

A Check-List and Host-List of the External Parasites found on South African Mammalia, Aves, and Reptilia.

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INTRODUCTION.

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 (*Esthiopteron 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 are 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.

In the check-lists the orders and families to which the parasites belong have been arranged in the following order:—

Acari.....	Family Sarcoptidae (mange and scab mites), page 706.
	„ Analgesidae (feather mites), page 710.
	„ Demodicidae (sabacic mites), page 722.
	„ Gamasidae, page 722.
	„ Argasidae (ticks), page 724.
	„ Ixodidae (ticks), page 726.
Dermaptera....	„ Hemimeridae, page 736.
Anoplura.....	Sub-order Siphunculata (sucking lice), page 736.
	„ Mallophaga (biting lice), page 740.
Siphonaptera..	Family Sarcopsyllidae (chigoes), page 770.
	„ Pulicidae (true fleas), page 772.
	„ Ceratopsyllidae (bat fleas), page 780.
Diptera.....	„ Hippoboscidae, page 781.
	„ Streblidae, page 783.
	„ Nycteribiidae, page 783.
Rhynchota....	„ Cimicidae (bed bugs and bat bugs), page 783.

An introduction to the host-lists will be found on page 784, and at the end of the paper a list of references has been included.

Sub-order SARCOPTOIDEA.

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*. All the species are parasitic upon mammals, living either on or in the skin; the exceptions are a few species found on birds.

TABLE OF GENERA (compiled after Canestrini and Kramer).

1. Mouthparts free.....	2
Mouthparts grown together, forming a sucking tube.....	<i>Cytolcichus</i> .
2. Pubescent ♀ without copulatory knobs at apex of abdomen.....	3
Pubescent ♀ with copulatory knobs at apex of abdomen.....	5
3. Anal opening dorsal.....	<i>Notoedrus</i> .
Anal opening terminal.....	4
4. Ovigerous ♀ with suckers on the two front pairs of legs; third pair of legs of ♂ with long hair, no suckers.....	<i>Sarcoptes</i>
Ovigerous ♀ without suckers on all the legs.....	<i>Cnemidocoptes</i> .
5. Suckers borne on a long three-segmented peduncle.....	<i>Psoroptes</i> .
Suckers borne on a short peduncle.....	6
6. ♀ with suckers on the two front pairs of legs and on the fourth pair; ♂ with spatulate hairs on the posterior lobes.....	<i>Chlorioptes</i> .
♀ with suckers only on the two front pairs of legs; hairs on the posterior lobes of the ♂ not spatulate.....	<i>Otodectes</i> .

Genus *Psoroptes* Gervais.

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

This genus contains two species, of which one has been found on cattle in Natal, and the other includes several varieties which live either on the skin or in the ears of various animals, causing intense irritation and producing symptoms commonly known as "scab."

1. *Psoroptes communis bovis* Gerlach.

Scab of cattle caused by this variety 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. The variety *bovis* is widely distributed in the Union, but is nowhere common. Specimens have also been received from Angola and South-West Africa.

2. *Psoroptes communis caprae*.

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

3. *Psoroptes communis cuniculi* Delafond.

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 communis ovis* Hering.

This is an extremely common parasite of sheep in South Africa. The mites 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 into the ears.

Another variety (*equi*) is common on horses in Europe, but it has not yet been recorded from South Africa. It chiefly affects the neck, withers, rump, and base of the tail of its host.

5. *Psoroptes natalensis* Hirst.

This species was described from specimens taken off cattle at Richmond, Natal. Hirst (11) 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 hairs on each of the abdominal lobes distinctly flattened and blade-like near their distal extremities.

Genus *Chorioptes* Gervais.

Symbiotes Gervais, 1857, nec Redtenbacher, 1849.

Chorioptes Gervais, Zool. Méd., i, p. 463 (1859).

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

1. *Chorioptes bovis caprae* Gervais and Beneden.

Hutcheon (15) 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 (recently received from Mr. A. Matthew, G.V.O., Bedford, Cape Province) contained specimens of this variety.

Genus *Otodectes* Canestrini.

Otodectes Canestrini, Prosp. Araeof., VI, p. 726 (1894).

This genus contains but a single species (*Otodectes cynotis* Heing), 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.

Genus *Sarcoptes* Latreille.

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

This genus also contains but a single species (*Sarcoptes scabiei*, De Geer), of which there are a number of varieties known to occur on various animals, including man. The mites are very small, and burrow into the skins of their hosts, producing symptoms known as "mange."

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, No. 3, 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 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 animal became cured during the winter in Canada.

Mange is much more prevalent in South Africa during the winter months than during the summer, and this we 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, and as a result of this the animals fall off in condition and become very liable to mange infection. Our experience has been that the mange parasites are not affected by direct sunlight when living in the skin of their hosts.

1. *Sarcoptes scabiei* bovis.

Common and widely distributed on cattle in the Union. We 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 Fürstenberg (1861).

Common and widely distributed on both Angora and Boer goats in the Union. We have transmitted it to a horse, calf, and sheep, but only a very small percentage of sheep appear to be susceptible. It only occurs on the faces of merino sheep where there is no wool. It has also been transmitted to pigs and man in Europe.

3. *Sarcoptes scabiei* cuniculi Neumann (1892).

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 and ferret in Europe.

4. *Sarcoptes scabiei equi* Gerlach (1857).
Common and widely distributed on horses throughout the Union. We 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.
5. *Sarcoptes scabiei ovis* Mégnin (1880).
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. We 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*.
6. *Sarcoptes scabiei suis* Gerlach (1857).
Occurs in pigs, but it is not very common. We 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* nov. var.
We have received a portion of skin of a *Strepsiceros strepsiceros* (Cape koodoo) from the Grahamstown district, Cape Province, grossly infested.
8. *Sarcoptes scabiei* var.
In August, 1916, we 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 on to 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 19th November the goat was only very slightly infected, and by the 8th December it had entirely recovered.

Genus *Notoedrus* Railliet.

Notoedrus Railliet, Zool., ed. 2, p. 660 (1893).

This genus contains two species which are found in Europe, namely: *N. cati* on cats and also occasionally on dogs, and the variety *cuniculi* on rabbits and *N. muris* on *R. rattus* and *R. norvegicus*.

1. *Notoedrus cati cuniculi* Gerlach.

This variety is occasionally found on domestic rabbits in this country. The mites are very small, and burrow into the skin of their host. They usually attack the face, especially round the eyes, and occasionally also the ears. The legs and genital regions may also become infected in advanced cases. Hirst (11) states that this variety is probably identical with *N. cati*, but that it is difficult to transmit *cati* to rabbits.

Genus *Cnemidocoptes* Fürstenberg.

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

This genus contains about six species parasitic upon birds.

1. *Cnemidocoptes mutans* Robin and Lanquetin (1859).

This species is parasitic upon fowls and produces symptoms known as "scaly leg"; it is a common disease in South Africa. The mite usually commences to attack its host beneath the scales just above the toes, and gradually works its way up the feet, causing the scales to become displaced. Occasionally the comb and neck are also attacked.

2. *Cnemidocoptes laevis gallinae* Railliet (1887).

This acarus 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 *Cytoleichus* Mégnin.

Cytoleichus Mégnin, Journ. Anat. et Physiol., XV, p. 150 (1879).

Cytodites Railliet, Elé. de Zool. Med. et Agr., ed. 2, p. 678 (1893).

1. *Cytoleichus nudus* Vizioli (1870).

This species lives in the air-sacs and the respiratory tract of the fowl. It has also been found in the heart, liver, and kidneys. It is a common parasite in South Africa.

Family ANALGESIDAE.

TABLE OF SUB-FAMILIES (after Canestrini and Kramer).

1. Integument strongly chitinized.....	2
Integument not strongly chitinized.....	<i>Epidermoptinae</i> .
2. Anal cups absent or rudimentary.....	<i>Dermoglyphinae</i> .
Anal cups well developed.....	3
3. ♀ with abdominal appendages.....	<i>Proctophyllodinae</i> .
♀ without abdominal appendages.....	4
4. Hind legs of ♂ and ♀ equally developed.....	<i>Pterolichinae</i> .
Hind legs of ♂ more developed than in the ♀.....	<i>Analyinae</i> .

Sub-family PTEROLICHINAE.

TABLE OF GENERA (after Canestrini and Kramer).

1. Third and fourth pairs of legs submedian.....	<i>Freyana</i> .
Third pair of legs not submedian.....	2
2. Only one form of capitulum in the ♂.....	3
Two forms of capitulum in the ♂.....	4
3. All the legs equally developed.....	<i>Pterolichus</i> .
4. Legs not all equally developed.....	<i>Xoloptes</i> .

Genus *Freyana* Haller.

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

1. *Freyana ceratorhina* Trouessart.

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

F. (H.) ceratorhina Can. and Kram., Demod. und Sarc., p. 34 (1899).

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

2. *Freyana gracilipes* Trouessart and Mégnin.

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

F. (Eufreyana) gracilipes Can. and Kram., Demod. und Sarc., p. 31 (1899).

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

3. *Freyana hirsutirostris* Trouessart and Mégnin.

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

F. (H.) hirsutirostris Can. and Kram., Demod. und Sarc., p. 33 (1899).

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

4. *Freyana manicata major* Trouessart and Neumann.

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

F. (M.) manicata major Can. and Kram., Demod. und Sarc., p. 35 (1899).

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

5. *Freyana marginata* Trouessart.
F. marginata Trt., Bull. Soc. Étud. sci., Angers, XVI, p. 96 (1886).
F. (Eufreyana) marginata Can. and Kram., Demod. und Sarc., p. 33 (1899).
 Described from specimens taken off *Rhynchops flavirostris* (African skimmer).
6. *Freyana oblonga* Trouessart and Neumann.
F. oblonga Trt. and Neu., Bull. sci., France-Belgique, XIX, p. 334 (1888).
F. (Eufreyana) oblonga Can. and Kram., Demod. und Sarc., p. 31 (1899).
 Described from specimens taken off *Ibis hagedash* = *Hagedashia hagedash* (hadadah ibis).
7. *Freyana pelargica* Trouessart and Neumann.
F. pelargica Trt. and Neu., Naturaliste, p. 396 (1884).
F. (Eufreyana) pelargica Can. and Kram., Demod. und Sarc., p. 31 (1899).
 Recorded taken from *Ciconia ciconia* (white stork) and *C. nigra* = *Melanopelargus niger* (black stork).

Genus *Pterolichus* Robin.

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

1. *Pterolichus bicaudatus* Gervais.
Tyroglyphus bicaudatus Gervais in Walkenaer. Hist. nat. Ins., Apt., iii, p. 262 (1844).
P. (Eupterolichus) bicaudatus Can. and 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. and Kram., Demod. und Sarc., p. 52 (1899).
 Recorded taken off *Charadrius squatarola* = *Squatarola squatarola* (grey plover) and *Limosa limosa* (black-tailed godwit).
- Pterolichus buchholzi fascigera* Mégnin and Trouessart.
P. buchholzi fascigera Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 428 (1884).
P. (E.) buchholzi fascigera Can. and Kram., Demod. und Sarc., p. 52 (1899).
 Recorded taken off *Arenaria interpres* (turnstone), *Totanus calidris* = *T. totanus* (redshank), and *Tringa canutus* = *Calidris canutus* (knot).
- Pterolichus buchholzi securicata* Mégnin and Trouessart.
P. buchholzi securicatus Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 428 (1884).
P. (E.) buchholzi securicata Can. and Kram., Demod. und Sarc., p. 53 (1899).
 Described from specimens taken off *Tringa subarquata* = *Erolia testacea* (curlew sandpiper).
3. *Pterolichus charadrii* Canestrini.
Dermaleichus charadrii, Can., Att. Real. Ist. Ven. Sci., Lett. ed Art. (5), V, p. 48 (1878).
P. (Eupterolichus) charadrii Can. and 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. and Berl., Att. Soc. Veneto-Trent., Padova, VII, p. 145 (1880).
P. (Eupterolichus) ciconiae Can. and Kram., Demod. und Sarc., p. 4 (1899).
 Described from specimens taken off *Ciconia alba* = *C. ciconia* (white stork).
5. **Pterolichus colymbi major** Mégnin and Trouessart.
P. colymbi major Mégn. & Trt., Jour. Microgr., Paris, VIII, p. 429 (1884).
P. (Eupterolichus) colymbi major Can. and Kram., Demod. und Sarc., p. 4 (1899).
 Recorded taken off *Podiceps cristata* = *P. infuscata* (African crested grebe).
6. **Pterolichus cuculi** Mégnin and Trouessart.
P. cuculi Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 332 (1884).
P. (Eupterolichus) cuculi Can. and Kram., Demod. und Sarc., p. 47 (1899).
 This species has been found on *Cuculus canorus* (European cuckoo) at other birds.
 A slight variety occurs on *Merops apiaster* (European bee-eater).
7. **Pterolichus cultrifer** Robin.
P. cultrifer Robin, Jour. Anat. et Physiol., XIII, p. 408, pl. 22. f. 8 (1877).
P. (Eupterolichus) cultrifer Can. and Kram., Demod. und Sarc., p. 54 (1899).
 Described from specimens taken off *Cypselus apus* = *Micropus apus* (European swift).
8. **Pterolichus delibatus** Robin.
P. delibatus Robin, Jour. Anat. et Physiol., XIII, p. 416 (1877).
P. (Eupterolichus) delibatus Can. and Kram., Demod. und Sarc., p. 43 (1899).
 This species has been recorded taken off *Corvus albicollis* (white-neck raven), *Corvus scapularis* = *C. albus* (pied crow), and other species Corvidae, also from Vulturidae.
9. **Pterolichus limosae selenura** Mégnin and Trouessart.
P. limosae selenurus Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 3 (1884).
P. (Eupterolichus) limosae selenura Can. and Kram., Demod. und Sarc., p. 49 (1899).
 Recorded taken off *Limosa lapponica* = *Vetula lapponica* (bar-tail godwit).
10. **Pterolichus minor** Mégnin and Trouessart.
P. minor Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 216 (1884).
P. (Eupterolichus) minor Can. and Kram., Demod. und Sarc., p. 40 (1899).
 Described from specimens taken off *Falco subbuteo* (hobby).
11. **Pterolichus marginatus** Trouessart.
P. marginatus Trt., Bull. Soc. Étud. sci. Angers., XVI, p. 104 (1886).
P. (Eupterolichus) marginatus Can. and Kram., Demod. und Sarc., p. 4 (1899).
 Described from specimens taken off *Ibis hagedash* = *Hagedashia hagedash* (hadadah ibis).
12. **Pterolichus martini** Trouessart.
P. martini Trt., Jour. Microgr., Paris, IX, p. 116 (1885).
P. (Eupterolichus) martini Can. and Kram., Demod. und Sarc., p. 39 (1899).
 Described from specimens taken off *Sterna hirundo* (common tern).

13. **Pterolichus ninnii** Canestrini.
Dermaleichus ninnii Can., Atti. Real. Ist. Ven. Sci., Lett. ed Art. (5) V, p. 56 (1878).
P. (Eupterolichus) ninnii Can. and Kram., Demod. und Sarc., p. 49 (1899).
 Described from specimens taken off *Numenius arquatus* (curlew).
14. **Pterolichus nisi** Canestrini.
Dermaleichus nisi Can., Atti. Real. Ist. Ven. Sci., Lett. ed Art. (5) V, p. 54 (1878).
P. (Eupterolichus) nisi Can. and Kram., Demod. und Sarc., p. 46 (1899).
 Recorded taken off *Circus pygargus* = *Pygargus pygargus* (Montagu's harrier) and *Pernis apivorus* (honey buzzard).
15. **Pterolichus numenii** Canestrini.
Dermaleichus numenii Can., Atti. Real. Ist. Ven. Sci., Lett. ed Art. (5), V, p. 61 (1878).
P. (Eupterolichus) numenii Can. and Kram., Demod. und Sarc., p. 50 (1899).
 Described from specimens taken off *Numenius phaeopus* = *Phaeopus phaeopus* (wimbrel).
16. **Pterolichus phoenicopteri** Mégnin and Trouessart.
P. phoenicopteri Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 384 (1884).
P. (Eupterolichus) phoenicopteri Can. and Kram., Demod. und Sarc., p. 52 (1899).
 Described from specimens taken off *Phoenicopterus antiquorum* = *P. major* (greater flamingo).
17. **Pterolichus porzanae** Canestrini.
Dermaleichus porzanae Can., Atti. Real. Ist. Ven. Sci., Lett. ed Art. (5), V, p. 49 (1878).
P. (Eupterolichus) porzanae Can. and Kram., Demod. und Sarc., p. 51 (1899).
 Described from specimens taken off *Ortygometra porzana* (spotted crane).
18. **Pterolichus rallorum** Robin.
P. rallorum Robin, Jour. Anat. et Physiol., XIII, p. 414 (1877).
P. (Eupterolichus) rallorum Can. and Kram., Demod. und Sarc., p. 50 (1899).
 Described from specimens taken off *Rallus crex* = *Crex crex* (corn-crake).
19. **Pterolichus rebergi gracilis** Mégnin and Trouessart.
P. rebergi gracilis Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 383, f. 49 (1884).
P. (Eupterolichus) rebergi gracilis Can. and Kram., Demod. und Sarc., p. 51 (1899).
 Described from specimens taken off *Himantopus himantopus* = *Hypsibates himantopus* (black-winged stilt).
20. **Pterolichus rubidus** Trouessart.
P. rubidus, Trt., Bull. Soc. Étud. sci. Angers, XVI, p. 110 (1886).
P. (Eupterolichus) rubidus Can. and Kram., Demod. und Sarc., p. 52 (1899).
 Described from specimens taken off *Diomedea chlororhyncha* = *Nealbatrus chlororhynchus* (yellow-billed mollymawk).
- Pterolichus rubidus petalifera** Trouessart.
P. rubidus petalifera Trt., Bull. Soc. ent. France, p. 291 (1898).
P. (E.) rubidus petalifera Can. and Kram., Demod. und Sarc., p. 52 (1899).
 Described from specimens taken off the same host as the type.
21. **Pterolichus sculpturatus** Hirst.
P. sculpturatus Hirst., Ann. Mag. Nat. Hirst. (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.

22. **Pterolichus securiger** Robin.
P. securiger Robin, Jour. Anat. et Physiol., XIII, p. 406, pl. 22, f. 9 (1877).
P. (Eupterolichus) securiger Can. and Kram., Demod. und Sarc., p. 55 (1899).
 Described from specimens taken off *Cypselus apus* = *Micropus apus* (European swift).
23. **Pterolichus serrativentris** Trouessart.
P. serrativentris, Trt., Bull. Soc. Étud. sci. Angers, XVI, p. 108 (1886).
P. (Eupterolichus) serrativentris Can. and Kram., Demod. und Sarc., p. 44 (1899).
 Described from specimens taken off *Leptoptilus crumeniferus* (marabou stork).
24. **Pterolichus squatarolae** Canestrini.
Dermaleichus squatarolae Can., Atti. Real. Ist. Ven. Sci., Lett. ed Art. (5), V, 9, 47 (1878).
P. (Eupterolichus) squatarolae Can. and Kram., Demod. und Sarc., p. 39 (1899).
 Described from specimens taken off *Squatarola squatarola* (grey plover).
25. **Pterolichus totani** Canestrini.
Dermaleichus totani Can., Atti. Real. Ist. Ven. Sci., Lett. ed Art. (5), V, p. 60 (1878).
P. (Eupterolichus) totani Can. and Kram., Demod. und Sarc., p. 49 (1899).
 Described from specimens taken off *Totanus calidris* = *T. totanus* (red-shank), and *T. pugnax* = *Philomachus pugnax* (ruff).
26. **Pterolichus uncinatus** Mégnin.
P. uncinatus Mégnin, Jour. Anat. et Physiol., XIII, p. 420 (1877).
P. (Eupterolichus) uncinatus Can. and Kram., p. 45 (1899).
 Described from specimens taken off *Vidua paradisica* = *Steganura paradisica* (paradise widow-bird).
27. **Pterolichus vexillarius minuta** Mégnin and Trouessart.
P. vexillarius minuta Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 431, f. 52 (1884).
P. (Eupterolichus) vexillarius minuta Can. and Kram., Demod. und Sarc., p. 54 (1899).
 Described from specimens taken off *Tockus melanoleucus* = *Rhynchaceros melanoleucus* (crowned hornbill) and *T. erythrorhynchus* (red-billed hornbill).

Genus **Xoloptes** Canestrini.

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

This is a small genus comprising four species.

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

Genus **Bdellorhynchus** Trouessart.

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

1. **Bdellorhynchus polymorphus** Trouessart.
B. polymorphus Trouessart, Jour. Microgr., Paris, IX, p. 110, f. 7 (1885).
B. polymorphus Can. and 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. Étud. sci. Angers, XVI, p. 118 (1886).

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

Sub-family DERMOLYPHINAE.

TABLE OF GENERA (after, Canestrini and Kramer).

1. All legs of ♂ equally developed, or fourth pair weaker than the others.
Third or fourth pair of legs of ♂ more developed than the others; suckers present on all the legs.
2. Anal cups present.....*Thecarthra*.
Anal cups absent.....*Sphaerogastra*.
3. Fourth pair of legs of ♂ thicker than the others.....*Syringobia*.
Third pair of legs of ♂ thicker than the others.....*Dermoglyphus*.

Genus **Thecarthra** Trouessart.

Thecarthra Trouessart, Bull. Soc. ent., France, p. 420 (1896).

1. **Thecarthra bouveti** Mégnin and Trouessart.

Pterolichus bouveti Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 435 (1884).

Thecarthra bouveti Can. and Kram., Demod. und Sarc., p. 72 (1899).

Described from specimens taken off *Charadrius hiaticula* (ringed plover).

2. **Thecarthra longitarsa** Mégnin and Trouessart.

Pterolichus longitarsus Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 436 (1884).

Thecarthra longitarsa Can. and Kram., Demod. und Sarc., p. 71 (1899).

This species has been recorded from *Squatarola helvetica* = *S. squatarola* (grey plover).

3. **Thecarthra semaphora** Trouessart.

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

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

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

4. **Thecarthra setigera** Mégnin and Trouessart.

Pterolichus setiger Mégn. and Trt., Jour. Microgr., Paris, VIII, p. 435 (1884).

Thecarthra setigera Can. and Kram., Demod., und Sarc., p. 73 (1899).

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

5. **Thecarthra simplex tyroglyphina** Trouessart and Neumann.

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

Thecarthra simplex tyroglyphina Can. and Kram., Demod und Sarc., p. 72 (1899).

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

6. **Thecarthra theca** Mégnin and Trouessart.

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

Thecarthra theca Can. and Kram., Demod. u. Sarc., p. 73 (1884).

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

7. **Thecarthra trouessarti** Berlese.

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

T. trouessarti Can. and Kram., Demod. u. Sarc., p. 72 (1899).

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

Genus **Syringobia** Trouessart and Neumann.

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

1. **Syringobia calceata** Trouessart.

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

S. calceata Can. and Kram., Demod. u. Sarc., p. 74 (1899).

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

2. **Syringobia chelopus** Trouessart and Neumann.

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

S. chelopus Can. and Kram., Demod. u. Sarc., p. 74 (1899).

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

Genus **Dermoglyphus** Mégnin.

Dermoglyphus Mégnin, Jour. Anat. et Physiol., XIII, p. 654 (1877).

Included in the genus are two species (*D. minor* Nörn and *D. elongatus* Mégn.), which live inside the quills of feathers of fowls in Europe. Both these species probably occur in S. Africa; also *D. varians* Trt., which has been found on guinea-fowls in Europe.

1. **Dermoglyphus deformis** Trouessart and Neumann.

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

Dermoglyphus deformis Can. and Kram., Demod. u. Sarc., p. 76 (1899).

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

2. **Dermoglyphus diplectrum** Trouessart.

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

D. diplectrum Can. and Kram., Demod. u. Sarc., p. 76 (1899).

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

Genus **Sphaerogaster** Trouessart.

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

1. **Sphaerogaster thylacodes** Trouessart.

S. thylacodes Trouessart in Berlese, Acari, Myr. et Scorp. in Ital., fasc. 88, No. 4.

S. thylacodes Can. and Kram., Demod. u. Sarc., p. 77 (1899).

Described from specimens taken off *Totanus glottis* = *Glottis nebularius* (greenshank) and *Tringa subarquata* = *Eriolia testacea* (curlew sandpiper).

Sub-family ANALGINAE.

TABLE OF GENERA (after Canestrini and Kramer).

1. Front legs without spines.....	<i>Pteronyssus</i> .	
Front legs with spines.....		2
2. Third pair of legs without suckers.....	<i>Analges</i> .	
Third pair of legs with suckers.....		3
3. Third and fourth pairs of legs of ♂ evenly developed.....	<i>Protalges</i> .	
Third and fourth pairs of legs of ♂ not evenly developed.....		4
4. Third pair of legs of ♂ more developed than the fourth pair....	<i>Mégninia</i> .	
Fourth pair of legs of ♂ more developed than the third pair.....		5
5. Fourth pair of legs with suckers.....	<i>Pteralloples</i> .	
Fourth pair of legs without suckers.....	<i>Xolalges</i> .	

Genus *Pteronyssus* Robini.

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

1. *Pteronyssus fuscus* Nitzsch.
Analges fuscus Nitz. in Ersch and Grub., Allg. Enc. Wissensch. u. Kün, I, p. 252 (1818).
Pteronyssus fuscus Can. and Kram., Demod. und Sarc., p. 84 (1899).
 Described from specimens taken off *Aquila haliaetus* = *Pandion haliaetus* (osprey).
2. *Pteronyssus gracilipes* Trouessart and Neumann.
P. gracilipes Trt. and Neu., Bull. Sci., France-Belgique, XIX, p. 353 (1888).
P. gracilipes Can. and Kram., Demod. und Sarc., p. 82 (1899).
 Described from specimens taken off *Totanus calidris* = *T. totanus* (red-shank).
3. *Pteronyssus integer* Trouessart and Neumann.
P. integer Trt. and Neu., Bull. Sci. France-Belgique, XIX, p. 352, pl. 24, f. 5 (1888).
P. integer Can. and Kram., Demod. und Sarc., p. 82 (1899).
 Described from specimens taken off *Muscicapa grisola* = *M. striata* (spotted flycatcher), a migrant to S. Africa.
4. *Pteronyssus nuntiaeveris* Berlese.
P. nuntiaeveris Berl., Acari., Myr. et Scor., Ital., fasc. 26, No. 5 (1884).
P. nuntiaeveris Can. and Kram., Demod. und Sarc., p. 82 (1899).
 Described from specimens taken off *Cotyle riparia* = *Riparia riparia* (European sandmartin).
5. *Pteronyssus obscurus* Berlese.
P. obscurus Berlese, Acari., Myr. et Scor., Ital., rept. and fasc. 18, No. 3 (1884).
P. obscurus Can. and Kram., Demod. und Sarc., p. 80 (1899).
 Recorded taken off *Chelidonaria urbica* (house martin) and *Cotyle riparia* = *Riparia riparia* (European sandmartin).
6. *Pteronyssus pallens* Berlese.
P. pallens Berlese, Acari., Myr. et Scor., fasc. 24, No. 8 (1884).
P. pallens Can. and Kram., Demod. und Sarc., p. 81 (1899).
 Described from specimens taken off *Acrocephalus arundinaceus* (great reed warbler), a migrant to S. Africa.

7. *Pteronyssus puffini* Buchholz.

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

Pteronyssus puffini Can. and Kram., Demod. und Sarc., p. 84 (1899).

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

8. *Pteronyssus truncatus* Trouessart.

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

P. truncatus Can. and 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 S. African species of *Lamprotornis*, of which there are two, and possibly other starlings as well.

Genus *Analges* Nitzsch.

Analges Nitzsch in Ersch and Gruber, All. Enc. Wissensch. u. Kün., I (1818).

1. *Analges bidentatus* Giebel.

Analges bidentatus Giebel, Zeit. Naturw., XXXVII, p. 496 (1871).

Analges bidentatus Can. and Kram., Demod. und Sarc., p. 87 (1899).

Recorded taken off the migrant *Acrocephalus arundinaceus* (great reed warbler) and other Passerines in Europe.

Another species which probably also occurs in S. Africa is *A. bifidus* Nitzsch, which has been found on domestic pigeons in Europe.

Genus *Mégninia* Berlese.

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

1. *Mégninia aestivalis* Berlese.

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

M. aestivalis Can. and Kram., Demod. und Sarc., p. 98 (1899).

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

Mégninia aestivalis subintegra, Berlese.

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

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

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

2. *Mégninia gallinulae* Buchholz.

Dermaleichus gallinulae Buchh., Bemerk. über Art. der Gatt. Derma., p. 28 (1869).

Mégninia gallinulae Can. and Kram., Demod. und Sarc., p. 98 (1899).

Recorded taken off *Ortygometra porzana* (spotted crane) in Europe.

Mégninia gallinulae major Berlese.

M. gallinulae var. *major* Berl., Acari., Myr. et Scorp., Ital., fasc. 26, No. 8 (1883).

M. gallinulae var. *major* Can. and Kram., Demod. und Sarc., p. 98 (1889).

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

3. *Mégninia ibidis* Trouessart.

M. ibidis Trt., Bull. Soc. Étud. Sci. Angers, XIV, p. 51 (1885).

M. ibidis Can. and Kram., Demod. und Sarc., p. 93 (1899).

Described from specimens taken off *Ibis falcinellus* = *Plegadis falcinellus* (glossy ibis).

Genus **Pteraloptes** Trouessart and Mégnin.

Pteraloptes 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).

1. **Pteraloptes mégnini falcinelli** Trouessart.

Analloptes mégnini falcinelli Trt., Bull. Soc. Étud. Sci. Angers, XIV, p. 60 (1885).

Pteraloptes mégnini falcinelli Can. and Kram., Demod. und Sarc., p. 104 (1899).

Described from specimens taken off *Ibis falcinellus* = *Plegadis falcinellus* (glossy ibis).

2. **Pteraloptes trifolium** Trouessart.

Analloptes trifolium Trt., Bull. Soc. Étud. Sci. Angers, XXVIII, p. 32 (1899).

Pteraloptes trifolium Can. and Kram., Demod. und Sarc., p. 103 (1899).

Described from specimens taken off *Chera procne* = *Diatropura procne* (long-tailed widowbird) in Angola.

Genus **Xolalges** Trouessart.

Xolalges Trouessart, Bull. Soc. Étud. Sci. Angers, XIV, p. 61 (1885).

1. **Xolalges scaurus** Trouessart.

X. scaurus Trt., Bull. Soc. Étud. Sci. Angers, XIV, p. 42 (1885).

X. scaurus Can. and Kram., Demod. und Sarc., p. 106 (1899).

Described from specimens taken off *Cuculus canorus* (European cuckoo).

Sub-family PROCTOPHYLLODINAE.

Genus **Alloptes** Canestrini.

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

1. **Alloptes bisetatus** Haller.

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

A. bisetatus Can. and Kram., Demod. und Sarc., p. 114 (1891).

Recorded taken off *Sterna hirundo* (common tern), *Sterna cantiaca* = *Thalasseus sandwicensis* (sandwich tern), and *Stercorarius parasiticus* (white-necked skua).

2. **Alloptes crassipes** Canestrini.

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

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

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

Alloptes crassipes conura Trouessart.

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

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

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

Alloptes crassipes myosura Trouessart.

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

A. crassipes var. *myosura* Can. and 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. and Berl., Atti. Soc. Veneto-Trent. Sci. Nat., VII, p. 147, pl. 19, f. 3, 4 (1881).

A. cypseli Can. and Kram., Demod. und Sarc., p. 114 (1899).

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

4. *Alloptes discosurus* Trouessart.

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

A. discosurus Can. and Kram., Demod. und Sarc., p. 112 (1899).

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

Genus *Allanalges* Trouessart.

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

1. *Allanalges analgoides* Trouessart.

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

Allanalges analgoides Can. and 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. and Kram., Demod. und Sarc., p. 115 (1899).

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

Genus *Trouessartia* Canestrini.

Pterocolus Haller, 1878, nec Schoenherr, 1833.

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

1. *Trouessartia appendiculata* Berlese.

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

Trouessartia appendiculata Can. and Kram., Demod. und Sarc., p. 121 (1899).

Recorded taken off *Cotyle riparia* = *Riparia riparia* (European sand-martin) and *Cypselus apus* = *Micropus apus* (European swift).

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. and Kram., Demod. und Sarc., p. 121 (1899).

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

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. and 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).

1. *Pteridectes bilobatus* Robin.

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

P. bilobatus Can. and Kram., Demod. und Sarc., p. 124 (1899).

Described from specimens taken off *Anthus trivialis* = *Spipola trivialis* (European tree pipit), a migrant to S. Africa.

2. *Pterodectes gynurus* Trouessart.

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

Pterodectes gynurus Can. and Kram., Demod. und Sarc., p. 125 (1899).

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

3. *Pterodectes megacaulus* Trouessart.

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

P. megacaulus Can. and Kram., Demod. und Sarc., p. 125 (1899).

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

4. *Pterodectes ortygometrae* Canestrini.

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

Pterodectes ortygometrae Can. and Kram., Demod. und Sarc., p. 122 (1899).

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

Pterodectes ortygometrae furcifer Trouessart.

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

Pterodectes ortygometrae var. *furcifer* Can. and Kram., Demod. und Sarc., p. 122 (1899).

Described from specimens taken off *Curcorius bicinctus* = *Smutsornis africanus* (two-banded courser) from S. Africa.

5. *Pterodectes rutilus* Robin.

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

P. rutilus Can. and Kram., Demod. und Sarc., p. 124 (1899).

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

Sub-family EPIDERMOPTINÆ.

TABLE OF S. AFRICAN GENERA (after Canestrini and Kramer).

- | | | |
|--|-----------------------|---|
| 1. Suckers massive..... | <i>Heteropsorus</i> . | |
| Suckers normal, small, legs of ♀ and ♂ evenly developed..... | | 2 |
| 2. Legs with claws..... | <i>Epidermoptes</i> . | |
| Legs without claws..... | <i>Rivoltasia</i> . | |

Genus *Heteropsorus* Trouessart and Neumann.

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

1. *Heteropsorus pteroptopus* Trouessart and Neumann.

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

H. pteroptopus Can. and Kram., Demod. und Sarc., p. 129 (1899).

Recorded taken off *Aerocephalus drundinateus* L. (great reed warbler).

Family LISTROPHORIDAE.

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

Sub-order PROSTIGMATA.

Mites with stigmata, or the rudiments of these spiracles, situated between the mandibles and the epistoma (a more or less prominent frontal lobe).

Family TROMBIDIDAE.

This family contains a number of species, many of which have their palpi greatly enlarged. Some species are predaceous on other small mites, and a few have been found in the feathers of birds, including the domestic fowl and pigeons. The mites known as "red spiders," also belong to this family.

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.

Sub-order VERMIFORMIA.

Family DEMODICIDAE.

The mites included in this family are very elongate and extremely small. They live in the sebaceous sacs and hair-follicles of various kinds of mammals. One species, *Demodex folliculorum* Simon, is a common parasite of man in Europe, and probably also occurs in this country.

Genus *Demodex* Owen (1843).

The following three species have been found in S. Africa:—

1. *Demodex bovis* Stiles.

This species occurs in cattle in Rhodesia, and has also been recorded from cattle in the Congo Free State.

2. *Demodex canis* Leydig.

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

3. *Demodex phylloides* Csokor.

Has been found in pigs at Onderstepoort, near Pretoria.

Sub-order MESOSTIGMATA.

Mites with the stigmata situated between the third and fourth pair of legs.

Family GAMASIDAE.

Genus *Myonyssoides* Hirst.

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

This genus, which is allied to *Myonyssus tiraboschi*, includes a single species.

1. *Myonyssoides capensis* Hirst, Proc. Zool. Soc., Lond., Pt. 1, pp. 49, 50, f. 1 (1925).

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

Genus *Dermanyssus* Dugès (1834).

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

1. *Dermanyssus gallinae* Redi (1674).

Recorded by Hirst (12) as attacking man at Capetown. This species is a common red mite of poultry and cage-birds in Europe and North America.

Genus *Liponyssus* Kolenati (1859).

This genus includes a number of species parasitic upon bats and rodents, and a few upon birds and reptiles.

1. *Liponyssus bacoti* Hirst.

Recorded by Hirst (12) 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.

2. *Liponyssus bursa* Berlese (1888).

This species, known as the "tropical red mite," is a serious pest of poultry in S. Africa. They are blood-suckers and attack their hosts chiefly at night. [In "The External Parasites of Poultry, with Measures for Their Control" (4), this parasite was erroneously recorded under the name of *Dermanyssus gallinae*.]

Genus *Laelaps* Koch.

Hirst gives a key to the females of this genus having four pairs of hairs on the genito-ventral plate in the Proc. Zool. Soc., Lond., Pt. 1, p. 53 (1925). The following species have been recorded taken in S. Africa:—

1. *Laelaps giganteus* Berlese.

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

Laelaps giganteus Hirst, Proc. Zool. Soc., Lond., Pt. I, pp. 66-67, f. 13 (1925).

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

Laelaps giganteus bakeri Hirst.

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

Recorded taken off *Arvicanthis pumilio* = *Rhabdomys pumilio* (striped mouse) 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.

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

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

Recorded taken in S. Africa off *Mus coucha* = *Mastomys coucha* (multi-mammate mouse), and from *Mus silaceus* = *Mastomys silaceus* at Grahamstown, C.P. 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.

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

Recorded taken in S. Africa on *Arvicanthis pumilio* = *Lemniscomys spinalis* (Bushveld striped mouse); also from *Otomys irroratus* (African water rat) at Grahamstown, C.P.

4. *Laelaps vansomereni* Hirst.*Laelaps vansomereni* Hirst.*Laelaps vansomereni* Hirst, Proc. Zool. Soc., Lond., Pt. 1, pp. 55-56, f. 4 (1925).Recorded taken off *Mus chrysophilus* = *Aethomys chrysophilus* (African rat) at Mfongosi, Zululand; also from rodents in Uganda and Kenya Colony.Genus *Haemolaelaps*.1. *Haemolaelaps capensis* Hirst.*H. capensis* Hirst, Jour. Zool. Res. Lond., 1, No. 2 (1916).Described from specimens taken of *Georychus hottentotus* = *Cryptomys hottentotus* (Hottentot mole-rat) from Cape Province.Genus *Rhinonyssus*.1. *Rhinonyssus coniventris* Trouessart.This species has been recorded by Hirst (Proc. Zool. Soc. Lond., 1921) taken in the nasal cavities of *Strepsilas interpres* = *Arenaria interpres* (turnstone).2. *Rhinonyssus echinipes* Hirst.*R. echinipes* Hirst, Proc. Zool. Soc. Lond., p. 359, f. 3, 4 (1921).Described from specimens collected in the nasal cavities of *Aegialitis hiaticula* = *Charadrius hiaticula* (ringed plover) in the Shetland Isles.

Super Family IXODOIDEA (Ticks).

Ticks are sub-divided into two families, the *Argasidae*, which includes the fowl ticks and tampanas, 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.

Genus *Argas* Latreille.

Body oval or rounded, flattened, and with a distinct flattened margin differing in structure from the rest of the body and giving the body a more or less sharp edge. On both dorsum and venter there are numerous symmetrically arranged discs, generally round or oval and distributed more or less in radial lines. Eyes absent.

* The classifications of ticks by Nuttall and Warburton in collaboration with Cooper and Robinson has been adopted in this paper.

TABLE OF SPECIES.

1. Body circular..... *A. vespertilionis* Latr.
Body oblong..... 2.
2. Margin of body formed of a border of quadrangular plates..... *A. persicus* Oken.
Margin of body formed of a series of irregular wrinkles..... *A. transpariepinus* White.
1. **Argas persicus** Oken (1818): "The fowl tick."

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, Egypt, Sudan, Algeria, Mauritius, Russia, Palestine, Turkestan, Persia, India, China, the southern parts of N. America, South America, and Australia. It is parasitic upon fowls, ducks, geese, turkeys, pigeons, canaries, and wild birds, and has frequently been known to attack man in Persia. The ticks live mainly in the cracks and crevices of woodwork of fowl-houses and runs, and under the bark of trees. They only 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 (*Spirochaeta marchouxi*), which is usually fatal to birds.

2. **Argas transpariepinus** White (1846).
The only specimens of this species which have been recorded are three females, which were probably collected north of the Orange River, and one male collected in Basutoland.
3. **Argus vespertilionis** Latr.: "The bat tick."
Recorded from various species of bats in the Cape Province, Transvaal, Egypt, Tunis, England, and France. 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 that this tick can transmit a spirillum to bats.

Genus *Ornithodoros* Koch.

Body oval or rounded, generally with the lateral margins straight and parallel, or almost so. Anterior margin usually pointed and hood-like. Margins thick and similar in structure to the rest of the integument, which is generally either mammillated or pitted. Folds and grooves constant on the anterior surface. Eyes absent or present.

TABLE OF SPECIES.

1. Integument mammillated..... 2
Integument not mammillated..... 5
2. Eyes present..... 3
Eyes absent..... 4
3. Body with hemispherical granulations..... *O. savignyi* Aud.
Body with flat contiguous granulations..... *O. pavimentosus* Neu.
4. Body broad and rounded in front..... *O. moubata* Murray.
Body sub-conical in front..... *O. talaje* var. *capensis* Neu.
5. Integument finely wrinkled; eyes absent. *O. pérengueyi* Bed and Hew.
Integument pitted; eyes absent..... *O. mégnini* Dugès.

1. **Ornithodoros savignyi** Audouin (1827): "The tampan tick."
This tick is widely distributed in Africa, it having been recorded from the Cape Province, Bechuanaland, South-West Africa, Transvaal,

Portuguese East Africa, Rhodesia, 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.

2. **Ornithodoros moubata** Murray (1877): "The eyeless tampan."
This species is found in similar country to the last, namely, sandy tracts. It has been recorded from the Cape Province, Bechuanaland, South-West Africa, Transvaal, Portuguese East Africa, Rhodesia, Angola, Congo, Somaliland, Kenya Colony, Tanganyika Territory, Zanzibar, and Abyssinia. It is parasitic upon man and his domestic animals, and also attacks fowls, rabbits, rats, and mice.
This species is the transmitting agent of *Spirochaeta duttoni*, the organism which causes African relapsing fever or tick fever in man. It has also been proved experimentally to transmit *Spirochaeta marchouxi* to fowls.
3. **Ornithodoros pavimentosus** Neumann (1901).
This rare species, which is parasitic upon man, has only been found in the South-West Africa. The type was collected at Bethany.
4. **Ornithodoros talaje capensis** Neu.: "The penguin tick."
This tick is found in penguin nests on islands off the Cape Province coast. It readily attacks both man and fowls when opportunities offer.
5. **Ornithodoros pérengueyi** Bedford and Hewitt, S. Afr. Jour. Nat. Hist., V, i.
Described from four females, three males, and one nymph collected at Nqamakwé, C.P., on the 10th December, 1923. They were collected by the Rev. L. S. Byrde, who reported on them as infesting a native church.
6. **Ornithodoros mégnini** Dugès.: "The spinose ear tick."
This is an American tick which has recently established itself throughout the dry districts of the Cape Province and the Orange Free State. It also occurs in parts of Natal. It is only found in the ears of its hosts, and is chiefly parasitic upon cattle, sheep, and goats; but also attacks man, horses, donkeys, dogs, cats, and ostriches.

Family IXODIDAE.

TABLE OF GENERA.

1. Anal groove surrounding the anus in front.....	2
Anal groove surrounding the anus behind (in <i>Boophilus</i> and <i>Margaropus</i> the anal groove is faint or obsolete).....	3
2. Inornate, eyes and festoons absent, males with a pregenital, median, anal, two adanal and two epimeral plates on the venter.....	<i>Ixodes</i> .
3. Hypostome and palpi short.....	4
Hypostome and palpi long.....	9
4. Eyes absent.....	<i>Haemaphysalis</i> .
Eyes present.....	5
5. Festoons present.....	6
Festoons absent.....	8
6. Males with coxae iv much larger than coxae i to iii, no plates or shields on ventral surface of male.....	7
Males with coxae iv not larger than coxae i to iii, a pair of adonal shields and usually a pair of accessory adanal shields on ventral surface of male. Species usually inornate, basis capituli generally hexagonal dorsally.....	<i>Rhipicephalus</i> .

7. Species ornate, basis, capituli rectangular dorsally.....*Dermacentor*.
Species inornate, basis capituli hexagonal dorsally with prominent lateral angles. Coxae iv of male with two long spines....*Rhipicentor*.
8. Inornate; coxae i with a small spine. Male with a median plate projecting backwards on either side of the anus, and with a caudal protusion when engorged. Fourth pair of legs of male dilated.....
Margaropus.
Inornate; coxae i bifid. Male with a pair of adanal and accessory shields, and a caudal protusion. Fourth pair of legs normal.....
Boophilus.
9. Eyes present..... 10
Eyes absent or rudimentary..... 11
10. Festoons absent or present. Males with a pair of adanal shields and two posterior abdominal protusions; accessory adanal shields absent or present.....*Hyalomma*.
Species usually ornate; festoons present. Male without adanal shields, but small plaques may be present on the venter near the festoons....
Amblyomma.
11. Species occurring almost exclusively on Reptilia.....*Aponomma*.

Genus *Ixodes* Latreille.

TABLE OF SPECIES.

1. Anal groove of male and female uniting behind....*I. ugandanus* Neu. 2
Anal groove of male and female not uniting behind..... 2
2. Anal groove of male and female with sides parallel..*I. rubicundus* Neu. 2
Anal groove of male and female (male of *I. daveyi* not known), horse-shoe shaped..... 3
3. Coxae ii to iv of female without spurs.....*I. pilosus* Koch. 3
Coxae ii to iv of female with sharp external spur.....*I. daveyi* Nutt.

1. *Ixodes ugandanus* Neumann.

Specimens of this species have been collected by H. H. Curson from *Thryonomys swinderenianus variegatus* (Natal cane-rat) in Zululand. The species was described by Neumann from a male and female taken off a cane-rat in Uganda. The same author has also recorded it from Tanganyika Territory, and it has also been recorded taken off a large rodent and sheep in West Africa (18).

2. *Ixodes rubicundus* Neumann (1904).

Recorded from sheep and goats in the Cape Province. It has also been found on sheep and cattle near Johannesburg, Transvaal, and is probably capable of producing paralysis in these animals.

3. *Ixodes pilosus* Koch (1844): "Sheep paralysis tick."

Both this species and its variety *howardi* Neu., the latter is probably invalid, have been found on cattle, horses, mules, sheep, goats, pigs, dogs, cats, a leopard, bushbuck, vaal rhebok (*Pelea capreolus*), Cape red hare [*Pronolagus* (= *Lepus*) *crassicaudatus*], hedgehog (*Aethichinus frontalis*), elephant-shrew, bat, and man in the Cape Province, Natal, and the Transvaal. Donitz has also recorded it from a civet cat at Umtali. Only the adult stages are found on cattle, horses, sheep, goats, and dogs, and the immature stages have been found on the Cape red hare and an elephant-shrew. This species is probably also capable of producing paralysis in cattle, sheep, and goats.

4. *Ixodes daveyi* Nuttall. Parasit., Vol. VI, Pt. 2, p. 133 (1913). Bedford and Hewitt.

A single female has been taken off a pink-billed weaver (*Quelea sanguinirostris lathamii*) at Onderstepoort, Transvaal, on the 1st November, 1919. This species was described from a single female also taken off a bird, a plantain-eater (*Gallirex johnstoni*), on the northern ridge of Ruwenzori, Uganda, by Dr. S. A. Neave in 1911. The male is not known.

Genus *Haemaphysalis* Koch.

TABLE OF SPECIES.

- | | | |
|---|---------------------------------|---|
| 1. Scutum much longer than broad..... | <i>H. leachi</i> Aud. | |
| Scutum ovate, only slightly or not longer than broad..... | | 2 |
| 2. Palpal article iii with distinct dorsal spine, more or less erect..... | | |
| | <i>H. parmata</i> Neu. | |
| Palpal article iii without dorsal spine, but posterior border may protrude | | 3 |
| 3. Coxae iv of ♂ with a very long, needle-like spur; palpal article iii of ♀ as broad or broader than ii..... | <i>H. aciculifer</i> Warb. | |
| Coxae iv of ♂ without such spur; palpal article iii of ♀ distinctly narrower than ii..... | | 4 |
| 4. Palpal article iii of ♂ and ♀, with a distinct retrograde process on the venter..... | <i>H. silacea</i> Robinson. | |
| Palpal article iii of ♀ without a spur; that of ♂ with a small ventral spur directed inwards..... | <i>H. hoodi</i> Warb. and Nutt. | |

1. *Haemaphysalis leachi* Audouin (1827): "The dog tick."

This species is very common and widely distributed in Africa, and it also occurs in Asia and Australia.

It has been found on the following animals in S. Africa:—Dogs, cats, cattle (rare), jackal, lion, leopard, black-footed cat (*Felis nigripes*), civet cat (*Civettictis civetta*), yellow mongoose (*Cynictis penicillata*), hedgehog (*Aethechinus frontalis*), genet (*Genetta felina*), *Suricata suricatta*, striped mouse (*Rhabdomys pumilio*), Cape red hare (*Pronolagus crassicaudatus rupestris*), Cape dassie (*Procavia capensis*), and a tortoise. Also on *Lepus capensis*, stink muishond (*Ictonyx striatus*), and ground-squirrel (*Geosciurus capensis*) at Glen, Orange Free State (R. Bigalke). This tick is the principal transmitting agent of canine piroplasmiasis or biliary fever to dogs in S. Africa.

2. *Haemaphysalis silacea* Robinson, Parasit., Vol. IV, Pt. iv, p. 478 (1911). Described from four females collected on oxen at Gunubie Park, East London, Cape Province. Five males and three females (partly engorged) were recently forwarded to the Division of Veterinary Education and Research taken off an ox at Riebeck East, Cape Province, in November, 1923 (Bedford and Hewitt).
3. *Haemaphysalis hoodi* Warburton and Nuttall, Parasit., Vol. II, Pt. 1, pp. 62, 63 (1909).
- H. africana* Howard, Ann. Transvaal Museum, pp. 219–223, Pl. 34 (1909).
H. hoodi (Wor. and Nutt.), Nuttall and Warburton, Mon. Ixod., Pt. 3, p. 483 (1915).

Two females and two males recorded by Bedford and Hewitt (5) taken from a redwing starling (*Amydrus morio* L.) by L. Hill at Pietermaritzburg, Natal, October, 1919.

This species was described from numerous females and males and one nymph taken off fowls by Dr. P. Hood at Bathurst, Gambia. It has also been recorded from a Burchell's coucal (*Centropus burchelli*), Portuguese East Africa (C. W. Howard); a Senegal coucal (*Centropus senegalensis*), Sierra Leone; guinea-fowl (*Numida meleagris* L.), Gold Coast; the ears of partridges in Nyasaland, and from a plantain-eater, *Gymnoschizorhis leopardi*, Shelley, Kenya Colony.

4. **Haemaphysalis parmata** Neumann.

Specimens have been collected by H. H. Curson off *Tragelaphus sylvaticus* (bushbuck) in Zululand. Nuttall and Warburton (17) have recorded it from the following hosts: Cattle and bushbuck in Uganda; Jackson's hartebeest in Kenya Colony; antelope and buffalo in the Congo Free State; cattle and harnessed antelope in Sierra Leone; and cattle, goat, sheep, and pig in the Cameroon.

5. **Haemaphysalis aciculifer** Warburton, Parasit., VII, pp. 125, 126 (1913).
H. aciculifer (Warb.) Nuttall and Warburton, Mon. Ixod., Pt. 3, p. 411, f. 345, 346 (1915).

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

This species was described from a male and female found on *Cobus thomasi* (antelope) in Uganda. Nuttall and Warburton also record a female taken off a reedbuck in the Gold Coast.

Genus **Dermacentor** Koch.

1. **Dermacentor rhinocerotis** De Geer (1778): "The rhinoceros tick."

This species has been recorded taken off rhinoceros at Durban (Natal), Cape Province, Mozambique, Zambesi, and Zanzibar.

In the veterinary research laboratory collection there are two males taken off a black rhinoceros (*Rhinaster bicornis*) in the Hluhluwe Game Reserve, Zululand, by D. T. Mitchell on the 26th February, 1915, and two males collected by Captain Taylor from the same host in Rhodesia.

Genus **Rhipicentor** Nuttall and Warburton.

1. **Rhipicentor vicinus** Neumann (1908): "The hedgehog tick."

This species was recorded taken off the hedgehog (*Aethechinus frontalis*) by C. W. Howard at Pretoria and Pienaars River, Transvaal. I have also taken specimens on the same host and also one female from a dog in the Pretoria District.

Genus **Rhipicephalus** Koch.

TABLE OF SPECIES.

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

Males—

- | | |
|---|---|
| 1. Eyes spherical..... | 2 |
| Eyes flat..... | 3 |
| 2. Legs brown, punctations on scutum numerous, but not coalescing.... | |

R. oculatus Neu.

Legs yellowish-red, punctations on scutum coalescing, making the shield appear shagreened.....*R. evertsi* Neu.

Legs banded, otherwise like *R. evertsi*....*R. evertsi albigeniculatus* Warb.

3. Scutum brown in colour..... 4
 Scutum brown with one to nine small pale spots; legs brown.....
R. maculatus Neu.
4. Coxae i prominent when viewed dorsally..... 5
 Coxae i not prominent when viewed dorsally..... 6
5. Scutum with fine and a few large punctations, distributed mainly in the middle. On the inside of the lateral grooves there is an area free of punctations. Fully fed males with a long caudal process.....
R. appendiculatus Neu.
6. Adanal shields not bifid or strongly pointed posteriorly, and not visible dorsally..... 7
 Adanal shields bifid posteriorly..... *R. lunulatus*, Neu.
 Adanal shields large, pointed posteriorly, their apices visible dorsally..
R. theileri Bed. and Hew.
7. Scutum with scattered unequal punctations, and with three posterior furrows. Caudal process absent or slight.... *R. sanguineus* Latr.
 Scutum glossy, with few punctations usually linearly arranged. Caudal process usually long in engorged specimens..... *R. simus* Koch.
 Scutum covered with punctations, making the shields shagreened....
R. capensis Koch.
 Punctations on scutum very numerous, but not coalescing.....
R. bursa Canes and Fanz.

Females—

1. Eyes spherical..... 2
 Eyes flat..... 3
2. Legs brown, punctations on scutum numerous, but not coalescing....
R. oculatus Neu.
 Legs yellowish-red, punctations on scutum coalescing making the shield appear shagreened..... *R. evertsi* Neu.
 Legs banded, otherwise like *R. evertsi*. *R. evertsi albigeniculatus* Warb.
3. Scutum brown with a largish yellowish-white median area on the posterior margin. Patches of small white clavate scales present on the dorsum of the abdomen..... *R. maculatus* Neu.
4. Scutum brown, without coloured markings..... 4
4. Scutum oval, longer than wide, width fairly numerous, unequal punctations..... *R. sanguineus* Latr.
5. Punctations on scutum very numerous, coalescing.... *R. capensis* Koch.
6. Punctations on scutum distinct, not coalescing..... 6
6. Punctations on scutum numerous and equal or almost so.....
R. bursa Canes. and Fanz.
- Punctations on scutum unequal in size..... 7
7. Fine punctations scarcely visible, large punctations few in number....
R. simus Koch.
- Fine punctations very apparent..... 8
8. Fестоons present..... *R. appendiculatus* Neu.
 Fестоons absent..... *R. theileri* Bed. and Hew.

1. **Rhipicephalus oculatus** Neumann (1901): "The brown-eyed tick."

This species is very rare in S. Africa. It has been recorded from cattle in the Transvaal and Tanganyika Territory, and from *Lepus* sp. in Damaraland. In the laboratory collection there are two engorged females collected at Grahamstown, Cape Province; five females taken off goats at Prieska, 4th September, 1919; and several males and one female collected on *Lepus capensis* at Glen, Orange Free State, 17th December, 1921, by R. Bigalke.

2. *Rhipicephalus evertsi* Neumann (1897): "The red tick."

This species, which is a two-host tick, is very common in the Union, and has also been recorded from South-West Africa, Rhodesia, Tanganyika Territory, Moçambique, and the Belgian Congo. It has been found on the following animals: Horses, mules, donkeys, cattle, sheep, goats, dogs, giraffe, zebra, eland, reed buck, and various other species of antelopes. The red 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.

3. *Rhipicephalus evertsi albigeniculatus* Warburton.

Recorded by Bedford and Hewitt (5), taken off horses, cattle, and a koodoo (*Strepsiceros strepsiceros*) by Dr. Schmidt at Omaruru, South-West Africa. Nuttall has also recorded it from cattle in the Lower Congo.

4. *Rhipicephalus maculatus* Neumann, Rév. de la Fam. des Ixod., p. 273 (1901).

Rhipicephalus ecinatus Neu., Ibed., p. 275 (1901).

Rhipicephalus maculatus (Neu.) Warburton, Parasit., Vol. V, Pt. 1, p. 17 (1912).

Recorded by Bedford and Hewitt (5) from a buffalo (*Synceros caffer*) and a white rhinoceros (*Ceratotherium simum*) in the Mfolozi Game Reserve, Zululand; a black rhinoceros (*Rhinaster bicornis*) and a koodoo (*Strepsiceros strepsiceros*) in the Hluhluwe Game Reserve, Zululand, and from a black rhinoceros at Mduna River, Zululand. The writer has also taken adult specimens on himself in the Mfolozi Game Reserve.

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.

5. *Rhipicephalus appendiculatus* Neumann (1901): "The brown tick."

Rhipicephalus nitens Neumann (1904).

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, dog, rabbits, Cape buffalo (*Synceros caffer*), the Cape hunting-dog (*Lycan pictus*), and man. It is the chief transmitting agent of East Coast fever to cattle, and also conveys redwater and *Piroplasma mutans* to cattle.

6. *Rhipicephalus lunulatus* Neumann (1907).

Recorded from horse, cattle, sheep, goat, and antelope in the Congo Free State, and from dogs and hedgehogs (*Aethechinus frontalis*) in the Zoutpansberg District, Transvaal.

7. *Rhipicephalus theileri* Bedford and Hewitt, S. Afr. Jour. Nat. Hist., V, i.

Described from a single male and female taken off a ground-squirrel (*Geosciurus capensis*) by R. Bigalke at Glen, Orange Free State, on the 15th August, 1921.

8. *Rhipicephalus sanguineus* Latreille (1804): "The European brown tick."

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 has also been found on cattle, sheep, goat, cat, lion, jackal, genet, hares, hedgehog (*Aethechinus frontalis*), and in Egypt on the fennel (*Canis megalotis*) and eagle owl (*Strix ascalaphus*).

9. **Rhipicephalus simus** Koch (1844): "The black-pitted tick."
This is another widely distributed tick in Africa; it has also been recorded from Turkestan and Borneo. The hosts are: Dog, horse, cattle, goat, sheep, hares, and rabbits, lion, Cape hunting-dog (*Lycaon pictus*), hedgehog (*Aethechinus frontalis*), bushpig (*Koirotopotamus choeropotamus*, and Natal warthog (*Phaechocherus sundevalli*). This species has been proved to transmit East Coast fever and *Anoplasma marginale* to cattle.
10. **Rhipicephalus capensis** Koch (1844): "The Cape brown tick."
This is not a common species in South Africa. It has been recorded from Namaqualand, Cape Province, and Transvaal on horse, cattle, goat, dog, and iguana (*Varanus saurus*). I have taken it on grass at Onderstepoort and R. Bigalke has collected adults on *Lepus saxatilis* at Glen, Orange Free State.
Nuttall has recorded it from cattle, antelope, and pig in the Belgian Congo. It is one of the transmitting agents of East Coast fever to cattle.
11. **Rhipicephalus bursa** Canestrini and Fanzago (1877).
This species has been recorded from Europe, North Africa, the Cape Province, Transvaal, Portuguese East Africa, and the West Indies, but it is probably a synonym of *R. capensis*. The hosts given are: Horse, donkey, cattle, sheep, goat, dog, wild boar, and hedgehog.

Genus **Margaropus** Karsch.

The genus only comprises the following species:—

1. **Margaropus winthemi** Karsch (1879).
This is a common tick in many parts of the Orange Free State and Basutoland, and also occurs in the Graaff-Reinet District, Cape Province. It is mainly parasitic upon horses, and is occasionally found on cattle.

Genus **Boophilus** Curtice.

TABLE OF SPECIES.

1. Hypostome of ♀ and ♂ with six rows of teeth; adanal shields of ♂ pointed at posterior ends; caudal appendage of ♂ blunt, but always present
B. decoloratus Koch.
Hypostome of ♀ and ♂ with eight rows of teeth; adanal shields of ♂ square at posterior ends; caudal appendage of ♂ small and conical, often absent.....*B. australis* Fuller.
1. **Boophilus decoloratus** Koch (1844): "The blue tick."
This species occurs throughout tropical and southern Africa, and is one of the commonest ticks found in the Union. It is chiefly parasitic upon cattle, horses, donkeys, and mules; but also occurs on sheep, goats, and dogs. It is usually found on the body and head of its host, 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 gall-sickness in cattle and spirochaetosis in cattle, sheep, and horses in this country.
2. **Boophilus australis** Fuller (1899).
This species, the Australian blue tick, has been recorded by Lounsbury and Howard 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.

TABLE OF SPECIES.

1. Scutum of ♀ and ♂ reddish-brown to black in colour; eyes prominent, black; coxae I deeply bifid..... 2
 Scutum of ♀ and ♂ yellowish-brown or yellowish-white with deep brown lines and punctations; eyes small, whitish; coxae I conical.....
H. hippopotamense Denny.
2. Punctations of scutum of ♂ unequal, but distinct, of ♀ coarse and unequal
H. aegyptium L.
 Punctations of scutum of ♂ coalescing, making the shield appear shagreened, of ♀ fine..... *H. impressum* Neu.
1. *Hyalomma aegyptium* Linné: "The bont-leg tick."
 This species is widely distributed throughout Africa, and has also been recorded from southern Europe and Asia. It is by no means common in the Union, its place being taken here by *H. impressum*. It has been found on the following animals: Cattle, horse, donkey, mule, sheep, dog, cat, giraffe, camel, blue wildebeest, reedbuck, and other antelopes, wild boar, and man. Howard (13) has recorded nymphs from *Calendula crassirostris* = *C. magnirostris* (thick-billed lark).
2. *Hyalomma impressum* Neumann (1901): "The South African bont-leg tick."
 This tick is very common in South Africa. The adults are parasitic upon equines, cattle, sheep, goats, dogs, cats, hares, ostriches, and man, and the larvae and nymphs mainly attack hares, rats and mice, and birds, including fowls and ostriches.
3. *Hyalomma hippopotamense* Denny (1843).
 Recorded from *Hippopotamus amphibius* in South and East Africa.

Genus *Amblyomma* Koch.

TABLE OF SPECIES.

Males—

1. Eyes flat..... 2
 Eyes hemispherical..... 5
2. Coxae I with a single long spine on posterior margin... *A. hebraeum* Koch.
 Coxae I with two largish spines..... 3
3. Scutum constricted at level of stigmata; posterior festoons appearing like overlapping folds..... *A. crenatum* Neu.
 Scutum not constricted, festoons normal..... 4
4. Scutum dark brown with irregular pale yellowish areas, which in old specimens may become more or less obliterated... *A. marmoreum* Koch.
 Scutum dark brown with golden-yellow areas, the light areas predominating..... *A. petersi* Karasch.
5. Scutum dark brown with pale areas on lateral margins.....
A. sylvaticum De Geer.
 Scutum black with coppery-red or golden-yellow areas bordered with metallic green. In dead specimens the scutum is often reddish-brown with yellow or orange pale areas..... 6
6. Punctations on scutum mostly fine..... *A. variegatum* Fabr.
 Punctations on scutum mostly large, more numerous.....
A. variegatum nocens Robin.

Females—

1. Eyes flat..... 2
 Eyes hemispherical..... 5

2. Coxae i with a single long spine on posterior margin . . . *A. hebraeum* Koch.
Coxae i with two largish spines 3
3. Posterior festoons with the inner margins longer than outer, giving them
a crenulated appearance *A. crenatum* Neu. 4
Posterior festoons normal
4. Hypostome with six rows of teeth *A. marmoreum* Koch.
Hypostome with eight rows of teeth *A. petersi* Karsch.
5. Scutum heart-shaped ; mainly light coloured . . . *A. sylvaticum* De Geer.
Scutum triangular ; dark, with or without pale spot . . . *A. variegatum* Fabr.

1. **Amblyomma hebraeum** Koch (1844): "The bont tick."

Amblyomma eburneum Gerstaecker (1873).

This species is widely distributed in the Union, but occurs more frequently on the low veld than the high veld. It has also been recorded from Moçambique, Kenya Colony, Tanganyika Territory, the Belgian Congo, and Abyssinia. It is parasitic upon horse, donkey, mule, sheep, goat, man, giraffe, elephant (*Loxodon africanus*), black rhinoceros (*Rhinaster bicornis*), white rhinoceros (*Ceratotherium simum*), koodoo (*Strepsiceros strepsiceros*), and other antelopes, and the Cape hunting-dog (*Lycan pictus*). The larvae and nymphs are occasionally found on hares and birds, including fowls and ostriches. It is the transmitting agent of heartwater to cattle, sheep, and goats in South Africa. Apart from this, the bites of the tick frequently cause swellings, which lead to sup-puration.

2. **Amblyomma crenatum** Neumann (1899): "The ruffled tick."

Recorded from rhinoceros in the Cape Province, Liberia, and Sumatra (?).

3. **Amblyomma marmoreum** Koch (1844): "The tortoise tick."

This tick has been recorded from the Cape Province, Transvaal, Belgian Congo, Kenya Colony, Tanganyika Territory, Upper Zambesia, and Zanzibar. It is common on tortoises in the Transvaal, and has also been found on snakes. Larvae and nymphs are reported to feed readily on ox and goat (13).

4. **Amblyomma petersi** Karsch (1878).

This species has been taken off a white rhinoceros (*Ceratotherium simum*) in the Mfolozi Game Reserve, Zululand, black rhinoceros (*Rhinaster bicornis*) in the Hluhluwe Game Reserve and Mduña River, Zululand, and also off a rhinoceros at Punda Milia, Kenya Colony (5).

Neumann gives the following hosts and localities:—

Hosts: *Rhinaster bicornis* and *Antilope oreas*.

Localities: Moçambique, Madagascar, and Liberia.

5. **Amblyomma sylvaticum** De Geer (1778).

Originally reported to have been taken off *Chelonia* (?) at the Cape of Good Hope. Bedford & Hewitt (5) have recorded it taken off a tortoise (*Testudo angulata*) at Essendene in the Alexandria District, Cape Province, and from the same host at Malmesbury, Cape Province; also from tortoises and a mole-snake (*Pseudaspis cana*) at Port Elizabeth, Cape Province.

6. **Amblyomma variegatum** Fabricius (1794): "The variegated tick."

This species has been found in the low veld of the Transvaal and Cape Province, but it is rare and local in South Africa. It has also been recorded from Rhodesia, Congo, Angola, Moçambique, Tanganyika Territory, Kenya Colony, Zanzibar, Madagascar, Mauritius, Senegal, Ivory Coast, Sierra Leone, and Nigeria. It has been found on horses,

cattle, sheep, goats, zebra, and rhinoceros. This species is capable of transmitting a form of heartwater, occurring in Kenya Colony, to cattle and goats.

Amblyomma variegatum nocens Robinson, Parasit., Vol. IV, Pt.4, p. 408, fig. 2 (1911).

Described from specimens collected in Rhodesia, where the tick is called the "pyaemia tick." To it is attributed the transmission of pyo-lymphangitis in equines, and its bites cause violent inflammation and sloughing of the mammae in cows. It also attacks the heads of native children, causing sloughing of portions of the scalp.

Sub-genus **Aponomma** Neumann.

TABLE OF SPECIES.

This sub-genus contains about twelve species, parasitic upon reptiles in various parts of the world. The following five species have been recorded from South Africa:—

Males—

- | | | |
|--|-------------------------------|---|
| 1. Body much broader than long; scutum reddish-brown, without punctations or with a few fine ones..... | <i>A. transversale</i> Lucas. | |
| Body nearly as broad as long..... | | 2 |
| 2. Scutum marked with nine metallic green spots..... | <i>A. exornatum</i> Koch. | |
| Scutum reddish-brown, without green spots..... | | 3 |
| 3. Tarsi 2, 3, and 4 attenuated at extremity..... | <i>A. latum</i> Koch. | |
| Tarsi with a bosse at extremity..... | <i>A. laeve capensis</i> Neu. | |

Females—

- | | | |
|--|-------------------------------|---|
| 1. Body much broader than long..... | <i>A. transversale</i> Lucas. | |
| Body as broad as long, or longer than broad..... | | 2 |
| 2. Scutum marked with three metallic green spots.. | <i>A. exornatum</i> Koch. | |
| Scutum reddish-brown, without green spots..... | | 3 |
| 3. Coxae i with blunt, flat spurs, punctations on scutum obsolete..... | <i>A. latum</i> Koch. | |
| Spines on coxae i sharp; punctations on scutum small and few..... | <i>A. laeve capensis</i> Neu. | |

1. **Aponomma transversale** Lucas (1844).
Neumaniella transversale Lahille.
Recorded as taken in the eye-sockets of a python (*Python sebae*) in South Africa.
2. **Aponomma exornatum** Koch (1844).
This tick is very common on the iguana (*Varanus niloticus*) in South Africa. It has also been found on *Python sebae* and a dog. It is widely distributed in Africa, having been recorded from Tanganyika Territory, Madagascar, Congo, Senegal, and Algeria.
3. **Aponomma latum** Koch (1844).
Recorded from Durban and India on *Python molurus* L.
4. **Aponomma laeve capensis** Neumann (1901).
Recorded from snakes, including a black snake in the Cape Province and a mamba (*Dendraspis angusticeps*) in the Transvaal.
5. **Aponomma globulus** Lucas (1844).
Described from specimens taken off *Python sebae* in South Africa. The male is not known.

Order **DERMAPTERA.**Family **HEMIMEIRIDAE.**

This is a very small family containing only two known species, both of which belong 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.

Genus **Hemimerus.**1. **Hemimerus talpoides** Walker.

A number of specimens have been collected by A. K. Haagner from *Cricetomys gambianus* in the Zoological Gardens at Pretoria. The species was described from specimens taken off the same host in Sierra Leone.

The second species, *H. hanseni* Sharp, has been recorded from the same host in Cameroon, Uganda, and Moçambique (?).

Order **ANOPLURA.**Sub-order **SIPHUNCULATA** (Sucking Lice).Family **PEDICULIDAE.**Genus **Pediculus** Linné.

Pediculus Linné, Syst. Naturae, ed. X. p. 610 (1758).

1. **Pediculus humanus** Linné (1758).

Common on man, especially among the natives in South Africa. It is found on the body of its host.

2. **Pediculus humanus capitis** De Geer (1778).

This variety is the common head-louse of man. It is smaller and darker than the body-louse, and occurs more frequently on the native races in South Africa.

Genus **Phthirus** Leach.

Phthirus Leach, Edinburgh Encycl., IX, p. 77 (1815).

1. **Phthirus pubis** Linné (1758).

This is the common pubic louse of man. It is common in South Africa.

Genus **Pedicinus** Gervais.

Pedicinus Gervais Aptères, III, p. 301 (1844).

This genus contains a few species occurring on monkeys. Two unidentified species have been found in South Africa, one on a vervet monkey (*Cercopithecus pygerythrus* Cuv.) at Fairfield, Rustenburg District, Transvaal, and the other on a grey chacma baboon (*Papio porcarius griseipes* Poc.) at Mooivlei, Transvaal.

Family **HAEMATOPINIDAE.**Genus **Haematopinus** Leach.

Haematopinus Leach, Zool. Misc., III, pp. 64, 65 (1817).

1. **Haematopinus asini** Linné (1758).

Haematopinus macrocephalus Burmeister (1838).

Common on horses, donkeys, and mules in the Union and Moçambique. Piaget has recorded it from a Burchell zebra (*Hippotigris burchelli*).

2. **Haematopinus bufali** De Geer (1778).

Recorded from the African buffalo (*Synceros caffer* Sparrm.) in the Congo Free State and Nyasaland, but it has not yet been taken off this animal in the Union.

3. **Haematopinus eurysternus** Nitzsch (1818).
Common on cattle throughout the Union and Moçambique.
4. **Haematopinus phacochoeri** Enderlein (1908).
This species is common on the bush pig (*Koiiopotamus choeropotamus* Desm.) and the Natal warthog (*Phacochoerus sundevalli* Lönnb.) in Zululand, and on the West African warthog (*Phacochoerus aethiopicus* L.) in the Transvaal. It has also been recorded from *Phacochoerus aeliani massaicus*, *P. africanus*, and *P. affinis nyasae* in Tanganyika Territory.
5. **Haematopinus suis** Linné (1758).
Haematopinus urivus Nitzsch (1818).
Common on domestic pigs in the Union and Moçambique.
6. **Haematopinus taurotragi** Cummings, Bull. Ent. Res., Vol. V, pp. 155-159, Figs. 1 and 2 (1914).
This species was described from specimens taken off an eland (*Taurotragus oryx*) in the Knowsby Managerie in 1857. It has since been taken off the same host; Drakensberg, Natal.

Genus **Linognathus** Enderlein.

Linognathus Enderlein, Zool. Anz., XXIX, p. 194 (1905).

1. **Linognathus angulatus** Piaget (1885).
This species has been found on a red duiker (*Cephalophus natalensis*) at Mfongosi, Zululand, and on a duiker (*Sylvicapra grimmii*); Rustenburg District, Transvaal. It was originally described from *Cephalophus nigrifrons*.
2. **Linognathus brevicornis** Giebel (1874).
Described from *Giraffa camelopardalis* L.
3. **Linognathus caviae-capensis** Pallas (1767).
This species has been found on the Transvaal dassie (*Procapra capensis coombsi* Rbts.) in the Rustenburg District, Transvaal, and on the Natal dassie (*P. capensis natalensis* Rbts.) in Natal.
4. **Linognathus fahrenheitzi** Paine (1914).
Linognathus forficulus Kellogg and Paine (1911).
Recorded taken on a mountain reedbuck (*Redunca fulvorufuta*) at Mfongosi, Zululand. It was originally described from specimens taken off a reedbuck (*Redunca arundinum*) in Nyasaland.
5. **Linognathus pedalis** Osborn (1896).
We have received specimens of this species taken off sheep at Irene, Transvaal.
6. **Linognathus setosus** Olfers (1816).
Linognathus piliferus Burmeister (1838).
This louse is by no means common in South Africa. We have taken it off dogs at Onderstepoort on two or three occasions. Waterston has recorded it from a dog at Capetown, and Fernandes from dogs in Moçambique.
7. **Linognathus stenopsis** Burmeister (1838).
Linognathus africanus Kellogg and Paine (1911).
Common on goats in the Union and Moçambique. We have also recorded it taken off a sheep at Kuruman, Cape Province.
8. **Linognathus tibialis** Piaget (1880).
Recorded taken off an impala (*Aepyceros melampus* Lecht.); Rustenburg District, Transvaal.

9. **Linognathus tibialis euchore** Waterston (1914).

Described from specimens taken off a springbok (*Antidorcas marsupialis*).

Also recorded taken off an impala (*Aepyceros melampus*) and a steenbok (*Raphiceros campestris*); Rustenburg District, Transvaal.

10. **Linognathus** nov. sp.

Several specimens taken off *Taurotragus oryx* (eland).

Genus **Eulinognathus** Cummings.

Eulinognathus Cummings, Ann. Mag. Nat. Hist. (VIII), XVII, p. 90 (1916).

1. **Eulinognathus denticulatus** Cummings, Ann. Mag. Nat. Hist., Ser. 8, Vol. 17, pp. 90-94, f. 1 (1916).

This louse is common on the spring hare (*Pedetes caffer*) in South Africa.

Genus **Neohaematopinus** Mjöberg.

Neohaematopinus Mjöberg, Arkiv. f. Zool., VI, pp. 13, 160 (1910).

Linognathoides Cummings, Bull. Ent. Res., III, p. 393 (1912).

1. **Neohaematopinus suahelicus** Ferris, Stang. Univer. Pub., Calif., U.S.A., Pt. IV, p. 258 (1923).

Described from specimens taken off a Zululand squirrel (*Paraxerus palliatus ornatus*), Ngoye Hills, Zululand; also collected from the following hosts in Kenya Colony: *Paraxerus palliatus suahelicus*, *P. jacksoni capitis*, and *Parasciurus animosus*.

2. **Linognathoides faurei** Bedford, 7th and 8th Rep. Div. Vet. Res., Un. S. Afr., pp. 710-712, Pl. 1, f. 2, Pl. 71, f. 3 (1920).

This louse is common on the ground-squirrel (*Geosciurus capensis*) in the Orange Free State. The generic position of this species is doubtful.

Genus **Haemodipsus** Enderlein.

Haemodipsus Enderlein, Zool. Anz., XXVIII, pp. 139, 143 (1904).

1. **Haemodipsus ventricosus** Denny (1842).

Occurs on the domestic rabbit, but is not very common in South Africa.

Genus **Polyplax** Enderlein.

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

1. **Polyplax spinulosa** Burmeister (1839).

This species has been recorded from *Rattus norvegicus*, *Rattus rattus*, *R. rattus alexandrinus* and other species of rats in various parts of the world. I have recorded it from two or three species of rats at Onderstepoort and from *Rattus norvegicus* at Maritzburg, Natal (1).

2. **Polyplax waterstoni** Bedford, 5th and 6th Rep. Dir. Vet. Res., Un. S. Afr., pp. 715-716, f. 1, 2, 4, 5 (1919).

Described from specimens taken off two species of rats at Onderstepoort, Transvaal (1). Ferris (15) has also recorded it from *Epimys peromyscus*, Kenya Colony.

3. **Polyplax biseriata** Ferris (1923).

Described from specimens taken off *Tatera bohmi varia*, Kenya Colony, and from a male and female taken from a gerbil (*Tatera lobengulae*) at Bothaville, Orange Free State (15, Part IV).

4. **Polyplax otomydis** Cummings, Bull. Ent. Res., Vol. III, pp. 395-7 (1912).
This species has been recorded taken from the following water-rats:
Otomys irroratus at Mfongosi, Zululand (Kellogg and Ferris) and Onderstepoort, Transvaal (Bedford); *Otomys luteolus*, an eastern Karroo species (Waterston); *Otomys irroratus tropicalis*, Kenya Colony (Cummings); and *O. angoniensis classodon*, Kenya Colony (Ferris).
5. **Polyplax cummingsi** Ferris (1916).
Described by Ferris (12) from a single female taken off *Dasymys incomtus* at Mfongosi, Zululand. He has also described it as *P. gracilis* Fabr., taken off *Aethomys* (= *Mus*) *chrysophilus* at the same locality, and from *Dasymys incomtus helukus*, Kenya Colony.
6. **Polyplax jonesi** Kellogg and Ferris, 1915.
Described from specimens taken off *Saccostomys campestris* (Peter's pouched mouse) at Mfongosi, Zululand (24).
7. **Polyplax arvicanthis** Bedford (1919).
Polyplax arvicanthis Bedford, 5th and 6th Rep. Dir. Vet. Res., Un. S. Afr., pp. 716, 717, f. 3 (1919).
Described from specimens taken off *Arvicanthis pumilio* = *Rhabdomys pumilio* (striped mouse) at Onderstepoort, Transvaal. Ferris has also recorded it from *Rhabdomys pumilio diminutis*, Kenya Colony (15, Part IV).
8. **Polyplax calva** Waterston (1917).
Described from specimens taken off giant rats (*Cricetomys gambianus*) at Acera, Gold Coast, and *Cricetomys* sp. in Zanzibar (25). Ferris has also recorded it from *C. gambianus osgoodi* and *C. gambianus enguvi* from Kenya Colony (15, Part IV). It has not yet been taken off *Cricetomys gambianus* in South Africa.

Genus **Hoplopleura** Enderlein.

Hoplopleura Enderlein, Zool. Anz., XXVIII, pp. 221-223 (1904).

1. **Hoplopleura biseriata** Ferris (1921).
Described from a single female taken off *Malacothrix typicus typicus* (typical large-eared mouse) at Bothaville, Orange Free State (15, Part II).
2. **Hoplopleura enormis enormis** Kellogg and Ferris (1915).
Found on *Arvicanthis dorsalis* = *Lemniscomys spinalis* (bushveld striped mouse) at Mfongosi, Zululand.
3. **Hoplopleura intermedia** Kellogg and Ferris (1915).
Described from specimens taken off *Mus coucha* = *Mastomys coucha* (multi-mammate mouse) at Mfongosi, Zululand. Also recorded from two unidentified species of rats caught at Onderstepoort, Transvaal (1), and from the following hosts in Kenya Colony: *Dendromys mesomelas insignis*, *Rattus tullbergi*, and *Zelotomys hildegardae* (15, Part II).

Genus **Schizophthirus** Ferris.

Schizophthirus Ferris, Stanz. Univer. Pub., Calif., U.S.A., III, p. 143 (1922).

1. **Schizophthirus graphiuri** Ferris (1922).
Described from specimens taken off *Graphiurus nanus* (dormouse) at Mtabamhlope, Natal, and from *Graphiurus murinus isolatus* and *G. raptor* in Kenya Colony 15, Part III).

Genus *Enderleinellus* Fahrenholz.

Enderleinellus Fahrenholz, Zool. Anz., XXXIX, p. 56 (1912).

This genus contains nineteen described species found on *Sciuridae*^e (squirrels), of which one has been found on a squirrel from South Africa.

1. *Enderleinellus zonatus* Ferris (1919).

Described from specimens taken off *Paraxerus palliatus ornatus* (Zululand squirrel) from Ngoye Hills, Zululand, and from the following hosts in Kenya Colony: *Paraxerus jacksoni capitis*, *P. palliatus suahelicus*, and *Parasciurus animosus* (15, Part I).

Genus *Scipio* Cummings.

Scipio Cummings, Bull. Ent. Res., III, p. 393 (1913).

This genus contains two described species found on *Octodontidae* (cane-rats), both of which have been recorded from South Africa.

1. *Scipio aulacadi* Neumann (1911).

Recorded from *Thryonomys* sp., Mfongosi, Zululand; *T. aulacodus* = *T. swinderanus variegatus* (cane-rat), Rustenburg District, Transvaal (1); and from *Thryonomys swinderanus* taken in Dahomey and north-eastern Rhodesia.

2. *Scipio breviceps* Ferris (1916).

Described from specimens taken off *Thryonomys* sp., Mfongosi, Zululand, and also recorded from *T. aulacodus* = *T. swinderanus variegatus*, Rustenburg District, Transvaal (1). Mr. Roberts informs me that *T. swinderanus variegatus* is the only species found in South Africa.

Genus *Hybophthirus* Enderlein.

Hybophthirus Enderlein, Denks. d. Med.-Naturw. Gesell. zu Jena, XIV, 79 (1909).

1. *Hybophthirus notophallus* Neumann (1909).

This species has been found on *Orycteropus afer* (ant-bear) in the Union and other parts of Africa.

Genus *Neolinognathus* Bedford.

Neolinognathus Bedford, Ent. Mo. Mag. (3), VI, p. 88 (1920).

This genus contains two described species found on *Macroscelidae* (elephant-shrews), of which one has been recorded from the Union.

1. *Neolinognathus elephantuli* Bedford, Ent. Mo. Mag. (3), VI, p. 89, 90, f. 1, 2 (1920).

Described from specimens taken off *Elephantulus myurus jamesoni* Chubb at Onderstepoort, Transvaal. Ferris (15, Part III) has also recorded it from *Petrodromus tetradactylus* and *Nasilis brachyrhynchus delameri* from Kenya Colony.

Sub-order MALLOPHAGA.

Family BOOPIDAE Mjöberg.

Genus *Heterodoxus* Le Souef and Bullen.

Heterodoxus Le Souef and Bullen, Vict. Naturalist, XVIII, p. 159 (1902).

1. *Heterodoxus longitarsus* Piaget (1880).

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 kangaroos and wallabies in Australia.

Family GYROPIDAE Burmeister.

Genus *Gyropus* Nitzsch.

Gyropus Nitzsch, Germar's Magazin, III, p. 303 (1818).

1. *Gyropus ovalis* Nitzsch (1838).

A common parasite of the guinea-pig (*Cavia cobaya*).

Genus *Gliricola* Mjöberg.

Gliricola Mjöberg, Arkiv. f. Zoologi, VI, p. 18 (1910).

1. *Gliricola porcelli* Linné (1758).

Gliricola gracilis Nitzsch (1838).

A common parasite of the guinea-pig (*Cavia cobaya*).

Family MENOPONIDAE Mjöberg.

Genus *Menopon* Nitzsch.

Menopon Nitzsch, Germar's Magazin, III, p. 299 (1818).

1. *Menopon africanum* Kellogg and Paine (1911).

Described by Kellogg and Paine from specimens taken off *Plectropterus gambensis* L. (spur-winged goose) in the Sudan. It has also been recorded from the same host in the Transvaal (2).

Menopon africanum transvaalensis Bedford, 7th and 8th Rep. Dir. Vet. Res., Un. S. Africa., p. 716 (1920).

Recorded taken from the following hosts in the Transvaal: *Sarkidiornis melanotus africanus* (knob-billed duck), *Dendrocygna viduata* (white-faced duck), *Casarca cana* (South African shelduck), *Anus erythrorhyncha* = *Paecilomitta erythrorhyncha* (red-billed duck), and domestic ducks (2).

2. *Menopon albidum* Giebel, Ins. Epiz., 280 (1874).

Recorded taken from *Neophron percnopterus* (Egyptian vulture).

3. *Menopon albipes* Giebel, Zeit., f. ges. Nat. XLVII, p. 250 (1876).

Recorded taken from *Lobivanellus albiceps* = *Xiphidiopterus albiceps* (white-crowned wattled plover).

4. *Menopon ambiguum* Nitzsch in Giebel, Ins. Epiz., p. 295 (1874).

Recorded taken from *Numenius phaeopus* = *Phaeopus phaeopus* (whimbrel), a migrant to South Africa.

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

Described from specimens taken off *Numida mitrata* in the Sudan, and recorded from *Numida coronata* (crowned guinea-fowl) in the Transvaal and from a guinea-fowl in Natal (1).

6. *Menopon brevipalpe* Piaget, Pédiculines, p. 498, Pl. 40, f. 5 (1880).

Described from specimens taken off *Phalacrocorax carbo*, and recorded by Waterston (36) from *Phalacrocorax capensis* = *Pseudocarbo capensis* (Cape cormorant).

7. *Menopon bucerotis* Kellogg, Schwed. Exp. Kilimanjaro, p. 54, Pl. 7, f. 12 (1910).

Described from specimens taken off *Bycanistes cristatus* = *Baryrhynchus cristatus* (crested hornbill) in East Africa, and recorded from specimens taken off *Bycanistes bucinator* (trumpeter hornbill) in Natal (2).

8. *Menopon circinatum* Piaget, Tid. v. Ent., XXXIII, p. 249, Pl. 10, f. 4 (1888).

Described from specimens taken off *Stercorarius pomarinus* = *Coprotheres pomarinus* (large white-necked skua).

9. **Menopon coarctatum** Scopoli, Ent. Carn., p. 382 (1763).
M. fuscocinctum, Denny, Anoplur. Brit., p. 219, Pl. 21, f. 4 (1842).
 Recorded from specimens taken off *Lanius collurio* = *Enneoctonus collurio* (red-backed shrike), a migrant to South Africa.
10. **Menopon coarctum** Nitzsch in Giebel, Zeit. f. ges. Nat., XXVIII, p. 392 (1866).
 This species has been recorded from *Numenius arquatus* (curlew), a migrant to South Africa.
11. **Menopon currucae** Schrank, Beiträge, p. 113 (1776).
 Recorded from *Sylvia curruca* (common whitethroat), a migrant to South Africa.
12. **Menopon eulasium** Kellogg, Schwed. Exp. Kilimanjaro, p. 54, Pl. 7, f. 11 (1910).
 Described from specimens taken off *Phalacrocorax africanus* = *Microcarbo africana* (reed cormorant) in East Africa.
13. **Menopon exile** Nitzsch, Zeit. f. ges. Nat., XXVII, p. 121 (1866).
 Described from specimens taken off *Saxicola oenanthe* = *Oenanthe oenanthe* (European wheatear), a migrant to South Africa.
14. **Menopon fasciatum** Scopoli, Ent. Carn., p. 383 (1763).
M. phanerostigma Nitzsch in Giebel, Zeit. f. ges. Nat., XXVIII, p. 391 (1866).
 Recorded from *Cuculus canorus* (European cuckoo), a migrant to South Africa.
15. **Menopon francolinus** Bedford, 7th and 8th Rep. Dir. Vet. Res., Un. S. Afr., p. 712, Pl. 2, f. 2, Pl. 5, f. 1 (1920).
 Described from specimens taken off *Francolinus sephaena* = *Dendroperdix sephaena* (bush partridge), and *Pternistis swainsoni* (Swainson's red-necked francolin) in the Transvaal.
16. **Menopon fuscofasciatum** Piaget, Pédiculines, p. 492, Pl. 40, f. 9 (1880).
 Recorded from *Sterna cantiaica* = *Thalasseus sandvicensis* (sandwich tern) and *Stercorarius pomarinus* = *Coprotheres pomarinus* (large white-necked skua).
17. **Menopon gallinae** Linné, Syst. Nat., p. 613 (1758).
M. pallidum Nitzsch in Burmeister, Handbuch, II, p. 440 (1838).
 A common parasite of the domestic fowl in South Africa.
18. **Menopon impar poicephalus** Bedford, 7th and 8th Rep. Dir. Vet. Res., Un. S. Afr., p. 718, 719 (1920).
 Described from a single male and female taken off *Poicephalus meyeri transvaalensis* (Transvaal Meyer's parrot) in the Transvaal.
19. **Menopon inaequale** Piaget, Pédiculines, p. 443, Pl. 35, f. 1 (1880).
 Recorded from *Lanius collurio* = *Enneoctonus collurio* (red-backed shrike), a migrant to South Africa.
20. **Menopon lophocerus** Bedford, 7th and 8th Rep. Dir. Vet. Res., Un. S. Afr., p. 717, 718, Pl. 1, f. 1, Pl. 3, f. 1 (1920).
 Described from specimens taken off the following hosts in the Rustenburg District, Transvaal: *Lophoceros ephirhinus* (South African grey hornbill), *L. erythrorhynchus* = *Tockus erythrorhynchus rufirostris* (southern red-billed hornbill), and *L. leucomelas* = *Xanthorhynchus leucomelas* (yellow-billed hornbill).