1923).*Synosternus caffer* (J. & R.) Jord., *Verhandl. III. Intern. Ento-Kongr.*, Zürich, II, p. 608 (1926).

Described from specimens taken off *Pedetes caffer* (springhare) at Bothaville, O.F.S., on the 5th January, 1921; also from specimens taken off *Genetta senegalensis*. We have also taken specimens off *Thos mesomelas* (black-backed jackal) at Vryburg, C.P. on the 28th June, 1916. Dr. Ingram has received specimens taken off *P. caffer* at Bultfontein, Hoopstad and Brandfort in the O.F.S.; also at Sandfontein, S.W.A., and we have taken numerous specimens off the same host at Petrusburg, O.F.S., 13th November, 1930. Specimens have also been taken off *Vulpes chama* (silver fox) at Petrusburg.

Genus XENOPSYLLA Glinkiewicz.

Xenopsylla, Glink., *Sitz.-Ber. Akad. Wiss. Wien*, CXVI, 1. p. 381 (1907).

Loemopsylla Jord. & Roths., *Parasit.*, I, p. 15 (1908).

Xenopsylla (J. & R.) Jord., *Verhandl. III Intern. Ento.-Kongr.*, Zürich, II, p. 609 (1926).

This genus includes thirty-two species occurring in Africa, Asia and southern Europe. One species, *X. brasiliensis*, has been introduced into Brazil. They are mainly parasitic upon Muridae and Sciuridae, and two species occur on birds.

Genotype: *Xenopsylla pachyuromyidis* Glink. = *cheopis* Roths.

Key to the Species.

1. ♂: segment v of foretarsi with three apical ventral spiniform setae; process of P³ of clasper without setae. ♀ with numerous setae extending far upwards on tergite VIII ... 2
 ♂: segment v of foretarsi with four apical ventral spiniform setae; process P³ of clasper with apical setae. ♀ with only 2 or 3 setae on the side of tergite VIII (apart from subapical row) ... *X. erilli*, p. 444.
2. No seta behind or above stigma of metepisternum ... 3
 At least one seta above this stigma or immediately behind it ... *X. trispinus*, p. 446.
3. Antepygidial seta of ♂ placed on a cone; ♀ with head of spermatheca much broader than base of tail, the dark colouring of tail almost confined to the swollen base ... 4
 Antepygidial seta of ♂ and ♀ not placed on a cone; ♀ with head of spermatheca not or only slightly wider than tail, tail darkened to about the middle; P¹ of clasper of ♂ without twisted or elbowed seta ... 11
4. ♂ with P² and P¹ sub-equal in length, the latter without thick twisted or elbowed seta; ♀ with a double chitinized sclerite behind entrance to bursa copulatrix ... 5
X. trifarius, p. 446.
 ♂ with P² longer than P¹; ♀ without these sclerites ... 5
5. Hind tibia with six dorsal notches bearing stout setae, inclusive of apical notch ... 6
 Hind tibia with an additional stout seta between second and third pairs ... 10
6. ♂: tergite I and sternite VIII without brush of long setae; ♀: sternite VII with either 2 (rarely 3) or 5 to 7 setae on each side ... 7
 ♂: sternite VIII with a brush of long setae; ♀ sternite VII with 3 (rarely 4) setae on each side ... 8

7. Sternite VII in ♂ and ♀ with 2 (rarely 3 in ♀) setae on each side; apical portion of ejaculatory tube of ♂ with sharp dorsal tooth ... *X. hamula*, p. 444.

Sternite VII of ♂ and ♀ with 5 to 7 setae on each side; ejaculatory tube of ♂ without tooth ... *X. brasiliensis*, p. 442.

8. ♂: sternite VIII with 11 long, stout setae on apical margin, which is produced backwards; tergite I divided into two lobes, the setae at apex forming a brush; paramere without a dorsal projection; ♀ head of spermatheca almost spherical; tergite VIII with less than 20 setae on each side ... *X. sulcata*, p. 445.

♂: sternite VIII with 8 to 9 setae on apical margin, which is straight; paramere with dorsal angle produced; ♀: head of spermatheca less spherical ... 9

9. ♂: tergite I with long stout setae which project at an angle, the setae at apex forming a brush; antepygidial seta on a small cone; ♀: tergite VIII with more than 20 setae on each side ... *X. lobengulae*, p. 445.

♂: tergite I with more slender appressed setae; antepygidial seta on a slightly larger cone; ♀: tergite VIII with less than 20 setae on each side ... *X. hirsuta*, p. 444.

10. Eye only equalling that of second segment of maxillary palpus; sternite VIII of ♂ with less than 20 setae on each side; sternite VII of ♀ with less than 20 setae on both sides; base of tail of spermatheca not ventricose ... *X. tortus*, p. 445.

Eye larger; sternite VIII of ♂ with more than 20 setae on each side, without brush of long setae; sternite VII of ♀ with more than 26 setae on the two sides together; base of tail of spermatheca more or less ventricose ... *X. scopulifer*, p. 445.

11. ♂♂ ... 12
 ♀♀ ... 15

12. Ventral arm of sternite IX with the dorsal and ventral margins equally chitinized ... 13
 Ventral arm of sternite IX dorsally and laterally transparent ... *X. versuta*, p. 446.

13. Last seta of sternite VIII small, close to apex; sternite IX widened proximally of middle ... 14
 Last seta of sternite VIII farther from apex than from the preceding seta; sternite IX not widened proximally of middle, nor distinctly curved upwards ... *X. cheopis*, p. 442.

14. Spiral of penis long and twisted into a double coil ... *X. piriei*, p. 445.

15. Dorsal wall of oviduct behind entrance to bursa copulatrix with a conspicuous brown sclerite on each side
X. eridos, p. 443.
X. piriei, p. 445.

These sclerites absent 16

16. Sternite VII with a row of 6 setae on the two sides together; spermatheca small *X. versuta*, p. 446.
 Sternite VII with more than 6 setae on the two sides together, with one or more setae in front of row; spermatheca larger *X. cheopis*, p. 442.

In addition to the above species, *Xenopsylla nubicus* Roths. has been recorded from South Africa (Waterston, 1915), but this species is known only to occur in North Africa and Palestine.

1. ***Xenopsylla brasiliensis*** (Baker) Figs. 23 and 24.

Pulex brasiliensis Baker, *Proc. U.S. Nat. Mus.*, XXVII, pp. 378, 379 (1904).

Loemopsylla vigetus Rothschild, *Nov. Zool.*, XVI, p. 53, Pl. 8, f. 3, 4 (1909).

Xenopsylla brasiliensis (Bak.) Roths., *Bull. Ent. Res.*, I, ii, p. 92, f. 8, 10 (1910).

Xenopsylla brasiliensis (Bak.) Jordan, *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 611, f. 42, 57 (1926).

This species occurs in South, East and West Africa, also in India, and Brazil, where no doubt it was introduced. It is known to carry plague (Ingram, 1927b), and also to transmit *Trypanosoma lewisi* to rats.

Mitchell (1921) recorded it taken off arboreal black rat, *Rattus rattus frugivorus* (= *R. rattus fruginis*) near Bothaville, O.F.S. Ingram (1927b) records it taken off *Rattus rattus* at Johannesburg, and from *Mastomys coucha* (multimammate mouse) at Rendezvous, O.F.S., and has since received specimens taken off *Rhabdomys pumilio* (striped mouse) at Bellville, C.P., and two males along with *P. irritans* from the blanket of a native who died of plague in the Theunissen District, O.F.S. The author found this species common on *M. coucha* and *Aethomys chrysophilus* (African rat) at Sycamore, Eastern Transvaal, in October and November, 1927, and has also taken it off a cat at Onderstepoort. We have one male taken off *A. chrysophilus pretoriae* Rbts. at Pretoria (coll. Austin Roberts).

2. ***Xenopsylla cheopis*** (Rothschild) Fig. 22.

Pulex cheopis Roths., *Ent. Mo. Mag.* (2), XIV, p. 85, Pl. 1, f. 3, 9; Pl. 2, f. 12, 19 (1903).

Pulex marinus Tiraboschi *Arch. Parasit.*, VIII, p. 251, f. 15 (1904).

Pulex philippinensis Herzog., *Bull. Bur. Gov. Lab. Manila*, XXIII, p. 77, f. 26, 27 (1904).

Xenopsylla pachyruromyidis Glinkiewicz, *Sitz., Ber. Akad. Wiss. Wien.* CXVI, i, p. 381, Pl. 2, f. 1-4 (1907).

Loemopsylla cheopis (Roths.) Jord. & Roths., *Parasit.*, I, p. 42, Pl. 1; Pl. 2, f. 8; Pl. 4, f. 8; Pl. 6, f. 1 (1908).

Xenopsylla cheopis (Roths.) Jordan, *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 614, f. 60, 71 (1926).

An Indo-African species which has become widely distributed throughout the tropics and sub-tropics. It is a well-known carrier of plague, and is a transmitting agent of *Trypanosoma lewisi* to rats; also a secondary host of the exotic worm, *Hymenolepis diminuta*. In South Africa it has been taken off the following hosts: Brown rat, *Rattus norvegicus* (= *Mus decumanus*), Pretoria (Jordan & Rothschild, 1908); *Rattus rattus* (black rat) near Bothaville, O.F.S. (Mitchell, 1921); bontebok, *Damaliscus dorcas* (= *D. pygargus*), Bredasdorp, C.P. (Waterston, 1915). Ingram (1927b) reports finding it on *R. rattus* at Johannesburg, and states that it is the commonest flea found on brown and black rats at the ports. He also records a single specimen from *Otomys irroratus* (water rat) at the Barrage, O.F.S., and having taken it off *Mystromys albicaudatus* (white-tailed rat) at Kromspruit, O.F.S. It is common on *R. rattus* and the varieties *frugivorus* and *alexandrinus* at Onderstepoort, and we have also taken it here off *Mastomys coucha* (multimammate mouse) and *Thallomys moggi* (Mogg's rat). We have also seen a ♂ taken off man, a ♂ off a cat, and a ♂ from a fowl at Maritzburg, Natal (coll. I. Hill).

3. ***Xenopsylla eridos*** (Rothschild).

Pulex eridos Roths., *Nov. Zool.*, XI, p. 611, Pl. 8, f. 21; Pl. 9, f. 23 (1904).

Loemopsylla eridos (Roths.) Jord. & Roths., *Parasit.*, I, p. 49, Pl. 7, f. 4 (1908).

Xenopsylla eridos (Roths.) Jordan, *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 615, f. 59, 77 (1926).

Described from specimens taken off the Karroo rat, *Paratomys brantsi* (= *Otomys brantsi*) at Deelfontein, Cape Province. It has also been recorded from *Mus. sp.* at Umfolosi, Zululand (Jordan & Rothschild, 1908), and from *Tatera lobengulae* (gerbille) and striped mouse, *Rhabdomys pumilo* (= *Arvicanthus pumilio*) near Bothaville, O.F.S. (Mitchell, 1921). Ingram (1927b) has recorded it from the following hosts: *T. lobengulae* at Standerton, Roberts Drift, Pyramid and Louis Trichardt in the Transvaal; the Barrage, Rendezvous, Frankfort, Knopiesfontein, Viljoen's Drift, and in the Ladybrand and Hoopstad Districts in the Orange Free State. *Desmodillus auricularis* Namaqua gerbille) at Bultfontein and Bloemfontein in the O.F.S., and in the Kimberley and Calvinia Districts, C.P.; *Paratomys luteolus* (eastern Karroo rat) at Steynsburg C.P.; *Myotomys broomi* (Broom's Karroo rat) in the Calvinia District, C.P., and *M. granti* (Grant's Karroo rat); *Leggada deserti* (desert dwarf mouse) at Villiers, O.F.S.; *Malacothrix typicus* (typical large-eared mouse) at Rendezvous, O.F.S.; *Otomys irroratus* (water rat) at Standerton; *Mastomys coucha*

(multimammate mouse) at Rendezvous, Greylings Rust, Weiveld Siding and the Barrage in the O.F.S.; *Cynictis penicillata* (yellow mongoose) at Blesboklaagte and Kroonspruit in the O.F.S.; *Suricata suricatta* (suricate) in the Frankfort District, O.F.S.; *Geosciurus capensis* (ground squirrel) at Rendezvous, O.F.S., and *Lepus capensis* (Cape hare) in the Calvinia District, Cape Province. He has also received specimens taken off *Lepus savatilis* in South-West Africa. Ingram (1927b) has found this species to be capable of sucking human blood, and states that it is apparently able to transmit plague from infected rodents to non-infected rodents.

4. **Xenopsylla erilli** (Rothschild).

Pulex erilli Rothschild, *Nov. Zool.*, XI, p. 610, Pl. 8, f. 16, 17; Pl. 9, f. 22 (1904).

Loemopsylla erilli (Roths.) Jord. & Roths., *Parasit.*, I, p. 58, Pl. 2, f. 6, 15; Pl. 5, f. 2; Pl. 7, f. 5 (1908).

Xenopsylla erilli (Roths.) Jord., *Verhandl. III. Intern. Ent.-Kongr.* II, p. 622, f. 29, 80 (1926).

Described from specimens taken off stink muishond, *Ictonyx striata* (= *Zorilla striata*), *Suricata suricatta* (= *S. tetradactyla*) and ground squirrel, *Geosciurus capensis* (= *Xerus capensis*) at Deelfontein, Cape Province. Ingram (1927b) has recorded it from *Cynictis penicillata* (yellow mongoose) and *S. suricatta* at Blesboklaagte, O.F.S.; *G. capensis* at the Barrage, Weiveld Siding and in the Bultfontein District, O.F.S. It has also been taken off *C. penicillata* near Bothaville, O.F.S. and *G. capensis* at Vryburg, C.P. Ingram (1927b) has found it to be capable of sucking human blood.

5. **Xenopsylla hamula** Jordan.

Xenopsylla hamula Jord. *Nov. Zool.*, XXXII, p. 99, f. 7 (1925).

Xenopsylla hamula Jord., *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 611 (1926).

Described from specimens taken off dormouse, *Claviglis murinus* (= *Graphiurus murinus*) at Grahamstown, C.P.

6. **Xenopsylla hirsuta** Ingram.

Xenopsylla hirsuta Ingram, *Bull. Ent. Res.*, XVIII, iv, p. 372, f. 4B, 5, 6A (1928).

Described from numerous specimens of both sexes taken in the nests of *Tatera afra* (Cape gerbille) at Bellville, C.P. in March and April, 1926. Mr. De Meillon has received specimens taken off *Tatera lobengulae* (gerbille) at Wolseley, Klaver and Tulbagh Valley, C.P.; also off *Rhabdomys pumilio* (striped mouse) at Breede River and Worcester, C.P.

This species has been shown to be capable of transmitting plague from rodent to rodent in South Africa (Dept. of Ento., 1930).

7. **Xenopsylla lobengulae** De Meillon.

Xenopsylla lobengulae De Meillon, *Nov. Zool.*, XXXVI, p. 139, f. 1-10 (1930).

Described from specimens taken off *Tatera lobengulae* (gerbille) at Chavonnes, Worcester, C.P., 5th October, 1928.

8. **Xenopsylla piriei** Ingram.

Xenopsylla piriei Ingram, *Bull. Ent. Res.*, XVIII, iv, p. 371, f. 1A, 2A, 3A (1928).

Described from numerous males and females taken in the nests of *Tatera lobengulae* (gerbille) in the Transvaal, and from nests and burrows of Karroo rats (*Myostomys broomi* and *Paratomys luteolus*), and off *Desmondillus auricularis* (Namaqua gerbille) in the Steynsburg and Calvinia Districts, C.P. in April, 1925 and September, 1926. Specimens have also been found on a gerbille between Pitsani and Hildavale, Bechuanaland Protectorate (B. de Meillon).

9. **Xenopsylla scopulifer** (Rothschild).

Pulex scopulifer Roths., *Nov. Zool.*, XII, p. 480, Pl. 13, f. 5 (1905).

Loemopsylla scopulifer (Roths.) Jord. & Roths., *Parasit.*, I, p. 52, Pl. 5, f. 1, 9 (1908).

Xenopsylla scopulifer (Roths.) Jord., *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 612, f. 40, 52 (1926).

Described from specimens taken off *Saccostomus campestris* (Peter's pouched mouse) and golden rock mouse, *Praomys arborarius* (= *Mus auricomis*) at Umfolosi, Zululand, and off *Cricetomys gambianus* (giant rat) at Beira, Mozambique.

10. **Xenopsylla sulcata** Ingram.

Xenopsylla sulcata Ingram, *Bull. Ent. Res.*, XVIII, iv, p. 374, f. 4A, 6B, 7 (1928).

Described from males and females collected from the nests of *Tatera afra* (Cape tatera) at Citrusdale, C.P., September, 1927. It has also been found on *Tatera lobengulae* (gerbille) at Citrusdale, Breede River and Goudini Road in the Cape Province (B. De Meillon).

11. **Xenopsylla tortus** (Jordan and Rothschild).

Loemopsylla tortus Jord. & Roths., *Parasit.*, I, p. 53, Pl. 5, f. 4 (1908).

Xenopsylla tortus (J. & R.) Jord., *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 612, Pl. 18, f. 41; Pl. 19, f. 58 (1926).

Described from specimens collected in Mozambique off *Cricetomys gambianus* (giant rat) and *Mus. sp.* Jordan (1908) records it off golden rock mouse, *Praomys arborarius* (= *Rattus auricomis*), Kenya Colony.

12. *Xenopsylla trifarius* De Meillon.

Xenopsylla trifarius De Meillon, *Nov. Zool.*, XXXV, p. 250, f. 2-5 (1930).

Described from specimens, both sexes, collected in the nest of *Tatera lobengulae* (tatera) at Klaver, C.P. in July, 1928.

13. *Xenopsylla trispinus* Waterston.

Xenopsylla trispinus Waterst., *Proc. Roy. Phys. Soc. Edin.*, XVIII, iii, p. 192, f. 1-6 (1911).

Xenopsylla trispinus (Waterst.) Jord., *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 618, f. 74 (1926).

Described from specimens, both sexes, found on *Petrochelidon spilodera* (S.A. cliff swallow) at Emgwali, Dohne, Cape Province. We have found specimens in the nests of the same bird at Onderstepoort.

14. *Xenopsylla versuta* Jordan.

Xenopsylla versuta Jord., *Nov. Zool.*, XXXII, p. 100, f. 8 (1925).

Xenopsylla versuta Jord., *Verhandl. III. Intern. Ent.-Kongr.*, II, p. 616, Pl. 20, f. 67, 72 (1926).

Described from specimens taken off *Funisciurus* sp. in Angola. Jordan (1926) has also recorded it from *Paraxerus aruscensis*, Tanganyika Territory. Specimens have also been taken off *Rhodomys pumilio* (striped mouse); north-east of Koro, Bechuanaland Protectorate, 8 May, 1930 (B. De Meillon).

Genus CTENOCEPHALIDES Stiles & Collins.

Ctenocephalus Kolenati, *Jahresb. Mähr.-Schles. Ges.*, p. 65 (1859).
nec. Hawle and Corda, 1847 (Trilobite).

Ctenocephalides Stiles & Collins, *Public Health Repts.*, XLV, 23, p. 1309 (1930).

This genus includes ten species and two varieties.

Genotype: *Pulex canis* Curtis.

Key to the South African Species.

1. Head less than twice as long as broad, with the frons strongly rounded 2
- Head slightly more than twice as long as broad, with the frons considerably less rounded; manubrium of clasper of ♂ narrow at apex *C. felis*
2. Hindtibia with 7 to 8 dorsal notches bearing stout setae; inclusive of apical notch; stigmata large (about 0.04 mm.) manubrium of clasper of ♂ widened at apex *C. canis*.
- Hindtibia with 6 dorsal notches bearing stout setae, inclusive of apical notch; stigmata smaller 3

3. Sternites III to VI of ♀ with 3 to 4 setae on each side; fore-tarsal segment V of ♂ with 5 thick spiniform setae on venter; manubrium of clasper of ♂ widened at apex *C. connatus*.
- Sternites III to VI of ♀ with 2 setae on each side; fore-tarsal segment V of ♂ with 2 spiniform setae on venter; manubrium of clasper of ♂ narrower at apex *C. felis strongylus*.

1. *Ctenocephalides canis* (Curtis) Fig. 26E.

Pulex canis Curtis, *Brit. Ent.*, III, No. 114, f. A-E, 8 (1826).

Rothschild (1910) states that this species is practically cosmopolitan, but more abundant in temperate countries than in the tropics. It is a parasite of dogs, but also occurs on rats. We have taken it off dogs at Onderstepoort, but it is not nearly so common on these animals as *C. felis*. I have seen specimens in the South African Museum recorded by Waterston (1914) from blue duiker, *Philantomba monticola* (= *Cephalophus monticola*). It has also been recorded from several other wild animals in South Africa, but the specimens proved to be *C. connatus*. It has been shown to be capable of transmitting plague from rodent to rodent, and is a transmitting agent of *Trypanosoma lewisi* to rats; also a secondary host of *Dipylidium caninum*, *Hymenolepis diminuta*, *Dirofilaria immitis* and *Dipetalonema reconditum*, only the first named worm being known to occur in South Africa.

2. *Ctenocephalides connatus* (Jordan).

Ctenocephalus connatus Jordan, *Nov. Zool.*, XXXII, p. 98, f. 5 (1925).

Described from specimens taken off stink muishond, *Ictonyx striata* (= *Zorilla striata*); ruddy mongoose. *Myonax rattamuchi* (= *Herpestes badius*); hedgehog, *Atelerix frontalis* (= *Erinaceus europaeus*) and springhare (*Pedetes caffer*) at Deelfontein, C.P.; ground squirrel, *Geosciurus capensis* (= *Xerus capensis*) and yellow mongoose (*Cynictis penicillata*) at Bothaville, O.F.S.; *Suricata suricatta* at Grahamstown, C.P.; also off *Lepus* in Tanganyika Territory. Ingram (1927b) has recorded it under the name of *C. canis* from the following hosts: *C. penicillata* at Thopjies and the Frankfort and Kroonstad Districts, O.F.S.; *S. suricatta* at the Barrage, Hoopstad, Blesboklaagte and in the Bultfontein District in the Orange Free State; *G. capensis* at the Barrage and in the Bultfontein and Kroonstad Districts, O.F.S.; *Lepus capensis* (Cape hare) in the Calvinia District, C.P. We have taken it off *S. suricatta* near Pretoria, and *A. frontalis* at Onderstepoort. In the laboratory collection there are also specimens taken off the following hosts: *G. capensis* and *Thos mesomelas* (black-backed jackal) at Vryburg, C.P. (coll. P. L. le Roux, and G.A.H.B.); *Felis ocreata caffra* (Cape wild cat) and *Genetta rubiginosa* (rusty-spotted genet) in the Rustenburg District, Transvaal; *Lycan pictus venaticus* (Cape hunting dog) and *Sylviacapra grimmi* (Cape duiker) in the Umfolosi Reserve, Zululand (coll. Austin Roberts and P. L. le Roux).

3. **Ctenocephalides felis** (Bouché) Fig. 26D.

Pulex felis Bouché, *Nov. Acta. Acad. Leop. Carol.*, XVII, p. 505 (1835).

A common and widely distributed flea throughout the world on cats, dogs and other animals. It is a common parasite on dogs and cats in the Pretoria District, and specimens have been taken off a cat at Maritzburg, Natal (coll. Laurence Hill). Waterston (1914) has recorded it taken off blue duiker, *Philantomba monticola* (= *Cephalophus monticola*). In the laboratory collection there are specimens taken off *Felis ocreata caffra* (Cape wild cat) and *Lepus zuluensis* in the Rustenburg District, Transvaal. It is a secondary host of *Dipylidium caninum*, *Dirofilaria immitis* and *Dipetalonema reconditum*, only the first named worm being known to occur in South Africa.

3A. **Ctenocephalides felis strongylus** (Jordan).

Ctenocephalus felis strongylus Jordan, *Nov. Zool.*, XXXII, p. 98 (1925).

Described from a large number of specimens taken off many different hosts in numerous localities from French West Africa and the Sudan to South Africa. Type off *Canis lateralis*, Kenya Colony. Specimens have been taken off *Myonax pulverulentus* (grey mongoose), Kenkelbosch, C.P. (coll. L. Hill), and *Genetta tigrina* in the Albany District, C.P.

GENUS CERATOPHYLLUS Curtis (1832).

This genus contains a large number of species found in many parts of the world, many of them being parasitic upon birds.

Key to the South African Species.

1. ♂: Exopodite not extending much above the process of clasper, with two strong setae of which the upper one stands halfway between apex and lower one; ♀: apex of sternite VII obliquely rounded, without projecting lobe *C. fasciatus*.
- ♂: Exopodite extending much beyond the apex of the process of the clasper, its upper seta much nearer to the lower one than to the apex; ♀: apex of sternite VII produced into a truncate lobe, below which the segment is sinuate *C. londiniensis*.

1. **Ceratophyllus fasciatus** (Bosc.) (1801), Fig. 26F.

Ceratophyllus fasciatus (Bosc.) Roths., *Bull. Ent. Res.*, I, p. 94, f. 18, 20 (1910).

Ceratophyllus fasciatus (Bosc.) Jord. & Roths., *Ectoparasites*, I, iii, p. 180, f. 165a, 165b, 166 (1921).

Jordan and Rothschild (1921) recorded two ♀♀ collected at Capetown, C.P., on the brown rat, *Rattus norvegicus* (= *Epimys decumanus*), and Ingram (1927b) has recorded specimens from *Rattus rattus*, Johannesburg. It has also been recorded taken off *R. norvegicus* and other small mammals in

Europe, Asia, North America and Australia. It readily bites man. It has been shown to be capable of transmitting plague from rodent to rodent and is a transmitting agent of *Trypanosoma lewisi* to rats; also a secondary host of *Hymenolepis diminuta* and *H. microstoma*, but these tapeworms are not known to occur in South Africa.

2. **Ceratophyllus londiniensis** Rothschild.

Ceratophyllus italicus Tirab. (1904).

Ceratophyllus londiniensis Roths., *Bull. Ent. Res.*, I, p. 94, f. 17, 19 (1910).

Ingram (1927b) has recorded specimens taken off *Rattus rattus* at Johannesburg. It also occurs on rats in Europe.

GENUS STIVALIUS Jordan and Rothschild.

Stivalius Jordan and Rothschild, *Ectoparasites*, I, iv, p. 249 (1922).

This genus contains seventeen species found on rodents and marsupials in Africa, Asia and Australia. Three species have been recorded from South Africa.

Genotype: *Ceratophyllus ahalae* Rothschild.

Key to the South African Species.

- | | |
|--|--------------------|
| 1. Males | 2 |
| Females | 4 |
| 2. Ninth sternite with lateral subapical process | 3 |
| Ninth sternite without lateral subapical process | <i>S. afer</i> . |
| 3. Paramere of penis with simple claw and a dorsal hump | |
| | <i>S. ahalae</i> . |
| Paramere of penis with double claw and a dorsal hump | |
| | <i>S. aporus</i> . |
| 4. Ventral angle of eighth tergite produced, acuminate | 5 |
| Ventral angle of eighth tergite rounded off | <i>S. afer</i> . |
| 5. Head of receptaculum seminis strongly humped dorsally | |
| | <i>S. ahalae</i> . |
| Receptaculum seminis less humped; the stout outer dorsal setae between middle and apex of hind tibia forming an almost regular comb | <i>S. aporus</i> . |

1. **Stivalius afer** Rothschild.

Pygiopsylla afer Roths., *Proc. Zool. Soc. Lond.*, p. 618 (1908).

Stivalius afer Jord. and Roths., *Ectoparasites*, I, iv, p. 250 (1922).

Described from specimens collected at Benguella and Dalla Tando in Angola; in the latter locality from *Arvicanthus rufinus*.

2. **Stivalius ahalae** (Rothschild).

♂. *Ceratophyllus ahalae* Roths., *Nov. Zool.*, XI, p. 631, Pl. 11, f. 51, Pl. 12, f. 55, Pl. 13, f. 60 (1904).

♂. *Pygiopsylla ahalae* Roths., *Proc. Zool. Soc. Lond.*, p. 617 (1908).

♂.♀. *Stivalius ahalae* (Roths.) Jord. & Roths., *Ectoparasites*, I, iv, p. 252, f. 242, 244 (1922).

This species has been found in India on *Rattus rattus* and *Sciurus palmarum*. Jordan and Rothschild (1922) has also recorded a male taken off Brant's mouse, *Myomys colonus* (= *Mus colonus*) at Mfongosi, Zululand, which differs very slightly from the type.

3. **Stivalius aporus** Jordan and Rothschild.

Stivalius aporus Jord. & Roths., *Ectoparasites*, I, iv, p. 254, f. 246 (1922).

Described from specimens taken off several hosts in India and Ceylon. One male is also recorded taken off Brant's mouse, *Myomys colonus* (= *Mus colonus*) at Mfongosi, Zululand, which like the last also differs very slightly from the type.

Genus PRAOPSYLLA Ingram.

Praopsylla Ingram, *Bull. Ent. Res.*, XVII, iii, p. 292 (1927).

This genus contains a single species.

1. **Praopsylla powelli** Ingram.

Praopsylla powelli Ingram, *Bull. Ent. Res.*, XVII, iii, p. 293, f. 4 (1927).

Described from two ♀♀ taken off *Praomys arborarius* (golden rock mouse) at Lickerroog, Calvinia District, C.P., July, 1926.

Genus CHIASTOPSYLLA Rothschild.

Chiastopsylla Rothschild, *Ent.*, XLIII, No. 563, p. 105 (1910).

This genus contains seven species and one variety found exclusively in South Africa on Muridae.

Genotype: *Ceratophyllus numae* Rothschild.

Key to the Species.

- 1. Males (male of *C. octavii* unknown) 2
- Females 8
- 2. Sternite IX with scales on distal margin 3
- Sternite IX with setae only on distal margin 5
- 3. Four pairs of scales on sternite IX, the scales equal and narrow *C. quadrisetis*.
- Three pairs of scales on sternite IX, scales wider 4

4. Sternite VIII finger-like distally; scales on sternite IX diamond-shaped, equal and acutely pointed ... *C. numae*.

Sternite VIII wedge-shaped; scales on sternite IX dissimilar, the uppermost broad, subquadrate, the second deeply and roundly emarginate distally, the third longest, pointed and spatulate *C. rossi*.

5. Genal spines absent (may be rudimentary in *pitchfordi*); internal plate of penis considerably longer than the manubrium 6

Genal spines present; internal plate of penis shorter than the manubrium *C. godfreyi*.

6. Vertical area of sternite IX triangular, the posterior margin almost straight with a tuft of four or five setae on its postero-ventral margin 7

Posterior margin of sternite IX rounded without such a tuft of setae *C. pitchfordi*.

7. Sternite VIII with a subapical ventral tuft of five to seven curved setae and one or more straight ones; longest seta of first hind tarsus reaching to apex or slightly beyond apex of second tarsus, the longest seta of second tarsus reaching to apex or slightly beyond apex of the fourth *C. mulleri*.

The curved subapical setae do not form so distinct a tuft, being more equally spaced along margin of the sternite; longest seta on first hind tarsus reaching to three-quarters the length of the fifth tarsus, and the longest seta on the second hind tarsus reaching to apex of fifth segment *C. mulleri longisetis*.

8. Incrassation on head separating the frons from the occiput ... 9

Incrassation on head absent; sternite VII with distal margin evenly rounded *C. octavii*.

9. Genal spines present; teeth of pronotal comb as long as or longer than the pronotum 10

Genal spines absent (may be rudimentary in *pitchfordi*); teeth of pronotal comb shorter than the pronotum; sternite VII with distal margin evenly rounded 13

10. Sternite VII with distal margin evenly rounded; median row of setae on mesonotum not reaching as far down as the postmedian row; spines present on tergites I-IV *C. quadrisetis*.

Sternite VII either incised or with a small rounded median lobe on the distal margin 11

11. Sternite VII with distal margin incised 12

Sternite VII with median lobe on distal margin; spines present on mesonotum and tergites I-IV; median row of setae on mesonotum extending down as far as the postmedian row *C. rossi*.

12. Sternite VIII with about a dozen setae on its ventral half, not including those on the posterior margin; spines present on metanotum and tergites I-IV; median row of setae on mesonotum extending down as far as the postmedian row *C. numae*.
Sternite VIII nearly bare ventrally; spines absent on metanotum and tergites I-IV *C. godfreyi*.
13. Tergite VII with a pointed lobe on its distal margin external to the antepygial seta *C. pitchfordi*.
Tergite VII with a less prominent and more rounded lobe *C. mulleri* and var. *longisetis*.

1. **Chiastopsylla godfreyi** Waterston.

♂. *Chiastopsylla godfreyi* Waterst., *Proc. Roy. Phys. Soc. Edin.*, XIX, i, p. 8, f. 1-3 (1913).

♀. *Chiastopsylla godfreyi* Waterst., *Trans. Ent. Soc., Lond.*, Pts. 3-5, p. 414, f. 1 (1920).

Described from a single male taken off striped mouse, *Rhabdomys pumilio* (= *Arvicanthus pumilio*) on the Pirie Mountains, near Kingwilliamstown, C.P., and from two females collected at Grahamstown, C.P. One ♂ taken off *Praomys namaquensis grahami* (Albany rock mouse), near Grahamstown, C.P. (coll. Austin Roberts).

2. **Chiastopsylla mulleri** Ingram.

Chiastopsylla mulleri Ingram, *Bull. Ent. Res.*, XVII, iii, p. 291, f. 2a, 3 (1927).

Described from numerous males and females collected in the nests of *Mystomys broomi* (Karoo rat) at Calvinia, C.P., in July and August, 1926. Specimens have also been taken off *Tatera lobengulae* (gerbille), Klaver, C.P., and *Paratomys luteolus* (Karoo rat), Doorn River, Klaver and Tulbagh, C.P. (coll. C. V. Muller; det. B. De Meillon).

2A. **Chiastopsylla mulleri longisetis** Ingram.

Chiastopsylla mulleri var. *longisetis* Ingram, *Bull. Ent. Res.*, XVII, iii, p. 292 (1927).

The females are indistinguishable from those of *C. mulleri*. Specimens were collected in the nests of *Mystomys broomi* (Karoo rat) at Zak River, 60 miles north of Calvinia, C.P., in August, 1926.

3. **Chiastopsylla numae** (Rothschild).

Ceratophyllus numae Roths., *Nov. Zool.*, XI, p. 637 (1904).

Described from specimens taken off the Karroo rat, *Paratomys brantsi* (= *Otomys brantsi*) at Deelfontein, Cape Province. We have taken specimens off *Otomys irroratus* (water rat), *Mastomys coucha* (multimammate mouse) and *Thallomys moggi* (Mogg's rat) at Onderstepoort. Mr. De Meillon has received specimens taken off *Paratomys luteolus*, Klaver, C.P. (coll. C. V. Muller).

4. **Chiastopsylla octavii** (Rothschild).

Ceratophyllus octavii Roths., *Nov. Zool.*, XI, p. 638 (1904).

Described from two ♀♀ taken off Cape dormouse, *Claviglis ocellaris* (= *Graphocularis biurus*) at Deelfontein, C.P. Mitchell (1921) records it taken off striped mouse, *Rhabdomys pumilio* (= *Arvicanthus pumilio*) near Bothaville, O.F.S. We have taken a ♀ off *Praomys namaquensis monticularis* (rock mouse) at Onderstepoort, 1st August, 1927.

5. **Chiastopsylla pitchfordi** Ingram (Fig. 25).

Chiastopsylla pitchfordi Ingram, *Bull. Ent. Res.*, XVII, iii, p. 289, f. 1, 2b (1927).

Described from specimens collected in nests of *Paratomys luteolus* (Karoo rat) at Steynsburg, C.P., October, 1925. Ingram (1927b) has also recorded it from *Myotomys granti* (Grant's Karroo rat).

6. **Chiastopsylla quadrisetis** De Meillon.

Chiastopsylla quadrisetis De Meil., *Nov. Zool.*, XXXV, p. 251, f. 6-8 (1930).

Described from specimens taken from nests of *Paratomys luteolus* (Karoo rat), Klaver, C.P., August, 1928.

7. **Chiastopsylla rossi** (Waterston), Fig. 26a.

Ceratophyllus rossi Waterst., *Ent. Mo. Mag.* (2) XX, p. 271, Pl. 5, f. 3, 4 (1909).

Described from a single ♀ taken off black rat, *Rattus rattus* (= *Mus rattus*) at Pirie, Kingwilliamstown, C.P. Waterston (1915) has also recorded it taken from *Rattus rattus*, *Otomys irroratus* (African water rat), *Crocidura flavescens* (red shrew) and *Mystomys albicaudatus* (white-tailed rat) at Grahamstown, C.P. Ingram (1927b) has recorded it from the following hosts: *Cynictis penicillata* (yellow mongoose), Bothaville, O.F.S. *Suricata suricatta* in the Frankfort, Ladybrand and Parys Districts, O.F.S. *Tatera lobengulae* (gerbille) in the Frankfort District and at the Barrage, O.F.S., and at Randfontein and Sunda in the Transvaal. *Myotomys broomi* and *M. granti* (Karoo rats) in the Calvinia District, C.P. *Paratomys luteolus* (eastern Karroo rat) at Steynsburg, C.P. *Mystomys albicaudatus* (white-tailed rat) at the Barrage and Weiveld Siding in the O.F.S. *Rhabdomys pumilio* (striped mouse), Randfontein, Transvaal, and Cape Flats. *Mastomys coucha* (multimammate mouse) in the Heilbron District and Barrage, O.F.S. Specimens have also been received by Dr. Ingram taken from *Tatera afra* (Cape gerbille) at Bellville, C.P. Mr. De Meillon has received specimens taken off *Paratomys luteolus*, Tulbagh, C.P. (coll. C. V. Muller); *Otomys irroratus*, Breede River, C.P. (coll. T. Muller) and *Rhabdomys pumilio*, Breede River, Goudini Road and Worcester, C.P. Specimens have also been taken off *O. irroratus*, Uitenhage District, C.P., and Onderstepoort, and *Aethomys chrysophilus* (African rat), Sycamore, Transvaal (coll. G.A.H.B.). Ingram (1927b) has found this species to be capable of sucking human blood.

Genus LISTROPSYLLA Rothschild.

Listropsylla Rothschild, *Ent. Mo. Mag.* (2), XVIII, p. 175 (1907).*Listropsylla* Jordan, *Nov. Zool.*, XXXVI, p. 130 (1930).

This genus contains seven species and one variety occurring only in Africa. The species are mainly parasitic upon *Muridae*.

Genotype: *Ceratophyllus agrippinae* Rothschild.*Key to the South African Species* (after Jordan).

1. Segment II of antenna apically rounded-enlarged, some of its setae reaching to apex of club or even beyond. Pygidium with 30 or more grooves on each side. ♂: body of clasper much shorter than long, its dorsal bay small, about as large as dorsal apical process; exopodite broad, of nearly even width, its long ventral seta slender, subventral. ♀: tail of spermatheca longer than head 2
- Segment II of antenna not enlarged, its setae reaching at most to middle of club. Pygidium with 21 or fewer grooves on each side 3
2. Tergites II to VII with at least one, usually two, setae more ventral than stigma. ♂: lower apical angle of clasper produced. ♀: nearly always with 4 antepygidial setae
L. agrippinae.
- Tergites V and VI at most with one, VII with no seta more ventral than stigma. ♂: lower apical angle of clasper not produced distad. ♀: 3 antepygidial setae.
L. vicinus.
3. Tergite I with fewer than 30 apical spines. ♂: body of clasper longer than broad, the dorsal bay wide; exopodite strongly narrowing towards both apex and base, its long ventral seta at two-thirds (approximately). ♀: tail of spermatheca shorter than head 4
- Tergite I with 40 or more apical spines. ♂: dorsal apical process of clasper triangular, large, very much larger than ventral apical projection, a row of setae along apical margin of clasper. ♀: head of spermatheca longer than tail, globular; no double sclerite behind ring of bursa copulatrix; stylet as long as hindtarsal segment III 5
4. Midtarsal segment I twice as long as V. Pygidium with 18 to 21 grooves on each side. ♂: ventral apical process of clasper at most thrice as long as broad. ♀: head of spermatheca irregularly elliptical *L. dorippae*.
- Midtarsal segment I less than twice as long as V. Pygidium with 16 to 17 grooves on each side. ♂: ventral apical process of clasper at least four times as long as broad. ♀: head of spermatheca subglobular *L. prominens*.

5. Pygidium with 19 to 24 grooves on each side. ♂: body of clasper below densely striated transversely. ♀: 4 to 6 setae below stigma on basal area of tergite VIII
L. chelura.

Pygidium with 21 to 24 grooves on each side. ♂: body of clasper below not striated. ♀: 7 to 10 setae below stigma on basal area of tergite VIII *L. cerrita*.

1. *Listropsylla agrippinae* (Rothschild).♂ ♀ *Ceratophyllus agrippinae* Roths., *Nov. Zool.*, XI, p. 634, Pl. 12, f. 56, 57; Pt. 13, f. 62, 64 (1904).♂ ♀ *Listropsylla agrippinae* (Roths.) Jordan, *ibid.*, XXXVI, p. 131 (1930).

Described from specimens taken off Karroo rats, *Paratomys brantsi* (= *Otomys brantsi*) and *Myotomys unisulcatus* (= *O. unisulcatus*) at Deelfontein, Cape Province. Ingram (1927b) has recorded it from the following hosts: *Myotomys broomi* and *M. granti* (Karoo rats) in the Calvinia District, C.P.; *Paratomys luteolus* (eastern Karroo rat) at Steynsburg, C.P., and *Rhabdomys pumilio* (striped mouse) at Bellville, C.P. Dr. Ingram has also received specimens taken from *Tatera afro* (Cape gerbille), Bellville, C.P., and *Aethomys chrysophilus* (African rat), Gobabis, S.W.A. Waterston (1915) records it from *Mystromys albicaudatus* (white-tailed rat), Grahamstown, C.P. We have received specimens taken off *Otomys irroratus* (water rat), *Myonax cauvii* (slender mongoose) and nest of *Rhabdomys pumilio* in the Uitenhage District, C.P.; also from *Myotomys turneri*, Wakkerstroom, Transvaal (coll. Austin Roberts). One female taken off *Praomys namaquensis grahami* (rock mouse) at Grahamstown, C.P., 28th September, 1914 (coll. J. Hewitt; det. J. Waterston). Mr. De Meillon has received specimens taken off *Tatera lobengulae* (gerbille), Klaver, C.P. (coll. C. V. Muller); *Paratomys luteolus*, Klaver and Tulbagh, C.P. (coll. C. V. Muller); *Rhabdomys pumilio*, Breede River and Goudini Road, C.P. (coll. T. Muller), and *Otomys irroratus*, Breede River (coll. T. Muller).

2. *Listropsylla cerrita* Jordan.♂ ♀ *Listropsylla cerrita* Jordan, *Nov. Zool.*, XXXVI, p. 136, f. 6, 7 (1930).

Described from specimens from nests of Karroo rats, *Myotomys broomi* and *Paratomys luteolus* on side of mountain, Klaver, Doorn River, C.P.

3. *Listropsylla chelura* Rothschild.♂ ♀ *Listropsylla chelura* Roths., *Ent. Mo. Mag.* (2), XXIV, p. 207, Pl. 5, f. 1, 2 (1913).♂ ♀ *Listropsylla chelura* (Roths.) Jordan, *Nov. Zool.*, XXXVI, p. 135 (1930).

Described from two males taken off striped mouse, *Rhabdomys pumilio* (= *Arvicanthus pumilio*) at Pirie, Kingwilliams-town, Cape Province, and one female from the same locality

off *Myosorex tenuis* (least brown-footed shrew). Jordan (1930) has also recorded specimens from *Arvicanthis* and *Tatera labengulae* (gerbille), Belville, C.P. Mr. De Meillon has received specimens taken off *Otomys irroratus* (African water rat) and *R. pumilio*, Breede River, C.P. (coll. T. Muller).

4. **Listropsylla dorippae** (Rothschild), Fig. 26H.

♀ *Ceratophyllus dorippae* Roths., *Nov. Zool.*, XI, p. 636 (1904).

♂ ♀ *Listropsylla dorippae* (Roths.) Jordan, *ibid.*, XXXVI, p. 132 (1930).

Described from females taken off Karroo rat, *Paratomys brantsi* (= *Otomys brantsi*), Deelfontein, Cape Province. Recorded by Mitchell (1921) as *L. stygius* from the following hosts near Bothaville, O.F.S.: Desert dwarf mouse, *Leggada deserti* (= *L. sp.*); large-eared mouse, *Malacothrix typicus* (= *M. sp.*); Cape fat mouse, *Steatomys krebsi* (= *S. sp.*); *Tatera lobengulae* (gerbille), and *Cynictis penicillata* (yellow mongoose). Also recorded by Ingram (1927b) as *L. stygius* from *Tatera lobengulae*, Randfontein and Pyramid in the Transvaal. Dr. Ingram received specimens taken off *Myotomys broomi* (Broom's Karroo rat) in the Calvinia District, C.P.

5. **Listropsylla prominens** Jordan.

♂ ♀. *Listropsylla prominens* Jordan, *Nov. Zool.*, XXXVI, p. 133, f. 3-5 (1930).

Described from specimens taken off multimammate mouse, *Mastomys coucha* (= *Rattus coucha*); African rat, *Aethomys chrysophilus* (= *Rattus chrysophilus*) and *Leggada minutoides* (dwarf mouse) at Mfongosi, Zululand.

6. **Listropsylla vicinus** (Rothschild).

♂ ♀. *Ceratophyllus vicinus* Roths., *Nov. Zool.*, XII, p. 484, Pl. 13, f. 7 (1905).

♂ ♀. *Listropsylla vicinus* (Roths.) Jordan, *ibid.*, p. 132 (1930).

Described from a male and female taken off the ruddy mongoose, *Myonax ratlamuchi* (= *Herpestes badius*) at Wakkerstroom, Transvaal.

Genus CTENOPHTHALMUS Kolenati.

Ctenophthalmus Kolenati, *Parasit. Chiropt.*, p. 33 (1856).

This genus contains a number of species found on rats and mice.

1. **Ctenophthalmus ansorgei** Rothschild.

Ctenophthalmus ansorgei Roths., *Nov. Zool.*, XIV, p. 330 (1907).

Described from specimens collected at Bihé, Angola, off mole-rat, *Cryptomys bocagei* de Wint. (= *Goerychus bocagei*).

2. **Ctenophthalmus calceatus** Waterston.

♀. *Ctenophthalmus calceatus* Waterst., *Ent. Mo. Mag.* (2), XXIII, p. 27 (1912).

♂. *Ctenophthalmus calceatus* Roths., *ibid.* (2), XXIV, p. 208 (1913).

Described from one ♀ taken off striped mouse, *Rhabdomys pumilio* (= *Arvicanthis pumilio*), Pirie Mountains, near Kingwilliamstown, C.P., and two ♂♂ taken off the same host in the same locality. Ingram (1927b) records taking three specimens in a nest of *Tatera lobengulae* (gerbille) at Randfontein, Transvaal.

This species is closely allied to *C. ansorgei* Roths. The ♀ also resembles that of *C. triodontis* Roths. (*Nov. Zool.*, XIV, p. 330, f. 3, 4, 1907).

Genus DINOPSYLLUS Jordan and Rothschild.

Dinopsyllus Jord. & Roth., *Nov. Zool.*, XX, iii, p. 561 (1913).

This genus contains eleven large species and one variety, mostly parasitic upon rats and mice. It is confined to Africa south of the Sahara. The species have the surface of the body with dorso-ventral lines.

Genotype: *Ctenopsyllus ellobius* Rothschild.

Key to the South African Species.

1. 0 to 2 genal spines *D. ingens*.
- Five genal spines 2
2. Vestigial frontal tubercle at or below centre of frons 3
- Vestigial frontal tubercle above centre of frons 5
3. Pronotum with two rows of setae; comb with 26 to 30 spines, these about two-thirds the length of pronotum; ♂: ventral armature of penis truncate; ♀: sternite VI with 24 to 34 setae; sternite VII with 55 to 69 setae (two sides together); sternite VIII with 25 to 39 setae on outer side below stigma 4
- Pronotum with three rows of setae; comb with 31 to 32 spines, less than two-thirds the length of pronotum; ♂: ventral armature of penis acuminate, strongly curved; ♀: sternite VI with 35 to 44 setae; sternite VII with 63 to 80 setae (two sides together); sternite VIII with 35 to 46 setae on outer side below stigma *D. tenax*.
4. ♂: apical margin of sternite VIII strongly rounded subapically *D. ellobius ellobius*
- ♂: apical margin of sternite VIII truncate-emarginate subventrally *D. ellobius abaris*.
5. ♂: combs on second and third tergites with eight or more spines; ♀: metepimerum with more than 28 setae; first tergite without spines *D. longifrons*.
- ♂: combs on second and third tergites with six or less spines; ♀: metepimerum with less than 26 setae
D. lypusus.

1. **Dinopsyllus ellobius ellobius** (Rothschild).

Ctenopsyllus ellobius Rothschild, *Nov. Zool.*, XII, p. 490 (1905).

Described from specimens taken off *Crocidura flavescens* (red shrew) at Wakkerstroom, Transvaal, and off *Mus. sp.* at Sibudeni, Zululand. Waterston (1915) has also recorded it from *Myodomys albicaudatus* (white-tailed rat), Grahamstown, C.P. Specimens have also been taken off *Otomys irroratus* at Grahamstown (coll. J. Hewitt; det. J. Waterston), and *Rhabdomys pumilio* (striped mouse) at Worcester, C.P. (B. De Meillon).

1A. **Dinopsyllus ellobius abaris** Jordan.

Dinopsyllus ellobius abaris Jord., *Nov. Zool.*, XXXVI, p. 129, f. 1 (1930).

Described from specimens taken off *Arvicanthus*, at Klaver, Doorn River, and Breede River, Cape Province.

2. **Dinopsyllus ingens** (Rothschild).

Typhlopsylla ingens Roths., *Ent. Rec.*, XII, p. 37, Pl. 2, f. 4 (1900).

Described from specimens taken off Cape dune mole, *Bathyergus suillus* (= *B. maritimus*) in the Cape Province. Waterston (1914) has recorded it "probably from porcupine". Dr. Ingram received specimens from the Cape Flats taken off *Cryptomys capensis* (Cape blesmol).

3. **Dinopsyllus longifrons** Jordan and Rothschild.

Dinopsyllus longifrons Jord. & Roths., *Nov. Zool.*, XX, iii, p. 566 (1913).

Described from specimens taken off the following hosts in Kenya Colony and Uganda: *Tachyorcytes audax*, *Otomys irroratus elgonis*, *Thamnomys sp.*, *Arvicanthus abyssinicus rubescens*, *Epimys sp.*, *Lophuromys sp.*, and *Oenomys sp.*

In the laboratory collection there are specimens taken off *Otomys irroratus* (African water rat) and *Mastomys coucha* (multimammate mouse), and from a nest of *Rhabdomys pumilio* (striped mouse) in the Uitenhage District, Cape Province. Specimens have also been taken off *Paratomys luteolus* (Karoo rat), Steynsburg, C.P., and off *Rhabdomys pumilio* on the Cape Flats (A. Ingram); also from *Tatera lobengulae* (gerbille) near Bothaville, Orange Free State, and a female from *Rattus rattus* (black rat) at Onderstepoort. Mr. De Meillon has received specimens taken off *R. pumilio*, Goudini Road and Breede River, C.P. (coll. T. Muller) and off *O. irroratus* and *T. lobengulae*, Breede River.

4. **Dinopsyllus lypusus** Jordan and Rothschild (Fig. 26r).

Dinopsyllus lypusus Jord. & Roths., *Nov. Zool.*, XX, iii, p. 570 (1913).

Dinopsyllus apistus Jord. & Roths., *ibid.*, p. 569 (1913), ♀ only.

Described from specimens collected in Kenya Colony and Uganda off several hosts belonging to the following genera: *Nasilio*, *Epimys*, *Arvicanthus*, *Lophuromys*, *Otomys*, *Oenomys*, and *Dasymys*.

Mitchell (1921) records it from the following hosts near Bothaville, Orange Free State: *Tatera lobengulae* (gerbille); multimammate mouse, *Mastomys coucha* (= *Rattus coucha*); striped mouse, *Rhabdomys pumilio* (= *Arvicanthus pumilio*), and large-eared mouse, *Malacothrix typicus* (= *M. sp.*). Ingram (1927b) has recorded it from the following hosts: *Geosciurus capensis* (Cape ground squirrel) at the Barrage, Vaal River, and in the Kroonstad District, O.F.S. *Desmodillus auricularis* (Namaqua gerbille) at Bloemfontein, O.F.S., and in the Kimberley District, C.P. *Tatera lobengulae* at Standerton, Robert's Drift, Sundra, Randfontein, Pyramid and Elim Hospital, in the Transvaal; at Viljoen's Drift, the Barrage, Weiveld Siding, and in the Kroonstad, Frankfort, Ladybrand, Heilbron and Hoopstad Districts in the Orange Free State. *Streatomys krebsi* (Cape flat mouse) at the Barrage, O.F.S. *Otomys irroratus* at Standerton, Transvaal, and Viljoen's Drift, O.F.S. *Myodomys albicaudatus* (white-tailed rat) at the Barrage, Weiveld Siding and in the Frankfort District, O.F.S. *Leggada deserti* (desert dwarf mouse) at Villiers, O.F.S., and Standerton, Transvaal. *Rhabdomys pumilio* on the Cape Flats. *Mastomys coucha* at Weiveld Siding, the Barrage and Knopiesfontein in the O.F.S., and at Randfontein, Transvaal; also from *Myotomys granti* (Grant's Karroo rat). Specimens have also been received by Dr. Ingram taken off *Tatera afra* (Cape gerbille) on the Cape Flats. The author found this species on *Aethomys chrysophilus* (African rat), *Mastomys coucha* and *Lemniscomys spinalis* (bushveld striped mouse) at Sycamore, Eastern Transvaal, in October and November, 1927. Mr. De Meillon received specimens taken off *Paratomys luteolus* (Karoo rat) at Tulbagh, C.P. (coll. C. V. Muller).

Ingram (1927b) has found this species to be capable of sucking human blood, and has demonstrated that it can transmit plague from infected rodents to uninfected rodents.

5. **Dinopsyllus tenax** Jordan.

♂ ♀. *Dinopsyllus tenax* Jordan, *Nov. Zool.*, XXXVI, p. 130, f. 2 (1930).

Described from specimens taken from nests of the Karroo rats, *Myotomys broomi* and *Paratomys luteolus* at Klaver, Doorn River, C.P.; also from Karroo rats, Breede River, C.P.

Genus *Hypsophthalmus* Jordan and Rothschild.

Hypsophthalmus Jord. & Roths., *Nov. Zool.*, XX, iii, p. 578 (1913).

This genus contains three African species, two of which have been found in South Africa.

Genotype: *Hypsophthalmus campestris* Jordan & Rothschild.

1. **Hypsophthalmus aganippes** (Rothschild).

Ctenopsyllus aganippes Rothschild, *Nov. Zool.*, XI, p. 647 (1904).

Described from specimens taken off *Mus. sp.* at Deelfontein, Cape Province. Ingram (1927b) has recorded it from *Myotomys broomi* (Broom's Karroo rat) in the Calvinia District, Cape Province. Specimens have been received by Mr. De Meillon taken off *Paratomys luteolus* (Karoo rat) at Doorn River, Klaver, C.P. (coll. C. V. Muller).

2. **Hypsophthalmus granti** (Rothschild), Fig. 26j.

Ctenopsyllus granti Roths., *Nov. Zool.*, XI, p. 646 (1904).

Described from specimens taken off Karroo elephant-shrew, *Macroscelides proboscideus* (= *Macro proboscideus*) at Deelfontein, Cape Province. Dr. Ingram has received specimens taken off the same host at Onderste Doorns, C.P., and from an elephant-shrew at Williston, C.P.

Genus LEPTOPSYLLA Jordan and Rothschild.

Ctenopsyllus Kolenati (1862), *nec Kolenati* (1856).

Leptopsylla Jord. & Roths., *Nov. Zool.*, XVIII, i, p. 85 (1911).

Genotype: *Ctenopsyllus musculi* (Dugès).

1. **Leptopsylla segnis** (Schönh) (Fig. 26k).

Pulex segnis Schönh, *Kon. Vet. Nya Handb.* (1816).

Pulex musculi Dugès, *Ann. Sci. Nat.*, XXVII, p. 160 (1832).

This species can be identified by the presence of two short, curved spines near the front angle of frons. Rothschild (1910) states that it is widely distributed, and is very common on rats and mice, especially *Mus musculus* (house mouse), with which it has spread. It occasionally bites man. Waterston (1915) has recorded it from the black rat, *Rattus rattus* (= *Mus rattus*) at Grahamstown, Cape Province. Ingram (1927b) has recorded it taken off *Rattus rattus* at Johannesburg and Standerton, in the Transvaal; East London, C.P., and Durban, Natal; also from *Tatera lobengulae* (gerbille) at Standerton. We have taken it off *R. rattus* at Onderstepoort and Mr. De Meillon has received specimens taken off the same host at Vryburg and Port Elizabeth, C.P. (coll. Dr. Gray). It has also been taken off *Rattus norvegicus* (brown rat) at Pietermaritzburg, Natal (coll. L. Hill). It has been shown to be capable of transmitting plague from rodent to rodent. It is also a secondary host of the exotic worm, *Hymenolepis diminuta*.

Family ISCHNOPSYLLIDAE.

This family, formally known as Ceratopsyllidae, contains a number of species found on bats.

Key to the South African Genera.

1. Maxillae sharp pointed, or acuminate at the lower distal angle; head and prothorax very short, the former higher than long, semicircular *Thaumapsylla*.
- Maxillae truncate, lower distal angle not acuminate, or only slightly so 2
2. Abdomen with combs *Ischnopsyllus*.
- Abdomen without combs, but minute spines may be present 3
3. Occiput with dorsal incrassations; posterior margin with several short, stout, pointed spine-like setae behind antennal groove *Araeopsylla*.
- Occiput without dorsal incrassations *Rhinolophopsylla*.

Genus THAUMAPSYLLA Rothschild.

Thaumapsylla Roths., *Nov. Zool.*, XIV, p. 329 (1907).

This genus contains a single species found on bats in South Africa.

1. **Thaumapsylla breviceps** Rothschild.

Thaumapsylla breviceps Roths., *Nov. Zool.*, XIV, p. 329 (1907).

Described from specimens taken off Cape fruit bat, *Rousettus leachi* (= *R. collaris*) in the Cape Province, and off long-winged fruit bat, *Eidolon helvum* (= *Rousettus stramineus*) at Knysna, Cape Province.

Genus ISCHNOPSYLLUS Westwood.

Ischnopsyllus Westwood, *Ent. Mo. Mag.*, I, p. 359 (1833).

This genus is widely distributed and contains twenty-six species found on bats.

Genotype: *Ceratopsyllus elongatus* Curtis.

1. **Ischnopsyllus ashworthii** Waterston.

Ischnopsyllus ashworthii Waterst., *Proc. R. Physic. Soc. Edin.*, XIX, i, p. 12, fig. (1913).

Described from a single female taken off Namaqua augur bat, *Rhinolophus geoffroyii augur* (= *R. augur*) at Pirie, Kingwilliamstown, Cape Province.

2. **Ischnopsyllus emminus** Jordan and Rothschild.

Ischnopsyllus emminus Jord. & Roths., *Ectoparasites*, I, iii, p. 142, f. 116, 117 (1921).

Described from one ♂ and two ♀♀ taken off Cape house bat, *Eptesicus capensis* (= *Vespertilio capensis*) at Greenwood Park, Natal.

3. **Ischnopsyllus grahami** Waterston.

Ischnopsyllus grahami Waterst., *Rec. Albany Mus.*, III, ii, p. 115, f. 1-3 (1915).

Described from ♂ taken off *Eptesicus capensis* (Cape house bat) at Grahamstown, Cape Province.

4. **Ischnopsyllus isomalus** Waterston.

Ischnopsyllus isomalus Waterst., *Rec. Albany Mus.*, III, ii, p. 109, f. 4, 5 (1915).

Araeopsylla isomalus (Waters.) Jord. and Roths., *Ectoparasites*, I, iii, p. 146 (1921).

Described from one ♀ taken in a cave near Pretoria, in which two species of bats were present, namely *Miniopterus sp.* and Namaqua augur bat, *Rhinolophus geoffroyii augur* (= *R. augur*). Specimens have been taken off *Miniopterus natalensis* (Natal sociable bat) in a cave at Irene, near Pretoria, 25th October, 1931 (coll. G.A.H.B.).

Genus *ARAEOPSYLLA* Jordan and Rothschild.

Araeopsylla Jord. & Roths., *Ectoparasites*, I, iii, p. 146 (1921).

This genus contains three species, one of which has been found in South Africa.

Genotype: *Ischnopsyllus scitulus* Rothschild.

1. **Araeopsylla scitulus** (Rothschild), Fig. 26L.

Ischnopsyllus scitulus Roths., *Nov. Zool.*, XVI, p. 55 (1909).

Described from specimens taken off *Nyctinomus aegyptiacus* (Egyptian free-tailed bat) at Kingwilliamstown, Cape Province. We have also taken specimens off *Nyctinomus bocagei* (Bocage's free-tailed bat) at Onderstepoort (det. Dr. K. Jordan).

Genus *RHINOLOPHOPSYLLA* Oudemans.

Rhinolophopsylla Oudemans, *Ent. Bericht.*, III, p. 3 (1909).

This genus contains four species found in Europe, Asia and Africa.

Genotype: *Typhlopsylla unipectinata* Taschenb.

1. **Rhinolophopsylla capensis** Jordan and Rothschild.

Rhinolophopsylla capensis Jord. & Roths., *Ectoparasites*, I, iii, p. 148, f. 126-128 (1921).

Described from a small series of ♂♂ and ♀♀ taken off *Nycteris capensis* (Cape long-eared bat) at Mfongosi, Zululand. Specimens taken off *Rhinolophus geoffroyii augur*, *Myotis tricolor* and *Miniopterus natalensis* in a cave at Irene, near Pretoria, 25th October, 1931 (coll. G.A.H.B.).

HOST-LISTS.

The host-lists have been divided into five parts as follows:—

	<i>Page.</i>
1. Ectoparasites found on man and domestic animals	464
2. Ectoparasites found on domestic birds	469
3. Ectoparasites found on South African mammals	470
4. Ectoparasites found on South African birds	488
5. Ectoparasites found on South African reptiles	512

It was thought advisable to arrange the mammals and birds according to the latest check-lists of the mammals and birds of South Africa. The classification and arrangement of the mammals, therefore, is that adopted by Austin Roberts in his M.S. "A Synoptic Check-list of the Mammals of South Africa", which will probably be published in the *Annals of the Transvaal Museum*, and the birds have been arranged according to "Synoptic Check-list of the Birds of South Africa" by the same author.

The families and specific names of the birds have been numbered, the numbers corresponding to the numbers in the above check-list.

The letters between brackets before the specific names of the parasites refer to the orders and families to which they belong, the following being a list:—

(A.S.) = Acarina.....	Family	Sarcoptidae (mange and scab mites).
(A.C.) =	"	Cytolichidae.
(A.A.) =	"	Analgesidae (feather mites).
(A.D.) =	"	Demodicidae (sebatic mites).
(A.C. ²) =	"	Cheyletidae.
(A.T.) =	"	Trombidiidae (harvest mites).
(A.D. ²) =	"	Dermanyssidae.
(A.P.) =	"	Parasitidae.
(I.A.) =	"	Argasidae (ticks).
(I.I.) =	"	Ixodidae (ticks).
(D.) = Dermaptera..	"	Hemimeridae.
(M.) = Anoplura.....	Suborder	Mallophaga (biting lice).
(R.) =	"	Rhyncophthirina (elephant lice).
(S.) =	"	Siphunculata (sucking lice).
(H.C.) = Hemiptera...	Family	Cimicidae (parasitic bugs).
(D.H.) = Diptera	"	Hippoboscidae.
(D.S.) =	"	Streblidae.
(D.N.) =	"	Nycteribiidae.
(S.T.) = Siphonaptera	"	Tungidae (chigoes).
(S.P.) =	"	Pulicidae (true fleas).
(S.I.) =	"	Ischnopsyllidae (bat fleas).

I.—HOST-LIST OF THE ECTOPARASITES FOUND ON MAN AND DOMESTIC ANIMALS IN SOUTH AFRICA.

HOMO SAPIENS.

- (A.S.) *Sarcoptes scabiei*.—A number of cases of human beings becoming infected with the varieties *scabiei*, *canis*, *bubulus* and *equi* have been recorded in Europe, and in addition to these the varieties *suis* and *caprae* have also been transmitted to man.
- (A.D.) *Demodex folliculorum* G. Simon, is another acarus which probably occurs in man in South Africa, but has not yet been recorded.
- (A.D.²) *Dermanyssus gallinae* Dugès.
 (A.D.²) *Liponyssus bacoti* (Hirst).
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas moubata* Murray.
 (I.A.) *Argas pavimentosus* (Neu.).
 (I.A.) *Argas persicus* (Oken).
 (I.A.) *Argas savignyi* Aud.
 (I.A.) *Argas talaje capensis* (Neu.).
 (I.A.) *Argas vespertilionis* (Latr.).
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch. (Larvae).
 (S.) *Pediculus humanus race humanus* Linné.
 (S.) *Pediculus humanus race corporis* De Geer.
 (S.) *Phthirus pubis* (Linné).
 (R.C.) *Cimex lectularius* Linné.
 (S.T.) *Tunga penetrans* (Linné).
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Pulex irritans* Linné.
 (S.P.) *Xenopsylla cheopis* (Roths.).
 (S.P.) *Ceratophyllus fasciatus* (Bosc.).
 (S.P.) *Leptopsylla segnis* (Schönh.).

EQUUS CABALLUS.

- (A.S.) *Sarcoptes scabiei equi* Raspail.
 (A.S.) *Sarcoptes scabiei bubulus* (Oudemans).
 (A.S.) *Sarcoptes scabiei caprae* Fürstenb.
 (A.S.) *Psoroptes equi* (Hering).
 (A.T.) *Trombicula* sp.
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas moubata* Murray.
 (I.A.) *Argas savignyi* Aud.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus capensis* Koch.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus evertsi mimeticus* Dönitz.
 (I.I.) *Rhipicephalus lunulatus* Neu.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Margaropus winthemi* Karsch.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Boophilus microplus* (Canestr.).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma variegatum* (Fabr.).
 (M.) *Bovicola equi* (Linné).
 (S.) *Haematopinus asini* (Linné).
 (D.H.) *Hippobosca rufipes* Von Olfers.
 (D.H.) *Hippobosca maculata* Leach.
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.

EQUUS ASINUS.

- (A.S.) *Sarcoptes scabiei equi* Raspail.
 (I.A.) *Argas mégnini* Dugès.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Margaropus winthemi* Karsch.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (M.) *Bovicola equi* (Linné).
 (S.) *Haematopinus asini* (Linné).
 (D.H.) *Hippobosca rufipes* Von Olfers.

MULE.

- (I.A.) *Argas mégnini* Dugès.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Margaropus winthemi* Karsch.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma variegatum* (Fabr.).
 (M.) *Bovicola equi* (Linné).
 (S.) *Haematopinus asini* (Linné).
 (D.H.) *Hippobosca rufipes* Von Olfers.

CATTLE.

- (A.S.) *Sarcoptes scabiei bubulus* (Oudemans).
 (A.S.) *Sarcoptes scabiei caprae* Fürstenb.
 (A.S.) *Sarcoptes scabiei equi* Raspail.
 (A.S.) *Sarcoptes scabiei mégnini nov. nom.*
 (A.S.) *Sarcoptes scabiei suis* Gerlach.
 (A.S.) *Psoroptes bovis* (Gerlach).
 (A.S.) *Psoroptes natalensis* Hirst.

- (A.T.) *Trombicula* sp.
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas moubata* Murray.
 (I.A.) *Argas savignyi* Aud.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Haemaphysalis silacea* Robinson.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus capensis* Koch.
 (I.I.) *Rhipicephalus duttoni* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus evertsi mimeticus* Dönitz.
 (I.I.) *Rhipicephalus lunulatus* Neu.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Rhipicephalus sanguineus* (Latr.).
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Margaropus winthemi* Karsch.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Boophilus microplus* (Canestr.).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma variegatum* (Fabr.).
 (I.I.) *Amblyomma marmoreum* Koch.
 (M.) *Bovicola bovis* (Linné).
 (S.) *Haematopinus eurytenuis* (Nitzsch).
 (S.) *Linognathus vituli* (Linné).
 (D.H.) *Hippobosca rufipes* Von Olfers.
 (D.H.) *Hippobosca maculata* Leach.
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.

SHEEP.

- (A.S.) *Sarcoptes scabiei bubulus* (Oudemans).
 (A.S.) *Sarcoptes scabiei caprae* Fürstenb.
 (A.S.) *Sarcoptes scabiei mégnini* nov. nom.
 (A.S.) *Psoroptes ovis* (Hering).
 (A.T.) *Trombicula* sp.
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas moubata* Murray.
 (I.A.) *Argas savignyi* Aud.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus punctatus* Bedford.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Rhipicephalus sanguineus* (Latr.).
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.

- (I.I.) *Amblyomma variegatum* (Fabr.).
 (M.) *Bovicola ovis* (Linné).
 (S.) *Linognathus africanus* Kellogg & Paine.
 (S.) *Linognathus pedalis* (Osborn).
 (D.H.) *Melophagus ovinus* Linné.

FAT-TAILED SHEEP.

- (M.) *Bovicola peregrina* (Tasch.).

GOATS.

- (A.S.) *Sarcoptes scabiei caprae* Fürstenb.
 (A.S.) *Sarcoptes scabiei equi* Raspail.
 (A.S.) *Sarcoptes scabiei mégnini* nov. nom.
 (A.S.) *Psoroptes caprae*.
 (A.S.) *Chorioptes caprae* Gerv. & Bened.
 (A.D.) *Demodex caprae* Railliet.
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas moubata* Murray.
 (I.A.) *Argas savignyi* Aud.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus capensis* Koch.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma variegatum* (Fabr.).
 (I.I.) *Amblyomma marmoreum* Koch (larve and nymphs).
 (M.) *Bovicola caprae* (Gurtl).
 (M.) *Bovicola limbatus* (Gervais).
 (M.) *Bovicola painei* (Kellogg & Nakayama).
 (S.) *Linognathus africanus* Kellogg & Paine.
 (S.) *Linognathus stenopsis* (Burm.).

PIG.

- (A.S.) *Sarcoptes scabiei bubulus* (Oudemans).
 (A.S.) *Sarcoptes scabiei caprae* Fürstenb.
 (A.S.) *Sarcoptes scabiei suis* Gerlach.
 (A.D.) *Demodex phylloides* Csokor.
 (I.A.) *Argas savignyi* Aud.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Haematopinus suis* (Linné).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.

DOG.

- (A.D.) *Demodex canis* Leyd.
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas moubata* Murray.

- (I.A.) *Argas savignyi* Aud.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicentor nuttalli* Cooper & Robins.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus capensis* Koch.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus lunulatus* Neu.
 (I.I.) *Rhipicephalus sanguineus* (Latr.).
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma variegatum* (Fabr.).
 (M.) *Heterodoxus longitarsus* (Piaget).
 (S.) *Linognathus setosus* (Olfers).
 (D.H.) *Hippobosca capensis* Von Olfers.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Pulex irritans* Linné.
 (S.P.) *Ctenocephalides canis* (Curtis).
 (S.P.) *Ctenocephalides felis* (Bouché).

CAT.

- (A.S.) *Notoedres cati cati* (Hering).
 (I.A.) *Argas mégnini* Dugès.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicephalus sanguineus* (Latr.).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (M.) *Felicola subrostrata* (Nitzsch).
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Xenopsylla brasiliensis* (Baker).
 (S.P.) *Xenopsylla cheopis* (Rothsch.).
 (S.P.) *Ctenocephalides felis* (Bouché).

RABBIT.

- (A.S.) *Sarcoptes scabiei precox* Canest.
 (A.S.) *Notoedres cati cuniculi* (Gerlach).
 (A.S.) *Psoroptes cuniculi* (Delafond).
 (A.C.²) *Cheyletiella parasitivorax* Mégnini.
 (S.) *Haemodipsus ventricosus* (Denny).

GUINEA-PIG.

- (M.) *Gyropus ovalis* Nitzsch.
 (M.) *Ghiricola porcelli* (Linné).

II.—HOST-LIST OF THE ECTOPARASITES FOUND ON DOMESTIC BIRDS IN SOUTH AFRICA.

FOWL.

- (A.S.) *Cnemidocoptes mutans* (Robin).
 (A.S.) *Cnemidocoptes gallinae* (Railliet).
 (A.C.) *Cytolichus nudus* (Viz.).
 (A.A.) *Dermoglyphus elongatus* (Mégn.).
 (A.A.) *Dermoglyphus minor* (Nörn.).
 (A.A.) *Epidermoptes bilobatus* Riv.
 (A.A.) *Rivoltasia bifurcata* (Riv.).
 (A.C.²) *Syringophilus bipectinatus* Heller.
 (A.D.²) *Liponyssus bursa* Berlese.
 (I.A.) *Argas moubata* Murray.
 (I.A.) *Argas parimentosus* (Neu.).
 (I.A.) *Argas persicus* (Oken).
 (I.A.) *Argas savignyi* Aud.
 (I.A.) *Argas talaje capensis* (Neu.).
 (I.I.) *Hyalomma aegyptium impressum* Koch (larvae and nymphs).
 (I.I.) *Amblyomma hebraeum* Koch (larvae and nymphs).
 (M.) *Lipeurus caponis* (Linné).
 (M.) *Lipeurus heterographus* Nitzsch.
 (M.) *Lipeurus tropicalis* Peters.
 (M.) *Goniodes dissimilis* Nitzsch.
 (M.) *Goniocotes hologaster* Nitzsch.
 (M.) *Goniocotes gigas* Taschb.
 (M.) *Menopon gallinae* (Linné).
 (M.) *Neumannia numidae* (Giebei).
 (M.) *Eomenacanthus stramineus* (Nitzsch).
 (H.C.) *Cimer columbarius* Jenyns.
 (S.T.) *Echidnophaga gallinacea* (Westw.).

TURKEY.

- (A.S.) *Cnemidocoptes mutans* (Robin).
 (A.A.) *Microspalax chanayi* Trt.
 (A.A.) *Dermoglyphus minor* (Nörn.).
 (A.A.) *Mégninia cubitalis* (Mégn.).
 (I.A.) *Argas persicus* (Oken).
 (I.I.) *Hyalomma aegyptium impressum* Koch (nymphs).
 (M.) *Lipeurus galliparonis* (Geoff.).
 (M.) *Gonodes meleagridis* (Linné).
 (M.) *Eomenacanthus stramineus* (Nitzsch).

GOOSE.

- (I.A.) *Argas persicus* (Oken).
 (M.) *Esthiopterum anseris* (Linné).

DUCK.

- (I.A.) *Argas persicus* (Oken).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Anatoecus icterodes* (Nitzsch).

PIGEON.

- (A.A.) *Falculifer rostratus* (Buchh.).
 (A.A.) *Mégninia columbae* (Buchh.).
 (A.A.) *Analges bifidus* (Nitzsch).
 (A.A.) *Pterophagus strictus* Mégn.
 (A.C.) *Syringophilus columbae* Hirst.
 (A.C.) *Sarcopterinus nidulans* (Nitzsch).
 (I.A.) *Argas persicus* (Oken).
 (M.) *Goniocotes bidentatus* (Scopoli).
 (M.) *Menacanthus giganteus* (Denny).
 (D.H.) *Pseudobynchia maura* (Bigot).

CANARY.

- (I.A.) *Argas persicus* (Oken).
 (M.) *Menacanthus spiniferus* (Piaget).

PEACOCK.

- (A.A.) *Pterolichus pavonis* Oudms.
 (A.A.) *Mégninia pavonis* Oudms.
 (A.C.) *Cheletoides uncinata* (Heller).
 (M.) *Goniodes parviceps* Piaget.
 (M.) *Goniodes pavonis* (Linné).
 (M.) *Goniocotes rectangulatus* N.
 (M.) *Menopon phacostomum* N.

OSTRICH.

- (A.A.) *Pterolichus bicaudatus* (Gerv.).
 (A.A.) *Pterolichus sculpturatus* Hirst.
 (I.A.) *Argas mégnini* Dugès.
 (I.A.) *Argas persicus* (Oken).
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (M.) *Struthiolipeurus struthionis* (Ger.).
 (D.H.) *Hippobosca struthionis* Janson.

III.—HOST-LIST OF THE ECTOPARASITES FOUND ON SOUTH AFRICAN MAMMALIA.

Order INSECTIVORA.

Family CHRYSOCHLORIDAE.

No parasites have been recorded from the South African golden moles.

Family ERINACEIDAE.

- Atelerix frontalis* (A. Smith). South African hedgehog.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicentor nuttalli* Cooper & Robins.
 (I.I.) *Rhipicephalus lunulatus* Neu.
 (I.I.) *Rhipicephalus sanguineus* (Latr.).
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Rhipicephalus theileri* Bedf. & Hewitt.
 (I.I.) *Hyalomma aegyptium impressum* Koch. (Larvae and nymphs).
 (S.T.) *Echidnophaga larina* Jord. & Roths.
 (S.P.) *Ctenocephalides connatus* (Jordan).

Family CROCIDURIDAE.

- Myosorex tenuis* Thos. & Schw. Drakensberg forest shrew.
 (S.P.) *Listropsylla chelura* Rothsch.
Crociodura flavescens I. Geoff. Red shrew.
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Dinopsyllus ellobius* Rothsch.

Family MACROSCOLIDIDAE.

- Macroscelides proboscideus* (Shaw). Karroo elephant shrew.
 (S.P.) *Hypsophthalmus granti* Rothsch.
Elephantulus najurus jamesoni Chubb. Jameson's rock-shrew.
 (S.) *Neolinognathus elephantuli* Bedford.

Order CARNIVORA.

Family VIVERRIDAE.

Subfamily VIVERRINAE.

- Civettictis civetta orientalis* (Matschie). Civet cat.
 (I.I.) *Haemaphysalis leachii* (Aud.).
Genetta felina felina (Thumb.). Cape small-spotted genet.
 (I.I.) *Haemaphysalis leachii* (Aud.).
Genetta felina ludia Thos. and Schw. Transvaal small-spotted genet.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Felicola genetta* (Bedford).
Genetta tigrina Schreb. Large-spotted genet.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Felicola genetta* (Bedford).
 (S.P.) *Ctenocephalides felis strongylus* Jordan.
Genetta rubiginosa Puch. Rusty-spotted genet.
 (S.P.) *Ctenocephalides connatus* (Jord.).

Subfamily HERPESTINAE.

- Herpestes caffer* (Gmel.). Large grey mongoose.
 (I.I.) *Ixodes rarus* Neu.
 (M.) *Felicola rammei* (Stobbe).
Myonax nigratus (Thomas). Damara brown mongoose.
 (M.) *Felicola calogalea* (Bedford).
Myonax ratlamachi (A. Smith). (*Herpestes badius*.) Ruddy mongoose.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Ctenocephalides connatus* (Jord.).
 (S.P.) *Listropsylla vicinus* (Rothsch.).

Myonax cauvii (A. Smith). Slender mongoose.

- (I.I.) *Ixodes rarus* Neu.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicephalus simus* Koch.
 (M.) *Felicola calogalea* (Bedford).
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).

Myonax pulverulentus (Wagner). Grey mongoose.

- (M.) *Felicola calogalea* (Bedford).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Ctenocephalides felis strongylus* (Jord.).

Ichneumia albicauda (G. Cuv.). White-tailed mongoose.

- (M.) *Felicola rostrata* Bedford.

Cynictis penicillata (G. Cuv.). Yellow mongoose.

- (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Felicola cynictis* (Bedford).
 (S.T.) *Echidnophaga bradyta* Jord. & Rothsch.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla erilli* (Rothsch.).
 (S.P.) *Ctenocephalides connatus* (Jord.).
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla dorippae* (Rothsch.).

Paracynictis selousi (de Winton). Selous' mongoose.

- (M.) *Felicola setosa* Bedford.

Atilax paludinosus (G. Cuv.). Water mongoose.

- (Syn. *Herpestes galera*).
 (M.) *Felicola acutirostris* (Stobbe).

Helogale parvula brunnula Thos. and Schw. Letaba pigmy mongoose.

- (M.) *Felicola helogale* Bedford.

Mungos mungo (Gmel). Banded mongoose.

- (I.I.) *Amblyomma hebraeum* Koch. (Nymphs).
 (S.T.) *Echidnophaga gallinacea* (Westw.).

Suricata suricatta Erxl. (*S. tetradactyla*). Suricate.

- (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Suricatoecus cooleyi* (Bedford).
 (S.T.) *Echidnophaga bradyta* Jord. & Rothsch.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla erilli* (Rothsch.).
 (S.P.) *Ctenocephalides connatus* (Jord.).
 (S.P.) *Chiastopsylla rossi* (Waterst.).

Family HYAENIDAE.

Crocuta crocuta Matschie. Spotted hyaena.

- (S.T.) *Echidnophaga larina* Jord. & Rothsch.

Hyaena.

- (I.I.) *Rhipicephalus simus* Koch.

Family PROTELIDAE.

Proteles cristatus (Sparrm.). Aardwolf.

- (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Protelicola intermedia* Bedford.
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Pulex irritans* Linné.

Family FELIDAE.

Leo leo Linné. Lion.

- (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicephalus sanguineus* (Latr.)
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.

Caracal caracal (Schreb.). Caracal.

- (S.P.) *Pulex irritans* Linné.
 (S.P.) *Procaviopsylla creusae* (Rothsch.). Straggler.
 (S.P.) *Procaviopsylla divergens* (Jord. & Rothsch.).
 Straggler.

Micropelis nigripes (Burch.). Black-footed cat.

- (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Amblyomma hebraeum* Koch. (Larvae).

Felis ocreata caffra (Desm.). Cape wild cat.

- (I.I.) *Ixodes pilosus* Koch.
 (M.) *Felicola caffra* (Bedford).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Ctenocephalides connatus* (Jordan).
 (S.P.) *Ctenocephalides felis* (Bouché).

Panthera pardus. Leopard.

- (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.

Family CANIDAE.

Vulpes chama (A. Smith). Silver fox.

- (A.S.) *Sarcoptes scabiei* var.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicephalus theileri* Bedford & Hewitt.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Synosternus caffer* (Roth. & Jord.).
 (S.P.) *Ctenocephalides connatus* (Jordan).

Thos mesomelas (Schreb.). Black-backed jackal.

- (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Pulex irritans* Linné.
 (S.P.) *Synosternus caffer* (Jord. & Rothsch.). Straggler.
 (S.P.) *Ctenocephalides connatus* (Jordan).

Lycaon pictus venaticus Burch. Cape hunting dog.

- (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Ctenocephalides connatus* (Jordan).

Family MUSTELIDAE.

Subfamily LUTRINAE.

No parasites have been recorded from South African otters.

Subfamily MELINAE.

Mellivora capensis (Schreb.). Cape badger.

- (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Trichodectes vosseleri* Stobbe.

Subfamily MEPHITINAE.

Ictonyx striatus (Parry). Stink muishond.

- (I.I.) *Haemaphysalis leachii* (Aud.).
 (M.) *Trichodectes ovalis* Bedford.
 (S.T.) *Echidnophaga bradyta* Jord. & Rothsch.
 (S.P.) *Xenopsylla erilli* (Rothsch.).
 (S.P.) *Ctenocephalides connatus* (Jord.).

Poecilogale albinucha (Gray). Snake muishond.

- (M.) *Trichodectes ovalis* Bedford.

Family PHOCIDAE.

Macrorhinus leoninus. Elephant seal.

- (S.) *Lepidophthirus macrorhini* Enderl.

Order ARTIODACTYLA.

Family HIPPOPOTAMIDAE.

Hippopotamus amphibius Linné. Hippopotamus.

- (I.I.) *Hyalomma hippopotamense* (Denny).

Family SUIDAE.

Koiiopotamus choeropotamus choeropotamus (Desm.). Bush pig.

- (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (S.) *Haematopinus latus* Neumann.

Phachochoerus aethiopicus (Linné). African warthog.

- (I.I.) *Hyalomma aegyptium* (Linné).
 (S.) *Haematopinus phachochoeri* Enderlein.

Phachochoerus sundevalli (Lönnb.) Natal warthog.

- (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Haematopinus phachochoeri* Enderlein.
 (S.T.) *Echidnophaga larina* Jord. & Roths.

Family GIRAFFIDAE.

Giraffa camelopardalis L. Giraffe.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Linognathus brevicornis* (Giebel).

Family BOVIDAE.

Syncerus caffer (Sparrm.). African buffalo.

- (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Haematopinus bufali* (De Geer).

Gorgon taurinus (Burch.). Blue wildebeest.

- (A.S.) *Sarcoptes scabiei* var.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Hyalomma aegyptium* (Linné).
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Linognathus gnu* Bedford.
 (S.) *Linognathus* nov. sp.
 (M.) *Damalinia theileri* Bedford.
 (D.H.) *Hippobosca rufipes* Von Olfers.

Connochaetes gnu (Zimm.). Black wildebeest.

- (S.) *Linognathus gnu* Bedford.
 (M.) *Bovicola harrisoni* (Cumm.).

Damaliscus albifrons (Burch.). Blesbok.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Boophilus decoloratus* (Koch).
 (M.) *Damalinia crenelata* (Piaget).
 (S.) *Linognathus* nov. sp.

Damaliscus dorcas (Pallas). [*D. pygargus* (Pall.)]. Bontebok.

- (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (M.) *Damalinia crenelata* (Piaget).
 (S.P.) *Xenopsylla cheopis* (Rothsch.).

Equinus equinus (Desm.). Roan antelope.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Hyalomma aegyptium* (Linné).

Ozanna nigra (Harris). Sable antelope.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Boophilus decoloratus* (Koch).
 (S.) *Linognathus* nov. sp.

Kobus ellipsiprymnus ellipsiprymnus (Ogilby). Waterbuck.

- (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus sanguineus* (Latr.).
 (I.I.) *Boophilus decoloratus* (Koch).

Redunca arundinum (Bodd.). Reedbuck.

- (I.I.) *Haemaphysalis aciculifer* Warburton.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (S.) *Linognathus fahrenheitzi* Paine.
 (M.) *Tricholipeurus reduncae* Bedford.
 (D.H.) *Echestypus paradoxus* (Newst.).

Redunca fulvorufula (Afz.). Mountain reedbuck.

- (S.) *Linognathus fahrenheitzi* Paine.
 (M.) *Tricholipeurus trabeculae* Bedford.

Pelea capreolus (Bchst.). Vaal rhebok.

- (I.I.) *Ixodes rubicundus* Neu.

Antidorcas marsupialis (Zimm.). Springbok.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (S.) *Linognathus tibialis* (Piaget).
 (S.) *Linognathus nov. sp.*
 (M.) *Tricholipeurus antidorcus* Bedford.
 (D.H.) *Echestypus binoculus* Speiser.

Aepyceros melampus (Lcht.). Impala.

- (I.I.) *Ixodes rarus* Neu.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Boophilus decoloratus* (Koch).
 (S.) *Linognathus sp.*
 (M.) *Tricholipeurus nov. sp.*

Aepyceros petersi Bochee. Angola impala.

- (M.) *Tricholipeurus aepycerus* Bedford.

Raphiceros campestris (Thunb.). Steenbuck.

- (A.S.) *Sarcoptes scabiei* var.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (S.) *Linognathus sp.*
 (M.) *Tricholipeurus lineatus* (Bedford).
 (D.H.) *Echestypus binoculus* Speiser.

Nototragus melanotis (Thunberg). Grysbok.

- (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Ixodes rubicundus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.

Taurotragus oryx (Pallas). Eland.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus evertsi mimeticus* Dönitz.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Hyalomma aegyptium* (Linné).
 (S.) *Haematopinus taurotragi* Cumm.
 (S.) *Linognathus taurotragus* Bedford.

Strepsiceros strepsiceros (Pallas). Koodoo.

- (A.S.) *Sarcoptes scabiei strepsiceros* Bedford.
 (I.I.) *Rhipicentor nuttalli* Cooper & Robins.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus evertsi mimeticus* Dönitz.
 (I.I.) *Rhipicephalus oculatus* Neu.
 (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Boophilus decoloratus* (Koch).
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Haematopinus taurotragi* Cumm.
 (D.H.) *Echestypus paradoxus* (Newst.).

Nyala angasi (Ang.). Nyala.

- (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus sp.*
 (I.I.) *Amblyomma hebraeum* Koch.
 (D.H.) *Echestypus paradoxus* (Newst.).

Tragelaphus sylvaticus (Sparrm.). Bushbuck.

- (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Haemaphysalis parvata* Neu.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Amblyomma hebraeum* Koch.
 (S.) *Linognathus nov. sp.*
 (S.) *Linognathus nov. sp.*
 (D.H.) *Echestypus paradoxus* (Newst.).

Sylviacapra grimmii (Linné). Cape duiker.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Hyalomma aegyptium impressum* Koch.
 (I.I.) *Amblyomma hebraeum* Koch.
 (M.) *Tricholipeurus lerouxi* Bedford.
 (S.) *Linognathus angulatus* (Piaget).
 (D.H.) *Echestypus paradoxus* (Newst.).
 (S.P.) *Ctenocephalides connatus* (Jord.)

Cephalophus natalensis (A. Smith). Red duiker.

- (S.) *Linognathus angulatus* (Piaget).

Philantomba monticola (Thunb.). Blue duiker.

- (M.) *Tricholipeurus bedfordi* (Hill).
 (S.) *Linognathus angulatus* (Piaget).
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Ctenocephalides canis* (Curtis).
 (S.P.) *Ctenocephalides felis* (Bouché).

Order PROBOSCIDEA.

Family ELEPHANTIDAE.

Loxodonta africanus (L.). African elephant.

- (I.I.) *Amblyomma hebraeum* Koch.
 (R.) *Haematomyzus elephantis* Piaget.

Order HYRACOIDEA.

Family PROCAVIIDAE.

Dendrohyrax arborea (A. Smith). Bush dassie.

- (M.) *Procavicola univirgata* (Neu.).
 (M.) *Procavicola neumanni* (Stobbe).
 (M.) *Procaviphilus granulatus* (Ferris).

Heterohyrax granti (Wroughton). Grant's dassie.

- (M.) *Procavicola lindfieldi* (Hill).
 (M.) *Procavicola heterohyracis* Bedford.
 (M.) *Dasyonyx transvaalensis* Bedford.
 (M.) *Procaviphilus sclerotis* Bedford.

Heterohyrax ruddi (Wroughton). Rudd's dassie.

- (M.) *Procavicola lindfieldi* (Hill).
 (M.) *Procavicola emarginata* (Bedford).
 (M.) *Dasyonyx oculatus* (Bedford).
 (M.) *Procaviphilus robertsi* (Bedford).
 (S.) *Prolinognathus caviae-capensis* (Pallas).

Procavia waterbergensis Brauer. Loc. South-West Africa.

- (M.) *Dasyonyx waterbergensis* Bedford.
 (S.) *Prolinognathus caviae-capensis* (Pallas).

Procavia coombi Roberts. Loc. Transvaal, Orange Free State.

- (I.I.) *Haemaphysalis cooleyi* Bedford.
 (I.I.) *Rhipicephalus punctatus* Bedford.
 (M.) *Procavicola pretoriensis* Bedford.
 (M.) *Dasyonyx ovalis* Bedford.
 (M.) *Dasyonyx transvaalensis* Bedford.
 (M.) *Procaviphilus serraticus* (Hill).?
 (S.) *Prolinognathus caviae-capensis* (Pallas).
 (S.P.) *Procaviopsylla angolensis* Jordan.

Procavia capensis (Pallas). Loc. Capetown, C.P.

- (S.P.) *Procaviopsylla creusae* (Rothsch.).
 (S.) *Prolinognathus caviae-capensis* (Pallas).

Procavia natalensis Roberts. Loc. Pigg's Peak, Swaziland; Deepdale, Natal; Grahamstown and Knysna, Cape Province.

- (M.) *Procavicola lindfieldi* (Hill).
 (M.) *Procavicola natalensis* Bedford.
 (M.) *Procaviphilus serraticus* (Hill).
 (S.P.) *Procaviopsylla creusae* (Rothsch.).

Procavia sp. Loc. Mtabamhlope, Natal.

- (I.I.) *Laodes rarus* Neumann.
 (M.) *Procavicola lindfieldi* (Hill).
 (M.) *Procavicola sternata* (Bedford).
 (M.) *Procaviphilus serraticus* (Hill).
 (S.) *Prolinognathus caviae-capensis* (Pallas).
 (S.P.) *Procaviopsylla divergens* (Jord. & Rothsch.).

Procavia sp. Loc. Mount Fletcher, C.P.

- (M.) *Procavicola subparva* Bedford.

Procavia sp. Loc. Lamberts Bay, C.P.

- (M.) *Procavicola parva* Bedford.
 (M.) *Procaviphilus serraticus* (Hill).
 (S.) *Prolinognathus caviae-capensis* (Pallas).

Procavia sp. Loc. Deelfontein, C.P.

- (S.P.) *Procaviopsylla creusae* (Rothsch.).
 (S.P.) *Procaviopsylla divergens* (Jord. & Rothsch.).

Order PERISSODACTYLA.

Family RHINOCEROTIDAE.

Ceratotherium simum (Burch.). White rhinoceros.

- (I.I.) *Dermacentor rhinocerotis* (De Geer).
 (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma petersi* Karsch.

Diceros bicornis (Linné). Black rhinoceros.

- (I.I.) *Dermacentor rhinocerotis* (De Geer).
 (I.I.) *Rhipicephalus maculatus* Neu.
 (I.I.) *Amblyomma hebraeum* Koch.
 (I.I.) *Amblyomma petersi* Karsch.
 (I.I.) *Amblyomma variegatum* (Fabr.).

Family EQUIDAE.

Hippotigris burchelli wahlbergi Poc. Wahlberg's zebra.

- (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus maculatus* Neu.

Hippotigris burchelli var.

- (I.I.) *Boophilus decoloratus* (Koch).
 (M.) *Bovicola ocellata* (Piaget).
 (S.) *Haematopinus asini* Linné.

Order TUBULIDENTATA.

Family ORYCTEROPIDAE.

Orycteropus afer (Pallas). Cape ant-bear.

- (S.) *Hybophthirus notophallus* (Neu.).
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.

Order EDENTATA.

Family MANIDAE.

- Smutsia temminckii* (Smuts). Scaly ant-bear.
 (I.I.) *Rhipicephalus simus* Koch.
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.

Order RODENTIA.

Family HYSTRICIDAE.

- Hystrix africae-australis* Ptrs. (Cape porcupine.)
 (S.T.) *Echidnophaga larina* Jord. & Rothsch.
 (S.P.) *Pariodontis riggenbachi* (Rothsch.).

Family PEDETIDAE.

- Pedetes caffer* (Pallas). Springhare.
 (A.P.) *Androlaelaps* sp.
 (A.P.) *Haemolaelaps* sp.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Haemaphysalis cooleyi* Bedford.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (S.) *Eulinognathus denticulatus* Cumm.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Synosternus caffer* (Jord. & Rothsch.).
 (S.P.) *Ctenocephalides connatus* (Jord.)

Family PETROMYIDAE.

- Petromys typicus tropicalis*. Rock rat.
 (S.) *Scipio* nov. sp.
Petromys nov. sp.
 (S.) *Scipio* nov. sp.

Family THRYONOMYIDAE.

- Thryonomys swinderianus variegatus* Ptrs. Natal cane-rat.
 (I.I.) *Ixodes ugandanus* Neu.
 (I.I.) *Rhipicephalus evertsi* Neu.
 (I.I.) *Rhipicephalus simus* Koch.
 (I.I.) *Amblyomma hebraeum* Koch. (Nymphs).
 (S.) *Scipio aulacodi* (Neu.).
 (S.) *Scipio breviceps* Ferris.

Family SCIURIDAE.

- Paraxerus cepapi* (A. Smith). Yellow-footed squirrel.
 (I.I.) *Rhipicephalus appendiculatus* Neu.
Paraxerus palliatus ornatus (Gray). Zululand squirrel.
 (S.) *Enderleinellus zonatus* Ferris.
 (S.) *Neohaematopinus heliosciuri* Cummings.
 (S.) *Neohaematopinus suahelicus* Ferris.

Geosciurus capensis Kerr. Cape ground squirrel.

- (A.P.) *Haemolaelaps* sp.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (I.I.) *Rhipicephalus theileri* Bedf. & Hewitt.
 (S.) *Linognathoides faurei* Bedford.
 (S.T.) *Echidnophaga bradyta* Jord. & Rothsch.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Pulex irritans* Linné. (Straggler).
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla erilli* (Rothsch.).
 (S.P.) *Ctenocephalides connatus* (Jord.).
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch. (Straggler).

Family GRAPHIURIDAE.

- Claviglis ocularis* (A. Smith). Cape dormouse.
 (S.P.) *Chiastoposylla octavii* Rothsch.
Claviglis nanus (de Winton). Rhodesian least grey dormouse.
 (S.) *Schizophthirus graphiuri* Ferris.
Claviglis alticola Roberts.
 (S.) *Schizophthirus graphiuri* Ferris.
Claviglis murinus (Desm.).
 (S.P.) *Xenopsylla hamula* Jord.

Family CRICETIDAE.

Subfamily CRICETINAE.

- Mystromys albicaudatus* (A. Smith). White-tailed rat.
 (S.P.) *Xenopsylla cheopis* (Rothsch.).
 (S.P.) *Chiastoposylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Dinopsyllus ellobius* Rothsch.
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.

Subfamily GERBILLINAE.

- Desmodillus auricularis* (A. Smith). Short-tailed gerbille.
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla piriei* Ingram.
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.
Tatera afra (Gray). Cape gerbille.
 (S.P.) *Xenopsylla hirsuta* Ingram.
 (S.P.) *Xenopsylla sulcata* Ingram.
 (S.P.) *Chiastoposylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.
Tatera angolae Wr. Angola gerbille.
 (S.) *Hoplopleura biseriata* Ferris.

Tatera lobengulae de Winton. Lobengula's gerbille.

- (A.P.) *Laelaps muricola* Trägårdh.
 (A.P.) *Haemolaelaps* sp.
 (I.I.) *Ixodes pilosus* Koch.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (S.) *Polyplax biseriata* Ferris.
 (S.) *Hoplopleura biseriata* Ferris.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla hirsuta* Ingram.
 (S.P.) *Xenopsylla lobengulae* De Meillon.
 (S.P.) *Xenopsylla piriei* Ingram.
 (S.P.) *Xenopsylla sulcata* Ingram.
 (S.P.) *Xenopsylla trifarius* De Meillon.
 (S.P.) *Chiastopsylla mulleri* Ingram.
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Listropsylla chelura* Rothsch.
 (S.P.) *Listropsylla dorippae* (Rothsch.).
 (S.P.) *Ctenophthalmus calceatus* Waterst.
 (S.P.) *Dinopsyllus longifrons* Jord. & Rothsch.
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.
 (S.P.) *Leptopsylla segnis* (Schönh.). (Straggler).

Family MURIDAE.

Subfamily OTOMYINAE.

Otomys irroratus (Brants). African water rat.

- (A.P.) *Laelaps parvulus* Hirst.
 (I.I.) *Haemaphysalis leachii* (Aud.).
 (S.) *Polyplax otomydis* Cummings.
 (S.P.) *Xenopsylla cheopis* (Rothsch.).
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Chiastopsylla numae* (Rothsch.).
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Listropsylla chelura* (Rothsch.).
 (S.P.) *Dinopsyllus ellobius* Rothsch.
 (S.P.) *Dinopsyllus longifrons* Jord. & Rothsch.
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.

Myotomys turneri (Wrough.). Turner's Karroo rat.

- (S.P.) *Listropsylla agrippinae* (Rothsch.).

Myotomys broomi (Thos.). Broom's Karroo rat.

- (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla piriei* Ingram.
 (S.P.) *Chiastopsylla mulleri* Ingram.
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Listropsylla cerrita* Jord.
 (S.P.) *Listropsylla dorippae* (Rothsch.).
 (S.P.) *Dinopsyllus tenax* Jord.
 (S.P.) *Hypsophthalmus aganippes* (Rothsch.).

Myotomys unisulcatus (Cuv.). Cuvier's Karroo rat.

- (S.P.) *Listropsylla agrippinae* (Rothsch.).

Myotomys granti (Thos.). Grant's Karroo rat.

- (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Chiastopsylla pitchfordi* Ingram.
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.

Paratomys brantsi (A. Smith). Brant's Karroo rat.

- (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Chiastopsylla numae* (Rothsch.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Listropsylla dorippae* (Rothsch.).

Paratomys luteolus (Thos. & Schw.). Eastern Karroo rat.

- (S.) *Polyplax otomydis* Cumm.
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Xenopsylla piriei* Ingram.
 (S.P.) *Chiastopsylla mulleri* Ingram.
 (S.P.) *Chiastopsylla numae* (Rothsch.).
 (S.P.) *Chiastopsylla pitchfordi* Ingram.
 (S.P.) *Chiastopsylla quadrisetis* De Meillon.
 (S.P.) *Chiastopsylla rossi* (Waterst.).
 (S.P.) *Listropsylla agrippinae* (Rothsch.).
 (S.P.) *Listropsylla cerrita* Jord.
 (S.P.) *Dinopsyllus longifrons* Jord. & Rothsch.
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.
 (S.P.) *Dinopsyllus tenax* Jord.
 (S.P.) *Hypsophthalmus aganippes* (Rothsch.).

Subfamily DENDROMYINAE.

Malacothrix typicus (A. Smith). Large-eared mouse.

- (S.) *Hoplopleura biseriata* Ferris.
 (S.P.) *Xenopsylla eridos* (Rothsch.).
 (S.P.) *Listropsylla dorippae* (Rothsch.).
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.

Steatomys krebsi Ptrs. Cape fat mouse.

- (S.P.) *Listropsylla dorippae* (Rothsch.).
 (S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.

Subfamily CRICETOMYINAE.

Cricetomys gambianus Waterh. Giant rat.

- (D.) *Hemimerus talpoides* Walker.
 (S.) *Polyplax calva* Waterst.
 (S.P.) *Xenopsylla scopulifer* (Rothsch.).
 (S.P.) *Xenopsylla tortus* Jord. & Rothsch.

Subfamily SACCOSTOMYINAE.

Saccostomys campestris (Ptrs.). Peter's pouched mouse.

- (S.) *Polyplax jonesi* Kellogg & Ferris.
 (S.P.) *Xenopsylla scopulifer* (Rothsch.).

Subfamily MURINAE.

Mus musculus Linné. House mouse.

No parasites have been found on this mouse in South Africa.

Leggada minutoides (A. Smith). Dwarf mouse.(S.P.) *Listropsylla prominens* Jordan.*Leggada deserti* Thos. Desert dwarf mouse.(S.P.) *Xenopsylla eridos* (Rothsch.).(S.P.) *Listropsylla dorippae* (Rothsch.).(S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.*Rhabdomys pumilio* (Sparrm.). Striped mouse.(A.P.) *Laelaps giganteus bakeri* Hirst.(A.P.) *Laelaps muricola* Trägardh.(I.I.) *Haemaphysalis leachii* (Aud.).(S.) *Polyplax arvicantis* Bedford.(S.P.) *Xenopsylla brasiliensis* (Baker).(S.P.) *Xenopsylla eridos* (Rothsch.).(S.P.) *Xenopsylla hirsuta* Ingram.(S.P.) *Xenopsylla versuta* Jordan.(S.P.) *Chiastopsylla godfreyi* Waterst.(S.P.) *Chiastopsylla octavii* Rothsch.(S.P.) *Chiastopsylla rossi* (Waterst.).(S.P.) *Listropsylla agrippinae* (Rothsch.).(S.P.) *Listropsylla chelura* Rothsch.(S.P.) *Ctenophthalmus calceatus* Waterst.(S.P.) *Dinopsyllus ellobius* (Rothsch.).(S.P.) *Dinopsyllus longifrons* Jord. & Rothsch.(S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.*Lemniscomys spinalis* Thos. (*Arvicantis dorsalis*). Bushveld

striped mouse.

(A.P.) *Laelaps giganteus* Berlese.(A.P.) *Laelaps parvulus* Hirst.(S.) *Hoplopleura enormis enormis* Kellogg & Ferris.(S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.*Rattus rattus* (Linné). Black rat.(A.S.) *Notoedres notoedres* (Méigen).(I.I.) *Haemaphysalis leachii* (Aud.).(I.I.) *Hyalomma aegyptium impressum* Koch. (Immature).(S.) *Polyplax spinulosa* (Burm.).(S.T.) *Echidnophaga gallinacea* (Westw.).(S.P.) *Xenopsylla brasiliensis* (Baker).(S.P.) *Xenopsylla cheopis* (Rothsch.).(S.P.) *Ceratophyllus fasciatus* (Bosc.).(S.P.) *Ceratophyllus londiniensis* Rothsch.(S.P.) *Chiastopsylla rossi* (Waterst.).(S.P.) *Dinopsyllus longifrons* Jord. & Rothsch.(S.P.) *Leptopsylla segnis* (Schönh.).*Rattus norvegicus* (Erxl.). Brown rat.(S.) *Polyplax spinulosa* (Burm.).(S.P.) *Xenopsylla cheopis* (Rothsch.).(S.P.) *Ceratophyllus fasciatus* (Bosc.).(S.P.) *Leptopsylla segnis* (Schönh.).*Aethomys chrysophilus* (de Winton). African rat.(A.P.) *Laelaps vansomerani* Hirst.(S.) *Polyplax cummingsi* Ferris.(S.P.) *Xenopsylla brasiliensis* (Baker).(S.P.) *Chiastopsylla rossi* (Waterst.).(S.P.) *Listropsylla prominens* Jord.(S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.*Thallomys moggi* (Roberts). Mogg's black-tailed rat.(S.) *Polyplax spinulosa* (Burm.).(S.) *Hoplopleura affinis* (Burm.).(S.P.) *Xenopsylla cheopis* (Rothsch.).(S.P.) *Chiastopsylla numae* (Rothsch.).*Praomys arborarius* Peters. Golden rock mouse.(S.P.) *Praopsylla porvelli* Ingram.(S.P.) *Xenopsylla scopulifer* (Rothsch.).(S.P.) *Xenopsylla tortus* Jord. & Rothsch.*Praomys namaquensis grahami* (Rbts.). Albany rock mouse.(I.I.) *Rhipicephalus simus* Koch.(S.P.) *Chiastopsylla godfreyi* Waterst.(S.P.) *Listropsylla agrippinae* (Rothsch.).*Praomys namaquensis monticularis* Jameson.(S.) *Polyplax praomydis* Bedford.(S.P.) *Chiastopsylla octavii* (Rothsch.).*Myomys colonus* (Brants). Brant's mouse.(S.P.) *Stivalius ahalae* (Rothsch.).(S.P.) *Stivalius aporus* Jord. & Rothsch.*Mastomys coucha* (A. Smith). Multimammate mouse.(A.P.) *Laelaps muricola* Trägardh.(I.I.) *Ixodes nairobiensis* Nuttall.(S.) *Polyplax waterstoni* Bedford.(S.) *Hoplopleura intermedia* Kellogg & Ferris.(S.T.) *Echidnophaga gallinacea* (Westw.).(S.T.) *Echidnophaga larina* Jord. & Rothsch.(S.P.) *Xenopsylla brasiliensis* (Baker).(S.P.) *Xenopsylla cheopis* (Rothsch.).(S.P.) *Xenopsylla eridos* (Rothsch.).(S.P.) *Chiastopsylla numae* (Rothsch.).(S.P.) *Chiastopsylla rossi* (Waterst.).(S.F.) *Dinopsyllus longifrons* Jord. & Rothsch.(S.P.) *Dinopsyllus lypusus* Jord. & Rothsch.(S.P.) *Listropsylla prominens* Jord.*Mastomys coucha silaceus* (Wagner).(A.P.) *Laelaps muricola* Trägardh.*Dasymys incomtus* (Sund.).(S.) *Polyplax cummingsi* Ferris.

Family BATHYERGIDAE.

Subfamily BATHYERGINAE.

Bathyergus suillus (Schreb.). (*B. maritimus* Gm.). Cape dune mole.

(S.) *Proenderleinellus lawrensis* (Bedford).

(S.P.) *Dinopsyllus ingens* Rothsch.

Subfamily HELIPHOBINAE.

Cryptomys capensis (Cuv.). [*Georychus capensis* (Cuv.)]. Cape blesmol.

(S.P.) *Dinopsyllus ingens* Rothsch.

Cryptomys hottentotus (Less.). Hottentot male rat.

(Syn. *Georychus hottentotus* Less.)

(A.D.)² *Myomysoides capensis* Hirst.

(A.P.) *Haemolaelaps capensis* Hirst.

(S.) *Proenderleinellus hilli* (Bedford).

Order LAGOMORPHA.

Family LEPORIDAE.

Pronotagus crassicaudatus (I. Geoff.). Cape red hare.

(I.I.) *Ixodes rubicundus* Neu.

(I.I.) *Haemaphysalis leachii* (Aud.).

Lepus capensis Linné. Cape hare.

(I.I.) *Haemaphysalis leachii* (Aud.).

(I.I.) *Rhipicephalus appendiculatus* Neu.

(I.I.) *Rhipicephalus evertsi* Neu.

(I.I.) *Rhipicephalus oculatus* Neu.

(I.I.) *Rhipicephalus sanguineus* (Latr.).

(I.I.) *Hyalomma aegyptium impressum* Koch. (Immature stages).

(S.T.) *Echidnophaga gallinacea* (Westw.).

(S.P.) *Xenopsylla eridos* Rothsch.

(S.P.) *Ctenocephalides connatus* (Jord.).

Lepus capensis ochropus Wagn.

(I.I.) *Rhipicephalus oculatus* Neu.

(I.I.) *Hyalomma aegyptium impressum* Koch.

Lepus saxatilis F. Cuv. Great hare.

(I.I.) *Rhipicephalus capensis* Koch.

(S.P.) *Xenopsylla eridos* Rothsch.

Lepus zuluensis Thos. & Schw. Zulu hare.

(I.I.) *Rhipicephalus appendiculatus* Neu.

(I.I.) *Rhipicephalus evertsi* Neu. (Immature stages).

(I.I.) *Rhipicephalus oculatus* Neu. (Adults).

(I.I.) *Boophilus decoloratus* (Koch).

(I.I.) *Hyalomma aegyptium impressum* Koch. (Immature stages).

(I.I.) *Amblyomma hebraeum* Koch. (Nymphs).

(S.P.) *Ctenocephalides felis* (Bouché).

Order CHIROPTERA.

Suborder MICROCHIROPTERA.

Family RHINOLOPHIDAE.

Rhinolophus geoffroyii augur Anders. Namaqua augur bat.

(I.I.) *Ixodes pilosus* Koch. (Probably *I. simplex* Neu.).

(D.S.) *Nycteribosca kollari* (Frauenf.).

(D.N.) *Nycteribia* sp.

(S.I.) *Ischnopsyllus ashworthii* Waterst.

(S.I.) *Rhinolophopsylla capensis* Jord. & Rothsch.

Rhinolophus capensis Licht.

(D.N.) *Nycteribia scissa* Speiser.

Rhinolophus darlingi Anders.

(D.N.) *Nycteribia* sp.

Family HIPPOSIDERIDAE.

Hipposideros caffer (Sund.). African leaf-nosed bat.

(A.T.) *Leeuwenhoekia polydiscum* Oudms.

(A.T.) *Microtrombidium minutissimum* Oudms.

(A.T.) *Typhlothrombium nanus* Oudms.

(D.S.) *Raymondia huberi* Frauenf.

Family NYCTERIDAE.

Nycteris damarensis Ptrs. Damara long-eared bat.

(D.S.) *Raymondia bedfordi* Ferris.

Nycteris capensis A. Smith. Cape long-eared bat.

(D.S.) *Rhinolophopsylla capensis* Jord. & Rothsch.

(D.N.) *Penicillidia fulvida* (Bigot).

Family VESPERTILLIONIDAE.

Eptesicus capensis (A. Smith). Cape house bat.

(I.A.) *Argas vespertilionis* (Latr.).

(H.C.) *Cimex pipistrelli* Jenyns.

(H.C.) *Cacodmus villosus* Stål.

(S.I.) *Ischnopsyllus emminus* Jord. & Rothsch.

(S.I.) *Ischnopsyllus grahami* Waterst.

Eptesicus capensis gracilior (Thos. & Schw.).

(S.T.) *Echidnophaga gallinacea* (West.).

Myotis tricolor (Smuts).

(I.I.) *Ixodes simplex* Neu.

(S.I.) *Rhinolophopsylla capensis* Jord. & Rothsch.

Scotophilus nigrita dingani (A. Smith). Zulu great house bat.

(H.C.) *Cacodmus sparsilis* Rothsch.

Miniopterus natalensis (A. Smith). Natal sociable bat.

(I.A.) *Argas vespertilionis* (Latr.).

(D.N.) *Penicillidia fulvida* (Bigot).

(S.I.) *Ischnopsyllus isomalus* Waterst.

(S.I.) *Rhinolophopsylla capensis* Jord. & Rothsch.

- Nyctinomus aegyptiacus* (E. Geoff.). Egyptian free-tailed bat.
(S.I.) *Araeopsylla scitulus* (Rothsch.).
Nyctinomus bocagei Seabra. Bocage's free-tailed bat.
(S.I.) *Araeopsylla scitulus* (Rothsch.).

Family PTEROPODIDAE.

- Eidolon helvum* (Kerr). Long-winged fruit bat.
(S.I.) *Thaumapsylla breviceps* Rothsch.
Roussetus leachi A. Smith. Cape fruit bat.
(S.I.) *Thaumapsylla breviceps* Rothsch.
"Bats."
(S.T.) *Echidnophaga aethiops* Jord. & Rothsch.
(D.S.) *Nycteribosca africana* Walk.
(D.N.) *Eucampsipodia hyrtli* (Kolenati).

Order PRIMATES.

Suborder LEMUROIDEA.

Family GALAGIDAE.

- Galago moholi* (A. Smith). Moholi night ape.
(S.) *Lemurphthirus galagus* Bedford.

Suborder ANTHROPOIDEA.

Family CERCOPITHECIDAE.

- Papio griseipes* (Poc.). Chaema baboon.
[Syn. *Papio porcarius* (Brünn.).]
(I.I.) *Rhipicephalus evertsi* Neu. (Nymphs).
(S.) *Pedicinus hamadryas* Mjöberg.
Cercopithecus aethiops (Cuv.). Vervet monkey.
[Syn. *C. pygerythrus* (Cuv.)].
(S.) *Pedicinus longiceps* Piaget.

IV.—HOST-LIST OF THE ECTOPARASITES FOUND ON SOUTH AFRICAN BIRDS.

1. Family STRUTHIONIDAE.

1. *Struthio australis* Gurn. Southern ostrich.
Parasites recorded in List No. II.

2. Family PHASIANIDAE.

2. *Pternistis swainsoni* (A. Smith). Swainson's red-necked francolin.
(M.) *Lipeurus pternistis* Bedford.
(M.) *Goniodes pternistis* Bedford.
(M.) *Goniocotes hologaster* Nitzsch.
(M.) *Menopon francolinus* Bedford.
(M.) *Menopon powelli* Bedford.

4. *Pternistis afer* (Mull.). Angola red-necked francolin.
(M.) *Lipeurus pternistis* Bedford.
(M.) *Menopon powelli* Bedford.

5. *Pternistis castaneiventer krebsi* Neum. Drakensberg red-necked francolin.
(M.) *Goniocotes hologaster* Nitzsch.
(M.) *Menopon powelli* Bedford.

6. *Chaetopus capensis* (Gmel.). Cape noisy francolin.
(M.) *Goniodes assimilis* Piaget.
(M.) *Colpocephalum spinosum* Piaget.

7. *Chaetopus adpersus* (Waterh.). Red-billed noisy francolin.
(M.) *Menopon powelli* Bedford.

11. *Dendroperdix sephaena* (A. Smith). Bush partridge.
(M.) *Goniocotes hologaster* Nitzsch.
(M.) *Menopon francolinus* Bedford.
(M.) *Menopon powelli* Bedford.

15. *Scleroptila jugularis* Büttikofer. Ovambo partridge.
(M.) *Lipeurus waterstoni* Bedford.
(M.) *Goniodes scleroptilus* Bedford.

3. Family NUMIDIDAE.

22. *Numida papillosa* Rehw. Guinea-fowl.
(I.A.) *Argas persicus* (Oken).
(M.) *Lipeurus lawrensis* Bedford.
(M.) *Goniodes numidae* Mjöberg.
(M.) *Goniocotes gigas* Taschenberg.
(M.) *Goniocotes hologaster* Nitzsch.
(M.) *Numidicola antennata* (Kellogg & Paine).
(M.) *Neumannia numidae* (Giebel).

4. Family PTEROCLIDAE.

26. *Nyctiperdix bicinctus* (Temm.). Double-banded sand-grouse.
(M.) *Syrrhoptoecus declivis* Waterston.
27. *Eremialector gutturalis* (A. Smith). Yellow-throated sand-grouse.

- (M.) *Syrrhoptoecus uncinus* Waterston.

28. *Pterocles namaquus* (Gmel.). Namaqua sand-grouse.

- (M.) *Syrrhoptoecus brevifrons* Waterston.

- (M.) *Syrrhoptoecus digonus* Waterston.

- (M.) *Neomenopon pteroclorus* Bedford.

5. Family TRERONIDAE.

32. *Vinago delalandei* (Bp.). Delalande's green pigeon.
(M.) *Goniodes aegypticus* (Kellogg & Paine).
(M.) *Columbicola columba* (Linné).

6. Family COLUMBIDAE.

33. *Dialiptila phaeonota* (Gray). Cape rock pigeon.
(M.) *Goniodes aegypticus* (Kellogg & Paine).

36. *Streptopelia semitorquata* (Rüpp.). Red-eyed turtle dove.
 (M.) *Goniodes hilli* Bedford.
 (M.) *Esthiopterum sudanicum* (Mjöberg).
38. *Afropelia capicola* (Sund.). Cape turtle dove.
 (M.) *Goniodes aegypticus* (Kellogg & Paine).
 (M.) *Menacanthus giganteus* (Denny).
- 38b. *Afropelia capicola damarensis* (Finsch & Hartl.). Damara turtle dove.
 (M.) *Goniodes aegypticus* (Kellogg & Paine).
 (M.) *Esthiopterum sudanicum* (Mjöberg).
 (M.) *Columbicola columba* (Linné).
39. *Stigmatopelia senegalensis aequatorialis* (Erl.). Laughing dove.
 (M.) *Goniodes aegypticus* (Kellogg & Paine).
 (M.) *Esthiopterum sudanicum* (Mjöberg).
 (M.) *Columbicola columba* (Linné).
7. Family RALLIDAE.
45. *Lupha cristata* (Gmel.). Red-knobbed coot.
 (M.) *Rallicola cuspidata* (Scopoli).
 (M.) *Rallicola fulica* (Denny).
 (M.) *Pseudomenopon tridens* (Nitzsch).
48. *Gallinula chloropus brachyptera* Brehm. African moorhen.
 (M.) *Rallicola cuspidata* (Scopoli).
 (M.) *Rallicola fulica* (Denny).
 (M.) *Pseudomenopon tridens* (Nitzsch).
49. *Porphyriops angulata* (Sund.). Lesser moorhen.
 (M.) *Rallicola cuspidata* (Scopoli).
 (M.) *Pseudomenopon tridens* (Nitzsch).
51. *Ortygometra porzana* (Linné). Spotted crane.
 (A.A.) *Pterolichus porzanae* (Can.).
 (A.A.) *Mégninia gallinulae* (Buchh.).
 (A.A.) *Mégninia gallinulae major* Berl.
 (A.A.) *Pterodectes ortygometrae* (Can.).
 (M.) *Rallicola mystax* (Giebel).
53. *Crex crex* (Linné). Corn crane.
 (A.A.) *Pterolichus rallorum* Robin.
 (M.) *Rallicola ortygometrae* (Schränk).
9. Family HELIORNITHIDAE.
63. *Podica petersi* Hartl. Peter's finfoot.
 (A.A.) *Alloptes discosurus* Trt.
 (M.) *Esthiopterum rotundatum* (Piaget).
11. Family PODICIPIDAE.
67. *Poliocephalus capensis* (Salvad.). Cape dabchick.
 (M.) *Degeeriella kilimanjarensis* (Kellogg).
68. *Proctopus nigricollis gurneyi* (Rbts.). Cape eared grebe.
 (M.) *Degeeriella columbina* (Scop.).

69. *Podiceps infuscata* (Salvad.). African crested grebe.
 (A.A.) *Pterolichus colymbi major* Mégn. & Trt.
 (M.) *Degeeriella columbina* (Scop.).
12. Family SPHENISCIDAE.
70. *Spheniscus demersus* (Linné). Jackass penguin.
 (I.A.) *Argas talaje capensis* (Neu.).
 (M.) *Austrogoniodes bifasciatus* (Piaget).
13. Family HYDROBATIDAE.
72. *Cymochorea leucorhoa* (Vieill.). Fork-tailed petrel.
 (M.) *Degeeriella alpha* (Kellogg).
77. *Adamastor cinereus* (Gmel.). Great grey petrel.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum angusticeps* (Piaget).
 (M.) *Esthiopterum diversum* (Kellogg).
78. *Procellaria aequinoctialis* Linné. Cape hen.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum diversum* (Kellogg).
 (M.) *Giebelia hexakon* Waterston.
 (M.) *Docophoroides brevis* (Dufour).
 (M.) *Docophoroides simplex* (Waterston).
79. *Pterodroma macroptera* (A. Smith). Cape parson.
 (M.) *Naubates pterodromi* Bedford.
 (M.) *Trabeculus schillingi* Rudow.
80. *Pterodroma incerta* (Schlegel). Brown petrel.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum diversum* (Kellogg).
 (M.) *Ancistrana vagelli* (Fabr.).
82. *Pterodroma mollis* (J. Gould). Soft-plumed petrel.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum diversum* (Kellogg).
 (M.) *Trabeculus schillingi* (Rudow).
 (M.) *Ancistrana vagelli* (Fabr.).
 (M.) *Colpocephalum furcatum* Rudow.
83. *Ardenna gravis* (O'Reil). Great shear-water.
 (M.) *Naubates harrisoni* Bedford.
 (M.) *Giebelia hexakon* Waterston.
85. *Neonectris griseus* (Gm.). Sooty shear-water.
 (M.) *Ancistrana vagelli* (Fabr.).
87. *Daption capensis* (Linné). Cape sea-pigeon.
 (A.A.) *Microspalax manicata major* Trt. & Neum.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum nigrolimbatum* (Giebel).
 (M.) *Ancistrana vagelli* (Fabr.).
 (M.) *Pseudonirmus gurtti* (Taschb.).

CHECK-LIST AND HOST-LIST OF SOUTH AFRICAN ECTOPARASITES.

88. *Macronectes giganteus* (Gmel.). Giant petrel.
 (M.) *Esthiopterum obscurum* (Rudow).
 (M.) *Trabeculus schillingi* Rudow.
 (M.) *Docophoroides murphyi* (Kellogg).
 (M.) *Naubates fuliginosus* (Taschb.).
14. Family OCEANITIDAE.
 89. *Oceanites oceanicus* (Kuhl.). Sooty petrel.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum diversum* (Kellogg).
 (M.) *Trabeculus schillingi* Rudow.
 (M.) *Ancistrona vagelli* (Fabr.).
15. Family DIOMEDEIDAE.
 92. *Diomedea exulans* Linné. Wandering albatross.
 (M.) *Harrisoniella diomedea* (Fabr.).
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum giganticola* (Kellogg).
 (M.) *Docophoroides brevis* (Dufour).
 (M.) *Colpocephalum pingue* Kellogg.
 93. *Thalassarche melanophrys* (Boie). Mollymawk.
 (M.) *Harrisoniella diomedea* (Fabr.).
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum diversum* (Kellogg). Straggler?
 (M.) *Esthiopterum giganticola* (Kellogg).
 (M.) *Esthiopterum obscurum* (Rudow).
 (M.) *Docophoroides harrisoni* Waterston.
 (M.) *Docophoroides murphyi* (Kellogg).
 (M.) *Docophoroides simplex* (Waterston).
 (M.) *Philoferus gonothorax* (Giebel). Straggler.
 94. *Diomedella cauta layardi* (Salvin). Layard's albatross.
 (M.) *Esthiopterum giganticola* (Kellogg).
 (M.) *Docophoroides harrisoni* Waterston.
 96. *Nealbatrus chlororhynchus* (Gmel.). Yellow-billed molly-
 mawk.
 (A.A.) *Pterolichus rubidus* Trt.
 (A.A.) *Pterolichus rubidus petalifera* Trt.
 (M.) *Naubates fuliginosus* (Taschb.).
 (M.) *Esthiopterum giganticola* (Kellogg).
 (M.) *Esthiopterum obscurum* (Rudow).
 (M.) *Docophoroides brevis* (Dufour).
 (M.) *Docophoroides murphyi* (Kellogg).
 97. *Phoebetria palpebrata* (Forst.). Sooty albatross.
 (M.) *Esthiopterum obscurum* (Rudow).
16. Family LARIDAE.
 98. *Larus dominicanus* (Lcht.). Cape black-backed gull.
 (M.) *Philoferus gonothorax* (Giebel).
 100. *Bruchigavia novae-hollandiae hartlaubi* Bruch. White-
 headed gull.
 (M.) *Degeeriella lingulata* (Waterston).
 (M.) *Philoferus gonothorax* (Giebel).
17. Family STERNIDAE.
 101. *Chlidonias leucoptera* (Schinz.). White-winged tern.
 (A.A.) *Thecarthra simplex tyroglyphina* (Trt. & Neum.).
 103. *Hydroprogne tschegrava* (Lepech.). Caspian tern.
 (A.A.) *Thecarthra theca* (Megn. & Trt.).
 104. *Sterna hirundo* Linné. Common tern.
 (A.A.) *Pterolichus martini* Trt.
 (A.A.) *Anoplomotus semaphorus* (Trt.).
 (A.A.) *Alloptes bisetatus* Haller.
 (M.) *Esthiopterum parviceps* (Piaget).
 (M.) *Degeeriella sellata* (Burm.).
 (M.) *Philoferus laricola* (Nitzsch).
 (M.) *Philoferus melanocephalus* (Nitzsch).
 (M.) *Menopon pachypus* Piaget.
 106. *Sterna macrura* Naum. Artic tern.
 (M.) *Philoferus atlanticus* (Kellogg).
 107. *Thalasseus sandvicensis* (Lath.). Sandwich tern.
 (A.A.) *Alloptes bisetatus* Haller.
 (M.) *Degeeriella sellata* (Burm.).
 (M.) *Philoferus melanocephalus* (Nitzsch).
 (M.) *Menopon fuscofasciatum* Piaget.
 (M.) *Actornithophilus piceus* (Denny).
 109. *Thalasseus bergii* (Lcht.). Swift tern.
 (M.) *Philoferus melanocephalus* (Nitzsch).
 (M.) *Actornithophilus crassipes* (Piaget).
 (M.) *Actornithophilus piceus* (Denny).
 110. *Sternula albifrons* Pall. Little tern.
 (M.) *Degeeriella nycthemera* (Nitzsch).
 (M.) *Philoferus laricola* (Nitzsch).
 114. *Anous stolidus* (Linné). Common noddy.
 (M.) *Degeeriella emarginata* (Kellogg & Chapman).
 (M.) *Degeeriella gloriosa* (Kellogg & Kuwana).
 (M.) *Degeeriella hebes* (Kellogg).
 (M.) *Actornithophilus epiphanes* (Kellogg & Chap-
 man).
18. Family RHYNCHOPIDAE.
 115. *Rhynchops flavirostris* Vieill. African skimmer.
 (A.A.) *Freyana marginata* Trt.
 (M.) *Philoferus elongatus* Piaget.
 (M.) *Actornithophilus latifasciatus* (Piaget).
19. Family STERCORARIIDAE.
 116. *Stercorarius parasiticus* (Linné). White-necked skua.
 (A.A.) *Thecarthra theca* (Megn. & Trt.).
 (A.A.) *Alloptes bisetatus* Haller.
 (M.) *Degeeriella normifer* (Grube).
 (M.) *Philoferus atlanticus* (Kellogg).
 (M.) *Philoferus cephalus* (Denny).

117. *Coprotheres pomarinus* (Temm.). Large white-necked skua.
 (M.) *Degeeriella normifer* (Grube).
 (M.) *Ethiopterum modestum* (Giebel).
 (M.) *Philopterus cephalus* (Denny).
 (M.) *Philopterus pustulosus* (Nitzsch).
 (M.) *Menopon circinatum* Piaget.
 (M.) *Menopon fuscofasciatum* Piaget.
 (M.) *Actornithophilus brachycephalus* (Giebel).
118. *Catharacta skua antarcticus* (Less.). Southern skua.
 (M.) *Degeeriella alpha* (Kellogg).
 (M.) *Ethiopterum modestum* (Giebel).
20. Family ARENARIIDAE.
119. *Arenaria interpres* (Linné). Turnstone.
 (A.A.) *Pterolichus buchholzi fascigera* Mégn. & Trt.
 (A.A.) *Thecarthra trouessarti* Berl.
 (A.D.²) *Rhinonyssus coniventris* Trt.
 (M.) *Degeeriella holophaea* (Nitzsch).
 (M.) *Degeeriella strepsilaris* (Denny).
 (M.) *Menopon strepsilae* Denny.
 (M.) *Actornithophilus bicolor* (Piaget).
 (M.) *Colpocephalum pediculoides* Mjöberg.
22. Family CHARADRIIDAE.
121. *Crocethia alba* (Pall.). Sanderling.
 (Syn. *Calidris arenaria* Linné).
 (M.) *Degeeriella cingulata* (Nitzsch).
 (M.) *Degeeriella complexiva* (Kellogg & Chapman).
 (M.) *Degeeriella decipiens* (Nitzsch).
 (M.) *Degeeriella testudinaria* (Child).
122. *Pagoa leschenaultii* (Less.). Great sandplover.
 (M.) *Degeeriella furva* (Nitzsch).
123. *Eupodella asiatica* (Pall.). Caspian plover.
 (M.) *Degeeriella assimilis* (Piaget).
124. *Leucopoliis marginatus* (Vieill.). White-fronted sandplover.
 (M.) *Degeeriella macrocephala* (Waterston).
 (M.) *Philopterus platygaster* (Denny).
125. *Leucopoliis pecuaria* Temm. Kittlitz's sandplover.
 (Syn. *L. varius* Vieill.).
 (M.) *Degeeriella macrocephala* (Waterston).
 (M.) *Philopterus platygaster* (Denny).
127. *Charadrius hiaticula* Linné. Ringed plover.
 (A.A.) *Pterolichus charadrii* (Can.).
 (A.A.) *Thecarthra bouveti* (Mégn. & Trt.).
 (A.D.²) *Rhinonyssus echinipes* Hirst.
 (M.) *Degeeriella hiaticula* (Müller).
 (M.) *Philopterus platygaster* (Denny).
128. *Afroëchus tricollaris* (Vieill.). Three-banded sandplover.
 (M.) *Degeeriella macrocephala* (Waterston).
 (M.) *Philopterus platygaster* (Denny).
129. *Squatarola squatarola* (Linné). Grey plover.
 (A.A.) *Pterolichus squatarolae* (Can.).
 (A.A.) *Pterolichus buchholzi* (Can.).
 (A.A.) *Thecarthra longitarsa* (Mégn. & Trt.).
 (M.) *Degeeriella hospes* (Nitzsch).
 (M.) *Philopterus acanthus* (Giebel).
 (M.) *Philopterus conicus* (Denny).
 (M.) *Philopterus naumanni* (Giebel).
133. *Hoplopterus armatus* (Burch.). Blacksmith plover.
 (M.) *Degeeriella hoplopteri* Mjöberg.
134. *Xiphidiopterus albiceps* (Gould). White-crowned wattled plover.
 (M.) *Menopon albipes* Giebel.
23. Family RECURVIROSTRIDAE.
137. *Recurvirostra avosetta* Linné. Avocet.
 (M.) *Degeeriella decipiens* (Nitzsch).
 (M.) *Degeeriella hiaticula* (Müller).
 (M.) *Degeeriella signata* (Piaget).
 (M.) *Degeeriella testudinaria* (Children).
 (M.) *Menopon micrandum* Nitzsch.
 (M.) *Actornithophilus uniseriatus* (Piaget).
138. *Himantopus himantopus* (Linné). Black-winged stilt.
 (A.A.) *Pterolichus rehbergi gracilis* Mégn. & Trt.
 (M.) *Degeeriella furva* (Nitzsch).
 (M.) *Degeeriella hemichroa* (Nitzsch).
 (M.) *Degeeriella opisthotoma* (Kellogg).
24. Family SCOLOPACIDAE.
139. *Numenius arquatus* (Linné). Curlew.
 (A.A.) *Pterolichus ninnii* (Can.).
 (M.) *Degeeriella numenii* (Denny).
 (M.) *Degeeriella phaeopi* (Denny).
 (M.) *Dollabella testudinaria* (Denny).
 (M.) *Philopterus humeralis* (Denny).
 (M.) *Philopterus major* (Waterston).
 (M.) *Menopon crocatum* Nitzsch.
 (M.) *Menopon nigropleurum* Denny.
 (M.) *Actornithophilus patellatus* (Piaget).
140. *Phaeopus phaeopus* (Linné). Whimbrel.
 (A.A.) *Pterolichus numenii* (Can.).
 (M.) *Degeeriella phaeopi* (Denny).
 (M.) *Dollabella testudinaria* (Denny).
 (M.) *Philopterus acanthus* (Giebel).
 (M.) *Philopterus humeralis* (Denny).
 (M.) *Philopterus rotundus* (Rudow).
 (M.) *Menopon ambiguum* Nitzsch.
 (M.) *Colpocephalum ocellatum* R.

141. *Limosa limosa* (Linné). Black-tailed godwit.
 (A.A.) *Pterolichus buchholzi* Can.
 (A.A.) *Alloptes crassipes* (Can.).
 (A.A.) *Alloptes crassipes conura* Trt.
 (M.) *Degeeriella cingulata* (Nitzsch).
 (M.) *Philoferus limosae* (Denny).
 (M.) *Actornithophilus spinulosus* (Piaget).
142. *Vetola lapponica* (Linné). Bar-tailed godwit.
 (A.A.) *Avenzoaria limosae selenura* (Még. & Trt.).
 (A.A.) *Thecarthra setigera* (Még. & Trt.).
 (M.) *Degeeriella obscura* (Nitzsch).
 (M.) *Philoferus acanthus* (Giebel).
 (M.) *Menopon meyeri* Giebel.
144. *Tringa erythropus* (Vroeg.). Green sandpiper.
 (Syn. *Totanus ochrophus* L.).
 (A.A.) *Syringobia calceata* Trt.
 (A.C.²) *Syringophilus helleri* Oudms.
 (M.) *Degeeriella ochropi* (Denny).
 (M.) *Esthiopterum emarginatum* (Piaget).
 (M.) *Actornithophilus affine* (Nitzsch).
145. *Erythroscelis fuscus* (Linné). Dusky sandpiper.
 (A.A.) *Avenzoaria asiatica* (Oudms.).
 (A.A.) *Avenzoaria australis* (Oudms.).
 (A.A.) *Avenzoaria limosae* (Buchh.).
 (A.A.) *Syringobia calcarata* Oudms.
146. *Actitis hypoleucos* (Linné). Common sandpiper.
 (M.) *Degeeriella obscura* (Nitzsch).
147. *Terekia cinerea* (Gulden). Terek sandpiper.
 (M.) *Degeeriella fulvofasciata* (Grube).
148. *Totanus totanus* (Linné). Redshank.
 (Syn. *Totanus calidris*).
 (A.A.) *Pterolichus buchholzi fascigera* Még. & Trt.
 (A.A.) *Avenzoaria bengalensis* (Oudms.).
 (A.A.) *Avenzoaria calidridis* (Oudms.).
 (A.A.) *Avenzoaria grillatoris* (Oudms.).
 (A.A.) *Avenzoaria indica* (Oudms.).
 (A.A.) *Avenzoaria limicolae* (Oudms.).
 (A.A.) *Avenzoaria totani* (Can.).
 (A.A.) *Avenzoaria tringae* (Oudms.).
 (A.A.) *Thecarthra bouveti* (Még. & Trt.).
 (A.A.) *Sammonia interfolia* (Még. & Trt.).
 (A.A.) *Syringobia calidridis* Oudms.
 (A.A.) *Syringobia chelopus* Trt. & Neu.
 (A.A.) *Syringobia totani* Oudms.
 (A.A.) *Plutarchia chelopus* (Trt.).
 (A.A.) *Pteronyssus gracilipes* Trt. & Neu.
 (A.A.) *Alloptes gambettae* Oudms.
 (A.C.²) *Syringophilus totani* Oudms.
 (A.C.²) *Cheletopsis anax* Oudms.
 (A.C.²) *Cheletopsis animosa* Oudms.
- (A.C.²) *Cheletopsis basilica* Oudms.
 (A.C.²) *Cheletopsis impavida* Oudms.
 (M.) *Menopon nigropleurum* Denny.
149. *Glottis nebularius* (Gunn.). Greenshank.
 (Syn. *Totanus glottis*).
 (A.A.) *Sphaerogastra thylacodes* Trt.
 (M.) *Degeeriella furva* (Nitzsch).
150. *Rhyacophilus glareola* (Linné). Wood sandpiper.
 (M.) *Philoferus glareolae* (Giebel).
 (M.) *Degeeriella obscura* (Burmeister).
151. *Philomachus pugnax* (Linné). Ruff and reeve.
 (A.A.) *Avenzoaria totani* (Can.).
 (A.A.) *Avenzoaria tringae* (Oudms.). (?).
 (A.A.) *Alloptes crassipes* (Can.).
 (A.A.) *Alloptes crassipes conura* Trt.
 (M.) *Degeeriella holophaea* (Nitzsch).
 (M.) *Degeeriella scalaris* (Piaget).
 (M.) *Menopon lutescens* Nitzsch.
 (M.) *Menopon nigropleurum* Denny.
 (M.) *Actornithophilus pustulosus* (Piaget).
 (M.) *Actornithophilus umbrinus* (Nitzsch).
152. *Pisobia minuta* (Leisl.). Little stint.
 (A.A.) *Avenzoaria totani* (Can.).
 (A.A.) *Avenzoaria tringae* (Oudms.). (?).
 (M.) *Degeeriella actophila* (Kell. & Chap.).
 (M.) *Degeeriella cingulata* (Nitzsch).
 (M.) *Degeeriella zonaria* (Nitzsch).
 (M.) *Philoferus fusiformis* (Denny).
 (M.) *Actornithophilus trilobatus* (Giebel).
153. *Erolia testacea* (Vroeg.). Curlew sandpiper.
 (A.A.) *Pterolichus buchholzi securicata* Még. & Trt.
 (A.A.) *Dermoglyphus diplectrum* Trt.
 (A.A.) *Sphaerogastra thylacodes* Trt.
 (M.) *Degeeriella actophila* (Kell. & Chap.).
 (M.) *Degeeriella brevipes* (Piaget).
 (M.) *Degeeriella zonaria* (Nitzsch).
 (M.) *Philoferus fusiformis* (Denny).
 (M.) *Actornithophilus umbrinus* (Nitzsch).
 (M.) *Actornithophilus umbrosus* (Harrison).
154. *Calidris canutus* (Linné). Knot.
 (A.A.) *Pterolichus buchholzi fascigera* Még. & Trt.
 (M.) *Degeeriella holophaea* (Nitzsch).
 (M.) *Philoferus fusiformis* (Denny).
155. *Capella media* (Frisch). Double snipe.
 (M.) *Philoferus auratus* (Nitzsch).
156. *Capella nigripennis* (Bp.). Ethiopian snipe.
 (M.) *Degeeriella scolopacis* (Denny).
157. *Rostratula benghalensis* (Linné). Painted snipe.
 (M.) *Degeeriella quadrisetacea* (Piaget).
 (M.) *Pseudomenopon rostratulum* Bedford.

25. Family CURSORIIDAE.
162. *Smutsornis africanus* (Temm.). Two-banded courser.
(A.A.) *Pterodectes ortygometrae furcifer* (Trt.).
27. Family DROMADIDAE.
166. *Dromas ardeola* (Payk.). Crab plover.
(A.A.) *Giebelia puffini* (Buchh.).
(A.A.) *Alloptes crassipes myosura* Trt.
(M.) *Degeeriella brunnea* (Nitzsch).
(M.) *Degeeriella stictochroa* (Nitzsch).
28. Family BURHINIDAE.
168. *Burhinops capensis* (Leht.). Cape thickknee.
(I.I.) *Hyalomma aegyptium* (Linné).
29. Family OTIDAE.
169. *Choriotis kori* (Burch.). Giant bustard.
(M.) *Otilipeurus kori* Bedford.
(M.) *Otidoecus dimorphus* Bedford.
(D.H.) *Olfersia pilosa* Macq.
176. *Afrotis afroides* A. Smith. White-quilled bustard.
(D.H.) *Olfersia pilosa* Macq.
30. Family BALEARICIDAE (= Gruidae).
182. *Balearica regulorum* (Benn.). Crowned crane.
(M.) *Esthiopterum gruis* (Linné).
(M.) *Heleonomus confusus* Ferris.
(M.) *Heleonomus miandrius* (Kellogg).
31. Family PLEGADIDAE.
183. *Threskiornis aethiopica* Lath. Sacred ibis.
(M.) *Ibidoecus threskiornis* Bedford.
(M.) *Colpocephalum pygidiale* Mjöberg.
185. *Plegadis falcinellus* (Linné). Glossy ibis.
(A.A.) *Mégninia ibidis* Trt.
(A.A.) *Pteraloptes mégnini falcinelli* (Trt.).
(M.) *Degeeriella sacra* (Giebel).
(M.) *Colpocephalum fusconigrum* Giebel.
186. *Hagedashia hagedash* (Lath.). Hadadah ibis.
(A.A.) *Freyana oblonga* Trt. & Neum.
(A.A.) *Pterolichus marginatus* Trt.
(M.) *Esthiopterum capitatum* (Piaget).
(M.) *Colpocephalum subpenicillatum* Piaget.
(M.) *Eulaemobothrion kelloggi* (Bedford).
32. Family PLATALEIDAE.
187. *Platalea alba* Scop. African spoonbill.
(M.) *Ibidoecus plataleae* (Denny).
(M.) *Eucolpocephalum robustum* Bedford.
33. Family CICONIIDAE.
188. *Ibis ibis* (Linné). Wood ibis.
(A.A.) *Halleria ceratorhina* Trt.
189. *Sphenorhynchus abdimi* Leht. White-bellied stork.
(M.) *Neophilopteris abdimius* Bedford.
190. *Dissoura episcopus* (Bodd.). Woolly-necked stork.
(M.) *Neophilopteris episcopi* (Kellogg).
192. *Ciconia ciconia* (Linné). White stork.
(A.A.) *Freyana pelargica* Trt. & Mégn.
(A.A.) *Pterolichus ciconiae* Can. & Berl.
(A.A.) *Xoloptes didactylus* Trt.
(M.) *Colpocephalum quadripustulatum* Nitzsch.
(M.) *Colpocephalum zebra* Nitzsch.
(M.) *Neophilopteris incompletus* (Nitzsch).
(M.) *Esthiopterum ciconiae* (Linné).
193. *Melanopelargus niger* (Linné). Black stork.
(A.A.) *Freyana pelargica* Trt. & Mégn.
(M.) *Esthiopterum ciconiae* (Linné).
(M.) *Neophilopteris tricolor* (Nitzsch).
(M.) *Colpocephalum ferrisi* Bedford.
(M.) *Colpocephalum quadripustulatum* Nitzsch.
194. *Anastomus lamelligerus* Temm. Openbill stork.
(M.) *Esthiopterum lepidum* (Nitzsch).
(M.) *Philopteris platyclypeatus* (Piaget).
(M.) *Colpocephalum occipitale* Nitzsch.
195. *Ephippiorhynchus senegalensis* (Shaw). Saddle-bill stork.
(A.A.) *Freyana gracilipes* Trt. & Mégn.
(M.) *Rallicola turbinata* (Piaget).
(M.) *Neophilopteris episcopi* (Kellogg).
(M.) *Colpocephalum ephippiorhynchi* Mjöberg.
(M.) *Colpocephalum oreas* Kellogg.
(M.) *Colpocephalum subflavescens* Piaget.
196. *Leptoptilus crumeniferus* (Less.). Marabou stork.
(A.A.) *Pterolichus serrativentris* Trt.
(M.) *Esthiopterum ciconiae* (Linné).
(M.) *Esthiopterum genitale* (Piaget).
(M.) *Colpocephalum longissimum* Rudow.
34. Family SCOPIDAE.
197. *Scopus umbretta bannermani* Grant. Hammerhead.
(A.A.) *Freyana pectinata* Trt.
(A.A.) *Pseudalloptes pyriiventris* Trt.
(A.A.) *Pseudalloptes pyriiventris vegetans* Trt.
(M.) *Degeeriella umbrina* (Nitzsch).
(M.) *Menopon madagascariense* Mjöberg.
(M.) *Colpocephalum scopinum* Mjöberg.

35. Family ARDEIDAE.

198. *Ardea cinerea* Linné. Common grey heron.
 (M.) *Esthiopterum ardeae* (Linné).
 (M.) *Colpocephalum decimfasciatum* Bois. & Lac.
 (D.H.) *Lynchia ardeae* (Macq.).
199. *Ardea melanocephala* Vig. & Child. Black-headed heron.
 (M.) *Colpocephalum decimfasciatum* Bois. & Lac.
201. *Pyrhrherodia purpurea* (Linné). Purple heron.
 (M.) *Esthiopterum leucoproctum* (Nitzsch).
 (M.) *Colpocephalum trochioxum* Nitzsch.
 (D.H.) *Lynchia ardeae* (Macq.).
202. *Casmerodius albus* (Linné). Great white heron.
 (M.) *Neophilopteris episcopi* (Kellogg). Straggler?
 (M.) *Colpocephalum oreas* Kellogg.
 (M.) *Colpocephalum veratrum* Kellogg.
204. *Egretta garbetta* (Linné). Little egret.
 (M.) *Colpocephalum decimfasciatum* var.
 (D.H.) *Lynchia ardeae* (Macq.).
205. *Bubulcus ibis* (Linné). Buff-backed egret.
 (D.H.) *Lynchia ardeae* (Macq.).
206. *Ardeola ralloides* (Scop.). Squacca heron.
 (M.) *Colpocephalum vittatum* Rudow.
 (M.) *Colpocephalum zonatum* Rudow.
212. *Ixobrychus minutus* (Linné). European little bittern.
 (M.) *Philopteris sulcatus* (Piaget).
 (M.) *Colpocephalum decimfasciatum* var.
213. *Nycticorax nycticorax* (Linné). Night heron.
 (M.) *Colpocephalum nyctarde* Denny.
215. *Botaurus stellaris* Linné. Bittern.
 (A.A.) *Pteraloptes stellaris* (Buchholz).
 (M.) *Esthiopterum stellare* (Denny).
 (M.) *Philopteris ovatus* (Giebel).
 (M.) *Colpocephalum trochioxum* Nitzsch.

36. Family PHOENICOPTERIDAE.

216. *Phoenicopterus major* Dumont. Greater flamingo.
 (A.A.) *Halleria hirsutirostris* Trt. & Mégn.
 (A.A.) *Pterolichus phoenicopteri* Mégn. & Trt.
 (M.) *Esthiopterum subsignatum* (Giebel).
 (M.) *Philopteris pygaspis* (Nitzsch).
 (M.) *Colpocephalum heterosoma* Piaget.
 (M.) *Trinoton femoratum* Piaget.

37. Family ANATIDAE.

218. *Plectropterus gambensis* (Linné). Spurwing goose.
 (M.) *Acidoproctus marginatus* Piaget.
 (M.) *Acidoproctus rostratus* (Rudow).
 (M.) *Esthiopterum anseris* (Linné).
 (M.) *Esthiopterum asymmetricum* (Rudow).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton anserinum* (Fabr.).
219. *Sarkidiornis melanotus africanus* Eyt. Knob-billed duck.
 (M.) *Acidoproctus marginatus* Piaget.
 (M.) *Anatoecus ferrugineus* (Giebel).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton aculeatum* Piaget.
 (M.) *Trinoton querquedulae* (Linné).
221. *Dendrocygna viduata* (Linné). White-faced duck.
 (M.) *Acidoproctus marginatus* Piaget.
 (M.) *Anatoecus icterodes* (Nitzsch).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton aculeatum* Piaget.
222. *Dendrocygna bicolor* (Vieill.). Whistling duck.
 (M.) *Anatoecus icterodes* (Nitzsch).
223. *Alopochen aegyptiacus* (Linné). Egyptian goose.
 (A.A.) *Bdellorhynchus psalidurus* Trt.
 (A.A.) *Pterodectes gynurus* (Trt.).
 (M.) *Acidoproctus rostratus* (Rudow).
 (M.) *Esthiopterum asymmetricum* (Rudow).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton anserinum* (Fabr.).
224. *Casarca cana* (Gm.). South African shelduck.
 (M.) *Acidoproctus marginatus* Piaget.
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton aculeatum* Piaget.
 (M.) *Trinoton querquedulae* (Linné).
227. *Paecilornitta erythrorhyncha* (Gm.). Red-billed teal.
 (M.) *Acidoproctus marginatus* Piaget.
 (M.) *Esthiopterum crassicornis* (Scop.).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton querquedulae* (Linné).
228. *Notonetta capensis* (Gm.). Cape wigeon.
 (M.) *Esthiopterum crassicornis* (Scop.).
 (M.) *Trinoton querquedulae* (Linné).
230. *Spatula clypeata* (Linné). European shoveller.
 (A.A.) *Bdellorhynchus polymorphus* Trt.
 (M.) *Esthiopterum crassicornis* (Scop.).
 (M.) *Anatoecus ferrugineus* (Giebel).
 (M.) *Trinoton querquedulae* (Linné).

232. *Thalassornis leuconotus* (A. Smith). White-backed duck.
 (M.) *Acidoproctus marginatus* Piaget.
 (M.) *Anatoecus icterodes* (Nitzsch).
 (M.) *Menopon tumidum* Piaget.
 (M.) *Trinoton aculeatum* Piaget.
234. *Nyroca capensis* Less. South African pochard.
 (M.) *Trinoton querquedulae* (Linné).
38. Family PHALACROCORACIDAE.
235. *Phalacrocorax lucidus* (Lcht.). South African cormorant.
 (M.) *Pectinopygus longicornis* (Piaget).
 (M.) *Menopon sigmoidale* Pic.
236. *Pseudocarbo capensis* (Sparrm.). Cape cormorant.
 (M.) *Pectinopygus acutifrons* (Rudow).
 (M.) *Menopon brevipalpe* Piaget.
 (M.) *Menopon pellucidum* Rudow.
237. *Anacarro neglecta* (Wahlb.). Bank cormorant.
 (M.) *Pectinopygus acutifrons* (Rudow).
238. *Microcarbo africana* (Gm.). Reed cormorant.
 (M.) *Pectinopygus afer* (Kellogg).
 (M.) *Pectinopygus setosus* (Piaget).
 (M.) *Menopon eulasiium* Kellogg.
239. *Microcarbo coronata* (Wahlb.). Crowned cormorant.
 (M.) *Pectinopygus afer* (Kellogg).
39. Family ANHINGIDAE.
240. *Anhinga rufa leuillanti* (Lcht.). Cape snake bird.
 (M.) *Pectinopygus setosus* (Piaget).
40. Family SULIDAE.
241. *Sulita capensis* (Lcht.). Malagus.
 (M.) *Pectinopygus bassanae* (Fabr.).
 (M.) *Menopon pustulosum* Nitzsch.
 (S.T.) *Echidnophaga gallinacea* (Westw.).
41. Family FREGATIDAE.
244. *Fregata minor* Gmel. Frigate bird.
 (M.) *Pectinopygus gracilicornis* (Piaget).
 (M.) *Menopon intermedium* Piaget.
 (M.) *Colpocephalum angulaticeps* Piaget.
 (D.H.) *Olfersia spinifera* (Leach).
42. Family PHAETONTIDAE.
246. *Leptophaeton lepturus* (Daud.). Tropic bird.
 (M.) *Pectinopygus majus* (Kellogg 1914), *nec* Piaget,
 1880. (Straggler?).
43. Family PELECANIDAE.
- 246a. *Pelecanus onocrotalus* (Linné). European pelican.
 (M.) *Pectinopygus forficulatum* (Nitzsch).
 (M.) *Tetrophthalmus titan* (Piaget).
 (M.) *Colpocephalum eucarenum* Nitzsch.
247. *Metapelecanus roseus* (Gm.). Eastern white pelican.
 (M.) *Tetrophthalmus subtitan* Bedford.
248. *Neopelecanus rufescens* (Gm.). Pink-backed pelican.
 (M.) *Pectinopygus forficulatum* (Nitzsch).
 (M.) *Tetrophthalmus africanus* Bedford.
44. Family VULTURIDAE.
249. *Gyps coprotheres* (Forst.). Cape vulture.
 (M.) *Falcolipeurus lineatus* Bedford.
 (M.) *Colpocephalum caudatum* Giebel.
 (M.) *Laemobothrion titan* (Piaget).
250. *Gyps rüppelli* Bp. Rüppell's vulture.
 (M.) *Falcolipeurus quadripustulatus* (Nitzsch).
 (M.) *Degeeriella fusca* (Nitzsch).
 (M.) *Colpocephalum flavescens* Nitzsch.
 (M.) *Laemobothrion tinnunculi* (Linné).
253. *Pseudogyps africanus fullebornei* Erl. Southern white-backed vulture.
 (M.) *Falcolipeurus africanus* Bedford.
 (M.) *Colpocephalum caudatum* Giebel.
 (M.) *Laemobothrion titan* Piaget.
254. *Neophron percnopterus* (Linné). Egyptian vulture.
 (M.) *Falcolipeurus monilis* (Nitzsch).
 (M.) *Menopon albidum* Giebel.
 (M.) *Menacanthus fulvofasciatus* (Piaget).
 (M.) *Laemobothrion percnopteri* Gervais.
45. Family SAGITTARIIDAE.
256. *Sagittarius serpentarius* (Miller). Secretary bird.
 (I.A.) *Argas persicus* (Oken).
 (M.) *Falcolipeurus secretarius* (Giebel).
 (M.) *Colpocephalum cucullare* Giebel.
46. Family FALCONIDAE.
259. *Circus aeruginosus* (Linné). European marsh harrier.
 (M.) *Degeeriella fusca* (Nitzsch).
 (M.) *Philopterus nisi* (Denny).
 (M.) *Colpocephalum bicinctum* Nitzsch.
 (M.) *Laemobothrion tinnunculi* (Linné).
260. *Pseudocircus macrourus* (Gm.). Pallid harrier.
 (M.) *Degeeriella fusca* (Nitzsch).
261. *Melanocircus maurus* (Temm.). Black harrier.
 (M.) *Degeeriella rufa* (Nitzsch).
262. *Pygargus pygargus* (Linné). Montagu's harrier.
 (A.A.) *Pterolichus nisi* (Can.).

263. *Melierax musicus* (Daud.). Chanting goshawk.
(M.) *Degeeriella fusca* (Nitzsch).
265. *Micronisus gabar* (Daud.). Gabar goshawk.
(M.) *Degeeriella fusca* (Nitzsch).
267. *Neonisus melanoleucus* (A. Smith). Black sparrowhawk.
(M.) *Degeeriella fusca* (Nitzsch).
268. *Aerospiza tachiro* (Daud.). African goshawk.
(M.) *Degeeriella fusca* (Nitzsch).
273. *Buteo vulpinus* (Gloger). Steppe buzzard.
(Syn. *Buteo desertorum* Daud.).
(M.) *Laemobothrion titan* (Piaget).
275. *Pterolestes rufofuscus* (Forst.). Jackal buzzard.
(M.) *Degeeriella fusca* (Nitzsch).
(M.) *Philopterus platyrhynchus* (Nitzsch).
(M.) *Laemobothrion titan* (Piaget).
277. *Pteroaetus verreauxi* (Less.). Black eagle.
(M.) *Degeeriella fusca* (Nitzsch).
(M.) *Laemobothrion titan* (Piaget).
282. *Nisaetus spilogaster* (Bp.). African hawk-eagle.
(M.) *Degeeriella fusca* (Nitzsch).
(M.) *Colpocephalum subpachygaster* Piaget.
(M.) *Laemobothrion titan* (Piaget).
284. *Hieraetus pennatus* (Gm.). Booted eagle.
(M.) *Degeeriella fusca* (Nitzsch).
289. *Circaetus pectoralis* (A. Smith). Black-chested harrier-eagle.
(M.) *Laemobothrion titan* (Piaget).
292. *Terathopius ecaudatus* (Daud.). Bateleur eagle.
(M.) *Falcolipeurus lineatus* Bedford.
(M.) *Laemobothrion titan* (Piaget).
293. *Cuncuma vocifer* (Daud.). Cape sea-eagle.
(M.) *Degeeriella fusca* (Nitzsch).
- 294a. *Milvus migrans*. Black kite.
(Syn. *M. ater* and *M. korschum.*)
(M.) *Degeeriella fusca* (Nitzsch).
(M.) *Philopterus spathulatus* (Giebel).
(M.) *Colpocephalum tricinctum* (Nitzsch).
(M.) *Laemobothrion titan* (Piaget).
295. *Milvus aegyptius* Gm. Kite.
(M.) *Degeeriella fusca* (Nitzsch).
(M.) *Philopterus milvi* (Mjöberg).
(M.) *Philopterus spathulatus* (Giebel).
(M.) *Colpocephalum abruptofasciatum* Mjöberg.
(M.) *Colpocephalum dissimile* Piaget.
(M.) *Laemobothrion titan* (Piaget).

296. *Elanus caeruleus* (Desf.). Black-shouldered kite.
(M.) *Degeeriella fusca* (Nitzsch).
298. *Pernis apivorus* (Linné). Honey buzzard.
(A.A.) *Pterolichus nisi* (Can.).
(M.) *Degeeriella phlyetopyga* (Nitzsch).
(M.) *Philopterus aquilinus* (Denny).
(M.) *Philopterus cornutus* (Piaget).
(M.) *Colpocephalum flavescens* Nitzsch.
300. *Rhynchodon peregrinus minor* (Bp.). Peregrine Falcon.
(M.) *Colpocephalum flavescens* Nitzsch.
302. *Falco subbuteo* (Linné). Hobby.
(A.A.) *Pterolichus minor* Mégn. & Trt.
(M.) *Degeeriella rufa* (Nitzsch).
(M.) *Laemobothrion tinnunculi* (Linné).
309. *Cerchneis rupicola* (Daud.). South African kestrel.
(M.) *Degeeriella fusca* (Nitzsch).
(M.) *Laemobothrion tinnunculi* (Linné).
311. *Tichornis naumanni* (Fleisch). Lesser kestrel.
(M.) *Degeeriella fusca* (Nitzsch).
47. Family PANDIONIDAE.
313. *Pandion haliaetus* (Linné). Osprey.
(A.A.) *Buchholzia fuscus* (Nitzsch).
(M.) *Kurodaia haliaeti* (Denny).
(M.) *Colpocephalum flavescens* Nitzsch.
(M.) *Laemobothrion titan* (Piaget).
48. Family TYTONTIDAE.
314. *Tyto alba affinis* (Lay.). Cape barn owl.
(Syn. *Strix flaminea.*)
(M.) *Philopterus rostratus* (Nitzsch).
(M.) *Colpocephalum subpachygaster* Piaget.
(S.T.) *Echidnophaga gallinacea* (Westw.).
49. Family BUBONIDAE.
317. *Nyctaeus lacteus* (Temm.). Giant eagle owl.
(M.) *Eustrigiphilus ceblebrachys* (Nitzsch).
(M.) *Philopterus cursor* (Nitzsch).
318. *Bubo capensis* A. Smith. Cape eagle owl.
(M.) *Philopterus cursor* (Nitzsch).
(M.) *Philopterus rostratus* (Nitzsch).
(M.) *Colpocephalum subpachygaster* Piaget.
319. *Bubo africanus* (Temm.). Cape spotted eagle owl.
(Syn. *Bubo maculosus.*)
(I.I.) *Hyalomma aegyptim impressum* Koch.
(M.) *Philopterus cursor* (Nitzsch).

320. *Phasmaptyna capensis* (A. Smith). Cape marsh owl.
(M.) *Philoater cursor* (Nitzsch).
323. *Strix woodfordi* (A. Smith). Woodford's bush owl.
(M.) *Philoater cursor* (Nitzsch).
50. Family PSITTACIIDAE.
326. *Poicephalus meyeri damarensis* Neum. Transvaal Meyer's parrot.
(M.) *Psittacomenopon poicephalum* (Bedford).
329. *Poicephalus robustus* (Gm.). Cape parrot.
(M.) *Psittacomenopon poicephalum* (Bedford).
52. Family CORACIIDAE.
333. *Coracias garrulus* Linné. European roller.
(M.) *Degeeriella subcuspidata* (Nitzsch).
(M.) *Menopon virgo* Giebel.
53. Family ALCEDINIDAE.
340. *Ceryle rudis* (Linné). Pied kingfisher.
(M.) *Philoater duplicatus* (Piaget).
347. *Chelicutona albiventris* (Scop.). Brown-hooded kingfisher.
(M.) *Philoater capistratus* Neumann.
54. Family BUCEROTIDAE.
349. *Bucorvus schlegeli* Roberts. South African hornbill.
(Syn. *Bucorvus cafer* Schl.).
(M.) *Chapinia africana* (Bedford).
350. *Baryrhynchus cristatus* (Rüpp.). Crested hornbill.
(M.) *Allomenopon bucerotis* (Kellogg).
351. *Bycanistes bucinator* (Temm.). Trumpeter hornbill.
(M.) *Allomenopon bucerotis* (Kellogg).
352. *Rhynchaceros melanoleucus* (Lcht.). Crowned hornbill.
(A.A.) *Pterolichus vexillarius minuta* Mégn. & Trt.
353. *Lophoceros epirhinus* (Sund.). South African grey hornbill.
(M.) *Allomenopon lophocerum* (Bedford).
355. *Tockus erythrorhynchus* (Temm.). Red-billed hornbill.
(A.A.) *Pterolichus vexillarius minuta* Mégn. & Trt.
(M.) *Allomenopon lophocerum* (Bedford).
356. *Xanthorhynchus leucomelas* (Lcht.). Yellow-billed hornbill.
(M.) *Allomenopon lophocerum* (Bedford).
55. Family UPUPIDAE.
358. *Upupa africana* Bechst. African hoopoe.
(M.) *Degeeriella upupae* (Denny).
56. Family MEROPIDAE.
362. *Merops apiaster* Linné. European bee-eater.
(A.A.) *Pterolichus cuculi* Mégn. & Trt.
(A.A.) *Allanalgus analgoides* (Trt.).
(M.) *Degeeriella apiaster* (Denny).
367. *Coccolaryna bullockoides* (A. Smith). White-fronted bee-eater.
(M.) *Degeeriella erythropteri* (Piaget).
(M.) *Cuculoecus meropis* (Denny).
368. *Melittophagus pusillus meridionalis* Sharpe. Little bee-eater.
(M.) *Degeeriella erythropteri* (Piaget).
(M.) *Cuculoecus meropis* (Denny).
57. Family CAPRIMULGIDAE.
370. *Caprimulgus europaeus* Linné. European nightjar.
(M.) *Degeeriella hypoleuca* (Nitzsch).
(M.) *Philoater macropus* (Giebel).
58. Family MACROPTERYGIDAE.
383. *Micropus apus* (Linné). European swift.
(A.A.) *Eustathia cultrifer* (Robin).
(A.A.) *Chauliacia securiger* (Robin).
(A.A.) *Mégninia aestivalis* Berl.
(A.A.) *Alloptes cypseli* Can. & Berl.
(A.A.) *Trouessartia appendiculata* (Berl.).
(M.) *Menopon parvulum* Piaget.
(M.) *Eureum cimicoides* Nitzsch.
(M.) *Dennyus truncatus* (Von Olfers).
388. *Colleoptera affinis* (Grey). Indian swift.
(M.) *Dennyus minor* (Kellogg & Paine).
(D.H.) *Crataerina acutipennis* Austen.
59. Family COLIIDAE.
- 391a. *Urocolius indicus lacteifrons* (Sharpe). Damara red-faced coly.
(M.) *Colilipeurus colius* (Bedford).
(M.) *Machaerilaemus urocolius* Bedford.
- 391b. *Urocolius indicus transvaalensis* Rbts. Transvaal red-faced coly.
(M.) *Colilipeurus colius* (Bedford).
(M.) *Machaerilaemus urocolius* Bedford.
(D.H.) *Ornithesza metallica* (Schiner).
61. Family MUSOPHAGIDAE.
398. *Crinifer concolor* (A. Smith). Southern grey lourie.
(A.A.) *Paralges deformis* Trt. & Neum.
62. Family CUCULIDAE.
400. *Oxylophus cafer* (Lcht.). Stripe-breasted cuckoo.
(M.) *Cuculiphilus fasciatus* (Scopoli).

405. *Cuculus canorus* Linné. European cuckoo.
 (A.A.) *Pterolichus cuculi* Mégn. & Trt.
 (A.A.) *Xolalges scaurus* Trt.
 (M.) *Degeeriella latirostris* (Burm.)
 (M.) *Cuculoecus latifrons* (Nitzsch).
407. *Notococcyx solitarius* (Steph.). Red-chested cuckoo.
 (M.) *Degeeriella latirostris* (Burm.)
 (M.) *Cuculiphilus fasciatus* (Scopoli).
409. *Lampromorpha cuprea* (Bodd.). Bronze cuckoo.
 (M.) *Cuculiphilus fasciatus* (Scopoli).
411. *Chrysococcyx intermedius sharpei* van Som. Southern emerald cuckoo.
 (A.A.) *Allanalges podagricus* Trt.
412. *Centropus senegalensis* (Linné). Senegal coucal.
 (I.I.) *Haemaphysalis hoodi* Warb. & Nuttall.
413. *Centropus burchelli* Swains. Burchell's coucal.
 (I.I.) *Haemaphysalis hoodi* Warb. & Nuttall.
69. Family HIRUNDINIDAE.
443. *Hirundo rustica* Linné. European swallow.
 (M.) *Degeeriella gracilis* (Nitzsch).
 (M.) *Philoaterus excisus* (Nitzsch).
 (M.) *Myrsidea rustica* (Nitzsch).
 (M.) *Hirundoecus malleus* (Nitzsch).
451. *Chelidonaria urbica* (Linné). House martin.
 (A.A.) *Pteronyssus obscurus* Berl.
 (A.A.) *Mégninia aestivalis subintegra* Berl.
 (A.A.) *Trouessartia appendiculata minutipes* (Berl.).
 (A.A.) *Pterodectes rutilus* Robin.
 (M.) *Degeeriella gracilis* (Nitzsch).
 (M.) *Philoaterus excisus* (Nitzsch).
 (M.) *Philoaterus quinquemaculatus* (Piaget).
453. *Petrochelidon spilodera* (Sund.).
 (I.A.) *Argas pérengueyi* (Bedf. & Hewitt).
 (S.P.) *Xenopsylla trispinus* Waterston.
 (D.H.) *Ornithomyia inocellata* Ferris.
458. *Riparia riparia* (Linné). European sandmartin.
 (A.A.) *Pteronyssus obscurus* Berl.
 (A.A.) *Pteronyssus nuntiaeveris* Berl.
 (A.A.) *Mégninia aestivalis subintegra* Berl.
 (A.A.) *Trouessartia appendiculata* (Berl.).
 (M.) *Degeeriella tenuis* (Nitzsch).
 (M.) *Myrsidea rustica* (Nitzsch).
70. Family LANIIDAE.
463. *Enneoctonus collurio* (Linné). Red-backed shrike.
 (M.) *Degeeriella cruciata* (Burm.)
 (M.) *Philoaterus lanii* (Fabr.)
 (M.) *Menopon coarctatum* (Scop.).
 (M.) *Menopon inaequale* Piaget.
466. *Laniarius ferrugineus* (Gmel.). Ferruginous bush-shrike.
 (M.) *Philoaterus subflavescens* (Geoff).
74. Family MUSCICAPIDAE.
517. *Alseonax adustus adustus* (Boie). Cape dusky flycatcher
 (M.) *Philoaterus subflavescens* (Geoff).
518. *Muscicapa striata* Vroeg. Spotted flycatcher.
 (A.A.) *Pteronyssus integer* Trt. & Neum.
 (M.) *Philoaterus subflavescens* (Geoff).
524. *Melaenornis ater* (Sund.). Black flycatcher.
 (M.) *Menacanthus spiniferus* (Piaget).
75. Family SYLVIIDAE.
530. *Sylvia curruca* (Linné). Common whitethroat.
 (M.) *Philoaterus subflavescens* (Geoff).
 (M.) *Menacanthus currucae* (Sch.).
532. *Hippolais coelebs* (Frentzel). Icterine warbler.
 (M.) *Philoaterus subflavescens* (Geoff).
534. *Acrocephalus arundinaceus* (Linné). Great reed warbler.
 (A.A.) *Pteronyssus pallens* Berl.
 (A.A.) *Analges bidentatus* Gieb.
 (A.A.) *Heteropsorus pteroptopus* Trt. & Neum.
542. *Muscipeta schoenobaena* (Linné). European sedge warbler.
 (M.) *Philoaterus subflavescens* (Geoff).
76. Family PYCNONOTIDAE.
598. *Loidorusa layardi* (Gurn.). Layard's bulbul.
 (M.) *Menacanthus spiniferus* (Piaget).
77. Family TURDIDAE.
608. *Turdoides bicolor* (Jard.). White babbler.
 (M.) *Menacanthus crateropus* Bedford.
611. *Turdoides jardinei jardinei* A. Sm. Jardine's babbler.
 (M.) *Menacanthus crateropus* Bedford.
629. *Oenanthe oenanthe* (Linné). European wheatear.
 (M.) *Menopon exile* Nitzsch.
647. *Caffrornis caffra* (Linnaeus). Cape robin.
 (I.I.) *Hyalomma aegyptium impressum* Koch. (Imma-
 ture forms).

82. Family NECTARINIIDAE.

683. *Notiocinnyris afer* (Linné). Greater double-collared sunbird.
(A.A.) *Pterodectes megacaulus* Trt.

83. Family MOTACILLIDAE.

701. *Psomophilus capensis* (Linné). Cape wagtail.
(M.) *Menacanthus* sp.
706. *Spipola trivialis* (Linné). European tree pipit.
(A.A.) *Pterodectes bilobatus* Robin.

84. Family ALAUDIDAE.

735. *Calendula magnirostris* (Steph.). Thick-billed lark.
(I.I.) *Hyalomma aegyptium impressum* Koch.
(Nymphs).

85. Family FRINGILLIDAE.

752. *Passer melanurus melanurus* (St. Mull.). Cape black-headed sparrow.
(M.) *Degeeriella vulgata* (Kell. & Chap.).
(M.) *Philopterus subflavescens* (Geoff).
(S.T.) *Echidnophaga gallinacea* (Westw.)
755. *Philetairus socius* (Lath.). Sociable weaver.
(I.A.) *Argas striatus* Bedford.

86. Family PLOCEIDAE.

776. *Steganura paradisea* (Linné). Paradise widowbird.
(A.A.) *Epidermoptes uncinatus* Mégn.
(M.) *Degeeriella bicurvata* (Piaget).
788. *Diatropura procne* (Bodd.). Long-tailed widowbird.
(A.A.) *Pteralloptes trifolium* (Trt.)
794. *Quelea sanguinirostris lathamii* (A. Smith). Pink-billed quelea.
(I.I.) *Ixodes daveyi* Nuttall.
(M.) *Machaerilaemus plocei* Bedford.
799. *Amadina erythrocephala* (Linné). Red-headed finch.
(M.) *Degeeriella vulgata* (Kell. & Chap.).

87. Family STURNIDAE.

- Sturnus vulgaris* Linné. European starling.
(A.A.) *Pteronyssus truncatus* Trt.
(A.A.) *Trouessartia corvina rosteri* (Berl.).
(M.) *Degeeriella nebulosa* (Burm.).
(M.) *Philopterus sturni* (Schränk).
(M.) *Myrsidea cucullaris* (Nitzsch).
Acridotheres tristis (Indian minor).
(M.) *Menacanthus spiniferus* (Piaget).

845. *Lamprocolius phoenicopterus phoenicopterus* (Swains). Cape glossy starling.
(M.) *Philopterus senegalensis* (Rudow).

- 845a. *Lamprocolius phoenicopterus bispecularis* (Strick). Northern glossy starling.
(M.) *Philopterus senegalensis* (Piaget).
(M.) *Menacanthus spiniferus* (Piaget).

853. *Amydrus morio* (Linné). Common redwing starling.
(I.I.) *Haemaphysalis hoodi* Warb. & Nutt.

89. Family ORIOLIDAE.

859. *Oriolus oriolus* (Linné). European golden oriole.
(M.) *Degeeriella munda* (Nitzsch).
(M.) *Philopterus ornatus* (Nitzsch).
(M.) *Ricinus dolichocephalus* (Scop.).

860. *Oriolus larvatus larvatus* Licht. Cape black-headed oriole.
(M.) *Philopterus ornatus* (Nitzsch).
(M.) *Ricinus dolichocephalus* (Scop.).

91. Family CORVIDAE.

863. *Corvus albus* Müll. (= *C. scapulatus* Daud.). Pied crow.
(A.A.) *Gabucinia delibata* (Robin).
(M.) *Degeeriella bipunctata* (Rudow).
(M.) *Degeeriella quadrangularis* (Rudow).
(M.) *Philopterus semisignatus* (Nitzsch).
(M.) *Menacanthus corvus* Bedford.
(M.) *Myrsidea obovata* (Piaget).
(M.) *Myrsidea ovata* (Piaget).
(M.) *Myrsidea sjoestedti* (Kellogg).
(M.) *Colpocephalum semicinctum* Rudow.

864. *Heterocorax capensis* (Licht.). Black crow.
(M.) *Degeeriella varia* (Nitzsch).
(M.) *Menacanthus corvus* Bedford.

865. *Corvultur albicollis* (Lath.). White-necked raven.
(A.A.) *Gabucinia delibata* (Robin).
(M.) *Degeeriella leucocephala* (Nitzsch).
(M.) *Degeeriella varia* (Nitzsch).
(M.) *Philopterus leptomelas* (Giebel).
(M.) *Myrsidea nigra* (Kellogg & Paine).
(M.) *Myrsidea sjoestedti* (Kellogg).

V.—HOST-LIST OF THE ECTOPARASITES FOUND ON
SOUTH AFRICAN REPTILES.

Sub-class CHELONIA.

Family TESTUDINIDAE.

Testudo angulata Schweigg. Angulated tortoise.

(I.I.) *Amblyomma latum* (Koch).

Testudo oculifera Kuhl.

(I.A.) *Argas moubata* Murray.

Testudo verreauxi Smith.

(I.A.) *Argas moubata* Murray.

Testudo pardalis Bell.

(I.I.) *Amblyomma marmoreum* Koch.

Sub-class SQUAMATA.

Order LACERTILIA.

Family VARANIDAE.

Varanus albigularis (Daud.).

(I.I.) *Aponomma exornatum* Koch.

Varanus niloticus (Linné). Water leguaan.

(I.I.) *Aponomma exornatum* Koch.

Order OPHIDIA.

Family BOIDAE.

Python sebae (Gmel.). South African python.

(I.I.) *Amblyomma nuttalli* Dönitz.

(I.I.) *Aponomma exornatum* Koch.

(I.I.) *Aponomma globulus* Lucas.

(I.I.) *Aponomma transversale* Lucas.

DIVISION A.—AGLYPHA.

Family COLUBRIDAE.

Pseudaspis cana (Linné). Mole snake.

(I.I.) *Amblyomma latum* (Koch).

DIVISION B.—OPISTHOGLYPHA.

Sub-family ELAPINAE.

Naia flava (Merrem). Cape cobra.

(I.I.) *Aponomma laeve capensis* Neu.

Sepedon haemachates (Lacep). Ringhals.

(I.I.) *Aponomma laeve capensis* Neu.

Dendraspis angusticeps (Smith). Mamba.

(I.I.) *Aponomma laeve capensis* Neu.

“Snake.”

(I.I.) *Amblyomma marmoreum* Koch.

TABLE OF DISEASES TRANSMITTED BY SOUTH
AFRICAN ECTOPARASITES.

Disease.	Organism Causing Disease.	Host.	Transmitted by.
Bubonic plague.....	<i>Pasteurella pestis</i> ...	Rodents Man	(S.P.) <i>Xenopsylla brasiliensis</i> (Baker). (S.P.) <i>Xenopsylla cheopis</i> (Rothsch.). (S.P.) <i>Xenopsylla eridos</i> (Rothsch.). (S.P.) <i>Xenopsylla hirsuta</i> Ingram. (S.P.) <i>Ctenocephalides canis</i> (Curtis). (S.P.) <i>Ceratophyllus fuscatus</i> (Bosc.). (S.P.) <i>Dinopsyllus typpus</i> (Jord. and Roths.). (S.P.) <i>Leptopsylla segnis</i> (Schönh.). (I.I.) Larvae of one or more species of <i>Ixodidae</i> .
Tick bite fever.....	<i>Rickettsia sp.</i>	Man	(S.) <i>Pediculus humanus</i> Linné. (S.) <i>Pediculus humanus</i> Linné.
Typhus fever.....	<i>Rickettsia prowazeki</i>	Man	(S.) <i>Pediculus humanus</i> Linné.
Trench fever.....	<i>Rickettsia quintana</i> *	Man	(S.) <i>Pediculus humanus</i> Linné.
Relapsing fever.....	<i>Treponema obermeieri</i> †	Man	(I.A.) <i>Argas moubata</i> Murray.
Human tick fever or African relap. fever	<i>Treponema duttoni</i> ..	Man	(I.A.) <i>Argas persicus</i> (Oken.). (I.A.) <i>Argas moubata</i> Murray.
Fowl tick fever.....	<i>Treponema gallinarum</i>	Fowls	(I.I.) <i>Boophilus decoloratus</i> (Koch). (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.A.) <i>Argas vespertilionis</i> (Latr.).
Spirillosis.....	<i>Treponema theileri</i> ..	Horse Cattle Sheep Bats	(I.I.) <i>Amblyomma hebraeum</i> Koch. (I.I.) <i>Amblyomma variegatum</i> (Fabr.). (I.I.) <i>Rhipicephalus evertsi</i> Neu.
Bat spirochaeta.....	<i>Treponema vespertilionis</i> *	Bats	(I.I.) <i>Haemaphysalis leachii</i> (Aud.). (I.I.) <i>Rhipicephalus sanguineus</i> (Latr.).
Heartwater.....	<i>Rickettsia ruminantium</i>	Cattle Sheep Goats	(I.I.) <i>Boophilus microplis</i> (Canestr.). (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus capensis</i> Koch. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus simus</i> Koch.
Biliary fever or equine piroplasmosis	<i>Nuttallia equi</i>	Horse Mule Donkey	(I.I.) <i>Haemaphysalis leachii</i> (Aud.). (I.I.) <i>Rhipicephalus sanguineus</i> (Latr.).
Biliary fever or canine piroplasmosis	<i>Piroplasma canis</i> ...	Dog	(I.I.) <i>Boophilus decoloratus</i> (Koch). (I.I.) <i>Boophilus microplis</i> (Canestr.). (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus capensis</i> Koch. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus simus</i> Koch.
Redwater or bovine piroplasmosis	<i>Piroplasma bigeminum</i>	Cattle	(I.I.) <i>Boophilus decoloratus</i> (Koch). (I.I.) <i>Boophilus microplis</i> (Canestr.). (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus capensis</i> Koch. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus simus</i> Koch.
East coast fever.....	<i>Theileria parva</i>	Cattle	(I.I.) <i>Boophilus decoloratus</i> (Koch). (I.I.) <i>Boophilus microplis</i> (Canestr.). (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus appendiculatus</i> Neu. (I.I.) <i>Rhipicephalus capensis</i> Koch. (I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Rhipicephalus simus</i> Koch.

* Not known to occur in South Africa.

† Doubtful whether African relapsing fever is caused by this species.

Disease.	Organism Causing Disease.	Host.	Transmitted by.
Gall-sickness (form of)	<i>Theileria mutans</i>	Cattle	(I.I.) <i>Rhipicephalus appendiculatus</i> Neu.
Gall-sickness.....	<i>Anaplasma marginale</i>	Cattle	(I.I.) <i>Rhipicephalus evertsi</i> Neu. (I.I.) <i>Boophilus decoloratus</i> Koch. (I.I.) <i>Rhipicephalus simus</i> Koch.
Paralysis.....	Toxin.....	Sheep Goats Cattle Vaal rhebok Pigeons	(I.I.) <i>Ixodes pilosus</i> Koch. (I.I.) <i>Ixodes rubicundus</i> Neu.
Trypanosomiasis of sheep	<i>Haemoproteus columbae</i> <i>Trypanosoma melophagium</i>	Sheep	(D.H.) <i>Pseudolynchia maura</i> (Bigot). (D.H.) <i>Melophagus ovinus</i> Linné.
Trypanosomiasis of rats	<i>Trypanosoma lewisi</i>	Rats	(S.) <i>Polyplax spinulosa</i> (Burm.). (S.P.) <i>Pulex irritans</i> Linné. (S.P.) <i>Xenopsylla brasiliensis</i> (Baker). (S.P.) <i>Xenopsylla cheopis</i> (Roths.). (S.P.) <i>Ctenocephalides canis</i> (Curtis). (S.P.) <i>Ceratophyllus fasciatus</i> (Bosc.).
Dog tapeworm.....	<i>Dipylidium caninum</i>	Dog Cat Man	(M.) <i>Trichodectes canis</i> (Degeer). (S.P.) <i>Pulex irritans</i> Linné. (S.P.) <i>Ctenocephalides canis</i> (Curtis). (S.P.) <i>Ctenocephalides felis</i> (Bouché).
Rat tapeworm*.....	<i>Hymenolepis diminuta</i>	Rats Mice Man	(S.P.) <i>Pulex irritans</i> Linné. (S.P.) <i>Xenopsylla cheopis</i> (Roths.). (S.P.) <i>Ctenocephalides canis</i> (Curtis). (S.P.) <i>Ceratophyllus fasciatus</i> (Bosc.). (S.P.) <i>Leptopsylla segnis</i> (Schönh.). (S.P.) <i>Ceratophyllus fasciatus</i> (Bosc.).
Mouse tapeworm*...	<i>Hymenolepis microstoma</i>	Mouse	(I.I.) <i>Rhipicephalus sanguineus</i> (Latr.).
Filaria of dog*.....	<i>Dirofilaria immitis</i> ..	Dog	(S.P.) <i>Ctenocephalides canis</i> (Curtis). (S.P.) <i>Ctenocephalides felis</i> (Bouché).
Filaria of dog*.....	<i>Dipetalonema reconditum</i>	Dog	(S.) <i>Linognathus setosus</i> (Olfers). (S.P.) <i>Pulex irritans</i> Linné. (S.P.) <i>Ctenocephalides canis</i> (Curtis). (S.P.) <i>Ctenocephalides felis</i> (Bouché).
Filaria of man*.....	<i>Dipetalonema perstans</i>	Man	(I.A.) <i>Argas moubata</i> Murray. (S.P.) <i>Pulex irritans</i> Linné.
Filaria of dog*.....	<i>Dipetalonema grassii</i>	Dog	(I.I.) <i>Rhipicephalus sanguineus</i> (Latr.).

* Not known to occur in South Africa.

LIST OF REFERENCES.

ACARINA.

- BEDFORD, G. A. H. (1912). "A Tick New to South Africa". *Rept. Dir. Vet. Res.*, Un. S. Afr., Vol. 2, pp. 343-344, Pl. 37.
- BEDFORD, G. A. H. (1916). "Experiments and Observations carried out with *Psoroptes communis* at Onderstepoort". *Rep. Dir. Vet. Res.*, Un. S. Afr., Vols. 3-4, pp. 101-107, f. 1-7.
- BEDFORD, G. A. H. (1920). "Ticks Found on Man and his Domestic Animals and Poultry in South Africa". *Jnl. Dept. Agric.*, Un. S. Afr., pp. 317-340, f. 1-29; also Reprint No. 16.
- BEDFORD, G. A. H. (1924). "The External Parasites of Poultry, with Measures for their Control". *Jnl. Dept. Agric.*, Un. S. Afr., Vol. 9, Pt. 2, pp. 123-140; also Reprint No. 33 and Bulletin No. 41, 1928.
- BEDFORD, G. A. H. (1925). "The Spinose Ear-tick (*Ornithodoros mégnini* Dugès)". *Jnl. Dept. Agric.*, Un. S. Afr., Vol. 10, pp. 147-153; f. 1, 2; also Reprint No. 7.
- BEDFORD, G. A. H. (1929). "Notes on Some African Ticks, with Descriptions of Three New Species". *Rep. Dir. Vet. Services*, Un. S. Afr., Vol. 15, pp. 493-496, Pl. 1-3.
- BEDFORD, G. A. H. (1931). "*Nuttalliella namaqua*, a New Genus and Species of Tick". *Parasit.*, Vol. 23, Pt. 2, pp. 230-232, Pl. 10 and text-fig. 1.
- BEDFORD, G. A. H. (1932). "Description of *Argas striatus*, a New Species of Tick". *Rept. Dir. Vet. Serv. & Anim. Indust.*, Vol. 18, pp. 221-222, f. 1-2.
- BEDFORD, G. A. H., AND HEWITT, J. (1925). "Descriptions of Two New Species of Ticks, with Notes on Rare and hitherto Unrecorded Species from South Africa". *S. Afr. Jnl. Nat. Hist.*, Vol. 5, Pt. 1, pp. 259-266, Pls. 19, 20.
- BUXTON, P. A. (1921). "The External Anatomy of the *Sarcoptes* of the Horse". *Parasit.*, Vol. 13, pp. 114-145, 1 pl., 22 figs.
- BUXTON, P. A. (1921). "On the *Sarcoptes* of Man". *Parasit.*, Vol. 13, pp. 146-151, f. 1-9.
- CAMERON, A. E. (1924). "*Sarcoptes* of Cattle". *Parasit.*, Vol. 16, pp. 255-265, f. 1-6.
- CANESTRINI, G., AND KRAMER, P. (1899). "Das Tierreich. Demodicidae und Sarcoptidae", pp. 1-193, f. 1-30.
- COOPER, W. F., AND ROBINSON, L. E. (1907). "Note on a New South African Tick, *Rhipicephalus phthirioides*, sp. n.". *Linn. Soc. Journ. Zool.*, Vol. 30, pp. 35-38, 4 figs., Pl. 5 (= *M. winthemi* Karsch.).
- COOPER, W. F., AND ROBINSON, L. E. (1908). "On Six New Species of Ixodidae, including a Second Species of the New Genus *Rhipicentor* N. and W.". *Proc. Camb. Philos. Soc.*, Vol. 14, pp. 457-470, 24 figs.
- DÖNITZ, W. (1910). "Die Zecken Südafrikas". *Denkschriften der Med.-Naturw. Gesellsch. zu Jena*, XVI, Jena, pp. 397-494, 4 pls.
- EWING, H. E. (1929). "A Manual of External Parasites", pp. 1-89, f. 1-57.
- HIRST, S. (1916). "Notes on Parasitic Acari". *Jnl. Zool. Res.*, Lond., Vol. I, No. 2, pp. 59-89.
- HIRST, S. (1919). Studies on Acari, No. 1. The Genus *Demodex*, Owen. Pp. 1-44, t.f. 1-4, Pls. 1-13.
- HIRST, S. (1920). Notes on Acari Parasitic on Birds, with Descriptions of Two New Species. *Ann. Mag. Nat. Hist.* (9) V, pp. 121-122.
- HIRST, S. (1921). On Some New or Little-known Acari, mostly Parasitic in Habit. *Proc. Zool. Soc. London*, pp. 357-378.
- HIRST, S. (1922). Mites Injurious to Domestic Animals. *Brit. Mus. Series* No. 13.

- HIRST, S. (1925). Descriptions of New Acari, mainly Parasitic on Rodents. *Proc. Zool. Soc. Lond.*, Pt. 1, pp. 49-69, f. 1-16.
- HOWARD, C. W. (1908). A List of the Ticks of South Africa. *Ann. Tvl. Mus.*, I, ii, pp. 73-122, Pl. 1-16.
- HOWARD, C. W. (1909). A New Species of *Haemaphysalis* from South Africa. *Ann. Tvl. Mus.*, I, pp. 219-223, and Reprint. (*H. africana*=*H. hoodi* Warb. and Nutt.).
- HUTCHEON, D. (1895). Scab: Its Nature, Cause, Symptoms and Treatment. Capetown.
- JACK, R. W. (1928). Ticks Infesting Domestic Animals in Southern Rhodesia. *Rhod. Agric. Journ.*, XXV, pp. 537-556, 704-716, figs., and Bulletin No. 696.
- LOUNSBURY, C. P. (1899). The Bont Tick. *Amblyomma hebraeum* Koch. Its Life-history and Habits. *Agric. Journ. Capetown*, XV, pp. 728-743, 1 fig.; also reprint.
- LOUNSBURY, C. P. (1900). Tick Investigations. *Rep. Gov. Ent. for the Year 1899*. Capetown, pp. 19-34, Pl. 3, 4.
- LOUNSBURY, C. P. (1901). Transmission of Malignant Jaundice of the Dog by a Species of Tick. *Agric. Journ.*, Capetown, XIX, pp. 714-724; also reprint.
- LOUNSBURY, C. P. (1903A). 1. Ticks and Rhodesian Cattle Disease, pp. 16-18 2. Ticks and Malignant Jaundice, pp. 18-20. 3. Ticks and Heartwater, pp. 20-41. *Rep. Gov. Ent. for the year 1902*. Capetown.
- LOUNSBURY, C. P. (1903B). The Fowl Tick. Studies on its Life-cycle and Habits. *Agric. Journ.*, Capetown, XXIII, pp. 261-273, 3 Pls.; also reprint.
- LOUNSBURY, C. P. (1904). Transmission of African Coast Fever. *Agric. Journ.*, Capetown, XXIV, pp. 428-432, 2 Pls.; also Reprint No. 5.
- MUNRO, J. W. (1919). Report on Scabies Investigation. *Journ. Roy. Army Med. Corps.*, XXXIII, pp. 1-41.
- NEUMANN, L. G. (1892). A Treatise on the Parasites and Parasitic Diseases of Domestic Animals, pp. 800, figs. 1-364.
- NEUMANN, L. G. (1908). A New Species of Tick from the Transvaal. *Ann. Tvl. Mus.*, I, ii, pp. 170-172. (*Rhipicentor vicinus*=*R. nuttalli* Cooper and Robinson.)
- NEUMANN, L. G. (1910). Description de deux nouvelles espèces d'Ixodinae. *Tijd. v. Ent.*, LIII, pp. 11-17, Pl. 1. (Description of *Rhipicephalus deltoideus*.)
- NUTTALL, G. H. F. (1916). Ticks of the Belgian Congo and the Diseases they convey. *Bull. Ent. Res.*, VI, iv, pp. 313-352, f. 1-48.
- NUTTALL, G. H. F., WARBURTON, C., COOPER, W. F., AND ROBINSON, L. E. (1908). Ticks: A Monograph of the Ixodoidea. Part I. Argasidae.
- NUTTALL, G. H. F., WARBURTON, C., COOPER, W. F., AND ROBINSON, L. E. (1911). *Ibid.* Bibliography.
- NUTTALL, G. H. F., WARBURTON, C., COOPER, W. F., AND ROBINSON, L. E. (1915). *Ibid.* Bibliography II.
- NUTTALL, G. H. F., AND WARBURTON, C. (1911). *Ibid.* Part II. Ixodes.
- NUTTALL, G. H. F., AND WARBURTON, C. (1915). *Ibid.* Part III. Haemaphysalis.
- OUDEMANS, A. C. (1906). Notes on Acari. XVth Series. *Tijd. v. Ent.*, Vol. 49, pp. 237-270, Pls. 9-12.
- OUDEMANS, A. C. (1908). Notes on Acari. XVth Series. *Ibid.*, Vol. 51, pp. 28-88, Pls. 1-3.
- OUDEMANS, A. C. (1908). Notizen über Acari. XVII Reihe (Syringobia) *Zool. Jahrbüch. Jena*, pp. 567-589, Pl. 33.

- OUDEMANS, A. C. (1910). Notes on Acari. XVIIIth Series. *Tijd. v. Ent.*, Vol. 53, pp. 197-234, Pls. 9-12.
- OUDEMANS, A. C. (1926). Etude du Genere *Notoedres* Railliet 1893 et de l'espèce *Acarus bubalis* Oudms., 1926. *Arch. Néerland des Sci. Exact. et Natur.*, Ser 3B, Vol. 4, pp. 145-262, f. 1-85.
- ROBINSON, L. E. (1911). New Species of Ticks (*Haemaphysalis* and *Amblyomma*); *Parasit.*, Vol. 4, pp. 478-484, f. 1-4.
- ROBINSON, L. E. (1926). Ticks: A Monograph of the Ixodoidea. Part IV. *Amblyomma*.
- SHILSTON, A. W. (1916). Sheep Scab. *Repts. Dir. Vet. Res.*, Un. S. Afr., Vols. 3 and 4, pp. 71-98.
- STILES, C. W., AND NOLAN, M. O. (1931). Key Catalogue of Parasites Reported for Chiroptera (Bats) with their possible Public Health Importance. *Nat. Instit. of Health Bull.*, U.S. Treas. Dept., No. 155, pp. 603-789.
- THELLER, A. (1909). Diseases, Ticks and their Eradication. *Tvl. Agr. Journ.*, Vols. 4, 5, and reprint.
- TROUESSART, E. L. (1916). Revision des Genres de la Sous-famille des Analgesinae ou Sarcoptides plumicoles. *Bull. Soc. Zool. de France*, Vol. 40, Pts. 8-10, pp. 207-223.
- WALKER, J. (1916). A Short Note on the Occurrence of *Cyodites nudus* (Vizali) in the Domestic Fowl in South Africa. *Repts. Dir. Vet. Res.*, Un. S. Afr., Vols. 3 and 4, pp. 527-529.
- WARBURTON, C. (1912). Notes on the Genus *Rhipicephalus*, with the description of New Species and the consideration of some species hitherto described. *Parasit.*, Vol. 5, Pt. 1, pp. 1-20.
- WARBURTON, C. (1920). Sarcoptic Scabies in Man and Animals. *Parasit.*, Vol. 12, pp. 265-300, t.f. 1-10, Pl. 15.

DERMAPTERA.

Family HEMIMERIDAE.

- CARPENTER, G. H. (1909). The Species of *Hemimerus* and their Distribution. *Ent. Mo. Mag.*, Ser. 2, Vol. 20, pp. 254-257, Pl. iv, f. 1-4. (For other references see the above.)
- JORDAN, K. (1909). Notes on the Anatomy of *Hemimerus talpoides*. *Nov. Zool.*, Vol. 16, pp. 327-330, Pl. 18.

ANOPLURA.

- BEDFORD, G. A. H. (1919). Anoplura from South African Hosts. *Repts. Dir. Vet. Res.*, Un. S. Afr., Vols. 5-6, pp. 709-731, f. 1-13.
- BEDFORD, G. A. H. (1920A). Anoplura from South African Hosts. Part 2. *Repts. Dir. Vet. Res.*, Un. S. Afr., Vols. 7 and 8, pp. 708-734, Pl. 1-7.
- BEDFORD, G. A. H. (1920B). Mallophaga from South African Birds. *Parasit.*, Vol. 12, Pt. 2, pp. 167-172, Pl. 12 and 13.
- BEDFORD, G. A. H. (1920C). Description of a New Genus and Species of Louse from an Elephant-shrew. *Ent. Mo. Mag.* (3), Vol. 6, pp. 87-90, f. 1, 2.
- BEDFORD, G. A. H. (1924). The External Parasites of Poultry, with Measures for their Control. *Jnl. Dept. Agric.*, Un. S. Afr., Vol. 9, Pt. 2, pp. 123-140, f. 6-9; also Reprint No. 33 and Bulletin No. 41, 1928.
- BEDFORD, G. A. H. (1927A). Description of a New Genus and Species of Anoplura (*Lemurphthirus galagus*) from a Lemur. *Parasit.*, Vol. 19, Pt. 2, pp. 263-264, f. 1, 2.
- BEDFORD, G. A. H. (1927B). Description of Three New Species of Anoplura from South African Mammals. *Trans. Roy. Soc. S. Afr.*, Vol. 14, Pt. 4, pp. 347-352, f. 1-6.

- BEDFORD, G. A. H. (1928). New Species of Trichodectidae from South African Mammals. *Repts. Dir. Vet. Educ. and Res., Un. S. Afr.*, Vols. 13-14, pp. 841-857, f. 1-16.
- BEDFORD, G. A. H. (1929). Anoplura (Siphunculata and Mallophaga) from South African Hosts. *Rept. Div. Vet. Services, Un. S. Afr.*, Vol. 15, pp. 501-549, f. 1-34.
- BEDFORD, G. A. H. (1930). New Genera and Species of Mallophaga from South African Hosts. *Rept. Div. Vet. Serv. Un. S. Afr.*, Vol. 16, pp. 153-173, f. 1-16.
- BEDFORD, G. A. H. (1931a). Description of Three Species of *Tetrophthalmus* (Mallophaga) found on Pelicans. *Parasit.*, Vol. 23, Pt. 1, pp. 236-242, f. 1-6.
- BEDFORD, G. A. H. (1931b). New Genera and Species of Mallophaga. *Rep. Dir. Vet. Serv. & Anim. Indust., Un. S. Afr.*, Vol. 17, pp. 283-297, f. 1-16.
- BEDFORD, G. A. H. (1932). Trichodectidae (Mallophaga) found on African Carnivora. *Parasit.*, XXIV (in press).
- BEDFORD, G. A. H. (1932). Trichodectidae (Mallophaga) Parasitic on Procaviidae. *Proc. Zool. Soc. Lond.* (in press).
- CUMMINGS, B. F. (1912). Anoplura from African Hosts. *Bull. Ent. Res.*, Vol. 3, pp. 393-397, f. 1-2.
- CUMMINGS, B. F. (1913). On some Nondescript Anoplura and Mallophaga. *Bull. Ent. Res.*, Vol. 4, p. 35-45.
- CUMMINGS, B. F. (1914). Descriptions of Five New Species of Anoplura and Mallophaga. *Bull. Ent. Res.*, Vol. 5, pp. 155-177, f. 1-8.
- CUMMINGS, B. F. (1916). Studies on Anoplura and Mallophaga: Being a Report upon a Collection from the Mammals and Birds in the Society's Gardens. Part 1. *Proc. Zool. Soc., London*, pp. 253-295, f. 1-24.
- CUMMINGS, B. F. (1916). *Ibid.* Part 2, *Proc. Zool. Soc., London*, pp. 643-693, f. 1-36.
- DENNY (1842). *Monographia Anoplurorum Britanniae*, London, 262 pp., 26 Pls.
- EWING, H. E. (1926a). Some Recent Generic Derivatives on the Mallophagen Genus *Philopterus* Nitzsch (Philopteridae). *Proc. Ent. Soc. Wash.*, Vol. 28, Pt. 6, pp. 145-150.
- EWING, H. E. (1926b). A Revision of the American Lice of the Genus *Pediculus*, together with a Consideration of the Significance of their Geographical and Host Distribution. *Proc. U.S. Nat. Mus.*, Vol. 68, Art. 19, pp. 1-30, t.f. 1-8, Pls. 1-3.
- EWING, H. E. (1927). Descriptions of new genera and species of Mallophaga, together with Keys to some related genera of Menoponidae and Philopteridae. *Jnl. Wash. Acad. Sc.*, Vol. 27, Pl. 4, pp. 86-96.
- EWING, H. E. (1929). A Manual of External Parasites. Pp. 90-152, f. 58-85.
- FERRIS, G. F. (1916a). Mallophaga and Anoplura from South Africa, with List of Mammalian Hosts of African Species. *Ann. Durban Mus.*, Vol. 1, Pt. 3, pp. 230-252, f. 16-27.
- FERRIS, G. F. (1916b). Some Generic Groups in the Mallophagan Family Menoponidae. *Canad. Ent.*, pp. 301-311, f. 10-15.
- FERRIS, G. F. (1916c). A Catalogue and Host-list of the Anoplura. *Proc. Calif. Acad. Sc.*, Vol. 6, Pt. 6, pp. 129-213.
- FERRIS, G. F. (1919-23). Contributions toward a Monograph of the Sucking Lice. Stanford University Publications. Pts. 1-4 published.
- FERRIS, G. F. (1924). The Mallophagan Family Menoponidae. Pt. 1. *Parasit.*, Vol. 16, Pt. 1, pp. 55-66.
- FERRIS, G. F. (1928). *Ibid.*, Part 3. *Parasit.*, Vol. 20, Pt. 2, pp. 221-227, f. 7-9.
- FERRIS, G. F. (1931a). Report upon certain Ectoparasites of Mammals. *Rep. Harv.-Afr. Exped. Liberia and Belg. Congo*, pp. 1022-1038, f. 12-24.

- FERRIS, G. F. (1931b). The Louse of Elephants. *Parasit.*, Vol. 23, Pt. 1, pp. 112-127, t.f. 1-5, Pls. 4, 5.
- GIEBEL, C. G. (1874). *Insecta Epizoa*. Leipsic, 308 pp., 20 Pls.
- HARRISON, L. (1916). The Genera and Species of Mallophaga. *Parasit.*, Vol. 9, pp. 1-154.
- HILL, L. (1922). Three New Species of *Trichodectes* from *Cephalophus monticola* and *Procavia capensis*. *Parasit.*, Vol. 14, Pt. 1, pp. 63-68, Pls. 1-2.
- HOWLETT, F. M. (1917). Notes on Head and Body-lice and upon Temperature Reactions of Lice and Mosquitoes. *Parasit.*, Vol. 10, i, pp. 186-188.
- KEILIN, D., AND NUTTALL, G. H. F. (1919). Hermaphroditism and other Abnormalities in *Pediculus humanus*. *Ibid.*, Vol. 11, pp. 278-328, Pls. 12-17.
- KEILIN, D., AND NUTTALL, G. H. F. (1930). Iconographic Studies of *Pediculus humanus*. *Ibid.*, Vol. 22, i, pp. 1-10, Pls. 1-18.
- KELLOGG, V. (1896). New Mallophaga, I. *Proc. Calif. Acad. Sc.* Vol. 6, pp. 31-168.
- KELLOGG, V. (1896). New Mallophaga, II, *Ibid.*, pp. 431-548.
- KELLOGG, V. (1906). A Gigantic New Biting Bird-louse. *Ent. News.*, pp. 62-63.
- KELLOGG, V. (1908). Mallophaga, in Wytzman's *Genera Insectorum*, Brussels, 87 pp., 3 Pls.
- KELLOGG, V. (1910). Mallophaga. *Wiss. Ergebn. Schwed. Zool. Exp. Kilimanjaro*, Vol. 3, abt. 15, pp. 43-56.
- KELLOGG, V. (1914). Mallophaga from Birds of the South Atlantic. *Brooklyn. Sc. Bull.*, Vol. 2, Pt. 4, pp. 80-89, Pl. 16.
- KELLOGG, V., AND FERRIS, G. F. (1915). Anoplura and Mallophaga from Zululand. *Ann. Durban Mus.* Vol. 1, Pt. 2, pp. 147-158, Pls. 15-16.
- KELLOGG, V., AND NAKAYAMA (1914). A New *Trichodectes* from Baja, California. *Psyche*, Vol. 21, pp. 90-92.
- KELLOGG, V., AND NAKAYAMA (1915). A New *Trichodectes* from the Goat. *Psyche*, Vol. 22, pp. 33-35.
- KELLOGG, V., AND PAINE (1911). Anoplura and Mallophaga from African Hosts. *Bull. Ent. Res.*, Vol. 2, pp. 145-152.
- KELLOGG, V., AND PAINE (1914). Mallophaga of Birds (mostly Corvidae and Phasianidae) of India. *Rec. Indian Mus.*, Vol. 10, pp. 217-243.
- MJÖBERG, E. (1910). Studien über Mallophagen und Anopluren. *Arkiv. f. Zool.*, Vol. 6, pp. 1-296, t.f. 1-156, Pls. 1-5.
- NEUMANN, L. G. (1911). Notes sur les Pédiculidés, II, *Arch. de Parasit.*, Vol. 14, pp. 401-414, f. 1-8.
- NEUMANN, L. G. (1912). Notes sur les Mallophages, II, *Ibid.*, Vol. 15, pp. 353-384, f. 1-29.
- NEUMANN, L. G. (1913). Notes sur les Mallophages, III, *Ibid.*, Vol. 15, pp. 608-634, f. 1-20.
- NUTTALL, G. H. F. (1917a). Bibliography of *Pediculus* and *Phthirus*. *Parasit.*, Vol. 10, Pt. 1, pp. 1-42.
- NUTTALL, G. H. F. (1917b). The Biology of *Pediculus humanus*. *Ibid.*, Vol. 10, Pt. 1, pp. 80-185, t.f. 1-12, Pls. 2-3.
- NUTTALL, G. H. F. (1918). Combating Lousiness among Soldiers and Civilians. *Ibid.*, Vol. 10, Pt. 4, pp. 411-536, t.f. 1-26, Pls. 10-13.
- PIAGET, E. (1880). *Les Pédiculines*. Leyden, 714 pp., 56 Pls.
- PIAGET, E. (1885a). *Les Pédiculines*, Supplement, Leyden, 162 pp., 16 Pls.
- PIAGET, E. (1885b).—Un nouveau parasite du Transvaal. *Tijd. v. Ent.*, Vol. 38, pp. 101-102.

CHECK-LIST AND HOST-LIST OF SOUTH AFRICAN ECTOPARASITES.

- PIAGET, E. (1890). *Nirmus assimilis*. *Trans. Ent. Soc. Lond. Proceedings*, p. 23.
- STOBBE (1913). Mallophagen 3. Beitrag: Die Trichodectiden des Berliner Museums für Naturkunde. *Sitz.-Ber. Ges. Nat. Freunde*, pp. 365-383, f. 1-8.
- TASCHENBERG (1882). Die Mallophagen. *Nova Acta Halle*, Vol. 44, 244 pp., 7 Pls.
- WATERSTON, J. (1914). On Some Ectoparasites in the South African Museum, Capetown. *Ann. S. Afr. Mus.*, Vol. 10, pp. 271-321, t.f. 1-3, Pls. 25-26.
- WATERSTON, J. (1915). On Two New Species of Mallophaga. *Ent. Mo. Mag.*, Ser. 3, Vol. 1, pp. 12-16.
- WATERSTON, J. (1917A). A New African Louse (*Polyplax calva*, n. sp.) from *Cricetomys*. *Parasit.*, Vol. 9, pp. 199-202, f. 1-2.
- WATERSTON, J. (1917B). On a New Species of Docophoroides Gigl. (*Eury-metopus* Tasch.) from an Albatross (*Diomedea melanophrys*). *Ent. Mo. Mag.*, Ser. 3, Vol. 3, p. 99, 1 f.
- WATERSTON, J. (1928). The Mallophaga of Sand-grouse. *Proc. Zool. Soc. London*, Pt. 2, pp. 333-356, f. 1-10.
- ZUNKER, M. (1928). Die Mallophagen der Haustiere. *Archiv. f. Wissensch. u. prakt. Tierheilk.* Vol. 58, Pt. 6, pp. 644-660, f. 1-10.

HEMIPTERA.

- CHATTON, E., AND BLANC, M. (1918). Large Eclectisme parasitaire de la Punaise des Lits Son Entretien aux Depens des Reptiles. *Bull. Soc. Path. Exot.*, Paris, Vol. 11, Pt. 5, pp. 382-387.
- PATTON AND CRAGG (1913). A Text-book of Medical Entomology, pp. 498-525, Pl. 41-43.
- PRINGAULT, E. (1914). *Cimex pipistrelli* Jen., Agent de la Transmission de la Trypanosomiase des Chauves-Souris. *C.R. Soc. Biol.*, Paris, Vol. 76, Pt. 19, pp. 881-884.
- ROTHSCHILD, HON. N. C. (1912). On the Genus *Cacodmus*. *Ent. Mo. Mag.*, Ser. 2, Vol. 24, pp. 102-103.
- ROTHSCHILD, HON. N. C. (1914). On Some Species of *Cacodmus*, a Genus of Bed-bugs. *Bull. Ent. Res.*, Vol. 5, Pt. 1, pp. 41-42, f. 1-5.
- STILES, C. W., AND NOLAN, M. O. (1930). Key Catalogue of Parasites Reported for Chiroptera (Bats) with their possible Public Health Importance. *Nat. Instit. of Health Bull.*, U.S. Treas. Depart., No. 155, pp. 603-742.

DIPTERA PUPIPARA.

- AUSTEN, E. E. (1906). Illustrations of British Blood-sucking Flies.
- AUSTEN, E. E. (1909). Illustrations of African Blood-sucking Flies other than Mosquitoes and Tsetse-flies.
- AUSTEN, E. E. (1926). On the Genus *Crataerina*, von Olf., and its allies (Diptera Pupipara-family Hippoboscidae), with descriptions of New Species. *Parasit.*, Vol. 18, Pt. 3, pp. 350-360, Pl. 16.
- BEDFORD, G. A. H. (1926). The Sheep Ked (*Melophagus ovinus* Linné). *Jnl. Dept. Agric.*, Un. S. Afr., pp. 484-490, f. 1-2 and Reprint No. 66.
- BEQUAERT, J. (1926). Medical Report of Rice-Harvard Expedition to the Amazon., pp. 240-243.
- BEQUAERT, J. (1930). Notes on Hippoboscidae. 2. The Subfamily Hippoboscinae. *Psyche*, Vol. 37, Pt. 4, pp. 303-326.
- FALCOZ, L. (1926). Faune de France, Diptères Pupipares, Paris, pp. 1-61, f. 1-76.

G. A. H. BEDFORD.

- FERRIS, G. F., AND COLE, F. R. (1922). Hippoboscidae (Diptera Pupipara). *Parasit.*, Vol. 14, Pt. 2, pp. 178-205, f. 1-20.
- FERRIS, G. F. (1925). Third Report upon Diptera Pupipara from the Philippine Islands. *The Philip. Jnl. Sc.*, Vol. 27, Pt. 3, pp. 413-421, f. 1-5.
- FERRIS, G. F. (1927). Fifth Report upon Diptera Pupipara from the Philippine Islands. *The Philip. Jnl. Sc.*, Vol. 34, Pt. 2, pp. 207-233, f. 1-19.
- FERRIS, G. F. (1930). Sixth Report upon Diptera Pupipara from the Philippine Islands. *The Philip. Jnl. Sc.*, Vol. 43, Pt. 4, pp. 537-553, f. 1-7.
- FERRIS, G. F. (1930). Some African Diptera Pupipara. *Parasit.*, Vol. 22, Pt. 3, pp. 275-282, f. 1-6.
- JOBLING, B. (1930). A Revision of the Genus *Raymondia* Frauenfeld (Diptera Pupipara, Streblidae) *Parasit.*, Vol. 22, Pt. 3, pp. 283-301, f. 1-10.
- JOBLING, B. (1931). A New Species of the Genus *Raymondia* Frauenfeld (Diptera Pupipara, Streblidae) with a Note on *Raymondia quadriceps* Jobling and *R. bedfordi* Ferris. *Parasit.*, Vol. 23, Pt. 1, pp. 79-83, f. 1-2.
- SCOTT, H. (1917). Notes on Nycteribiidae, with Descriptions of two New Genera. *Parasit.*, Vol. 9, Pt. 4, pp. 593-610, Pl. 24.

SIPHONAPTERA.

- BEDFORD, G. A. H. (1924). The External Parasites of Poultry, with Measures for their Control. *Jnl. Dept. Agric.*, Un. S. Afr., Vol. 9, Pt. 2, pp. 123-140; also Reprint No. 33 and Bulletin No. 41, 1928.
- DE MEILLON, B. (1930). New Fleas from South Africa. *Novit. Zool.*, Vol. 35, pp. 250-253, f. 1-9.
- DE MEILLON, B. (1930). A New *Xenopsylla* from South Africa. *Novit. Zool.*, Vol. 36, pp. 139-142, f. 1-10.
- DEPARTMENT OF ENTOMOLOGY (1930). *Ann. Rep. S. Afr. Inst. Med. Res.*, 1929, pp. 29-31.
- EWING, H. E. (1929). A Manual of External Parasites, London, pp. 153-183, figs.
- INGRAM, A. (1927A). New Fleas from South African Rodents. *Bull. Ent. Res.*, Vol. 17, Pt. 3, pp. 289-293, f. 1-4.
- INGRAM, A. (1927B). See Mitchell, J. A., Pirie and Ingram.
- INGRAM, A. (1928). Three New South African *Xenopsylla* (Siphonapt.). *Bull. Ent. Res.*, Vol. 18, Pt. 4, pp. 371-375, f. 1-7.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1906). A Revision of the Sarcopsyllidae—a Family of Siphonaptera. *Thom. Yates and John. Labs. Rep.*, Vol. 7, Pt. 1, pp. 15-72, Pls. 1-4.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1908). Revision of the Non-combed Eyed Siphonaptera. *Parasit.*, Vol. 1, Pt. 1, pp. 1-100, Pls. 1-7.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1913). Siphonaptera collected by Mr. Robin Kemp in Tropical Africa. *Novit. Zool.*, Vol. 20, Pt. 3, pp. 528-581.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1921). New Genera and Species of Bat-fleas. *Ectoparasites*, Vol. 1, Pt. 3, pp. 142-162, f. 116-147.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1921). On *Ceratophyllus fasciatus*, and Some Allied Indian Species of Fleas. *Ectoparasites*, Vol. 1, Pt. 3, pp. 178-198.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1922). On *Pygiopsylla* and Allied Genera of Siphonaptera. *Ectoparasites*, Vol. 1, Pt. 4, pp. 231-265.
- JORDAN, K., AND ROTHSCCHILD, N. C. (1923). On some *Siphonaptera* from the Eastern Hemisphere. *Ectoparasites*, Vol. 1, Pt. 5, pp. 293-308.

CHECK-LIST AND HOST-LIST OF SOUTH AFRICAN ECTOPARASITES.

- JORDAN, K. (1925). New Siphonaptera. *Novit. Zool.*, Vol. 32, Pt. 1, pp. 96-112, f. 1-46.
- JORDAN, K. (1926). On *Xenopsylla* and Allied Genera of Siphonaptera, in *Verhandl. III. Internat. Ento-Kongr.*, Zürich, Pt. 2, pp. 593-627, 16 figs., 4 pls.
- JORDAN, K. (1930). On Some South African Fleas. *Novit. Zool.*, Vol. 36, pp. 139-142, f. 1-10.
- MITCHELL, J. A. (1921). Plague in South Africa: Perpetuation and spread of Infection by Wild Rodents. *S. Afr. Med. Rec.*, Vol. 19, Pt. 24, pp. 475-477. (Gives list of fleas collected from wild rodents and small carnivora in north-western Orange Free State.)
- MITCHELL, J. A., PIRIE AND INGRAM, A. (1927). The Plague Problem in South Africa: Historical, Bacteriological and Entomological Studies. *Publ. of the S. Afr. Instit. for Med. Res.*, pp. 89-256.
- ROTHSCHILD, HON. N. C. (1900). Some New Exotic Fleas. *Ent. Pec. and Jnl. Var.*, Vol. 12, pp. 36-38.
- ROTHSCHILD, HON. N. C. (1904). Further contributions to the knowledge of Siphonaptera. *Novit. Zool.*, Vol. 11, pp. 602-653.
- ROTHSCHILD, HON. N. C. (1905). Some New Siphonaptera. *Novit. Zool.*, Vol. 12, pp. 479-491.
- ROTHSCHILD, HON. N. C. (1907). Some New Siphonaptera. *Novit. Zool.*, Vol. 14, pp. 329-333.
- ROTHSCHILD, HON. N. C. (1907). Some New African Siphonaptera. *Ent. Mo. Mag.*, Ser. 2, Vol. 18, pp. 175-176.
- ROTHSCHILD, HON. N. C. (1908). Notes on a Collection of Siphonaptera from the Ruwenzori, Uganda. *Ent. Mo. Mag.* Ser. 2, Vol. 19, pp. 76-79, Pl. 1.
- ROTHSCHILD, HON. N. C. (1909). Some New Siphonaptera. *Novit. Zool.*, Vol. 16, pp. 53-56.
- ROTHSCHILD, HON. N. C. (1910). A Synopsis of the Fleas Found on Domestic Rats and Mice. *Bull. Ent. Res.*, Vol. 1, Pt. 2, pp. 89-98.
- ROTHSCHILD, HON. N. C. (1913). A New *Listropsylla* and the Male of *Otenophthalmus calceatus*, Waterst. (1912), both from South Africa. *Ent. Mo. Mag.*, Ser. 2, Vol. 24, pp. 207-208, Pl. 5, f. 1-3.
- STILES, C. W., AND COLLINS, B. J. (1930). *Ctenocephalides*, New Genus of Fleas Type *Pulex canis*. *Publ. Health Repts.*, Vol. 45, Pt. 23, pp. 1308-1310. Also Reprint No. 1382.
- STILES, C. W., AND NOLAN, M. O. (1930). Key Catalogue of Parasites Reported for *Chiroptera* (Bats) with their Possible Public Health Importance. *Nat. Instit. of Health Bull.*, U.S. Treas. Depart., No. 155, pp. 603-742.
- WATERSTON, J. (1909). A New *Ceratophyllus* from South Africa. *Ent. Mo. Mag.*, Ser. 2, Vol. 20, p. 271, Pl. 5.
- WATERSTON, J. (1912). A New African Flea. *Ent. Mo. Mag.*, Ser. 2, Vol. 23, pp. 27-28.
- WATERSTON, J. (1913). Notes on *Chiaestopsylla* Rothschild, a genus of Siphonaptera, with Description of a New Species (*Ch. godfreyi*). *Proc. R. Physic. Soc. Edin.*, pp. 8-11.
- WATERSTON, J. (1913). A New Species of *Ischnopsyllus* (*I. ashworthi*) parasitic upon the Cape Horse-shoe Bat (*Rhinolophus augur*). *Proc. R. Physic. Soc. Edin.*, pp. 12-15.
- WATERSTON, J. (1914). On Some Ectoparasites in the South African Museum, Capetown. *Ann. S. Afr. Mus.*, Vol. 10, Pt. 9, pp. 273-274.
- WATERSTON, J. (1915). Notes on Siphonaptera in the Albany Museum, Grahamstown, South Africa, with Descriptions of Two New Species of the Genus *Ischnopsyllus*. *Rec. Albany Museum, Grahamstown*, Vol. 3, Pt. 2, pp. 107-119, f. 1-5.

- WATERSTON, J. (1920). Description of the Female of *Chiaestopsylla godfreyi* Waterst., with Further Notes on the genus. *Trans. Ent. Soc. Lond.*, Pts. 3-5, pp. 414-416, f. 1.

MAMMALS.

- ROBERTS, AUSTIN. A Synoptic Check-list of the Mammals of South Africa. (In Manuscript).

BIRDS.

- ROBERTS, AUSTIN (1924). Synoptic Check-list of the Birds of South Africa. *Ann. Transvaal Museum*, Vol. 10, Pt. 3, pp. 89-195, Pl. 2-5.
- ROBERTS, AUSTIN (1926). Some Changes in Nomenclature, New Records of Migrants and New Forms of South African Birds. *Ann. Transvaal Museum*, Vol. 11, Pt. 4, pp. 217-225.

ERRATA.

Rhipicephalus punctatus Bedford (1929) is preoccupied by *R. neavei* var. *punctatus* Warburton (1912). I therefore propose the name *distinctus* for this species (See page 298).

Acidoproctus rostratus (Rudow) proves to be an immature specimen of *A. bifasciatus* Piaget, not *A. stenopygus* (Nitzsch). I had overlooked Taschenberg's work in which he figures Rudow's type (1882, p. 197, Pl. 7, f. 3). As *A. bifasciatus* was described nine years later it therefore becomes a synonym of *A. rostratus*, and Nitzsch's name *stenopygus* must stand for the second species (See page 333).

The genus *Bathyergicola* Bedford (page 400) should probably be retained until the type of *Proenderleinellus* has been either figured or adequately described.

