

Order PHTHIRAPTERA (Lice)

Species of this suborder are small and wingless and have dorso-ventrally flattened bodies. Their antennæ are short and are composed of 3 to 5 segments. The eyes are reduced or absent and the segmentation of the thorax is indistinct. The tarsi consist of 1 or 2 segments and each tarsus bears 1 or 2 claws. There is 1 pair of spiracles situated on the mesothorax. Typically there are 6 pairs of abdominal spiracles, but when fusion of abdominal segments occurs there may be fewer than 6 pairs. The operculated eggs are cemented, without stalks, to the hairs or feathers of the host. There is no metamorphosis. The phase of the life history that leaves the egg resembles the adult and is called the first nymph. There are 3 ecdyses, the first nymph becoming the second nymph, which becomes the third nymph and this becomes the adult. The whole life history lasts 2-3 weeks and is passed on the host. Lice cannot live off the host for longer than a few days. Uninfected hosts are infected by close contact with infected ones, but lice may also be spread by farm equipment and personnel. Thus lice of horses may be spread by brushes, blankets, harness or other stable equipment. Thus Scott (1950) found that *Linognathus pedalis*, the foot louse of sheep, passed through three nymphal instars, each of which lasted, under Australian conditions, about 7 days. The eggs required about 17 days to hatch and 5 days were required before the adult female laid eggs, so that the whole period from egg to egg was about 43 days. This species can live off the host for about 18 days, and Scott showed that lambs can be infected from pastures up to 3 days after infected sheep have been removed from the pastures.

The lice are divided into two suborders, the characteristics of which are summarised below.

Suborder 1. ANOPLURA (Siphunculata, Sucking lice)

The mouth parts are adapted for sucking the blood of the host. The two antennæ are visible at the sides of the head and are usually composed of 5 segments. There is no sexual dimorphism, except in the Polyplacinae. The thorax is small and its 3 segments are fused together; the abdomen is relatively large, with 7 of its 9 segments visible, the segments often bearing at their sides dark-brown or black areas of thickened chitin, called

paratergal plates. The eyes are reduced or absent, but are present in the human head louse, *Pediculus humanus*, and on the human pubic louse, *Phthirus pubis*. The first pair of legs is usually smaller with weaker

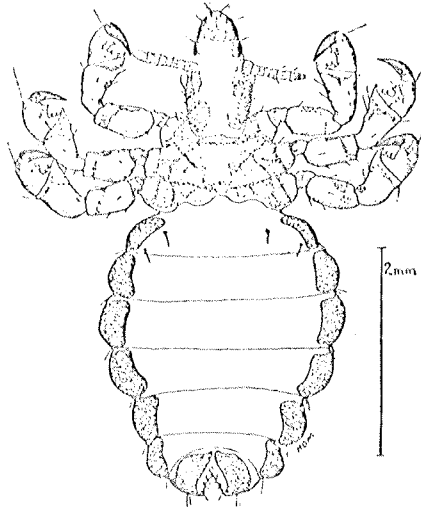


FIG. 219.—*Hamatopinus suis*, FEMALE.
(ORIGINAL.)

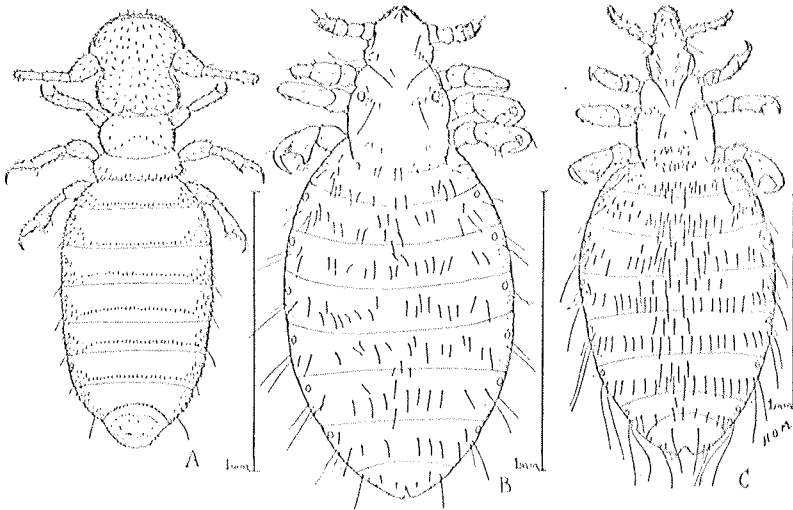


FIG. 220.—SHEEP LICE. (ORIGINAL.)
A, *Damalinea ovis*; B, *Linognathus pedalis*; C, *L. africanus*.

claws; the third pair of legs is usually the largest. The two segments of the tarsus are usually not distinguishable. Each tarsus has only 1 claw. The hair of the host is held between this claw and a thumblike process on the ventral apical angle of the tibia. In the Hamatopinidae

the hold on the hair is helped by a spiny pad, the *tibial pad*, which can be thrust up to lock the grip on the hair. There are thoracic spiracles on the dorsal side of the mesothorax and 6 pairs of abdominal spiracles. The head is usually more or less pointed anteriorly. Ferris (1951) classifies the Anoplura into four families, which have the following characters:

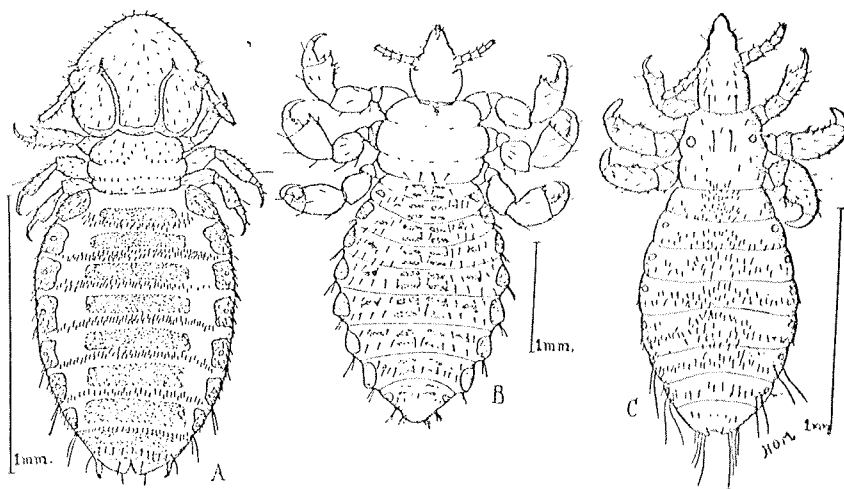


FIG. 221.—CATTLE LICE. (ORIGINAL.)

A, *Damalinia bovis*; B, *Hematopinus eurysternus*; C, *Linognathus vituli*.

Family HÆMATOPINIDÆ

The eyes are absent, the head has forward prolongations (temporal angles) behind the antennæ, and the thorax is broad; there are marked paratergal plates, and there is 1 row of spines on each abdominal segment. To this family belong:

Hæmatopinus asini (Linné, 1755), the sucking louse of equines.

H. suis (Linné, 1758), the very large louse of pigs.

H. eurysternus (Nitzsch, 1818), the "short-nosed" cattle louse, with a relatively short head and broad thorax and abdomen.

Family LINOGNATHIDÆ

The eyes are absent; the abdomen is membranous with numerous hairs on the segments. The first pair of legs are the smallest. Most species are parasitic on ungulates.

To this family belong:

Linognathus ovillus (Neumann, 1907), the body louse or "blue louse" of sheep, occurs in New Zealand, Australia and Scotland. Its head is much longer than wide and also longer than the thorax.

L. vituli (Linné, 1758), the "long-nosed" cattle louse, which has an elongate head and body.

L. africanus Kellogg and Paine, 1911, the African "blue louse" of sheep.

L. pedalis (Osborn, 1896), the "foot louse" of sheep. The head, Scott (1950) states, is as wide as long and not longer than the thorax. This louse occurs on the legs and feet of the sheep where there is no wool.

L. stenopsis (Burmeister, 1838) on goats.

L. setosus (v. Olfers, 1816) (syn. *L. piliferus*) on dogs and foxes.

Solenopotes capillatus Enderlein, 1904, on cattle in Europe, U.S.A. and Australia.

Family HOPLOPLEURIDÆ

The eyes are absent; the abdomen has paratergal plates on at least one segment. Most species are parasitic on squirrels, shrews, rats, mice and other rodents and a few on insectivores and monkeys. The antennæ of species of the family Polyplacinae found on rodents may show sexual differences.

Family PEDICULIDÆ

There are pigmented eyes present; the abdomen has paratergal plates.

To this family belong the human head and body lice belonging to the species *Pediculus humanus*, the legs of which are all the same size, the claws being slender; and the human pubic or crab louse, *Phthirus pubis*, which has a very wide thorax and a small abdomen, the first pair of legs being slender with slender claws. The species of the other families of this suborder are parasitic on seals, walruses and elephant shrews.

Suborder 2. MALLOPHAGA

Species of this suborder are often called biting lice, a name which refers to the fact that many species of this suborder feed on the epithelial debris on the skin of the host, or even on the feathers of birds, and have mouth parts adapted for chewing up this material. It is now known, however, that some species of them suck the blood of their hosts and have mouth parts adapted for this purpose. In species of this suborder the

mesothorax and metathorax are fused to form one piece, in front of which the prothorax is a distinct and separate segment. The thoracic spiracles are on the ventral side of the mesothorax. The tarsi of species parasitic on birds have 2 claws and those of species parasitic on mammals have 1 claw.

The suborder Mallophaga is divided by Hopkins (1949), into three superfamilies:

Superfamily 1. ISCHNOCERA

In species of this superfamily the antennae are filiform and visible at the sides of the head and they are composed of 3 to 5 segments. The head of an ischnoceran louse may therefore look at first sight somewhat like that of a sucking louse (Anoplura), although it is usually broader. There are no maxillary palps, so that these cannot be mistaken, as the palps of Amblycera may be, for the antennae. The mandibles bite vertically. In the abdomen segments 1 and 2, and 9 and 10, are fused and segment 11 may not be visible. Parasitic on both mammals and birds. The following species, the names of which are given by Hopkins and Clay, 1952, may be found on the farm animals named.

A. Species of Ischnocera found on Birds

Cuelotogaster (Lipeurus) heterographus Nitzsch, 1866, the "head louse of poultry," occurs on the skin and feathers of the head and neck. Male 2.43 mm., female 2.6 mm. long. In the male the first segment of the antenna is long and thick, bearing a posterior process. The abdomen is elongate in the male and barrel-shaped in the female, with dark-brown lateral tergal plates. The eggs are laid singly on the feathers. It occurs on fowls and partridges. It is a dangerous parasite of chicks.

Lipeurus caponis Linné, 1758, the "wing louse," is a slender, elongate louse which occurs on the under-side of the large wing feathers and moves about very little. It occurs on fowls and pheasants.

Goniodes gigas (Taschenberg) 1879 (syn. *Goniocotes gigas*) is a large louse occurring on the body and feathers of the fowl. Male 3.2 mm., female 5 mm. long.

Goniocotes gallinae (de Geer) 1778 (syn. *Goniocotes hologaster*; *Goniodes hologaster*), the "fluff louse," occurs in the fluff at the base of the feathers of fowls, pheasants and pigeons. It is a small louse; the male is 1 mm. long and the female 1.6 mm. The body is broad and the head short and wide.

Chelopistes meleagridis (Linn.) 1758 (syn. *Goniodes meleagridis*; *Virgula meleagridis*) is a common louse of the turkey, and *Columbicola columbae*

(Linné, 1758) (syn. *Lipeurus baculus* Nitzsch) occurs on domestic and wild pigeons. *Anaticola crassicornis* and *A. anseris* may be found on the duck.

B. Species of *Ischnocera* found on Mammals

Damalinia (Bovicola) bovis (Linné, 1758) (syn. *Trichodectes scalaris*) on cattle.

Damalinia (Bovicola) equi (Linné, 1758) (syn. *Trichodectes parumpilosus*) on equines.

Damalinia (Bovicola) ovis (Linné, 1758) (syn. *Trichodectes spherocephalus*) on sheep.

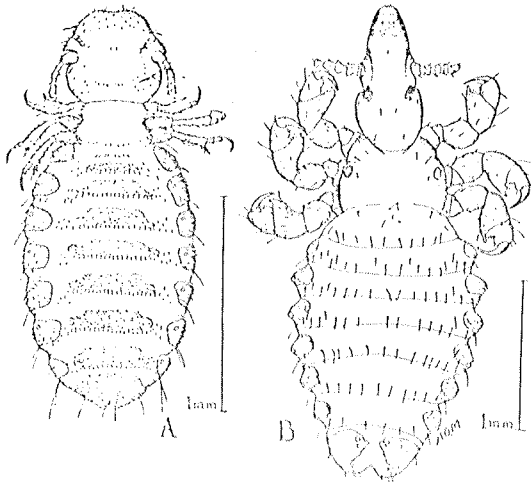


FIG. 222.—LICE OF THE HORSE. (ORIGINAL.)

A, *Damalinia equi*; B, *Hematopinus asini*.

Damalinia (Bovicola) caprae (Gurlt, 1843) (syn. *Trichodectes scimax*) on goats.

B. painei (Kellogg and Nakayama, 1914) on goats.

Damalinia limbata (syn. *Trichodectes limbatus*) (Gervais, 1847) on angora goats.

Trichodectes canis (de Geer, 1778) (syn. *T. latus*) on dogs.

Felicola subrostratus (syn. *F. subrostrata*) Nitzsch, 1838, on cats.

Superfamily 2. AMBLYCERA

In species of this superfamily the antennæ lie in grooves in the sides of the head and they may not be readily seen. Maxillary palps may, however, be present and these may be visible in mounted specimens and may be confused with the antennæ. The antennæ, however, may be identified by the fact that usually they consist of 4 segments and the third segment is stalked, being somewhat the shape of an egg-cup that holds the fourth segment. The palps, when they are present, also have 4 segments, but the third segment is not stalked. The antennæ of some species (e.g. those of the genus *Columbicola*) show sexual dimorphism, the antennæ of the males being elongate and having a swollen first segment,

with an appendage on the third segment. The mandibles bite horizontally. Only 9 of the 11 abdominal segments are visible. The head is often broader and more rounded anteriorly than that of the *Anoplura*, but this is not a very reliable character. Parasitic on both mammals and birds. The following species may be encountered by veterinarians:

A. Species of *Amblycera* found on Birds

Menopon gallinæ (Linné, 1758) (syn. *M. pallidum*), the "shaft louse" of poultry, is pale yellow in colour. Male 1.71 mm., female 2.04 mm. long. The thoracic and abdominal segments have each one dorsal row of bristles. This species occurs on fowls and, according to Piaget, also on ducks and

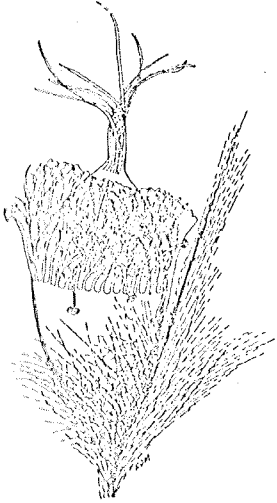


FIG. 223.—*Menacanthus stramineus*, EGG ATTACHED TO FEATHER. (ORIGINAL.)

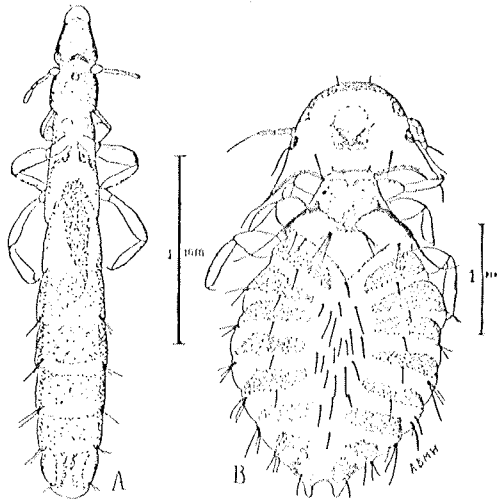


FIG. 224.—A, *Columbicola columbe*; B, *Chelopistes meleagridis*. (ORIGINAL.)

pigeons. It moves about rapidly. The eggs are laid in clusters on the feathers. *M. phæostomum* (Nitzsch, 1818) occurs on the peacock.

Menacanthus (Eomenacanthus) stramineus (Nitzsch) 1818 (syn. *Menopon biserialatum*) is the yellow "body louse of poultry," occurring on the skin of those parts of the body which are not densely feathered like the breast, thighs and around the anus. It occurs on the fowl, turkey, peacock and Japanese pheasant, and is especially harmful to small chicks. Male 2.8 mm., female 3.3 mm. long. The abdominal segments have each two dorsal rows of bristles. The eggs have characteristic filaments on the anterior half of the shell and on the operculum, and are laid in clusters on the feathers near the skin.

Trinoton anserinum (J. C. Fabricius) 1805 (syn. *Trinoton anseris*) may be found on the duck and the swan.

B. Species of *Amblycera* found on Mammals

Although most of the *Amblycera* occur on birds, some species are parasitic on mammals, among which a *Gyropus ovalis* and *Gliricola*

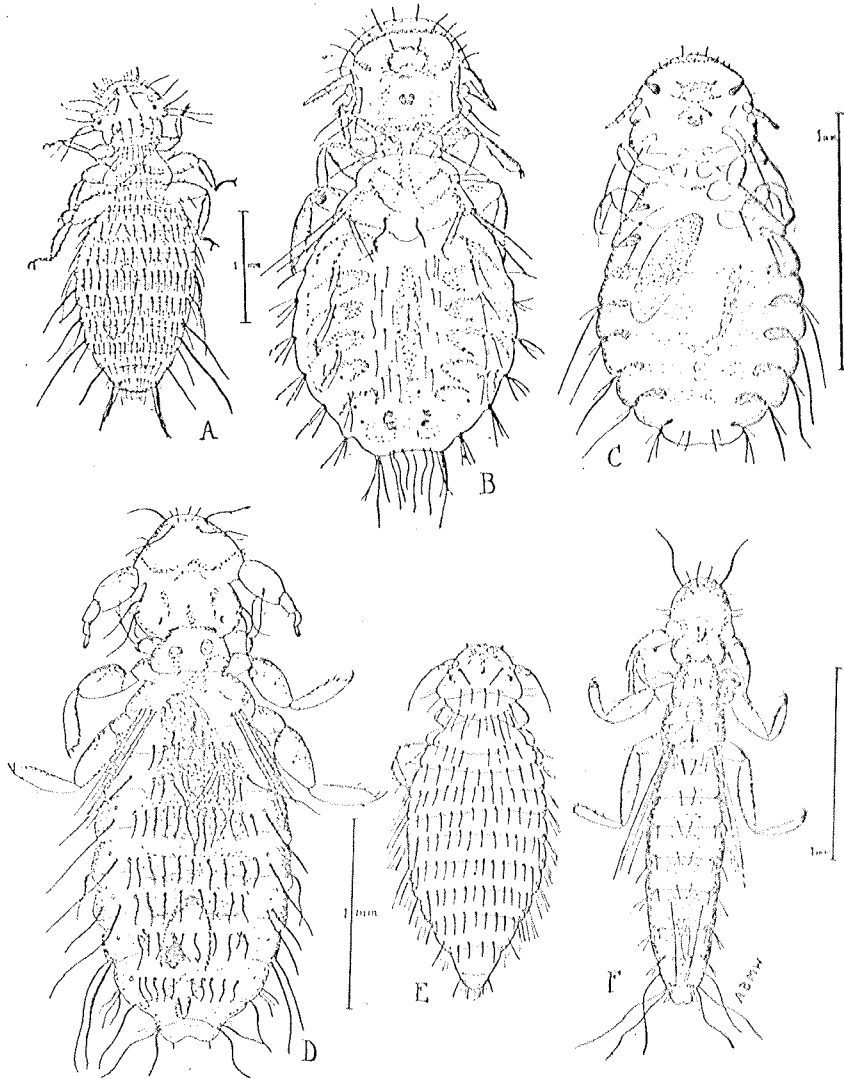


FIG. 225.—COMMON FOWL LICE. (ORIGINAL.)

A, *Menacanthus stramineus*; B, *Goniocotes gigas*; C, *G. hologaster*; D, *Cyclotogaster heterographus*; E, *Menofon gallinae*; F, *Lipanus caponis*.

porcelli and *Trimenopon hispidum* may all be found on the guinea-pig, and the former two species also occur on other rodents. *Heterodoxus spiniger* is common on the dog in warm countries and *H. longitarsus* and *H. macropus* occur on kangaroos and wallabies.

EFFECTS OF LICE ON THEIR HOSTS

The chief effects of lice on their hosts are due to the irritation they cause. The hosts become restless and do not feed or sleep well and they may injure themselves or damage their feathers, hair or wool by biting and scratching the parts of their bodies irritated by the lice. The egg-production of birds and the milk-production of cattle may fall. In mammalian hosts scratching may produce wounds or bruises on the animal, while in sheep the wool is damaged and it is also soiled by the faeces of the lice. The coat becomes rough and shaggy, and in bad cases the hair becomes matted together. The skin turns dry and scaly, so that large scabs or crusts may form, resembling lesions of mange.

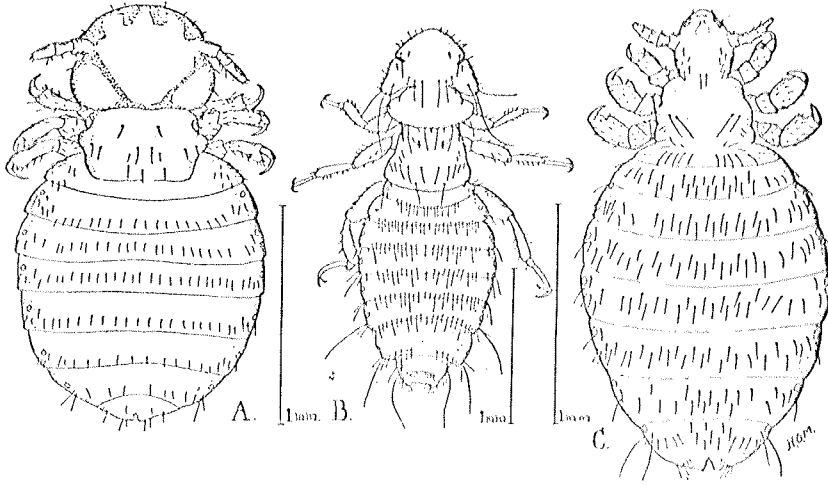


FIG. 226.—DOG LICE. (ORIGINAL.)

A, *Trichodectes canis*; B, *Heterodoxus longitarsus*; C, *Linognathus setosus*.

The animals are restless; they do not feed well and their reduced condition may make them susceptible to other diseases. In the case of calves, lousiness leads to much licking, and since the hair is loose, hair-balls readily form in the stomach. The foot louse of sheep is found most frequently around the dew-claws, and severe infections may produce lameness.

Hematopinus suis, may spread swine fever by passing from a dead pig to healthy ones.

Pediculosis is seen especially in winter in animals with a long winter coat and when they suffer from cold and insufficient feeding.

Diagnosis is easily made by finding the lice, especially when the animal is standing in the sunlight.

HAMSTER (*Circetus circetus*).*Cysticercus tenuicollis*

BIRDS.

FOWL (*Gallus gallus*).

<i>Echinostoma revolutum</i>	<i>Gongylonema ingluvicola</i>
<i>Echinoparyphium recurvatum</i>	<i>Gongylonema crami</i>
<i>Hypoderæum conoideum</i>	<i>Acuaria hamulosa</i>
<i>Prosthogonimus pellucidus</i>	<i>Acuaria spiralis</i>
<i>Prosthogonimus ovatus</i>	<i>Tetrameres americana</i>
<i>Plagiorchis arcuatus</i>	<i>Tetrameres fissispina</i>
<i>Notocotylus attenuatus</i>	<i>Physaloptera truncata</i>
<i>Catantropis verrucosa</i>	<i>Oxyspirura mansonii</i>
<i>Brachylæmus commutatus</i>	<i>Oxyspirura parvorum</i>
<i>Collyriclum faba</i>	<i>Polymorphus boschadisi</i>
<i>Dithyridium variabile</i>	<i>Callitroga americana</i> (larva)
<i>Davainea proglottina</i>	<i>Menopon galline</i>
<i>Raillietina tetragona</i>	<i>Menacanthus stramineus</i>
<i>Raillietina echinobothrida</i>	<i>Cuelotogaster heterographus</i>
<i>Raillietina cesticeillus</i>	<i>Lipeurus caponis</i>
<i>Cotugnia digonopora</i>	<i>Goniocotes gigas</i>
<i>Amobotania sphenoides</i>	<i>Goniocotes gallinæ</i>
<i>Choanotania infundibulum</i>	<i>Goniodes gigas</i>
<i>Metroliasthes lucida</i>	<i>Goniodes dissimilis</i>
<i>Hymenolepis carioeca</i>	<i>Ceratophyllus gallinæ</i>
<i>Fimbriaria fasciolaris</i>	<i>Echinophaga gallinacea</i>
<i>Heterakis gallinæ</i>	<i>Argas persicus</i>
<i>Heterakis brevispiculum</i>	<i>Hyalomma ægyptium</i>
<i>Heterakis putaustralis</i>	<i>Hemaphysalis cinnabarina</i>
<i>Heterakis indica</i>	<i>Amblyomma hebraeum</i>
<i>Ascaridia galli</i>	<i>Cnemidocoptes gallinæ</i>
<i>Subulura brumpti</i>	<i>Cnemidocoptes mutans</i>
<i>Subulura differens</i>	<i>Cytodites nudus</i>
<i>Strongyloides avium</i>	<i>Laminosioptes cysticola</i>
<i>Capillaria longicollis</i>	<i>Dermanyssus gallinæ</i>
<i>Capillaria columbæ</i>	<i>Liponyssus bursa</i>
<i>Capillaria annulata</i>	<i>Liponyssus bacoti</i>
<i>Syngamus trachea</i>	<i>Liponyssus sylviarum</i>
<i>Trichostrongylus tenuis</i>	<i>Neoschöngastia americana</i>
<i>Hartertia gallinarum</i>	

TURKEY (*Meleagris gallopavo*).

<i>Brachylæmus commutatus</i>	<i>Trichostrongylus tenuis</i>
<i>Collyriclum faba</i>	<i>Acuaria hamulosa</i>
<i>Dithyridium variabile</i>	<i>Acuaria spiralis</i>
<i>Raillietina cesticeillus</i>	<i>Tetrameres americana</i>
<i>Choanotania infundibulum</i>	<i>Tetrameres fissispina</i>
<i>Metroliasthes lucida</i>	<i>Oxyspirura mansonii</i>
<i>Heterakis gallinæ</i>	<i>Menacanthus stramineus</i>
<i>Ascaridia galli</i>	<i>Chelopistes meleagridis</i>
<i>Subulura brumpti</i>	<i>Argas persicus</i>
<i>Strongyloides avium</i>	<i>Hyalomma ægyptium</i>
<i>Capillaria columbæ</i>	<i>Cnemidocoptes mutans</i>
<i>Capillaria contorta</i>	<i>Cytodites nudus</i>
<i>Capillaria annulata</i>	<i>Dermanyssus gallinæ</i>
<i>Syngamus trachea</i>	<i>Liponyssus bursa</i>

HOST PARASITE LIST

PIGEON (*Columba livia domestica*).

Echinoparyphium parvulum
Echinoparyphium recurvatum
Hypoderæum conoideum
Brachylæmus commutatus
Apatemon gracilis
Cotylurus cornutus
Davainea proglottina
Raillietina tetragona
Cotugnia cuneata
Ascaridia columbæ

Capillaria columbæ
Capillaria longicollis
Ornithostrongylus quadriradiatus
Acuaria spiralis
Tetrameres fissispina
Pseudolynchia canariensis
 (?) *Menopon gallinæ*
Goniocotes gallinæ
Columbicola columbæ
Argas persicus

GUINEA-FOWL (*Numida meleagris*).

Brachylæmus commutatus
Raillietina tetragona
Raillietina cesticillus
Heterakis gallinæ
Ascaridia galli
Subulura brumpti

Subulura differens
Syngamus trachea
Trichostrongylus tenuis
Acuaria spiralis
Chelopistes meleagridis

PEA-FOWL (*Pavo cristatus*).

Raillietina tetragona
Heterakis gallinæ
Oxyuris mansonii

Menopon phæostomum
Menacanthus stramineus

DUCK (*Anas boschas domestica*).

Opisthorchis simulans
Echinostoma revolutum
Echinoparyphium parvulum
Echinoparyphium recurvatum
Hypoderæum conoideum
Prosthogonimus pellucidus
Notocotylus attenuatus
Catatropis verrucosa
Typhlocælum cymbium
Typhlocælum obovale
Hypitasmus tumidus
Apatemon gracilis
Parastrigca robusta
Cotylurus cornutus
Bilharziella polonica
Cotugnia fastigata
Hymenolepis lanceolata
Fimbriaria fasciolaris

Porrocaecum crassum
Heterakis gallinæ
Heterakis dispar
Ascaridia galli
Capillaria contorta
Cyathostoma bronchialis
Amidostomum anseris
Trichostrongylus tenuis
Acuaria uncinata
Tetrameres fissispina
Tetrameres crani
Hystrichis tricolor
Polymorphus boschadis
Filicollis anatis
Trinoton anseris
Menopon gallinæ
Argas persicus

GOOSE (*Anser anser domesticus*).

Echinostoma revolutum
Hypoderæum conoideum
Notocotylus attenuatus
Catatropis verrucosa
Hypitasmus tumidus
Hymenolepis lanceolata
Fimbriaria fasciolaris
Heterakis gallinæ
Heterakis dispar

Ascaridia galli
Syngamus trachea
Cyathostoma bronchialis
Amidostomum anseris
Trichostrongylus tenuis
Acuaria uncinata
Polymorphus boschadis
Filicollis anatis
Argas persicus