

A TREATISE  
ON THE  
RASITES AND PARASITIC  
DISEASES  
OF THE  
DOMESTICATED ANIMALS

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CHAPTER IV

PHTHIRIASES

THE general name of *Phthiriasis* (from *φθερί*, a louse) has been given to the cutaneous affection due to the presence of *Lice* on the skin. It is also named the *Pedicular disease* and *Lousiness*.

In its ordinary sense, the term *Louse* comprises all the apterous parasites which do not jump like Fleas, and only by accident quit their host.

With the exception of the Melophagus of the Sheep and some doubtful species, all belong to the sub-order of *Hemipterous parasites*, *Rhynchota*, or the *Pediculinæ* of Piaget.

These are small-sized—only a few millimetres in length—apterous insects, of a dull-white colour, and the mouth of which is adapted either for pricking or masticating. The head bears two simple eyes, or *ocelli*, often but little distinct; and two antennæ, composed of three, four, or five articles. The three thoracic segments are more or less confounded with each other. The abdomen is usually composed of nine segments. The legs are ordinarily short and strong; the tarsi are formed of two articles, the last of which has two nails, or hooklets, by which the insect can creep. The eggs, called *nits*, are pyriform, have an operculum at one end, and are fixed very solidly to the hairs or feathers by a glutinous substance. The young—which leave the eggs by the operculum—have quite the shape of the adults, and do not undergo any metamorphoses, though they only acquire their definitive colour and consistency after several moultings.

The male and female differ from each other, in the former being a little smaller than the latter, frequently by peculiarities in the antennæ, by the last abdominal segment being often divided in the female and rounded in the male, which has also, on the middle line, a copulating apparatus of a brownish colour, and digitiform or lancet-shaped.

The males are usually much less numerous than the females.

The Hemipterous parasites are divided into two families—the *Pediculidæ* and the *Ricinidæ*.

The *Pediculidæ*, or *Lice properly called*, have the mouth arranged as a sucker at the anterior border of the head; the tarsi always terminate in a single claw, with the exception of the *Hæmatomyzus*, which has two. The *Ricinidæ*, or *Mallophaga*, have the buccal apparatus formed for mastication; they are *pellivorous*—that is, they live on epidermic productions, hairs (*pilivorous*), or feathers (*pennivorous*); the pieces constituting the mouth are placed at the inferior surface of the head, and the tarsi terminate in one or two claws.

**PEDICULIDÆ.**—These have a movable proboscis, formed of the upper and lower lips, and armed in front with one or two verticilli of small spines. In this canal are four channels, arranged two and two, the juxtaposition of which form an internal tube, or sucker, narrower and longer than the canal. The insect projects this sucker beyond the sheath to bury it in the skin, and uses it to aspirate the blood. The hooklets, or spines of the sheath, fix the aspiratory apparatus, and so prevent access of air. The thorax is small, but usually larger and shorter than the head, and shows scarcely any traces of its division into three segments. The abdomen is generally elliptical in outline, and has its last segment rounded in the male, with an opening for the penis; in the female this segment is notched or bilobate, with two small terminal appendages.

All the known species live on the Mammalia. The Lice infesting Man—the head Louse (*Pediculus capitis*), body Louse (*Pediculus corporis*), and pubic Louse or Morpion (*Phthirus pubis*)—belong to this family: genera *Pediculus* and *Phthirus*. The species which are found on the domesticated animals are all included in the genus *Hæmatopinus* (Leach).

**Hæmatopinus.**—The species of this genus are not very distinct from the genus *Pediculus*, the species of which are comparatively few, and live, two on Man, and a third on a Monkey. The *Hæmatopinus* species are characterized by their head being inserted directly on the thorax, without any constriction

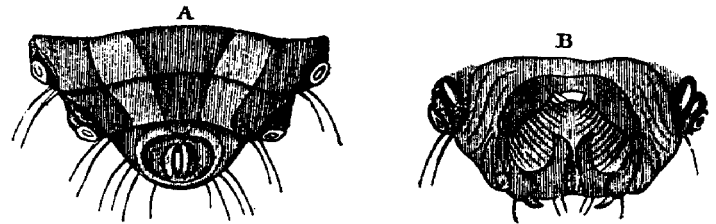


FIG. 25.—Magnified posterior extremity of the *Hæmatopinus* of the Fig.—Delafond.

A, Male dorsal surface. B, Female ventral surface.

like a neck; by their antennæ of five articles, their abdomen of eight or nine segments, their tarsi with a single claw, and their legs without a distinct appendage at the internal angle of their tarsal extremity (Figs. 25, 26, 28, 29, 34, 36, 37, 40).

They are found on all the domesticated Mammalia, with the exception of the Sheep, Cat, and Guinea-pig.

**RICINIDÆ.**—These parasites are often distinguished at first sight from the *Pediculidæ* by their head, which is always larger than their thorax, and the shape of which is determined by a system of dark horny bands, to which particular names are given. The most important are: 1. The *antennal bands*, which are marginal, and border the head in front, from the insertion of the antennæ, joining or not joining each other in the middle line; 2. The *occipital bands*, which extend—one on each side—from the occiput, or posterior border, to the base of the mandibles or orbit. The mouthpieces are situated on the inferior surface, and are principally constituted by the mandibles, in the form of short hooks, and by the jaws. The thorax generally has its *prothorax* distinct, but its other two segments are usually joined as one, which receives the name of *metathorax*. The first seven abdominal segments have their borders strengthened by a *lateral band*, and most frequently have transverse spots.

The masticatory apparatus of the Ricinidæ allows them to subsist on epidermic productions, and fragments of hairs or feathers. They do not suck the blood of their host like the Pediculidæ; so that they might be considered, not as true parasites, but as commensals which free the skin from its scurf. But it must not be concluded that they are really advantageous to the animal infested by them. Not only do they soil the skin by their dejections, their 'nits,' their exuvie, and their dead bodies, but it is certain that their contact is felt by the creatures on which they live, and on which they produce disagreeable itching, accompanied by sharp biting. Birds invaded by these vermin are often in bad health.

The Ricinidæ are divided into two sub-families: 1. The *Philopterina*, which have the antennæ composed of three or five articles, and have no maxillary palps; 2. The *Liotheina*, whose antennæ have four articles, and are provided with quadri-articulated maxillary palps projecting beyond the anterior border of the head.

**Philopterina**.—Independently of the above characters, it is necessary to note in these parasites the frequently important development of the anterior part of the head, which is named the *clypeus*, and is sometimes distinctly separated from the posterior part by a suture. The *antennal sinus* is a more or less deep notch on each side of the middle line of the head, and at the bottom of it is a small protuberance that carries the antennæ.

The Philopterina are divided into eleven genera, only six of which are of interest here. These are: the *Trichodectes*, which live exclusively on Mammalia; the *Ornithobius*, *Lipeurus*, *Goniodes*, *Goniocotes*, and the *Docophorus*, which are parasitic on Birds.

**Trichodectes** (Nitzsch) are characterized by their three-articled antennæ, these having five in all the other genera. They are limited to Mammalia, the other genera being special to Birds (Figs. 27, 30, 31, 35, 38, 39).

**Ornithobius** (Denny), Fig. 49, and **Lipeurus** (Nitzsch), Fig. 46, have a narrow, elongated body, the sides being nearly parallel. The antennæ are different in the two sexes; besides, in *Lipeurus* the third article in the male has an appendage which is absent in *Ornithobius*. The latter has the abdomen bordered on each side by two parallel bands, while there is only one on *Lipeurus*. *Ornithobius* is special to the Swan.

**Goniodes** (Nitzsch.—Fig. 43) and **Goniocotes** (Burm.—Figs. 44, 45) have the body flattened, sides rounded, or of an elongated oval, and the antennæ different in the two sexes, the first article in the male being larger than the others. In the male *Goniodes* the third article, and sometimes the first, has an appendage which is absent in *Goniocotes*; and the latter always has the abdomen rounded at the end, while in the male *Goniodes* it sometimes has two points.

**Docophorus** (Nitzsch.—Fig. 48).—The antennæ are alike in both sexes, and are inserted in sinuses or excavations at the sides of the head, which has strong movable trabeculæ at its anterior angle.

The *Liotheina* are distinguished from the Philopterina by their four-articled antennæ and distinct maxillary palps. The head is very broad at the temples, and appears to be triangular or trilobate. In front of the temple there is often a notch, called the *orbital sinus*, in which is found the eye, though this is usually not very distinct.

The *Liotheina* comprise ten genera, four of which have their representatives on the domesticated animals. These are *Gyropus*, *Trinoton*, *Colpocephalum*, and *Menopon*.

The **Gyropes** (*Gyropus* Nitzsch—Figs. 41, 42) have only a single claw at the tarsi, while there are two in the nine other genera. The head presents, posteriorly, two notches, limiting the very salient temples. They are only met with on the Mammalia, and principally on Rodents.

The **Trinotons** (*Trinoton* Nitzsch) have the head very round in front, the temples salient and projected backwards; a wide orbital sinus, having at the bottom a bilobate eye; and the antennæ short and concealed. The thorax is divided into three distinct segments, and the tarsi have two claws. This species lives exclusively on Palmipeds.

The **Colpocephales** (*Colpocephalum* Nitzsch) have the head broader than long—somewhat like that of the Trinotons; but they are distinguished from them by their rarely bilobate eyes, and antennæ projected beyond the head. The tarsi have two claws. They live on all kinds of birds except the Coursers.

The **Menopons** (*Menopon* Nitzsch—Fig. 47) generally have the head like that of the two preceding genera, but the orbital sinus is absent or very shallow at the part occupied by the eye, and often also that where the antennæ are fixed; the latter are always short and indistinct. Living on Birds of all kinds except the Coursers, Piaget has on two occasions found them on Mammals—one of them, the *Menopon extraneum*, on the Guinea-pig.

This summary zoological description being considered sufficient to enable anyone to recognise the genus to which a parasite belongs, it will be easy to determine its species by the following information.

**HORSE**.—The horse harbours the *Hæmatopinus macrocephalus*, the *Trichodectes pilosus*, and the *Trichodectes pubescens*—the last less frequently than the first two.

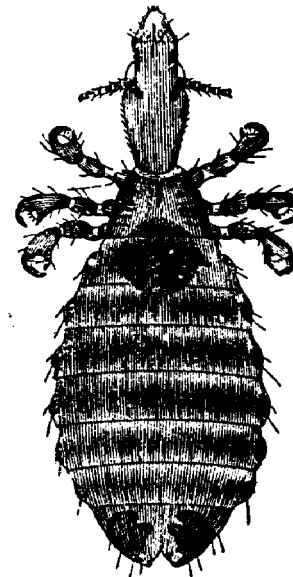


FIG. 26.—*Hæmatopinus macrocephalus*, female, of the Horse; magnified twenty diameters.—Railliet.



FIG. 27.—*Trichodectes pilosus*, female, of the Horse; magnified twenty diameters.—Railliet.

**Hæmatopinus macrocephalus** (Burm.—Fig. 26).—Head elongated and narrow; antennæ implanted on a kind of lateral protuberance, behind which is a deep notch, lodging the eye at the bottom. At this part the temples are wide and curve forwards; then the head contracts, and assumes a triangular form in its posterior moiety. The thorax is much shorter than the head; the

abdomen is oval, with continuous and slightly sinuous borders; the two stigmata on the margin of each ring are placed in the middle of a lateral protuberance. The head and abdomen are of a grayish-yellow colour, and the thorax a brown maroon. The length of the female is 3·6 mm.; that of the male 2·6 mm.

*Trichodectes pilosus* (Giebel—Fig. 27).—The head is broader than it is long, and is rounded in front—a little widened at the temples; the antennal band makes a turn around the forehead. The first seven segments of the abdomen have middle quadrangular spots. The head, thorax, legs, and abdomen are covered with hair on both surfaces, and, in addition, the last abdominal segment on the male has two hairy cushions. The general colour is yellow; spots and head ferruginous; band brown maroon. The length of the female is 1·9 mm.; that of the male 1·6 mm.

*Trichodectes pubescens* (*T. parumpilosus* Piaget).—This species is much rarer than the preceding; it is 0·2 mm. less in length, and differs chiefly in the head, which is hairy only along the borders.

Ass.—The *Hæmatopinus* of the Ass belongs to the same species as that of the Horse, but Piaget makes it a variety—*Colorata*—

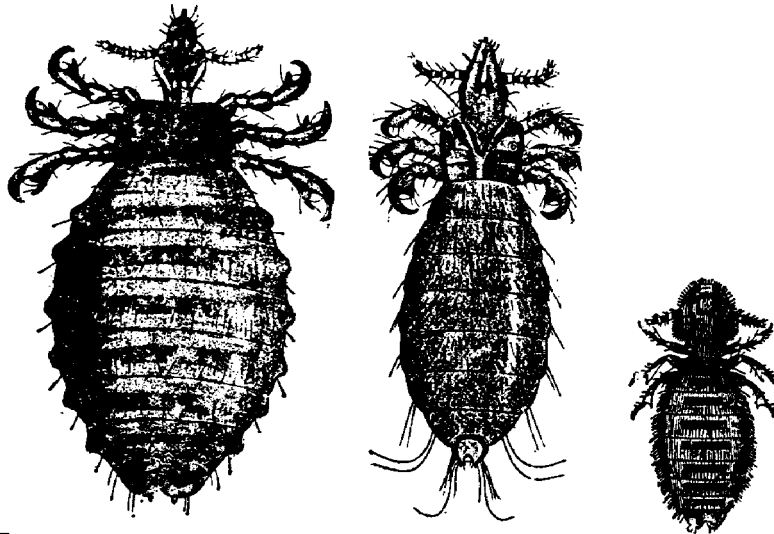


FIG. 28.—*Hæmatopinus eurysternus*, female, of the Ox; magnified twenty diameters.

FIG. 29.—*Hæmatopinus vituli*, female, of the Ox; magnified twenty diameters.

FIG. 30.—*Trichodectes scalaris*, female, of the Ox; magnified twenty diameters.—Railliet.

little larger than the type, head less hairy, tint darker, and with a quadrangular lateral spot on the sternum. *Trichodectes pilosus* is also a parasite of the Ass.

Ox.—*Hæmatopinus eurysternus*, *H. vituli*, and *Trichodectes scalaris*, are found on the Ox.

*Hæmatopinus eurysternus* (Nitzsch—Fig. 28).—The head is rounded in front, slightly elongated—more in the male than the female. It is, besides, chiefly distinguished from the *H. macrocephalus* by its oval and very large abdomen, having on each segment a slightly-coloured lateral tubercle. The head and thorax are fawn-coloured, the latter being darkest; the abdomen is yellow or grayish; the genital spot is dark. The female is 3 mm. long, and the male 2 mm.

*Hæmatopinus vituli*—(Linn, Fig. 29, *H. tenuirostris*).—Rarer than the preceding, the head is elongated and somewhat buried in the thorax; the latter is as broad as it is long, and the abdomen is narrow—scarcely wider at the sixth segment—the largest—than at the first. The general tint is a deep chestnut, brighter on the forehead, legs, and the lateral band of the abdomen. The female is 3 mm., and the male 2·5 mm. long. It is found on sucking calves, and it also infests adults, perhaps as much as calves.

*Trichodectes scalaris* (Nitzsch—Fig. 30).—The head, scarcely so broad as it is long, is almost parabolic in shape, and very hairy. It resembles *Tr. pilosus*, but it has not the hairy cushions on the last abdominal segment, and the median spots are larger. The general colour is white, the spots ferruginous, the bands being darker. The length of the female is 1·5 mm.

SHEEP.—The *Pediculinæ* are only represented on the Sheep by the *Trichodectes sphærocephalus* (Nitzsch—Fig. 31).

It has the head as broad as long, rounded in front, the antennal band turning round the forehead, which has long hairs at the sides. The antennæ are hairy and slightly longer in the male than in the female; the median spots on the abdomen are sub-quadrangular. The general colour is white, spots and head ferruginous. The length of the female is 1·7 mm., and of the male 1·4 mm.

The phthiriasis of the Sheep is usually due to the *Melophagus ovinus* (Lat.), which belongs to the Pupiparous Diptera (see p. 33), but which, being apterous, does



FIG. 31.—*Trichodectes sphærocephalus*, female, of the Sheep; magnified twenty diameters.

FIG. 32.—*Melophagus* of the Sheep; magnified. The line on the left indicates the natural length.

FIG. 33.—Proboscis of the *Melophagus*; much magnified.—L. Dufour.\*

\* a, Proboscis; b, its free extremity; c, basilar enlargement, with the muscles inserted into it; d, horny spines, also furnished with muscles.

not quit its host, and multiplies in the fleece; it is nourished on the grease (yolk) of the wool, the débris of hair, and on the blood that it causes to flow by its bites; consequently, it lives like the *Pediculinae*. Macquart formulates its characteristics as follows:

'Head disengaged from the thorax. Palps elongated, fluffy, and inclined downwards. Antennæ nude and in the form of tubercles. Eyes small and very close; no ocelli. Thorax somewhat narrow; abdomen oval. Feet downy; tarsal claws bi-dentated. Wings null.' The general colour is ferruginous; abdomen grayish-brown, and irregularly spotted. Length of body, 3 to 5 mm.

**GOAT.**—The *Hæmatopinus* of the Goat is the *H. stenopsis* (Burm.—Fig. 34).

The head is elongated, narrow, conical, round in front, notched laterally, and widened at the temples, in the form of a gourd, acuminate in the thorax, which is scarcely concave on the abdomen; the latter is an elongated oval in shape, bearing two terminal appendages; stigmata nearly marginal. Colour straw-yellow, gray for the abdomen. Length of female 2 mm., male 1.5 mm.

Several species of *Trichodectes* have been described as living on the Goat, but only one, the *Scaly Trichodectes* (*Tr. climax* Nitzsch—Fig. 35), is well established.

The head is scarcely as broad as it is long, and is quadrangular, having in front a broad but shallow notch, at which the two antennal bands stop; the antennæ are longer in the male than in the female, the first article being thicker and shorter than the others, and the second longer than the third. The abdomen has median spots, which diminish in breadth as the length

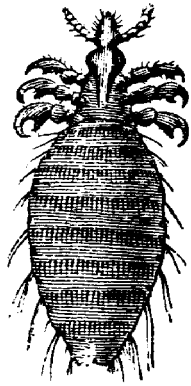


FIG. 34.—*Hæmatopinus stenopsis*, female, of the Goat; magnified twenty diameters.

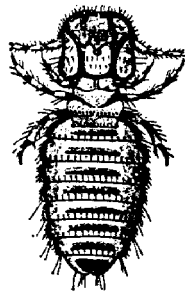


FIG. 35.—*Trichodectes climax*, female, of the Goat; magnified twenty diameters.

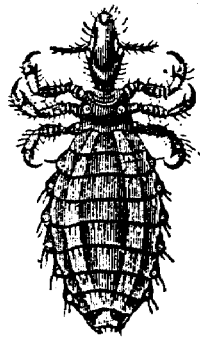


FIG. 36.—*Hæmatopinus urius*, female, of the Pig; magnified about nine diameters.—Delafond.

increases; the last segment in the male has two hairy cushions. The head and thorax are reddish-brown, abdomen pale yellow, spots maroon-brown, and the bands dark. The female is 1.8 mm., and the male 1.3 mm. long.

This species lives on the common as well as the Angora Goat. The species

that Gervais figures and describes as the *Tr. limbatus* is evidently the *Tr. climax*, though Piaget appears to identify it with his *Tr. climax* var. *major*, found also on the Angora Goat, and the female only of which differs slightly from the type, scarcely in dimensions. With regard to the form vaguely described and figured by Gervais as *Tr. climax*, it appears to us to correspond to none of the known species. According to Taschenberg, *Tr. capræ* (Gurlt) and *Tr. solidus* (Rudow) of the Guinea Goat, and probably *Tr. mambricus* (Rudow) of the Levant Goat, are identical with *Tr. climax*. Taschenberg has also recognised that *Tr. crassipes* (Rudow) of the Angora Goat is none other than *Tr. penicillatus* (Piag.), found by Piaget on a Kangaroo (*Macropus penicillatus*). But this might be a case of wandering parasites on an abnormal host.

**CAMEL.**—The *Hæmatopinus* of the Camel (*H. cameli* Redi), which has only been seen by Redi, much resembles that of the Pig.

**PIG.**—The Pig nourishes only the *Hæmatopinus urius* (Nitzsch, *H. suis* Linn.—Fig. 36).

This species is the largest known amongst the *Pediculinae*. The head is very long and narrow, rounded and conical in front, with five hairs on each side, and towards the sucker three other long hairs. The temple has a very salient sharp horn on the first article of the antennæ, and it gradually contracts to the occiput, which is rounded to its thoracic suture. The abdomen is an elongated oval, very developed, with continuous borders; the stigmata are on a prominent lateral protuberance. The head and abdomen are yellowish-gray in colour, the stigmatic spots and thorax a maroon-brown, and legs fawn-tinted. The female is 5 mm., and male 4 mm. long.

**DOG.**—The Dog has one *Hæmatopinus* and one *Trichodectes*:

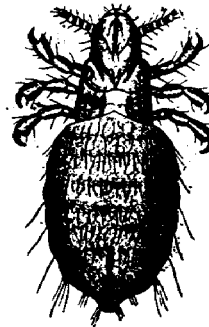


FIG. 37.—*Hæmatopinus piliferus*, male, of the Dog; magnified twenty diameters.



FIG. 38.—*Trichodectes latus*, male, of the Dog; magnified twenty diameters. Railliet.

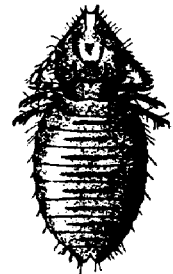


FIG. 39.—*Trichodectes subrostratus*, female, of the Cat; magnified twenty-five diameters.

*Hæmatopinus piliferus* (Burm.—Fig. 37). The head is short and almost as wide as long; it is salient in the thorax to which it is exactly applied; the third and fourth articles of the antennæ are alike. The abdomen is very developed in the female, and is a long oval in shape; it has nine rounded segments, which are often salient at the sides; stigmata distinct and marginal; the first seven segments have two rows of short bristles. The general tint is yellowish-white, the head and thorax being a little darker. The female is 2 mm. and the male 1.5 mm. long.

*Trichodectes latus* (Nitzsch—Fig. 38).—The head is sub-quadrangular, much broader than it is long, truncated in front; the antennæ are hairy, and different in the two sexes, the first article in the male being much thicker, and occupying a moiety of the length of the organ. The abdomen is broad and more rounded in the female, with lateral, but no median spots. The colour is bright yellow, spots darker; the bands on the head are blackish-brown. Length of the female 1.5 mm., of the male 1.4 mm.

**CAT.**—The Cat has only one kind of Louse, the *Trichodectes subrostratus* (Nitzsch—Fig. 39).

Head sub-pentagonal, longer than it is wide, acuminated in front, with a small shallow notch; antennæ alike in the two sexes. Abdomen larger in the female and notched behind; in the male it has rather the shape of a horizontal cone, terminating in a very salient, conical, and downy ninth segment. Abdomen whitish; head and thorax bright-yellow, with the bands and spots darker. Length: female 1.3 mm., male 1.2 mm.

**FERRET.**—There is sometimes met with on the Ferret, and in great numbers, the *Hæmatopinus piliferus*, which lives on the Dog.

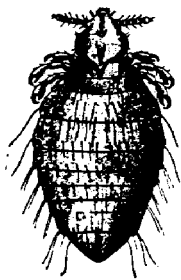


FIG. 40.—*Hæmatopinus ventricosus*, male, of the Rabbit; magnified twenty-five diameters.



FIG. 41.—*Gyropus gracilis*, female, of the Guinea-pig; magnified twenty-five diameters.

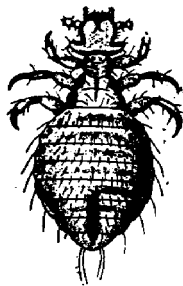


FIG. 42.—*Gyropus ovalis* male, of the Guinea-pig; magnified twenty-five diameters.

**RABBIT.**—The only Louse found on the Rabbit is the *Hæmatopinus ventricosus* (Denny—Fig. 40). It is rare.

The head is subuliform, broader than long, constricted behind the antennæ, widened at the temples, where it is rounded. The thorax is wider than the head, and is concave on the abdomen; the latter is oval, as broad as long, bulging, rough, and hairy. The head, thorax, and legs are of a bright chestnut colour; the abdomen is of a dirty-white. The length of the female is 1.3 mm., and of the male 1.2 mm.

**GUINEA-PIG.**—The Lice of the Guinea-pig are two species of *Gyropus* (Figs. 41, 42).

*Gyropus gracilis* (Nitzsch).—This is recognised by its long, narrow abdomen, especially in the male; by its head, made, as it were, trilobate in front of the antennæ; by the notch at the temples; and by its antennæ, the fourth article of which is globular, and rests on the third as an elongated peduncle. The general colour varies from dull white to ochre-yellow. The length of the female is 1.2 mm., and of the male 1 mm.

*Gyropus ovalis* (Giebel).—This differs by its large, oval abdomen, crenulated on the borders, and garnished with two rows of hairs on each segment. The head is shorter and broader. The general colour is white; the spots, tarsal bands, and claws are dark. It has the same length as *Gyropus gracilis*.

To these must be added the *Menopon extraneum* (Piaget), found once by Piaget, and of which mention has been already made (p. 61).

**BIRDS** maintain a larger number of Lice than the Mammalia, and these parasites all belong to the family of Ricinidæ. Each species is not strictly localized on a particular host, but many are common to several kinds of Birds. On the other hand, the promiscuousness of the poultry-yards, and, above all, of the markets, may lead to erratic parasites passing to a Fowl from a specifically different host.

**FOWLS.**—The parasites found on Fowls belong to the four genera *Goniodes*, *Goniocotes*, *Lipeurus*, and *Menopon*.

*Goniodes dissimilis* (Nitzsch—Fig. 43).—The head is broader than it is long and rounded in front; it is smaller in the male. The antennæ of the male—double those of the female—have the first article most developed, and have a long

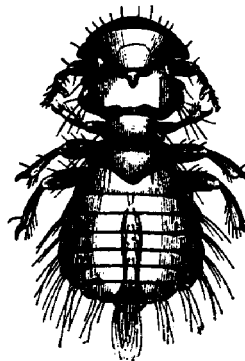


FIG. 43.—*Goniodes dissimilis*, male, of the Fowl; magnified twenty diameters.—Piaget.

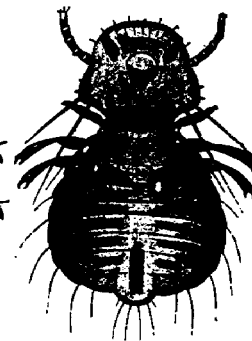


FIG. 44.—*Goniocotes hologaster*, male, of the Fowl; magnified forty diameters.

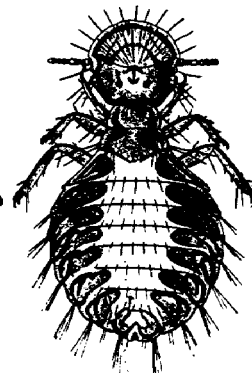


FIG. 45.—*Goniocotes gigas*, female, of the Fowl; magnified ten diameters.

hair at the inner side. The temporal angles are salient, especially in the female, but do not form horns. The antennal band is very strong, and wide in front, with a series of distinct fissures for the implantation of hairs. There are five bristles at the posterior border of the metathorax. There are also two median bristles, and three or four at the angles of each abdominal segment, with an arched marginal spot; at the ventral surface of the abdomen of the female there are two little bands in the form of a T laid sideways. The general colour is a dull white, the spots darker, and the bands fawn-tinted. The length of the female is 2.5 mm., and of the male 2 mm. This is one of the most frequent parasites.

Packard has observed on the Fowl a *Goniod*e of Burnett (*Gd. Burnetti* Pk.), which is probably allied to *Goniodes dissimilis*.

**Goniocotes hologaster** (Nitzsch—Fig. 44).—The head is as wide as it is long, the anterior border rounded and slightly convex, the antennal band being wider in front. The abdomen has unicoloured quadrangular lateral bands, curved and broader towards the suture, and wider on the ventral than the dorsal surface; the transverse patches are faint, but distinct; the sutures are only visible between the first three segments. The general tint is a dirty-yellow, deeper at the thorax; the bands are brownish. The female is 1·3 mm., and the male 0·8 to 0·9 mm. long. Taschenberg has noticed a variety (var. *maculata*).

**Goniocotes gigas** (Tasch.—Fig. 45).—This is recognisable by its round and very large abdomen, marked on each segment by long, transverse, tongue-shaped spots, coloured only on their border. It has, besides, proportions which are quite exceptional in this genus. The general colour is yellow; the abdomen and metathorax are brighter coloured, and the bands and outline of the spots are dark. The female is 4 mm., and the male 3 mm. long.

**Lipeurus variabilis** (Nitzsch—Fig. 46).—The head is round in front, and is broadest at its anterior portion in the male, and at the temples in the female; it is margined in front by an uninterrupted antennal band. The first article of the male antennæ is longer than the other four put together, and has a strong obtuse excrescence. There is a middle spot beneath the thorax; the female has a genital, lance-shaped spot, and the last ring of the abdomen is bilobate. The general colour is a pale yellow, the spots being a deep fawn-tint, and the bands black. The female is 2·2 mm., and the male 1·9 mm. long.

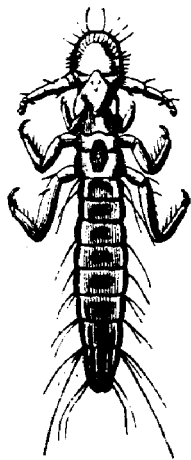


FIG. 46.—*Lipeurus variabilis*, male, of the Fowl; magnified twenty diameters.

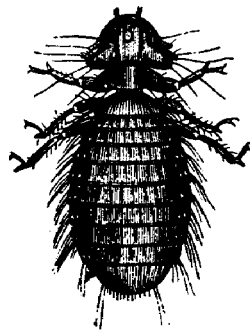


FIG. 47.—*Menopon pallidum*, female, of the Fowl; magnified twenty diameters.—Railliet.

**Lipeurus heterographus** (Nitzsch).—The head is parabolic in front, very wide behind the eye, and limited anteriorly by an uninterrupted antennal band. The metathorax is as long as the prothorax. The abdomen is an elongated oval, slightly larger in the female, with six short bristles implanted in tubercles on each segment in the male, and median spots on each ring and bristles on their borders. The general tint is pale yellow, spots fawn-coloured, bands black. The female is 2 mm. long, the male being 1·8 mm.

**Menopon pallidum** (Nitzsch—Fig. 47).—The head is slightly angular in front and somewhat crescent-shaped, the temples being bent downwards; the latter are short and rounded, with four bristles and some hairs; there is no appendage to the second article of the antennæ. The thorax is longer than the head in the female; they are equal in size in the male. The legs are strong and hairy. The abdomen is an elongated oval in the female, narrower and

longer in the male, with a single series of bristles on each segment. The general tint is a dirty-yellow, the spots on the abdomen being a bright fawn-colour. The female is 1·7 mm. long, and the male 1·8 mm.

**Menopon biserialatum** (Piaget).—This is rendered distinct from the preceding by its head, which is distinctly parabolic in front, by the presence of two series of bristles on each ring of the abdomen, and by the eighth segment, which is in the male elongated and narrow. It has the same tints as the preceding. The female is 2·7 mm. in length, the male 2·9 mm. This species lives also on the Turkey, Pheasant, and Pigeon.

**TURKEY.**—The parasites of the Turkey belong to the genera *Goniodes*, *Lipeurus*, and *Menopon*.

**Goniodes stylifer** (Nitzsch).—The head is as broad as it is long; it is quadrangular, especially in the male; the temporal angle forms a long horn, acuminate behind and terminated by a bristle. The metathorax has divergent sides, acuminate on the abdomen, and bearing five bristles on the posterior border. The seven first segments of the abdomen show tongue-shaped spots on the sides, which cover the transverse third of the segment; in the middle of each there is a bright spot occupied by the stigma; there are numerous hairs on both surfaces. The general colour is dirty-white, the spots are fawn-coloured, and the bands brown or black. The length of the female is 3 mm., that of the male 3·2 mm.

**Lipeurus polytrapezius** (Nitzsch).—The head is relatively short—it is stronger in the female—scarcely so wide at the temples, and very rounded in front, where it is bordered by the uninterrupted antennal band. The first article of the male antennæ is thick, fusiform, a little longer than the other four collectively, and is provided with a strong excrescence at its base. Beneath the thorax there are two median spots, the second of which extends for a short distance on the abdomen. The female has an acuminate genital spot posteriorly, and the last abdominal segment is deeply notched. The general colour is yellow, spots fawn-tinted, and bands black. The length of the female is 3 mm. to 3·7 mm., and of the male 2·8 to 3·7 mm.

The *Menopon* of the Turkey is the *M. biserialatum*, which lives also on the Fowl. It is probably the same as the *M. stramineum* (Nitzsch).

**GUINEA-FOWL.**—A *Goniode*, a *Goniocote*, and a *Menopon* live on the Guinea-fowl.

**Guinea-fowl Goniodes** (*Gd. numidianus* Denny).—The head is longer than it is broad; the antennæ of the male are somewhat long, and have the third article curved and acute, carrying the succeeding two beyond its axis; the eye is salient, and occupit a little retreating. The metathorax is wider than the head and acuminate on the abdomen, with a black band at the posterior border; the legs are strong. The abdomen is oval, with the spots twice interrupted. Its length is 1·7 mm. It has been found by Denny on the Guinea-fowl.

There has also been found on this Bird the *Goniodes stylifer* of the Turkey.

**Goniocotes rectangulatus** (Nitzsch).—This differs from *Gonioc. hologaster* of the Fowl chiefly in the lateral bands of the abdomen, which are wide on the ventral surface of this parasite. The segmental sutures are only distinct between the three first. The length of the female is 1 mm., and of the male 0·8 mm. This species was found on a Guinea-fowl by Taschenberg, but it is rather a parasite of the Peacock.

**Lipeurus of the Guinea-fowl** (*L. numidæ* Denny).—The head is large, subpanduriform, rounded in front where it is bordered by the antennal band, and wide behind the eye; the female antennæ have the second article very long. The metathorax is nearly as wide as the prothorax. The abdomen is oval, the first seven segments showing a double series of spots, which form

two uninterrupted dorsal bands. The colour is livid yellow, and the bands and spots black. The length is 2·1 mm.

This species was found on the Guinea-fowl by Denny, who considered it a *Nirmus* (*Nirmus numidæ*)—he probably had not seen the female (Railliet).

**Menopon of the Guinea-fowl** (*M. numidæ* Gieb.).—The head is semilunar, and the orbital sinuses distinct. The prothorax is large, with three sharp points at each angle; the metathorax is large and trapeziform. The abdomen is also large, with festooned borders garnished with bristles and dark spots. The general colour is reddish. Length 1 mm.

**PEACOCK.**—The parasites of the Peacock, like those of the Guinea-fowl, belong to the genera *Goniodes*, *Goniocotes*, and *Menopon*.

**Goniodes falcicornis** (Nitzsch).—The head is nearly square, and curved somewhat downwards in front, especially in the male; the antennal band is narrow anteriorly and has parallel borders; the temples are angular, and do not form a horn behind; the occiput is scarcely depressed; the first article of the male antennæ is very thick, is nearly as long as the other four, and has a strong appendage on the inner side; the third article has a long curved appendage; the other two are thin, and rest on a protuberance of the third. The metathorax is not so large as the head in the female, but in the male it is as large, or larger, than the prothorax. The abdomen is very large, and on the sides has very dark-coloured languiform spots. The genital apparatus of the male is very large, and ascends to the third segment. The general colour is yellowish-white, the spots being a deep-fawn hue. The female is 3·3 mm., and the male 3 mm. long. This is a common parasite.

**Small-headed Goniodes** (*Gd. parviceps* Piaget).—This differs from the preceding principally in the head, which is more regularly quadrangular; in its metathorax, which is larger than the head; in its abdomen, which is scarcely so large as the metathorax; and in the dimensions of the male and female, which are 2 mm. long.

**Goniocotes rectangularis** (Nitzsch).—This is the same as that which has been found on the Guinea-fowl.

**Black-mouthed Menopon** (*M. phæostomum* Nitzsch).—The head is elongated, contracted and rounded in front, very wide at its posterior border, and the temples narrowed and bent downwards. There is no appendage to the second article of the antennæ. The thorax is longer than the head, and the metathorax a little rounded on the abdomen; the latter is a long oval in the female and larger than in the male, with a single series of bristles on each ring. The general tint is yellow, brightest in the male; the spots are fawn-coloured. The female is 1·6 mm., and the male 1·3 mm. long.

**PHEASANT.**—The parasites of the common Pheasant are:

**Goniodes Colehius** (Denny).—This differs from the *G. dissimilis* of the Fowl chiefly in the presence of a small tooth at the inner side of the antennæ of the male, of only two bristles at the posterior border of the metathorax, and in numerous median bristles on each segment. The dimensions are about the same.

**Goniodes truncatus** (Giebel).—The head is large and parabolically rounded in front; the temples are not excavated, nor prolonged posteriorly as horns; the occiput is convex, and the occipital angles are acute. The abdomen is an elongated oval, that of the male is truncated behind; the lateral bands are arched, and a short appendage on them is pushed into the preceding segment. The colour is white, with dark bands. The female is 3 mm., and the male 2·4 mm. long.

**Goniocotes chrysocephalus** (Giebel).—This differs chiefly from *Gc. rectangularis* of the Guinea-fowl and Peacock, in having the sutures between the eight first segments of the abdomen visible. The colour is yellow, particularly on the head and thorax. The female is 1·2 mm., and the male 0·8 mm. long.

**Lipeurus variabilis.**—This parasite of the Fowl has also been found on the common Pheasant by Taschenberg and by Railliet.

**Long Menopon** (*M. productum* Piaget).—This differs from *M. pallidum* of the Fowl principally in having the temples less excavated, and the body elliptical and constricted to the sixth segment in the female, and nearly as short as broad in the male, with the ninth segment short and like a reversed ogive. The general tint ochre-yellow, fawn-coloured on the sides of the abdomen. The female is 1·8 mm., and the male 1·5 mm. long.

**Menopon Biseriatum.**—This is the same as that found on the Fowl and Turkey.

Among the parasites found on the Silver Pheasant, are placed the *Goniocotes chrysocephalus* of the common Pheasant, and a variety of the *Menopon phæostomum*, of which the type lives on the Peacock.

The Golden Pheasant offers, amongst others, the *Lipeurus heterographus* of the Fowl, and the *Menopon productum* of the common Pheasant.

**PIGEON.**—On the domestic Pigeon the following Recindia have been found:

**Dwarf Goniode** (*Gd. minor* Piaget).—All the species have the abdomen oval and broad, but this one is distinguished by the antennæ of the male, the last two articles of which are very reduced and scarcely visible; and by its metathorax, which is rounded on the abdomen. The colour is yellow, and the female is 1·7 mm. long, the male being 1·4 mm.

**Companion Goniocotes** (*Gc. compar* Nitzsch).—The length of the head is a little less than its width at the posterior border; the anterior border is convex, and the antennal band linear. The abdomen is oval, and rounded in the female, truncated posteriorly in the male, and has coloured spots only on the border of each segment; each margin of the abdomen has two parallel bands. Colour, dirty-yellow. The female is 1·4 mm., and the male 1 mm. long.

**Rod-shaped Lipeurus** (*L. baculus* Nitzsch).—The head is elongated and very narrow, the anterior part—clypeus—being round and separated from the other portion by a constriction; it is not bordered in front by an antennal band, and is garnished by six fine hairs and two claviform appendages. The first article of the male antennæ is much thicker than the others, and has an enlargement at its base, but has no appendage; the third article has a strong lateral appendage. The prothorax is quadrangular, and one-third shorter than the metathorax. The colour is dirty-white, with bright yellow spots and brown bands. The female is 2·1 mm. to 2·3 mm., and the male 1·3 mm. to 2·3 mm. long.

**Long-tailed Colpocephalus** (*C. longicaudatus* Nitzsch).—The occipital bands are not distinct. The abdomen of the female is conical, and bordered by narrow dark bands; the first segments are the longest, the ninth elongated, constricted at its posterior moiety, rounded and fringed with long fine hairs; in the male the abdomen is an elongated oval, and the last segment is rounded and garnished with numerous long bristles. It is white, with fawn-coloured spots. The female is 1·6 mm., and the male 1·3 mm. long.

**Broad Menopon** (*M. latum* Piaget).—The head is parabolic, and nearly angular in front. There is an appendage to the second article of the antennæ in the two sexes. The thorax is longer than the head in the female, shorter in the male; the metathorax is not so broad as the head, and is rounded on the abdomen. The latter is large, oval, and rounded in the female, and oval and elongated in the male, with salient angles. The colour is yellow, with bright, fawn-coloured spots. The female is 3 mm., and the male 1·5 mm. long.

We have also found on a Pigeon the *M. biseriatum*, already described (p. 69).



GOOSE.—The parasites of the domestic Goose belong to the genera *Docophorus*, *Lipeurus*, and *Trinoton*.

**Bilious *Docophorus* (*D. icterodes* Nitzsch).**—The head is longer than broad; the clypeus is semicircular, with a triangle on each side, and at the lower surface a constricted elongated spot. The prothorax is not so wide as the metathorax. The abdomen is bordered on each side by a uniformly broad band; the first segment has an interrupted transverse band on the median line; the others have a wide lateral band, leaving free the middle third; and the last is simply notched in the female. The colour is brownish-red. Length of female 1·8 mm., and male 1·3 mm. It is frequent on Ducks and relatively rare on Geese, on which it constitutes, according to Piaget, a mere variety that Nitzsch has named *Docophorus adustus*.

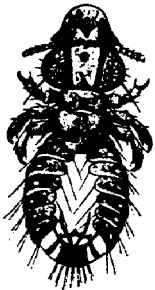


FIG. 48.—*Docophorus icterodes*, male, of the Duck; magnified twenty-five diameters.

***Lipeurus anseris* (Gurtl).**—The head is elongated and conical, rounded in front, with the clypeus analogous to that of the preceding species. The metathorax is double the size of the prothorax, and is constricted at the sides. The colour is white, with black spots. The dimensions are the same.

***Trinoton conspurcatum* (Nitzsch).**—This is a very large species. The head is as long as it is wide, and is exceeded in front by the last two articles of the palps, showing on each side two enlargements, the posterior of which—the temple—has five bristles. The thorax is longer than the head, and rounded on the abdomen. The legs are long, and garnished with hairs and bristles. The abdomen is oval, not so wide at the base as the metathorax, and the angles are salient; the first eight segments have a series of bristles fixed in colourless tubercles. The colour is white, the spots brown maroon, bands black, thorax dark, head bright-fawn tint. The female is 6·3 mm., and the male 5·8 mm. long. This parasite was found by Denny on the Goose, but it is more frequent on the Swan.

***Trinoton continuum* (Piaget).**—This species has four bristles at the temples, the abdomen has slightly salient angles, and is more downy on its two surfaces, while there are fewer hairs on the legs. The dimensions are also less, being for the female 6 mm., and for the male 5·6 mm. long. It is, probably, only a variety of the preceding species, and is more common.

DUCK.—A *Docophorus*, *Lipeurus*, *Trinoton*, and a *Menopon* have been found upon the domestic Duck.

The *Docophorus icterodes*, described as infesting the Goose, is very common on the Duck.

***Lipeurus squalidus* (Nitzsch).**—The head is narrow, elongated in front of the antennæ, and suddenly constricted at the suture of the clypeus; the latter has a spot—signature—parallel to the border, and rounded posteriorly. There are six hairs on the forehead, two of which are on the clypeus, the second being very flat; in front of the mandibles there is a round and small fossa; the temple is round, and has one bristle and a spine; the antennal bands stop at the suture of the clypeus, and do not go beyond it in front.

The metathorax is not so wide as the head, is slightly longer than it is broad, and is a little concave on the abdomen. The latter has a straight, uniformly wide, black band on each side; and transverse fawn-coloured spots more or less apparent. The general colour is fawn yellow. The female is 2·8 mm., and the male 2·5 mm. long.

This parasite is very common, and Taschenberg has found it on the Barbary Duck.

**Pale *Trinoton* (*T. luridum* Nitzsch).**—This more especially differs from the *T. conspurcatum* of the Goose, by the presence of only four bristles at the temples; the metathorax is concave on the abdomen, the latter having segments rounded at the sides; narrow transverse spots, interrupted in the middle on the first two segments, and surrounding a colourless circle on the side; and the bristles not having a swollen base. The colour is white, with maroon spots and black bands. The length of the female is 5·4 mm., and of the male 4·7 mm.

**Dark *Menopon* (*M. obscurum* Piaget).**—The head is crescent-shaped and strong, with the temples broad and turned downwards, and the lateral borders nearly as long as the thorax. The abdomen has dark, narrow, lateral bands without appendages. The colour is dark fawn. The length is 1·4 mm. to 1·5 mm. Common.

SWAN.—Independently of the *Trinoton conspurcatum*, which lives on the Goose, the domestic Swan—*Cygnus olor*—has an *Ornithobius*.

***Ornithobius bucephalus* (Giebel).**—The head is massive, nearly as broad as it is long, irregularly quadrangular, and shaped anteriorly like a pair of closed forceps; the antennæ are strong and carried forward; the posterior part of the head is divided into three portions by the two occipital bands, which, at first parallel, converge in front towards the root of the mandibles. The thorax is narrower, and a little shorter than the head. The abdomen is oval, and nude except at the angles; the lateral bands are very narrow. The colour is white, with pearly transparent bands. The length of the two sexes is 3·5 mm. to 4·5 mm.

**Symptoms.**—Pthiriasis is manifested in all animals by signs of itching, the intensity of which is subordinate to the number of parasites, and the group to which these belong. The *Hæmatopinus* has the rostrum formed for pricking. It attacks the substance of the skin to feast on the blood and humours exuded as a result of this pricking, and causes a much more intense pruritus than that occasioned by *Ricinidæ*. The locality of the pruritus naturally indicates that of the parasites, which are also betrayed by their eggs—these being less deeply situated among the

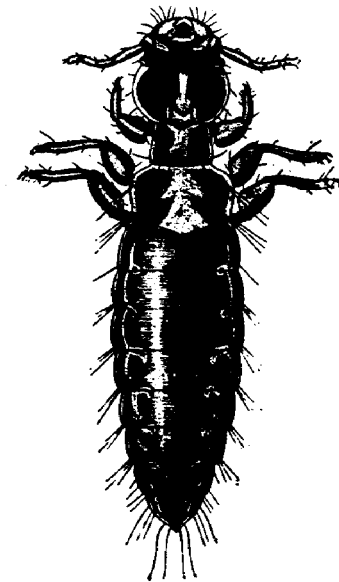


FIG. 49.—*Ornithobius bucephalus*, male, of the Swan; magnified fifteen diameters.

hair or feathers—and likewise by the débris the parasites leave after moulting.

*Horse and Ass.*—The hæmatopinic phthiriasis of the Horse and Ass has its principal seat at the mane and forelock, but more especially at the root of the tail, or in the neighbourhood of these parts. The animal seeks to rub itself against everything within its reach, gently bites its neighbours, and allows itself to be bitten and rubbed by them. On entering a stable, it is easy to recognise animals so affected, by the erectness and matting of the hairs, especially at the root of the tail; and a careful examination will readily reveal the presence of the Hæmatopinus and its eggs, along with numerous epidermic pellicles—constituting a real pityriasis. When grooming has not been carried out for some days, the dried dead bodies of parasites, and the exuvæ of their moultings, increase the general aspect of uncleanliness. The papules which some authors have described are rarely observed, but only various excoriations due to rubbing. Railliet has seen an old mare 'which showed on the back little tumours caused by elevation of the epidermis, beneath which were numerous masses of Hæmatopinus.'

Trichodectic phthiriasis is less common, and not so pruriginous; but with this exception, it resembles the preceding, from which it is distinguished by examining the parasite. The Trichodectes are not often found on the upper parts of the body, but the two phthiriasis may, though rarely, co-exist on the same Horse.

*Ox.*—The same symptomatic differences are remarked between the hæmatopinic and trichodectic phthiriasis of the Ox; but, contrary to what is observed in the Horse, the latter appears to be the more frequent. The Trichodectes are spread over the whole body, while the Hæmatopinus prefers the ears, back of the head, upper border of the neck, and middle of the back and loins. The pruritus impels the animal to rub itself against trees, posts, or salient parts of its dwelling, and with its rough tongue it licks the skin; consequently, there are large hairless patches, and often an abundant epidermic secretion with—though very exceptionally—thickening of the skin, which may mislead as to the true nature of the malady.

*Sheep.*—The Sheep Lice are concealed at the bottom of the fleece. The presence of the Melophagus is indicated by the pupæ, which are attached to the individual fibres, and appear as shining oval bodies, not unlike small apple pips in colour and shape. In separating the wool, the parasites are found close to the skin, and when they are numerous the fleece is entangled, and sometimes absent in places. These parasites attract the attention of Starlings and Wagtails, which hover about flocks of Sheep, and perch familiarly on their backs in order to feed on the parasites.

The Melophagus often emigrates from suckling ewes to the lambs, which it sometimes torments so much as to cause serious emaciation. If the fleece is short, in order to avoid the teeth of the animal, the parasite takes refuge in front of the shoulders, on the

neck, and particularly about the ears and horns. By their biting they produce great itching, which makes the Sheep gnaw themselves, scratch their bodies with their hind-feet, and rub against anything within reach. At the places where the parasites have been biting, on separating the wool, a red patch the size of a lentil is seen, in the centre of which is a darker red spot.

The Trichodectes are less frequently observed than the Melophagus, perhaps because of their smaller size. They may in certain cases seriously alter the wool; for its shedding appears to be due to the cutting they effect by their mandibles at the root of the fibres, according to the observations of Railliet.

The Trichodectes induce severe itching, and the wool is more or less altered, broken, and matted in places. There also may be seen bright-red spots from 8 mm. to 10 mm. in diameter, covered by thin furfuraceous scales, formed of epidermic débris and dried serosity. The Trichodectes are easily found, hanging on by means of their claws or jaws to the wool fibres on and around these places. According to Delafond, these parasites are much more common on lean, debilitated, or badly-nourished Sheep than on vigorous and well-fed ones.

*Pig.*—This animal is greatly incommoded when invaded by the Hæmatopinus. The species infesting it is the largest of the family, and causes a pruritus proportionate to its size. The skin is marked by red papules of various dimensions, and is often excoriated. The itching is most severe at night, and the animal rubs itself eagerly against its sty or trough, rolls in the litter, or even demolishes its habitation. Sequens relates that of 140 sucking-pigs, 40—aged from one to two weeks—succumbed to an intense phthiriasis affecting all the Pigs. The disease lasted four or five days. At the autopsies, besides signs of anæmia, there were found numerous excoriations and ulcerations on various parts of the body, the knees and hocks were inflamed, and even the capsular ligaments were involved—all the result of the intense pruritus which had destroyed these young Pigs. The disease ceased when parasiticide and disinfecting agents were had recourse to. Viborg was a witness to similar occurrences, which led him to declare that the Hæmatopinus may pass to beneath the skin, and make its exit by the nose, mouth, and eyes. This, so manifest an exaggeration, shows to what an extent these parasites may crowd on the same animal.



FIG. 50.—Pupa of the Melophagus of the Sheep, attached to the end of a lock of wool.

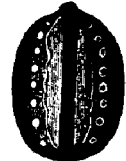


FIG. 51.—Magnified pupa of the Sheep Melophagus, seen on its dorsal surface, and showing two series of seven umbilicated points.

*Dog.*—Lousy Dogs do not appear to be much inconvenienced by their numerous parasites. *Hæmatopinus* torments them more than the *Trichodectes*, and sometimes to a high degree. Both are encountered on all parts of the body, but *Hæmatopinus* is more particularly seen about the throat.

*Goat.*—According to Delafond, Lice may live in very great numbers on the Goat, especially in winter. The skin becomes irritated, and the hair falls off, leaving bare places covered with flaky, sometimes thick crusts, beneath which the integument is red and frequently ulcerated. The *Hæmatopinus* more especially produces these troubles; but with Angora Goats the *Trichodectes* cause great depreciation in the value of the hair.

*Camel, Cat, Ferret, Rabbit, and Guinea-pig.*—The phthiriasis of these animals have scarcely received any attention up to the present time, and their trifling importance or rarity justifies the silence maintained with regard to them. The *Trichodectes* of the Cat are seen most frequently on young animals debilitated by scabies. The majority of the Guinea-pigs affected have numerous *Gyropus* species concealed in their fur; their presence is revealed by a yellowish dust at the ends of the hairs twenty-four hours after the death of their host. The oval *Gyropus* is much less abundant than the small *Gyropus*, and prefers to localize itself on the head.

*Birds.*—Phthiriasis has a much greater importance for Poultry than for the domesticated Mammalia; as the first are nearly always attacked in a variable degree, and the multiplication of their parasites becomes a real nuisance, causing them to lose their rest, become emaciated, and frequently compromises the rearing of their offspring. Their parasites are found all over the body, though less on the thighs, neck, and head than on the trunk, and especially beneath the wings. It is sometimes the reverse, however; for it at times happens that the head, and chiefly the neck—which cannot be reached by the beak—are particularly frequented by the Lice. Each species of Fowl being capable of nourishing several kinds of parasites, these may be found collectively on the same individual. And as several of the Ricinidæ attack very different species, it may be remarked that, by the cohabitation of Fowls, Turkeys, Guinea-fowls, etc., one kind of parasite may be accidentally met with on an illegitimate host.

**Diagnosis.**—The diagnosis of the disease is easy, when the size of the parasites is known. It is well, nevertheless, so far as the Mammalia—and especially the Horse and Sheep—are concerned, to be careful not to attribute to Lice affections of the skin which are sometimes coincident with phthiriasis, but are of quite another nature. Such is scabies, which has otherwise a serious gravity, and which has been occasionally overlooked for some time, because the pruritus—of psoric origin—was ascribed to Lice.

**Prognosis.**—This is rarely serious, considering the efficaciousness of the numerous remedies we possess. Nevertheless, in certain

cases the malady induced is particularly obstinate to cure, especially when large numbers of young or debilitated animals have to be dealt with. Budelot relates the history of one enzoöty of hæmatopinic phthiriasis, affecting 119 Horses of a regiment of Artillery, which prevailed for nearly five months, notwithstanding the parasiticide treatment employed. It is true that, in reading this account, and in estimating the gravity of the cutaneous troubles he observed, one is inclined to question whether it was not one of those coincidences of scabies and phthiriasis the possibility of which has already been referred to.

The troublesomeness of phthiriasis is dependent upon the pruritus which accompanies it. It may happen—at least with cattle—that the loss of hair will temporarily depreciate the value of the animals. Such depilation is damaging to Sheep; the disease has been known to persist for six years in one flock, and the wool to fall off to such an extent that the animals looked as if just clipped.

Birds, and especially Pigeons, sometimes suffer much from the invasion of parasites. There are poultry-yards and dovecots where these insects are perpetuated, in spite of all the efforts made to destroy them. Young creatures, particularly young Pigeons, at times succumb to phthiriasis, and breeding is then rendered very risky. When the nests are infested with parasites, the Pigeons neglect hatching, and even abandon their young.

**Etiology.**—It is clear that contagion is the primary cause of phthiriasis, and that the rapid increase of Lice is due to a succession of prosperous generations, arising from a contagious host of the same species as that now dealt with.

It is always possible that two domesticated animals of different species may infect each other—as when the same kind of parasite may live on one or the other, as is the case with the *Trichodectes pilosus* of the Horse and Ass, with the *Menopon biserialatum* of the Fowl, Turkey, and Pheasant, with the *Goniocotes rectangulatus* of the Guinea-fowl and Peacock, with the *Docophorus icterodes* of the Goose and Duck, and with the *Trinoton conspurcatum* of the Goose and Swan. Beyond these exceptions, the parasites which accidentally venture upon a different species to that of their natural host do not become acclimatized or multiply there, but soon emigrate.

Certain conditions favour the extension of the malady, and give to the contagion an unusual activity.

Want of cleanliness plays the chief part in this extension. The length of the hair or the abundance of the fleece is one of the predisposing circumstances. In addition, debility in the animals gives a more favourable soil for the parasites, whether this weakness be due to age, breed, temperament, work, food, etc.

For example, the *Trichodectes* appear somewhat more frequently on young Horses, while the *Hæmatopinus* rather favours old ones. Calves are more exposed to Lice than adult cattle, and these parasites are rarely found on short-haired dogs, while they are frequent on

those with long frizzly hair. Though two species may live together, the *Hæmatopinus piliiferus* is more particularly met with on long-haired sporting Dogs, as Spaniels, etc., and the *Trichodectes latus* on little Lap-dogs with long or frizzly coats, as small Spaniels, King Charles Spaniels, long-haired Terriers, Havana Dogs, etc.

Anæmic Sheep are frequently lousy, and in the instance cited by Railliet the nursing ewes were more especially attacked. According to Villeroy, ewes suffer most from the *Trichodectes*, etc., during the winter, and particularly if it be wet. It is stated, so Stephen asserts, that if lean Sheep are bought to feed on turnips, it is when they commence to fatten that the *Melophagus* multiplies on them in an astonishing manner. Otherwise it appears to prefer lambs, and on shearing they are sometimes found to be literally covered with the parasite in places at the anterior part of the neck.

The *Melophagus* species are at times so abundant that they constitute a veritable scourge; this happens in North America and in Iceland. And yet these parasites are not prolific, for the female only lays one larva at a time, and there are but four or five in the course of the year. These larvæ are sacciform, non-segmented, have four lateral surfaces, and measure 3·7 mm. long, 1·9 mm. broad, and 1·6 mm. high. Their buccal parts are alone movable. They become transformed very rapidly into nymphæ, even on the body of their host.

When the conditions are favourable Lice multiply, on the contrary, at a wonderful rate, the females being very prolific, and growth very rapid. It has been already stated that the third generation of a Louse of the human head amounts in about twelve weeks to about 125,000 individuals, and these calculations do not take into account the numerous causes of destruction which restrain this multiplication; they are, nevertheless, instructive in enabling us to understand cases of excessive phthiriasis.

When phthiriasis occurs among Poultry, it is ascribed to feeble nutrition, due to bad or too uniform food, to the influence of damp, dirty, close, dark, and badly-ventilated premises. There are years which are favourable to this disease, and seasons appear to have an influence on its progress, while temperament and breed are not to be ignored. Bechstein, cited by Rivolta and Delprato, states that of two Capuchin Monkeys living in the same conditions, one was infested with Lice, while they were rare on the other. We have observed the same occurrence in a Bantam Fowl, which was really lousy, while two Gascony Fowls living with it were quite free from parasites.

**Treatment.**—The attention required to be given to animals in cases of phthiriasis, will vary according to whether they are Mammals or Birds.

**Mammals.**—Perfect cleanliness keeps animals clear of lice. Such cleanliness is easy to realize with short-haired animals, and will rapidly get rid of the few parasites which contagion may convey to them. When phthiriasis is present, a cure will be singularly

favoured by removing the hair of the Horse or Ox, as well as of the long-haired Dog, and the wool of the Sheep. With regard to the latter, clipping usually suffices to get rid of *Melophagus*; many of the parasites are cut by the shears, and those remaining on the skin are soon knocked off by the animal rubbing itself, so that in about two days none are to be seen. Sometimes, however, for them as for other parasites, it is necessary to have recourse to insecticide agents, the number of which is considerable.

A. One of the most efficacious and most employed is the decoction of tobacco (30 to 50 grammes to the litre of water). When near a manufactory of tobacco, the expense is much reduced by obtaining the refuse powder, or the juice, to which ten times the weight of oil is to be added; though this juice, being rich in ammoniacal matters, has the inconvenience of decomposing rapidly. This treatment answers for all animals. Nevertheless, precautions must be taken; for the whole body should not be dressed at once, as poisoning may ensue from absorption of the alkaloids of the tobacco. For Sheep the preparation is kept in a bottle, the cork in which is perforated by a quill. As soon as the shepherd observes a Sheep commencing to scratch itself, he gets hold of it, and seizing its head between his legs, he opens out the wool and pours the fluid on to those places that require it.

B. Frictions with *fatty bodies*, linseed-oil in particular, kill the Lice by asphyxia. Cooking-oil, in which fish have been fried, has been recommended as especially efficacious. This treatment is more particularly applicable to the Pig.

C. Mercurial ointment is a certain cure, but its employment is dangerous; therefore only a small surface should be dressed with it at a time, and it ought not to be used for Dogs, even when they are muzzled, and still less for cattle, which are so sensitive to mercury. Numerous cases of poisoning of animals by means of mercury are recorded.

D. Frictions with a decoction of stavesacre seeds, 50 grammes to the litre of water, or of colchicum bulb in the same proportions.

E. Insecticide powder. It is well, beforehand, to damp the skin with soapy water. Then the powder is dusted or blown over the skin *ad hoc*. The powders of pyrethrum flowers, and stavesacre and cevadilla seeds are most generally used.

F. Frictions with a mixture of 1 part benzine, 6 parts of green soap, and 20 parts water; or, better, petroleum 1 part, common oil 10 parts. Employed alone, the benzine, and especially the petroleum, is too active, and may remove the hair.

G. Schleg's mixture is recommended in Germany, because of its efficaciousness and harmlessness. It is composed of 16 grammes each of arsenious acid and potash, and 1½ litres of water, to which 1½ litres of vinegar are subsequently added.

H. Cresyl, or creolin—1 to 5 per cent. aqueous solution—promises to take an important place in the treatment of phthiriasis. It is convenient and effective.

Whatever may be the remedy adopted, it is well to repeat the dressing at intervals of five to eight days, in order to kill the parasites hatched from the eggs, which have resisted the first dressing. The majority of the eggs are killed by vinegar, and this is the reason why it is so often added to parasiticide decoctions in the proportion of 500 grammes to the litre.

For house Dogs, fatty preparations, and in general all those which are likely to soil furniture or the hair, are to be avoided. For them, frequent baths, and washing with creolin solution and carbolized soap, are to be recommended, together with the use of insect-powder and the comb and brush.

Lastly, when a number of animals are invaded, independently of the curative measures, disinfection of the buildings—stables, sheepfolds, pigsties, kennels, etc.—is necessary. Boiling water at first, afterwards limewash, or merely creolin solution—5 per cent.—answers very well. All litter should be destroyed, and the animals should be dressed out of doors if possible.

*Birds.*—There are many ways of destroying vermin on Fowls. Flowers of sulphur, or one of the insecticide powders mentioned above, may be blown among the feathers by an instrument *ad hoc*. As the Fowls in flapping their wings, or the Pigeons in their flight, may shake out the powder, it is a good plan to moisten the roots of their feathers with glycerine or soapy water before blowing in the powder of pyrethrum or stavesacre.

But individual treatment will not suffice. The floors, ceilings, walls, perches, and nests are the haunts of parasites, which will soon take the place of those that have been destroyed; and sometimes great difficulty may be experienced in finally abolishing them. Schneider speaks favourably of fumigations with sulphide of carbon. Small open phials filled with this liquid are placed in the hen-roost or dovecot, at those parts where they are not likely to be upset, and very quickly all the vermin are destroyed or expelled. This can be repeated whenever a new invasion is apprehended.

Lime-dust is indicated as a means as simple as it is infallible. In the absence of the Birds, two small handfuls of this is thrown against the roof and walls, so as to produce a cloud of dust. A portion falls into the nests and crevices, and the remainder reaches the ground. The vermin are killed, and in about two minutes the place is carefully swept out, and the sweepings placed on a fire.

The procedure which is the most recommended and employed is the following: All the masonry is lime-washed at least twice a year, and everything in the roost is taken out—spars, perches, nests, etc.—and steeped in water containing 5 grammes of carbolic acid to the litre of water. Then with a hand-pump or any similar instrument, throw the solution with force upon every part of the interior of the dwelling; this kills and washes down the insects. After emptying the hen-roost and closing all the apertures, a quantity of sulphur may be burned therein. The place should be kept shut

up for three days, then opened widely for twenty-four hours before allowing the Fowls into it. The Fowls themselves are advantageously protected against parasites by lime or sand-baths. To form these there should be made in the run, under some kind of shelter, a shallow square hole, which is to be filled with lime, fine sand, cinders, or light soil, with which powdered sulphur may be mixed. If the Birds are much troubled with vermin, insecticide powder may be added to this bath.

According to the *Hausfrauen Zeitung* (1889), instead of spreading straw on the floors of the roost, wood wool should be used, or wood chopped up into fine pieces, such as are used for packing. A layer of this is warmer than straw, drives away the vermin by its aromatic odour, does not rot so quickly, and furnishes an almost odourless manure very suitable for clayey, heavy soil.

For some time there has been sold an engine named 'Lagrange's Exterminator,' which serves to kill the parasites on the Birds themselves. This is a wooden box into which the Bird is introduced with its feet tied, its head being kept outside by a special opening. In the box sulphur or a brimstone match is burned, and five minutes of this fumigation suffices to kill all the parasites.

Lastly, it may be mentioned that there is another means, somewhat insufficient, but very often adopted, which consists in putting into the roosts a branch of alder-tree. The Lice, attracted by the odour, gather upon it, and early next morning the branch is carefully removed and burned outside. This is repeated until there are no parasites.

Independently of the parasites mentioned, and those to be alluded to hereafter, some Insects may accidentally torment Birds, and form part of their vermin.

The Fowl, and particularly the Gosling and Duckling, are sometimes attacked by small Diptera, which pass into their nostrils and ears. They may be protected by one of the remedies already noticed, or, better, by a decoction of walnut-leaves—30 grammes to the litre of water containing 125 grammes of vinegar; or of assafoetida—60 grammes to the same quantity of water and vinegar as in the preceding. With this the threatened parts should be impregnated.

In unclean roosts and dovecots there are sometimes large numbers of Bugs that belong to a particular species—the **Dove-cot Bug** (*Acanthia columbaria* Jenyns)—closely allied to the **Bed Bug** (*Acanthia lectularia* Linn.), which is well known. These Bugs exhaust young animals by sucking their blood, and fatigue them by the itching they induce after the bites. According to Railliet, hens hatching are so tormented by these parasites that they sometimes abandon their eggs, on which are then seen small specks formed by the excrement of the Bugs.

Pigeons also suffer from larvæ of the **Dermestes lardarius** (Linn.), the **Tenebrio molitor** (Linn.), and various **Necrophores** (*Necrophorus* Fabr.) and

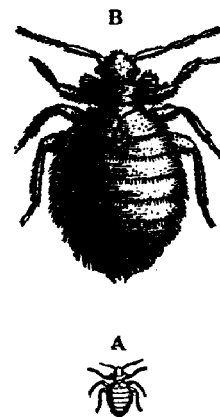


FIG. 52.—Bug of the Fowl.—Railliet. A, Natural size. B, Magnified.

**Silphes** (*Silpha* Fabr.). These larvæ of the Coleoptera, which are at first developed in old manure of the dovecot, finish by attacking the young Pigeons, gnawing the skin of the neck and abdomen—even the superficial muscles—and producing wounds which are often fatal, and in which burrow the larvæ of Muscidae. This evil is closely allied to the uncleanliness of habitations, and should be remedied. Otherwise, these vermin can be made to disappear by the means already indicated: but in this particular case the floor of the dovecot should be covered with pine sawdust mixed with sand, some of this mixture being also put in the nests.

The attention to individuals consists in removing the larvæ from the wounds, and in dressing these with a 1 per cent. aqueous solution of carbolic acid.